



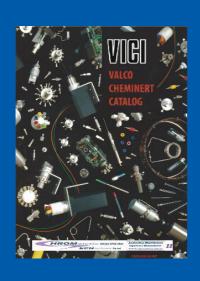


2012 (>16) INT#65

CATALOG

VALCO CHEMINERT

TOOLS FOR SCIENCE AND MEDICINE



INJECTORS VALVES DETECTORS FITTINGS SYRINGES TUBING

CATALOG 65 INT







- **New products**
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- **Cheminert fittings**
- **Liquid handling**
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- Valve selection
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REGULATIONS







26 Water Street East

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.

age 263 for a list of non-CE items.

Australian Distributors Importers & Manufacurers www.chromtech.net.au

Welcome to VICI

VICI is an acronym for Valco Instruments Company Inc. VICI now defines multiple companies which manufacture various products for the analytical industry.

VICI Valco Instruments

For over 40 years, Valco Instruments has been the leading designer and manufacturer of standard and custom components for precision analytical, biomedical, and biocompatible instrumentation. In addition to Valco and Cheminert® valves and fittings, we offer a wide range of related products such as electric and pneumatic actuators, tubing and sampling loops, heated enclosures, valve sequence and temperature controllers, gas purifiers, GC detectors, and digital interfaces.



Fafnir, one of a long line of Valco Saint Bernards, at the Houston, Texas office

VICI AG International

VICI AG International, in Schenkon, Switzerland, is an independent site for the manufacturing of Valco and Cheminert valves and the handling of all VICI product lines in Europe, Africa, the Middle East, and the Far East. Present certification is ISO 9001:2008 and 14001:2004.

VICI Metronics

VICI Metronics, Inc. is the leading manufacturer of devices and instruments that are used in the generation of calibration gas standards. The line includes Dynacal and G-Cal permeation tubes, Dynacalibrator calibration gas generators, and gas monitors. Metronics is the leading provider of



Our engineering/development facility on Waterbury Drive in Houston



VICI AG International in Schenkon, Switzerland



VICI Metronics

explosives, narcotics, and chemical warfare dopants for TSA airport security (ammonia, DCM), law enforcement, border patrol, military, and other trace detection industry professionals.

We offer high performance gas specific purifers suitable for use in GC/MS and LC/MS systems. The helium, hydrogen, nitrogen, and air purifiers remove sulfur and nitrogen compounds, halocarbons, hydrocarbons, moisture, oxygen, and other contaminants.

The Metronics facility also houses production of and support for Valco-Bond and ValcoPLOT capillary columns.

VICI Precision Sampling

Your resource for syringes, Mininert® valves, probes, and tubing. Our pre-cut stainless steel tubing is available in standard lengths, or cut and bent to your specifications. All our syringes feature ultra smooth bores, easily replaceable parts, low dead volume, crisp clean gradations, and precision calibrations.

VICI Valco Canada

Products from all VICI companies are available in Canada directly from this location. We also supply and support our Canadian dealers and OEMs.



VICI Precision Sampling Baton Rouge, Louisiana



VICI Valco Canada Brockville, Ontario

CONTACT US

See box on facing page for: VICI Valco Instruments VICI AG International VICI Valco Canada

VICI Metronics

Tel (877) 737-1887 (360) 697-9199 Fax (360) 697-6682 Email metronics@vici.com columns@vici.com 26295 Twelve Trees Lane Poulsbo, WA 98370

VICI Precision Sampling

Tel (800) 828-1653 (225) 927-1128 Fax (225) 923-1331 Email precision@vici.com P.O. Box 15886 Baton Rouge I A 70895

New products THE LATEST FROM VICE

NEW

Fast GC conversion kit for 6890/7890 GCs

Components for Fast GCpage 4

These kits include everything you need to turn your standard GC into a high-speed analytical machine. Just specify the column you want and we'll provide the rest. The typical kit takes just an hour to install, with complete step-by-step instructions included. All that's required is a small hole in the top of the column oven, and we even provide the drill bit!



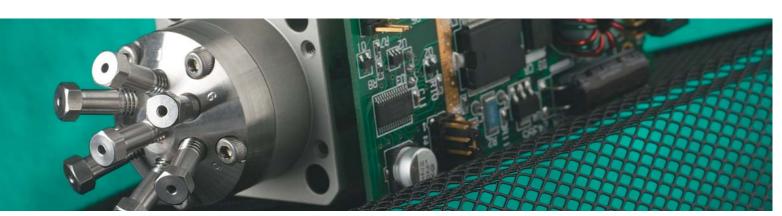
NEW

Fast GC components turbocharge analyses

Column temperature controllerpage 5

Our Fast GC controller provides programmable temperature control for analysis-optimized column bundles. The programmable controller coupled with a column bundle (we can provide one using our fused silica column or yours) slashes conventional analytical times. The result of years of research, these systems provide high throughput analyses at a fraction of the cost of a conventional GC.







NEW

Mini PDD detector helps pay for itself

miniPDD Model D-2-IM page 222

The miniature D-2-IM consumes less than one fifth as much helium as its big brothers, our popular D-3 and D-4 pulsed discharge detectors. With the ever-increasing price of helium, this can represent savings of hundreds of dollars per year. With robust performance, easy maintenance, and nearly the same sensitivity as the larger models, the mini PDD is the clear choice for field portable applications and for labs concerned about operational costs.



NEW

New modular universal actuator to replace the microelectric

Modular universal actuator page 194

This new version of the popular universal actuator gives greater flexibility for the instrument manufacturer working in the limited space frequently encountered in modern instruments. The design also makes it possible to mount the more sensitive electronics module away from the liquid end of the valve. The modular unit has all the features of the composite model, allowing instrument manufacturers to use a single motor and control software to operate virtually any Valco or Cheminert rotary valve, with greater programmability plus optional communication interfaces.



NEW

Special adapters ease connectivity to 360 micron tubing

Internal reducers for 360 µm tubing...... page 38 External to internal reducer for 360 µm tubing...... 39

Our unique 360 micron fittings permit direct connection to any capillary tubing with 360 μm OD. But making the transition to valves or other fittings with larger tubing meant using a union. Now you can minimize the number of connections using our IZR and EZR adapters. IZRs permit plumbing 360 μm tubing directly into a 1/16" or 1/32" Valco fitting detail, and the EZR permits the same connection to 1/16" external details. Available in PEEK or stainless steel.

Fast GC Components

NEW

Components for fast GC

The Problem

In the quest for more rapid chromatographic results, there are two distinct avenues - the small, portable instruments made specifically for use in the field, and traditional GCs which are modified to accelerate the analysis. The components developed by Valco engineering exceed the requirements of both approaches.

The Solution

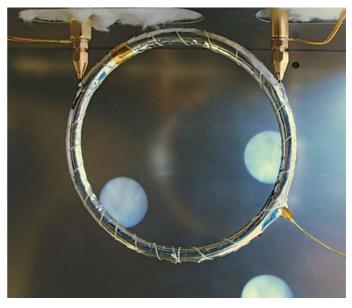
Valco now offers a variety of components which can be used individually or in concert with others to provide the optimal solution for the analysis.

- Resistively-heated low mass columns
- Fast temperature controller
- Pulsed discharge detector (PDD)

Our valves can provide the necessary sample injection, and resistively-heated columns dramatically decrease analysis time. The fast temperature controller offers provisions for multiple ramp temperature programming with a user-friendly Windows interface and a compact size suitable for use in the lab or in the field. Column temperature is controlled by regulating the amount of current applied to the wire-wrapped or nickel-clad capillary column.

We offer a variety of detector options to suit a wide array of applications - from our TCD to our popular PDDs (pulsed discharge detectors), which can be tuned for optimal analyte specificity. Our new miniPDD (page 222) is ideal for portable applications or for areas where helium use must be minimized.

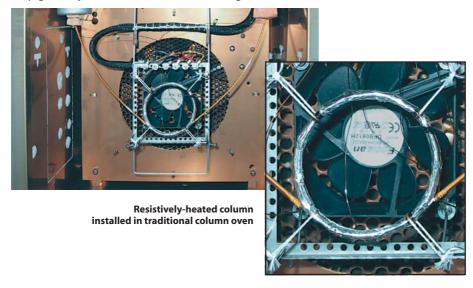
So whether you have a traditional lab GC that you want to turbo-charge or are building a portable GC for rapid analyses, our extensive line of fast GC components can help get the job done on time and on budget.



Column kit installed in Agilent 6890 column oven



View of relocated Agilent FID to permit use of fast GC column kit



TO DISCUSS YOUR REQUIREMENTS IN DETAIL, CONTACT OUR TECHNICAL DEPARTMENT

MORE INFORMATION

Fast GC temperature controller....page 5 PDD Pulse discharge detector 223 TCD Thermal conductivity detector227

NEW

WED value instruments Ca. Inc. Reset Power

Column temperature controller

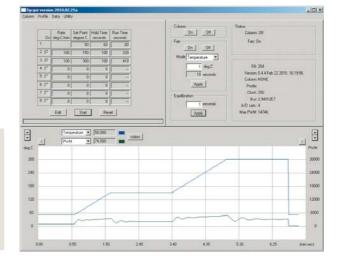
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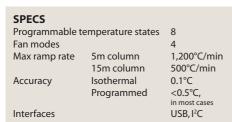
- For use with nickel-wire and nickel-clad resistively-heated columns
- Programmable 8-state temperature profile
- Compatible with any GC or analyzer
- User-friendly Windows-based control and monitor program
- OEM and end user versions available

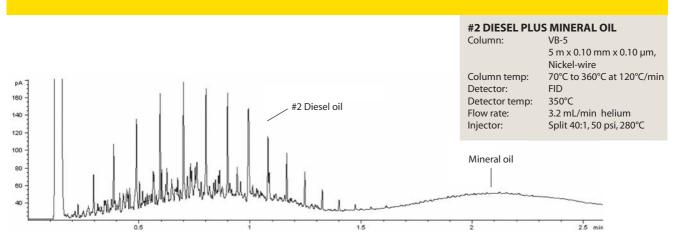
The VICI column heating unit is designed for precise temperature programming with rapid heating and cooling of a low mass nickel-clad or nickel-wire column. The column is resistively-heated by applying a low-voltage current to the column coating or wire, eliminating the need for a traditional GC column oven and heating element with their power and space requirements. Column temperature is controlled by regulating the amount of current, with a small fan for quickly cooling the low-mass column to near-ambient temperature.

These features plus speed, compact size, and low power requirement make this unit an ideal component in fast, portable GCs, but it can be easily employed on any GC or analyzer.

The Windows-based control program (screen capture below) facilitates simple creation of temperature profiles with as many as eight states, and allows multiple columns to be tuned with each configuration saved for reloading. Multiple data parameters can be graphed, with data logged and analyzed.







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.

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.

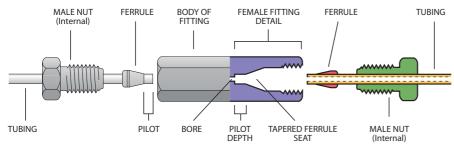


Figure 1 Valco compression fitting

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 \pm .002".

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



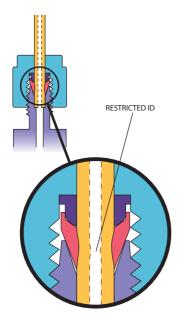


Figure 2
ID restriction
in common compression fitting

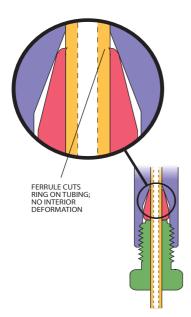


Figure 3 No ID restriction in Valco compression fitting

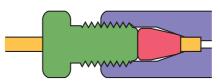
Interchangeability

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

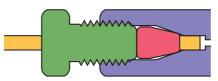
Because of variations in tubing OD and in pilot and taper designs from manufacturer to manufacturer, the amount of tubing extending beyond the made up ferrule can vary. (The most radical variation is in the fittings manufactured by Waters. Based on the old Swagelok design, they have a pilot depth considerably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

Reliably Clean

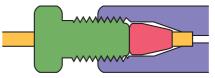
Most of our state of the art CNC machines use water-based lubricants. After each part comes off the machine, it is cleaned with water-soluble detergents and then rinsed in hot deionized water. Finally, every metal fitting that we make is given a thorough cleaning with steam from deionized water at 140°C.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



a. Tubing seats correctly at bottom of detail



b. Tubing doesn't reach bottom of detail, introducing dead volume



c. Tubing reaches bottom of detail before ferrule seats

Figure 4

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

Introduction

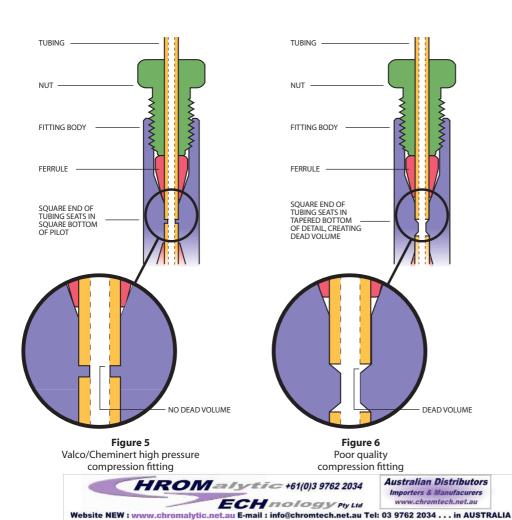
VALCO FITTINGS

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.



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.

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.

Additional difficulties may be

encountered if this type of fitting is

loosened and retightened repeatedly.

The male threaded part can become

flared to the point where it is impos-

sible to get the nut on, and the tube

detail so that it's difficult to remove

end often flares out in the fitting

the tube.

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.

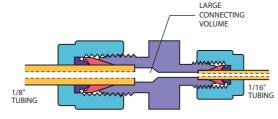


Figure 7
Common commercial reducing union

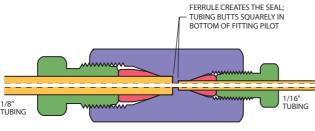


Figure 8Valco zero dead volume reducing union

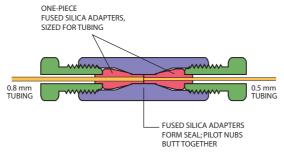


Figure 9Valco zero dead volume through-bore union

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.

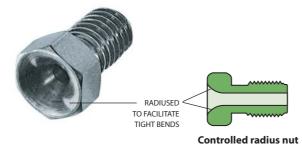
Package of 10:	Length	Stainless nuts Prod No
1/32" nut	.30"	ZN.5-10
1/32" nut	.45"	LZN.5-10
1/16" nut	.43"	ZN1-10
1/16" nut	.50"	MZN1-10
1/16" nut	.625"	IZN1-10
1/16" nut 1/16" nut	.025 .75" 1.00"	LZN1-10 LZN1-10 XLZN1-10
1/8" nut	.57"	ZN2-10
1/8" nut	.82"	LZN2-10
1/8" nut	1.07"	XLZN2-10
1/4" nut	.70"	ZN4-10
1/4" nut	1.11″	LZN4-10



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.

Description	Length	Prod No			
Stainless steel 1/16", standard	.43"	ZN1R			
1/16" , short	.30"	ZSN1R	ami	6	
1/8", standard	.57"	ZN2R			
PEEK	_				
1/16", hex	.45"	ZN1RPK			
1/16", fingertigh	t .88"	ZN1RFPK			



*U.S. patent number 6 247 731

Standard length Australian Distributors HROMalytic +61(0)3 9762 2034 Importers & Manufacurers www.chromtech.net.au ECH no logy Pty Ltd Website NEW: www.chromalytic.net.au E-mail: info@chromtech.net.au Tel: 03 9762 2034... in AUSTRALIA

TECH TIP

Fittings for **360 micron** tubing are available on pages 57-58.

MORE INFORMATION

PEEK nuts page 63 HPLC column end fittings42-46 Reducing unions Internal......29 External 30 External/internal.....31 Internal/external.....31 Unions Internal......26 External 27

External/internal.....27

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" $4.6 \, \text{mm} = .180''$ 6.0 mm = .236" 6.4 mm = .253" 7.0 mm = .275" 10.0 mm = .400" 27.0 mm = 1.08" $1/32" = 0.8 \, \text{mm}$

1/16" =

1/8"

1/4"

3/8"

1.6 mm

 $= 3.2 \, \text{mm}$

 $= 6.4 \, \text{mm}$

 $= 9.5 \, \text{mm}$

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.

* PTFE-coated threads standard.

Description	Stainless nuts Prod No
1/32" e xternal nut	EN.5
1/32" external nut, knurled	EN.5KN
1/16" external nut	EN1
1/8" external nut	EN2
1/4" external nut	EN4 *
3/8" external nut	EN6 *
1/2" external nut	EN8 *
1" external nut	EN1K *

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.

Description	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
1/16"	1.13"	LZP1	LZP1H
1/8"	1.00"	ZP2	ZP2H
1/8"	1.40"	LZP2	LZP2H
1/4"	1.20"	ZP4	—

Caps - stainless steel



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

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

MORE INFORMATION

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Website NEW: www.chromalytic.net.au E-mail: info@chromtech.net.au Tel: 03 9762 2034 . . in AUSTRALIA

Ferrules

VALCO FITTINGS

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

	Prod No	Prod No	Prod No
Package of 10:	Stainless,	Stainless,	Stainless,
	Type 303	Type 316	Gold-plated
1/32"	ZF.5-10	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
Sold individually:	Hastelloy C	Nickel	Titanium
1/32"	ZF.5HC	ZF.5NI	ZF.5TI
1/16"	ZF1HC	ZF1NI	ZF1TI
1/8"	ZF2HC	ZF2NI	ZF2TI
1/4"	ZF4HC	ZF4NI	ZF4TI
Package of 10:	Brass		
1/32" 1/16"	ZF.5B-10 ZF1B-10		
1/8" 1/4"	ZF2B-10 ZF4B-10		

- Not available

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





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-platedGP More inert than standard stainless Stainless steel, Type 303 GC, gas lines, general purpose Stainless steel, LC with high chloride ions in solutions TitaniumTl *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 254-255. **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" $4.6 \, \text{mm} = .180''$ 6.0 mm = .236" 6.4 mm = .253"7.0 mm = .275"

10.0 mm = .400" 27.0 mm = 1.08"

 $1/32" = 0.8 \, \text{mm}$ 1/16" = 1.6 mm

1/8" $= 3.2 \, \text{mm}$ 1/4" = 6.4 mm

3/8" $= 9.5 \, \text{mm}$ 1/2" = 12.7 mm

Polymeric ferrules



		Prod No	Prod No	Prod No
Package	of 10:	PTFE, Virgin	PTFE, Glass-filled	FEP
	1/32"	ZF.5TF-10	ZF.5TFG-10	ZF.5FEP-10
	1/16"	ZF1TF-10	ZF1TFG-10	ZF1FEP-10
	1/8"	ZF2TF-10	ZF2TFG-10	ZF2FEP-10
	1/4"	ZF4TF-10	ZF4TFG-10	ZF4FEP-10
	3/8"	ZF6TF-10	ZF6TFG-10	ZF6FEP-10
	1/2"	ZF8TF-10	ZF8TFG-10	ZF8FEP-10
Package	of 10:	PFA	CTFE	PEEK
rackage	1/32"	ZF.5PFA-10	ZF.5KF-10	ZF.5PK-10
	1/32	ZF1PFA-10	ZF.3KF-10 ZF1KF-10	ZF.3PK-10 ZF1PK-10
	1/10	ZF2PFA-10	ZF1KF-10 ZF2KF-10	ZF1FK-10 ZF2PK-10
	., -			
	1/4"	ZF4PFA-10	ZF4KF-10	ZF4PK-10
	3/8"	ZF6PFA-10	ZF6KF-10	ZF6PK-10
	1/2"	ZF8PFA-10	ZF8KF-10	ZF8PK-10
Package	of 5:	Polyimide,	Polyimide,	Polyimide,
		Graphite	Valcon	Virgin
	1/32"	ZF.5GV-5	ZF.5V-5	ZF.5V1-5
	1/16"	ZF1GV-5	ZF1V-5	ZF1V1-5
	1/8"	ZF2GV-5	ZF2V-5	ZF2V1-5
	1/4"	ZF4GV-5	ZF4V-5	ZF4V1-5
	3/8"	ZF6GV-5	ZF6V-5	ZF6V1-5
	1/2"	ZF8GV-5	ZF8V-5	ZF8V1-5

POLYMERS AT A GLANCE

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

FEPFEP
Chemical resistance
equals PTFE, but lower
creep and higher
friction

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 fer-

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 256.

MORE INFORMATION

Grooved PEEK

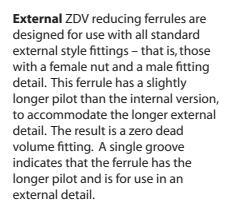
ferrules nage 63

Reducing ferrules

VALCO FITTINGS

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

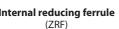
Internal ZDV (zero dead volume) reducing ferrules are designed for use with all standard Valco internal style fittings - that is, those with a male nut and female fitting detail. The ferrule features an integral pilot which fills the pilot cavity (the space between the end of the ferrule and the bottom of the detail), yielding a zero dead volume fitting.



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.











Standard reducing ferrule (RF)

Internal reducing ferrules

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

		Prod No	Prod No	Prod No
Packag	ge of 5:	PTFE, Glass-filled	PEEK	Polyimide, Valcon
	1/16" to 1/32" 1/8" to 1/32" 1/8" to 1/16" 1/4" to 1/16" 1/4" to 1/8"	ZRF1.5TFG-5 ZRF2.5TFG-5 ZRF21TFG-5 ZRF41TFG-5 ZRF42TFG-5	ZRF1.5PK-5 ZRF2.5PK-5 ZRF21PK-5 ZRF41PK-5 ZRF42PK-5	ZRF1.5V-5 ZRF2.5V-5 ZRF21V-5 ZRF41V-5 ZRF42V-5
Packag	ge of 5:	CTFE	Polyimide, Virgin	
Packag	ne of 5: 1/16" to 1/32" 1/8" to 1/32" 1/8" to 1/16"	ZRF1.5KF-5 ZRF2.5KF-5 ZRF21KF-5		



PEEK reducing ferrule and internal nut (Order nut separately.)

TECH TIP

Fittings for 360 micron tubing are available on pages 57-58.

TECH TIP

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

Virgin polyimide is produced as Vespel®.

MORE INFORMATION

Internal reducers (IZR)..... page 38 External reducers (EZR)39 Ferrule removal kits.... 16

For 1/16" and 1/32" reducing ferrules with smaller ODs for use with fused silica, see the FS and FSR adapters on pages 16-17.

External reducing ferrules

OPTION

Available in Virgin Polyimide.

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

	Prod No	Prod No	Prod No	
Package of 5:	PTFE, Glass-filled	PEEK	Polyimide, Valcon	
1/16" to 1/32" 1/8" to 1/32" 1/8" to 1/16"	EZRF1.5TFG-5 EZRF2.5TFG-5 EZRF21TFG-5	EZRF2.5PK-5	EZRF1.5V-5 EZRF2.5V-5 EZRF21V-5	
1/4" to 1/16" 1/4" to 1/8"	EZRF41TFG-5 EZRF42TFG-5		EZRF41V-5 EZRF42V-5	
Package of 5:	CTFE			
1/16" to 1/32" 1/8" to 1/32" 1/8" to 1/16"	EZRF1.5KF-5 EZRF2.5KF-5 EZRF21KF-5			
1/4" to 1/16"	EZRF41KF-5			
1/4" to 1/8"	EZRF42KF-5		•	
				PEEK reducing ferrule and external nut (Order nut 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.

	Prod No	Prod No	Prod No
Package of 5:	PTFE, Glass-filled	PEEK	Polyimide, Valcon
1/16" to 1/32" 1/8" to 1/32" 1/8" to 1/16"	RF1.5TFG-5 RF2.5TFG-5 RF21TFG-5	RF1.5PK-5 RF2.5PK-5 RF21PK-5	RF1.5V-5 RF2.5V-5 RF21V-5
1/4" to 1/16" 1/4" to 1/8"	RF41TFG-5 RF42TFG-5	RF41PK-5 RF42PK-5	RF41V-5 RF42V-5
Package of 5: 1/16" to 1/32" 1/8" to 1/32" 1/8" to 1/16" 1/4" to 1/16" 1/4" to 1/8"	RF1.5KF-5 RF2.5KF-5 RF21KF-5 RF41KF-5 RF42KF-5		

0.25 mm 0.50 mm 0.75 mm	= .020"
1.0 mm 1.5 mm 2.0 mm	= .060"
4.6 mm 6.0 mm 6.4 mm	= .236"
7.0 mm 10.0 mm	
1/4" = 3/8" =	6.4 mm 9.5 mm

CONVERSIONS

HROM 1946 +61(0)3 9762 2034

Website NEW: www.chromalytic.net.au E-mail: info@chromtech.net.au Tel: 03 9762 2034 . . . in AUSTRALIA

Fused silica adapters

VALCO FITTINGS

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 graphitereinforced 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. Note that the determining factor in adapter size selection is the fused silica tubing's outer diameter, or OD. Typical ODs for common columns are included in the product number tables.



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 of 5:		Polyimide, Valcon	PEEK	Polyimide, Virgin
		Prod No	Prod No	Prod No
1/32" Ad	dapters			
	Tubing OD:			
	< 0.20 mm	FS.2-5	FS.2PK-5	_
	0.20 ≤ 0.25 mm	FS.25-5	FS.25PK-5	FS.25V1-5
	0.25 ≤ 0.36 mm	FS.36-5	FS.36PK-5	_
	0.36 ≤ 0.40 mm	FS.4-5	FS.4PK-5	FS.4V1-5
	0.40 ≤ 0.50 mm	FS.5-5	FS.5PK-5	FS.5V1-5
	$0.50 \le 0.80 \text{ mm}$	ZF.5V-5	ZF.5PK-5	ZF.5V1-5
1/16" Adapters				
	Tubing OD:			
	< 0.20 mm	FS1.2-5	FS1.2PK-5	FS1.2V1-5
	0.20 ≤ 0.25 mm	FS1.25-5	FS1.25PK-5	FS1.25V1-5
	0.25 ≤ 0.30 mm	FS1.3-5	FS1.3PK-5	FS1.3V1-5
	0.30 ≤ 0.40 mm	FS1.4-5	FS1.4PK-5	FS1.4V1-5
	0.40 ≤ 0.50 mm	FS1.5-5	FS1.5PK-5	FS1.5V1-5
	$0.50 \le 0.80 \text{ mm}$	FS1.8-5	FS1.8PK-5	FS1.8V1-5
	$0.80 \le 0.90 \text{ mm}$	FS1.9-5	FS1.9PK-5	FS1.9V1-5
	0.90 ≤ 1.0 mm	FS11.0-5	FS11.0PK-5	FS11.0V1-5

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



WHICH ADAPTER FOR WHICH COLUMN? 1/16" 1/32" Column Typical ID column adapter adapter OD 0.25 mm $< 0.20 \, \text{mm}$ FS1.25 FS1.4 0.25 mm 0.4 mm FS.4 0.32 mm 0.5 mm FS.5 FS1.5 0.53 mm 0.8 mm 7F 5V FS1.8

HROIN 1 +61(0)3 9762 2034

ECH 100 Y Pty Ltd

Website NEW: www.chromalytic.net.au E-mail: info@chromtech.net.au Tel: 03 9762 2034 . . . in AUSTRALIA

OPTIONS

Other sizes may be available in some materials. Contact Tech Support for availability.

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®.

TECH TIP

If a fused silica tube breaks off in a throughtype 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**, left, can be used to remove ferrules from all types of fittings.

Removable fused silica adapters (FSR)

Package of 5:



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 counterbored 1/16" nut. The 1/32" FSR adapter uses a standard Valco 1/32" nut.

Polyimide, Valcon

	Prod No	
1/32" removable adapters		
Tubing OD:		
< 0.25 mm	FSR.25-5	
$0.30 \le 0.35 \text{ mm}$	FSR.3-5	
$0.35 \le 0.40 \text{ mm}$	FSR.4-5	
$0.40 \le 0.50 \text{mm}$	FSR.5-5	
1/32" replacement liners		
Tubing OD:		
< 0.25 mm	FSL.25-5	
$0.25 \le 0.40 \text{ mm}$	FSL.4-5	
$0.40 \le 0.50 \text{ mm}$	FSL.5-5	
$0.40 \le 0.50 \text{ mm}$ Package of 5:	FSL.5-5 Polyimide, Valcon Prod No	
Package of 5:	Polyimide, Valcon	PEEK Prod No
	Polyimide, Valcon	
Package of 5: 1/16" removable adapters	Polyimide, Valcon	
Package of 5: 1/16" removable adapters Tubing OD:	Polyimide, Valcon	Prod No
Package of 5: 1/16" removable adapters Tubing OD: < 0.15 mm	Polyimide, Valcon Prod No —	Prod No FS1R.15PK-5
Package of 5: 1/16" removable adapters Tubing OD: < 0.15 mm < 0.20 mm	Polyimide, Valcon Prod No — FS1R.2-5	FS1R.15PK-5 FS1R.2PK-5 FS1R.4PK-5

 $0.90 \le 1.0 \text{ mm}$

1/16" replacement liners

Tubing OD:

< 0.15 mm

< 0.20 mm

 $0.20 \le 0.40 \text{ mm}$

 $0.40 \le 0.50 \text{ mm}$

 $0.50 \le 0.80 \text{ mm}$

 $0.90 \le 1.0 \text{ mm}$

MORE INFORMATION

Fused silica Unions pages 19,61 Fittings.... 16-21, 58-61 A pin vise and drill index are useful for enlarging the inner diameters of the FS adapters. Pin vise and drill index 55

CONVERSIONS

 $100 \, \mu m = .004$ " $150 \, \mu m = .006$ " $0.25 \, \text{mm} = .010$ " $0.50 \, \text{mm} = .020$ " 0.75 mm = .030" 1.0 mm = .040" 1.5 mm = .060" 2.0 mm = .080" $4.6 \, \text{mm} = .180''$ $6.0 \, \text{mm} = .236$ " $6.4 \, \text{mm} = .253$ " $7.0 \, \text{mm} = .275$ " $10.0 \, \text{mm} = .400$ "

27.0 mm = 1.08"

 $1/32" = 0.8 \, \text{mm}$ 1/16" = $1.6 \, \text{mm}$

 $= 3.2 \, \text{mm}$

 $= 6.4 \, \text{mm}$

= 9.5 mm

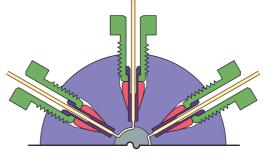
1/8"

1/4"

3/8"

REPLACEMENT PARTS **Ferrules** (package of 5) 1/32" Polyimide ZF.5V-5 1/16" Polyimide ZF1V-5 (package of 10) 1/16" PEEK Nuts

ZF1PK-10 (package of 10) 1/32" SS ZN.5-10 Special nuts for FSRs: 1/16" \$\$ 7CN1-10 1/16" SS long 17CN1-10



FS1R1.0-5

FS1L.2-5

FS1L.4-5

FS1L.5-5

FS1L.8-5

FS1L1.0-5

FS1R1.0PK-5

FS1L.15PK-5

FS1L.2PK-5

FS1L.4PK-5

FS1L.5PK-5

FS1L.8PK-5

FS1L1.0PK-5

Removable FSR adapters in a valve



Fused silica fittings

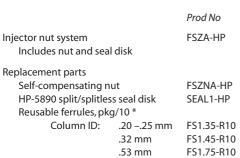
VALCO FITTINGS

Injector nut for Agilent 6850, 6890, 7820, 7890, and 5890, Series I and II

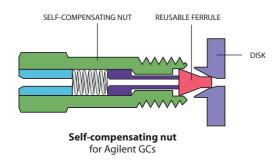
This self-compensating nut is a direct replacement for the standard nut on the split/splitless injectors of the Agilent GCs listed above. This retrofit offers enhanced ferrule reusability and temperature stability, resulting in fingertight leak-free connections over the full programmed temperature range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



^{*}These reusable ferrules seal at the tip, and are different from standard ferrules.



Replacement ferrules

for injector nuts, above

These reusable ferrules seal at the tip, and are different from standard ferrules. For use with FSZNA-HP nuts above.

Package of 10:		Prod No
Column ID:	.20 –.25 mm .32 mm	FS1.35-R10 FS1.45-R10
	.53 mm	FS1.75-R10





$150 \, \mu m = .006$ " 0.25 mm = .010" $0.50 \, \text{mm} = .020$ " 0.75 mm = .030" 1.0 mm = .040" 1.5 mm = .060" 2.0 mm = .080" $4.6 \, \text{mm} = .180''$ 6.0 mm = .236" 6.4 mm = .253" 7.0 mm = .275" 10.0 mm = .400" 27.0 mm = 1.08" $1/32" = 0.8 \, \text{mm}$

1/16" =

1/8"

1/4"

3/8"

CONVERSIONS $100 \, \mu m = .004$ "



1.6 mm

 $= 3.2 \, \text{mm}$

 $= 6.4 \, \text{mm}$

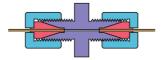
 $= 9.5 \, \text{mm}$ 1/2" = 12.7 mm



1/32" Ultra low mass external unions

The 1/32" external union is specially designed for use with capillary columns in GC. It has 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. Order fused silica adapters separately, below.

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



1/32" external union for use with capillary columns in GC

1/32" One piece fused silica adapters (FS)

The 1/32" one piece FS adapter is recommended for use in 1/32" ultra low mass external unions, and 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.

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.

Note that the determining factor in adapter size selection is the fused silica tubing's outer diameter, or OD. Typical ODs for common columns are included in the product number tables.

Package of 5:	Polyimide, Valcon Prod No	PEEK Prod No	Polyimide, Virgin Prod No
Tubing OD:	7.704.710	7.700.710	7.700.710
< 0.20 mm	FS.2-5	FS.2PK-5	_
0.20 ≤ 0.25 mm	FS.25-5	FS.25PK-5	FS.25V1-5
0.25 ≤ 0.36 mm	FS.36-5	FS.36PK-5	_
0.36 ≤ 0.40 mm	FS.4-5	FS.4PK-5	FS.4V1-5
$0.40 \le 0.50 \text{ mm}$	FS.5-5	FS.5PK-5	FS.5V1-5
0.50 ≤ 0.80 mm	ZF.5V-5	ZF.5PK-5	ZF.5V1-5

Fused silica adapters

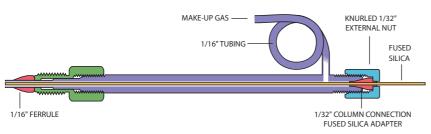
VALCO FITTINGS

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).

Description	Length	Bore	Prod No
1/16" to 1/32"	1.5" 1.5" 1.5"	0.5 mm 0.75 mm 1.0 mm	FSMUAS1.5M FSMUAS1.5 FSMUAS1.5L
	3.5"	0.75 mm	FSMUA1.5





Fused silica make-up adapter (FSMUA1.5)

CONVERSIONS

 $100 \, \mu m = .004$ " $150 \, \mu m = .006$ " 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" $1/32" = 0.8 \, \text{mm}$ $1/16" = 1.6 \, \text{mm}$ $1/8" = 3.2 \, \text{mm}$ 1/4" = 6.4 mm 3/8" = 9.5 mm 1/2" = 12.7 mm



Internal to external reducer/adapters

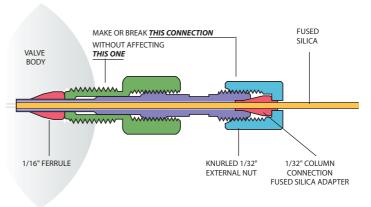
Internal fittings provide the smallest possible fitting volume. But there are situations, such as when you're using graphite ferrules which tend to become lodged in internal details, when an external fitting might be more desirable. A typical situation of that nature is the connection of a fused silica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

 Description
 Bore
 Prod No

 1/16" to 1/32"
 0.25 mm
 IZERA1.5C

 0.5 mm
 IZERA1.5M

 1.0 mm
 IZERA1.5



Internal to external FS adapter (IZERA1.5) shown installed in a valve

CAUTION

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

MORE INFORMATION

1/32" fused silica adapter ferrules nage 19

1/32" FUSED SILICA FERRULES (package of 5)

Tubing OD:

≤0.25 mm FS.25-5 0.25 mm ≤0.4 mm FS.4-5 0.4 mm ≤0.5 mm FS.5-5 0.5 mm <0.8 mm 7F.5V-5



Microvolume connectors

VALCO FITTINGS

Micro-unions, -tees, -crosses, and -Y's have a unique twopiece design which allows us to provide an extremely small bore in a conventional ferrule and nut fitting. The actual connection area is separated from the nut threads, with the ferrule detail in a metal or polymer insert and the threads machined into a stainless steel or polymer ring. Since the insert has a much smaller diameter than a standard one-piece fitting, it can be drilled with much shorter tools; and, since a shorter drill has less tendency to wander or break, holes as small as .006" (0.15 mm) can be machined with the same high degree of concentricity found in all Valco fittings.

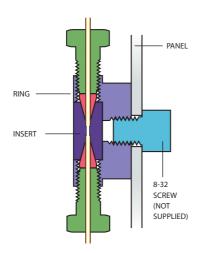
Valco microvolume fittings make it possible to couple 100 micron ID capillary GC, HPLC, or CZE columns without special nuts and ferrules.

A stainless ring with one of the plastic inserts provides electrical insulation within the insert, while the PEEK ring achieves total isolation.

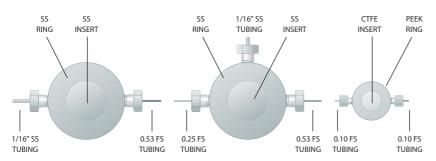
The ring containing the threads is made from PEEK or stainless steel. Inserts are made of stainless steel, Hastelloy C, Titanium, PEEK, or CTFE. PEEK rings are not as robust as stainless steel, and are not usable above 75°C. The stainless steel ring with a metal insert can operate at up to 10,000 psi (liquid) for HPLC or SFC.

All standard Valco zero dead volume reducing ferrules (ZRF, FS, and FSR) will work in these fittings. They are uniquely designed to fill the void between the fitting pilot and the smaller tubing OD, eliminating any dead volume in the fitting. (Reducing ferrules such as Valco's RF series should be avoided, since they leave dead volume.)





Panel mounting



Stainless to fused silica union 1/16" fittings

Make-up adapter 1/16" fittings

CZE union 1/32" fittings

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MORE INFORMATION

FS fused silica adapters..... page 16 FSR fused silica adapters.....17

ZRF internal reducing ferrules 14

Ferrules

Metal.....12

CONVERSIONS

 $100 \, \mu m = .004$ " $150 \, \mu m = .006$ "

0.25 mm = .010"

0.50 mm = .020"

0.75 mm = .030"

1.0 mm = .040"

1.5 mm = .060"

2.0 mm = .080"

 $4.6 \, \text{mm} = .180'$

6.0 mm = .236"

6.4 mm = .253"

 $7.0 \, \text{mm} = .275$ "

10.0 mm = .400"

27.0 mm = 1.08"

 $1/32" = 0.8 \, \text{mm}$

1/16" 1.6 mm

1/8" 3.2 mm

6.4 mm

3/8" 9.5 mm

1/4"

1/2" $= 12.7 \, \text{mm}$

1/32" Microvolume connectors

Includes ring, nuts, and ferrules. With metal inserts: ferrules are the same material as the insert, and ring and nuts are stainless steel. With polymer inserts: ferrules are the same material as the insert, and ring and nuts are PEEK.

Insert Material:	Stainless steel	Hastelloy C	Titanium	PEEK	CTFE
	Prod No	Prod No	Prod No	Prod No	Prod No
0.15 mm bore					
Union	MU.5XCS6	MU.5XCHC	MU.5XCTI	MU.5XCPK	MU.5XCKF
Tee	MT.5XCS6	MT.5XCHC	MT.5XCTI	MT.5XCPK	MT.5XCKF
Υ	MY.5XCS6	MY.5XCHC	MY.5XCTI	MY.5XCPK	MY.5XCKF
Cross	MX.5XCS6	MX.5XCHC	MX.5XCTI	MX.5XCPK	MX.5XCKF
0.25 mm bore					
Union	MU.5CS6	MU.5CHC	MU.5CTI	MU.5CPK	MU.5CKF
Tee	MT.5CS6	MT.5CHC	MT.5CTI	MT.5CPK	MT.5CKF
Υ	MY.5CS6	MY.5CHC	MY.5CTI	MY.5CPK	MY.5CKF
Cross	MX.5CS6	MX.5CHC	MX.5CTI	MX.5CPK	MX.5CKF

1/16" Microvolume connectors

Includes ring, nuts, and ferrules. With metal inserts: ferrules are the same material as the insert, and ring and nuts are stainless steel. With polymer inserts: ferrules are the same material as the insert, and ring and nuts are PEEK.

Insert M	aterial:	Stainless steel I	Hastelloy C	Titanium	PEEK	CTFE
		Prod No	Prod No	Prod No	Prod No	Prod No
0.15 mm	bore					
	Union	MU1XCS6	MU1XCHC	MU1XCTI	MU1XCPK	MU1XCKF
	Tee	MT1XCS6	MT1XCHC	MT1XCTI	MT1XCPK	MT1XCKF
	Υ	MY1XCS6	MY1XCHC	MY1XCTI	MY1XCPK	MY1XCKF
	Cross	MX1XCS6	MX1XCHC	MX1XCTI	MX1XCPK	MX1XCKF
0.25 mm	bore					
	Union	MU1CS6	MU1CHC	MU1CTI	MU1CPK	MU1CKF
	Tee	MT1CS6	MT1CHC	MT1CTI	MT1CPK	MT1CKF
	Υ	MY1CS6	MY1CHC	MY1CTI	MY1CPK	MY1CKF
	Cross	MX1CS6	MX1CHC	MX1CTI	MX1CPK	MX1CKF

Replacement components

6	1/32" connectors	1/16" connectors
Description	Prod No	Prod No
SS ring for union, tee, or cross	MRX.5S6	MRX1S6
SS ring for Y	MRY.5S6	MRY1S6
PEEK ring for union, tee, or cross	MRX.5PK	MRX1PK
PEEK ring for Y	MRY.5PK	MRY1PK
Nuts for SS ring	ZN.5	ZN1
Nuts for PEEK ring	ZN.5FPK	ZN1FPK

Inserts for any connector:

To order an insert, add an "I" after the "M" in the product number.

For example, to order an insert for a 1/16" microvolume union MU1CS6, order part number MIU1CS6.

OPTIONS

0.50, 0.75, and 1.0 mm bores are available in most materials and configurations.

NANOBORE CONNECTIONS

For 0.10 mm (100 μ m) bore fittings, see pages 57-61.



Unions

VALCO FITTINGS

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.

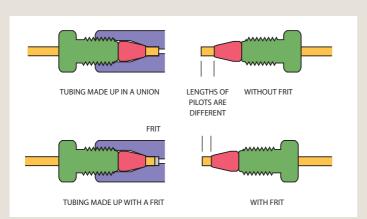


Bulkhead versions can be mounted through an instrument panel or on a bracket. The fitting body is undercut so that it bites into the panel when the mounting nut is tightened, eliminating the need for a lock washer. An O-ring can be installed between the body and the panel to allow operation in purged 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 48-52 Frits and screens......53



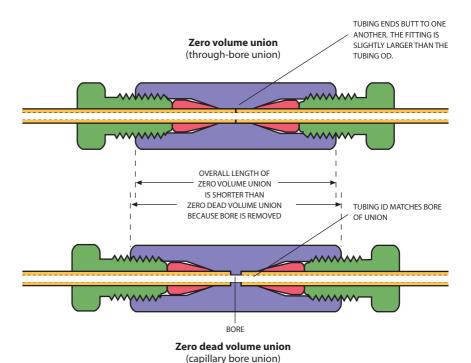


CONVERSIONS $0.25 \, \text{mm} = .010$ " $0.50 \, \text{mm} = .020$ " 0.75 mm = .030" 1.0 mm = .040" 1.5 mm = .060" 2.0 mm = .080" 4.6 mm = .180" 6.0 mm = .236" 6.4 mm = .253" $7.0 \, \text{mm} = .275$ " 10.0 mm = .400" 27.0 mm = 1.08" $1/32" = 0.8 \, \text{mm}$ 1/16" 1.6 mm 1/8" $= 3.2 \, \text{mm}$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

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.



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 INFORMATION

Reducing unions to connect two tubes with different ODs....p 28-31 Unions with

1/4-28 fittings 72-73

Unions

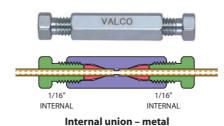
VALCO FITTINGS

Internal unions - stainless steel

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

Standard internal unions

Tubing	a internal anio	13
OD	Bore	Prod No
1/32"	0.15 mm 0.25 mm 0.50 mm 1/32"	ZU.5XC ZU.5 ZU.5L ZU.5T
1/16"	0.15 mm 0.25 mm 0.50 mm	ZU1XC ZU1C ZU1M
	0.75 mm 1.0 mm 1/16"	ZU1 ZU1L ZU1T
1/8"	0.75 mm 2.0 mm 1/8"	ZU2 ZU2L ZU2T
1/4"	0.75 mm 4.6 mm 1/4"	ZU4 ZU4L ZU4T



Standard bore version (ZU1) Ends of tubing seat squarely at bottoms of fitting details

Bulkhead internal unions

Tubing	a internal amoi		Bulkhead panel
OD	Bore	Prod No	hole diameter
1/32"	0.15 mm	ZBU.5XC	5/16"
	0.25 mm	ZBU.5	5/16"
	0.50 mm	ZBU.5L	5/16"
	1/32"	ZBU.5T	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"
	1/8"	ZBU2T	7/16"
1/4"	0.75 mm	ZBU4	5/8"
	4.6 mm	ZBU4L	5/8"
	1/4"	ZBU4T	5/8"



Bulkhead internal union – metal (ZBU1)

MORE INFORMATION

Internal unions, high pressure PEEK . . p 57,65

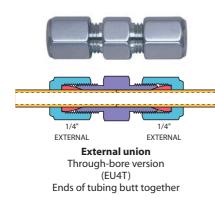
For special materials and/or smaller bores:

Microvolume connectors offer a complete range of 1/32" and 1/16" unions in various metals and polymers, with bore sizes ranging from .006" (0.15 mm) to .040" (1.0 mm). Refer to pages 22-23.

CONVERSIONS

0.25 mm	= .010"
0.50 mm	= .020"
0.75 mm	= .030"
1.0 mm	= .040"
1.5 mm	= .060"
2.0 mm	
4.6 mm	= .180"
6.0 mm	= .236"
6.4 mm	
7.0 mm	
10.0 mm	= .400"
27.0 mm	= 1.08"
1/32" = 1/16" = 1/8" =	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" =	
5/16" = .312	?" = 7.9 mm

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





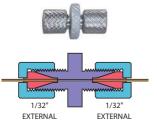
Bulkhead external union (EBU2L)

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	Bore	Standard	Bulkhead	Bulkhead panel
OD		Prod No	Prod No	hole diameter
1/16"	See note abov	e		
1/8"	1.0 mm	EU2	—	—
	2.0 mm	EU2L	EBU2L	5/16"
	1/8"	EU2T	EBU2T	5/16"
1/4"	2.0 mm	EU4	EBU4	7/16"
	4.6 mm	EU4L	EBU4L	7/16"
	1/4"	EU4T	EBU4T	7/16"



1/32" external union (EU.5) For use with GC capillary columns

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. Order fused silica adapters separately (*page 16*). Standard material is 300 series stainless.

Bore	Prod No
0.25 mm	EU.5
0.50 mm	EU.5L
1/22"	FII 5T

Sta go

1/16"

INTERNAL

External/internal union Standard bore (EZU1)

EXTERNAL

Adapts existing external fittings to Valco zero volume internal fittings

External/internal unions

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

Tubing OD	Bore	Standard <i>Prod No</i>	Bulkhead <i>Prod No</i>	Bulkhead panel hole diameter
1/32"	0.25 mm	EZU.5	_	_
	0.50 mm	EZU.5L	_	_
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"
1/8"	1.0 mm	EZU2	EZBU2	7/16"
	2.0 mm	EZU2L	EZBU2L	7/16"
	1/8"	EZU2T	EZBU2T	7/16"



Bulkhead external/internal union (F7BU1)

TECH TIP 1/16", 1/8", and 1/4" external Valco fitting components are compatible with Parker

Reducing unions

VALCO FITTINGS

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.

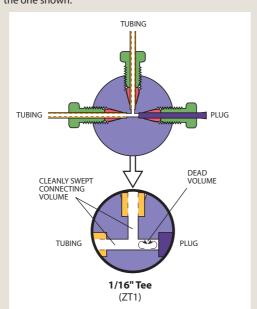
Internal fittings are almost always the best with tubing of 1/8" OD or smaller. They make a stronger connection and offer the lower volume necessary for high performance instrumentation. Also, because 1/16" external fittings have very thin, easily distorted walls, they are not as durable as 1/16" internal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



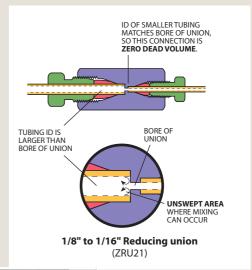
DEAD VOLUME

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



UNSWEPT VOLUME

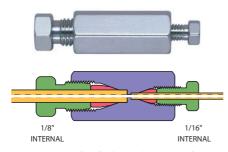
Even in connections which are by most definitions "zero dead volume," unswept volume may be created where large ID transitions occur. The amount of mixing depends on the amount of mismatch in the IDs.



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Internal reducing union – metal Standard bore (ZRU21)

Internal reducing unions - stainless steel

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.

Standard internal reducing unions

Tubing OD	Bore	Prod No
1/16" to 1/32"	0.15 mm 0.25 mm 0.50 mm 1/32"	ZRU1.5X0 ZRU1.5 ZRU1.5L ZRU1.5T
1/8" to 1/32"	0.25 mm 0.50 mm 1/32"	ZRU2.5 ZRU2.5L ZRU2.5T
1/8" to 1/16"	0.25 mm 0.75 mm 1/16"	ZRU21C ZRU21 ZRU21T
1/4" to 1/16"	0.25 mm 0.75 mm 1/16"	ZRU41C ZRU41 ZRU41T
1/4" to 1/8"	0.75 mm 2.0 mm 1/8"	ZRU42 ZRU42L ZRU42T

Bulkhead internal reducing unions

			Bulkhead panel
Tubing OD	Bore	Prod No	hole diameter
1/16" to 1/32"	0.25 mm	ZBRU1.5	5/16"
	0.50 mm	ZBRU1.5L	5/16"
	1/32"	ZBRU1.5T	5/16"
1/8" to 1/32"	0.25 mm	ZBRU2.5	5/16"
	0.50 mm	ZBRU2.5L	5/16"
	1/32"	ZBRU2.5T	5/16"
1/8" to 1/16"	0.25 mm	ZBRU21C	5/16"
	0.75 mm	ZBRU21	5/16"
	1/16"	ZBRU21T	5/16"
1/4" to 1/16"	0.25 mm	ZBRU41C	7/16"
	0.75 mm	ZBRU41	7/16"
	1/16"	ZBRU41T	7/16"
1/4" to 1/8"	0.75 mm	ZBRU42	7/16"
	2.0 mm	ZBRU42L	7/16"
	1/8"	ZBRU42T	7/16"



Bulkhead internal reducing union – metal (ZBRU21)

MORE INFORMATION

Internal reducing unions, high pressure PEEK pages 57,65 External/internal reducing unions 31 Internal/external reducing unions 31 Standard unions 24-27 Unions with 1/4-28 fittings 72-73

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 = .253" 7.0 mm = .275" 10.0 mm = .400" 27.0 mm = 1.08"

1/16" = $1.6 \, \text{mm}$

= 3.2 mm

 $= 6.4 \, \text{mm}$

= 9.5 mm

1/8"

1/4"

3/8"

1/2"

Reducing unions

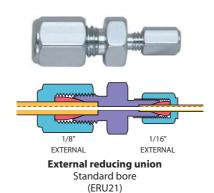
VALCO FITTINGS

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.

Standard external reducing unions

Tubing OD	Bore	Prod No
1/8" to 1/16"	0.75 mm 1.00 mm 1/16"	ERU21 ERU21L ERU21T
1/4" to 1/16"	0.75 mm 1/16"	ERU41 ERU41T
1/4" to 1/8"	0.75 mm 2.0 mm 1/8"	ERU42 ERU42L ERU42T



Bulkhead external reducing unions

T. /		2 (1)	Bulkhead panel
Tubing OD	Bore	Prod No	hole diameter
1/8" to 1/16"	1.0 mm 1/16"	EBRU12L6 EBRU12T	5/16" 5/16"
1/4" to 1/16"	1.0 mm 1/16"	EBRU14L EBRU14T	7/16" 7/16"
1/4" to 1/8"	2.0 mm	EBRU24L	7/16"



Bulkhead external reducing union (EBRU12L)

TECH TIP

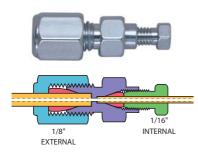
1/16", 1/8", and 1/4" external Valco fitting components are compatible with Parker and Swagelok fittings.

TECHTIP

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.

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" $1/32" = 0.8 \, \text{mm}$ $1/16" = 1.6 \, \text{mm}$ 1/8" = 3.2 mm 1/4" = 6.4 mm 3/8" = 9.5 mm 1/2" $= 12.7 \, \text{mm}$ 5/16" = .312" = 7.9 mm 3/8" = .375" = 9.5 mm 7/16" = .437" = 11.1 mm



External/internal reducing union Standard bore (F7RU21)



Bulkhead external/internal reducing union (EZBRU21)

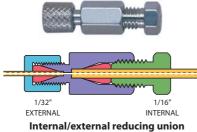
External/internal reducing unions

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.

Dudlahaa d

Tubing OD	Bore	Standard Prod No	Bulkhead <i>Prod No</i>	Bulkhead panel hole diameter
1/16" to 1/32"	0.25 mm 0.50 mm 1/32"	EZRU1.5 EZRU1.5L EZRU1.5T	EZBRU1.5L EZBRU1.5T	 5/16" 5/16"
1/8" to 1/32"	0.25 mm	EZRU2.5	—	—
	0.50 mm	EZRU2.5L	EZBRU2.5L	5/16"
	1/32"	EZRU2.5T	EZBRU2.5T	5/16"
1/8" to 1/16"	0.25 mm	EZRU21C	—	—
	0.75 mm	EZRU21	EZBRU21	5/16"
	1/16"	EZRU21T	EZBRU21T	5/16"
1/4" to 1/16"	0.25 mm	EZRU41C	—	—
	0.75 mm	EZRU41	EZBRU41	7/16"
	1/16"	EZRU41T	EZBRU41T	7/16"
1/4" to 1/8"	1.0 mm	EZRU42	EZBRU42	7/16"
	2.0 mm	EZRU42L	EZBRU42L	7/16"
	1/8"	EZRU42T	EZBRU42T	7/16"



Internal/external reducing union Standard bore (EZRU.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 16.) Only polymeric or soft metal ferrules should be used with 1/32" external details.

Tubing OD	Bore	Standard <i>Prod No</i>	Bulkhead <i>Prod No</i>	panel hole hole diameter
1/16" to 1/32"	0.25 mm	EZRU.51	EZBRU.51	5/16"
	0.50 mm	EZRU.51L	EZBRU.51L	5/16"
	1/32"	EZRU.51T	EZBRU.51T	5/16"



Bulkhead internal/external reducing union (EZBRU.51)

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

TECH TIP

Fused silica adapters... page 16-17 Polymeric ferrules 13 External unions..... 27 Internal reducing unions 29

Internal unions 76

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Tees and crosses

VALCO FITTINGS

Tees

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

Tubing OD	Bore	Prod No
1/32"	0.25 mm 0.50 mm	ZT.5 ZT.5L
1/16"	0.25 mm 0.50 mm 0.75 mm 1.00 mm	ZT1C ZT1M ZT1 ZT1L
1/8"	0.75 mm 2.00 mm	ZT2 ZT2L
1/4"	1.00 mm 4.60 mm	ZT4 ZT4L



Crosses

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

Tubing OD	Bore	Prod No
1/32"	0.25 mm 0.50 mm	ZX.5 ZX.5L
1/16"	0.25 mm 0.50 mm 0.75 mm 1.00 mm	ZX1C ZX1M ZX1 ZX1L
1/8"	0.75 mm 2.00 mm	ZX2 ZX2L
1/4"	1.00 mm 4.60 mm	ZX4 ZX4L



SURFACE MOUNTING TEES AND CROSSES

1/8" and 1/4" tees and crosses have two threaded mounting holes (8-32). For 1/32" and 1/16", 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.

SPECIAL METALS AND/OR SMALLER **BORES**

See microvolume connectors: 1/32" and 1/16" tees, crosses, Y's, and unions in various metals and polymers, with smaller bores.

Microvolume

connectorspp 22-23 High pressure

PEEK connectors..62-66 Nanovolume

connectors57-61

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 38

MORE INFORMATION

PEEK tees.... pages 57,64 PEEK crosses57,64

1/16" Manifolds





1/16" manifolds connect 4 - 16 inlet lines to a single outlet, and are often used to connect the outlets from several columns to a single detector. The unique angled entry of our design reduces dispersion to a minimum. Available with 1.00 mm inlet/outlet bore. Standard materials are PEEK or 300 series stainless.

	Inlet bore	Outlet bore	Material	Prod No
4 inlets	0.25 mm	0.75 mm	Stainless steel	Z4M1
	0.25 mm	0.75 mm	PEEK	Z4M1PK
6 inlets	0.25 mm	0.75 mm	Stainless steel	Z6M1
	0.25 mm	0.75 mm	PEEK	Z6M1PK
8 inlets	0.25 mm	0.75 mm	Stainless steel	Z8M1
	0.25 mm	0.75 mm	PEEK	Z8M1PK
10 inlets	0.25 mm	0.75 mm	Stainless steel	Z10M1
	0.25 mm	0.75 mm	PEEK	Z10M1PK
12 inlets	0.25 mm	0.75 mm	Stainless steel	Z12M1
	0.25 mm	0.75 mm	PEEK	Z12M1PK
14 inlets	0.25 mm	0.75 mm	Stainless steel	Z14M1
	0.25 mm	0.75 mm	PEEK	Z14M1PK
16 inlets	0.25 mm	0.75 mm	PEEK	Z16M1PK

1/8" Manifolds

1/8" manifolds connect 4 - 12 inlet lines to a single outlet, and are typically used in a gas distribution system to minimize the number of fitting connections. A manifold pipe fitting version is also available. (See page 34.) Standard material is 300 series stainless steel.

	Inlet bore	Outlet bore	Prod No
4 inlets	2.00 mm	2.00 mm	Z4M2
6 inlets	2.00 mm	2.00 mm	Z6M2
8 inlets	2.00 mm	2.00 mm	Z8M2
10 inlets	2.00 mm	2.00 mm	Z10M2
10 mets	2.00 111111	2.00 11111	Z 1 0 1 V 1 Z
12 inlets	2.00 mm	2.00 mm	Z12M2



SURFACE MOUNTING MANIFOLDS

Mounting kit **DVBRKIT**

TECH TIP

A manifold used with an SD flowpath multiposition valve allows HPLC column selection with a single valve. See page 141 for an illustration.

SD UW valves... page 134

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"

 $6.0 \, \text{mm} = .236$ " 6.4 mm = .253"

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

27.0 mm = 1.08"

 $1/32" = 0.8 \, \text{mm}$ 1/16" = $1.6 \, \text{mm}$

 $1/8" = 3.2 \, \text{mm}$ 1/4"

3/8" = 9.5 mm = 127 mm

 $= 6.4 \, \text{mm}$

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Manifold pipe adapters

VALCO FITTINGS

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.

Description		Bore	Prod No	
One 1/8" fer	male pipe to: three 1/16" ZDV fittings three 1/8" ZDV fittings three 1/4" ZDV fittings	1.0 mm 2.0 mm 4.6 mm	FP1Z3M21 FP1Z3M22 FP1Z3M24	
One 1/4" female pipe to:				
	three 1/16" ZDV fittings	1.0 mm	FP1Z3M41	
	three 1/8" ZDV fittings	2.0 mm	FP1Z3M42	
	three 1/4" ZDV fittings	4.6 mm	FP1Z3M44	
Two 1/8" female pipe to:				
	three 1/16" ZDV fittings	1.0 mm	FP2Z3M21	
	three 1/8" ZDV fittings	2.0 mm	FP2Z3M22	
	three 1/4" ZDV fittings	4.6 mm	FP2Z3M24	
Two 1/4" female pipe to:				
	three 1/16" ZDV fittings	1.0 mm	FP2Z3M41	
	three 1/8" ZDV fittings	2.0 mm	FP2Z3M42	
	three 1/4" ZDV fittings	4.6 mm	FP2Z3M44	

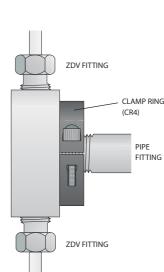
ZDV FITTING

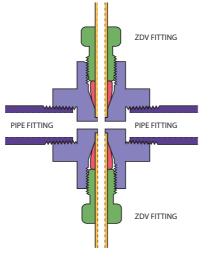
PIPE FITTING

ZDV FITTING

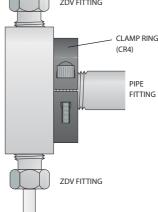
One pipe fitting

to Valco ZDV fittings





Two pipe fittings to Valco ZDV fittings



Adapter with optional mounting clamp ring

SURFACE MOUNTING MANIFOLDS

Mounting kit **DVBRKIT**

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"

 $1/32" = 0.8 \, \text{mm}$

1/16" 1.6 mm

1/8" $= 3.2 \, \text{mm}$

1/4" $= 6.4 \, \text{mm}$

3/8" $= 9.5 \, \text{mm}$

1/2" = 12.7 mm



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.

Description		Bore	Prod No
1/8" NPT n	nale to:		
	1/16" ZDV fitting	1.0 mm	PZA21
	1/16" ZDV fitting	1/16"	PZA21T
•	1/8" ZDV fitting	1.0 mm	PZA22
1/4" NPT n	nale to:		
	1/16" ZDV fitting	1.0 mm	PZA41
	1/8" ZDV fitting	1.0 mm	PZA42
	1/8" ZDV fitting	2.0 mm	PZA42L
	1/4" ZDV fitting	4.6 mm	PZA44L
1/2" NPT n	nale to:		
	1/16" ZDV fitting	1.0 mm	PZA81
	1/8" ZDV fitting	1.0 mm	PZA82
	1/8" ZDV fitting	2.0 mm	PZA82L
•	1/4" ZDV fitting	4.6 mm	PZA84L

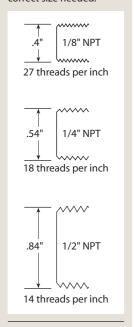
Female pipe to Valco internal adapters

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.

	Description	on	Bore	Prod No
	1/8" NPT	female to: 1/16" ZDV fitting	1.0 mm	FPZA21
1		1/8" ZDV fitting 1/8" ZDV fitting	1.0 mm 2.0 mm	FPZA22 FPZA22L
[3]	1/4" NPT	female to:		FD74.4
		1/16" ZDV fitting 1/8" ZDV fitting	1.0 mm 1.0 mm	FPZA41 FPZA42
ST. VI		1/8" ZDV fitting 1/4" ZDV fitting	2.0 mm 4.6 mm	FPZA42L FPZA44L
VALGO	1/2" NPT	female to:		
		1/16" ZDV fitting 1/8" ZDV fitting	1.0 mm 1.0 mm	FPZA81 FPZA82
		1/8" ZDV fitting 1/4" ZDV fitting	2.0 mm 4.6 mm	FPZA82L FPZA84L
		VALCO		
	-			

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.



MORE INFORMATION

Pipe to Valco external adapters nage 36

Pipe adapters

VALCO FITTINGS

Male pipe to Valco external adapters

Male pipe adapters make a minimum volume connection from the female pipe fittings typically found on pressure gauges and regulators to Valco external fittings. Standard material is 300 series stainless.

Note: We do not manufacture adapters with 1/16" external fittings because they have very thin, easily distorted walls. We recommend use of the PZAs on the previous page.

Description	Bore	Prod No
1/8" NPT male to: 1/8" external fitting 1/4" external fitting	2.0 mm 4.6 mm	PEA22 PEA24
1/4" NPT male to: 1/8" external fitting 1/4" external fitting	2.0 mm 4.6 mm	PEA42 PEA44
1/2" NPT male to: 1/8" external fitting 1/4" external fitting	2.0 mm 4.6 mm	PEA82 PEA84



Female pipe to Valco external adapters

Female pipe adapters make a minimum volume connection from the male pipe fittings typically found in gas distribution plumbing to Valco external fittings. Standard material is 300 series stainless.

Note: We do not manufacture adapters with 1/16" external fittings because they have very thin, easily distorted walls. We recommend use of the FPZAs on the previous page.

Description	Bore	Prod No	
1/8" NPT female to: 1/8" external fitting 1/4" external fitting	2.0 mm 4.6 mm	FPEA22 FPEA24	
1/4" NPT female to: 1/8" external fitting 1/4" external fitting	2.0 mm 4.6 mm	FPEA42 FPEA44	
1/2" NPT female to: 1/8" external fitting 1/4" external fitting	2.0 mm 4.6 mm	FPEA82 FPEA84	

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TECH TIP

Because of their dead volume and the risk of thread leaks, pipe fittings are a poor choice for trace gas analysis. Thread sealants, particularly PTFE tape, cannot boost their performance to adequate levels. For trace gas applications, choose Valco zero dead volume fittings with gold-plated stainless ferrules. (See page 12.)

MORE INFORMATION

Our manifold pipe adapters on page 34 allow you to connect one or two pipe fittings to three Valco zero dead volume fittings.

Pipe to Valco internal adapters..... page 35

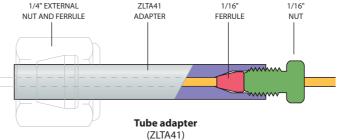
CONVERSIONS

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

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.





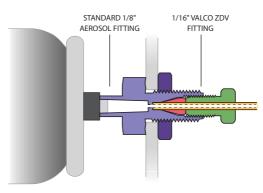


Aerosol adapter bulkhead union

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.

DescriptionProd NoAerosol adapter bulkhead unionZBAA1



Aerosol adapter bulkhead union (ZBAA1)

Internal reducers

VALCO FITTINGS

Internal reducers

NEW

for 360 µm tubing

Directly connect 360 μ m 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 (*illustration below*). All versions have a stainless steel body, with 360 μ m nut/ferrule material as indicated.

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

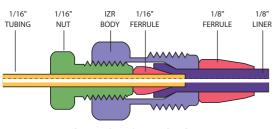


Internal reducers

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 pages 48-52) 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	W	lithout frit	With 2μ frit
	Bore	Prod No	Prod No
1/16" to 1/32"	0.25 mm	IZR1.5	IZR1.5F
	0.50 mm	IZR1.5L	IZR1.5LF
	1/32"	IZR1.5T	—
1/8" to 1/16"	0.25 mm	IZR21C	IZR21CF
	0.50 mm	IZR21	IZR21F
	1.00 mm	IZR21L	IZR21LF
	1/16"	IZR21T	—
1/4" to 1/16"	1.00 mm	IZR41	IZR41F
1/4" to 1/8"	1.00 mm	IZR42	IZR42F
1/4" to 1/8"	2.00 mm	IZR42L	IZR42LF





Valco's unique internal reducer

IZR liner with pressed-in frit



360 MICRON FITTINGS

See our extensive line of 360 µm fittings . .pp 57-58

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" $4.6 \, \text{mm} = .180''$ 6.0 mm = .236" 6.4 mm = .253" $7.0 \, \text{mm} = .275$ " 10.0 mm = .400" 27.0 mm = 1.08" $1/32" = 0.8 \, \text{mm}$ 1/16" 1.6 mm 1/8" $= 3.2 \, \text{mm}$ 1/4" $= 6.4 \, \text{mm}$

1/2" = 12.7 mm

 $= 9.5 \, \text{mm}$

3/8"

^{*} glass-filled

External to internal reducer

NEW

for 360 µm tubing



Directly connect 360 μm tubing into a 1/32" Valco external union or the external type fittings common on injectors and detectors with a Valco zero dead volume connection.

Tubing OD	Nut/ferrule material	Bore	For use with	Prod No
1/32" to 360 µm	Stainless	150 µm	Metal tubing	C360EZR.5XC



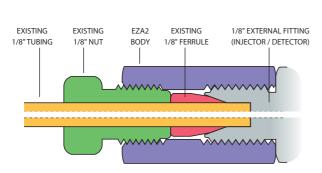
External to internal adapters (injector/detector adapters)

EZAs (external adapters) and EZRs (external reducers) adapt an external tee or union or the external type fittings common on injectors and detectors to Valco zero dead volume connections. Since EZAs are commonly used to connect an external fitting to an existing tube already made up with a Valco internal fitting, a nut and ferrule are not included.

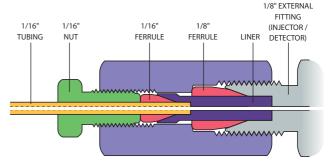
Only one wrench is required to change tubes after the fitting is made up. While an external to internal union or reducing union plus a length of tubing can accomplish the same thing, these adapters do the trick with a single fitting.

Standard material is 300 series stainless. The EZA does not include a nut or ferrule. The EZR includes a liner, one nut, and two ferrules.

	Description	Bore	Prod No
External to	internal adapters		
	1/16" ext. to 1/16" int.	_	EZA1
	1/8" ext. to 1/8" int.	_	EZA2
External re	ducers		
	1/16" ext. to 1/32" int.	0.25 mm 1/32"	EZR1.5 EZR1.5T
	1/8" ext. to 1/32" int. 1/8" ext. to 1/16" int.	0.25 mm 0.50 mm 1/16"	EZR2.5 EZR21 EZR21T
	1/4" ext. to 1/16" int.	1.00 mm 1/16"	EZR41 EZR41T
	1/4" ext. to 1/8" int.	1.00 mm 1/8"	EZR42 EZR42T



External to internal adapter (EZA2)



External to internal reducer (EZR21)

Syringe adapters

VALCO FITTINGS

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.

Description Prod No

For high pressure 1/16" ZDV Cheminert injectors with polymeric stators (C2, C3, C4, and C52 series)

Most applications PFA bushing ZVISF-1PFAH High throughput applications High density polyethylene bushing ZVISF-1PEH



Most applications PFA bushing ZVISF-1PFA High throughput applications High density polyethylene bushing ZVISF-1PE



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.

Description Prod No For high pressure injectors C-VISF-1H (C2, C3, C4, and C52 series injectors) For fittings and low pressure injectors C-VISF-1 (C22Z and C62Z series injectors) **Replacement liners and ferrules** VISL-1

Liner for C-VISF-1

Liner for C-VISF-1H VISL-1H Ferrule for C-VISF-1 (or 1H) ZF1VISF

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.

Description Prod No For use with blunt tip needle For 1/32" fittings and injectors - 26 ga VISF.5FPK 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 For 1/8" fittings and injectors VISF-A **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



Loop fill port assembly

for Cheminert C2 and C4 valves

The loop fill port assembly, for use with Cheminert high pressure valves (C2 and C4 series), 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 $7 \mu l$, and the other is $0.50 \mu l$ mm ID and $17 \mu l$.

Description Prod No
Loop fill port assembly C-LFP

Female luer adapters

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

Description Prod No

Female luer to: 1/32" fitting ZLA-.5
1/16" fitting ZLA-1
1/8" fitting ZLA-2

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.

Description		Prod No	
Septum injector no with support Replacement supp Septum, low bleed	ort	EN2SI ZF2SI SI4G	
		-	
•			SYRINGE
			SEPTUM INJECTOR NUT
			SEPTUM SEPTUM SUPPORT
	-		1/8" EXTERNAL FITTING

MORE INFORMATION

Cheminert valves

Model C2..... 160, 163 Model C4..... 161, 164

CONVERSIONS

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

0.75 mm = .030"

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

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1/16" = 1.6 mm

1/8" = 3.2 mm

1/4" = 6.4 mm

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

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43 (of 292) (2012-

Septum injector nut

with septum and support (EN2SI)

43 (of 292) (2012-16) # **65**

HPLC column end fittings

VALCO 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.

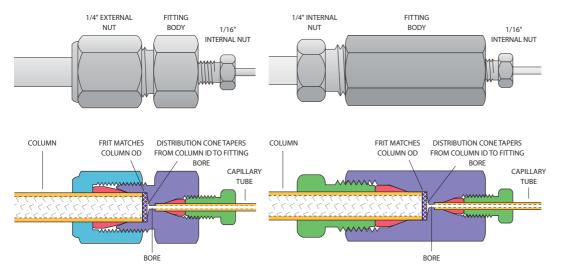
If a temporary frit is used during column packing, the frit OD should match the column OD. Permanent frits should have an OD matched to the column ID, and should be pressed in to give the lowest dead volume.

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.

The newest addition to the line is the Nanovolume® column end fitting. (See page 61.) These all-PEEK fittings 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 26

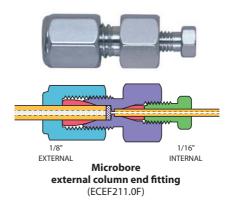
MORE INFORMATION Frits..... page 45

Microbore column end fittings

(1.0 mm – 2.0 mm column ID)

Standard material is Type 316 stainless.

			Without frit	Removable 2µ frit
	Bore	Column ID	Prod No	Prod No
External column end fit	tings			
1/16" to 1/16"	0.25 mm	1.0 mm	ECEF111.0	ECEF111.0F
1/8" to 1/16"	0.25 mm	1.0 mm	ECEF211.0	ECEF211.0F



			Without frit	Removable 2µ frit
	Bore	Column ID	Prod No	Prod No
Internal column end fitti	ngs			
1/16" to 1/32"	0.25 mm	1.0 mm	CEF1.5	CEF1.5F
1/16" to 1/16"	0.25 mm	1.0 mm	CEF1	CEF1F
1/8" to 1/32"	0.25 mm	1.0 mm	CEF2.51.0	CEF2.51.0F
1/8" to 1/16"	0.25 mm	1.0 mm	CEF211.0	CEF211.0F
1/8" to 1/16"	0.25 mm	2.0 mm	CEF212.0	CEF212.0F

1/16' 1/16" INTERNAL INTERNAL Microbore internal column end fitting (CEF1F)

NANOBORE COLUMN **END FITTINGS**

See our complete line of 100 μm and 150 μm bore fittings on page 61.

CONVERSIONS

 $100 \, \mu m = .004$ " $150 \, \mu m = .006$ " $0.25 \, \text{mm} = .010$ " $0.50 \, \text{mm} = .020$ " 0.75 mm = .030" 1.0 mm = .040" 1.5 mm = .060" 2.0 mm = .080"4.6 mm = .180"

> 6.4 mm = .253" 7.0 mm = .275" $10.0 \, \text{mm} = .400$ "

> $6.0 \, \text{mm} = .236$ "

27.0 mm = 1.08"

 $1/32" = 0.8 \, \text{mm}$ 1/16" = $1.6 \, \text{mm}$ 1/8" = 3.2 mm

1/4" $= 6.4 \, \text{mm}$ 3/8" = 9.5 mm 1/2" = 127 mm

HROMalytic +61(0)3 9762 2034

ECH nology Pty Ltd

Australian Distributors Importers & Manufacurers Website NEW: www.chromalytic.net.au E-mail: info@chromtech.net.au Tel: 03 9762 2034 . . . in AUSTRALIA

HPLC column end fittings

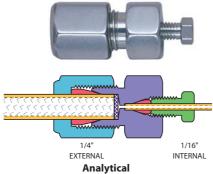
VALCO FITTINGS

Analytical column end fittings

(2.0 mm – 4.6 mm column ID)

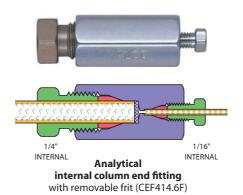
Standard material is Type 316 stainless.

			Without frit	Removable 2µ frit
	Bore	Column ID	Prod No	Prod No
External column end fit	tings			
1/4" to 1/16"	0.4 mm	2.1 mm	ECEF412.1	ECEF412.1F
1/4" to 1/16"	0.4 mm	3.0 mm	ECEF413.0	ECEF413.0F
1/4" to 1/16"	0.4 mm	4.0 mm	ECEF414.0	ECEF414.0F
1/4" to 1/16"	0.4 mm	4.6 mm	ECEF414.6	ECEF414.6F



external column end fitting with removable frit (ECEF414.6F)

			Without frit	Removable 2µ frit
	Bore	Column ID	Prod No	Prod No
Internal column end fitt	tings			
1/4" to 1/16"	0.4 mm	2.1 mm	CEF412.1	CEF412.1F
1/4" to 1/16"	0.4 mm	3.0 mm	CEF413.0	CEF413.0F
1/4" to 1/16"	0.4 mm	4.0 mm	CEF414.0	CEF414.0F
1/4" to 1/16"	0.4 mm	4.6 mm	CFF4146	CFF414 6F



NANOBORE COLUMN END FITTINGS

See our complete line of 100 µm and 150 µm bore fittings on page 61.

CONVERSIONS

= .004"
= .006"
= .010"
= .020"
= .030"
= .040"
= .060"
= .080"
= .180"
= .236"
= .253"
= .275"
= .400"
= 1.08"
0.8 mm
1.6 mm
3.2 mm

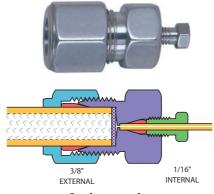
1/4" 3/8" = 6.4 mm

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

Semi-preparative and preparative column end fittings

Standard material is Type 316 stainless.

			Without frit	Removable 2µ frit
	Bore	Column ID	Prod No	Prod No
External column end fit	tings			
3/8" to 1/16"	0.40 mm	6.0 mm	ECEF616.0	ECEF616.0F
3/8" to 1/16"	0.40 mm	7.0 mm	ECEF617.0	ECEF617.0F
1/2" to 1/16"	0.75 mm	9.0 mm	ECEF819.0	ECEF819.0F
1/2" to 1/16"	0.75 mm	10.0 mm	ECEF8110.0	ECEF8110.0F
1" to 1/16"	0.75 mm	20.0 mm	ECEF1K1	ECEF1K1F



Semi-preparative external column end fitting (ECEF616.0F)



Replacement frits

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	Titanium
		Pore	Frit	Prod No	Prod No	Prod No
Package	of 10:	Size	thickness			
	1/16" frits	0.5μ	0.75 mm	.5FR1-10	.5FR1HC-10	_
		2μ	0.75 mm	2FR1-10	2FR1HC-10	2FR1TI-10
		10μ	0.75 mm	10FR1-10	_	_
	1/8" frits	0.5μ	1.00 mm	.5FR2-10	_	_
		2μ	1.00 mm	2FR2-10	2FR2HC-10	2FR2TI-10
		10μ	1.00 mm	10FR2-10	_	_
	1/4" frits	0.5µ	1.00 mm	.5FR4-10	_	_
		2μ	1.00 mm	2FR4-10	2FR4HC-10	2FR4TI-10
		10μ	1.00 mm	10FR4-10	10FR4HC-10	_
Each:	3/8" frits	2μ	1.00 mm	2FR6	2FR6HC	2FR6TI
	1/2" frits	2μ	1.00 mm	2FR8	2FR8HC	2FR8TI
	1" frits	2μ	1.50 mm	2FR1K	2FR1KHC	2FR1KTI

Post-column reaction tee fittings

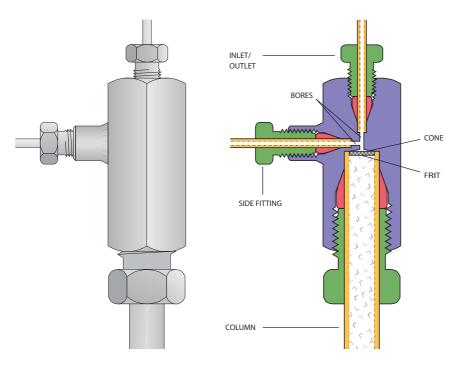
VALCO FITTINGS

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
1/16"	1.0 mm	1/32"	0.90 mm	1/32"	0.25 mm	TCEF1.5.5T
1/16"	1.0 mm	1/16"	0.25 mm	1/16"	0.25 mm	TCEF111
1/8"	1.0 mm	1/16"	0.75 mm	1/16"	0.75 mm	TCEF211
1/8"	1.0 mm	1/16"	1.65 mm	1/16"	0.40 mm	TCEF211T
1/4" 1/4" 1/4" 1/4"	4.6 mm 4.6 mm 4.6 mm	1/16" 1/16" 1/16" 1/8"	0.25 mm 0.75 mm 1.65 mm 0.75 mm	1/16" 1/16" 1/16" 1/16"	0.25 mm 0.75 mm 0.75 mm 0.75 mm	TCEF411C TCEF411 TCEF411T TCEF421
3/8"	6.0 mm	1/16"	0.75 mm	1/16"	0.75 mm	TCEF611
3/8"	6.0 mm	1/16"	1.65 mm	1/16"	0.75 mm	TCEF611T
1/2"	9.0 mm	1/16"	0.75 mm	1/16"	0.75 mm	TCEF811
1/2"	9.0 mm	1/16"	1.65 mm	1/16"	0.75 mm	TCEF811T





Post-column reaction fitting (TCEF411)

TECH TIP

Tee column end fittings (TCEFs) for 1/16" OD tubing/columns have a round profile. For other sizes, they are made of hexagonal bar stock.

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" $1/32" = 0.8 \, \text{mm}$ 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



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.

Description Prod No 1/4" x 2 cm precolumn system PCS412F

Includes:

One precolumn insert

One internal column end fitting

One 2µ frit

PCS415F 1/4" x 5 cm precolumn system

Includes:

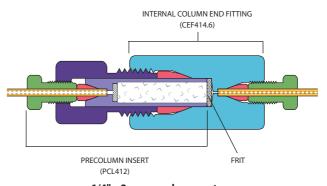
One precolumn insert

One external column end fitting

One 2µ frit

Precolumns (for use with existing column end fittings)

1/4" x 2 cm precolumn insert PCL412 1/4" x 5 cm precolumn insert PCL415



1/4" x 2 cm precolumn system (PCS412F)



Fingertight HPLC cartridge precolumns

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

Description Prod No

0.25 ml (4.0 mm ID x 2 cm)

Fingertight cartridge assembly SFECH412 Replaceable cartridge SFEC42

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



Filters

VALCO FITTINGS

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.

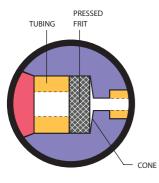
Valco's unique filter design results in extremely low internal volume and simplifies filter element replacement. Filter bodies are "coned" for uniform flow and maximum filter surface area. The filters are made entirely of metal, so they can be used at any instrumentation temperature. While the standard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

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

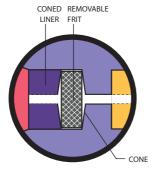
significantly different thicknesses, they cannot be used interchangeably in the same filter body.)

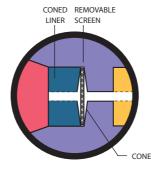
- Pressed frits, permanently installed in the filter, are recommended where contaminants are the exception and not the rule. The frits are 2µ stainless.
- Removable frits are the best choice for maximum filtration, or if the application requires Hastelloy C or titanium. However, they allow more mixing and tend to clog more than screens. A 2µ frit is included with the filter, but 0.5, 2, and 10u 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 10u stainless replacement screens may be ordered.





Pressed frit





Removable frit

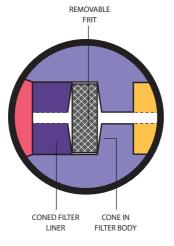
Removable screen

Biocompatible filter . p 78 In-line filters for 1/4-28 fittings 78 Mobile phase filters.....79-80

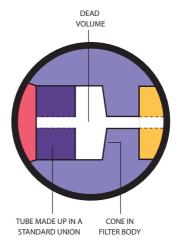
Filters with removable frits are designed to compensate for the thickness of the filter element – the resulting pilot depths are identical with the rest of the Valco product line, facilitating interchangeability of made up fittings. Therefore, although our filters look very much like our unions, they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

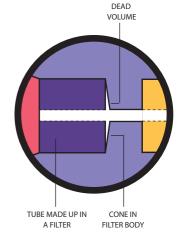
An arrow imprinted on all filter bodies serves to differentiate them from unions and to indicate recommended flow direction.



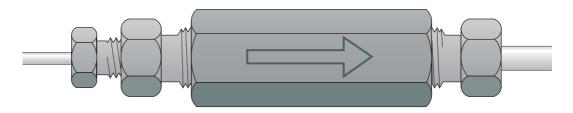
Filter with removable frit Coned for uniform flow and maximum filter surface



Filter with frit removed being used as a reducing union Dead volume is created where frit should be



Filter with frit removed being used as a reducing union Cone in filter body creates dead volume



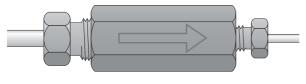
Arrow imprinted on filter body showing recommended direction of flow

Filters with a pressed frit

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.

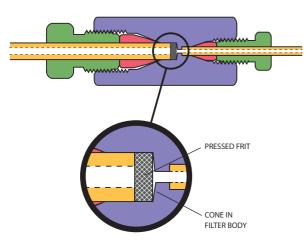
		Standard	Bulkhead
Description	Bore	Prod No	Prod No
1/16" to 1/32"	0.25 mm	ZRUF1.5	ZBRUF1.5
1/16" to 1/16"	0.75 mm	ZUF1	ZBUF1
1/8" to 1/16"	0.75 mm	ZRUF21	ZBRUF21
1/8" to 1/8"	0.75 mm	ZUF2	ZBUF2
1/4" to 1/8"	2.00 mm	ZRUF42	ZBRUF42
1/4" to 1/4"	4.60 mm	ZUF4	ZBUF4





1/8" FITTING

1/16" FITTING



Reducing filter with a pressed frit 1/8" to 1/16' (ZRUF21)

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" $1/32" = 0.8 \, \text{mm}$ 1/16" = 1.6 mm1/8" = 3.2 mm 1/4" = 6.4 mm

= 9.5 mm 1/2" = 12.7 mm

3/8"



Filters with a removable frit

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.

Description	Bore	Standard Prod No	Bulkhead Prod No
1/32" to 1/32"	0.25 mm	ZUFR.5F	ZBUFR.5F
1/16" to 1/32" 1/16" to 1/16"	0.25 mm 0.25 mm 0.50 mm	ZRUFR1.5F ZUFR1CF ZUFR1F	ZBRUFR1.5F ZBUFR1CF ZBUFR1F
1/8" to 1/16" 1/8" to 1/8"	0.75 mm 2.00 mm	ZRUFR21F ZUFR2F	ZBRUFR21F ZBUFR2F
1/4" to 1/16" 1/4" to 1/8"	1.00 mm 2.00 mm	ZRUFR41F ZRUFR42F	ZBRUFR41F ZBRUFR42F



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.

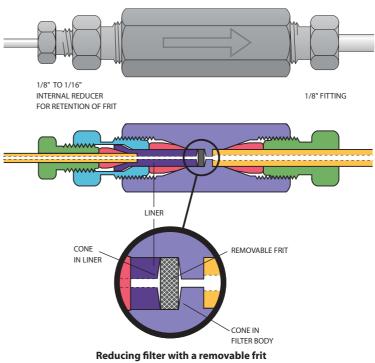
Note! The difference in thickness also means that frits and screens cannot be used interchangeably in the same fitting body:

A frit must always be replaced with a frit.

A screen must always be replaced with a screen.

Replacement

frits page 53



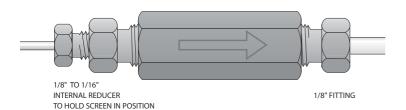
Reducing filter with a removable frit 1/8" to 1/16" (ZRUFR21F)

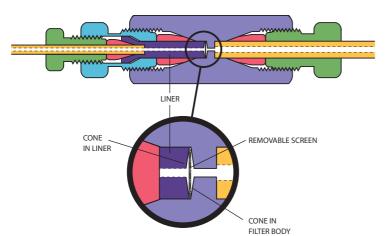
Filters with a removable screen

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 <i>Prod No</i>
1/32" to 1/32"	0.25 mm	ZUFR.5	ZBUFR.5
1/16" to 1/32" 1/16" to 1/16"	0.25 mm 0.25 mm 0.50 mm	ZRUFR1.5 ZUFR1C ZUFR1	ZBRUFR1.5 ZBUFR1C ZBUFR1
1/8" to 1/16" 1/8" to 1/8"	0.75 mm 2.00 mm	ZRUFR21 ZUFR2	ZBRUFR21 ZBUFR2
1/4" to 1/16" 1/4" to 1/8"	1.00 mm 2.00 mm	ZRUFR41 ZRUFR42	ZBRUFR41 ZBRUFR42







Reducing filter with a removable screen 1/8" to 1/16" (ZRUFR21)

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.

Replacement screens..... page 53

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" $1/32" = 0.8 \, \text{mm}$ $1/16" = 1.6 \, \text{mm}$ 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

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.

Stainless

		Pore Size	Frit Thickness	Steel Prod No	Hastelloy C Prod No	Titanium <i>Prod No</i>
Pkg of 5:	1/32" frits	0.2µ	0.25 mm	.2FR.5-5	_	_
		0.5µ	0.25 mm	.5FR.5-5	_	_
		2μ	0.25 mm	2FR.5-5	_	_
Pkg of 10:	1/16" frits	0.5µ	0.75 mm	.5FR1-10	.5FR1HC-10	_
		2µ	0.75 mm	2FR1-10	2FR1HC-10	2FR1TI-10
		10µ	0.75 mm	10FR1-10	_	_
Pkg of 10:	1/8" frits	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	2FR2TI-10
		10µ	1.00 mm	10FR2-10	_	_
Pkg of 10:	1/4" frits	0.5µ	1.00 mm	.5FR4-10	_	_
		2µ	1.00 mm	2FR4-10	2FR4HC-10	2FR4TI-10
		10µ	1.00 mm	10FR4-10	10FR4HC-10	_

Replacement screens

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 ZBRI IFR42 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.

				Stainless Steel
	Package of 10:	Pore Size	Screen Thickness	Prod No
•	1/32" screens	<1µ 1µ 2µ 10µ	0.040 mm 0.050 mm 0.075 mm 0.125 mm	.5SR.5-10 1SR.5-10 2SR.5-10 10SR.5-10
	1/16" screens	<1μ 1μ 2μ 10μ	0.040 mm 0.050 mm 0.075 mm 0.125 mm	.5SR1-10 1SR1-10 2SR1-10 10SR1-10
	1/8" screens	<1µ 1µ 2µ 10µ	0.040 mm 0.050 mm 0.075 mm 0.125 mm	.5SR2-10 1SR2-10 2SR2-10 10SR2-10
ed in on. For e size will r, but the	1/4" screens	<1μ 1μ 2μ 10μ	0.040 mm 0.050 mm 0.075 mm 0.125 mm	.5SR4-10 1SR4-10 2SR4-10 10SR4-10

TECH TIP

Our screen materials are describe terms of nominal micron retentio example, a screen with a 2 µ pore retain most particles 2 µ or larger, 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	Absolute
	retention	retention
<1µ	<1µ	5-6µ
1μ	1μ	6-7µ
2µ	2μ	7-8µ
1011	1011	11-1311

HROM alytic +61(0)3 9762 2034 ECH nology Pty Ltd Website NEW: www.chromalytic.net.au E-mail: info@chromtech.net.au Tel: 03 9762 2034 . . . in AUSTRALIA

Australian Distributors Importers & Manufacurers www.chromtech.net.au

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.

Size	Prod No
3/16"	SWH3
1/4"	SWH4



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.



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".



HRON 256 +61(0)3 9762 2034 ECH 100 9 Pty Ltd Website NEW: www.chromalytic.net.au E-mail: info@chromtech.net.au Tel: 03 9762 2034 . . . in AUSTRALIA

TECH TIP

If a fused silica tube breaks off in a throughtype 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.



Open end wrenches

Size	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



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 on the facing page), and for enlarging the inner diameter of fused silica adapters.

Prod No

PV

Template

This tool is just what you need when you're 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



Mirror

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





MORE INFORMATION

Tightening tools for PEEK fittings......67
Tubing accessories 90.92

Cheminert® fittings

INERT AND BIOCOMPATIBLE

Cheminert fittings are available for high and low pressure applications, and 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.

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.

High pressure 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 $\mu l/min$ range, when the transfer volume can be critical.

360 Micron Nanovolume® Fittings

Our newest 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 50 - 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.

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

MORE INFORMATION

High pressure Cheminert fittings......pp 57-67
Low pressure Cheminert fittings......68-77
Nanovolume® fittings.....57-61
Valco fittings.....6-55

CONVERSIONS

10,000 psi = 689.5 bar20,000 psi = 1,378.9 bar





- For direct connection of 360 µm tubing
- Work with metal, fused silica, or PEEK
- Up to 20,000 psi (liquid) with metal or fused silica tubing
- Snap-in rotating ferrule for "one-piece" fitting with no tubing twist
- Eliminate use of liners

Our new 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. 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.

Tees and crosses offer a choice of three bore sizes, and feature a "quickmount" base with adhesive backing to make sure that the fitting is stable and fragile tubing doesn't get broken. There is also a quick-mount PEEK union.

For PEEK or fused silica tubing — up to 10,000 psi liq*

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 an integral base with double stick tape to secure fittings to a surface.

*or burst pressure of tubing

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

Valco 360 micron reducers 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.

Internal fittings...pg 38



MORE INFORMATION

Nanovolume® fittings
For fused silica tubing,
10,000+ psi liq ..pg 58
For metal tubing,
up to 20,000 psi liq . 58
1/32" Nanovolume®
fittings59-61
Injectors with
360 micron fittings...154

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

Nut/ferrules, caps, plugs, tightening tool

ool for 360 μm tubing

	Prod No
Nut/ferrule	C360NFPK
Cap	C360CPK
Plug	C360PPK
Tightening tool	C360ET

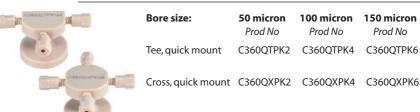
Unions and reducing unions

for 360 µm tubing

COMOGUPAGE III	Bore size:	50 micron <i>Prod No</i>	100 micron Prod No	150 micron Prod No
	Union, quick mount	C360QUPK2	C360QUPK4	C360QUPK6
	Union	C360UPK2	C360UPK4	C360UPK64
	Reducing union, 1/16" to 360 µm	_	_	C360RU1PK6

Tees and crosses

for 360 µm tubing





For fused silica tubing — 10,000 psi liq and above*

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.

Nut/ferrules and caps

for 360 µm FS tubing

Prod No

C360NFFS Nut/ferrule

Cap C360CFS

Unions and reducing unions

for 360 µm FS tubing

	Bore size:	50 micron <i>Prod No</i>	100 micron Prod No	150 micron Prod No
	Union	C360UFS2	C360UFS4	C360UFS6
	Reducing unions, 1/32" to 360 µm	C360RU.5FS2	C360RU.5FS4	C360RU.5FS6
===	Reducing union, 1/16" to 360 µm	_	_	C360RU1FS6

For metal tubing — up to 40,000 psi liq**

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



Nut/ferrule

Prod No C360NFS6



C360C

Unions and reducing unions

for 360 µm tubing

	Bore size:	50 micron <i>Prod No</i>	100 micron <i>Prod No</i>	150 micron <i>Prod No</i>
	Union	C360US62	C360US64	C360US66
=======================================	Reducing unions, 1/32" to 360 µm	C360RU.5S62	C360RU.5S64	C360RU.5S66
===	Reducing union, 1/16" to 360 µm	_	_	C360RU1S66

1/32" Nanovolume® fittings 59-61 **CONVERSIONS**

360 µm tubing

 $50 \, \mu m = .002$ " $100 \, \mu m = .004$ " $150 \, \mu m = .006$ " 1/32" = 0.8 mm1/16" $= 1.6 \, \text{mm}$

DIRECT CONNECTIONS TO 1/32" AND 1/16" Valco 360 micron reducers directly connect 360 µm

tubing to 1/16" or 1/32" Valco valve or fitting details,

providing a positive leakfree seal with zero dead

Internal fittings p 38 External fittings.....39

C72MUp 154 C72MX154 **MORE INFORMATION** 360 µm Nanovolume® fittings for use below 10,000 psi liq. . 57

Electroformed nickel, 87 PEEK90

volume.

TECH TIP Use these metal 360 micron nuts with nano

injectors:

NOTE

For metal 360 µm tees and crosses contact the factory.



60 (of 292) (2012-16) # 65

^{*}or burst pressure of tubing



Designed for high resolution capillary HPLC, Cheminert Nanovolume® connectors include our one-piece 1/32" fingertight fittings, with a patented* collapsible ferrule that makes fingertight 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.

Internal nut with collapsible ferrule

C-NNFFPK

Prod No

For use with: Fittings on pages 59-61

C-EN.5FPKB

External nut

For use with: Unions on page 60

Column end fittings on page 61

Note: Requires collapsible PEEK ferrule, below



Collapsible PEEK ferrule ZGF.5PK

For use with: External nut, above



Internal plug C-NPFPK

For use with: Fittings on page 59-60

Unions

for 1/32" tubing



100 µm bore 150 µm bore Prod No Prod No

Union for 1/32" PEEK or

C-NEU.5XFPK C-NEU.5FPK

electroformed nickel tubing

Does not require or include liners.

Reducing unions

1/16" to 1/32" tubing



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

100 um bore 150 um bore Prod No

Tee 1/32" tubing or fused silica* 1/32" tubing or fused silica* C-NTXFPK C-NTFPK C-NYXFPK C-NYFPK

Prod No

Cross 1/32" tubing or fused silica*

C-NXFPK C-NXXFPK

*A liner is needed for use with fused silica. Order 27 mm length, page 60.





Tubing

TECH TIP

separately.

Our liners adapt

Nanovolume® tees, Y's, and crosses for use

with fused silica tubing.

Liners page 60

MORE INFORMATION 360 µm fittings . .pp 57-58

PEEK90

nickel.....87

tubing......60

1/32" Nanovolume® column end fittings..61

Electroformed

Unions for fused silica

They must be ordered

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



For use with: 10 port valve CN2-4340 C-NVISF fill port

for 26 gauge needles



Consult factory regarding CN2 and CN4 valves

*U.S. patent no. 6 575 501



Nanovolume® unions and liners ■ for FS tubing

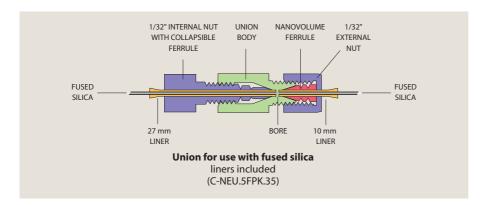
CHEMINERT FITTINGS

Unions

for fused silica tubing

		100 µm bore	150 µm bore
	FS tubing OD	Prod No	Prod No
Union for fused silica tubing	125 -175 μm	C-NEU.5XFPK.15	C-NEU.5FPK.15
Includes liners.	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





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.

27 mm liners

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

1/32" Nanovolume® frits

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

Pkg/5:	Pore size	Prod No
	0.2 micron	.2FR.5-5
	0.5 micron	.5FR.5-5
	2 micron	2FR.5-5







Screen embedded in end of liner for 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. 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.

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

100 µm bore

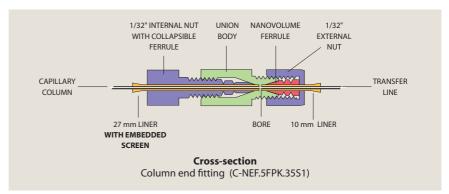
Column end fittings

for fused silica capillary columns

150 µm bore



Each:	For tubing OD	Prod No	Prod No
Column end fitting	125 - 175 μm	C-NEF.5XFPK.15S1	C-NEF.5FPK.15S1
for fused silica tubing	175 - 225 μm	C-NEF.5XFPK.20S1	C-NEF.5FPK.20S1
Includes liners	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



TECH TIP

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

CONVERSIONS

 $100 \, \mu m = .004$ " $150 \, \mu m = .006$ " $0.25 \, \text{mm} = .010$ " $0.50 \, \text{mm} = .020$ " 0.75 mm = .030" 1.0 mm = .040" 1.5 mm = .060" 2.0 mm = .080" $4.6 \, \text{mm} = .180''$ $6.0 \, \text{mm} = .236$ " $6.4 \, \text{mm} = .253''$ $7.0 \, \text{mm} = .275''$ $10.0 \, \text{mm} = .400$ " 27.0 mm = 1.08" $1/32" = 0.8 \, \text{mm}$ 1/16" = 1.6 mm 1/8" $= 3.2 \, \text{mm}$ 1/4"

 $= 6.4 \, \text{mm}$

= 9.5 mm

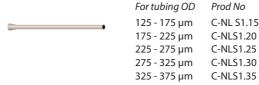
3/8"

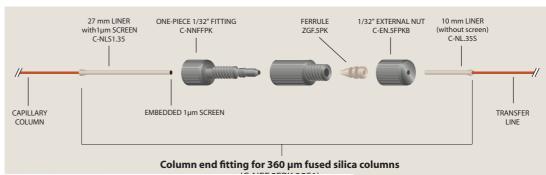
Replacement liners for column end fittings

for FS capillaries

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

27 mm liners for column end fittings





High pressure ■ PEEK fittings

CHEMINERT FITTINGS

No twist one-piece fittings

for 1/32" and 1/16" tubing

These patented* 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.

Package of 5:	Length	Glass-filled PEE ferrule Prod No	K PEEK ferrule Prod No	CTFE ferrule Prod No
1/32" hex	Short	ZNF.5PKG-5	ZNF.5PK-5	_
1/16" hex	Short Medium Long	ZNF1PKG-5 MZNF1PKG-5 LZNF1PKG-5	ZNF1PK-5 MZNF1PK-5 LZNF1PK-5	ZNF1KF-5 MZNF1KF-5 LZNF1KF-5
1/16" fingerti	ght	ZNF1FPKG-5	ZNF1FPK-5	ZNF1FKF-5

^{*} Patent No. 7,316,777



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" $1/32" = 0.8 \, \text{mm}$ $1/16" = 1.6 \, \text{mm}$ $1/8" = 3.2 \, \text{mm}$ 1/4" $= 6.4 \, \text{mm}$ 3/8" = 9.5 mm

1/2" = 12.7 mm



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.

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.

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

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.

	PEEK Gla	ss-filled PEEK
Package of 10:	Prod No	Prod No
1/32"	ZF.5PK-10	ZF.5PKG-10
1/16"	ZF1PK-10	ZF1PKG-10
1/8"	ZF2PK-10	ZF2PKG-10
1/4"	ZF4PK-10	ZF4PKG-10
3/8"	ZF6PK-10	ZF6PKG-10
1/2"	ZF8PK-10	ZF8PKG-10

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. They are not recommended for use with PEEK tubing.

Package of 10:	Prod No
1/32"	ZGF.5PK-10
1/16"	7GF1PK-10

^{*} Patent no. 6,575,501.

Chemical resistance; up to 125°C

MORE INFORMATION

Tightening tool for hex-head PFFK nuts. 67

High pressure ■ PEEK fittings

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 63.) PEEK caps include a PEEK nut and ferrule.

Description	Length	PEEK plugs	PEEK caps
	of nut*	Prod No	Prod No
1/32" fingertight	.42"	ZP.5FPK	ZC.5FPK
1/32" fingertight	.54"	LZP.5FPK	—
1/16" fingertight	.87"	ZP1FPK	ZC1FPK
1/16" hex	.62"	MZP1PK	ZC1PK
1/16" long hex	.87"	LZP1PK	—
1/8" hex	.62"	ZP2PK	ZC2PK



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.

Description	Length of nut*	Prod No
1/16" hex	.62"	C-MZP1PK
1/16" long hex	.87"	C-LZP1PK
1/16" fingertight	.88"	C-ZP1FPK



Tees and crosses - high pressure PEEK

Tees connect three lines. Crosses connect four lines. The 1/32" and 1/16" nuts are fingertight; 1/8" nuts are hex, for wrench tightening.

Tubing	Bore	PEEK tees	PEEK crosses
OD		Prod No	Prod No
1/32"	0.25 mm	ZT.5FPK	ZX.5FPK
	0.50 mm	ZT.5LFPK	ZX.5LFPK
1/16"	0.25 mm	ZT1CFPK	ZX1CFPK
	0.50 mm	ZT1MFPK	ZX1MFPK
	0.75 mm	ZT1FPK	ZX1FPK
	1.00 mm	ZT1LFPK	ZX1LFPK
1/8"	0.75 mm	ZT2PK	ZX2PK
	2.00 mm	ZT2LPK	ZX2LPK



POLYMERS AT A GLANCE

PEEK (PK)..... page 256 Chemical resistance: up to 125℃

TECH TIP

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

PEEK ferrules 63	
PFA ferrules13	

MORE INFORMATION

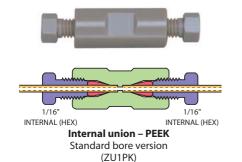
Low pressure plugs....71 Tightening tool for hex-head PEEK nuts..67

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" $1/32" = 0.8 \, \text{mm}$

1/16" = 1.6 mm 1/8" $= 3.2 \, \text{mm}$ 1/4" = 6.4 mm

3/8" $= 9.5 \, \text{mm}$ 1/2" = 12.7 mm





(ZBU1FPK)

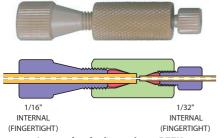


Bulkhead hex internal union – PEEK (ZBU1PK)

Internal unions - high pressure PEEK

The 1/32" nuts are fingertight; 1/16" nuts are available in a choice of fingertight or hex; and 1/8" nuts are hex, for wrench tightening.

Tubing OD	Bore	Standard Prod No		ulkhead el hole diameter
1/32" fingertig	ght			
	0.25 mm	ZU.5FPK	ZBU.5FPK	5/16"
	0.50 mm	ZU.5LFPK	ZBU.5LFPK	5/16"
	1/32"	ZU.5TFPK	ZBU.5TFPK	5/16"
1/16" fingertic	ght			
	0.25 mm	ZU1CFPK	ZBU1CFPK	3/8"
	0.50 mm	ZU1MFPK	ZBU1MFPK	3/8"
	0.75 mm	ZU1FPK	ZBU1FPK	3/8"
	1/16"	ZU1TFPK	ZBU1TFPK	3/8"
1/16" hex				
	0.25 mm	ZU1CPK	ZBU1CPK	3/8"
	0.50 mm	ZU1MPK	ZBU1MPK	3/8"
	0.75 mm	ZU1PK	ZBU1PK	3/8"
	1/16"	ZU1TPK	ZBU1TPK	3/8"
1/8" hex	0.75 mm	ZU2PK	ZBU2PK	7/16"
	2.0 mm	ZU2LPK	ZBU2LPK	7/16"
	1/8"	ZU2TPK	ZBU2TPK	7/16"



Internal reducing union – PEEK
Standard bore
(ZRU1.5FPK)



Bulkhead internal reducing union – PEEK (ZBRU1.5FPK)

Internal reducing unions – high pressure PEEK

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

Tubing OD	Bore	Standard Prod No		ulkhead el hole diameter
1/16" to 1/32"	0.25 mm 0.50 mm 1/32"	ZRU1.5FPK ZRU1.5LFPK ZRU1.5TFPK		5/16" 5/16" 5/16"
1/8" to 1/32"	0.25 mm 0.50 mm 1/32"	ZRU2.5FPK ZRU2.5LFPK ZRU2.5TFPK	2011021021111	3/8" 3/8" 3/8"
1/8" to 1/16"	0.25 mm 0.75 mm 1.00 mm 1/16"	ZRU21CFPK ZRU21FPK ZRU21LFPK ZRU21TFPK	ZBRU21CFPK ZBRU21FPK ZBRU21LFPK ZBRU21TFPK	3/8" 3/8" 3/8" 3/8"

Internal/external reducing union - high pressure PEEK





Nanovolume® reducing union – PEEK (ZERU1.5FPK)



One-piece fingertight fittings – color-coded PEEK

These molded fingertight fittings are rated to 5000 psi (350 bar), so they can be used in virtually any HPLC fitting detail with 10-32 threads. Six colors allow easy identification of tubing lines.

Package of 5:

Color	Prod No
Natural	JR-55020-5
Black	JR-55021-5
Red	JR-55022-5
Yellow	JR-55023-5
Blue	JR-55024-5
Green	JR-55025-5



One-piece PEEK fingertight fittings – narrow hex-head

This natural PEEK machined fitting has a narrow hex head and 10-32 threads.

Package of 5:

Color Prod No JR-5508-5 Natural



Color-It fingertight adapters

Use Color-It snap-on extensions to color-code our 1/4" hex-head nuts, and turn the nut into a fingertight fitting at the same time. Color-It adapters are available in six different colors, and can be used with PEEK and stainless hexhead nuts.

Package of 5:

Color	Prod No
Blue	JR-55010-5
Yellow	JR-55011-5
Green	JR-55012-5
Black	JR-55013-5
White	JR-55014-5
Red	JR-55015-5



Package of 12:

Color Prod No JR-55016-12 Multi-color (2 of each color)

CAUTION

One-piece combination nuts and ferrules are not for high pressure gas service.

MORE INFORMATION

Color-coded PEEK tubing ... page 91

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" $1/32" = 0.8 \, \text{mm}$ 1.6 mm

1/8"

1/4"

3/8"

 $= 3.2 \, \text{mm}$

 $= 6.4 \, \text{mm}$

= 9.5 mm 1/2" = 12.7 mm



PEEK starter kit

In LC applications involving proteins, peptides, nucleic acids, or other samples of biological origin, metal systems may interact with samples or release transition metals that will deactivate columns. The PEEK starter kit facilitates replacement of stainless steel tubing, fittings, ferrules, mobile phase filters, etc., to create a biocompatible environment for samples and mobile phase.

Prod No

PEEK starter kit JR-35P

Includes:

- 1 Plastic box
- 10 PEEK one-piece fittings, 10-32
- 5 PEEK fingertight fittings
- 5 PEEK nuts, hex-head, long
- 20 PEEK ferrules, double-ended, 1/16"
 - PEEK union, HP body only, 10-32
 - 2 Tubing elbows, 90°
 - 2 Tubing elbows, 180°
 - PEEK filter, in-line, incl. PAT frit, 5 μm
- 1 Clean-cut tubing cutter
- 1 Last Drop PTFE filter, 5 μm

3m PEEK tubing, 1/16" x 0.25 mm ID, blue stripe

3m PEEK tubing, 1/16" x 0.50 mm ID, orange stripe

1 Tweezers



Tightening tools for Valco and Cheminert fittings

These handy tools make it fast and easy to tighten hexhead fittings. The red version is for use with the C360 series fittings shown on pages 57-58. The green tool is for any 1/32" fitting with a 3/16" hex head nut, and 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 new C25G selector on page 178.

ColorFor use withProd NoRed360 µm fittingsC360ETGreen1/32" fittings (6-40 threads)CNFTBlue1/16" fittingsZNFTBlack6-40 fittings for C25G valvesCGFT

MORE INFORMATION

Hex-head PEEK fittings 360 µm...... page 57 1/32".........62-63 1/16"

High pressure....62-63 Low pressure71 C25G selectors 178

Low pressure ■ Flangeless tube end fittings

CHEMINERT 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.

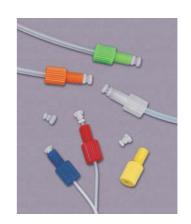
Flangeless tube end fittings

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.)

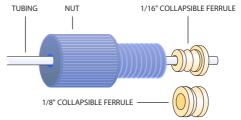


* Patent No. 6,575,501

Elangologe fittings

Flangeless fi with CTFE fe	-	1/16" OD	1/8" OD
(pkg/	5)	Prod No	Prod No
Black Blue Brow		CFL-1BK CFL-1BE CFL-1BR	CFL-2BK CFL-2BE CFL-2BR
Dark Greei Laver		CFL-1DG CFL-1G CFL-1L	CFL-2DG CFL-2G CFL-2L
Natur Oran Purpl	ge	CFL-1N CFL-1E CFL-1P	CFL-2N CFL-2E CFL-2P
Red White Yellov		CFL-1R CFL-1W CFL-1Y	CFL-2R CFL-2W CFL-2Y
Assorted flan	geless fitting 12, one of eac		
	CTFE ferrule PEEK ferrule		CFL-2A CFL-2A-PK
Replacemen	ts		
PEEK ferrules CTFE ferrules PEEK nuts	11 3 /	CFL-CB1PK CFL-CB1KF CFL-1PK	CFL-CB2PK CFL-CB2KF CFL-2PK
Setting tool		CST	CST

1/16" OD



Flangeless tube end fitting

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

= 12.7 mm

Standard flanged tube end fittings The basic component of the Cheminert s

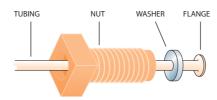
1/4-28



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 70). 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.



Flanged tube end fitting

Flanged fittings	1/16" OD	1/8" OD
(pkg/10)	Prod No	Prod No
Black	CF-1BK	CF-2BK
Blue	CF-1BE	CF-2BE
Brown	CF-1BR	CF-2BR
Dark gray	CF-1DG	CF-2DG
Green	CF-1G	CF-2G
Lavender/pink	CF-1L	CF-2L
Natural	CF-1N	CF-2N
Orange	CF-1E	CF-2E
Purple	CF-1P	CF-2P
Red	CF-1R	CF-2R
White	CF-1W	CF-2W
Yellow	CF-1Y	CF-2Y
Assorted flangeless fittings (pkg/12, one of e		CF-2A
Washers (pkg/10)	CF-W1	CF-W2

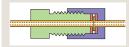
TECH TIP

To make up standard flanged tube end fittings, use the flanging tool on page 70.

A flanging starter kit, complete with flanging tool, flanging tips, and an array of tubing and fittings, is also available. (See page 70)

TECH TIP

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



MORE INFORMATION

High pressure fittingspp 57-67 PTFE and FEP tubing 92

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.

Package of 5:	PEEK	CTFE
Tubing OD	Prod No	Prod No
1/16"	CEN1PK	CEN1KF
1/8"	CFN2PK	CFN2KF



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 230 VAC	CFT-110 CFT-220

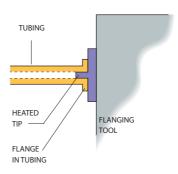
Flanging tool accessories

Flanging tips

for tubing ID \leq 0.25 mm CFT-TXC \leq 0.75 mm CFT-TC

> ≤ 1.00 mm CFT-TM ≤ 1.50 mm CFT-TL ≤ 2.00 mm CFT-TXL

Razor blades (pkg/10) CFT-R **Tubing holder** CFT-H



Forming a tubing flange



Cheminert starter kits

(Non-CE)

Starter kits come in either 1/16" or 1/8" versions, with flanging tools for 110 VAC or 230 VAC.

		110 VAC	230 VAC
		Prod No	Prod No
Starter	kits		
	1/16" tubing	CFT1K-110	CFT1K-220
	1/8" tubing	CFT2K-110	CET2K-220

The starter kit includes:

1 flanging tool with 3 flanging tips 1 tubing holder 20 standard tube end fittings 20 stainless steel washers 10 couplings 20 feet of PTFE tubing 1/16" OD x 0.030" ID or 1/8" OD x .060" ID 1 male luer adapter 1 female luer adapter 1 plug 1 tee 1 glass connector



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MORE INFORMATION			
Standard tube end			
fittings page 69			
Stainless steel			
washers 69			
Couplings			
Male luer adapter76			
Female luer adapter 76			
Plug71			
Tee74			
Glass connector 73			

CHEMINERT FITTINGS



Easy-Flange kit

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 the 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 Easy-Flange kit

Includes:

Plastic box

Flanging discs with:

0.5 mm SS pin for PEEK tubing

0.8 mm polymer pin

0.8 mm titanium pin

1.3 mm polymer pin

1.3 mm titanium pin

Clean-cut tubing cutter

6 feet of PTFE tubing, 1/16" x 0.75 mm ID



Plugs

1/4-28 and 1/2-20

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

		PEEK	CIFE	Deirin
		Prod No	Prod No	Prod No
Pkg/5:	1/4-28	CPPK	CPKF	_
Pkg/1:	1/2-20	_	CP-4K	CP-4D



MORE INFORMATION Clean-cut tubing

Tightening tool for

CONVERSIONS $0.25 \, \text{mm} = .010$ " $0.50 \, \text{mm} = .020$ " 0.75 mm = .030" 1.0 mm = .040" 1.5 mm = .060" 2.0 mm = .080"4.6 mm = .180" $6.0 \, \text{mm} = .236$ " 6.4 mm = .253"

cutter page 92

hex-head PEEK nuts..67

 $7.0 \, \text{mm} = .275$ " $10.0 \, \text{mm} = .400$ "

27.0 mm = 1.08"

 $1/32" = 0.8 \, \text{mm}$ 1/16" = $1.6 \, \text{mm}$

 $= 3.2 \, \text{mm}$

1/8"

1/4"

3/8"

Low pressure PEEK plugs

10-32

These all-PEEK plugs are for use in Cheminert PEEK fittings and low pressure polymeric valves (C20Z and C30Z series). For high pressure polymeric valves (C1-C5 series), use the plugs on page 64.

		PEEK
Package of 1:	Length of nut*	Prod No
1/16" hex	.62"	MZP1PK
1/16" long hex	.87"	LZP1PK
1/16" fingertight	.88"	ZP1FPK



Caps

1/4-28

Caps are used to close off lines with 1/4-28 tube end fittings.

	PEEK	CTFE
Package of 5:	Prod No	Prod No
	CCPK-5	CCKF-5



 $= 6.4 \, \text{mm}$ = 9.5 mm - 127 mm Australian Distributors HROM = 1 y tic +61(0)3 9762 2034 Importers & Manufacurers www.chromtech.net.au ECH no logy Pty Ltd

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Low pressure ■ Unions

CHEMINERT FITTINGS

Cheminert to Cheminert 1/4-28 to 1/4-28 Unions

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.

Tubing	Bore	PEEK	CTFE
OD		Prod No	Prod No
1/16"	0.25 mm	CUCPK	CUCKF
1/16"	0.50 mm	CUPK	CUKF
1/16"	0.75 mm	CUMPK	CUMKF
1/8"	1.50 mm	CULPK	CULKF



Polypropylene

Package/5:		Prod No	
1/8" Butt		CUTPP	

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.

Tubing OD	Bore	PEEK Prod No	CTFE Prod No	316 Stainless Prod No
1/16"	0.25 mm	CZUCPK	CZUCKF	CZUCS6
1/16"	0.50 mm	CZUPK	CZUKF	CZUS6
1/16"	0.75 mm	CZUMPK	CZUMKF	CZUMS6



Cheminert to 1/4" tubing Unions

1/4-28 to 1/2-20

Include flangeless 1/4-28 and 1/2-20 fittings.

Tubing		PEEK	CTFE
OD	Bore	Prod No	Prod No
1/8" to 1/4"	1.50 mm	CU4LPK	CU4LKF





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" $1/32" = 0.8 \, \text{mm}$ 1/16" = 1.6 mm 1/8" = 3.2 mm

= 6.4 mm

= 9.5 mm 1/2" = 12.7 mm

1/4"

3/8"

CHEMINERT FITTINGS

Bulkhead unions Cheminert to Cheminert 1/4-28 to 1/4-28

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

Tubing	Bore	PEEK	CTFE	316 Stainless
OD		Prod No	Prod No	Prod No
1/16"	0.25 mm	CBUCPK	CBUCKF	CBUCS6
1/16"	0.50 mm	CBUPK	CBUKF	CBUS6
1/16"	0.75 mm	CBUMPK	CBUMKF	CBUMS6
1/8"	1.50 mm	CBULPK	CBULKF	CBULS6



Bulkhead 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" OD tubing.

Tubing		PEEK	CTFE	316 Stainless
OD	Bore	Prod No	Prod No	Prod No
1/16"	0.25 mm	CZBUCPK	CZBUCKF	CZBUCS6
1/16"	0.50 mm	CZBUPK	CZBUKF	CZBUS6
1/16"	0.75 mm	CZBUMPK	CZBUMKF	CZBUMS6



Low pressure **Te**s, crosses, and **aniblds**

CHEMINERT FITTINGS

1/4-28 Tees

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

Tubing OD	Bore	PEEK Prod No	CTFE Prod No
1/16" 1/16" 1/16"	0.25 mm 0.50 mm 0.75 mm	CTCPK CTPK CTMPK	CTCKF CTKF CTMKF
1/8"	1.50 mm	CTLPK	CTLKF



Crosses 1/4-28

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

Tubing OD	Bore	PEEK Prod No	CTFE Prod No
1/16" 1/16" 1/16"	0.25 mm 0.50 mm 0.75 mm	CXCPK CXPK CXMPK	CXCKF CXKF CXMKF
1/8"	1.50 mm	CXLPK	CXLKF



Manifolds 1/4-28

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

Tubing	Bore	PEEK	CTFE
OD		Prod No	Prod No
5 ports 1/16" 1/8"	0.75 mm	C5M1PK	C5M1KF
	1.50 mm	C5M2PK	C5M2KF
9 ports 1/16" 1/8"	0.75 mm	C9M1PK	C9M1KF
	1.50 mm	C9M2PK	C9M2KF



MORE INFORMATION

Flangeless tube end fittings page 68

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"

 $1/32" = 0.8 \, \text{mm}$

1/16" = 1.6 mm

1/8" = 3.2 mm

1/4"

 $= 6.4 \, \text{mm}$ 3/8" = 9.5 mm

1/2" = 12.7 mm

CHEMINERT FITTINGS



Mixing tees

1/4-28

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

Tubing		PEEK	CTFE
OD	Bore	Prod No	Prod No
1/16"	0.75 mm	CM1XPK	CM1XKF
1/8"	1.50 mm	CM2XPK	CM2XKF

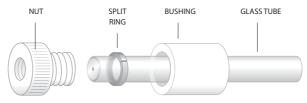


Glass connectors

1/4-28 female to 1/4" glass tube

Glass connectors join a Cheminert tube end fitting to 1/4" OD glass tubing. Complete assemblies include a bushing and nut, a polypropylene or CTFE split ring, and a 1/4" OD x 3-1/4" long piece of 1 mm or 2 mm ID glass tube. This connector works only with our glass tubes.

		Acetal	CTFE
	Description	Prod No	Prod No
	Complete assembly		
	1 mm ID glass tubing	CGC41	CGC41KF
	2 mm ID glass tubing	CGC42	CGC42KF
Components			
	Bushing	CGCB	CGCBKF
	Nut	CGCN	CGCNKF
	Glass tube, 3-1/4" long		
	1 mm ID	CGCG41	_
	2 mm ID	CGCG42	_
	Split rings (package of 5)	CGCR	CGCRKF



Glass connector

Low pressure **A**apters

CHEMINERT FITTINGS

Tube adapters

1/4-28

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

Tubing		PEEK	CTFE	316 Stainless
OD	Bore	Prod No	Prod No	Prod No
1/8"	1.5 mm	CTA2PK	CTA2KF	CTA2S6
1/4"	1.5 mm	CTA4PK	CTA4KF	CTA4S6



Luer adapters

Luer to 1/4-28 or 10-32

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

		PEEK	CTFE	PFA
Description	Bore	Prod No	Prod No	Prod No
Female luer				
to 1/4-28 male	1.50 mm	CFLAPK	CFLAKF	CFLAPFA
to 10-32 female	0.75 mm	ZUFLPK	ZUFLKF	_
Male luer				
to 1/4-28 male	1.50 mm	CMLAPK	CMLAKF	CMLAPFA



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
Description	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



CHEMINERT FITTINGS



Pipe adapters

1/4-28 to NPT

Versions adapt male or female 1/4-28 fittings to male or female NPT.

NPT	Bore	PEEK Prod No	CTFE Prod No	
Female	1/4-28 to mal	e NPT		
1/8"	1.5 mm	CPA2PK	CPA2KF	
1/4"	1.5 mm	CPA4PK	CPA4KF	
Male 1	/4-28 to male I	NPT		
1/8"	1.5 mm	CEPA2PK	CEPA2KF	
1/4"	1.5 mm	CEPA4PK	CEPA4KF	
Female 1/4-28 to female NPT				
1/8"	1.5 mm	CFPA2PK	CFPA2KF	
1/4"	1.5 mm	CFPA4PK	CFPA4KF	



Cheminert 1/4-28 to Valco 10-32 ZDV adapter

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

Description Prod No Bore Port adapter 0.50 mm ZLCA1PK

One-piece fingertight column coupler

Choose from a variety of coupler IDs, indicated by the color of the sleeve (which parallels the color-coding of our PEEK tubing on page 91). 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.

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

CONVERSIONS

 $0.25 \, \text{mm} = .010$ "

 $0.50 \, \text{mm} = .020$ " 0.75 mm = .030"

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

2.0 mm = .080"

4.6 mm = .180"

 $6.0 \, \text{mm} = .236$ " 6.4 mm = .253"

7.0 mm = .275"

 $10.0 \, \text{mm} = .400$ "

27.0 mm = 1.08" $1/32" = 0.8 \, \text{mm}$

1/16" = $1.6 \, \text{mm}$ $1/8" = 3.2 \, \text{mm}$

1/4" = 6.4 mm

3/8" = 9.5 mm 1/2" = 127 mm

Australian Distributors HROM = 1 y tic +61(0)3 9762 2034 Importers & Manufacurers www.chromtech.net.au ECH nology Pty Ltd Website NEW: www.chromalytic.net.au E-mail: info@chromtech.net.au Tel: 03 9762 2034 . . . in AUSTRALIA

Filters and Prifit fittings

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
Kit with 2 of each size above	C-PF



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. (Fitting shown is not included.)

Pore size	Prod No
2 micron 10 micron	CFE-S2 CFE-S10
75 micron	CFE-S75



Biocompatible filter

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 tightened by hand.

Tubing OD	Bore	Prod No
1/16"	0.5 mm	ZU1FPK.5

Replacement elements (PEEK-encapsulated titanium)

Pore size Prod No
0.5 micron C-F1.5Tl





CONVERSIONS

0.25 mm = .010" $0.50 \, \text{mm} = .020$ " 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" $1/32" = 0.8 \, \text{mm}$ 1/16" = 1.6 mm 1/8" = 3.2 mm 1/4" $= 6.4 \, \text{mm}$ 3/8" = 9.5 mm 1/2" = 12.7 mm

CHEMINERT FITTINGS



Last Drop mobile phase filter

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

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. The filter/sparger features a PEEK tripod connector for the solvent line, and a 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



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
2 micron	C-MPFTI2
10 micron	C-MPFTI10

Filters

CHEMINERT FITTINGS

No-Met biocompatible mobile phase filter

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*.

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

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



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.

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

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





CONVERSIONS

0.25 mm = .010" $0.50 \, \text{mm} = .020$ " 0.75 mm = .030" 1.0 mm = .040" 1.5 mm = .060" 2.0 mm = .080" $4.6 \, \text{mm} = .180''$ 6.0 mm = .236" 6.4 mm = .253"7.0 mm = .275" 10.0 mm = .400" 27.0 mm = 1.08" $1/32" = 0.8 \, \text{mm}$ 1/16" = 1.6 mm 1/8" = 3.2 mm 1/4" $= 6.4 \, \text{mm}$

 $= 9.5 \, \text{mm}$ 1/2" = 12.7 mm

3/8"

CHEMINERT FITTINGS



Mobile phase or solvent reservoirs

1/4-28

These high density polyethylene reservoirs for in-line solvent use come with polypropylene caps, 1/4-28 flangeless fittings, and 1/8" PTFE tubes for one or two lines plus vent. Plugs are included for conversion to solvent storage when the reservoir is removed from the system. Optional PTFE filters with titanium frits are available at the bottom of page 79.

Capacity	Сар	Prod No
0.5 liter	2-hole	C-MPR2
0.5 liter	3-hole	C-MPR3
0.5 liter	plain	C-BOT16
1.0 liter	plain	C-BOT32

VICI caps



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

		Proa No
VICI-cap	2 ports	JR-S-11001
	3 ports	JR-S-11002
	4 ports	JR-S-11003

TECH TIP

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

MORE INFORMATION

Bulkhead connectors ... page 73
Flangeless fittings ... 68
Plugs ... 71
Polymeric tubing 90-92



Valves for vials

Screw-cap Mininert valves 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.

Pkg/12:	Cap/thread size	Prod No
	13 mm-425 15 mm-425	PS-614158 PS-614160
	18 mm-400 20 mm-400 24 mm-400	PS-614161 PS-614170 PS-614163
	Crimp top	PS-614250



Liquid handling PUMPS AND ULTRA-HIGH PRESSURE VALVES

Diluter/dispensers, M series (Non-CE)

- Full liquid handling functionality
- Self-priming
- No syringes
- Largest volume range available
- Easy to use Wizard format does away with math problems and charts



Cheminert M Series diluter/ dispensers simplify the sample preparation process for dispensing and diluting liquids. A user-friendly Wizard format eliminates all the math calculations and charts usually associated with diluting and dispensing applications. Just enter the dilution ratio and the final volume, and the correct volume is calculated and automatically dispensed for each ratio.

For multiple dispenses, simply enter the volume and the number of dispense repetitions, and the Wizard calculates the total volume to be aspirated. It's that easy!

The diluter/dispenser is built around a patented syringe-free, bi-directional, positive displacement pump. This design approach gives the largest volume range available, and eliminates the inconvenience of having to change and refill syringes.

M10 Diluter/Dispensers

10 nl - 10 ml - M10 diluter/dispenser

Prod No CD10-4841-M1A

M50 Diluter/Dispensers

50 µl - 50 ml – M50 diluter/dispenser

Prod No

CD50-8182-M2A

Additional Features

"Smart" hand probe

The hand probe signals the operator when an aspirate or dispense step is completed. The unique design also allows the use of fixed or disposable probe tips, as well as other accessories.

Program memory

Up to 100 programs can be permanently stored.

Multi-solvent option

A multiposition stream selection valve can be easily integrated with the pump for multi-solvent applications.

Printer option

Print out methods, sequential steps, time/date/operator stamp, titration, and tubing volume values.

Applications

- Simple dispensing of reagents using the manual dispense mode
- Micro dispensing in microplates and genomic arrays
- Dilutions for AA, ICP, GC, and HPLC samples
- Serial dilutions for all samples
- Multi-sample and reagent additions, micro-plates, tube to plate, tube to tube
- Small and large volume dispensing of reagents
- Titrations



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.

RS-232 and RS-485 communication protocols are incorporated into the microprocessor-driven controller. (USB interface requires an adapter.) 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 1/8" diameter pistons in sapphire 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.

SPECS		
	M6	M50
Continuous minimum dispense	100 nl	50 µl
Continuous maximum dispense	•	25 ml/min
Maximum back pressure	100 psi	100 psi
Gravimetric precision		
for 125 μl	0.5%	0.8%
for 1.25 ml	0.05%	0.1%
Pump internal volume (µl)	100 ± 2 μl	625 ± 10 μl

Applications

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

HROM = 1 y tic +61(0)3 9762 2034



M6 pumps

10 nl - 10 ml

	Prod No
M6 pump with:	
Controller and stepper motor	CP2-4841-100M1
Stepper motor (no controller)	CP2-4841-100SM
M6 pump only	CP2-4841-100D

M50 pumps

50 μl - 50 ml

M50 pump with: Controller and stepper motor CP3-8182-625M2 Stepper motor (no controller) CP3-8182-625SM2 M50 pump only CP3-8182-625D

Prod No

Accessories and replacement parts

		Prod No
Pump motor		
M6		CP-DSM
M50		CP-DSM2
Controller, MicroLynx-4		CP-CM1-P
Standoff assembly *	2"	2SOAMPCP
	3"	3SOAMPCP
	4"	4SOAMPCP
	6"	6SOAMPCP

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"

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



Ultra-high pressure injector system

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 pushbuttons on the controller
- Laboratory computer via serial port communication
- Contact closure inputs

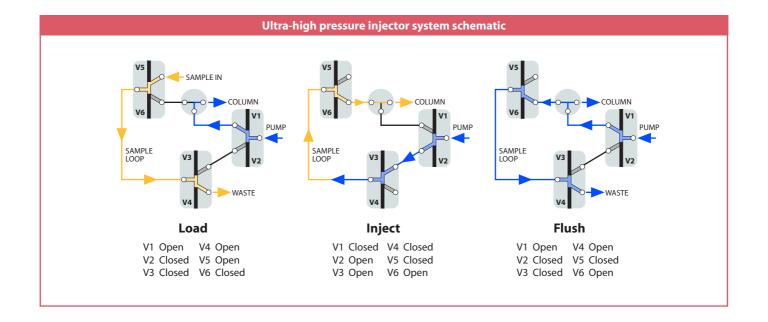
For more information, contact our technical department.

Ultra-high pressure injector system

for liquids

Prod No SPSS40





LIQUID HANDLING

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 213 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 219)



On/off valve 360 µm ZDV fittings

On/off valves for liquids

SPECS		Fitting size	Bore	Prod No
Temp	Pressure	360 µm	0.15 mm	ASFVO40K360
50°C	40,000 psi liq	1/32"	0.15 mm	ASFVO40K.5
		1/16"	0.15 mm	ASFVO40K1

Prime/purge valves for liquids

SPECS		Fitting size	Bore	Prod No
Temp	Pressure	360 µm	0.15 mm	ASFV40K360
50°C	40,000 psi liq	1/32"	0.15 mm	ASFV40K.5
		1/16"	0.15 mm	ASFV40K1



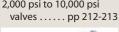
SPECS		Fitting size	Bore	Prod No
Temp	Pressure	360 µm	0.15 mm	ASFVOD40K360
50°C	40,000 psi liq	1/32"	0.15 mm	ASFVOD40K.5
		1/16"	0.15 mm	ASEVOD40K1



Prime/purge valve 360 µm ZDV fittings









TECH TIP

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



Tubing METAL AND POLYMERIC

We offer chromatography grade tubing in ODs of 360 μ m, 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.

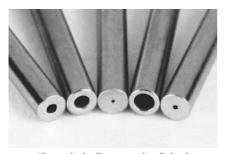
Cutting and Cleaning

The improper cutting and cleaning of metal tubing is the largest single cause of chromatographic problems and premature valve failure. The use of our precision cut and finished tubing with VICI fittings and valves maintains the flow uniformity and cleanliness that high performance systems require.

VICI's electrolytic cutting process yields polished tubing with flat ends, minimizing the potential for dead volumes or leaks caused by the uneven ends and burrs left by the tools common in the general laboratory environment – wire cutters, files, jewelers' saws, and most

tubing cutters. These non-precision cutters are likely to generate particulates and deform inner and outer diameters, which can introduce dead volume and flow anomalies.

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



File cut



Plier cut

TECH TIP

Forty 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

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" $6.4 \, \text{mm} = .253$ " $7.0 \, \text{mm} = .275$ " 10.0 mm = .400"

27.0 mm = 1.08" $1/32" = 0.8 \, \text{mm}$

1/8"

1/4"

3/8"

1.6 mm

 $= 3.2 \, \text{mm}$

 $= 6.4 \, \text{mm}$

= 9.5 mm

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.

A comparison of the interiors of commonly used tubing (below) shows the quality of the electroformed nickel tubing surface. (All photos are x500 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.

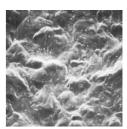
Custom IDs/ODs are available upon request.



Electroformed nickel (EFNi)



Nickel 200 alloy



Type 316 stainless steel

360 µm OD EFNi tubing

Custom lengths

Prices are per foot. 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	30 feet
.007"	TEFNI.110	50 feet

1/32" OD EFNi tubing

Custom lengths

Prices are per foot. 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	30 feet
.007"	TEFNI.507	50 feet
.010"	TEFNI.510	50 feet
.012"	TEFNI.512	50 feet
.015"	TEFNI.515	50 feet
.020"	TEFNI.520	50 feet

1/16" OD EFNi tubing

Custom lengths

Prices are per foot. See pricing note in box at left.

Tubing ID	Prod No	Max length
.020"	TEFNI120	25 feet
.030"	TEFNI130	35 feet
040"	TFFNI140	50 feet



Special tubing

TUBING

VICI electrochemically plates PEEK and 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.



Nickel-clad fused silica

- 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.

For high pressure applications, we recommend using our 1/32" 316 stainless ferrules.

1/32'' OD tubing is available in IDs from 10 to 250 μ m, permitting use of metal ferrules for improved leak-tight connections.

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

Tubing ID	Prod No
10 μm	TNFS800360010
15 μm	TNFS800360015
20 μm	TNFS800360020
25 μm	TNFS800360025
50 μm	TNFS800360050
100 μm	TNFS800360100
180 μm	TNFS800360180
250 μm	TNFS800360250



Nickel-clad polyimide-coated fused silica

- Thin wall version for resistive heating offers improved heat transfer as compared to wire-wrapped designs
- Thin wall version results in column packages with even less mass, critical when temperature measurement is based on the change in resistance

Any polyimide-coated FS can be electroplated with pure nickel. This results in a ruggedized traditional FS column (or transfer line with deactivated FS), which can be resistively heated, if desired. Temperature is measured using the resistance of the nickel, removing any need for external sensors. A thin-wall, low mass version optimized for resistive heat applications is available in eight different diameters. We offer several options for tubing connections.

Please contact the factory to discuss your application.

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.



Custom lengths



Nickel-clad PEEK

NEW Nickel-clad PEEK

760 µm

1015 µm

- Permits use of PEEK tubing at 30,000 psi
- Direct connection with metal ferrules

Since we can manufacture virtually any size of PEEK tubing from 360 µm OD/.002" ID on up, the possibilities are endless. In any size, the mechanical properties of nickel combined with the chemical properties of PEEK produce enhanced performance with robust metal ferrule connections.

> TNPK16001140760 TNPK160011401015

Tubing OD: Tubing ID	800 μm (1/32") Prod No	1600 μm (1/16") Prod No
50 μm	TNPK800360050	TNPK16001140050
75 µm	TNPK800360075	TNPK16001140075
100 μm	TNPK800360100	TNPK16001140100
125 µm	TNPK800360125	TNPK16001140125
180 µm	TNPK800360180	TNPK16001140180
205 µm	TNPK800360205	_
250 µm	TNPK800404250	TNPK16001140250
305 µm	TNPK800510305	TNPK16001140305
380 μm	TNPK800535380	_
510 µm	TNPK800660510	TNPK16001140510

CONVERSIONS

 $50 \, \mu m = .002$ "

 $75 \, \mu m = .003$ " $100 \, \mu m = .004$ "

 $125 \, \mu m = .005"$

 $150 \, \mu m = .006$ "

 $180 \, \mu m = .007$ "

 $205 \, \mu m = .008"$

 $250 \, \mu m = .010$ "

 $305 \, \mu m = .012$ "

 $380 \, \mu m = .015$ "

 $510 \, \mu m = .020$ "

 $760 \, \mu m = .030$ " $1015 \, \mu m = .040"$

 $800 \, \mu m = 1/32$ "

 $1600 \, \text{um} = 1/16$ "

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PEEK tubing Natural

TUBING

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 and 1/32" tubing; ±.0005" for 1/16" tubing with ID up to .010" and ±.001" for IDs above .010"; and ±.003" for 1/8".



360 µm PEEK tubing

Custom lengths

Custom-length 360 μm PEEK tubing is square-cut and ready to use. Specify the length required, in meters

	.002" ID	.004" ID	.005" ID	.006" ID	
	Prod No	Prod No	Prod No	Prod No	
Priced per meter	TPK.102	TPK.104	TPK.105	TPK.106	

1/32" OD PEEK tubing

Length	.0025" ID <i>Prod No</i>	.005" ID Prod No	.010" ID <i>Prod No</i>	.015" ID <i>Prod No</i>
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
Length	Prod No
5 meters	TPK260-5M
10 meters	TPK260-10M
25 meters	TPK260-25M

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° elhow IR-357180-5



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MORE INFORMATION

Polymeric tubing
PTFE page 92
FEP92
ETFE92

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.



CONVERSIONS $10 \, \text{ft} = 3.05 \, \text{m}$ $25 \, \text{ft} = 7.62 \, \text{m}$ $= 30.48 \, \text{m}$

 $50 \, \mu m = .002$ "

 $100 \, \mu m = .004$ " $125\mu m = .005$ "

 $150 \, \mu m = .006$ "

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

0.75 mm = .030" 1.0 mm = .040" 1.5 mm = .060" 2.0 mm = .080" $4.6 \, \text{mm} = .180''$ $6.0 \, \text{mm} = .236$ " 6.4 mm = .253" 7.0 mm = .275" 10.0 mm = .400" 27.0 mm = 1.08" $1/32" = 0.8 \, \text{mm}$ $1/16" = 1.6 \, \text{mm}$ $1/8" = 3.2 \, \text{mm}$

100 ft

1/4"

3/8"

 $= 6.4 \, \text{mm}$

= 9.5 mm

Color-coded PEEK tubing

Color-coded tubing helps you identify the ID of your PEEK tubing – each ID is coded with a different color. Use this tubing where maximum chemical resistance and biocompatibility are required.

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 the 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 integrallybonded 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



1/16" OD striped color-coded PEEK tubing

Custom lengths

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

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

Tubing ID	Color	bar	psi	Prod No
.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 striped color-coded PEEK tubing

Pre-cut kits

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

Includes 15 pieces of tubing; 5 each of 5 cm, 10 cm, and 20 cm pre-cut lengths.

Tubing ID	Color	bar	psi	Prod No	
.005" .007" .010"	Red Yellow Blue	420 400 386	6100 5800 5600	JR-T-98013 JR-T-98017 JR-T-98025	
.020" .030"	Orange Green	350 240	4500 3500	JR-T-98050 JR-T-98075	
	ne of each abo	ove product	number	JR-T-98200	
V & 11 1			6.11 . 11	D 116 II	

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



Polymeric tubing

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 90-91.



1/16" OD polymeric tubing

Prod No	.006" ID Prod No	.010" ID <i>Prod No</i>	.015" ID <i>Prod No</i>	.020" ID Prod No	.030" ID
_					
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
5 meters	_	TFEP110-5M	_	TFEP120-5M	TFEP130-5M
10 meters	_	TFEP110-10M	_	TFEP120-10M	TFEP130-10M
25 meters	_	TFEP110-25M	_	TFEP120-25M	TFEP130-25M
5 meters	_	TTZ110-5M	_	TTZ120-5M	TTZ130-5M
10 meters	_	TTZ110-10M	_	TTZ120-10M	TTZ130-10M
25 meters	_	TTZ110-25M	_	TTZ120-25M	TTZ130-25M
	5 meters 10 meters 25 meters 5 meters 10 meters 25 meters 5 meters 10 meters	Prod No Prod No 5 meters TTF106-5M 10 meters TTF106-10M 25 meters — 10 meters — 25 meters — 5 meters — 5 meters — 10 meters — 10 meters —	Prod No Prod No Prod No 5 meters TTF1106-5M TTF110-5M 10 meters TTF106-10M TTF110-10M 25 meters TTF106-25M TTF110-25M 5 meters — TFEP110-5M 10 meters — TFEP110-10M 25 meters — TFEP110-25M 5 meters — TTZ110-5M 10 meters — TTZ110-5M 10 meters — TTZ110-10M	Prod No Prod No Prod No Prod No 5 meters TTF1106-5M TTF110-5M TTF115-5M 10 meters TTF106-10M TTF110-10M TTF115-10M 25 meters TTF106-25M TTF110-25M TTF115-25M 5 meters — TFEP110-5M — 10 meters — TFEP110-10M — 5 meters — TTZ110-25M — 5 meters — TTZ110-5M — 10 meters — TTZ110-10M —	Prod No Prod No Prod No Prod No Prod No 5 meters TTF1106-5M TTF110-5M TTF115-5M TTF120-5M 10 meters TTF106-10M TTF110-10M TTF115-10M TTF120-10M 25 meters TTF106-25M TTF110-25M TTF115-25M TTF120-25M 5 meters — TFEP110-5M — TFEP120-5M 10 meters — TFEP110-10M — TFEP120-10M 25 meters — TFEP110-25M — TFEP120-25M 5 meters — TTZ110-5M — TTZ120-5M 10 meters — TTZ110-10M — TTZ120-10M

1/8" OD polymeric tubing

		~	,	
PTFE	Prod No	.030" ID <i>Prod No</i>	.060" ID <i>Prod No</i>	.085" ID
FIFE	5 meters	TTF230-5M	TTF260-5M	TTF285-5M
	10 meters	TTF230-10M	TTF260-10M	TTF285-10M
	25 meters	TTF230-25M	TTF260-25M	TTF285-25M
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	_
- Not a	vailable			

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





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

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MORE INFORMATION

PEEK tubing	
Natural	page 90
Color-coded	91
Striped	91

CUSTOM LENGTHS

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

TUBING POLYMERS

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

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 custom-cleaned tubing.)

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

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

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

CONVERSIONS

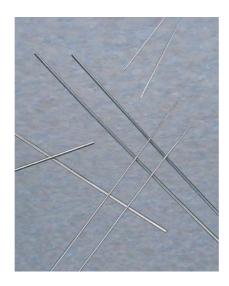
50 μm	= .002"
100 μm	= .004"
125μm	= .005"
150 μm	= .006"
0.25 mm	= .010"
0.50 mm	= .020"
0.75 mm	= .030"
1.0 mm	= .040"
1.5 mm	= .060"
2.0 mm	= .080"
4.6 mm	= .180"
6.0 mm	= .236"
6.4 mm	= .253"
7.0 mm	= .275"
10.0 mm	= .400"
27.0 mm	
1/32" =	0.8 mm
1/16" =	1.6 mm
1/8" =	3.2 mm
1/4" = 3/8" =	6.4 mm 9.5 mm

316 s	tainless				Bulk quantities
	Tubing ID	1/32" OD <i>Prod No</i>	1/16" OD <i>Prod No</i>	1/8" OD <i>Prod No</i>	
	.005" .007" .010"	TSS.505 TSS.507 TSS.510	TSS105 — TSS110	_ _ _	
	.015" .020"	— TSS.520	TSS115 TSS120	_	
	.026" .030" .040"	_ _ _	TSS126 TSS130 TSS140	 TSS230 TSS240	
	.060" .070" .085"	_ _ _	_ _ _	TSS260 TSS267 TSS285	
Nicke	el 200				Bulk quantities
	Tubing ID	1/32" OD <i>Prod No</i>	1/16" OD <i>Prod No</i>	1/8" OD Prod No	
	.005" .010" .020"	— TNI.510 TNI.520	TNI105 — TNI120	_ _ _	
	.030" .040" .085"	_ _ _	TNI130 TNI140 —	— — TNI285	
Haste	elloy C				Bulk quantities
	Tubing ID	1/32" OD <i>Prod No</i>	1/16" OD <i>Prod No</i>	1/8" OD Prod No	
	.010" .020"	_ _	THC110 THC120	_	
	.030" .040"	_ _	THC130 THC140		
	.070" .085"		_ _	THC270 THC285	
Incon	el 600				Bulk quantities
	Tubing ID	1/32" OD <i>Prod No</i>	1/16" OD <i>Prod No</i>	1/8" OD Prod No	
	.061" .082"	_ _	_ _	TINCO261 TINCO282	
– Not r	normally availa	able			

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 saving 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 lengths

		•	
Length	.005" ID	.010" ID	.020" ID
	Prod No	Prod No	Prod No
2 pieces per packa	ne		
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 packa	age		
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 pack	age		
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 paci	kage		
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

Forty years of Valco experience show 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" $0.75 \, \text{mm} = .030$ " 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" $1/32" = 0.8 \, \text{mm}$ $1/16" = 1.6 \, \text{mm}$ $1/8" = 3.2 \, \text{mm}$ $1/4" = 6.4 \, \text{mm}$ $3/8" = 9.5 \, \text{mm}$

1/2" = 12.7 mm

1/16" OD stainless tubing

Pre-cut i	lengths
-----------	---------

.,	OD Sta.	mess tabing	7		TTC CUT	rerigeris	
	Length	.005" ID <i>Prod No</i>	.010" ID Prod No	.020" ID Prod No	.030" ID Prod No	. 040" ID Prod No	
2 pieces	per packag	e					
	5 cm 10 cm 20 cm	T5C5D T10C5D T20C5D	T5C10D T10C10D T20C10D	T5C20D T10C20D T20C20D	T5C30D T10C30D T20C30D	T5C40D T10C40D T20C40D	
	30 cm 50 cm 100 cm	T30C5D T50C5D —	T30C10D T50C1 0D T100C10D	T30C20D T50C20D T100C20D	T30C30D T50C30D T100C30D	T30C40D T50C40D T100C40D	
10 piece	s per packag 5 cm 10 cm 20 cm	ge T5C5-10 T10C5-10 T20C5-10	T5C10-10 T10C10-10 T20C10-10	T5C20-10 T10C20-10 T20C20-10	T5C30-10 T10C30-10 T20C30-10	T5C40-10 T10C40-10 T20C40-10	
	30 cm 50 cm 100 cm	T30C5-10 T50C5-10	T30C10-10 T50C10-10 T100C10-10	T30C20-10 T50C20-10 T100C20-10	T30C30-10 T50C30-10 T100C30-10	T30C40-10 T50C40-10 T100C40-10	
50 piece	s per packag 5 cm 10 cm 20 cm	ge T5C5-50 T10C5-50 T20C5-50	T5C10-50 T10C10-50 T20C10-50	T5C20-50 T10C20-50 T20C20-50	T5C30-50 T10C30-50 T20C30-50	T5C40-50 T10C40-50 T20C40-50	
	30 cm 50 cm 100 cm	T30C5-50 T50C5-50 —	T30C10-50 T50C10-50 T100C10-50	T30C20-50 T50C20-50 T100C20-50	T30C30-50 T50C30-50 T100C30-50	T30C40-50 T50C40-50 T100C40-50	
100 piec	es per packe 5 cm 10 cm 20 cm	nge T5C5-100 T10C5-100 T20C5-100	T5C10-100 T10C10-100 T20C10-100	T5C20-100 T10C20-100 T20C20-100	T5C30-100 T10C30-100 T20C30-100	T5C40-100 T10C40-100 T20C40-100	
	30 cm 50 cm 100 cm	T30C5-100 T50C5-100	T30C10-100 T50C10-100 T100C10-100	T30C20-100 T50C20-100 T100C20-100	T30C30-100 T50C30-100 T100C30-100	T30C40-100 T50C40-100 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

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

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

Typical ID tolerances for our tubing are $\pm .001$ ". 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

OUICK OVERVIEW OF OUR LINE-UP

Following is an overview of the many types of valves available from VICI.

Valco Injectors and Valves for GC

pages 98-101, 104-113

For over 40 years Valco valves have been the industry standard in gas chromatography. Models are available with 3, 4, 6, 8, 10, 12, or 14 ports, with 1/32", 1/16", 1/8", or 1/4" fittings, and with bore sizes from 0.25 mm (.010") to 4 mm (.156"). In addition, Valco valves offer the widest range of rotor and body materials of any valve available, with alloys and polymer composites capable of meeting virtually any system requirement. All models can be ordered in manual, pneumatic, or electrically actuated versions.



Valco Injectors and Valves for HPLC

pages 101, 114-118

A pioneer and industry leader in products for HPLC, Valco continues to offer the market's most diverse line in terms of number of ports, fitting sizes, materials of construction, and actuation. Versions with 3, 4, 6, 8, 10, 12 port are offered, with 1/32", 1/16", or 1/8" fittings. As with the GC line, Valco valves offer the widest range of rotor and body materials of any valves available, with alloys and polymer composites capable of meeting virtually any system requirement. All models can be ordered in manual, pneumatic, or electrically actuated versions.



Valco Selectors

pages 102-103, 124-135

One inherent benefit of the Valco conical rotary design is that it allows multiple planes of ports, facilitating unique multiposition configurations useful for stream selection, column selection, or trapping. Versions are available for GC and HPLC applications, with 1/16", 1/8", or 1/4" fittings, with bore sizes from 0.40 to 4.0 mm (.016" to .156"). Selectors are available for up to 16 streams (34 ports), all with Valco's trademark flexibility in terms of actuation and material options.



Diaphragm Valves for GC

pages 142-145

A diaphragm valve consists of plungers and ports arranged in a circular pattern, with the plungers controlled by the reciprocating action of two air actuated pistons. Extremely long lifetime (typically 1,000,000 cycles at ambient temperature; approximately 500,000 cycles at elevated temperatures), 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. Our miniature version features 1/16" or 1/32" zero dead volume fittings, and is the first to offer a 10 port configuration in addition to the 6 port and internal sample 4 port models.



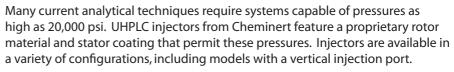


VALVE SELECTION



Cheminert UHPLC Injectors

pages 146-148, 154-157



Nanovolume® UHPLC injectors feature a uniform flowpath as small as 100 microns (.004"). Specially-designed fittings allow direct connection of 360 micron OD PEEK, fused silica, or electroformed nickel tubing. Versions are also available with standard 1/32" or 1/16" fittings. Microbore UHPLC injectors offer flowpaths of 0.25 mm (.010"), with a choice of 1/32" or 1/16" fittings.



Cheminert HPLC Injectors and Valves

pages 146-149, 158-165

The Cheminert HPLC line includes 4, 6, 8, and 10 port versions. The submicroliter injector has an injection volume as small as 10 nanoliters, and Nanovolume® internal sample injectors offer a volume down to 4 nanoliters. Valves feature 1/32" and 1/16" zero dead volume fittings, with bore sizes from $100 \, \mu m$ (.006") to 0.75 mm (.030") for nanobore, microbore, and analytical applications. Most models are available in manual, air, or electrically actuated versions, and some can be ordered with a proprietary coated stainless stator and high-strength PAEK rotor to ensure long periods of maintenance-free operation.



Cheminert Injectors and Valves for Low Pressure Applications

pages 146, 150, 166-169

Cheminert's two position design offers 4, 6, 8, or 10 port configurations. The design features a choice of Valco 1/16" zero dead volume fittings or 1/4-28 Cheminert internal fittings for 1/16" or 1/8" OD tubing. All models are available in manual, air, or electrically actuated versions.



Cheminert Selectors

pages 152-153, 172-179

Choose among 4, 6, 8, 10, 14, 20, 24, or 28 position stream selection valves, in high pressure and low pressure models, plus UHPLC selectors for up to 10 streams. A variety of configurations are available with bore sizes from 0.10 mm (.004") for HPLC column selection to 4.6 mm (.180") for applications requiring minimal restriction across the valve. Metal or all-polymeric valves can be ordered, with models available in manual, pneumatic, or electrically actuated versions.



page 84

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.



FOR OEMs

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

HPLC pages 151, 180-183 Low pressure151, 184-185 153 186-187

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Valco valves

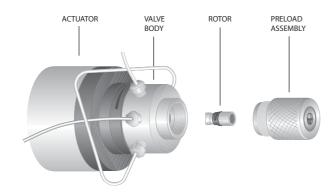
FOR INJECTION, SWITCHING, AND STREAM SELECTION

- 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 5,000 psi

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 page 101; product numbers and prices begin on page 104. For information on **selectors**, refer to pages 102-3.



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

MORE INFORMATION

Decoding Valco valve product no's... 266-269

Valve descriptions

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Valco valve prices

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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. Contact the factory for the additional cost.

Example:

An A4C6WE (air actuated 1/16" 6 port WE 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 specific types include Nitronic 60, Type 316 stainless steel, and Type 316L stainless steel. VICI will select the material to be used based on availability and quality. HPLC grade stainless is the standard material for all Valco two position valves and high pressure multiposition valves.

SPECIAL BODY	MATERIAL — (CODES	
TWO POSITION Body material	VALVES Code	MULTIPOSITION Body material	ON VALVES Code
	Code	•	Code
HPLC grade Stainless steel	SS	HPLC grade Stainless steel	SS
Hastelloy C-22	HC	Hastelloy C-22	HC
Inconel 600	IN	Inconel 600	IN
Monel 400	M4	Monel 400	M4
Nickel	NI	Nickel	NI
Nitronic 50	N5	Nitronic 50	N5
Titanium *	TI	Titanium *	TI
* Not available for	WT, UWT, or T se	ries valves (high temp) due to	material temperature limit.



Handling and leak testing

VALCO VALVES

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 drvina (e.g. buffers).

Care should be taken that particles do not enter the valve.

TECH TIP See Technical Note 201, "Operation Notes and Cleaning Instructions" for more detailed information about unpacking and handling

the valve.

Leak Testing

The standard test methods for cross-port and outport leakage insure 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

10⁻⁸ to 10⁻¹⁰ cc-atm/sec

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Standard tension and components **Ultra trace gas analysis** (ppb range) Higher tension and specially processed stator and rotor material

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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 and contact the factory for the price.

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.



Two position injectors and switching valves have many applications, as shown in the section beginning on page 119. In this catalog, Valco two position valves are divided into GC and HPLC sections, with the GC section starting on page 104 and the HPLC section on page 114.

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 sampling valve (pages 104-5 and 114), 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.

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.

SPECIFICATIONS VALCO TWO POSITION VALVES Standard Valve Max Max Max Max pressure type rotor pressure temp temp material Sampling and Internal sample injectors switching valves GC W and UW Valcon E 1000 psi liq 175°C 400 psi gas 225°C Valcon T 330°C 300 psi gas MW Valcon E2 100 psi gas 75°C **HPLC** W and UW Valcon H 5000 psi liq 75°C 5000 psi liq 75°C

VALVE TYPES Standard **Fitting** port diameter W Type 1/32" 0.25 mm (.010") 1/16" 0.40 mm (.016") **UW** Type 1/16" 0.75 mm (.030") 1/8" 0.75 mm (.030") 1/4" MW Type 4.0 mm (.156") For special port diameters, please consult the 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 25 optional rote		ssion of these	

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Applications . 119-123
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.....

Instead of the back and forth switching of two position valves, selectors (multiposition valves) step incrementally through continuous revolutions (bi-directionally with universal and modular universal actuators). While we can supply older models, all the valves in this catalog have a preload assembly. This design allows the rotor to be inspected or replaced without taking the valve off the actuator, and valves ordered with a microelectric actuator are permanently aligned.

Flowpath Configurations

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

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

ST (trapping) selectors are used for multi-column, multi-sample, or multitrap operations.

STF (trapping/flow-through)

selectors are similar to STs, with the single difference being that the nonselected streams are returned to their own vents or sources rather than being dead-ended or trapped as they are in the standard ST configuration.

PORT DIAMETERS—						
Low	pressure	(MW)			
Fitting size	No. of Positions	ро	Stand ort dia	dard meter		
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 D	IAMETER	RS—	
High	pressure	(UW)	
Fitting size	No. of Positions		dard ameter
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")



MORE INFORMATION **Actuation** .. pp 188-209 Applications . 119-123 Materials Metals..... 254-255 Polymers256 Valve rotors.....257 Specifying a special

body material99

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

For special port diameters, please consult the factory.

Low Pressure Selectors

Valco **MW Type** selectors are available with 1/16", 1/8", or 1/4" fittings. (For port diameters, refer to the chart on the preceding 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.

Although not shown in this catalog, MW selectors are also available in a higher temperature version. While actual specifications vary with the configuration, typical specifications are 200 psi and 330°C. Consult our technical staff for more information.

SPECI	FICATIONS	,						
VALCO	SELECTO	RS – Lov	v pressure	(MW)				
Fittings size	Number of positions	Standard rotor material	Max pressure	Max temp	Max pressure	Max temp	Max pressure	Max temp
	,		SD)	SC			
			Dead-		Common flowpa			
1/16" 1/8" 1/4"	4 - 16 4 - 8 10 - 16 4 - 8	Valcon E Valcon E Valcon E Valcon E2	400 psi gas 400 psi gas 200 psi gas 100 psi gas	200°C 200°C 200°C 75°C	200 psi gas 200 psi gas 200 psi gas 100 psi gas	200°C 200°C 200°C 75°C	.,	/8" valves are ble in versions
., .	, 0	valcon E2	SF Flow-thr flowp	ough	ST Trappi flowpa	ing	ST Trapping/Flo flowp	F w-through
1/16" 1/8" 1/4"	4 - 16 4 - 16 4 - 8	Valcon E Valcon E Valcon E2	200 psi gas 200 psi gas 100 psi gas	200°C 200°C 75°C	200 psi gas 200 psi gas –	200°C 200°C –	200 psi gas 200 psi gas –	200°C 200°C –

High Pressure Selectors

Valco **UW Type** 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 preceding page.)

	SELECTO		h pressure	(UW)		
Fittings size	Number of positions	Standard rotor material	Max pressure	Max temp	Max pressure	Max temp
			Dead-	SD Dead-end flowpath		ng ith
1/16" 1/8"	4 - 12 4 - 8	Valcon E Valcon E	5000 psi liq 5000 psi liq	75°C 75°C	5000 psi liq -	75°C –

Internal sample injectors, 1/32" fittings, 0.25 mm ports (.010")

W Type

Med temp

1/32" 0.25 mm

Includes 2" standoff. Manual version is not available without standoff. Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply



Sample volume	.06 μl	.1 μl	.2 μl	.5 μl
	Prod No	Prod No	Prod No	Prod No
Manual with standoff	2NI4WE.06	2NI4WE.1	2NI4WE.2	2NI4WE.5
With air actuator	A2NI4WE.06	A2NI4WE.1	A2NI4WE.2	A2NI4WE.5
With microelectric actuator	EP2NI4WE.06	EP2NI4WE.1	EP2NI4WE.2	EP2NI4WE.5
Replacement valve	DNI4WE.06	DNI4WE.1	DNI4WE.2	DNI4WE.5
Replacement rotor	SSANI4WE.06	SSANI4WE.1	SSANI4WE.2	SSANI4WE.5

SPECS 1000 psi liq 175°C max

Nitronic 60 valve body Valcon E rotor

OPTIONS

- 3",4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium, Zirconium (see pages 254-5)

Internal sample injectors, 1/16" fittings, 0.40 mm ports (.016")

Med temp

1/16" 0.40 mm

Includes 2" standoff. Manual version has no standoff. Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply



SPECS 1000 psi liq 175°C max Nitronic 60 valve body Valcon E rotor

W Type

OPTIONS

- 6 and 8 port valves available
- 3",4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium, Zirconium (see pages 254-5)

Sample volume	.06 µl	.1 µl	.2 µl	.5 µl
	Prod No	Prod No	Prod No	Prod No
Manual	CI4WE.06	CI4WE.1	CI4WE.2	CI4WE.5
Manual with standoff	2CI4WE.06	2CI4WE.1	2CI4WE.2	2CI4WE.5
With air actuator	A2CI4WE.06	A2CI4WE.1	A2CI4WE.2	A2CI4WE.5
With microelectric actuator	EP2CI4WE.06	EP2CI4WE.1	EP2CI4WE.2	EP2CI4WE.5
Replacement valve	DCI4WE.06	DCI4WE.1	DCI4WE.2	DCI4WE.5
Replacement rotor	SSACI4WE.06	SSACI4WE.1	SSACI4WE.2	SSACI4WE.5



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Internal sample injectors, 1/16" fittings, 0.75 mm ports (.030")

UW Type

SPECS 1000 psi liq 175°C max

Nitronic 60 valve body Valcon E rotor

OPTIONS

- 6 and 8 port valves available
- 3",4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium, Zirconium (see pages 254-5)

Includes 2" standoff. Manual version has no standoff.

Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply



Med temp
Internal sample
1/16" 0.75 mm

Sample volume	.2 μl	.5 μΙ	1 μΙ	2 µl
	Prod No	Prod No	Prod No	Prod No
Manual	CI4UWE.2	CI4UWE.5	CI4UWE1	CI4UWE2
Manual with standoff	2CI4UWE.2	2CI4UWE.5	2CI4UWE1	2CI4UWE2
With air actuator	A2CI4UWE.2	A2CI4UWE.5	A2CI4UWE1	A2CI4UWE2
With microelectric actuator	ED2CI4UWE.2	ED2CI4UWE.5	ED2CI4UWE1	ED2CI4UWE2
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")

UW Type

SPECS 1000 psi liq 175°C max

Nitronic 60 valve body Valcon E rotor

OPTIONS

- 3", 4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium, Zirconium (see pages 254-5)

Includes 2" standoff. Manual version has no standoff.

Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply



Med temp
nternal sample
1/8" 0.75 mm

Sample volume	.2 µl	.5 μl	1 μΙ	2 µl
	Prod No	Prod No	Prod No	Prod No
Manual	I4UWE.2	I4UWE.5	I4UWE1	I4UWE2
Manual with standoff	2I4UWE.2	2I4UWE.5	2I4UWE1	2I4UWE2
With air actuator	A2I4UWE.2	A2I4UWE.5	A2I4UWE1	A2I4UWE2
With microelectric actuator	ED2I4UWE.2	ED2I4UWE.5	ED2I4UWE1	ED2I4UWE2
Replacement valve	DI4UWE.2	DI4UWE.5	DI4UWE1	DI4UWE2
Replacement rotor	SSAI4UWE.2	SSAI4UWE.5	SSAI4UWE1	SSAI4UWE2



Sampling and switching valves, 1/32" fittings, 0.25 mm ports (.010")

W Type

Med temp 1/32"

Includes 4" standoff. Manual version not available without standoff. Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply Sample loops are not included with valves. Order separately.

	4 Ports	6 Ports	8 Ports	10 Ports
	Prod No	Prod No	Prod No	Prod No
Manual with standoff	4N4WE	4N6WE	4N8WE	4N10WE
With air actuator	A4N4WE	A4N6WE	A4N8WE	A4N10WE
With microelectric actuator	EH4N4WE	EH4N6WE	EH4N8WE	EH4N10WE
Replacement valve	DN4WE	DN6WE	DN8WE	DN10WE
Replacement rotor	SSAN4WE	SSAN6WE	SSAN8WE	SSAN10WE



Nitronic 60 valve body Valcon E rotor

For 300 psi, 350°C max, see facing page.

OPTIONS

- 3 and 12 port valves available
- 2", 3", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium, Zirconium (see pages 254-5)



ABOUT LOOPS Other materials

- available in many sizes: Electroformed Nickel, Nickel 200, PEEK, and PTFE
- Sample loop shape and dimensions may vary from batch to batch due to fluctuations in tubing ID. Loop volume is controlled as closely as possible, but is not calibrated.

MORE INFORMATION

Air page 197 Manual.....204 Microelectric190-1 Universal 193

Actuators

Materials

1/32" Stainless steel loops

for W Type valves

Each stainless steel loop includes two stainless nuts and two stainless ferrules. Order special fittings separately.



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 ul	SI 20NIW	500 11	SI SOONW

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Sampling and switching valves, 1/32" fittings, 0.25 mm ports (.010")

WТуре

SPECS 300 psi gas 350°C max

Nitronic 60 valve body Valcon T rotor

For 400 psi, 225°C max, see facing page

OPTIONS

- 3 and 12 port valves available
- 2", 3", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium, Zirconium (see pages 254-5)

Includes 4" standoff. Manual version not available without standoff. Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply Sample loops are not included with valves. Order separately.

H	igł	ո temp
1/32	"	0.25

				8 00 g
	4 Ports	6 Ports	8 Ports	10 Ports
	Prod No	Prod No	Prod No	Prod No
Manual with standoff	4N4WT	4N6WT	4N8WT	4N10WT
With air actuator	A4N4WT	A4N6WT	A4N8WT	A4N10WT
With microelectric actuator	EH4N4WT	EH4N6WT	EH4N8WT	EH4N10WT
Replacement valve	DN4WT	DN6WT	DN8WT	DN10WT
Replacement rotor	SSAN4WT	SSAN6WT	SSAN8WT	SSAN10WT



ABOUT LOOPS

- Other materials 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

1/32" Stainless steel loops

for W Type valves

Each stainless steel loop includes two stainless nuts and two stainless ferrules. Order special fittings separately.

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

500 µl

Calibrated

20 ul SI 20NW

Colling of the Col

SL500NW

Sampling and switching valves, 1/16" fittings, 0.40 mm (.016")

(0)

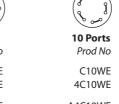
W Type

Med temp

0.40 mm

Includes 4" standoff Manual version has no standoff Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply Sample loops are not included with valves. Order separately.

4 Ports	6 Ports	8 Ports	10 Ports
Prod No	Prod No	Prod No	Prod No
C4WE	C6WE	C8WE	C10WE
4C4WE	4C6WE	4C8WE	4C10WE
A4C4WE	A4C6WE	A4C8WE	A4C10WE
EH4C4WE	EH4C6WE	EH4C8WE	EH4C10WE
DC4WE	DC6WE	DC8WE	DC10WE
SSAC4WE	SSAC6WE	SSAC8WE	SSAC10WE
	Prod No C4WE 4C4WE A4C4WE EH4C4WE DC4WE	Prod No C4WE 4C4WE A4C6WE A4C4WE EH4C4WE DC4WE Prod No Prod	4 Ports 6 Ports 8 Ports Prod No Prod No Prod No C4WE C6WE C8WE 4C4WE 4C6WE 4C8WE A4C4WE A4C6WE A4C8WE EH4C4WE EH4C6WE EH4C8WE DC4WE DC6WE DC8WE



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(see pages 254-5) ■ Smaller and larger bores available in most

configurations.

SPECS

400 psi gas

225°C max

OPTIONS

Nitronic 60 valve body Valcon E rotor

For 300 psi, 350°C max, see page 110.

■ 3 and 12 port valves available

■ 2",3", and 6" standoffs ■ Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium, Zirconium



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 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.

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1/16" Stainless steel loops

for W Type valves

Each stainless steel loop includes two stainless nuts and two stainless ferrules. Order special fittings separately.



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

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Sampling and switching valves, 1/16" fittings, 0.75 mm ports (.030")

UW Type

SPECS 400 psi gas 225°C max

Nitronic 60 valve body Valcon E rotor

For 300 psi, 330°C max, see page 111.

OPTIONS

- 3,12 and 14 port valves available
- 2",3", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium, Zirconium (see pages 254-5)
- Larger bore available

Includes 4" standoff. Manual version has no standoff. Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply Sample loops are not included with valves. Order separately.

Med temp

0.75 mm

	4 Ports	6 Ports	8 Ports	10 Ports
	Prod No	Prod No	Prod No	Prod No
Manual	C4UWE	C6UWE	C8UWE	C10UWE
Manual with standoff	4C4UWE	4C6UWE	4C8UWE	4C10UWE
With air actuator	A4C4UWE	A4C6UWE	A4C8UWE	A4C10UWE
With microelectric actuator	ED4C4UWE	ED4C6UWE	ED4C8UWE	ED4C10UWE
Replacement valve	DC4UWE	DC6UWE	DC8UWE	DC10UWE
Replacement rotor	SSAC4UWE	SSAC6UWE	SSAC8UWE	SSAC10UWE



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 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.

1/16" Stainless steel loops

for UW Type valves

Each stainless steel loop includes two stainless nuts and two stainless ferrules. Order special fittings separately.

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



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GC ■ High temperature

VALCO VALVES

Sampling and switching valves, 1/16" fittings, 0.40 mm ports (.016")

W Type

High temp

0.40 mm

Includes 4" standoff

Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply Sample loops are not included with valves. Order separately.

	4 Ports	6 Ports	8 Ports	10 Ports
	Prod No	Prod No	Prod No	Prod No
Manual with standoff	4C4WT	4C6WT	4C8WT	4C10WT
With air actuator	A4C4WT	A4C6WT	A4C8WT	A4C10WT
With microelectric actuator	EH4C4WT	EH4C6WT	EH4C8WT	EH4C10WT
Replacement valve	DC4WT	DC6WT	DC8WT	DC10WT
Replacement rotor	SSAC4WT	SSAC6WT	SSAC8WT	SSAC10WT



UW type: 3, 12, and 14 port valves available

■ 2", 3", and 6" standoffs

SPECS

300 psi gas

350°C max

Nitronic 60 valve body Valcon T rotor

For 400 psi, 225°C max, see page 108. **OPTIONS**

■ 3 and 12 port valves available

- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium, Zirconium (see pages 254-5)
- Smaller and larger bores available in most configurations.



1/16" Stainless steel loops

for W Type valves

Each stainless steel loop includes two stainless nuts and two stainless ferrules. Order special fittings separately.



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	SI 10KCW
		The second second	

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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 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.

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Sampling and switching valves, 1/16" fittings, 0.75 mm ports (.030")

UW Type

SPECS

300 psi gas 330°C max

Nitronic 60 valve body Valcon T rotor

For 400 psi, 225°C max, see page 109.

OPTIONS

- 3,12 and 14 port valves available
- 2", 3", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium, Zirconium (see pages 254-5)
- Larger bore available

Includes 4" standoff

Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply Sample loops are not included with valves. Order separately.

High temp

0.75 mm

	4 Ports	6 Ports	8 Ports	10 Ports
	Prod No	Prod No	Prod No	Prod No
Manual with standoff	4C4UWT	4C6UWT	4C8UWT	4C10UWT
With air actuator	A4C4UWT	A4C6UWT	A4C8UWT	A4C10UWT
With microelectric actuator	ED4C4UWT	ED4C6UWT	ED4C8UWT	ED4C10UWT
Replacement valve	DC4UWT	DC6UWT	DC8UWT	DC10UWT
Replacement rotor	SSAC4UWT	SSAC6UWT	SSAC8UWT	SSAC10UWT



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 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

1/16" Stainless steel loops

for UW Type valves

Each stainless steel loop includes two stainless nuts and two stainless ferrules. Order special fittings separately.

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



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Sampling and switching valves, 1/8" fittings, 0.75 mm ports (.030")

UW Type

Med temp

0.75 mm

Includes 4" standoff. Manual version has no standoff.

Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply

Sample loops are not included with valves. Order separately (see facing page).

4 Ports	6 Ports	8 Ports	10 Ports
Prod No	Prod No	Prod No	Prod No
4UWE	6UWE	8UWE	n/a
44UWE	46UWE	48UWE	410UWE
A44UWE	A46UWE	A48UWE	A410UWE
ED44UWE	ED46UWE	ED48UWE	ED410UWE
D4UWE	D6UWE	D8UWE	D10UWE
SSA4UWE	SSA6UWE	SSA8UWE	SSA10UWE
	Prod No 4UWE 44UWE A44UWE ED44UWE D4UWE	4 Ports Prod No Prod No 4 UWE 44UWE A44UWE A46UWE ED44UWE D4UWE D6UWE	4 Ports Prod No Prod No Prod No Prod No Prod No 4UWE 44UWE 46UWE A44UWE A44UWE ED44UWE BD46UWE BD48UWE D6UWE D8UWE D8UWE

SPECS 400 psi gas 225°C max

Nitronic 60 valve body Valcon E rotor

For 300 psi, 330°C max, see facing page.

OPTIONS

- 3, 12, and 14 port valves available
- 2", 3", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium, Zirconium (see pages 254-5)
- Larger bore available

Sampling and switching valves, 1/4" fittings, 4.0 mm ports (.156")

Low temp

4.0 mm

Includes 4" standoff. Manual version not available without standoff. Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply Sample loops are not available.

	4 Ports	6 Ports	8 Ports
	Prod No	Prod No	Prod No
Manual with standoff	4VL4MWE2	4VL6MWE2	4VL8MWE2
With air actuator	A4VL4MWE2	A4VL6MWE2	A4VL8MWE2
With microelectric actuator	ET4VL4MWE2	ET4VL6MWE2	ET4VL8MWE2
Replacement valve	DVL4MWE2	DVL6MWE2	DVL8MWE2
Replacement rotor	SSAVL4MWE2	SSAVL6MWE2	SSAVL8MWE2

MW Type

SPECS

100 psi gas 75°C max

Nitronic 60 valve body Valcon E2 rotor

OPTIONS

- 2", 3", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium, Zirconium (see pages 254-5)



High temp

Sampling and switching valves, 1/8" fittings, 0.75 mm ports (.030")

Manual with standoff

With microelectric actuator

With air actuator

Replacement valve

Replacement rotor

UW Type

0.75 mm

SPECS 300 psi gas 330°C max

Nitronic 60 valve body Valcon T rotor

For 400 psi, 225°C max, see facing page.

OPTIONS

- 3,12, and 14 port valves available
- 2", 3", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium, Zirconium (see pages 254-5)
- Larger bore available

Includes 4" standoff. Manual version not available without standoff. Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply Sample loops are not included with valves. Order separately.

Prod No

44UWT

A44UWT

D4UWT

ED44UWT

SSA4UWT

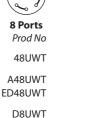
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6	(مر



SSA6UWT



SSA8UWT





Prod No
410UWT
A410UWT ED410UWT
D10UWT SSA10UWT



ABOUT LOOPS

- Other materials 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 brazed or 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.

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1/8" Stainless steel loops

for UW Type valves

Each stainless steel loop includes two stainless nuts and two stainless ferrules. Order special fittings separately.

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

HPLC ■ **Injectors**

VALCO VALVES

Internal sample injectors, 1/16" fittings, 0.40 mm ports (.016") 0.25 mm column port diameter (.010")

W Type

5,000 psi

1/16" 0.40 mm

Sample volume	.06 μl Prod No	.1 μl Prod No	.2 μl Prod No	.5 μl Prod No
	7704770	7700710	1104110	7704710
Manual	CI4W.06	CI4W.1	CI4W.2	CI4W.5
With air actuator	ACI4W.06	ACI4W.1	ACI4W.2	ACI4W.5
With microelectric actuator	EPCI4W.06	EPCI4W.1	EPCI4W.2	EPCI4W.5
Replacement valve	DCI4W.06	DCI4W.1	DCI4W.2	DCI4W.5
Replacement rotor	SSACI4W.06	SSACI4W.1	SSACI4W.2	SSACI4W.5

Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply



SPECS 5000 psi liq 75°C max Nitronic 60 valve body Valcon H rotor

OPTIONS

- 2",3",4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium, Zirconium (see pages 254-5)
- 1/32" fittings with 0.25 mm bore (.010") also available. Consult factory for product number and pricing.



Internal sample injectors, 1/16" fittings, 0.75 mm ports (.030")

UW Type

5,000 psi

1/16" 0.75 mm

Sample volume	.2 μl	.5 μl	1 μl	2 μl
	Prod No	Prod No	Prod No	Prod No
Manual with 2" standoff	2CI4UW.2	2CI4UW.5	2CI4UW1	2CI4UW2
With air actuator	ACI4UW.2	ACI4UW.5	ACI4UW1	ACI4UW2
With microelectric actuator	EDCI4UW.2	EDCI4UW.5	EDCI4UW1	EDCI4UW2
Replacement valve	DCI4UW.2	DCI4UW.5	DCI4UW1	DCI4UW2
Replacement rotor	SSACI4UW.2	SSACI4UW.5	SSACI4UW1	SSACI4UW2

Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply



SPECS 5000 psi liq 75°C max Nitronic 60 valve body Valcon H rotor

OPTIONS

- 2",3",4",and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium, Zirconium (see pages 254-5)
- 1/32" fittings with 0.25 mm bore (.010") also available. Consult factory for product number and pricing.

NOTE

These valves are not available in manual closemount version.

UW Type 1/16" fittings



5,000 psi

Analytical

Injectors and switching valves, 1/16" fittings, 0.40 mm ports (.016")

Manual

With air actuator

Replacement valve

Replacement rotor

With microelectric actuator

W Type

SPECS 5000 psi liq

75°C max

Nitronic 60 valve body Valcon H rotor

OPTIONS

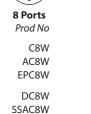
- 3 and 12 port valves available
- 2", 3", 4", and 6" standoffs
- 1/32" and 1/16" versions available with 0.25 mm (.010") bore
- Materials: Hastellov C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium, Zirconium (see pages 254-5)

Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply Sample loops are not included with valves. Order separately.



4 Ports	6 Ports
Prod No	Prod No
C4W	C6W
AC4W	AC6W
EPC4W	EPC6W
DC4W	DC6W
SSAC4W	SSAC6W







0.40 mm

10 Ports <i>Prod No</i>	
C10W AC10W EPC10W	
DC10W SSAC10W	



W Type 1/16" fittings

OPTIONAL FLOWPATH

Model C6W 6 port valves can also be ordered with a dual 3-way rotor, as described in EPA Method

To specify this flowpath, substitute "2X3" for "6" in the valve or rotor product number.



MORE INFORMATION

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Standoff

assemblies

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 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.

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1/16" Stainless steel loops

for W Type valves

Each stainless steel loop includes two stainless nuts and two stainless ferrules. Order special fittings separately.



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

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HPLC ■ Semi-preparative

VALCO VALVES

Injectors and switching valves, 1/16" fittings, 0.75 mm ports (.030")

UW Type

5,000 psi

Semi-prep

Manual with 2" standoff

With microelectric actuator

With air actuator

Replacement valve

Replacement rotor

0.75 mm

Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply Sample loops are not included with valves. Order separately.

DC6UW

SSAC6UW



DC4UW

SSAC4UW

(6)	
4 Ports	6 Ports
Prod No	<i>Prod No</i>
2C4UW	2C6UW
AC4UW	AC6UW
EDC4UW	EDC6UW



8 Ports	10 Ports
Prod No	Prod No
2C8UW	2C10UW
AC8UW	AC10UW
EDC8UW	EDC10UW
DC8UW	DC10UW
SSAC8UW	SSAC10UW



SPECS

5000 psi liq

Valcon H rotor

standoffs

■ 1/32" and 1/16"

Nitronic 60 valve body

75°C max

OPTIONS ■ 3,12, and 14 port valves available ■ 2",3",4", and 6"

0.25 mm (.010") bore ■ Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium, Zirconium

versions available with

(see pages 254-5) ■ Larger bore available.

NOTE

These valves are not available in manual closemount version.



UW Type 1/16" fittings

1/16" Stainless steel loops

for UW Type valves

Each stainless steel loop includes two stainless nuts and two stainless ferrules. Order special fittings separately.



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 SL25CUW	2 ml	SL2KCUW SL5KCUW
25 μl	SLZSCUW	2 ml	SL3KCUVV
50 μl	SI 50CHW		SI 10KCI IW



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 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.

Injectors and switching valves, 1/8" fittings, 0.75 mm (.030")

Manual with 2" standoff

With microelectric actuator

With air actuator

Replacement valve

Replacement rotor

UW Type

SPECS 5000 psi liq 75°C max

Nitronic 60 valve body Valcon H rotor

OPTIONS

- 3 and 12 port valves available
- 2", 3", 4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium, Zirconium (see pages 254-5)
- Larger bore available. (see page 118)

Manual 10 port includes 2" standoff.

Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply Sample loops are not included with valves. Order separately.

∕ ~	
P	8)

4 Ports	6 Ports
Prod No	Prod No
24UW	26UW
A4UW	A6UW
ED4UW	ED6UW
D4UW	D6UW
SSA4UW	SSA6UW



8 Ports	
Prod No	
28UW	
WU8A	
ED8UW	
D8UW	
SSA8UW	

5,000 psi Semi-prep

0.75 mm



D10UW

SSA10UW

ارض کا
10 Ports <i>Prod No</i>
210UW A10UW ED10UW

NOTE

These valves are not available in manual closemount version.



UW Type 1/8" fittings

ABOUT LOOPS

- Other materials 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 brazed or 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.

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1/8" Stainless steel loops

for UW Type valves

Each stainless steel loop includes two stainless nuts and two stainless ferrules. Order special fittings separately.

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

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HPLC ■ **Preparative**

VALCO VALVES

Injectors and switching valves, 1/8" fittings, large bore

UW Type

5,000 psi

1/8" Large bore

Manual with 2" standoff

With microelectric actuator

With air actuator

Replacement valve

Replacement rotor

Manual 10 port includes 2" standoff.

SSAL4UW

Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply. Sample loops are not included with valves. Order separately.

SSAL6UW

6 Ports 8 Ports 10 Ports 1.3 mm (.050") 1.7 mm (.067") 1.7 mm (.067") 1.0 mm (.040") Prod No Prod No Prod No Prod No 2L4UW 2L6UW 2L8UW 2L10UW AL4UW AL8UW AL10UW AL6UW EDL4UW EDL6UW EDL8UW EDL10UW DL4UW DL6UW DL8UW DL10UW

SSAL8UW



SPECS

Nitronic 60 valve body Valcon H rotor

OPTIONS

- 3 port valve available
- 2", 3", 4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium, Zirconium (see pages 254-5)
- Smaller bore available. (see page 117)



SSAL10UW

These valves are not available in manual closemount version.



UW Type 1/8" fittings

ABOUT LOOPS

- Other materials 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 brazed or 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.

MORE INFORMATION

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Standoff

1/8" Stainless steel loops for UW Type valves

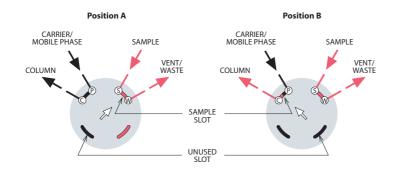
Each stainless steel loop includes two stainless nuts and two stainless ferrules. Order special fittings separately.

Volume	Prod No	Volume	Prod No
100 µl	SL100UW	2 ml	SL2KUW
250 µl	SL250UW	5 ml	SL5KUW
500 µl	SL500UW	10 ml	SL10KUW
1 ml	SI 1KUW	20 ml	SI 20KUW





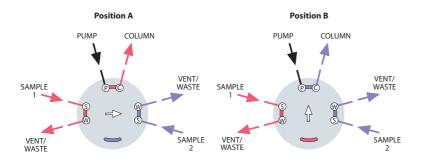
4 port internal sample injector



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

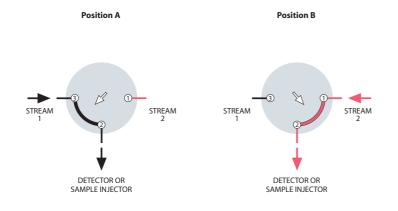


DUAL MICROVOLUME SAMPLE INJECTION

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 minimize valve wear. 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.

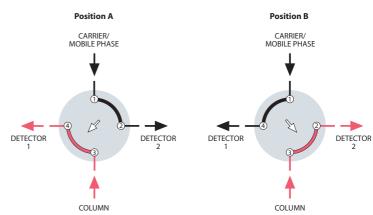
Applications ■ Valco two position valves

VALCO VALVES

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.

4 port switching valve

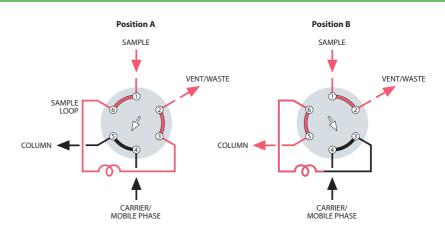


SAMPLE INJECTION

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 external sample injector

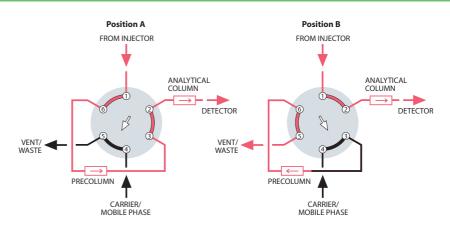


BACKFLUSH OF PRECOLUMN TO VENT

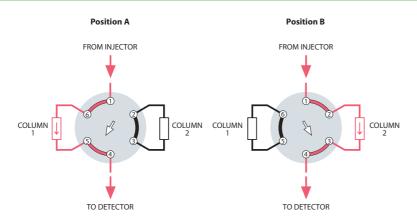
This plumbing scheme allows slower eluting components (end cut) which are not of interest to be backflushed to vent. Often a shorter version of the analytical column is used as the precolumn. Once all the components of interest have entered the main column (at port 2), the valve switches, backflushing 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 switching



6 port column selection

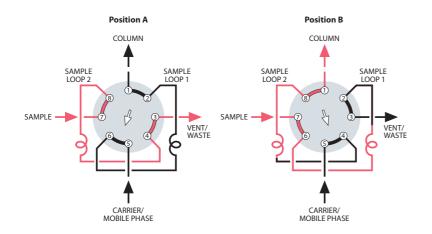


TWO COLUMN SELECTION

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.

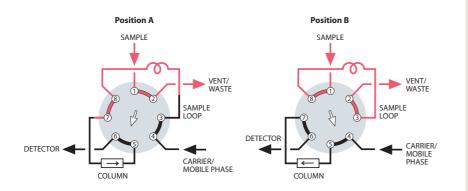
8 port dual external sample injector



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.

Applications ■ Valco two position valves

VALCO VALVES

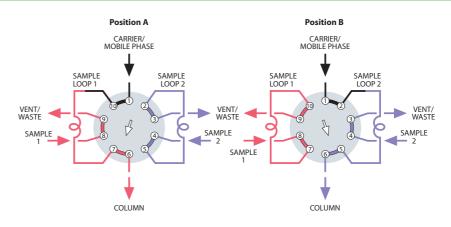
TWO DIFFERENT SAMPLES TO SAME COLUMN

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

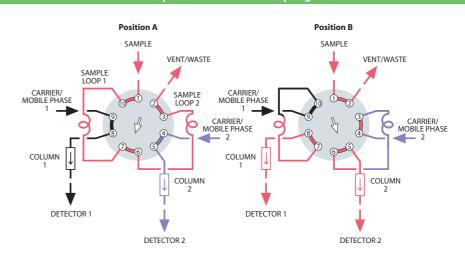


SIMULTANEOUS INJECTION OF THE SAME SAMPLE ONTO SEPARATE COLUMNS

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.

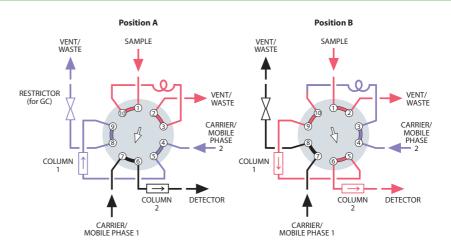
10 port dual external sampling



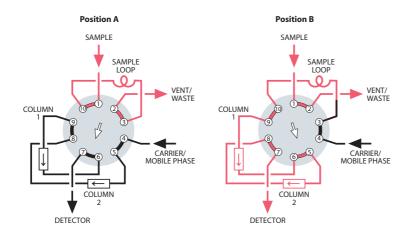
LOOP SAMPLING WITH BACKFLUSH OF PRE-COLUMN TO VENT

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



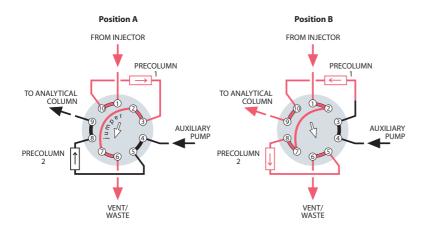
10 port sampling/switching



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

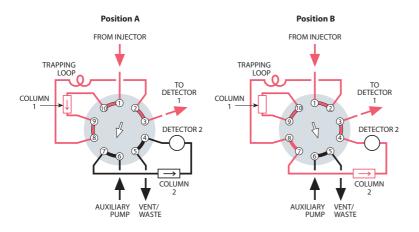


SAMPLE ENRICHMENT (CLEANUP) USING DUAL PRECOLUMNS

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

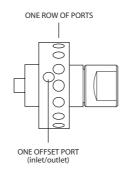
Sample is injected (using a separate injector) onto an analytical column. Early eluting components (front cut) pass through a trapping loop and are detected (at port 3). The valve is then switched, and the center (or heartcut) which was retained in the trapping loop is injected onto the second column 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.

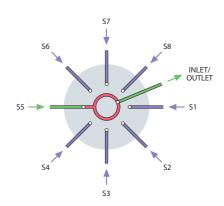
Selectors ■ Low pressure

VALCO VALVES

Dead-end flowpath -SD configuration

SD valves select one of 4 to 12 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 136.





1/16" fittings, 0.75 mm ports (.030")

MW Type

Low pressure

0.75 mm

Includes 2" standoff. Ask about closemount assembly if valve will not be heated. Microelectric actuators: 24 VDC (includes a 110/230 VAC to 24 VDC power supply)

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 254-255)
- Larger bore available except 16 position

SPECS 400 psi gas 200°C max Nitronic 60 body Valcon E rotor

	6 Position	10 Position	12 Position	16 Position
	Prod No	Prod No	Prod No	Prod No
Manual (not recommended)	2CSD6MWE	2CSD10MWE	2CSD12MWE	2CSD16MWE
W ith air actuator	A2CSD6MWE	A2CSD10MWE	A2CSD12MWE	A2CSD16MWE
With microelectric actuator	EMT2CSD6MWE	EMT2CSD10MWE	EMT2CSD12MWE	EMT2CSD16MWE
Replacement valve	DCSD6MWE	DCSD10MWE	DCSD12MWE	DCSD16MWE
Replacement rotor	SSACSD6MWE	SSACSD10MWE	SSACSD12MWE	SSACSD16MWE



MORE INFORMATION Application.... page 136 Actuators Air196 Microelectric192 Universal 193

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Closemount208 Standoff......205

1/8" fittings, 1.0 mm ports (.040")

MW Type

SPECS

4-8 Positions:

400 psi gas 200°C max

10-16 Positions:

200 psi gas 200°C max

Nitronic 60 body Valcon E rotor Includes 2" standoff. Ask about closemount assembly if valve will not be heated. Microelectric actuators: 24 VDC (includes a 110/230 VAC to 24 VDC power supply)

Low pressure

SD

1/8"

1.0 mm

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 254-255)
- Larger bore available

	6 Position	10 Position	12 Position	16 Position
	Prod No	Prod No	<i>Prod No</i>	<i>Prod No</i>
Manual (not recommended)	2SD6MWE	2SD10MWE	2SD12MWE	2SD16MWE
With air actuator	A2SD6MWE	A2SD10MWE	A2SD12MWE	A2SD16MWE
With microelectric actuator	EMT2SD6MWE	EMT2SD10MWE	EMT2SD12MWE	EMT2SD16MWE
Replacement valve	DSD6MWE	DSD10MWE	DSD12MWE	DSD16MWE
Replacement rotor	SSASD6MWE	SSASD10MWE	SSASD12MWE	SSASD16MWE

1/4" fittings, 4.0 mm ports (.156")

MW Type

SPECS
100 psi gas
75°C max
Nitronic 60 boo

Nitronic 60 body Valcon E2 rotor Includes 2" standoff. Ask about closemount assembly if valve will not be heated. Manual version not available.

Microelectric actuators: 24 VDC (includes a 110/230 VAC to 24 VDC power supply)

Low pressure

SD Dead-end

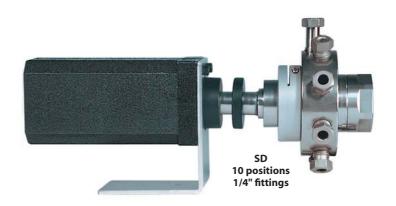
1////

4.0 mm

OPTIONS

- 3", 4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium (see pages 254-255)

	4 Position <i>Prod No</i>	6 Position Prod No	8 Position Prod No	10 Position <i>Prod No</i>
With air actuator	AH2VLSD4MWE2	AH2VLSD6MWE2	AH2VLSD8MWE2	AH2VLSD10MWE2
With microelectric actuator	EMT2VLSD4MWE2	EMT2VLSD6MWE2	EMT2VLSD8MWE2	EMT2VLSD10MWE2
Replacement valve	DVLSD4MWE2	DVLSD6MWE2	DVLSD8MWE2	DVLSD10MWE2
Replacement rotor	SSAVLSD4MWE2	SSAVLSD6MWE2	SSAVLSD8MWE2	SSAVLSD10MWE2



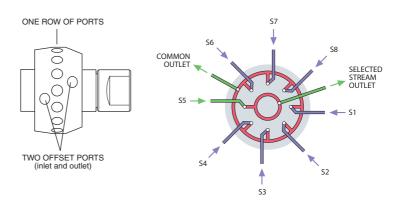


Selectors ■ Low pressure

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 137.



12 Position

1/16" fittings, 1.0 mm ports (.040")

MW Type

Low pressure

SC **Common outlet**

1.0 mm

Includes 2" standoff. Ask about closemount assembly if valve will not be heated. Microelectric actuators: 24 VDC (includes a 110/230 VAC to 24 VDC power supply)

OPTIONS

■ 4 and 8 positions available

6 Docition

- 3", 4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium (see pages 254-255)

10 Position

200 psi gas 200°C max Nitronic 60 body Valcon E rotor

16 Position

SPECS

	Prod No	Prod No	Prod No	Prod No
Manual (not recommended)	2CSC6MWE	2CSC10MWE	2CSC12MWE	2CSC16MWE
With air actuator	AH2CSC6MWE	A2CSC10MWE	A2CSC12MWE	A2CSC16MWE
With microelectric actuator	EMT2CSC6MWE	EMT2CSC10MWE	EMT2CSC12MWE	EMT2CSC16MWE
Replacement valve	DCSC6MWE	DCSC10MWE	DCSC12MWE	DCSC16MWE
Replacement rotor	SSACSC6MWE	SSACSC10MWE	SSACSC12MWE	SSACSC16MWE



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1/8" fittings, 1.0 mm ports (.040")

MW Type

SPECS 200 psi gas 200°C max Nitronic 60 body

Valcon E rotor

Includes 2" standoff. Ask about closemount assembly if valve will not be heated. Microelectric actuators: 24 VDC (includes a 110/230 VAC to 24 VDC power supply)

Low pressure

SC Common outlet

1/8"

1.0 mm

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 254-255)
- Larger bore available except 16 position

	6 Position	10 Position	12 Position	16 Position
	Prod No	Prod No	Prod No	Prod No
Manual (not recommended)	2SC6MWE	2SC10MWE	2SC12MWE	2SC16MWE
With air actuator	AH2SC6MWE	A2SC10MWE	A2SC12MWE	A2SC16MWE
With microelectric actuator	EMT2SC6MWE	EMT2SC10MWE	EMT2SC12MWE	EMT2SC16MWE
Replacement valve	DSC6MWE	DSC10MWE	DSC12MWE	DSC16MWE
Replacement rotor	SSASC6MWE	SSASC10MWE	SSASC12MWE	SSASC16MWE

1/4" fittings, 4.0 mm ports (.156")

MW Type

SPECS 100 psi gas 75°C max Nitronic 60 body Valcon E2 rotor

Includes 2" standoff. Ask about closemount assembly if valve will not be heated. Manual version not available.

Microelectric actuators: 24 VDC (includes a 110/230 VAC to 24 VDC power supply)

Low pressure

SC Common outlet

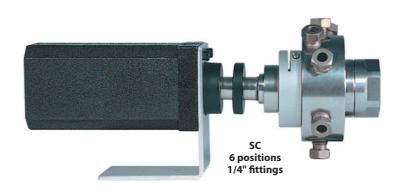
1////

4.0 mm

OPTIONS

- 3", 4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium (see pages 254-255)

	4 Position <i>Prod No</i>	6 Position Prod No	8 Position Prod No
With air actuator	AH2VLSC4MWE2	AH2VLSC6MWE2	AH2VLSC8MWE2
With microelectric actuator	EMT2VLSC4MWE2	EMT2VLSC6MWE2	EMT2VLSC8MWE2
Replacement valve Replacement rotor	DVLSC4MWE2	DVLSC6MWE2	DVLSC8MWE2
	SSAVLSC4MWE2	SSAVLSC6MWE2	SSAVLSC8MWE2



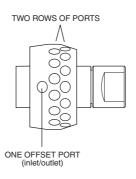


Selectors ■ Low pressure

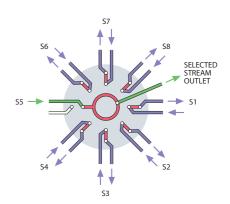
VALCO VALVES

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 138.



12 Position



1/16" fittings, 1.0 mm ports (.040")

MW Type

Low pressure

1.0 mm

Includes 2" standoff. Ask about closemount assembly if valve will not be heated. Microelectric actuators: 24 VDC (includes a 110/230 VAC to 24 VDC power supply)

OPTIONS

■ 4 and 8 positions available

6 Docition

- 3", 4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium (see pages 254-255)

10 Position

SPECS 200 psi gas 200°C max Nitronic 60 body Valcon E rotor

16 Position

	Prod No	Prod No	Prod No	Prod No
Manual (not recommended) With air actuator With microelectric actuator	2CSF6MWE	2CSF10MWE	2CSF12MWE	2CSF16MWE
	AH2CSF6MWE	A2CSF10MWE	A2CSF12MWE	A2CSF16MWE
	EMT2CSF6MWE	EMT2CSF10MWE	EMT2CSF12MWE	EMT2CSF16MWE
Replacement valve	DCSF6MWE	DCSF10MWE	DCSF12MWE	DCSF16MWE
Replacement rotor	SSACSF6MWE	SSACSF10MWE	SSACSF12MWE	SSACSF16MWE



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1/8" fittings, 1.0 mm ports (.040")

MW Type

SPECS
200 psi gas
200°C max
Nitronic 60 body
Valcon E rotor

Includes 2" standoff. Ask about closemount assembly if valve will not be heated. Microelectric actuators: 24 VDC (includes a 110/230 VAC to 24 VDC power supply)

Low pressure

SF

Flow-throu

1/8"

1.0 mm

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 254-255)
- Larger bore available except 16 position

	6 Position	10 Position	12 Position	16 Position
	Prod No	Prod No	Prod No	Prod No
Manual (not recommended)	2SF6MWE	2SF10MWE	2SF12MWE	2SF16MWE
With air actuator	AH2SF6MWE	A2SF10MWE	A2SF12MWE	A2SF16MWE
With microelectric actuator	EMT2SF6MWE	EMT2SF10MWE	EMT2SF12MWE	EMT2SF16MWE
Replacement valve	DSF6MWE	DSF10MWE	DSF12MWE	DSF16MWE
Replacement rotor	SSASF6MWE	SSASF10MWE	SSASF12MWE	SSASF16MWE

1/4" fittings, 4.0 mm ports (.156")

MW Type

SPECS 100 psi gas 75°C max Nitronic 60 body Valcon E2 rotor

Includes 2" standoff. Ask about closemount assembly if valve will not be heated. Manual version is not available.

Microelectric actuators: 24 VDC (includes a 110/230 VAC to 24 VDC power supply)

Low pressure

SF Flow-through

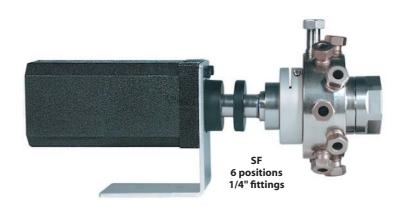
1/4"

4.0 mm

OPTIONS

- 3", 4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium (see pages 254-255)

	4 Position Prod No	6 Position Prod No	8 Position Prod No
With air actuator	AH2VLSF4MWE2	AH2VLSF6MWE2	AH2VLSF8MWE2
With microelectric actuator	EMT2VLSF4MWE2	EMT2VLSF6MWE2	EMT2VLSF8MWE2
Replacement valve	DVLSF4MWE2	DVLSF6MWE2	DVLSF8MWE2
Replacement rotor	SSAVLSF4MWE2	SSAVLSF6MWE2	SSAVLSF8MWE2

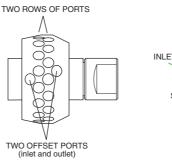


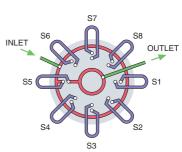
Selectors ■ Low pressure

VALCO VALVES

Trapping flowpath -ST configuration

ST selectors are used for multi-column, multi-sample, or multi-trap operations, and are available for use with 4 to 16 loops, or positions. For an application suggestion, see page 139.





1/16" fittings, 0.75 mm ports (.030")

MW Type

Low pressure

Includes 2" standoff. Ask about closemount assembly if valve will not be heated. Microelectric actuators: 24 VDC (includes a 110/230 VAC to 24 VDC power supply)

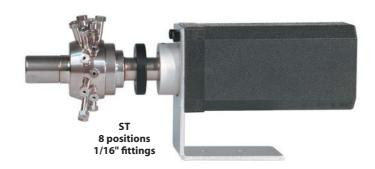
OPTIONS

- 4 and 8 positions available
- 3", 4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium (see pages 254-255)

SPECS 200 psi gas 200°C max Nitronic 60 body

Valcon E rotor

	6 Position	10 Position	12 Position	16 Position
	Prod No	Prod No	Prod No	Prod No
Manual (not recommended)	2CST6MWE	2CST10MWE	2CST12MWE	2CST16MWE
With air actuator	AH2CST6MWE	A2CST10MWE	A2CST12MWE	A2CST16MWE
With microelectric actuator	EMT2CST6MWE	EMT2CST10MWE	EMT2CST12MWE	EMT2CST16MWE
Replacement valve	DCST6MWE	DCST10MWE	DCST12MWE	DCST16MWE
Replacement rotor	SSACST6MWE	SSACST10MWE	SSACST12MWE	SSACST16MWE



1/16" Stainless steel loops for MW Type valves

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.

•		_		
Volume	Prod No	Volume	Prod No	
50 µl	SL50CSTP	1 ml	SL1KCSTP	\ /
100 µl	SL100CSTP	2 ml	SL2KCSTP	\ /
				\ /
250 µl	SL250CSTP	5 ml	SL5KCSTP	7 7
500 µl	SI 500CSTP	10 ml	SI 10KCSTP	TT

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Australian Distributors Importers & Manufacurers

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Mounting hardware
Closemount208
Standoff205

1/8" fittings, 1.0 mm ports (.040")

MW Type

1.0 mm

SPECS 200 psi gas 200°C max

Nitronic 60 body Valcon E rotor

Includes 2" standoff. Ask about closemount assembly if valve will not be heated. Microelectric actuators: 24 VDC (includes a 110/230 VAC to 24 VDC power supply)

Low pressure

1/8"

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 254-255)
- Larger bore available except 16 position

6 Position	10 Position	12 Position	16 Position
Prod No	Prod No	Prod No	Prod No
2ST6MWE	2ST10MWE	2ST12MWE	2ST16MWE
AH2ST6MWE	A2ST10MWE	A2ST12MWE	A2ST16MWE
EMT2ST6MWE	EMT2ST10MWE	EMT2ST12MWE	EMT2ST16MWE
DST6MWE	DST10MWE	DST12MWE	DST16MWE
SSAST6MWE	SSAST10MWE	SSAST12MWE	SSAST16MWE

Manual (not recommended) With air actuator With microelectric actuator Replacement valve Replacement rotor

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 brazed or welded 1/16" tube ends or reducing unions.
- 1/8" loops < 100 µl are made from 1/16" OD tubing with brazed or 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

for MW Type valves

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.

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

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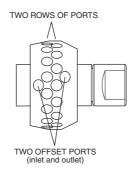
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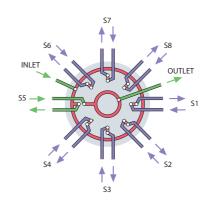
Selectors ■ Low pressure

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 140.





1/16" fittings, 0.75 mm ports (.030")

MW Type

Low pressure

STF Trap/ flow-throw

Includes 2" standoff. Ask about closemount assembly if valve will not be heated. Microelectric actuators: 24 VDC (includes a 110/230 VAC to 24 VDC power supply)

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 254-255)

SPECS 200 psi gas 200°C max Nitronic 60 body Valcon E rotor

	6 Position <i>Prod No</i>	10 Position Prod No	12 Position <i>Prod No</i>	16 Position <i>Prod No</i>
Manual (not recommended)	2CSTF6MWE	2CSTF10MWE	2CSTF12MWE	2CSTF16MWE
With air actuator	AH2CSTF6MWE	A2CSTF10MWE	A2CSTF12MWE	A2CSTF16MWE
With microelectric actuator	EMT2CSTF6MWE	EMT2CSTF10MWE	EMT2CSTF12MWE	EMT2CSTF16MWE
Replacement valve	DCSTF6MWE	DCSTF10MWE	DCSTF12MWE	DCSTF16MWE
Replacement rotor	SSACSTF6MWE	SSACSTF10MWE	SSACSTF12MWE	SSACSTF16MWE

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MORE INFORMATION Application.... page 140 Actuators Air196 Microelectric192 Universal 193 Materials Metals..... 254-255 Polymers 256 Valve rotors......257 Mounting hardware Closemount208 Standoff......205

1/8" fittings, 1.0 mm ports (.040")

MW Type

1.0 mm

SPECS 200 psi gas 200°C max Nitronic 60 body Valcon E rotor

Includes 2" standoff. Ask about closemount assembly if valve will not be heated. Microelectric actuators: 24 VDC (includes a 110/230 VAC to 24 VDC power supply)

Low pressure

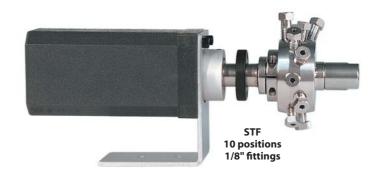
STF Trap/ flow-throw

1/8"

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 254-255)
- Larger bore available except 16 position

	6 Position	10 Position	12 Position	16 Position
	Prod No	Prod No	Prod No	Prod No
Manual (not recommended)	2STF6MWE	2STF10MWE	2STF12MWE	2STF16MWE
With air actuator	AH2STF6MWE	A2STF10MWE	A2STF12MWE	A2STF16MWE
With microelectric actuator	EMT2STF6MWE	EMT2STF10MWE	EMT2STF12MWE	EMT2STF16MWE
Replacement valve	DSTF6MWE	DSTF10MWE	DSTF12MWE	DSTF16MWE
Replacement rotor	SSASTF6MWE	SSASTF10MWE	SSASTF12MWE	SSASTF16MWE

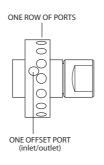


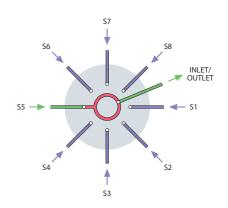
Selectors ■ High pressure

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 141.





1/16" fittings, 0.4 mm ports (.016")

UW Type

5,000 psi

0.40 mm

OPTIONS

- 8 and 12 positions available
- 2", 3", 4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium (see p. 254-255)

Microelectric actuators: 24 VDC (includes a 110/230 VAC to 24 VDC power supply)

- Low pressure, high temperature versions available
- Larger bore available except 10 and 12 positions

	4 Position Prod No	6 Position <i>Prod No</i>	10 Position <i>Prod No</i>
Manual (not recommended)	CSD4UW	CSD6UW	CSD10UW
With air actuator	ACSD4UW	ACSD6UW	ACSD10UW
With microelectric actuator	EMTCSD4UW	EMTCSD6UW	EMTCSD10UW
Replacement valve	DCSD4UW	DCSD6UW	DCSD10UW
Replacement rotor	SSACSD4UW	SSACSD6UW	SSACSD10UW

SPECS 5000 psi liq 75°C max Nitronic 60 body Valcon E rotor

1/8" fittings, 0.75 mm ports (.030")

5,000 psi

0.75 mm

OPTIONS

- 2", 3", 4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium (see p. 254-255)

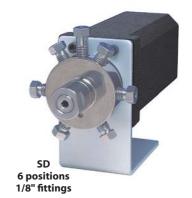
Microelectric actuators: 24 VDC (includes a 110/230 VAC to 24 VDC power supply)

- Low pressure, high temperature versions available
- Larger bore available except 8 position

	4 Position	6 Position	8 Position
	Prod No	Prod No	Prod No
Manual (not recommended)	SD4UW	SD6UW	SD8UW
With air actuator	ASD4UW	ASD6UW	ASD8UW
With microelectric actuator	EMTSD4UW	EMTSD6UW	EMTSD8UW
Replacement valve	DSD4UW	DSD6UW	DSD8UW
Replacement rotor	SSASD4UW	SSASD6UW	SSASD8UW

SPECS 5000 psi liq 75°C max Nitronic 60 body Valcon E rotor

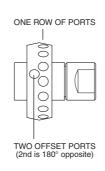
UW Type

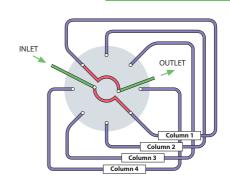




Both column ends selected -ST configuration

ST selectors are used for multi-column, multi-sample, or multitrap 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 141.





1/16" fittings, 0.4 mm ports (.016")

UW Type

SPECS 5000 psi liq 75°C max

Nitronic 60 body Valcon E rotor

Manual versions are not available.

Microelectric actuators: 24 VDC (includes a 110/230 VAC to 24 VDC power supply).

OPTIONS

- 2", 3", 4", and 6" standoffs
- Materials: Hastelloy C, Inconel 600, Monel 400, Nickel 200, Nitronic 50, Titanium (see p. 254-255)
- Low pressure, high temperature versions available. (Consult factory.)

5,000 psi

0.40 mm

	4 Columns or Loops <i>Prod No</i>	6 Columns or Loops <i>Prod No</i>
With air actuator	ACST4UW	ACST6UW
With microelectric actuator	EMTCST4UW	EMTCST6UW
Replacement valve	DCST4UW	DCST6UW
Replacement rotor	SSACST4UW	SSACST6UW



4 position 1/16" fittings

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 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



1/16" Stainless steel loops

for UW Type valves

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.

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
این ۱۸۸	SI 100CSTI IW	10 ml	SL10KCSTUW

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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.

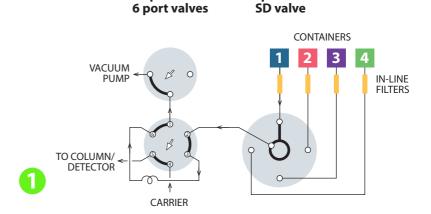
1 A vacuum pump is used to move sample from the containers to a 6 port sampling valve. 2 The 3 port valve is used to block the vacuum flow through the sampling valve to allow the sample within the loop to equilibrate at atmospheric pressure. 3 The 6 port valve is then switched, injecting the sample. 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.

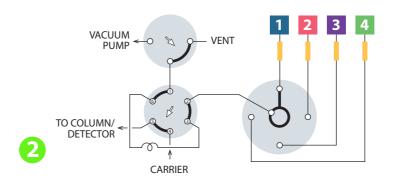
The SD flowpath isolates the unselected sample streams, but the potential exists for extraneous sample or contaminants to be in the lines when containers are first connected. To avoid problems, either prepurge each line or allow sufficient sampling time for the line to purge prior to injection.

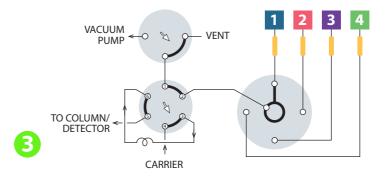
SD flowpath — low pressure

4 position

3 port and





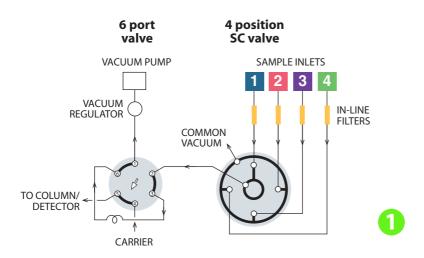


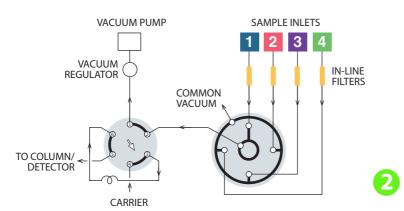
MORE INFORMATION

SD prices Low pressure . . 124-125 High pressure134 Application

High pressure SD ...141

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.

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 50-52

MORE INFORMATION

Actuators

Air page 196 Mod. universal 194 Universal 193

SC prices 126-127

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STREAM SELECTION WITH **CONTINUOUS FLOW TO INDIVIDUAL OUTLETS**

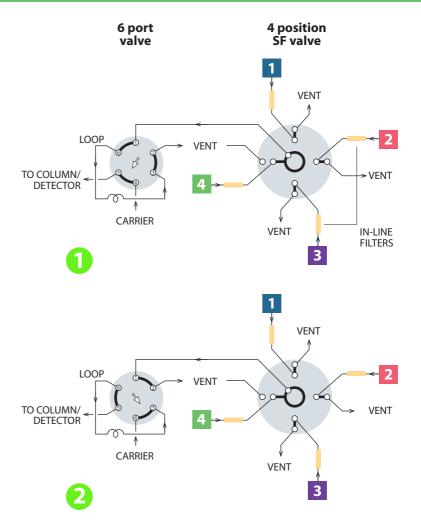
SD and SC valves select and isolate one of 4 to 16 streams, with the remainder dead-ended in the SD and flowing to a common outlet in the SC. The SF selector is similar, but carries the evolution a step further with the non-selected streams flowing through individual outlets.

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.

SF flowpath

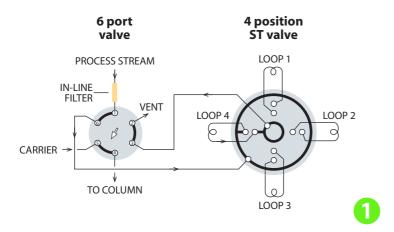


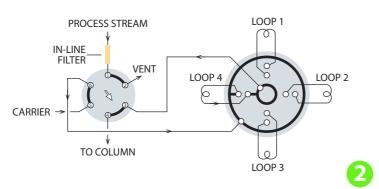
MORE INFORMATION

Actuators Air page 196 Mod. universal 194 Universal 193

SF prices 128-129

ST flowpath — low pressure





SAMPLE TRAPPING APPLICATIONS FOR 4 TO 16 STREAMS

ST selectors are used for multicolumn, 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 collection/trapping and analysis/desorption. Both valves can be supplied with pneumatic or electric actuators to automate these functions.

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 50-52

MORE INFORMATION

ST prices

Low pressure . . . 130-131 High pressure 135

Application

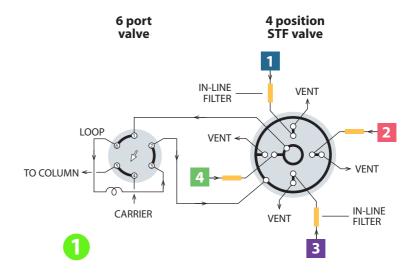
High pressure ST141

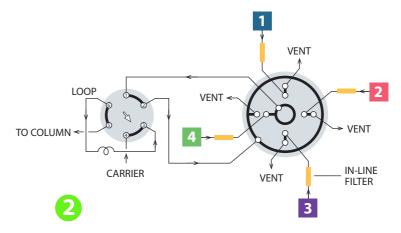
SAMPLE TRAPPING WITH CONTINUOUS FLOW TO INDIVIDUAL OUTLETS

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.

STF flowpath





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 50-52

MORE INFORMATION

Actuators

Air page 196 Mod. universal 194 Universal 193

STF prices

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SD flowpath — high pressure

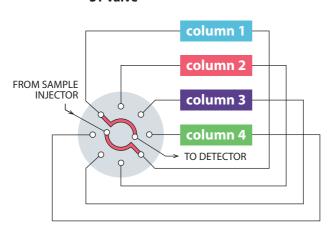
8 position Manifold SD valve FROM SAMPLE column 1 TO DETECTOR **INJECTOR** column 2 column 3 column 4 column 5 column 6 column 8

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

4 position **ST** valve



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 INFORMATION

Prices

SD high pressure ...134

ST high pressure....135 Application

Low pressure SD... 136 Low pressure ST ... 139 Manifolds

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Diaphragm valves FOR CONTINUOUS AUTOMATED OPERATION

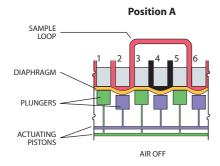
- Only 35 mm (1.375") in diameter
- >1,000,000 cycle lifetime
- Three configurations 6 port, 10 port, and 4 port internal sample
- Built in actuator
- 1/16" or 1/32" Valco zero dead volume fittings

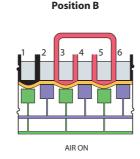
The VICI mini diaphragm valve is designed for trouble-free use in applications requiring minimal maintenance and maximum lifetime, making it an ideal choice for the process industry, automated lab analyzers, or continuous-monitoring environmental analyses.

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.





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 VALVES

Dimensions

Valve diameter is 35 mm (1.375"), height is 42 mm (1.625"), and weight is less than 255 g (9 oz).

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 198.)

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.



Purge ring Page 144

ACTUATION

A 3-way solenoid is required for actuation.
3-way solenoid ... p 198

MORE INFORMATION Materials

Metals..... 254-255

Valve descriptions

Valco selectors .. 102-103

Valve prices

Ordering information

DIAPHRAGM VALVES

Diaphragm valves, 1/32" fittings, 0.25 mm ports (.010")

Process GC

1/32"

Includes stainless steel nuts and ferrules.

A 3-way solenoid is required for actuation. Order separately on page 198.



4 port .5 µl internal sample Prod No

DV12-1114-.5



4 port 1 µl internal sample Prod No

DV12-1114-1



6 port sampling/switching Prod No

DV12-1116



10 port multifunctional Prod No

DV12-1110

10 port

multifunctional

Prod No

SPECS

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

0.40 mm

Includes stainless steel nuts and ferrules.

A 3-way solenoid is required for actuation. Order separately on page 198.

4 port .5 µl internal sample

Prod No DV22-2114-.5

4 port 1 µl internal sample

Prod No DV22-2114-1

6 port sampling/switching Prod No

> DV22-2116 DV22-2110

SPECS

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

0.75 mm

Includes stainless steel nuts and ferrules.

A 3-way solenoid is required for actuation. Order separately on page 198.

4 port
.5 μl internal sample
Prod No

DV22-3114-.5

4 port 1 µl internal sample Prod No

DV22-3114-1

6 port sampling/switching Prod No

DV22-3116

10 port multifunctional Prod No

DV22-3110

SPECS

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.

1/16" sample loops

Each stainless steel loop includes two 1/16" stainless nuts and ferrules.



1/32" sample loops

Each stainless steel loop includes two 1/32" stainless steel nuts and ferrules.

Volume Prod No CSLN1K

CSLN2K $2 \mu l$ CSLN5K 5 µl

10 µl CSLN10K

DTFF dianhranm



6 port 1/16" fittings

Prod No

Replacement diaphragms

Prod No Polyimide diaphragm .010" bore DV22-21D .016" bore DV22-21D .030" bore

Accessories

Purge ring DV22-PURGE Mounting kit DVRRKIT

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OPTIONS

Materials:

Hastelloy C Type 316 stainless For more information, refer to the metals discussion on page 254-5.

MORE INFORMATION

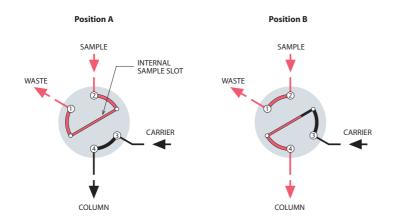
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DV22-31D

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DIAPHRAGM VALVES

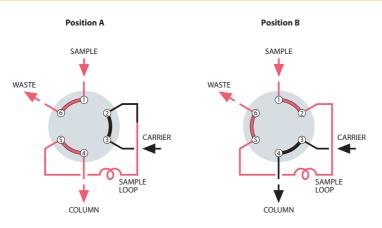
4 port sample injector



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.

5 port sample injector



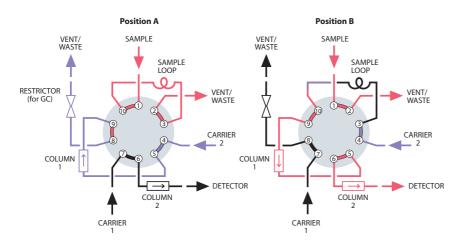
SAMPLE INJECTION

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 INFORMATION

More applicationspages 120-121

10 port sample injecto



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 INFORMATION

More applications pages 122-123



Cheminert® valves

FOR INJECTION, SWITCHING, AND STREAM SELECTION

- Pressure ratings from 100 psi to 20,000 psi liq
- Inert, biocompatible construction
- Easy field service
- Automated operation pneumatic or electric
- 4, 6, 8, and 10 port and internal sample two position models
- Stream selection versions with up to 26 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).



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 longlife 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.

Metal valves are supplied with stainless nuts, with ferrules of the same material as the stator. Fittings for polymeric valves vary with the valve design. The valve price lists contain more detailed information.

Sample injection loops are available in a variety of materials, and are found on the pages with their corresponding valves.

TECH TIP

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

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

MORE INFORMATION

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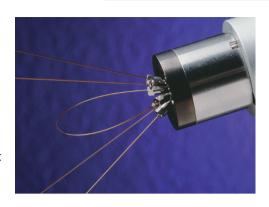
Selectors 172-179 UHPLC 154-157



Nanovolume[®]

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, suitable for the most demanding analytical techniques. All models are compatible with any VICI actuation option.



Nanovolume® Injectors and switching valves

Application	Fittings		Bore size	Model	Pressure rating	More info
UHPLC	360 micron		100 or 150 μm	C72MU	20,000 psi	p. 154
20,000 psi				C72MX	15,000 psi	p. 154
15 000 pci				C72MH	10,000 psi	vici.com
15,000 psi	1/32" stainless		100 or 150 μm	C72NU	20,000 psi	vici.com
10,000 psi	1/16" stainless	-		C72NX	15,000 psi	p. 155
				C72NH	10,000 psi	vici.com
			150 µm	C72X	15,000 psi	vici.com
				C72H	10,000 psi	vici.com
HPLC 5,000 psi	1/32" PEEK or stainless		100 or 150 μm	C2N	5,000 psi	p. 158

Nanovolume® Internal sample injectors

Application	Fittings		Bore size	Sample sizes available	Model	Pressure rating	More info		
UHPLC	1/32" stainless		100 µm	4, 10, or 20 nl	C74NU	20,000 psi	vici.com		
20,000 psi					C74NX	15,000 psi	vici.com		
15,000 psi					C74NH	10,000 psi	vici.com		
					150 µm	10, 20, or 30 nl	C74NU	20,000 psi	vici.com
10,000 psi	psi				C74NX	15,000 psi	p. 155		
					C74NH	10,000 psi	vici.com		
	1/16" stainless	THE RESERVE AND ADDRESS OF THE PARTY OF THE	150 μm 10, 2	10, 20, or 50 nl	C74U	20,000 psi	vici.com		
		Printifiin -			C74X	15,000 psi	vici.com		
						C74H	10,000 psi	vici.com	
HPLC 5,000 psi	1/32" PEEK or stainless		100 or 150 μm	4, 10, or 20 nl	C4N	5,000 psi	p. 159		

NANOVOLUME® VALVES AT VICI.COM For more information on

all valve options listed here, go to:

www.vici.com/ cval/cval_nano.php



Nanovolume® Selectors

Application	Fittings		Bore size	Model	Pressure rating	More info		
UHPLC	1/32" stainless		100 or 150 μm	C75NU	20,000 psi	vici.com		
20,000 psi						C75NX	15,000 psi	p. 172
15,000 psi				C75NH	10,000 psi	vici.com		
	1/16" stainless		150 μm	C75U	20,000 psi	vici.com		
10,000 psi				C75X	15,000 psi	vici.com		
				C75H	10,000 psi	vici.com		

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Overview UHPLC microbore injectors, switching valves, and selectors

CHEMINERT VALVES

UHPLC

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	Model	Pressure rating	More info		
UHPLC	1/32" stainless	25	250 µm	C72NU	20,000 psi	vici.com		
20,000 psi						C72NX	15,000 psi	vici.com
15,000 psi				C72NH	10,000 psi	vici.com		
10,000 psi	1/16" stainless				250 µm	C72U	20,000 psi	vici.com
						C72X	15,000 psi	p. 156
				C72H	10,000 psi	p. 156		

Microbore **UHPLC** internal sample injectors

Application	Fittings		Bore size	Sample sizes available	Model	Pressure rating	More info
UHPLC	1/32" stainless		250 µm	20, 50, or	C74NU	20,000 psi	vici.com
20,000 psi				100 nl	C74NX	15,000 psi	vici.com
15,000 psi					C74NH	10,000 psi	vici.com
10,000 psi	1/16" stainless		250 µm	250 μm 20, 50, or 100 nl	C74U	20,000 psi	vici.com
					C74X	15,000 psi	p. 157
					C74H	10,000 psi	p. 157

Microbore **UHPLC** selectors

Application	Fittings		Bore size	Model	Pressure rating	More info		
UHPLC	1/32" stainless		250 µm	C75NU	20,000 psi	vici.com		
20,000 psi						C75NX	15,000 psi	p. 172
15,000 psi				C75NH	10,000 psi	vici.com		
10,000 psi	1/16" stainless			250 µm	C75U	20,000 psi	vici.com	
				C75X	15,000 psi	vici.com		
				C75H	10,000 psi	p. 173		



For more information on all valve options listed here, go to:

www.vici.com/ cval/cval_uhplc.php



MORE INFORMATION Nanovolume® injectors and selectors147

HPLC injectors

Nanobore

Nanovolume® HPLC injectors and internal sample injectors include 1/32" PEEK nuts and ferrules. See page 147 for an overview of these valves.

Microbore

Model C2 valves can be used as injectors or switching valves.

Model C4 is an internal volume sample injector with sample sizes ranging from 10 nl to 50 nl.

Model C6 continuous flow injector is designed to maintain pump flow during most of the switching cycle, virtually eliminating pressure spikes.

Model C1CFI is a 6 port through-thehandle continuous flow injector. An engraving on the stator maintains pump flow between ports 2 and 3 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.

Analytical

Models C2, C6, and C1CFI are also available for analytical injection and switching, with port sizes of 0.40 mm (.016"). Model C4 offers internal volume sample sizes ranging from 0.1 to 0.5 µl.

Semi-Preparative HPLC

Model C2 valves are available with flow passages optimized for semipreparative HPLC. Choose from 4, 6, 8, or 10 port versions. Contact our sales or technical support departments for more information.

Autosampler Replacements

We supply direct replacements for injectors in many popular autosamplers. Call technical support to determine which replacement is best for your application.





Microbore, page 162 Analytical, page 165

5,000 psi Through-handle

Continuous flow

MORE INFORMATION HPLC selectors152 Injectors and selectors for OFMe

MODEL C1CFI FLOWPATH LOAD MID INJECT PUMP COLUMN PUMP COLUMN PUMP COLUMN roto

omatic diagra c of continuous flow Model C6, see pages 162 and 165. Australian Distributors HROM = 1 y tic +61(0)3 9762 2034 Importers & Manufacurers ECH nology Pty Ltd Website NEW: www.chromalytic.net.au E-mail: info@chromtech.net.au Tel: 03 9762 2034... in AUSTRALIA

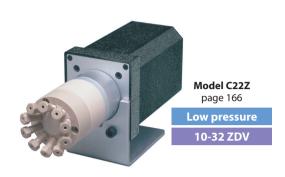
Low pressure injectors

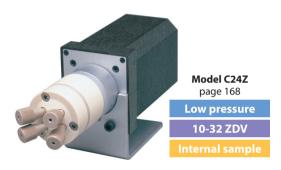
With Valco Zero Dead Volume (ZDV) Fittings

C20Z Series 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 C20Z series valves. Use of metal fittings in a C20Z valve voids the warranty.

The Model C22Z is a conventional two position sample injector and switching valve, with 4, 6, 8, or 10 ports. Sample injection requires a loop, ordered separately.

The Model C24Z is an internal sample injector, for applications in which the sample size is smaller than that of any available external loop. Sample sizes available are 0.2, 0.5, and 1 µl.





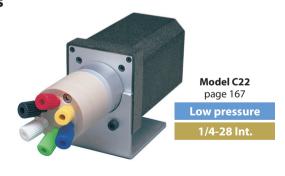
With Cheminert 1/4-28 Fittings

C20 Series valve caps have female threads for direct connection of lines – no couplings are required. C20 Series valves are available in 4. 6, 8, and 10 port versions. Standard specifications are 100 psi gas/250 psi liquid at 75°C.

Multicolored Cheminert 1/4-28 flangeless fittings for 1/16" or 1/8" OD tubing (depending on the valve model) are included.

Model C22 valves are used for sample injection or switching. (Functionally equivalent to Model C22Z) Sample injection requires a loop, ordered separately.

The Model C24 is an internal sample injector like the C24Z, available with 0.5, 1.0, or 2.0 µl sample size.





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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.

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

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For OEMs







Integrated Motor/Injector Assemblies

Cheminert's Model C52 (HPLC) and Model C62(Z) (low pressure) injectors are integrated motor/valve 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, the C52 and C62 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 is optional.

Autosampler and Other OEM Injectors

Model C3 is a unique injector with 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.

Model C2V is designed specifically for use in an autosampler. It is like the standard C2 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.

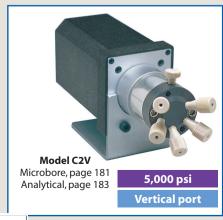
UNIVERSAL ACTUATOR

The new universal actuator operates virtually any Valco or Cheminert rotary valve – two position and selector alike - greatly simplifying the electronic aspect of instrument design.....193

OEM SELECTOR VALVES

See pages 153 and 186-187 for selector (multiposition) valves for **OEMs**





UHPLC and high pressure selectors

UHPLC Model C75 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. See charts on pages 147 and 148 for all options.



Model C75 See chart on page 147

20,000 psi

15,000 psi

10,000 psi

PORT DIAMETERS

page 174 5,000 psi

Model C5

The C5 valve is the backbone of the Cheminert HPLC column selector system, which includes two stream selection valves mounted on a single microelectric actuator.

HPLC Model C5, with Valco ZDV

fitting details, is available with 4,

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.

6, 8, or 10 positions. Stators are

Columns are not included

Consult the factory for information about a UHPLC column selector system.



HPI C column selector system page 175

5,000 psi

Model **Fitting** Standard port diameter **High Pressure** 1/16" ZDV 0.15 mm (.006")0.25 mm (.010")0.40 mm (.016")0.75 mm (.030")**Low Pressure** C25Z 1/16" ZDV 0.75 mm (.030") 1/4-28 0.75 mm (.030")

	for 1/16" tubing		
	1/4-28 for 1/8" tubing	1.50 mm	(.060")
C25G	1/16" ZDV	0.67 mm	(.026")
C45	1/2-20 for 1/4" tubing	4.6 mm	(.180")
OEM -	High Pressu	ıre	
C55	1/16" ZDV	0.25 mm 0.40 mm 0.75 mm	(.016")
OEM -	Low Pressu	re	
C65Z	1/16" ZDV	0.75 mm	(.030")
C65	1/4-28 for 1/16" tubing	0.75 mm	(.030")
	1/4-28 for 1/8" tubing	1.50 mm	(.060")

SPECIFICATIONS

CHEMINERT SELECTORS					
Model	Stator	Std rotor	Max	Max	Number of
	material	material	pressure	temp	positions
High P	ressure				
C5	Metal	Valcon H	5000 psi liq	75°C	4, 6, 8, 10
	PAEK	Valcon E	5000 psi liq	50°C	4, 6, 8, 10
Low Pi	ressure				
C25Z	PPS	Valcon E2	100 psi gas/	75°C	4, 6, 8, 10,
			250 psi liq		12,14
C25	PPS	Valcon E2	100 psi gas/	75°C	4, 6, 8, 10
			250 psi liq		
C25G	PEEK	Valcon M	100 psi liq	50°C	20, 24, 28
C45	PPS	Valcon TF	100 psi liq	50°C	4, 6, 8
OEM – High Pressure					
C55	Metal	Valcon H	5000 psi liq	50°C	4, 6, 8, 10
	PAEK	Valcon E	5000 psi liq	50°C	4, 6, 8, 10
OEM – Low Pressure					
C65Z	PPS	Valcon E2	100 psi gas/	50°C	4, 6, 8, 10
			250 psi liq		
C65	PPS	Valcon E2	100 psi gas/	50°C	4, 6, 8, 10
			250 psi liq		

UNIVERSAL ACTUATOR

The new universal actuator operates virtually any Valco or Cheminert rotary valve two position and selector alike – greatly simplifying the electronic aspect of instrument design. ... 193

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.

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Model C25Z page 176

Low pressure 10-32 ZDV



Model C25 page 177

Low pressure

1/4-28 Internal



Model C25G page 178

Low pressure -40 flat bottom



Model C45 page 179

Low pressure

1/2-20 Int.

Low pressure selectors

With Valco Zero Dead Volume Fittings

Model C25Z valves feature the popular 1/16" Valco ZDV details for 1/16" OD tubing. Available in 4, 6, 8, 10, 12, and 14 positions, with a variety of actuator options. Standard materials are PPS stator and Valcon E2 rotor, with other materials optional.

With Cheminert 1/4-28 Fittings

The Model C25 has female 1/4-28 threaded fitting details for direct connection of lines – no couplings are required. The C25 is available in 4, 6, 8, and 10 position models. Multicolored Cheminert 1/16" or 1/8" flangeless fittings are included. Rotors are made of Valcon E2 with stators of PPS.

With 6-40 Fittings for 1/16" or 1/32" tubing

Model C25G valves feature 6-40 flat bottom details that can accommodate 1/16" (standard) or 1/32" (optional) tubing. The fitting is one piece PEEK with a stainless steel retainer. available with 20, 24, or 28 positions. Universal actuator is required.

With Cheminert 1/2-20 Fittings

Model C45 valves feature 1/2-20 threaded fitting details for use with 1/4" OD tubing. This is a tapered rotor valve with large bore for high flow applications. Rotors are made from Valcon E2, with valve body made from PPS. Available in 4 and 6 position configurations only.

For OEMs

Integrated Motor/Stream Selectors

Cheminert's new Model C55 (HPLC) and **Model C65(Z)** (low pressure) stream selectors are integrated motor/valve assemblies designed specifically to be built into an OEM system. The compact, lightweight 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 is optional.



OEM INJECTORS See pages 151, 180-185 for injectors for OFMs



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Model C55 page 186

5,000 psi

UHPLC ■ Nanovolume® injectors with 360µm fittings

CHEMINERT VALVES

20,000 psi UHPLC Nanovolume® valves 360 micron fittings, 100 micron bore (.004")

20,000 psi

Nanobore

360 μm 100 μm

Includes stainless 360 micron fittings. Valves for use with fused silica tubing have gold-plated ferrules.

Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply.

Prod No Prod No

Coated stainless stator for use with stainless tubing

C72MU-4676 Manual C72MU-4674 C72MU-4674A C72MU-4676A With air actuator With microelectric actuator C72MU-4674EH C72MU-4676EH Replacement valve C72MU-4674D C72MU-4676D Replacement rotor C72M-46R4 C72M-46R6 Replacement stator C72M-4C74 C72M-4C76

For use with fused silica tubing

C72MFSU-4674 C72MFSU-4676 Manual With air actuator C72MFSU-4674A C72MFSU-4676A With microelectric actuator C72MFSU-4674EH C72MFSU-4676EH Replacement valve C72MFSU-4674D C72MFSU-4676D C72M-46R6 Replacement rotor C72M-46R4 Replacement stator C72M-4C74 C72M-4C76

Model C72MU

SPECS

20,000 psi liq 50°C max

Stainless w/ inert coating stator

Valcon E3 rotor

OPTIONS

- 150 micron (.006") bore
- Internal sample injector (4 - 20 nl)
- 10,000 and 15,000 psi versions available



Model C72MU 360 micron fittings (Model C72MX is similar)

15,000 psi UHPLC Nanovolume® valves 360 micron fittings, 150 micron bore (.006")

15,000 psi

Nanobore

360 µm

150 µm

Includes stainless 360 micron fittings.

Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply.



6 Port Prod No

Prod No

Coated stainless stator

Manual C72MX-6676 C72MX-6670 With air actuator C72MX-6676A C72MX-6670A C72MX-6670ED With microelectric actuator C72MX-6676EH C72MX-6670D Replacement valve C72MX-6676D C72M-66R0 Replacement rotor C72M-66R6 Replacement stator C72M-6C76 C72M-6C70

Model C72MX

SPECS

15,000 psi liq 50°C max

Stainless w/ inert coating stator

Valcon E3 rotor

OPTIONS

- 100 micron (.004") bore
- Internal sample injector (4 - 20 nl)
- 10,000 psi version available
- 4 and 8 port versions available

MORE INFORMATION

360 micron Nanovolume® fittings page 58



1/32"

15,000 psi UHPLC Nanovolume® valves 1/32" Valco stainless fittings, 150 micron bore (.006")

Model C72NX

15,000 psi

Nanobore

150 µm

15,000 psi liq 50°C max

Stainless w/ inert coating stator

Valcon E3 rotor

OPTIONS

- 100 micron (.004") bore
- 250 micron (.010") bore
- 10,000 psi version available
- 4 and 8 port versions available

Includes stainless nuts and ferrules.

Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply.

* The 6 port valve includes a 5 µl loop of the stator material.



Prod No Prod No

Coated stainless stator

Manual With air actuator With microelectric actuator

Replacement valve Replacement rotor Replacement stator

C72NX-6670 C72NX-6676 C72NX-6676A C72NX-6670A C72NX-6676EH C72NX-6670ED

C72NX-6676D C72NX-6670D C72N-66R6 C72N-66R0 C72N-6C76 C72N-6C70



Model C72NX 1/32" Valco stainless fittings

Sample loops for C72NX valves

Each stainless loop includes two stainless 1/32" Valco fittings.

	Stainless
Volume	Prod No
1 µl	CSLN1K5
2 µl	CSLN2K
5 µl	CSLN5K
10 µl	CSLN10K





fittings



15,000 psi UHPLC Nanovolume® internal sample injectors 1/32" Valco stainless fittings, 150 micron bore (.006")

Model C74NX

SPECS 15,000 psi liq

50°C max

Stainless w/ inert coating stator Valcon E3 rotor

OPTIONS

■ 100 micron (.004") bore

250 micron (.010") bore

10,000 and 20,000 psi

Includes stainless nuts and ferrules.

Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply.

10 nanoliters

Prod No

C74N-6C7



15,000 psi

Nanobore

1/32"

150 µm

C74X

versions available

Coated stainless stator Manual

With air actuator

With microelectric actuator Replacement valve Replacement rotor Replacement stator

Prod No C74NX-6674-.01 C74NX-6674-.02 C74NX-6674-.01A C74NX-6674-.02A C74NX-6674-.01EH C74NX-6674-.02EH C74NX-6674-.01D C74NX-6674-.02D C74N-66R-.01

20 nanoliters

C74N-66R-.02 C74N-6C7

30 nanoliters Prod No

C74NX-6674-.03 C74NX-6674-.03A C74NX-6674-.03EH C74NX-6674-.03D C74N-66R-.03 C74N-6C7

MORE INFORMATION

1/32" Valco fittingspages 10,12 1/16" Nanovolume® injectors C72X vici.com

> HROM = 1 y tic +61(0)3 9762 2034 ECH nology Pty Ltd Website NEW: www.chromalytic.net.au E-mail: info@chromtech.net.au Tel: 03 9762 2034... in AUSTRALIA

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UHPLC Microbore

CHEMINERT VALVES

15,000 psi UHPLC microbore valves, 1/16" Valco fittings, 0.25 mm ports (.010")

Model C72X

15,000 psi

Microbore

With microelectric actuator

Replacement valve Replacement rotor

Replacement stator

Manual With air actuator Includes stainless steel nuts and ferrules.

Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply.

* The 6 port valve includes a 5 µl stainless steel sample loop.



Prod No

C72X-1674

C72X-1674A

C72X-1674EH

C72X-1674D

C72-16R4

C72-1C74

6 Port*
Prod No
C72X-1676

C72X-1676A

C72X-1676EH

C72X-1676D

C72-16R6

C72-1C76



C72-1C78

8 Port Prod No	
C72X-1678 C72X-1678A C72X-1678ED	
C72X-1678D	



10 Port

Prod No C72X-1670

C72X-1670A C72X-1670ED C72X-1670D

C72-1C70

C72-16R0 C72-16R8

SPECS 15,000 psi liq 50°C max Stainless stator with inert coating

OPTIONS

Valcon E3 rotor

■ 0.15 mm ports (.006")

10,000 psi UHPLC microbore valves, 1/16" Valco fittings, 0.25 mm ports (.010")

10,000 psi

Microbore

Manual

With air actuator

Replacement valve

Replacement rotor

Replacement stator

With microelectric actuator

1/16" 0.25 mm

Includes stainless steel nuts and ferrules.

Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply.

* The 6 port valve includes a 5 µl stainless steel sample loop.



\sim			
4 Port			
Prod No			
C72H-1674			
C72H-1674A			
C72H-1674EH			
C72H-1674D			
C72-16R4			

C72-1C74





C72-16R6

C72-1C76

C72H-1676D

8 Port Prod No

C72H-1678 C72H-1678A C72H-1678ED

C72H-1678D C72-16R8 C72-1C78



10 Port Prod No

C72H-1670 C72H-1670A C72H-1670ED

C72H-1670D C72-16R0 C72-1C70

Model C72H

SPECS 10,000 psi liq 50°C max

Stainless stator with inert coating Valcon E3 rotor

OPTIONS

■ 0.15 mm ports (.006")



Model C72H (C72X similar) 1/16" ZDV fittings

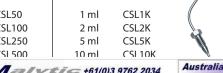
Stainless steel sample loops

for C72X and C72H valves

Each loop includes two stainless steel nuts and ferrules.

Metal loops > 2 ml are made from 1/8" OD tubing with brazed or welded 1/16" tube ends or reducing unions.

Prod No	Volume	Prod No	Volume	Prod No
CSL2	50 µl	CSL50	1 ml	CSL1K
CSL5	100 µl	CSL100	2 ml	CSL2K
CSL10	250 µl	CSL250	5 ml	CSL5K
CSI 20	500 ul	CSI 500	10 ml	CSI 10K
	CSL2 CSL5 CSL10	CSL2 50 μl CSL5 100 μl CSL10 250 μl	CSL2 50 μl CSL50 CSL5 100 μl CSL100 CSL10 250 μl CSL250	CSL2 50 μl CSL50 1 ml CSL5 100 μl CSL100 2 ml CSL10 250 μl CSL250 5 ml



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.

15,000 psi UHPLC microbore internal sample injectors, 1/16" Valco fittings, 0.25 mm ports (.010")

Model C74X

SPECS

15,000 psi liq 50°C max

Stainless stator with inert coating Valcon E3 rotor

Includes stainless steel nuts and ferrules.

Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply.



15,000 psi

Microbore

0.25 mm

OPTIONS

■ 0.15 mm ports (.006")

Sample volume	20 nanoliters <i>Prod No</i>	50 nanoliters <i>Prod No</i>	100 nanoliters <i>Prod No</i>
Manual	C74X-167402	C74X-167405	C74X-16741
With air actuator	C74X-167402A	C74X-167405A	C74X-16741A
With microelectric actuator	C74X-167402EH	C74X-167405EH	C74X-16741EH
Replacement valve	C74X-167402D	C74X-167405D	C74X-16741D
Replacement rotor	C74-16R02	C74-16R05	C74-16R1
Replacement stator	C74-1C7	C74-1C7	C74-1C7

10,000 psi UHPLC microbore internal sample injectors, 1/16" Valco fittings, 0.25 mm ports (.010")

Model C74H

SPECS 10,000 psi liq 50°C max

Stainless stator with inert coating Valcon E3 rotor

OPTIONS

■ 0.15 mm ports (.006")

Includes stainless steel nuts and ferrules. Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply.



10,000 psi

Microbore

1/16" 0.25 mm

Sample volume	20 nanoliters	50 nanoliters	100 nanoliters
	Prod No	Prod No	Prod No
Manual	C74H-167402	C74H-167405	C74H-16741
With air actuator	C74H-167402A	C74H-167405A	C74H-16741A
With microelectric actuator	C74H-167402EH	C74H-167405EH	C74H-16741EH
Replacement valve	C74H-167402D	C74H-167405D	C74H-16741D
Replacement rotor	C74-16R02	C74-16R05	C74-16R1
Replacement stator	C74-1C7	C74-1C7	C74-1C7



Model C74H (C74X similar) 1/16" ZDV fittings

MORE INFORMATION Actuators Air page 197 Microelectric190 Universal 193 Materials Metals..... 254-255 Polymers 256 Valve rotors......257 Standoff

assemblies

Australian Distributors HROMalytic +61(0)3 9762 2034 Importers & Manufacurers www.chromtech.net.au ECH nology Pty Ltd Website NEW: www.chromalytic.net.au E-mail: info@chromtech.net.au Tel: 03 9762 2034 . . . in AUSTRALIA

HPLC ■ Nanovolume® injectors with 1/32" fittings

CHEMINERT VALVES

5,000 psi Nanovolume® valves, 1/32" fittings, 100 micron ports (.004")

Model C2N

5,000 psi

Nanobore

1/32"

100 μm

Includes nuts and ferrules.

Valves with stainless stators have stainless fittings.

Valves with PAEK stators have PEEK fittings.

Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply.

* The 6 port valve includes a 250 nl PEEK loop.

	6 Port*	10 Port
	Prod No	Prod No
N60 stainless stator	5011 4004	5011 1000
Manual	C2N-4006	C2N-4000
With microelectric actuator	C2N-4006EH	C2N-4000EH
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 microelectric actuator	C2N-4346EH	C2N-4340EH
Replacement valve	C2N-4346D	C2N-4340D
Replacement rotor	C2N-43R6	C2N-43R0

C2N-4C46

SPECS

5000 psi liq

75°C max

Metal stator

Valcon H rotor

5000 psi liq 50°C max

PAEK stator Valcon E rotor

OPTIONS

■ 150 micron (.006") and 250 micron (.010") bores



Model C2N 1/32" ZDV fittings

Sample loops

Replacement stator

for C2N valves

C2N-4C40

Each stainless loop includes two stainless steel nuts and ferrules. Each PEEK loop includes two PEEK nuts and ferrules.

	tainless stee Prod No	PEEK Prod No		
1 μl 2 μl	CSLN1K CSLN2K	CSLN1KPK CSLN2KPK		
5 µl	CSLN5K	CSLN5KPK	(
10 µl	CSLN10K	CSLN10KPK		



Australian Distributors Importers & Manufacurers

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.

5,000 psi Nanovolume® internal sample injector, 1/32"fittings, 100 micron ports (.004")

Model C4N

5000 psi liq 75°C max

Metal stator

Valcon H rotor

5000 psi liq 50°C max

PAEK stator Valcon E rotor

OPTIONS

■ 150 micron (.006") bore

Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply.



5,000 psi

Nanobore

1/32" 100 μm

Sample volume	4 nanoliters <i>Prod No</i>	10 nanoliters <i>Prod No</i>	20 nanoliters <i>Prod No</i>
N60 stainless stator	C4N 4004 004	CAN 4004 01	C4N 4004 02
Manual With microelectric actuator	C4N-4004004	C4N-400401	C4N-400402
	C4N-4004004EH	C4N-400401EH	C4N-400402EH
Replacement valve	C4N-4004004D	C4N-400401D	C4N-400402D
Replacement rotor	C4N-40R004	C4N-40R01	C4N-40R02
Replacement stator	C4N-4C0	C4N-4C0	C4N-4C0
PAEK stator Manual With microelectric actuator	C4N-4344004 C4N-4344004EH	C4N-434401 C4N-434401EH	C4N-434402 C4N-434402EH
Replacement valve	C4N-4344004D	C4N-434401D	C4N-434402D
Replacement rotor	C4N-43R004	C4N-43R01	C4N-43R02
Replacement stator	C4N-4C4	C4N-4C4	C4N-4C4



Model C4N 1/32" ZDV fittings

HPLC Microbore

CHEMINERT VALVES

Microbore valves, 1/16" Valco fittings, 0.25 mm ports (.010")

Model C2

5,000 psi

Microbore

1/16" 0.25 mm

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.

Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply.

* The 6 port valve includes a 5 µl loop of the stator material.

	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 air actuator	C2-1004A	C2-1006A	C2H- 1008A	C2H-1000A
With microelectric actuator	C2-1004EH	C2-1006EH	C2H-1008EH	C2H-1000EH
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 air actuator	C2-1344A	C2-1346A	C2H-1348A	C2H-1340A
With microelectric actuator	C2-1344EH	C2-1346EH	C2H-1348EH	C2H-1340EH
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 air actuator	C2-1034A	C2-1036A	C2H-1038A	C2H-1030A
With microelectric actuator	C2-1034EH	C2-1036EH	C2H-1038EH	C2H-1030EH
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

SPECS

5000 psi liq 75°C max

Metal stator Valcon H rotor

5000 psi liq 50°C max

PAEK stator Valcon E rotor

OPTIONS

- Continuous flow version is available as Model C6. See page 162.
- Hastelloy C stators
- Loop fill port assembly for injection from front of the valve. See page 41.
- 0.15 mm (0.006") bore

NOTE

Cheminert high pressure valves with polymeric stators have a longer pilot depth.



Order loops from page 161.



Model C2 1/16" ZDV fittings

Actuators Air page 197 Microelectric190 Universal 193 Materials Metals..... 254-255 Polymers 256 Valve rotors.....257 Nuts Metal.....10 PEEK63 Ferrules Metal.....12 PEEK63 Standoff

assemblies205

MORE INFORMATION

Nanoliter sample injector, 1/16" Valco fittings, 0.15 mm ports (.006")

Model C4

SPECS

5000 psi liq 75°C max

Metal stator Valcon H rotor

5000 psi liq 50°C max

PAEK stator Valcon E rotor

OPTIONS

- 100, 200, and 500 nl sample volumes are also available in 0.25 mm bore. See page 164.
- Loop fill port assembly for injection from front of the valve. See page 41.
- 0.25 mm (0.010") bore

NOTE

Cheminert high pressure valves with polymeric stators have a longer pilot depth.

Includes nuts and ferrules.

Valves with stainless stators have stainless fittings.

Valves with PAEK stators have PEEK fittings.

Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply.



5,000 psi Microbore

1/16"	0.15 mm
.,	0010111111

Sample volume	10 nanoliters Prod No	20 nanoliters <i>Prod No</i>	50 nanoliters <i>Prod No</i>
N60 stainless stator Manual With air actuator With microelectric actuator	C4-000401 C4-000401A C4-000401EH	C4-000402 C4-000402A C4-000402EH	C4-000405 C4-000405A C4-000405EH
Replacement valve Replacement rotor Replacement stator	C4-000401D C4-00R01 C4-0C0	C4-000402D C4-00R02 C4-0C0	C4-000405D C4-00R05 C4-0C0
PAEK stator Manual With air actuator With microelectric actuator	C4-034401 C4-034401A C4-034401EH	C4-034402 C4-034402A C4-034402EH	C4-034405 C4-034405A C4-034405EH
Replacement valve Replacement rotor Replacement stator	C4-034401D C4-03R01 C4-0C4	C4-034402D C4-03R02 C4-0C4	C4-034405D C4-03R05 C4-0C4



Model C4 1/16" ZDV fittings

ABOUT LOOPS

- Other materials are available in many sizes: Electroformed Nickel, Hastelloy C, Nickel 200, and PTFE. See pages 254-255.
- 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

Sample loops

for C1, C2, C2V, C3, and C6 valves

Each metal loop includes two stainless steel nuts and ferrules. Each PEEK loop includes two PEEK nuts and ferrules.

	Stainless	PEEK	Titanium
	Steel (fo	or PAEK stators	;)
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	CSI 10K	_	_



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HPLC Microbore

CHEMINERT VALVES

5,000 psi

Microbore

Continuous flow

Through-handle

0.25 mm

Microbore continuous flow through-the-handle injector, 1/16" Valco fittings, 0.25 mm ports (.010")

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. Includes one 5 µl loop of the stator material.

N60 stainless stator **PAEK stator** Prod No Prod No 6 port injector C1CFI-1006 C1CFI-1346 Replacement rotor C1-10R6 C1-13R6 Replacement stator C1CF-1C06 C1CF-1C46

Replacement injector fitting for 22 gauge x 2" long needle C-261



Model C1CFI

SPECS 5000 psi liq

75°C max Metal stator

Valcon H rotor

5000 psi lia 50°C max PAEK stator

Valcon E rotor

OPTIONS

■ 0.40 mm bore (.016") on page 165.

MORE INFORMATION

Syringes..... page 250

Cheminert high pressure valves with polymeric stators have a longer pilot depth.



Microbore continuous flow injector, 1/16" Valco fittings, 0.25 mm ports (.010")

Model C6

5,000 psi

Microbore

Continuous flow

1/16" 0.25 mm



Model C6 1/16" ZDV fittings

Includes nuts and ferrules.

Valves with stainless stators have stainless fittings.

Valves with PAEK stators have PEEK fittings.

Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply. Includes one 5 µl loop of the stator material.

	N60 stainless stator <i>Prod No</i>	PAEK stator Prod No
Manual	C6-1006	C6-1346
With pneumatic actuator	C6-1006A	C6-1346A
With standard electric actuator	C6-1006E	C6-1346E
With microelectric actuator	C6-1006EH	C6-1346EH
Replacement valve	C6-1006D	C6-1346D
Replacement rotor	C2-10R6	C2-13R6
Replacement stator	C6-1C06	C6-1C46

SPECS

5000 psi liq 75°C max

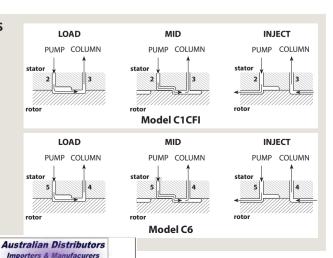
Metal stator Valcon H rotor

5000 psi liq 50°C max PAEK stator Valcon E rotor

Order loops from page 161.

CONTINUOUS FLOWPATHS

An engraving on the stator maintains pump flow between the pump connection port and the column connection port during most of the switching cycle, virtually eliminating pressure spikes.



Analytical valves, 1/16" Valco fittings, 0.40 mm ports (.016")

Model C2

0.40 mm

SPECS

5000 psi liq 75°C max

Metal stator Valcon H rotor

5000 psi liq 50°C max

PAEK stator Valcon E rotor

OPTIONS

- Continuous flow version is available as Model C6. See page 162.
- 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.

NOTE

Cheminert high pressure valves with polymeric stators have a longer pilot depth.



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.

Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply.

* The 6 port valve includes a 20 µl loop of the stator material.









5,000 psi

Analytical

	4 Port	6 Port*	8 Port	10 Port
	Prod No	Prod No	Prod No	<i>Prod No</i>
N60 stainless stator Manual With air actuator With microelectric actuator	C2-2004 C2-2004A C2-2004EH	C2-2006 C2-2006A C2-2006EH	C2H-2008 C2H-2008A C2H-2008EH	C2H-2000 C2H-2000A C2H-2000EH
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 With air actuator With microelectric actuator	C2-2344 C2-2344A C2-2344EH	C2-2346 C2-2346A C2-2346EH	C2H-2348 C2H-2348A C2H-2348EH	C2H-2340 C2H-2340A C2H-2340EH
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 With air actuator With microelectric actuator	C2-2034 C2-2034A C2-2034EH	C2-2036 C2-2036A C2-2036EH	C2H-2038 C2H-2038A C2H-2038EH	C2H-2030 C2H-2030A C2H-2030EH
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



Model C2 1/16" ZDV fittings

OPTIONAL FLOWPATH

Model C2 6 port valves can also be ordered with a dual 3-way rotor, as described in EPA Method

To specify this flowpath, substitute "6X" for "6" in the valve or rotor product number.



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



HPLC ■ Analytical

CHEMINERT VALVES

Analytical internal sample injector, 1/16" Valco fittings, 0.25 mm ports (.010")

Model C4

5,000 psi

Analytical

Sample volume



Includes nuts and ferrules.

0.1 µl

Prod No

Valves with metal stators have stainless steel nuts and ferrules of the stator material. Valves with PAEK stators have PEEK nuts and ferrules.

0.5 µl

Prod No

Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply.

0.2 µl

Prod Noe

5000 psi liq 50°C max

PAEK stator Valcon E rotor

OPTIONS

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

N60 stainless stator Manual With air actuator With microelectric actuator	C4-10041	C4-10042	C4-10045
	C4-10041A	C4-10042A	C4-10045A
	C4-10041EH	C4-10042EH	C4-10045EH
Replacement valve	C4-10041D	C4-10042D	C4-10045D
Replacement rotor	C4-10R1	C4-10R2	C4-10R5
Replacement stator	C4-1C0	C4-1C0	C4-1C0
PAEK stator Manual With air actuator With microelectric actuator	C4-13441	C4-13442	C4-13445
	C4-13441A	C4-13442A	C4-13445A
	C4-13441EH	C4-13442EH	C4-13445EH
Replacement valve	C4-13441D	C4-13442D	C4-13445D
Replacement rotor	C4-13R1	C4-13R2	C4-13R5
Replacement stator	C4-1C4	C4-1C4	C4-1C4
Titanium stator Manual With air actuator With microelectric actuator	C4-10341	C4-10342	C4-10345
	C4-10341A	C4-10342A	C4-10345A
	C4-10341EH	C4-10342EH	C4-10345EH
Replacement valve	C4-10341D	C4-10342D	C4-10345D
Replacement rotor	C4-10R1	C4-10R2	C4-10R5
Replacement stator	C4-1C3	C4-1C3	C4-1C3



Model C4 1/16" ZDV fittings

NOTE

Cheminert high pressure valves with polymeric stators have a longer pilot depth.

MORE INFORMATION

Analytical continuous flow through-the-handle injector, 1/16" Valco fittings, 0.40 mm ports (.016")

6 port injector

Replacement rotor

Replacement stator

Model C1CFI

SPECS

5000 psi liq 75°C max

Metal stator Valcon H rotor

5000 psi liq 50°C max

PAEK stator Valcon E rotor

OPTIONS

■ 0.25 mm bore (.010") on page 162.

MORE INFORMATION

Syringes..... page 250

NOTE

Cheminert high pressure valves with polymeric stators have a longer pilot depth.

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.

Includes one 20 µl loop of the stator material.

N60 stainless stator **PAEK stator** Prod No Prod No C1CFI-2006 C1CFI-2346 C1-20R6 C1-23R6

C1CF-2C46

PAFK stator

Replacement injector fitting for 22 gauge x 2" long needle

C-261

C1CF-2C06



5,000 psi

Analytical

Continuous flow

Through-handle

0.40 mm



Analytical continuous flow injector, 1/16" Valco fittings, 0.40 mm ports (.016")

Model C6

5,000 psi

Analytical

Continuous flow

SPECS

5000 psi liq 75°C max

Metal stator

Valcon H rotor

5000 psi liq 50°C max PAEK stator Valcon E rotor

Order loops from page 161.

Includes nuts and ferrules.

Valves with stainless stators have stainless fittings.

Valves with PAEK stators have PEEK fittings.

Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply. Includes a 20 µl loop of the stator material.

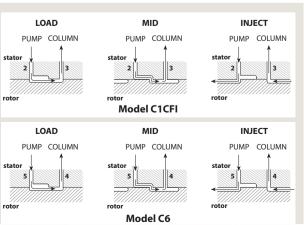
N60 stainless stator

	1400 Stailliess Statol	IALKStato
	Prod No	Price
Prod No	Price	
Manual	C6-2006	C6-2346
With pneumatic actuator	C6-2006A	C6-2346A
With microelectric actuator	C6-2006EH	C6-2346EH
Replacement valve	C6-2006D	C6-2346D
Replacement rotor	C2-20R6	C2-23R6
Replacement stator	C6-2C06	C6-2C46

Model C6 1/16" ZDV fittings

CONTINUOUS FLOWPATHS

An engraving on the stator maintains pump flow between the pump connection port and the column connection port during most of the switching cycle, virtually eliminating pressure spikes.



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Valves with 1/16" Valco ZDV fittings, 0.75 mm ports (.030")

Model C22Z

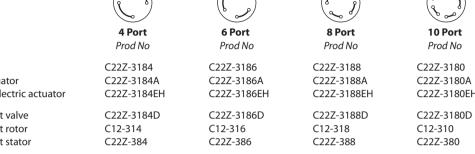
Low pressure

10-32 ZDV

0.75 mm

Includes Valco ZDV PEEK nuts and ferrules. Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply. 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 air actuator	C22Z-3184A	C22Z-3186A	C22Z-3188A	C22Z-3180A
With microelectric actuator	C22Z-3184EH	C22Z-3186EH	C22Z-3188EH	C22Z-3180EH
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





The purge option permits

SPECS

75°C max **PPS** stator

OPTIONS

Valcon E2 rotor

available. Purge option

100 psi gas/ 250 psi liq

■ 12 and 14 port versions

■ Other polymeric rotors and stators are available. **PURGE OPTION**

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.



Model C22Z 1/16" ZDV fittings

Sample loops

EED

for Model C22Z



Loops include PEEK nuts and ferrules. Loops smaller than 500 μ l are made from 1/16" OD tubing; loops 500 μ l or bigger are made from 1/8" OD tubing with polymeric unions and 1/16" ends.

DEEL

	FEP	PIFE	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

DTEE

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St

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.

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Valves with 1/4-28 fitting details for 1/16" tubing, 0.75 mm ports (.030")

Model C22

SPECS 100 psi gas/ 250 psi liq

75°C max PPS stator Valcon E2 rotor Includes multicolored Cheminert 1/4-28 flangeless fittings for 1/16" tubing. Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply. Sample loops are not included with valves. Order separately.

Low pressure

0.75 mm



4 Port	6 Port
Prod No	Prod No
C22-3184	C22-3186
C22-3184A	C22-3186A
C22-3184EH	C22-3186EH
C22-3184D	C22-3186D
C22-314	C22-316
C22-384	C22-386



Prod No

C22-3188

C22-3188A

C22-3188EH

C22-3188D

C22-318

C22-388



C22-3180EH C22-3180D C22-310 C22-380

Valves with 1/4-28 fitting details for 1/8" tubing, 1.50 mm ports (.060")

Manual

With air actuator

Replacement valve

Replacement rotor

Replacement stator

With microelectric actuator

Model C22

100 psi gas/ 250 psi liq 75°C max

PPS stator Valcon E2 rotor Includes multicolored Cheminert 1/4-28 flangeless fittings for 1/8" tubing. Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply. Sample loops are not included with valves. Order separately.

Low pressure

1/4-28 Internal

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 air actuator	C22-6184A	C22-6186A	C22-6188A	C22-6180A
With microelectric actuator	C22-6184EH	C22-6186EH	C22-6188EH	C22-6180EH
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

for Model C22

Loops include flangeless fittings with white color nuts. Loops smaller than 500 µl are made from 1/16" OD tubing; loops 500 µl or bigger are made from 1/8" OD tubing.

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

	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





Model C22 1/4-28 fittings



Low pressure

CHEMINERT VALVES

Internal sample injectors, 1/16" Valco ZDV fittings, 0.40 mm ports (.016")

Model C24Z

Low pressure

Includes Valco ZDV PEEK nuts and ferrules. Microelectric actuator:24 VDC, with 110/230 VAC to 24 VDC power supply.

10-32 ZDV

0.40 mm

Replacement stator

Sample volume	0.2 μl Prod No	0.5 μl Prod No	1 μl Prod No
Manual	C24Z-21842	C24Z-21845	C24Z-2184-1
With air actuator	C24Z-21842A	C24Z-21845A	C24Z-2184-1A
With microelectric actuator	C24Z-21842EH	C24Z-21845EH	C24Z-2184-1EH
Replacement valve	C24Z-21842D	C24Z-21845D	C24Z-2184-1D
Replacement rotor	C24-10R2	C24-10R5	C24-10R-1

C24Z-1C8

C24Z-1C8

C24Z-1C8





SPECS

100 psi gas/ 250 psi liq 75°C max

PPS stator Valcon E2 rotor

OPTIONS

- 2.0 µl sample volumes are also available.
- Purge option.
- Other polymeric rotors and stators are available.

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.

MORE INFORMATION

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Internal sample injectors, 1/4-28 for 1/16" tubing, 0.50 mm ports (.020")

Model C24

SPECS

100 psi gas/ 250 psi liq 75°C max

PPS stator Valcon E2 rotor

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.

Includes multicolored Cheminert 1/4-28 flangeless fittings for 1/16" tubing. Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply.



Low pressure

1/4-28 Internal

1/16" 0.50 mm

Sample volume	0.5 μl	1 μl	2 μl
	Prod No	Prod No	Prod No
Manual	C24-21845	C24-2184-1	C24-2184-2
With air actuator	C24-21845A	C24-2184-1A	C24-2184-2A
With microelectric actuator	C24-21845EH	C24-2184-1EH	C24-2184-2EH
Replacement valve	C24-21845D	C24-2184-1D	C24-2184-2D
Replacement rotor	C24-10R5	C24-10R-1	C24-10R-2
Replacement stator	C24-1C8	C24-1C8	C24-1C8



Model C24 1/4-28 fittings

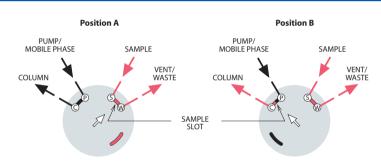
These illustrations show basic sample injection techniques using Cheminert two position valves. With rare exceptions, there is no difference between switching valves and external volume sampling valves, so the same valve can be used for either function.

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.

MICROVOLUME SAMPLE INJECTION

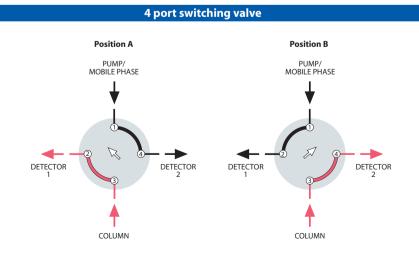
The internal sample (fixed volume) flowpath is used when very small sample volumes are required. The sample size is determined by a passage engraved on the valve rotor, allowing precise, repeatable injections. In Position A, the sample flows through the sample passage while the mobile phase flows through 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 internal sample injector

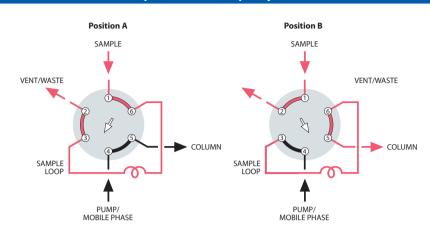


DETECTOR SELECTION FROM TWO COLUMNS OR ONE COLUMN AND AUXILIARY CARRIER

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



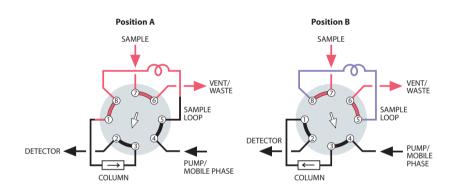
SAMPLE INJECTION

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 applicationspages 120-121

8 port sampling/switching

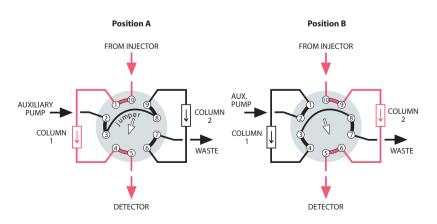


LOOP SAMPLING WITH BACKFLUSH TO DETECTOR

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 121

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 applicationspages 122-123

UHPLC ■ Nanovolume® selectors

CHEMINERT VALVES

15,000 psi UHPLC Nanovolume® selectors, 1/32" Valco fittings, 150 micron ports (.006")

Model C75NX

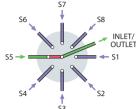
15,000 psi

Nanobore

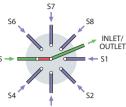
1/32"

150 µm

Includes Valco stainless steel fittings. Manual version not available. Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply.



	6 Position <i>Prod No</i>	8 Position <i>Prod No</i>	10 Position <i>Prod No</i>
Coated stainless stator With air actuator With microelectric actuator	C75NX-6676A	C75NX-6678A	C75NX-6670A
	C75NX-6676EMH	C75NX-6678EMT	C75NX-6670EMT
Replacement valve	C75NX-6676D	C75NX-6678D	C75NX-6670D
Replacement rotor	C75N-66R6	C75N-66R8	C75N-66R0
Replacement stator	C75N-6C76	C75N-6C78	C75N-6C70



50°C max Stainless stator with inert coating Valcon E3 rotor

OPTIONS

SPECS

15,000 psi liq

- 100 micron (.004") bore
- 250 micron (.010") bore
- 10,000 and 20,000 psi versions available
- 4 positions



10,000 psi UHPLC microbore selectors, 1/16" Valco fittings, 0.25 mm ports (.010")

Model C75H

10,000 psi liq 50°C max

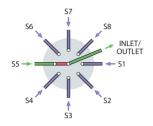
Stainless stator with inert coating Valcon E3 rotor

OPTIONS

- 150 micron (.006") bore
- 15,000 psi version available
- 4 positions

Includes Valco stainless steel fittings. Manual version not available. Microelectric actuator:

24 VDC, with 110/230 VAC to 24 VDC power supply.



10,000 psi Microbore 1/16" 0.25 mm

	6 Position <i>Prod No</i>	8 Position <i>Prod No</i>	10 Position <i>Prod No</i>
Coated stainless stator With air actuator With microelectric actuator	C75H-1676A	C75H-1678A	C75H-1670A
	C75H-1676EMH	C75H-1678EMT	C75H-1670EMT
Replacement valve	C75H-1676D	C75H-1678D	C75H-1670D
Replacement rotor	C75-16R6	C75-16R8	C75-16R0
Replacement stator	C75-1C76	C75-1C78	C75-1C70



1/16" Valco stainless fittings

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High pressure ■ Selectors

CHEMINERT VALVES

HPLC stream selector, 1/16" Valco ZDV fittings, 0.40 mm ports (.016")

Model C5

5,000 psi

10-32 ZDV

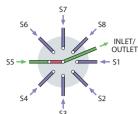
0.40 mm

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. Microelectric actuator:

24 VDC, with 110/230 VAC to 24 VDC power supply.



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

SPECS 5000 psi liq 75°C max Metal stator

Valcon H rotor

5000 psi liq 50°C max **PAEK** stator Valcon E rotor

OPTIONS

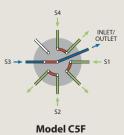
- 2", 3", 4", and 6" standoffs
- Hastelloy C stator
- Optional 0.15 mm (.006") and 0.25 mm (.010") bores available
- Optional 0.75 mm (.030") bore for Prep HPLC available



OPTIONAL FLOWPATH

Model C5F, the flowthrough 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.



schematic diagram

MORE INFORMATION Manifolds page 33

HPLC column selector system with 1/16" Valco ZDV fittings, 0.40 mm ports (.016")

Model C5

0.40 mm

5,000 psi

10-32 ZDV

SPECS 5000 psi liq 75°C max

Metal stator Valcon H rotor

5000 psi liq 50°C max PAEK stator

Valcon E rotor

OPTIONS

- 2", 3", 4", and 6" standoffs
- Hastellov 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 modular universal actuator, which can be controlled manually, via remote logic level signal, or by RS-232 interface (RS-485 optional). (See plumbing diagram below.)

Includes nuts and ferrules.

Valves with stainless stators have stainless fittings.

Valves with PAEK stators have PEEK fittings.

Includes microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply.

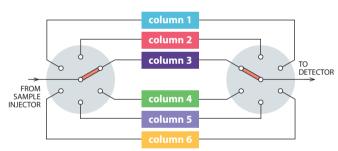
			. ,
	6 Column Prod No	8 Column Prod No	10 Column <i>Prod No</i>
N60 stainless stator			
System	C5-2006EMTD	C5H-2008EMTD	C5H-2000EMTD
Replacement rotor	C5-20R6	C5-20R8H	C5-20R0H
PAEK stator			
System	C5-2346EMTD	C5H-2348EMTD	C5H-2340EMTD
Replacement rotor	C5-23R6	C5-23R8H	C5-23R0H

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

RS-232 interface cable

Prod No

I-22697





Model C5 system Columns not included

UHPLC COLUMN SELECTOR SYSTEMS

Consult the factory for more information on UHPLC systems.

ORDERING STATORS

Valves for dual drive assemblies have mirror image stators. Consult **Technical Support for** correct product number before ordering.

Both valves use the same rotor.

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Standoff assemblies

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Low pressure ■ Selectors

CHEMINERT VALVES

Stream selector, 1/16" Valco ZDV fittings, 0.75 mm ports (.030")

Model C25Z

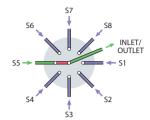
Low pressure

10-32 ZDV

1/16" 0.75 mm

Includes Valco ZDV PEEK nuts and ferrules. Microelectric actuator:

24 VDC, with 110/230 VAC to 24 VDC power supply.



	6 Position <i>Prod No</i>	8 Position <i>Prod No</i>	10 Position <i>Prod No</i>	14 Position <i>Prod No</i>
Manual With air actuator With microelectric act.	C25Z-3186	C25Z-3188	C25Z-3180	C25Z-31814
	C25Z-3186A	C25Z-3188A	C25Z-3180A	C25Z-31814A
	C25Z-3186EMH	C25Z-3188EMH	C25Z-3180EMH	C25Z-31814EMH
Replacement valve	C25Z-3186EWIH	C25Z-3188D	C25Z-3180EMIH	C25Z-31814EMIH
Replacement rotor Replacement stator	C15-310	C15-310	C15-310	C25Z-325
	C25Z-386	C25Z-388	C25Z-380	C25Z-38-14



OPTIONS

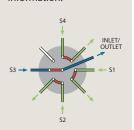
- 4 and 12 positions available
- 2",3",4",and 6" standoffs
- Other polymeric materials are available. Consult the factory.



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 selector, 1/4-28 fittings for 1/16" tubing, 0.75 mm ports (.030")

Model C25

SPECS

100 psi gas/ 250 psi liq

75°C max **PPS** stator

Valcon E2 rotor

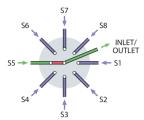
OPTIONS

- 2", 3", 4", and 6" standoffs
- CTFE stator

Includes multicolored Cheminert 1/4-28 flangeless fittings for 1/16" tubing.

Microelectric actuator:

24 VDC, with 110/230 VAC to 24 VDC power supply.



Low pressure

1/4-28 Internal

1/16" 0.75 mm

	4 Position <i>Prod No</i>	6 Position <i>Prod No</i>	8 Position Prod No	10 Position <i>Prod No</i>
Manual	C25-3184	C25-3186	C25-3188	C25-3180
With air actuator	C25-3184A	C25-3186A	C25-3188A0	C25-3180A
With microelectric act.	C25-3184EMH	C25-3186EMH	C25-3188EMH	C25-3180EMH
Replacement valve	C25-3184D	C25-3186D0	C25-3188D	C25-3180D
Replacement rotor	C25-314	C25-316	C15-310	C25-310
Replacement stator	C25-384	C25-386	C25-388	C25-380

Stream selector, 1/4-28 fittings for 1/8" tubing, 1.50 mm ports (.060")

Model C25

SPECS

100 psi gas/ 250 psi liq 75°C max

PPS stator Valcon E2 rotor

OPTIONS

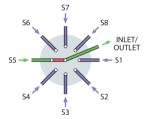
- 2", 3", 4", and 6" standoffs
- CTFE stator

Includes multicolored Cheminert 1/4-28 flangeless fittings for 1/8" tubing.

Microelectric actuator:

24 VDC, with 110/230 VAC to 24 VDC power supply.

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Low pressure

1/4-28 Internal

1.50 mm

	4 Position	6 Position	8 Position	10 Position
	Prod No	Prod No	Prod No	Prod No
Manual	C25-6184	C25-6186	C25-6188	C25-6180
With air actuator	C25-6184A	C25-6186A	C25-6188A	C25-6180A
With microelectric act.	C25-6184EMH	C25-6186EMH	C25-6188EMH	C25-6180EMH
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 versionof C25. (See discussion on facing page.) 3,4,5,6, and 7 positions are available.

Consult the factory for C25F prices and information.

MORE INFORMATION

Actuators Air page 196 Microelectric192 Universal 193 Materials Metals..... 254-255 Polymers 256 Valve rotors......257

Standoff assemblies

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Low pressure ■ Selectors

CHEMINERT VALVES

Stream selector, 1/16" Cheminert fittings

Model C25G

Low pressure

6-40 flat bottom

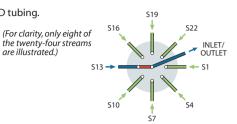
1/16

Includes 6-40 PEEK nut/bushings for 1/16" OD tubing.

Available only with

microelectric actuator: 24 VDC,

with 110/230 VAC power supply.



Bore:	20 Position 0.67 mm (.026") <i>Prod No</i>	24 Position 0.61 mm (.024") <i>Prod No</i>	28 Position 0.56 mm (.022") Prod No
With microelectric actuator	C25G-24520EMT	C25G-24524EMT	C25G-24528EMT
Replacement valve	C25G-24520D	C25G-24524D	C25G-24528D
Replacement rotor	C25G-24R20	C25G-24R24	C25G-24R28
Replacement stator	C25G-2C520	C25G-2C524	C25G-2C528

SPECS 100 psi liq 50°C max PEEK stator Valcon M rotor

OPTIONS

- 2",3",4",and 6" standoffs
- Consult the factory for optional materials.



Fittings for C25G valves

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.

Prod No

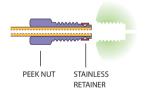
CGFT

6-40 one piece nut/bushing, CNNF1PK natural PEEK, stainless retainer

Tightening tool





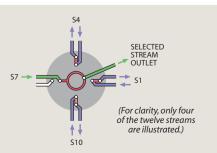


OPTIONAL FLOWPATHS

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.



Model C35ZF schematic



Australian Distributors Importers & Manufacurers

CHEMINERT VALVES

Stream selector, 1/2-20 fittings for 1/4" tubing, 4.6 mm ports (.180")

Model C45

SPECS

100 psi liq 50°C max **PPS** stator Valcon TF rotor

OPTIONS

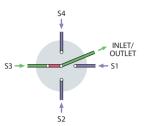
- 2", 3", 4", and 6" standoffs
- Consult the factory for optional materials.
- 8 position selectors are available with 3 mm (.120") ports

Manual version not available.

Includes Cheminert 1/2-20 flangeless fittings for 1/4" tubing, Delrin nuts, and CTFE ferrules.

Microelectric actuator:

24 VDC, with 110/230 VAC to 24 VDC power supply.



Low pressure

1/2-20 Internal

4.6 mm

	4 Position Prod No	6 Position <i>Prod No</i>
With air actuator	C45-9784A	C45-9786A
With microelectric actuator	C45-9784EMT	C45-9786EMT
Replacement valve	C45-9784D	C45-9786D
Replacement rotor	C45-97R4	C45-97R6

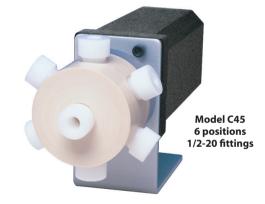
Prod No

Fittings for C45 valves

For additional 1/2-20 fittings and adapters, see page 72.



Nuts	CTFE Delrin PPS	CFL-4KF CFL-4D CFL-4PPS
Ferrules	CTFE	CFL-CB4KF-S
Plugs	CTFE Delrin	CP-4K CP-4D



MORE INFORMATION

Actuators

Air page 196 Microelectric192 Universal 193

Materials

assemblies

Metals..... 254-255 Polymers 256 Valve rotors......257 Standoff

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Integrated motor/valve, 1/16" Valco fittings, 0.25 mm ports (.010")

Model C52

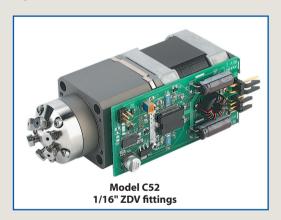
See page 151 for more information on Model C52 valves. Also available in vertical port version. Contact the factory. Includes nuts and ferrules.

Valves with stainless stators have stainless fittings. Valves with PAEK stators have PEEK fittings.

Microbore Integrated

CE ready*	(\mathcal{C}_{j})			
	4 Port	6 Port*	8 Port	10 Port
	Prod No	Prod No	Prod No	Prod No
N60 stainless stator				
With integrated actuator	C52-1004l	C52-1006l	C52-1008I	C52-1000I
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	C52-1346l	C52-1348I	C52-1340I
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

(2)





Sample loops

for C52 injectors

Each metal loop includes two stainless steel nuts and ferrules. Each PEEK loop includes two PEEK nuts and ferrules.

Stainless	PEEK
Steel	(for PAEK stators)
Prod No	Prod No
CSL2	CZSL2PK
CSL5	CZSL5PK
CSL10	CZSL10PK
CSL20	CZSL20PK
CSL50	CZSL50PK
CSL100	CZSL100PK
CSL250	CZSL250PK
CSL500	CZSL500PK
CSL1K	CZSL1KPK
CSL2K	CZSL2KPK
CSL5K	CZSL5KPK
CSI 10K	_
	Steel Prod No CSL2 CSL5 CSL10 CSL20 CSL50 CSL100 CSL250 CSL100 CSL250 CSL500 CSL5K



ABOUT LOOPS

- Other materials available in many sizes: Electroformed Nickel, Hastelloy C, Nickel 200, and PTFE (see pages 254-255).
- 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

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SPECS

5,000 psi liq 40°C max

N60 stainless stator Valcon H rotor

5,000 psi lia 40°C max

000

PAEK stator Valcon E rotor

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 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.

NOTE

Cheminert high pressure valves with polymeric stators have a longer pilot depth.

MORE INFORMATION

Materials

Metals	page 254-5
Polymers	256
Valve rotors.	257

Microbore centered port injector, 1/16" Valco fittings, 0.25 mm ports (.010")

Model C3

SPECS

5000 psi liq

75°C max Metal stator

Valcon H rotor

5000 psi liq 50°C max

PAEK stator Valcon E rotor

OPTIONS

■ Titanium and Hastelloy stators available



NOTE

Cheminert high pressure valves with polymeric stators have a longer pilot depth.

Includes nuts and ferrules.

Valves with stainless stators have stainless fittings.

Valves with PAEK stators have PEEK fittings.

Includes one 5 µl loop of the stator material.

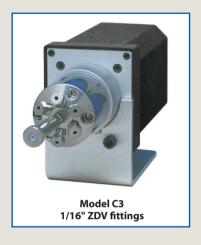
Includes syringe fill port for 22 gauge 3/4" and 2" needle.

Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply.

N60 stainless stator Prod No	PAEK stator Prod No
C3-1006	C3-1346
C3-1006A	C3-1346A
C3-1006EH	C3-1346EH
C3-1006D	C3-1346D
C2-10R6	C2-13R6
C3-1C06	C3-1C46
	Prod No C3-1006 C3-1006A C3-1006EH C3-1006D C2-10R6



5,000 psi Microbore



Microbore vertical port injector, 1/16" Valco fittings, 0.25 mm ports (.010")

SPECS

5000 psi liq 75°C max

Metal stator

Valcon H rotor

5000 psi liq 50°C max

PAEK stator Valcon E rotor

OPTIONS

■ Titanium and Hastelloy stators available



Includes nuts and ferrules.

Valves with stainless stators have stainless fittings.

Valves with PAEK stators have PEEK fittings.

Includes one 5 µl loop of the stator material.

Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply.

	N60 stainless stator Prod No	PAEK stator Prod No
Manual	C2V-1006	C2V-1346
With air actuator	C2V-1006A	C2V-1346A
With microelectric actuator	C2V-1006EH	C2V-1346EH
Replacement valve	C2V-1006D	C2V-1346D
Replacement rotor	C2-10R6	C2-13R6
Replacement stator	C2V-1C06	C2V-1C46



Model C2V

5,000 psi **Microbore**

Vertical port



Integrated motor/valve, 1/16" Valco fittings, 0.40 mm ports (.016")

Model C52

5,000 psi

Analytical

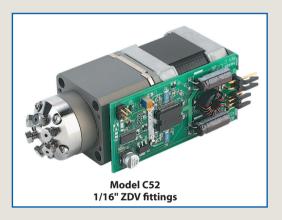
Integrated

0.40 mm

See page 151 for more information on Model C52 valves. Includes nuts and ferrules. Valves with stainless stators have stainless fittings.

Valves with PAEK stators have PEEK fittings.nuts and ferrules.

CE ready*				المحمدة المحمدة
	4 Port	6 Port*	8 Port	10 Port
N60 stainless stator	Prod No	Prod No	Prod No	Prod No
With integrated actuator	C52-2004I	C52-2006l	C52-2008I	C52-2000I
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	C52-2346l	C52-2348I	C52-2340I
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

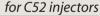




Sample loops

Each metal loop includes two stainless steel nuts and ferrules. Each PEEK loop includes two PEEK nuts and ferrules.

Edeli i Elik loop ilielades two i Elik lides ali			
	Stainless	PEEK	
	Steel	(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	CSI 10K		



ABOUT LOOPS

- Other materials available in many sizes: Electroformed Nickel, Hastelloy C, Nickel 200, and PTFE (see pages 254-255).
- 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

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SPECS

5,000 psi liq 40°C max

N60 stainless stator Valcon H rotor

5,000 psi lia 40°C max

PAEK stator Valcon E rotor

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 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.

NOTE

Cheminert high pressure valves with polymeric stators have a longer pilot depth.

MORE INFORMATION

Materials

Metals	page 254-5
Polymers	256
Valve rotors	257

Analytical centered port injector, 1/16" Valco fittings, 0.40 mm ports (.016")

Model C3

SPECS

5000 psi liq

75°C max

Metal stator

Valcon H rotor

5000 psi liq

50°C max

PAEK stator Valcon E rotor

OPTIONS

■ Titanium and Hastelloy stators available



NOTE

Cheminert high pressure valves with polymeric stators have a longer pilot depth.

Includes nuts and ferrules.

Valves with stainless stators have stainless fittings.

Valves with PAEK stators have PEEK fittings.

Includes one 20 µl loop of the stator material.

Includes syringe fill port for 22 gauge 3/4" and 2" needle.

Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply.

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



5,000 psi

Analytical

0.40 mm



Analytical vertical port injector, 1/16" Valco fittings, 0.40 mm ports (.016")

SPECS

5000 psi liq 75°C max

Metal stator

Valcon H rotor

5000 psi liq 50°C max

PAEK stator Valcon E rotor

OPTIONS

■ Titanium and Hastelloy stators available



Includes nuts and ferrules.

Valves with stainless stators have stainless fittings.

Valves with PAEK stators have PEEK fittings.

Includes one 20 µl loop of the stator material.

Microelectric actuator: 24 VDC, with 110/230 VAC to 24 VDC power supply.

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



Model C2V

5,000 psi Analytical

Vertical port

0.40 mm



Integrated motor/valve, 1/16" Valco ZDV fittings, 0.75 mm ports (.030")

Model C62Z

Low pressure

Includes Valco ZDV PEEK nuts and ferrules. Sample loops are not included with valves. Order separately.

Integrated

10-32 ZDV

0.75 mm

CE readv*

With motor, sensor, & controller

With motor and sensor only



Prod No

C62Z-3184I C62Z-3184I-S



Prod No

C62Z-3186I C62Z-3186I-S



C62Z-3188I C62Z-3188I-S



C62Z-3180I C62Z-3180I-S 50°C max PPS stator Valcon E2 rotor

OPTIONS

SPECS

Other polymeric rotors and stators are available

100 psi gas/ 250 psi liq

Consult the factory for prices and information.

Serial communication via RS-232 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.



Sample loops

for Model C62Z

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.

Volume	FEP	PTFE	PEEK
	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	CZSL2KFFP	CZSL2KTF	CZSL2KPK



■ 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.

ABOUT LOOPS

MORE INFORMATION

Materials

Metalspage 254-255
Polymers256
Valve rotors257

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Integrated motor/valve, 1/4-28 fitting details for 1/16" tubing, 0.75 mm ports (.030")

Model C62

SPECS

100 psi gas/ 250 psi liq 75°C max

PPS stator Valcon E2 rotor

OPTIONS

 Serial communication via RS-232 is available.

* CE READY

See note on facing page.

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*



Prod No

C62-3184I C62-3184I-S



Prod No





Prod No

C62-3188I C62-3188I-S



Model C62

1/4-28 fittings



Prod No

C62-3180I C62-3180I-S

Integrated motor/valve, 1/4-28 fitting details for 1/8" tubing, 1.50 mm ports (.060")

With motor, sensor, & controller

With motor and sensor only

Model C62

SPECS

100 psi gas/ 250 psi liq 75°C max

PPS stator Valcon E2 rotor

OPTIONS

■ Serial communication via RS-232 is available.

* CE READY

See note on facing page.

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 readv*

	4 Port	6 Port	8 Port	10 Port
	Prod No	Prod No	Prod No	Prod No
With motor, sensor, & controller	C62-6184I	C62-6186I	C62-6188I	C62-6180I
With motor and sensor only	C62-6184I-S	C62-6186I-S	C62-6188I-S	C62-6180I-S



2 ml

for Model C62

Loops include flangeless fittings with natural color nuts. Loops less than 500 μ l are made from 1/16" OD tubing; loops 500 µl or greater are made from 1/8" OD tubing.



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





HPLC Selectors

CHEMINERT VALVES ■ **OEM**

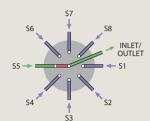
Integrated motor/stream selector, 1/16" Valco ZDV fittings, 0.40 mm ports (.016")

Model C55

5,000 psi **Integrated** Includes nuts and ferrules.

Valves with stainless stators have stainless fittings. Valves with PAEK stators have PEEK fittings.

See Tech Tip, below.



10-32 ZDV

Stream selector

0.40 mm

CE ready*	4 Position <i>Prod No</i>	6 Position Prod No	8 Position <i>Prod No</i>	10 Position <i>Prod No</i>
N60 stainless stator With integrated actuator Including RS-232 interface	C55-2004I C55-2004IA	C55-2006I C55-2006IA	C55-2008I C55-2008IA	C55-2000I 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 Including 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



SPECS 5000 psi liq 50°C max Metal stator

Valcon H rotor 5000 psi liq

50°C max PAEK stator Valcon E rotor

OPTIONS

- Optional bore: 0.25 mm (.010") 0.75 mm (.030")
- 4 and 8 positions 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.

TECH TIP

For accurate port alignment, these integrated motor/stream selectors must be turned in one direction only. Factory setting is clockwise rotation, but it can be changed by a jumper setting. (See Technical Note TN-821 on vici.com)





Integrated motor/stream selector, 1/16" Valco ZDV fittings, 0.75 mm ports (.030")

Model C65Z

100 psi gas/ 250 psi liq 50°C max

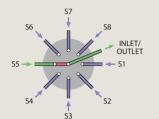
PPS stator Valcon E2 rotor

* CE READY

See note on facing page.

Includes Valco ZDV PEEK nuts and ferrules.

See Tech Tip on facing page.



Low pressure

Integrated Stream selector

10-32 ZDV

0.75 mm

CE ready*

With integrated actuator
Including RS-232 interface
With motor and sensor only

6 Position

Prod No

4 Position

4 Position

Integrated motor/stream stream selector,

1/4-28 fittings for 1/16" tubing, 0.75 mm ports (.030")

100 psi gas/ 250 psi liq 50°C max

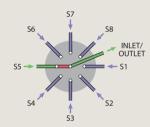
PPS stator Valcon E2 rotor

* CE READY

See note on facing page.

Includes multicolored Cheminert flangeless fittings for 1/16" tubing. See photo on facing page.

See Tech Tip on facing page.



Model C65

Low pressure **Integrated**

Stream selector

1/4-28 Internal

0.75 mm

CE ready*

With integrated actuator
Including RS-232 interface
With motor and sensor only

Prod No	Prod No
C65-3184I	C65-3186l
C65-3184IA	C65-3186IA
C65-3184I-S	C65-3186I-S

6 Position

8 Position	10 Positio
Prod Noe	Prod No
C65-3188I	C65-3180I
C65-3188IA	C65-3180I
C65-3188I-S	C65-3180I

Integrated motor/stream stream selector, 1/4-28 fittings for 1/8" tubing, 1.50 mm ports (.060")

SPECS

100 psi gas/ 250 psi liq 50°C max

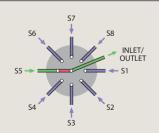
PPS stator Valcon E2 rotor

* CE READY

See note on facing page.

Includes multicolored Cheminert flangeless fittings for 1/8" tubing. See photo on facing page.

See Tech Tip on facing page.



Model C65

-۷

Low pressure

Integrated

1/4-28 Internal

1.50 mm

CE ready*

	4 Position <i>Prod No</i>	6 Position <i>Prod No</i>	8 Position <i>Prod No</i>	10 Position <i>Prod No</i>
With integrated actuator	C65-6184I	C65-6186l	C65-6188I	C65-6180I
Including 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

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.

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.

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 lightweight, 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.



Manual page 204



Two position, page 197 Selector, page 196

MORE INFORMATION

Actuators

Airpages 196-197 Microelectric .. 190-192 Modular universal ..194 Universal electric ...193

Mounting Hardware

Closemount assembly208
Standoff assembly205

Controllers and Accessories

DVI199
Digital valve interface
HSSA198
High speed switching
accessory
MSVA2198
Manifold 3-way
solenoid valve
assembly
PFAF199
Position feedback for
air actuators
RAD204
Right angle drive
Solenoid air valves198



Microelectric actuator For two position valves, page 190

Electric Actuation

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 with a controller assembly that features position-indicating LEDs and a toggle switch, or can be easily connected to an external data system for fully automated control. Built-in multidrop RS-232 (RS-485 optional) facilitates bidirectional communications.

The new **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.

A modular universal actuator, also available, is fully backward-compatible with multiposition microelectric actuator models EMH and EMT. Like the universal actuator, it can also be used for two position valves.



Microelectric actuator For selectors, page 192



Universal actuator Two position and selectors, page 193



Modular universal actuatorTwo position and selectors, page 194



Standoff assemblies page 205

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.

Right Angle Drive

Some installations don't allow the valve and actuator to be installed in a typical in-line configuration. The RAD (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 electric and air actuators.



Microelectric actuators for two position valves

- C € certified
- Automatic alignment via stall-sensing circuitry no mechanical microswitches
- Manual remote control with position indication
- High speed switching <100 ms in EQ model
- RS-232 bidirectional communication (switchable RS-485)
- Universal power supply, 110/230 VAC to 24 VDC

The two position microelectric actuator features exclusive stallsensing circuitry which eliminates problems associated with valve/ actuator misalignment. Power to the actuator motor is switched off when the driver pin goes against the stop of the valve cutout - no sooner, no later – and it's all done without any mechanical microswitches. Not only does this mean that alignment problems are a thing of the past, it means that you can stock one actuator for valves that turn 30°, 36°, 45°, 60°, 90°, or anything in between.

During initialization, the valve rotates at moderate speed while the actuator waits to sense the stall. Once the rotation angle has been measured and confirmed by repetition, the angle is memorized and actuation takes place at maximum speed. Valve position memory is maintained even in the event of a power failure. There is nothing more to do unless you wish to install a valve with a different angle of rotation. In that event, cycling the actuator with no valve mounted sets up reinitialization.

Since different valve models have varying actuation torque requirements, there are five microelectric actuator models - EO. EH, EP, ED, and ET. Consult the chart on the facing page to determine which model meets your requirements. When a valve and actuator are ordered at the same time, the proper actuator is supplied automatically.

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. The microelectric actuator is designed for room temperature use, so valves which will be mounted in ovens require a standoff assembly to locate the actuator out of the heated zone.

The microelectric actuator consists of a control module, a stepper motor/ gearbox assembly, a manual remote control, interconnecting cables, and a 110/230 VAC to 24 VDC power supply. The RS-232 interface cable, if required, must be ordered separately. (See facing page.)

for two position valves

Microelectric actuators

Standard voltage 24 VDC. Includes autosensing 24 VDC power supply. Standoff version includes a 2" standoff. 3", 4", and 6" standoffs are also available. Consult the chart below left to determine which actuator model is best suited for your valve.

Description	With	With	For use with
	closemount	2" standoff	existing
	assembly	assembly	standoff
	Prod No	Prod No	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

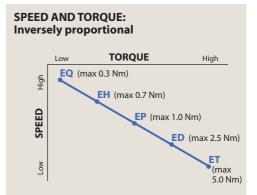


WHICH MODEL FOR WHICH TWO POSITION VALVE?

Fitting size	Valve type	Actuator model	Valve <i>F</i> type	Actuator model
	Valc	o GC	Valco	HPLC
1/32"	W	EΗ	W	EP
1/16"	W	EH	W	EP
1/16"	UW	ED	UW	ED
1/8"	UW	ED	UW	ED
1/4"	MW	ET	_	_

Cheminert HPLC & Low Pressure

Model C72X 8 and 10 ports ED All other valves EΗ



MORE INFORMATION

Closemount hardware..page 208 Microelectric actuators for selectors 192

Right angle drive . 204 Standoff assembly 205 Standoff mounting hardware......205

ORDER TIP

To purchase a two position valve with a microelectric actuator installed, see valve ordering information.

Valco injectors and valves... 98-117

Cheminert injectors and valves. 146-169, 181,183

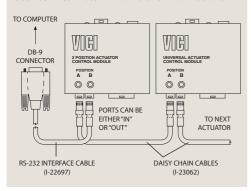
RS-232 interface cable

Description Prod No
RS-232 interface cable I-22697

DAISY CHAIN CABLES

Daisy chain cables permit a single serial port (RS-232) to control multiple actuators – newer two position microelectric and universal.

See Technical Note 421 for further information..



NFW

for newer two position microelectric actuators and universal actuators

Daisy chain cables

- More layout flexibility
- More economical than multi-drop configuration

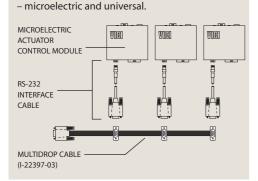
The newly redesigned two position microelectric actuator controller on the facing page (differentiated by a plastic housing instead of a metal one) allows multiple units to be daisy-chained for control from a single serial port. Universal actuators with the RS232/485 option (page 193) can be included in the series, if desired. A chain of actuators requires only one RS-232 interface cable, plus a 3-pin daisy chain cable for each actuator – a more flexible and economical solution than the multi-drop cable application described below.

For lengths other than the 55 cm cable listed, please contact our technical support department. Note that cable lengths should be shorter than one meter for reliable RS-232 communication; longer lengths can affect the signal integrity.

Length Prod No 55 cm I-23062

MULTI-DROP CABLES

Multi-drop cables permit a single serial port (RS-232) to control multiple actuators



Multi-drop cables

for microelectric and universal actuators

■ Work with all VICI microelectric and universal actuators (RS232/485 option)

Multi-drop cables permit a single serial port (RS-232) to control any combination of microelectric actuators (two position and multiposition, any vintage) and universal actuators with the RS232/485 option (page 193). These ribbon cables have one female DB9 and 2 to 8 male DB9 connectors, spaced at approximately 6".

Note: An RS-232 interface cable (I-22697), above, is required for **each** actuator.

No. of actuators to be controlled	Prod No
2	I-22897-02
3	I-22897-03
4	I-22897-04
5	I-22897-05
6	I-22897-06
8	I-22897-08

Plug-and-play cables

for two position microelectric actuators

Plug-and-play cables will allow a direct connection and control between a specific instrument and the microeletric two position actuator. Contact technical support for other instruments.

Relay assembly	Prod No
Two position microelectr	ic actuator to
Agilent 6890 GC	V-RA-24VDC-HP6890
Agilent 7890 GC	V-RA-24VDC-HP6890
Varian 3800 GC	V-RA-24VDC-VA3800
Agilent 1100 LC	V-RA-5VDC-HP1100
Waters Alliance IC	_D_\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\

TECH TIP

Electric actuators can be directly controlled by signals from microprocessor-based instruments, data systems, or valve programmers, unlike air actuators, which require an interface to convert the signal to an air pulse.

MORE INFORMATION

Universal actuators

Microelectric actuators for selectors

- C € certified
- Direction reversal
- Position indication LED display RS-232 output BCD 5V negative true output
- Manual control Step and home functions Clockwise and counterclockwise functions
- Remote control Step and home functions with contact closure Direct position access with BCD 5V negative true input Direct position access with RS-232 input (RS-485 optional)
- Automatic self-alignment with keyed valves and standoffs
- Universal power supply, 110/230 VAC to 24 VDC

One actuator can be used on any selector, from 2 to 96 positions - you tell the actuator how many stops to make through its 360° of rotation. 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 below.)

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.

The microelectric actuator is designed for room temperature use. Valves which will be mounted in ovens require a standoff assembly, which locates the actuator out of the heated zone.

Microelectric actuators

for selectors

Standard voltage 24 VDC. Includes autosensing 24 VDC power supply. Standoff version includes a 2" standoff. 3", 4", and 6" standoffs are also available. Consult the chart below to determine which actuator model is best suited for your valve.

	With keyed	With keyed	For use with
	closemount	2" standoff	existing
	assembly	assembly	standoff
Description	Prod No	Prod No	Prod No
High speed actuator	EMH	EMH2	EMHS
High torque actuator	EMT	EMT2	EMTS

RS-232 interface cable

Prod No Description RS-232 interface cable I-22697



TECH TIP

Multi-drop cables permit a single serial port to control multiple actuators. In addition, we offer plug-and-play cables for direct connection of the actuator to a specific instrument.

Multi-drop cables...191 Plug-and-play cables195

ORDER TIP

To purchase a selector (multiposition valve) with a microelectric actuator installed, see valve ordering information.

Valco selectors ... pp 124-135 Cheminert selectors 172-179

MORE INFORMATION

Closemount hardware.... page 208 Microelectric actuators for two position190 Right angle drive204 Standoff assembly....205 Standoff mounting hardware.....205

WHICH MODEL FOR WHICH INJECTOR / TWO POSITION VALVE?

Valco			
Fitting	Valve	Actuator	Actuator
size	type	model	model
		GC	HPLC
1/32"	W	EUH	EUH
1/16"	W	EUH	EUH
1/16"	UW	EUD	EUD
1/8"	UW	EUD	EUD

MW

Cheminert

1/4"

	Actuator model	Actuator model		
	HPLC	UHPLC		
4 and 6 ports *	EUH	EUH		
8 and 10 ports	EUH	EUD		
	Low			
pressure				
All valves	EUH			
*20,000 psi versions use EUD.				

EUT

WHICH MODEL FOR WHICH SELECTOR? Valco

vaico			
All valves	Actuator model EUT		
Cheminert			
	Actuator model HPLC	Actuator model UHPLC	
4 and 6 position * 8 and 10 position	EUH EUD	EUH EUD	
	Low pressure		
Model C25 and C25Z Model C25G Model C45	EUH EUD EUT		
* 20,000 psi versions	use EUD.		

ABOUT STANDOFFS

Keyed standoff assemblies are used with selectors on universal actuators, to key the valve body to the actuator and standoff so that the actuators can self-align and operate valves with any number of positions.

Valco selectors are not keyed unless ordered with a universal actuator. To install a universal actuator on an existing Valco selector, the key (pin) must be removed from the actuator clamp ring assembly. This can be done easily with a pair of pliers.

See page 207, top and bottom illustrations, for drawings of keyed standoff assemblies with modular universal actuators.

Universal actuators

- C € certified
- One actuator works with two position valves and selectors
- Simplified, universal communication protocol
- Variety of interfaces
- Three versions for various valve torque requirements

Our universal actuators are truly universal – a single actuator can be used to operate a selector and later to operate a two position valve and back again, simply by changing simple settings.

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 RS232/485, USB, or BCD interfaces.



Note: while the actuators listed below 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 substitute the actuator product number in place of a different actuator and we'll provide the correct hardware.

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-232/485	EUHA	EUDA	EUTA
USB	EUHB	EUDB	EUTB
BCD	EUHC	EUDC	EUTC

MORE INFORMATION

NOTE

Modular universal actuators, with the motor separated from the controller, offer the same features and functionality as the universal actuator. The modular configuration is often easier to incorporate into an instrument design.

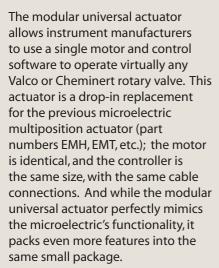
Modular universal actuators for OEMs 194-5





Modular universal actuators

- C € certified
- Bidirectional
- Optional position indication LCD display **BCD** RS-232/485 USB
- 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



This new version of the popular universal actuator makes it easier for the instrument manufacturer to work in the limited space frequently encountered in today's modern instruments. Plus, the modular design makes it possible to mount the more sensitive electronics module away from the liquid end of the valve.

Like the microelectric actuator. the modular universal actuator is bidirectional, and can be easily programmed to take the shortest path during actuation. Position feedback is available via RS232/485

All Valco and Cheminert valves and selectors can be actuated by one of the three available versions: high speed, medium speed/torque, or high torque. The actuator includes a universal input 24 volt DC power supply and a manual controller with LCD display. An OEM version that excludes these and the motor mounting bracket is available at additional savings.

While the actuators listed here are universal, the valve mounting hardware is not. The product numbers shown do not include the hardware required to mount a valve, since the parts required depend on the valve type. If you are ordering a universal actuator with a new valve. the proper hardware is, of course, included. If you are ordering an actuator for use with an existing valve, call our technical support staff for help in acquiring the correct mounting hardware.

(switchable) or USB interfaces.

WHICH MODEL FOR WHICH **INJECTOR / TWO POSITION VALVE?**

Valco

_				
	Fitting size	Valve type	Actuator model	Actuator model
			GC	HPLC
	1/32"	W	UMH	UMH
	1/16"	W	UMH	UMH
	1/16"	UW	UMD	UMD
	1/8"	UW	UMD	UMD
	1/4"	MW	UMT	_

Cheminert

Valco

All valves

Cheminert

4 and 6 position *

8 and 10 position

Model C25G

Model C45

Model C25 and C25Z UMH

* 20,000 psi versions use UMD.

	Actuator model	Actuator model	
	HPLC	UHPLC	
4 and 6 ports *	UMH	UMH	
8 and 10 ports	UMH	UMD	
	Low		
	pressure		
All valves	UMH		
*20,000 psi versio	ns use UMD.		

WHICH MODEL FOR WHICH SELECTOR?

Actuator model

UMT

Actuator

model

HPLC

UMH

UMD

Low pressure

UMD

UMT

NEW Modular universal actuators

for selectors and two position valves

Standard voltage 24 VDC. Includes autosensing 24 VDC power supply. Consult the charts at left to determine which actuator model is best suited for your valve.

	High	Medium	High
	speed	torque	torque
Interface	Prod no	Prod no	Prod no
Standard	UMH	UMD	UMT
RS-232/485	UMHA	UMDA	UMTA
USB	UMHB	UMDB	UMTB
BCD	LIWHC	HMDC	LIMTC
USB	UMHB	UMDB	UMTB

MOUNTING HARDWARE

Actuator

model

UHPLC

UMH

UMD

Closemount hardware..... page 208 Right angle drive204 Standoff assembly....205 Standoff mounting hardware......205

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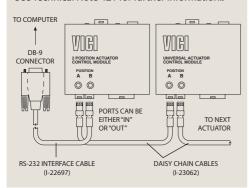
RS-232 interface cable

Description Prod No RS-232 interface cable I-22697

DAISY CHAIN CABLES

Daisy chain cables permit a single serial port (RS-232) to control multiple actuators – newer two position microelectric and universal.

See Technical Note 421 for further information..



NEW for universal actuators **Daisy chain cables** and newer two position microelectric actuators

- More layout flexibility
- Economical

Universal actuators with the RS232/485 interface option can be daisy-chained for control from a single serial port. The series can also include the redesigned two position microelectric actuator (page 191) if desired. A chain of actuators requires only one RS-232 interface cable, plus a 3-pin daisy chain cable for each actuator – a more flexible and economical solution than the multi-drop cable application described in the shaded box below.

For lengths other than the 55 cm cable listed, please contact our technical support department. Note that cable lengths should be shorter than one meter for reliable RS-232 communication; longer lengths can affect the signal integrity.

Length Prod No 55 cm I-23062

Plug-and-play cables for microelectric selector and universal 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.

BCD cable Prod No

Modular 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 175)

Remote cable

Modular universal actuator to

Agilent 1100 LC V-EMPMCR-HP1100 Waters Alliance LC V-EMPMCR-WA2690

For 8 and 10 column selector * (page 175)

Remote cable

Modular universal actuator to

Agilent 1100 LC V-EMPMCR-HP1100-10 Waters Alliance LC V-EMPMCR-WA2690-10

MULTI-DROP CABLES MICROELECTRIC VOGO WG VIGO ACTUATOR Multi-drop cables permit a single CONTROL MODULE serial port (RS-232) to control multiple actuators. These ribbon cables work with all VICI microelectric and universal RS-232 (RS232 option) actuators. Requires one INTERFACE RS-232 interface cable per actuator. CABLE MORE INFORMATION See page 191. Microelectric actuators for two position190 for selectors192 MULTIDROP CABLE Universal actuators ... 193 (1-22397-03) Australian Distributors HROMalytic +61(0)3 9762 2034 Importers & Manufacurers

^{*} Requires a specific software setting in the actuator control module

Air actuators For selectors

ACTUATORS AND ACCESSORIES

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 (multiposition) 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.

Description	With	With	With standoff
	closemount	2" standoff	mounting
	assembly	assembly	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.

Description	With closemount assembly Prod No	With 4" standoff assembly Prod No	With standoff mounting hardware 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.

Description Prod No
Standard ORMP
High temp ORTMP



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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 INFORMATION

PFAF page 199
Position feedback

Mounting Hardware

_	
Closemount	
hardware	208
Right angle drive	.204
Standoff assembly	.205
Standoff mounting	
hardware	.205

Air actuators for two position valves

The recommended method for implementing a two position air actuator is a manifold solenoid valve assembly (5-way three position solenoid air valve, page 198) 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.

No. of ports		With closemount assembly	With 4" standoff assembly	For use with existing standoff
in valve	Description	Prod No	Prod No	Prod No
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	With 2" standoff	For use with existing
	assembly	assembly	standoff
Description	Prod No	Prod No	Prod No
90° rotation	AT90	AT902	AT90S
60° rotation	AT60	AT602	AT60S
45° rotation	AT45	AT452	AT45S
36° rotation	AT36	AT362	AT36S
30° rotation	AT30	AT302	AT30S
	Description 90° rotation 60° rotation 45° rotation 36° rotation	closemount assembly Description Prod No 90° rotation AT90 60° rotation AT60 45° rotation AT45 36° rotation AT36	closemount assembly Description Prod No Prod No 90° rotation AT90 AT902 60° rotation AT60 AT602 45° rotation AT45 AT452 36° rotation AT36 AT362

Replacement O-rings

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

Description Prod No
Standard OR
High temp ORT



Actuator compression fittings

Includes 1/8" compression to 10-32 male thread, plus 1/8" brass ferrule and hex nut.

Prod No

3 piece fitting assembly F-TCF







Air actuator with a closemount assembly



Air actuator with a **4" standoff assembly**



Air actuator for use with an existing standoff

MORE INFORMATION

Solenoids

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 240 VAC	V-SV-S52-110VAC V-SV-S52-220VAC	
24 VAC 24 VDC	V-SV-S52-24VAC 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 212-213) or the DV22 diaphragm valves on pages 142-144. 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 240 VAC	V-SV-S32-110VAC V-SV-S32-220VAC	
24 VAC 24 VDC	V-SV-S32-24VAC V-SV-S32-24VDC	

5-Way three 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.

5		
	Prod No	
110 VAC 240 VAC	V-SV-S53-110VAC V-SV-S53-220VAC	
24 VAC 24 VDC	V-SV-S53-24VAC V-SV-S53-24VDC	



MORE INFORMATION Actuators

Airpages 196-197 Microelectric 190-192 Universal electric193

Mounting Hardware

Closemount
hardware..... page 208
Right angle drive.....204
Standoff assembly....205
Standoff mounting
hardware.......205



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



HSSA 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 above.

Prod No

HSSA



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.

Description Prod No

For Valco W type valves

PFW90 4 port PFW60 6 port 8 and 10 port PFW36

For Cheminert valves

C2 series except 4 port PFC2 C2 series, 4 port PFC4 C4 series PFC4

Purge housings

ACTUATORS AND ACCESSORIES

Purge housings for Valco valves eliminate any possible diffusion from the atmosphere into the valve, or safely vent fugitive emissions from the valve. They are typically used in trace level analyses to isolate the valve from ambient air, but can also be used as a safety measure to isolate a valve against leaks into the atmosphere, such as when pyrophoric, toxic, or carcinogenic materials are present in the sample stream.

Two screws secure each half of the purge housing to the valve, so that the rear chamber of the housing (the preload assembly/spring side of the valve) can be removed for rotor inspection or replacement without affecting the actuator side of the housing.

Ideally, the purge housing should be ordered when a new valve is ordered, so that it can be factoryinstalled. Field installation of purge housings is generally not recommended. To order a new valve with a purge housing, add the suffix "PH" to the product number for the valve/actuator assembly. The purge housing requires a standoff assembly, which can be 2", 3", 4", or 6" long.

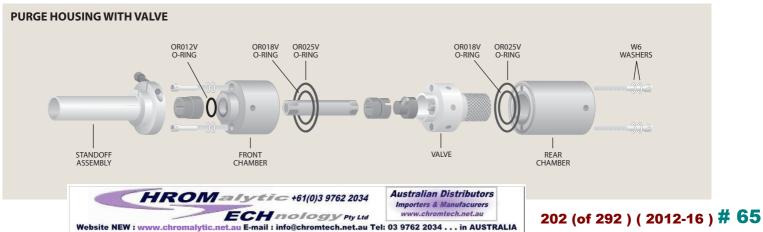
All Valco two position valves with two threaded mounting holes will accommodate a purge housing without modification. Some two position valves must be modified at the factory to accept the housing. The charge for modifying an existing valve includes the new purge housing. Call our service department to make arrangements for this service.

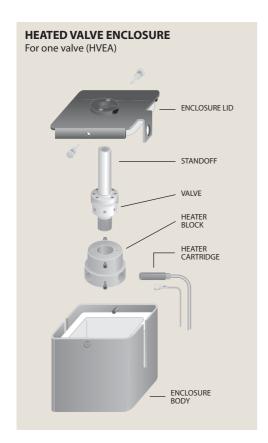


Purge housings

for two position valves and selectors

Description	Prod No	Notes	SPECS
On a new valve	Add suffix PH to valve prod no	Requires standoff assembly. Multiposition valve	Maximum temperature: 175°C
On existing valve, factory installation	Contact factory	requires an actuator.	Note: The purge housing limits the maximum temperature of the
On existing valve, for field installation	Not recommended	ı	purged valve to 175°C, regardless of the valve specifications.





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.

An insulated enclosure and a standard heater block are included. The product number chart lists the heater cartridge 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.

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 * 65W/350°C	HVEA HVEAN	HVEAX HVEANX
	4-1/4" x 5-1/8" x 3-5/8"d	65W/350°C * 65W/350°C	HVEB HVEBN	HVEBX 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

^{*} for use with 1/32" valves



MORE INFORMATION

ITC page 203 Instrumentation temperature controller

Heated column

enclosures203 Heater assemblies 202 Heater blocks 202

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Heater assemblies ■ Heater blocks

ACTUATORS AND ACCESSORIES

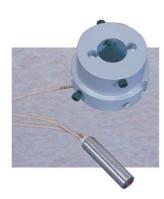
Heater assemblies

(Non-CE)

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.

Description	Rating	Prod No
Heater assembly 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.

Description	Prod No
Low mass heater block, 1 valve	HBS
Standard heater block, 1 valve	НВ
Standard heater block, 1 NW Type valve (1/32" fittings)	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

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MORE INFORMATION
Heated valve



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 201), 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 a column mandrel, an insulated enclosure, and a standard heater block, with or without the heater cartridge and 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
Heated colun	nn enclosure			
1 column	4" x 4-1/4" x 3-5/8"d 4-1/4" x 5-1/8" x 3-5/8"d 8" x 8" x 6"d	65W/350°C 65W/350°C 65W/350°C	HCE1 HCEB HCEC	HCE1X HCEBX HCECX
2 columns	8" x 5-1/4" x 4"d	65W/350°C	HCE2	HCE2X
	drel assembly not included lumn mandrel)		Prod No CM	



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.

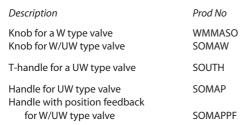
The ITC is available with a range of 0°C to 399°C, in 110 VAC or 230 VAC.

		Prod No
0°C to 399°C	110 VAC 230 VAC	ITC10399 ITC10399-220
Replacement t	I-21014-01	

Knobs and handles

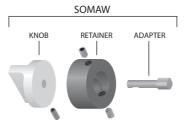
for use with a standoff

Choose from theselection below 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. Includes parts shown.

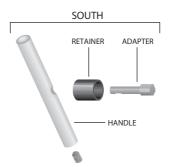




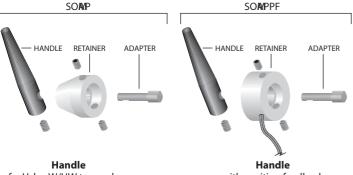
Knob for Valco W type valves



Knob for Valco W/UW valves



T-handle for Valco UW type valves



for Valco W/UW type valves

Handlewith position feedback
for Valco W/UW type valves

RAD Right angle drive

for two position actuators

Some installations don't allow the valve and actuator to be installed in a typical in-line configuration. The RAD 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. Not for use with 1/4" valves.

RAD with standoff includes a 2" standoff; 3", 4", and 6" standoffs are also available.

With closemount	With 2" standoff
hardware	assembly
Prod No	Prod No
RAD	2RAD

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.



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. The microelectric actuator for selectors uses 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 microelectric and standard 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

ndon assemblies and indulting hardware				
	Standoff assembly	Clamp ring	Screws	
	Prod No	Prod No	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 multiposition valves				
(UW and MW Types only)	2SOAMMP	CR10	HWSC-SC8-8TDH	l
For Cheminert two position valves	2SOAMP	CR8	HWSC-SC8-8B	
For Cheminert selectors	2SOAMMP	CR10	HWSC-SC8-8TDH	l
Standard electric actuators				
For Valco two position valves				
with 1 or 2 mounting holes	2SOA	CR3	HWSC-SC8-8B	
with no mounting holes	2SOAMP	CR3	HWSC-SC8-8B	
For Valco selectors	2SOAMP	CR3	HWSC-SC8-8B	
For Cheminert valves	2SOAMP	CR3	HWSC-SC8-8B	

Actuators

installed.

TECH TIP

Air pages 196-7 Microelectric 190-192 Universal elec193

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

CONVERTING FROM CLOSEMOUNT TO A 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 INFORMATION

For illustrations of standoffs on valves and actuators, see pages 206 and 207

Standoff assemblies

for manual valves

Includes knob, standoff assembly, retainer, and adapter. For illustration, see page 206, top.

Prod No

For Valco W and UW Type two position valves rated less than 5,000 psi

with 1 or 2 mounting holes 4SOWK with no mounting holes 4SOWKMP For Valco UW Type two position valves rated 5,000 psi and higher

with 1 or 2 mounting holes 4SOUTH with no mounting holes **4SOUTHMP** For Cheminert valves 4SOWKMP





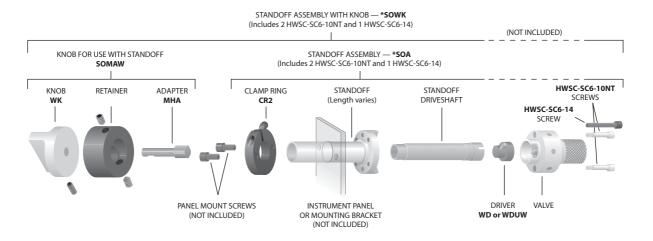
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Standoff assemblies

ACTUATORS AND ACCESSORIES

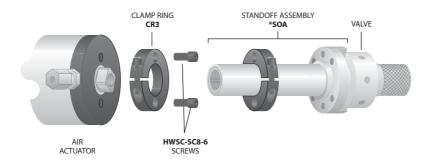
Standoff with

VALCO TWO POSITION VALVE - MANUAL



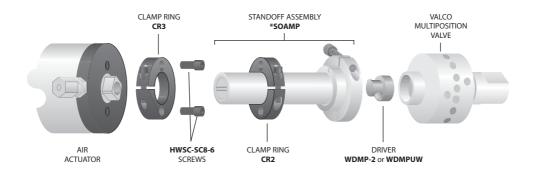
Standoff with

VALCO TWO POSITION VALVE - AIR ACTUATOR



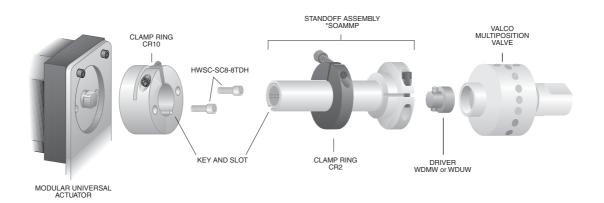
Standoff with

VALCO SELECTOR – AIR ACTUATOR



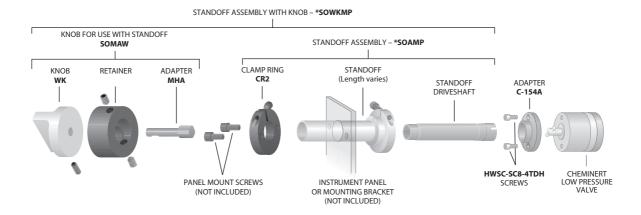
Keyed standoff with

VALCO SELECTOR - MICROELECTRIC, UNIVERSAL, OR MODULAR UNIVERSAL ACTUATOR



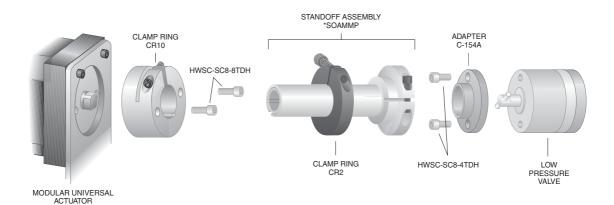
Standoff with

CHEMINERT TWO POSITION VALVE - MANUAL



Keyed standoff with

CHEMINERT SELECTOR - MICROELECTRIC, UNIVERSAL, OR MODULAR UNIVERSAL ACTUATOR



Closemount hardware

ACTUATORS AND ACCESSORIES

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.)

> Description 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.

Description	Prod No
rescription	1100110

Air or standard electric actuators

For Valco two position valves

with 1 or 2 mounting holes CMH with no mounting holes **CMHMP** For Valco multiposition valves **CMHMP**

For Cheminert valves

high pressure design CMH11H low pressure design CMH11L (low pressure design includes required adapter)



Two position microelectric actuators

For Valco two position valves

with 1 or 2 mounting holes CMH12H with no mounting holes CMH12H

For Cheminert two position valves

high pressure design CMH12H low pressure design CMH12L (low pressure design includes required adapter)

Universal and modular universal actuators

For Valco multiposition valves

(UW and MW Types only) CMH13

For Cheminert multiposition valves

high pressure design CMH13H low pressure design (low pressure design includes required adapter)

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.

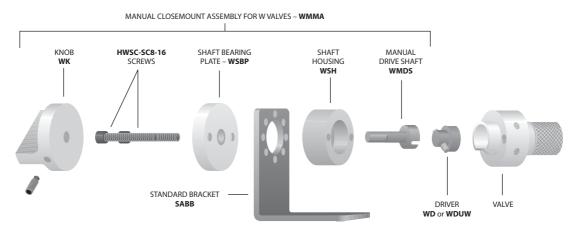
Actuators

Air	pages	196-197
Microe	electric	190-192
Modul	ar universa	l194
Univer	sal	193



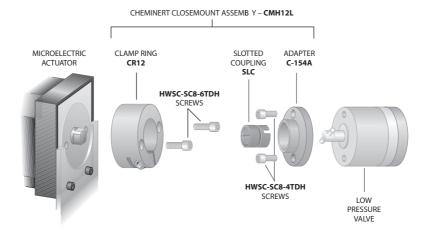
Closemount with

VALCO VALVE - MANUAL



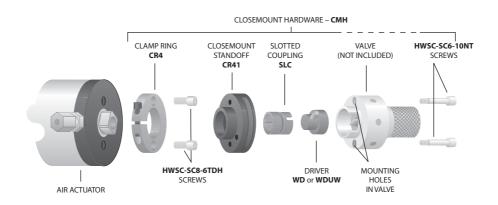
Closemount with

CHEMINERT VALVE (Low pressure two position) - MICROELECTRIC



Closemount with

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.

Size Pro	
	/H3 /H4



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.



Open end wrenches

Size	For use with	Prod No	
3/16" x 1/4"	1/32" and 1/16" nuts	OEW	2 6
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.



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.



Template

This tool is just what you need when you're 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.



Mirror

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



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.

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, 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/CO₂ actuated versions. The automated valves require 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.

*Not suitable for use with gases.





CONTROL DEVICES

On/off valves for liquids

SPECS

Temp Pressure

Standard temperature / high pressure

1/16" 100°C 10,000 psi liq

High temperature / medium pressure

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

Standard temperature/ high pressure

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

High temperature/ medium pressure

		Manual	Manual	Air actuated	Air actuated
		with 2" knob	with 4" knob	with 2" standoff	with 4" standoff
Fitting size	Bore	Prod No	Prod No	Prod No	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

for liquids Prime/purge valves

SPECS

Temp Pressure

Standard temperature / high pressure

1/16" 100°C 10,000 psi liq

High temperature / medium pressure

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

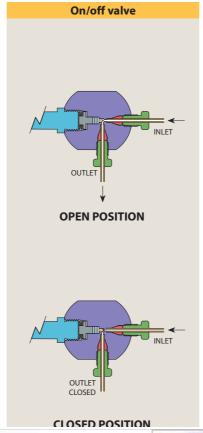
Standard temperature/ high pressure

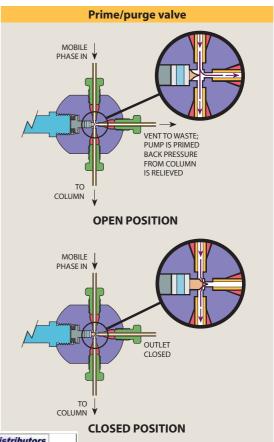
		Manual	Air actuated
		with 1" knob	with 1" standof
Fitting size	Bore	Prod No	Prod No
1/16"	0.50 mm	SFV	ASFV
	0.75 mm	SFVL	ASFVL

High temperature/ medium pressure

		Manual	Manual	Air actuated	Air actuated
		with 2" knob	with 4" knob	with 2" standoff	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

Air actuator option MOUNTING HOLES (1.00" CENTER) AIR INLET/OUTLET (50 PSI ACTUATION) AN EAOR21 FITTING FOR 1/8" AIR SUPPLY TUBING IS INCLUDED. (SEE PAGE 216)







Combo valves

CONTROL DEVICES

A new generation needle and shutoff valve combines 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, the valve is ideal for providing hydrogen and air to an FID. It can also be used to supply makeup or combustion gas in a wide variety of applications.

Flow is set using the screwdriver adjustment in the center of the on/off knob.

The valve body materials are anodized aluminum or stainless steel, with Viton® O-ring seals. Maximum temperature is 100°C, and maximum inlet pressure is 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.

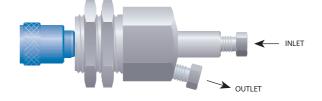
The standard knob is silver-colored and .62" long. Colored knobs for gas identification are available separately, in two lengths.

Combo valves

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

SPECS
Inlet pressure:
100 psi
Maximum
temperature:
100°C

Optional colored knobs	Standard (.62") Prod No	Long (1.25") Prod No
Green	CNVEKG	CNVEKLG
Red	CNVEKR	CNVEKLR
Blue	CNVEKU	CNVEKLU
Silver	CNVEKS	CNVEKLS
Black	CNVEKB	CNVEKLB





CONTROL DEVICES

Very similar in function to the more recent design on the opposite page, these are the original, hex-bodied combo valves made by the Condyne division of VICI Metronics for nearly 30 years. Condyne products have been transferred to the Valco Houston location, where a number of improvements have been made.

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, but the standard knob can be changed if desired. 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

SPECS Maximum inlet pressure: 100 psi	Maximu m fl @ 40psi He o	• • • •	1/16" Valco fittings Prod No	1/8" Valco fittings Prod No
Maximum tem-	10 ml/min	Green	CVA10GS1	CVA10GS2
perature:	50 ml/min	Red	CVA50RS1	CVA50RS2
100°C	150 ml/min	Blue	CVA150US1	CVA150US2
	500 ml/min	Black	CVA500BS1	CVA500BS2
	1 liter/min	Yellow	CVA1KYS1	CVA1KYS2



Gas flow controllers

CONTROL DEVICES

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 a minimum of 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.

Fixed span upstream-referenced flow controller

Model 100 gas flow controller

The Model 100 is available in a variety of preset maximum flow rates, from 150 mL/min to 10 liters/min (N₂ at 40 psi). Any flow controller in this series can be ordered with a 10-turn Spectrol digital dial (3 or 4 digits), to permit a visual indication of the flow setting.

All flow rates listed below are based on N₂ at 40 psi inlet pressure. Maximum inlet pressure is 200 psi.



SPECS

Preset max flow rates:

150 mL/min to 10 liters/min (N₂ at 40 psi).

Maximum inlet pressure:

200 psi

Maximum temperature: 100°C

Standard fittings:

■ 1/8" external tube fittings (EAOR22)

Other fittings are available. (See below.) Contact the factory for further information.

		Aluminum body Viton diaphragm	Aluminum body SS diaphragm	SS body Viton diaphragm	SS body SS diaphragm
	Flow rate				
	/min	Prod No	Prod No	Prod No	Prod No
With st	andard conti	rol 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 Sp	ectrol 3-digi	it 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 Sp	ectrol 4-digi	it 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

ADAPTERS USED FOR VALCO AND CONDYNE CONTROL DEVICES

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

Australian Distributors HROM = 1 y tic +61(0)3 9762 2034 Importers & Manufacurers www.chromtech.net.au ECH nology Pty Ltd Website NEW: www.chromalytic.net.au E-mail: info@chromtech.net.au Tel: 03 9762 2034... in AUSTRALIA

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 included. To use 1/8" OD tubing, order PZA22 on page 35.

CONTROL DEVICES

Model 202 gas flow controller

Adjustable span upstream-referenced flow controller

SPECS

Flow range:

infinitely adjustable Min: 5 mL/min Max: 1.6 L/min (N₃ at 40 psi)

Maximum inlet pressure:

200 psi

Maximum temperature: 100°C

Standard fittings:

- 1/8" NPT female pipe threads
- Pipe adapters to 1/16" OD tubing are included.

Other fittings are available. (See facing page.)

The Model 202 provides a user-variable span adjustment permitting it to be used for a variety of flow ranges. After the span is adjusted, the flow controller has a full 10 turns of resolution between the minimum and maximum flow rates. When equipped with a Spectrol digital dial, settings are reproducible to better than 1%.



	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 cont	t rol knob FC22AV1K	FC22AS1K	FC22SV1K	FC22SS1K
With Spectrol 3-dig	git dial FC22AV1S3	FC22AS1S3	FC22SV1S3	FC22SS1S3
With Spectrol 4-dig	git dial FC22AV1S4	FC22AS1S4	FC22SV1S4	FC22SS1S4

Model 300 gas flow controller

Fixed span downstream-referenced flow controller

SPECS

Maximum flow rate:

1.6 L/min with ambient downstream pressure

Maximum inlet pressure:

200 psi

Maximum temperature: 100°C

Standard fittings:

■ 1/8" external tube fittings (EAOR22)

Other fittings are available. (See facing page.) Contact the factory for further information.

The Model 300 flow controller provides a stable flow rate when upstream pressure conditions vary, providing the downstream pressure remains constant.

All flow rates listed below are based on N₂ at 40 psi inlet pressure. Maximum inlet pressure is 200 psi.



	Flow rate	Aluminum body Viton diaphragm	Aluminum body SS diaphragm	SS body Viton diaphragm	SS body SS diaphragm
	/min	Prod No	Prod No	Prod No	Prod No
With sta	ndard contr	ol 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 Sp	ectrol 3-digi	t 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 Sp	ectrol 4-digi	t 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

MORE INFORMATION

Male pipe adapters
Internal...... page 35
External 36

With screwdriver adjustable operator

0 - 750 mL FC31AV1



Micrometering valves

CONTROL DEVICES

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

1/16" microme	etering valves		With vaico πttings
Seal	Lubrication	Prod No	
Standard: 2–225 ml	/min@ 15 psig N ₂ inlet		
Viton Viton Kalrez	Lubricated Non-lubricated Non-lubricated	ZBNV1 ZBNV1-D ZBNV1-KZ	→ INLE
Fine control: 2–175	ml/min@ 15 psig N ₂ inlet		
Viton Viton Kalrez	Lubricated Non-lubricated Non-lubricated	ZBNV1F ZBNV1F-D ZBNV1F-KZ	OUTLET
Low flow: 2–90 ml/r	min@ 40 psig N ₂ inlet		
Viton Viton Kalrez	Lubricated Non-lubricated Non-lubricated	ZBNV1LF ZBNV1LF-D ZBNV1LF-KZ	
1/16" microme	etering valves		with 18" tubes
Seal	Lubrication	Prod No	
Fine control: 2-175	ml/min@ 15 psig N ₂ inlet		
Viton Viton Kalrez	Lubricated Non-lubricated Non-lubricated	BNV1 BNV1-D BNV1-KZ	
Low flow: 2–90 ml/r	min@ 40 psig N ₂ inlet		
Viton Viton Kalrez	Lubricated Non-lubricated Non-lubricated	BNV1LF BNV1LF-D BNV1LF-KZ	

CONTROL DEVICES

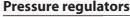
VICI regulators are machined from aluminum bar stock and then hardanodized to provide contaminationfree service. They feature a stainless steel diaphragm and Viton®-sealed stainless poppet. The compact size (1.125" diameter by 2" long for regulator, 3" long for combo version) saves panel space and permits installation anywhere that an 11/16" hole can be located. Mounting hardware is supplied.

While the outward appearance is unchanged, a recent redesign has enhanced thermal stability, linearity, and shock resistance.

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 0.05 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.



No knoh and shut-off feature



Pressure regulators		NEW	No knob and shut-off feature		
SPECS Maximum inlet pressure:		Valco internal fittings 1/16"	Valco internal fittings 1/8"	External fittings 1/8"	
250 psi Maximum	Pressure range:	Prod No	Prod No	Prod No	
temperature: 100°C	0-15 psi 0-30 psi	PR51A15Z1 PR51A30Z1	PR51A15Z2 PR51A30Z2	PR51A15E2 PR51A30E2	
Wetted materials: ■ Anodized aluminum ■ Stainless steel ■ Viton	0-60 psi	PR51A60Z1	PR51A60Z2	PR51A60E2	



aluminum ■ Stainless steel



	9			
SPECS Maximum inlet pressure: 250 psi	Pressure	Valco internal fittings 1/16" Prod No	Valco internal fittings 1/8" Prod No	External fittings 1/8" Prod No
Maximum	range:			
temperature: 100°C	0-15 psi 0-30 psi	PR50A15Z1 PR50A30Z1	PR50A15Z2 PR50A30Z2	PR50A15E2 PR50A30E2
Wetted materials: ■ Anodized	0-60 psi	PR50A60Z1	PR50A60Z2	PR50A60E2

Instrumentation

DETECTORS, ANALYZERS, AND PURIFIERS

Most of the components we supply to the instrumentation industry are from our valve and fitting lines. The rest, from our R&D 100 Award-winning pulsed discharge detectors to our application-dedicated trace gas analyzers, are primarily for gas detection and purification.

Pulsed discharge detectors

Non-radioactive, multiple mode electron capture / helium photoionization

VICI PDDs (pulsed discharge detectors) utilize a stable, low powered, pulsed DC discharge in helium as an ionization source. Eluants from the column, flowing counter to the flow of helium from the discharge zone, are ionized by photons from the helium discharge. The bias electrode(s) focus the resulting electrons toward the collector electrode, where they cause changes in the standing current which are quantified as the detector output. Performance is equal to or better than detectors with conventional radioactive sources.

In the electron capture mode, the PDD is a selective detector for monitoring high electron affinity compounds such as freons, chlorinated pesticides, and other halogen compounds. For this type of compound, the minimum detectable quantity (MDQ) is at the femtogram (10⁻¹⁵) or picogram (10⁻¹²) level.

In the helium photoionization mode, the PDD is a universal, non-destructive, high sensitivity detector. The response to both inorganic and organic compounds is linear over a wide range. Response to fixed gases is positive (increase in standing current), with an MDQ in the low ppb range.

The PDD in helium photoionization mode is an ideal replacement for FIDs in petrochemical or refinery environments, where the hydrogen and flame can be problematic. In addition, when the discharge gas is doped with argon, krypton, or xenon (depending on the desired cutoff point), the PDD functions as a specific photoionization detector for selective determination of aliphatics, aromatics, amines, and other species.



R&D 100 AWARD WINNER

TRACE GAS ANALYZERS AT VICI.COM

For more information about trace gas analyers, go to:

www.vici.com/instr/itga.php



MORE INFORMATION

Pulsed discharge detectors

detectors

Model D-2.... page 221

Model D2-IM 222

Model D-3 223

Model D-4 223

Plug-and-play detectors

for Agilent 6890 ... 223

for Agilent 7890 ... 223

for other GCs 223



Model D-2

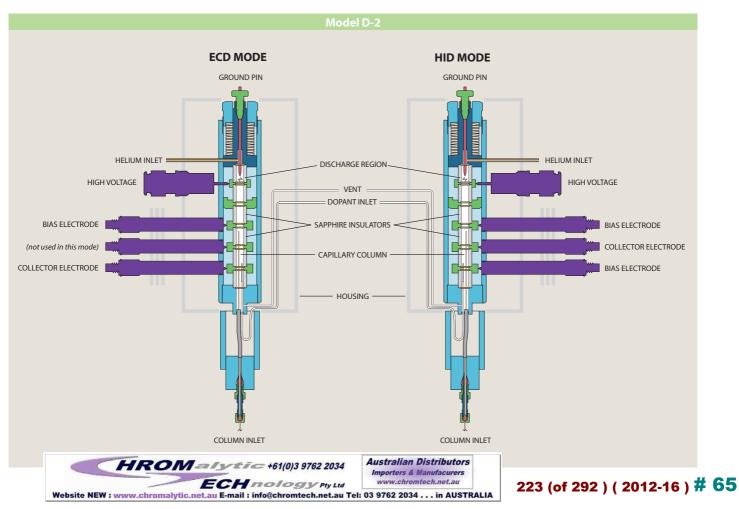
The D-2 is a dual mode, universal detector system which can be retro-fitted to your older GC. The D-2-I is optimized for trace level work in the helium photoionization mode. The stand-alone systems include detector, controller, electrometer, HP2 helium purifier (see page 226), and power supply.



ϵ PDD Model D-2 Stand-alone system

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

Description	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



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.

It can be paired with other Valco components (controller, pulse module, helium purifiers, etc.) or can be purchased alone for use with existing components. Call today to discuss the endless possibilities.



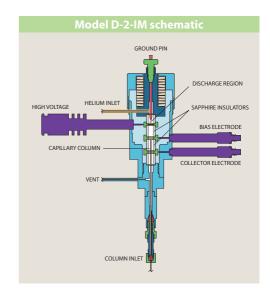
Detector cell only optimized for helium photoionization mode

Description Prod No miniPDD cell only PD-D2-IM

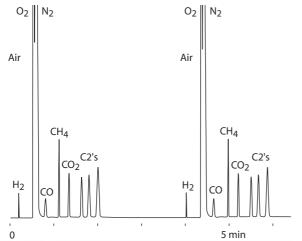
miniPDD system

Includes controller and purifier D-2-IM





miniPDD Model D-2-IN



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

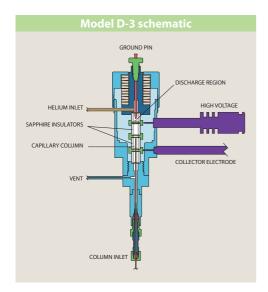
100°C (min /b ald 1 mi

at 100°C/min (hold 1 min)

Sample: 2000 ppm in air, 2 µL size Carrier: Helium

Carrier: Helium Discharge gas: Helium

INSTRUMENTATION



Plug-and-play detectors for Agilent 7890 and 6890

Model D-3 is designed for plugand-play installation on the popular Agilent 6890 and 7890, and is optimized for trace level work in the helium photoionization mode.

Both versions utilize the electonics and power supply of the host GC.

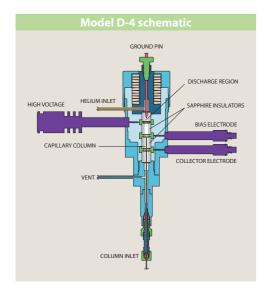
PDD Model D-3

Helium photoionization

Detector optimized for trace level work in helium photoionization mode

	110 VAC	230 VAC
Description	Prod No	Prod No
Plug-in system for Agilent 7890	D-3-I-7890	D-3-I-7890-220
Plug-in system for Agilent 6890	D-3-I-HP	D-3-I-HP-220





Plug-and-play detectors for other GCs

Pulsed Discharge Detector Model D-4 is available in versions for easy installation on most of the GCs in current use, including the Varian 3800; Shimadzu 14, 17, 2010, and 2014; ThermoFinnigan Trace, Mega, and Top; and Hewlett Packard 5890. The D-4 is single mode, optimized for trace level work in the helium photoionization mode.

PDD Model D-4

Helium photoionization

Detectors optimized for trace level work in helium photoionization mode

	110 VAC	230 VAC
Description	Prod No	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 €

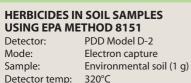
NOTE

PDD Model D-4-I-220 has been designed to meet C€ regulations



Pulsed discharge detector ■ Applications

INSTRUMENTATION



Column: ValcoBond VB-5

 $30 \text{ m} \times 0.25 \text{ mm} \times 0.25 \mu\text{m}$

Column temp: 60°C (2 min),

20°C/min to 180°C, 4°C/min to 220°C,

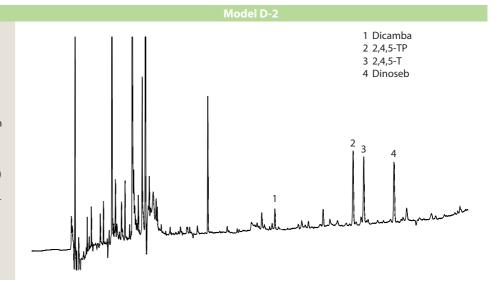
40°C/min to 300°C (5 min) 200°C

Injector temp:

Sample volume: 2 μL (solvent microextrac-

tion), 1:15 split Discharge gas: Helium Dopant gas: Helium/argon

Attenuation:



PAH RESIDUES IN AN ENVIRONMENTAL SOIL SAMPLE SPIKE

Detector: PDD Model D-2 Mode: Helium photoionization Sample: Environmental soil (1 g) 300°C Detector temp:

Column: ValcoBond VB-35

 $30 \text{ m} \times 0.25 \text{ mm} \times 0.25 \text{ } \mu\text{m}$

Column temp: 120°C for 3 min, 15°C/min

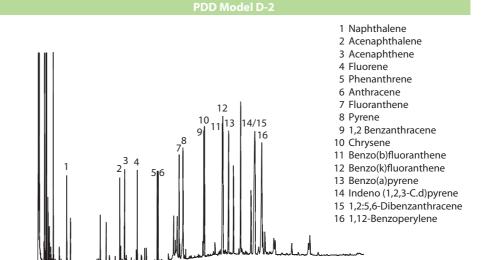
to 310°C for 15 min

275°C Injector temp:

Sample volume: 2 µL (solvent microextrac-

tion), 1:15 split

Discharge gas: Helium Dopant gas: none Attenuation:



SIMULATED DISTILLATION **IN TWO MINUTES**

miniPDD Detector: Detector temp: 320°C

ValcoBond® VB-1 Column: $5 \text{ m} \times 0.25 \text{ mm} \times 0.20 \text{ } \mu\text{m}$

40°C initial for 0.1 min Column temp:

to 320°C at 150°C/min

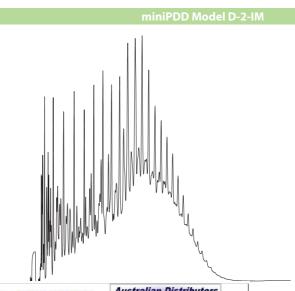
Injector temp: Cold on-column injection

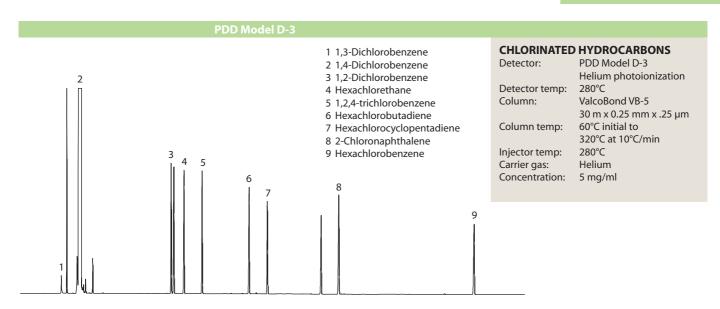
Carrier gas: Helium Helium Reference gas:

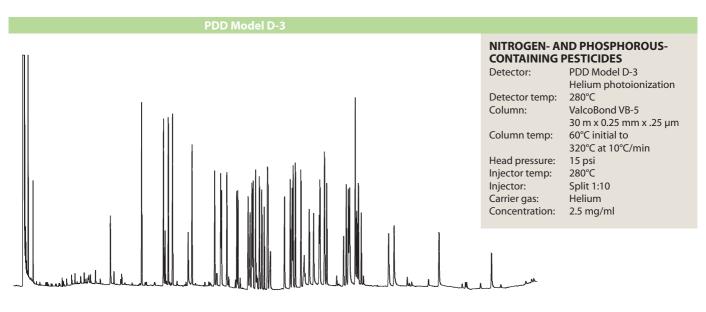
Sample: Reference Gas Oil (RGO)

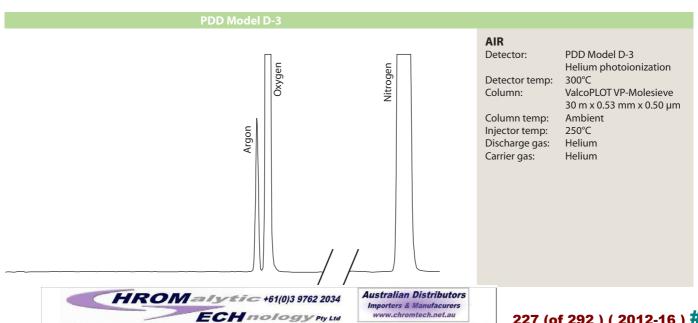
provided by

Separation Systems, Inc.









Website NEW: www.chromalytic.net.au E-mail: info@chromtech.net.au Tel: 03 9762 2034... in AUSTRALIA

Gas purifiers

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. 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 subppm 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

Includes universal power supply.

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

Replacement getter assembly

I-23572HP2 Helium Nitrogen I-23572NP2

HELIUM PURIFIER

■ CE certified

■ Gases purified He, Ne, Ar, Kr, Xe, Rn

Maximum operating pressure 1000 psig

Outlet impurities less than 10ppb Impurities removed

 $H_2O, H_2, O_2, N_2, NO, NH_3, CO, CO_2, and CH_4,$ based on 10ppm total inlet impurities. Other impurities removed include CF₄, CCl₄, SiH₄ and light hydrocarbons.

■ Impurities *not* removed He, Ne, Ar, Kr, Xe, Rn

NITROGEN PURIFIER

■ CE certified

 Gases purified N₂ only

Impurities removed

Outlet impurities less than 10ppb H₂O, H₂, O₂, NO, NH₃, CO, CO₂, and CH₄, based on 10ppm total inlet impurities. Other impurities removed include CF₄, CCl₄, SiH₄ and light hydrocarbons.

Impurities *not* removed He, Ne, Ar, Kr, Xe, Rn, N

HROM = 15 = +61(0)3 9762 2034 ECH nology Pty Ltd w.chromalytic.net.au E-mail : info@chromtech.net.au Tel: 03 9762 2034 . . . in AUSTRALIA

Australian Distributors Importers & Manufacurers www.chromtech.net.au

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INSTRUMENTATION



Miniature gas purifiers

The Valco Miniature Helium Purifier (HPM) and Miniature Nitrogen Purifier (NPM) are designed to be installed in a gas chromatograph's flow path immediately upstream of the injector. The HPM/NPM 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

 ϵ

Includes universal p	oower supply.	
	Helium	Nitrogen
	purifier	purifier
Description	Prod No	Prod No
110 VAC	HPM-110	NPM-110
230 VAC	HPM-220	NPM-220



Microvolume thermal conductivity detector

Our dual filament TCD is a stand-alone unit consisting of the detector housing and a controller with electrometer and temperature controls. The detector cell includes two separate nickel/iron filaments, capable of independent or referenced (differential) operation. Cell volume and geometry are optimized for capillary chromatography and

enhanced sensitivity at low flow rates. (Recommended total flow rate: 2-10 mL/min.) Thermal stability is maintained to ±0.02°C, resulting in a stable, noise-free signal. A single 0-1 millivolt attenuated output for a strip chart recorder is provided through the signal cable at the rear of the controller, with 0-1 volt and 0-10 volt unattenuated signals available through the remote signal cable.

TCD Thermal conductivity detectors

 ϵ

	110 VAC	230 VAC
Description	Prod No	Prod No
Entire unit (cell and electronics)	TCD2-NIFE-110	TCD2-NIFE-220
Cell/oven assembly only, dual filament	TCD2-NIFED-110	TCD2-NIFED-220
TCD controller only	TCD2-C-110	TCD2-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. In addition, Metronics is the leading provider of 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. The product line also includes gas purifiers, contaminant traps, and GC Industries oxygen and toxic gas monitors.

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. This 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 easily be generated by simply varying the dilution flow rate.

By contrast, bottled trace level (ppb and ppm) standards can be very expensive, and calibrations requiring multiple components over a wide range of concentrations require a large number of gas cylinders, consuming valuable lab space. Problems can also arise from degradation of the standard within the cylinder, from changes in cylinder pressure, and from interaction of calibration components and surfaces.

TO ORDER

For prices or more information about specific compounds available in permeation devices, contact VICI Metronics:

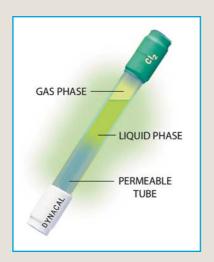
Toll-free 877–737–1887 Tel360–697–9199 Fax.....360–697–6682

vicimetronics.com





CALIBRATION GAS STANDARDS



- Ideal for lab environments
- Smaller than G-Cal devices
- More accurate than G-Cal devices
- Require a temperature-controlled environment
- Inexpensive calibration solution

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 longterm studies of effects on materials or biological systems – in short, any situation requiring a stable concentration of a specific trace chemical.

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 Dichloromethane Dimethyl sulfide Ethanol Ethylene oxide Freon Formaldehyde Hydrogen cyanide Hydrogen fluoride Hydrogen sulfide lodine Isopropyl alcohol Mercury Methanol Methyl bromide **MTBE** Nitrogen dioxide Octane Sulfur dioxide Sulfur hexafluoride Thiophene Toluene Vinyl acetate Water

Tubular device

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.

Extended life tubular device

Our unique extended life tubular (XLT) device is essentially 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 device

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.

MORE INFORMATION

Xylenes

G-Cal nerm tubes in 232



Dynacalibrator® calibration gas generators

CALIBRATION GAS STANDARDS

- Deliver precise concentrations from ppb to high ppm
- Use Dynacal® permeation devices as the trace gas source, with front panel access to the permeation chamber
- Proprietary constant temperature system controls chamber temperature at a set point with ±0.01°C accuracy
- Choice of plumbing and flow configurations

VICI Metronics Dynacalibrators allow you to verify the accuracy of analytical data from air pollution monitoring, industrial hygiene surveys, odor surveys, and other instruments measuring gas concentration. All models enable calibrations traceable to NIST standards for almost any gas analyzer, in the lab or in the field.

The design takes full advantage of all the conveniences inherent in our Dynacal® permeation devices to generate and deliver precise concentrations ranging from ppb to high ppm for hundreds of different compounds. Standard features on all our models, from the most basic Model 150 to the most fully-equipped Model 500, facilitate accurate, reproducible, trouble-free calibrations time after time.

Model 120 (Non-CE) 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.

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

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.

CALIBRATION GAS STANDARDS

Model 230 Dynacalibrators®

With a flexible flow metering system to maintain a constant carrier flow through the permeation chamber, the Model 230 allows the dilution flow to be varied over a wide range, generating the spectrum of concentrations required for checking analyzer linearity. Like all Dynacalibrators, its permeation chamber is big enough to accomodate several permeation devices for higher output concentrations or multi-component mixtures.



Model 340 Dynacalibrators®

The Model 340 adds a front panel mode control switch to select between zero or span calibration modes. In the zero mode, scrubbed air is delivered to the span outlet, allowing the end user to establish zero before sampling.



Model 450 Dynacalibrators®

Ordinarily, the plumbing connections between the sample manifold, analyzer, and calibrator must be changed for each calibration. The Model 450's unique "through-port" feature eliminates this chore. The mode control switch selects among standby, zero, span 1 (low concentration), and span 2 (high concentration) modes.



Model 500 Dynacalibrators®

This innovative design features two separate permeation chambers with independent temperature control systems. The chambers can be used independently, or together to combine concentrations of trace components. Separate solenoid valves allow the carrier flows to be switched from the dilution stream to a vent port.



TO ORDER

For prices or more information about specific compounds available in permeation devices, contact VICI Metronics:

Toll-free 877–737–1887 Tel360–697–9199 Fax.....360–697–6682



G-Cal permeation devices

CALIBRATION GAS STANDARDS

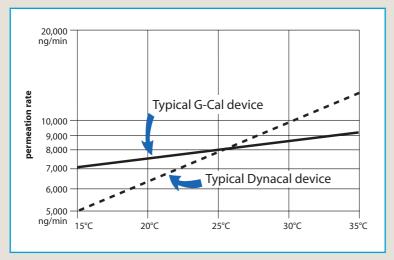
- Excellent for use in the field
- Can be operated at room temperature
- Can handle Arsine and Phosphine
- Longer lifetime than Dynacal® devices

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 3 Phosphine * Propylene Oxide Sulfur Dioxide Sulfur Hexafluoride Thiophene Toluene Vinyl Chloride Water **Xylenes**

* Available only in G-Cal permeation devices.

MORE INFORMATION

Dynacal perm tubes.....p. 229

CALIBRATION GAS STANDARDS



- 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 unique 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

Non-CE, use restricted within the EU.

Flow range	Oven	Battery	Prod No.
100-1000 cc/min	no	1.5 VDC	2301
	no	12 VDC NiCad	2310-10
	yes	12 VDC NiCad	2330-10
200-4000 cc/min	no	12 VDC NiCad	2310-20
	yes	12 VDC NiCad	2330-20

TO ORDER

For prices or more information about specific compounds available in permeation devices, contact VICI Metronics:

Toll-free 877–737–1887 Tel360–697–9199 Fax.....360–697–6682



GC capillary columns ALCOBOND® AND VALCOPLOT®

from VICI Metronics

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 retention characteristics identical to the phases you are used to.

ValcoPLOT® capillary columns

- Widest polarity range
- Faster than micropacked
- Water tolerant

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.

VALCOBOND PHASES

VALCOPLOT PHASES

ValcoPLOT Molesieve 5Å

pages 236-238

VB-FLUORO Bonded fluorosilicone phase 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)



pages 240-244

ValcoPLOT A High purityDivinylbenzene/ethyleneglycoldimethacrylate

ValcoPLOT Metal Molesieve 5Å ValcoPLOT B Divinylbenzene/polyethyleneimine ValcoPLOT Alumina KCI ValcoPLOT C Divinylbenzene/acrylonitrile

ValcoPLOT Alumina Na, So,

PRODUCTS FOR GC

Other useful products for gas chromatography include:

1/32" ultra low mass external unions... p 19 FS adapter ferrules.16-17

Detectors 221-223,227 Injection

valves104-113

selectors.....124-135 Gas purifiers.....246-247

Helium and nitrogen

Inlet discs

(injector nuts for HP 6890 and 5890 .. 18

Reduced breakdown injection port

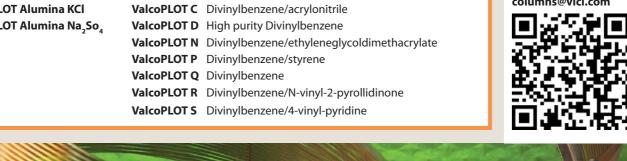
liners.....245

TO ORDER

For prices or more information about your specific application, contact VICI Metronics:

Toll-free 877-737-1887 Tel360-697-9199 Fax.....360-697-6682







GC CAPILLARY COLUMNS

PRIMARY APPLICATIONS

Aldehydes **CFCs Explosives** Ketones **PAHs** Silanes Unsaturated compounds

VB-Fluoro Capillary Columns

- 100% bonded Fluorosilicone
- High thermal stability
- Unique selectivity

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.

Primary applications include ketones, aldehydes, explosives, PAHs, silanes, CFCs, and unsaturated compounds.

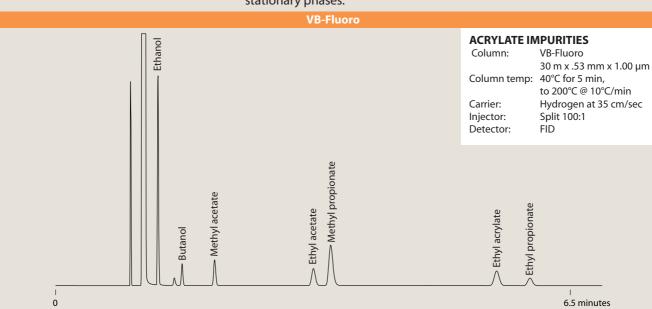
VB-Fluoro columns are a good replacement for Rtx-200, DB-200, DB-210, and VF-200 columns.

VB-Fluoro

0.25 mm ID df Prod No CFS-N03025-025 30 meters 0.25

0.53 mm ID

30 meters 1.00 CFS-N03053-100





ValcoBond® columns

GC CAPILLARY COLUMNS

VB-1

100% dimethylpolysiloxane

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

0.10 mm ID	df	Prod No	0.32 mm ID, d	ont'd	Prod No
10 meters	0.10	CFS-A01010-010B	15 meters	2.00	CFS-A01532-200B
10 meters	0.20	CFS-A01010-020B	15 meters	3.00	CFS-A01532-300B
10 meters	0.40	CFS-A01010-040B	15 meters	4.00	CFS-A01532-400B
20 meters	0.10	CFS-A02010-010B	15 meters	5.00	CFS-A01532-500B
20 meters	0.20	CFS-A02010-020B	30 meters	0.10	CFS-A03032-010B
20 meters	0.40	CFS-A02010-04 0B	30 meters	0.25	CFS-A03032-025B
0.18 mm ID	df	Prod No	30 meters	0.32	CFS-A03032-032B
10 meters	0.10	CFS-A01018-010B	30 meters	0.50	CFS-A03032-050B
10 meters	0.18	CFS-A01018-018B	30 meters	1.00	CFS-A03032-100B
10 meters	0.40	CFS-A01018-040B	30 meters	2.00	CFS-A03032-200B
			30 meters	3.00	CFS-A03032-300B
30 meters	0.10	CFS-A03018-010B	30 meters	4.00	CFS-A03032-400B
30 meters	0.18	CFS-A03018-018B CFS-A03018-040B	30 meters	5.00	CFS-A03032-500B
30 meters 30 meters	0.40 1.00	CFS-A03018-100B	60 meters	0.10	CFS-A06032-010B
30 meters	1.00		60 meters	0.25	CFS-A06032-025B
40 meters	0.18	CFS-A04018-018B	60 meters	0.32	CFS-A06032-032B
40 meters	0.40	CFS-A04018-040B	60 meters	0.50	CFS-A06032-050B
0.25 mm ID	df	Prod No	60 meters	1.00	CFS-A06032-100B
15 meters	0.10	CFS-A01525-010B	60 meters	2.00	CFS-A06032-200B
15 meters	0.25	CFS-A01525-025B	60 meters	3.00	CFS-A06032-300B
15 meters	0.50	CFS-A01525-050B	60 meters	4.00	CFS-A06032-400B
15 meters	1.00	CFS-A01525-100B	60 meters	5.00	CFS-A06032-500B
15 meters	1.50	CFS-A01525-150B	0.53 mm ID	df	Prod No
30 meters	0.10	CFS-A03025-010B	15 meters	0.15	CFS-A01553-015B
30 meters	0.25	CFS-A03025-025B	15 meters	0.50	CFS-A01553-050B
30 meters	0.50	CFS-A03025-050B	15 meters	1.00	CFS-A01553-100B
30 meters	1.00	CFS-A03025-100B	15 meters	1.50	CFS-A01553-150B
30 meters	1.50	CFS-A03025-150B	15 meters	3.00	CFS-A01553-300B
60 meters	0.10	CFS-A06025-010B	15 meters	5.00	CFS-A01553-500B
60 meters	0.25	CFS-A06025-025B	30 meters	0.15	CFS-A03053-015B
60 meters	0.50	CFS-A06025-050B	30 meters	0.50	CFS-A03053-050B
60 meters	1.00	CFS-A06025-100B	30 meters	1.00	CFS-A03053-100B
60 meters	1.50	CFS-A06025-150B	30 meters	1.50	CFS-A03053-150B
0.32 mm ID	df	Prod No	30 meters	3.00	CFS-A03053-300B
15 meters	0.10	CFS-A01532-010B	30 meters	5.00	CFS-A03053-500B
15 meters	0.25	CFS-A01532-025B	60 meters	1.00	CFS-A06053-100B
15 meters	0.32	CFS-A01532-032B	60 meters	1.50	CFS-A06053-150B
15 meters	0.50	CFS-A01532-050B	60 meters	3.00	CFS-A06053-300B
15 meters	1.00	CFS-A01532-100B	60 meters	5.00	CFS-A06053-500B

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

VB-35

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

0.25 mm ID	df	Prod No
15 meters	0.25	CFS-C01525-025B
15 meters	0.50	CFS-C01525-050B
30 meters	0.25	CFS-C03025-025B
30 meters	0.50	CFS-C03025-050B
60 meters	0.25	CFS-C06025-025B
60 meters	0.50	CFS-C06025-050B
0.32 mm ID	df	Prod No
15 meters	0.25	CFS-C01532-025B
15 meters	0.50	CFS-C01532-050B
30 meters	0.25	CFS-C03032-025B
30 meters	0.50	CFS-C03032-050B

0.32 mm ID, cont'd		Prod No
60 meters	0.25	CFS-C06032-025B
60 meters	0.50	CFS-C06032-050B
0.53 mm ID	df	Prod No
15 meters	0.50	CFS-C01553-050B
15 meters	1.00	CFS-C01553-100B
30 meters	0.50	CFS-C03053-050B
30 meters	1.00	CFS-C03053-100B

60 meters

60 meters

(35%Phenyl)-methylpolysiloxane

CFS-C03053-100B 1.00 CFS-C06053-050B 0.50 1.00 CFS-C06053-100B

PRIMARY APPLICATIONS

Drugs **Pesticides** Herbicides PAHs Pharmaceuticals PCBs EPA Method 8081A (organochlorine pesticides)

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REPLACES

DB-5, DB-5ms,

HP-5, HP-5MS,

SPB-5, MDN-5,

Ultra-5, Rtx-5, Rtx-

5MS, Rtx-5sil MS,

BP-5, CP-Sil 8 CB,

GB-5,007-5,OV-5,

SE-54, AT-5, and

ZB-5

GC CAPILLARY COLUMNS

VB-5

(5% Phenyl)-methylpolysiloxane

PRIMARY APPLICATIONS

Drugs Herbicides Hydrocarbons **PCBs Pesticides** Phenols Semi-volatiles Sulfur compounds

0.10 mm ID	df	Prod No	0.32 mm ID, co	ont'd	Prod No
10 meters	0.10	CFS-B01010-010B	30 meters	0.10	CFS-B03032-010B
10 meters	0.20	CFS-B01010-020B	30 meters	0.25	CFS-B03032-025B
20 meters	0.10	CFS-B02010-010B	30 meters	0.50	CFS-B03032-050B
20 meters	0.20	CFS-B02010-020B	30 meters	1.00	CFS-B03032-100B
0.18 mm ID	df	Prod No	30 meters	2.00	CFS-B03032-200B
10 meters	0.18	CFS-B01018-018B	30 meters	3.00 5.00	CFS-B03032-300B CFS-B03032-500B
10 meters	0.40	CFS-B01018-040B			
20 meters	0.18	CFS-B02018-018B	60 meters	0.10	CFS-B06032-010B
20 meters	0.40	CFS-B02018-040B	60 meters 60 meters	0.25 0.50	CFS-B06032-025B CFS-B06032-050B
30 meters	0.18	CFS-B03018-018B	60 meters	1.00	CFS-B06032-030B
30 meters	0.16	CFS-B03018-040B	60 meters	2.00	CFS-B06032-200B
			60 meters	3.00	CFS-B06032-300B
40 meters	0.18	CFS-B04018-018B	60 meters	5.00	CFS-B06032-500B
40 meters	0.40	CFS-B04018-040B	0.53 mm ID	df	Prod No
0.25 mm ID	df	Prod No	15 meters	0.50	CFS-B01553-050B
15 meters	0.10	CFS-B01525-010B	15 meters	1.00	CFS-B01553-100B
15 meters	0.25	CFS-B01525-025B	15 meters	1.50	CFS-B01553-150B
15 meters	0.50	CFS-B01525-050B	15 meters	2.00	CFS-B01553-200B
15 meters	1.00	CFS-B01525-100B	15 meters	2.65	CFS-B01553-265B
30 meters	0.10	CFS-B03025-010B	15 meters	3.00	CFS-B01553-300B
30 meters	0.25	CFS-B03025-025B	15 meters	5.00	CFS-B01553-500B
30 meters	0.50	CFS-B03025-050B	30 meters	0.50	CFS-B03053-050B
30 meters	1.00	CFS-B03025-100B	30 meters	1.00	CFS-B03053-100B
60 meters	0.10	CFS-B06025-010B	30 meters	1.50	CFS-B03053-150B
60 meters	0.25	CFS-B06025-025B	30 meters	2.65	CFS-B03053-265B
60 meters	0.50	CFS-B06025-050B	30 meters	3.00	CFS-B03053-300B
60 meters	1.00	CFS-B06025-100B	30 meters	5.00	CFS-B03053-500B
0.32 mm ID	df	Prod No	60 meters	1.00	CFS-B06053-100B
15 meters	0.10	CFS-B01532-010B	60 meters	1.50	CFS-B06053-150B
15 meters	0.25	CFS-B01532-025B	60 meters	2.00	CFS-B06053-200B
15 meters	0.50	CFS-B01532-050B	60 meters	2.65	CFS-B06053-265B
15 meters	1.00	CFS-B01532-100B	60 meters	3.00	CFS-B06053-300B
15 meters	2.00	CFS-B01532-200B	60 meters	5.00	CFS-B06053-500B
15 meters	3.00	CFS-B01532-300B			
15 meters	5.00	CFS-B01532-500B			

VB-50/608

(50%Phenyl)-methylpolysiloxane

PRIMARY APPLICATIONS

Drugs Pharmaceuticals Herbicides Steroids **PAHs** Tocopherols **PCBs EPA Methods Pesticides** 508,608 and 8080

0.25 mm ID	df	Prod No	0.32 mm ID,	ont'd	Prod No
15 meters	0.25	CFS-D01525-025B	60 meters	0.25	CFS-D06032-025B
15 meters	0.50	CFS-D01525-050B	60 meters	0.50	CFS-D06032-050B
30 meters	0.15	CFS-D03025-015B	60 meters	1.00	CFS-D06032-100B
30 meters	0.25	CFS-D03025-025B	0.53 mm ID	df	Prod No
30 meters	0.50	CFS-D03025-050B	15 meters	0.50	CFS-D01553-050B
60 meters	0.25	CFS-D06025-025B	15 meters	0.83	CFS-D01553-083B
60 meters	0.50	CFS-D06025-050B	15 meters	1.00	CFS-D01553-100B
0.32 mm ID	df	Prod No	30 meters	0.50	CFS-D03053-050B
15 meters	0.25	CFS-D01532-025B	30 meters	0.83	CFS-D03053-083B
15 meters	0.50	CFS-D01532-050B	30 meters	1.00	CFS-D03053-100B
15 meters	1.00	CFS-D01532-100B	60 meters	0.50	CFS-D06053-050B
30 meters	0.25	CFS-D03032-025B	60 meters	0.83	CFS-D06053-083B
30 meters	0.50	CFS-D03032-050B	60 meters	1.00	CFS-D06053-100B
30 meters	1.00	CFS-D03032-100B			

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



ValcoBond® columns

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VB-Wax REPLACES

SUPEROX II,

007-CW, OV-WAX,

AT-WAX, and

ZB-WAX

0.10 mm ID df Prod No DB-WAX, DB-10 meters 0.10 CFS-G01010-010A WAXetr, HP-WAX, 20 meters 0.10 CFS-G02010-010A HP-InnoWAX, HP-20M, CB-WAX, 0.18 mm ID df Stabilwax, RtxWAX, 10 meters CFS-G01018-018A 0.18 20 meters 0.18 CFS-G02018-018A SUPELCOWAX-10, 0.25 mm ID df Prod No BP-20, CP-WAX 52 CB, GB-WAX, 15 meters 0.25 CFS-G01525-025A

0.25

0.25

CFS-G03025-025A

CFS-G06025-025A

30 meters

60 meters

100% bonded polyethylene glycol

0.32 mm ID	df	Prod No
15 meters	0.25	CFS-G01532-025A
15 meters	0.50	CFS-G01532-050A
15 meters	1.00	CFS-G01532-100A
30 meters	0.25	CFS-G03032-025A
30 meters	0.50	CFS-G03032-050A
30 meters	1.00	CFS-G03032-100A
60 meters	0.25	CFS-G06032-025A
60 meters	0.50	CFS-G06032-050A
0.53 mm ID	df	Prod No
15 meters	0.50	CFS-G01553-050A
15 meters	1.00	CFS-G01553-100A
30 meters	0.50	CFS-G03053-050A
30 meters	1.00	CFS-G03053-100A
60 meters	1.00	CFS-G06053-100A

PRIMARY APPLICATIONS

Alcohols Aldehydes **Aromatics Flavors** Fragrances Organic Acids Solvents

VB-624/1301

REPLACES DB-624, HP-624, HP-VOC, Rtx-624, Rtx-Volatiles, BP-624, Vocol, 007-624, 007-502, NON-PAKD, 624, ZB-624

0.18 mm ID	df	Prod No
10 meters	1.00	CFS-E01018-100A
20 meters	1.00	CFS-E02018-100A
30 meters	1.00	CFS-E03018-100A
40 meters	1.00	CFS-E04018-100A
0.20 mm ID	df	Prod No
25 meters	1.12	CFS-E02520-112A
0.25 mm ID	df	Prod No
15 meters	1.40	CFS-E01525-140A
30 meters	1.40	CFS-E03025-140A
60 meters	1.40	CFS-E06025-140A

df	Prod No
1.80	CFS-E01532-180A
1.80	CFS-E03032-180A
1.80	CFS-E06032-180A
df	Prod No
3.00	CFS-E01553-300A
3.00	CFS-E03053-300A
3.00	CFS-E06053-300A
3.00	CFS-E07553-300A
	1.80 1.80 1.80 df 3.00 3.00

(6% Cyanopropyl-phenyl)-methylpolysiloxane

PRIMARY APPLICATIONS

EPA Methods 501.3 502.2 503.1 524.2 601 602 8010 8015 8020 8240

VB-1701

REPLACES DB-1701,007-1701, HP-1701, CP-Sil 19 CB, Rtx-1701, SPB-1701, BP-10, ZB-1701

0.25 mm ID	at	Prod No
15 meters	0.25	CFS-F01525-025A
15 meters	0.50	CFS-F01525-050A
30 meters	0.25	CFS-F03025-025A
30 meters	0.50	CFS-F03025-050A
60 meters	0.25	CFS-F06025-025A
60 meters	0.50	CFS-F06025-050A
0.32 mm ID	df	Prod No
0.32 mm ID	df	Prod No
15 meters	0.25	CFS-F01532-025A
15 meters	0.50	CFS-F01532-050A
15 meters	1.00	CFS-F01532-100A

0.25 mm ID df

(14% Cyanopropyl-phenyl)-methylpolysiloxane

0.32 mm ID, c	ont'd	Prod No
60 meters	0.25	CFS-F06032-025A
60 meters	0.50	CFS-F06032-050A
60 meters	1.00	CFS-F06032-100A
0.53 mm ID	df	Prod No
15 meters	0.50	CFS-F01553-050A
15 meters	1.00	CFS-F01553-100A
30 meters	0.50	CFS-F03053-050A
30 meters	1.00	CFS-F03053-100A
60 meters	0.50	CFS-F06053-050A
60 meters	1.00	CFS-F06053-100A

PRIMARY APPLICATIONS

Drugs PAHs **PCBs Pesticides Phenols** Solvents Tranquilizers

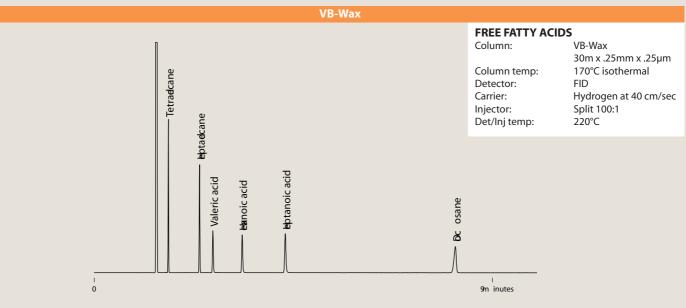
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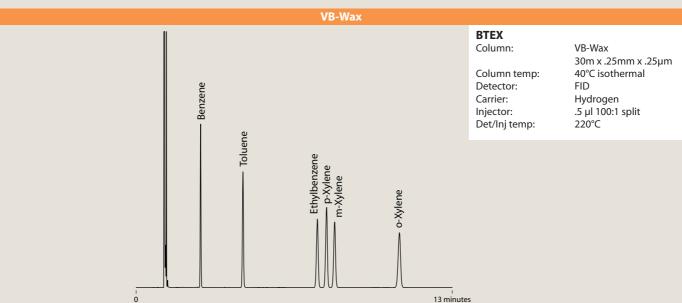
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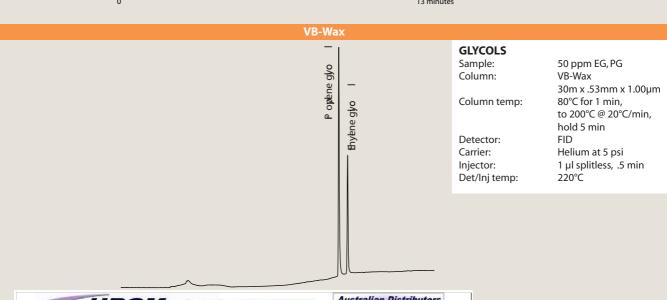
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GC CAPILLARY COLUMNS







ValcoPLOT® columns

GC CAPILLARY COLUMNS

Molesieve 5Å Molesieve 5Å

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/O₂ without the need for cryogenic equipment. The thin film columns offer fast elution of carbon monoxide with near perfect peak symmetry.

Fused silica

Stainless steel

0.53 mm ID	df	Prod No	0.53 mm ID	df (µm)	Prod No
15 meters	20	CFS-X1553-200	15 meters	20	CSS-X1553-200
15 meters	50	CFS-X1553-500	30 meters	20	CSS-X3053-200
30 meters	20	CFS-X3053-200	30 meters	50	CSS-X3053-500
30 meters	50	CFS-X3053-500			

PRIMARY APPLICATIONS

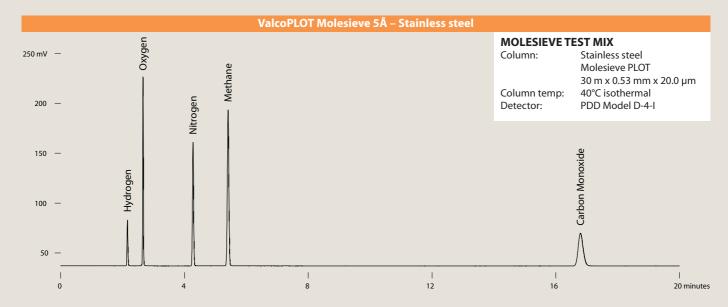
Gases

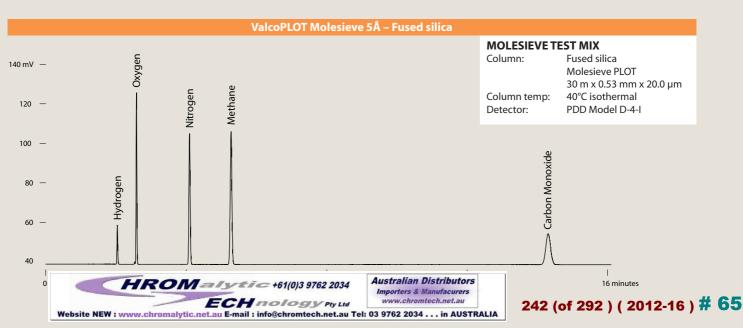
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For prices or more information about your specific application, contact VICI Metronics:

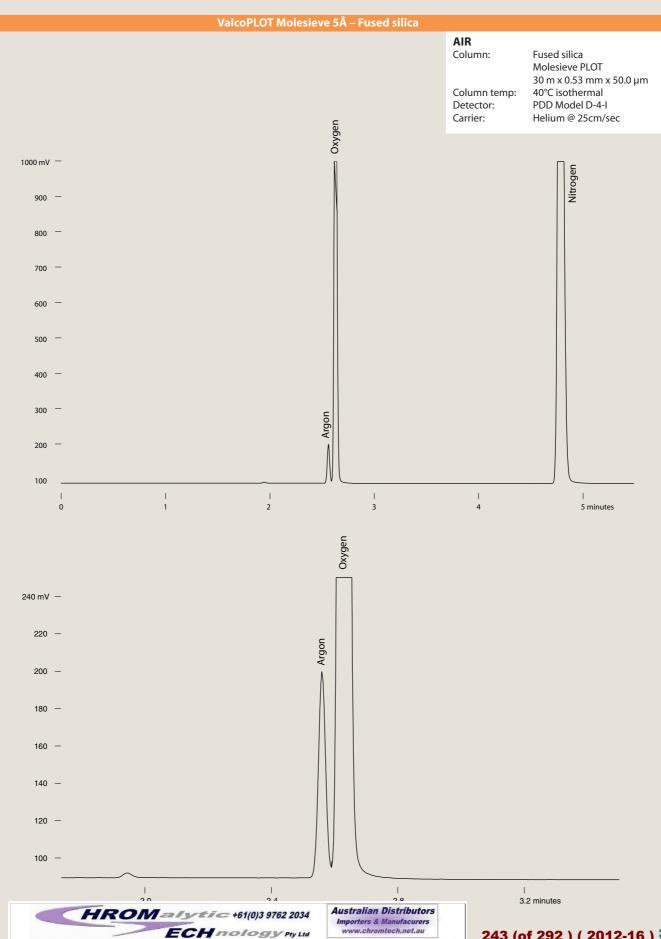
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Alumina Aluminum oxide

REPLACES

GS-Alumina HP-PLOT Al203 CP-AI203/KCI CP-Al203/Na2SO4 Rt-alumina-PLOT Al203/KCI Al203/Na2SO4

With ValcoPLOT Al₂O₃ PLOT columns there's no need for cryogenic equipment to analyze C1 - C5 hydrocarbons in a main stream of C1 - C5 hydrocarbons. ValcoPLOT Al₂O₃ columns are deactivated with small salt crystals stable to 200°C. KCI deactivation produces a relatively apolar column while Na₂SO₄ produces columns exhibiting increased retention of unsaturated hydrocarbons.

PRIMARY APPLICATIONS

C1 - C5 hydrocarbons

VP-Alumina/KCI

VP-Alumina/Na2SO4

Fused silica			Fused silic	Fused silica			
0.53 mm ID	df	Prod No	0.53 mm ID	df	Prod No		
15 meters	10	CFS-Y1553-100	15 meters	10	CFS-Z1553-100		
30 meters	10	CFS-Y3053-100	30 meters	10	CFS-Z3053-100		
50 meters	10	CFS-Y5053-100	50 meters	10	CFS-Z5053-100		

ValcoPLOT A

High purity Divinylbenzene/ethyleneglycoldimethacrylate

Fused silica

0.32 mm ID	df (μm) Prod No	0.53 mm ID	df	Prod No
15 meters	10	CFS-PA1532-100	15 meters	20	CFS-PA1553-200
30 meters	10	CFS-PA3032-100	30 meters	30	CFS-PA3053-200

PRIMARY APPLICATIONS

Solvents Light gases Light hydrocarbons Residual solvents

ValcoPLOT D

High purity Divinylbenzene

Fused silica

0.32 mm ID	df	Prod No	0.53 mm ID	df	Prod No
15 meters	10	CFS-PD1532-100	15 meters	20	CFS-PD1553-200
30 meters	10	CFS-PD3032-100	30 meters	20	CFS-PD3053-200

PRIMARY APPLICATIONS

Solvents Hydrocarbons Alcohols Sulfur compounds Residual solvents Halogenated hydrocarbons

ValcoPLOT Q

Divinylbenzene

Fused silica

0.32 mm ID	df	Prod No	0.53 mm ID	df	Prod No
15 meters	10	CFS-PQ1532-100	15 meters	20	CFS-PQ1553-200
30 meters	10	CFS-PQ3032-100	30 meters	20	CFS-PQ3053-200

PRIMARY APPLICATIONS

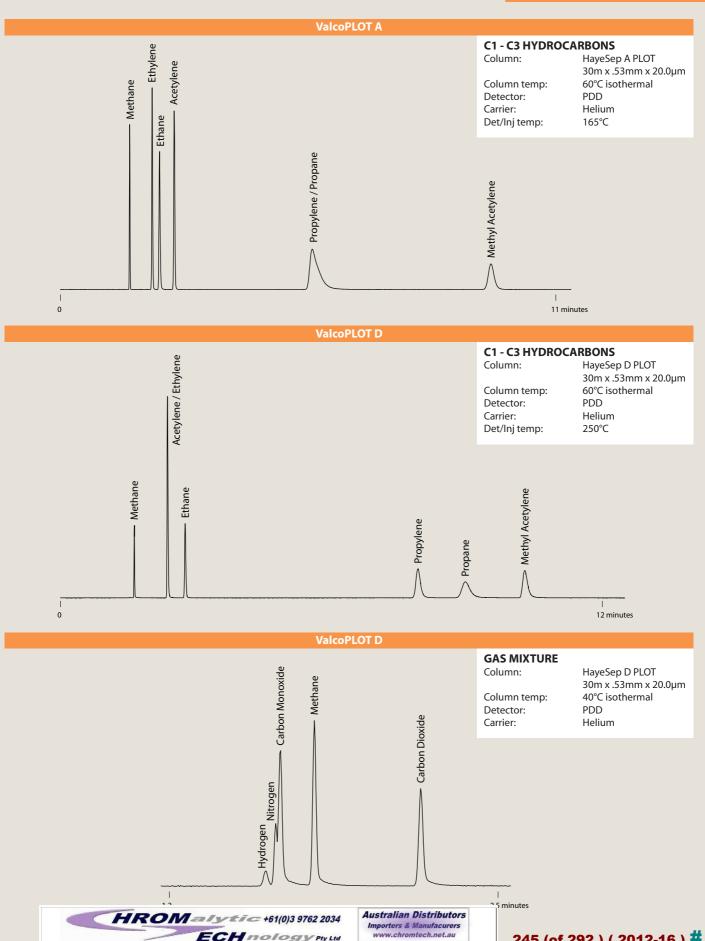
Note: We highly recommend ValcoPLOT D, which has similar retention characteristics but is made from higher purity raw materials.

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ValcoPLOT® columns

GC CAPILLARY COLUMNS

Va	lco	PL	.OT	B

Divinylbenzene/polyethyleneimine

			•	•
ΙЭΠ	SA	a	CIL	ica

0.32 mm ID	df	Prod No	0.53 mm ID	df	Prod No
15 meters	10	CFS-PB1532-100	15 meters	20	CFS-PB1553-200
30 meters	10	CFS-PB3032-100	30 meters	20	CFS-PB3053-200

ValcoPLOT C

Divinylbenzene/acrylonitrile

Fused silica

0.32 mm ID	df	Prod No	0.53 mm ID	df	Prod No
15 meters	10	CFS-PC1532-100	15 meters	20	CFS-PC1553-200
30 meters	10	CFS-PC3032-100	30 meters	20	CFS-PC3053-200

ValcoPLOT N

Divinylbenzene/ethyleneglycoldimethacrylate

Fused silica

0.32 mm ID	df	Prod No	0.53 mm ID	df	Prod No
15 meters	10	CFS-PN1532-100	15 meters	20	CFS-PN1553-200
30 meters	10	CFS-PN3032-100	30 meters	20	CFS-PN3053-200

ValcoPLOT P

Divinylbenzene/styrene

Fused silica

0.32 mm ID	df	Prod No	0.53 mm ID	df	Prod No
15 meters	10	CFS-PP1532-100	15 meters	20	CFS-PP1553-200
30 maters	10	CES-PP3032-100	30 maters	20	CES_PP3053_200

ValcoPLOT R

Divinylbenzene/N-vinyl-2-pyrollidinone

Fused silica

0.32 mm ID	df	Prod No	0.53 mm ID	df	Prod No
15 meters	10	CFS-PR1532-100	15 meters	20	CFS-PR1553-200
30 meters	10	CFS-PR3032-100	30 meters	20	CFS-PR3053-200

ValcoPLOT S

Divinylbenzene/4-vinyl-pyridine

Fused silica

0.32 mm ID	df	Prod No	0.53 mm ID	df	Prod No
15 meters	10	CFS-PS1532-100	15 meters	20	CFS-PS1553-200
30 meters	10	CFS-PS3032-100	30 meters	20	CFS-PS3053-200

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GC CAPILLARY COLUMNS





- Reduce breakdown of Endrin and DDT
- Increase the interval between liner changes

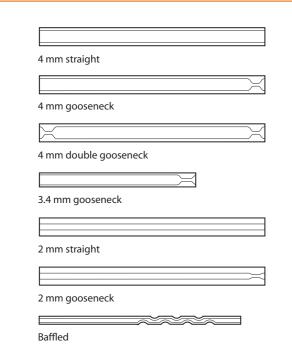
DDT and Endrin are easily degraded in the injection port; with non-deactivated liners and those filled with non-deactivated glass wool, Endrin breakdown can be as high as 98%. EPA method 8081A states, "If degradation of either DDT or Endrin exceeds 15%, take corrective action before proceeding with calibration."

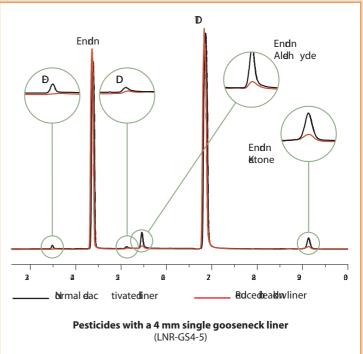
VICI reduced breakdown liners are produced by applying a highly-crosslinked siloxane over a conventionally deactivated liner. The resulting liner contributes less to breakdown than any other component of the injection system.

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





Gas purification

GAS-SPECIFIC PURIFIERS AND CONTAMINANT TRAPS

from VICI Metronics

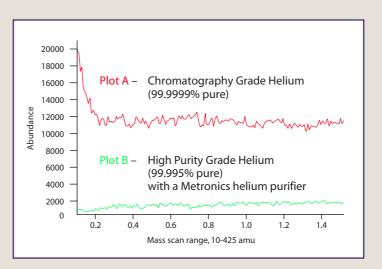
Gas Specific Purifiers and Contaminant Traps

- Original equipment in Agilent® Mass Spec and LC Mass Spec
- 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 optimum 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 entry into 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.

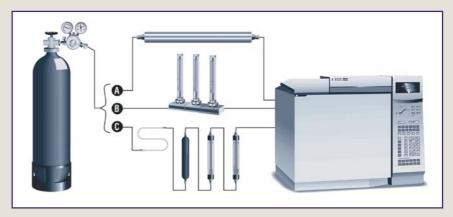
VICI Metronics gas purifiers dramatically reduce contaminant levels and absorb a greater variety of contaminants than other gas purification products. Advanced materials and design features quarantee that the modules will produce gases that are at least a factor of ten higher than a 99.9999% "chromatography 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.





GAS PURIFICATION

Every connection in your gas delivery system has the potential for leaks; the more fittings you have, the greater the potential. Using a VICI Metronics purifier or trap (A) minimizes the number of fittings as compared to a typical manifold system (B) or contaminant trap configuration with multiple components (C).



SPECS

22.5" long x 1.5" diameter (purifiers noted with * in the charts are are 12" long) Max inlet pressure 1000 psi (6895 kPa) Recommended flow 500 mL/min

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

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



*12" long

TO ORDER

For prices or more information about our gas purifiers, contact VICI Metronics:

Toll-free 877–737–1887 Tel360–697–9199 Fax.....360–697–6682

vicimetronics.com



PPB at outlet (based on 50 ppm nominal inlet concentration level)

FFB at Outlet (based on 30 ppm norminal linet concentration level)						
Description	СО	CO ₂	02	H ₂ O	Sulfur compounds	Non-methane hydrocarbons
Helium purifier Hydrogen purifier Air purifier Methane purifier	<1 <1 <1	<1 <1 <1	<1 <1 <1	<1 <1 <1 <1	<1 <1 <1	<3 <3 <3 <3
Nitrogen purifier Nitrogen purifier for LC/MS apps Purifier for nitrogen generators	<1	<1	<1	<1 <25 <25	<1 <25 <25	<3 <25 <25
Moisture trap Hydrocarbon trap Oxygen trap Sulfur trap			<1	<1 <1 <1	<1	<3

Analytical syringes PLUS MININERT VALVES AND MICRO VALVES

from VICI Precision Sampling

Micro Valves for GC and LC

- 200 psi, .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.



Micro valves for GC and LC

1/4-28

"T" flow path 3 ports 4 ports	Prod No PS-660100 PS-660110	3 PORT	4 PORT	SPECS 200 psi gas ¹ 500 psi liquid ² .060" bore 1/4-28 fitting detail All polymer-based materials
180° flow path 2 ports 4 ports	PS-660200 PS-660210	2 PORT	4 PORT	
90° flow path 2 ports 3 ports 4 ports	PS-660300 PS-660310 PS-660320	2 PORT	3 PORT	4 PORT

- ¹ Tested with Helium using 1/16" OD x 0.84 mm ID PTFE tubing with PEEK collapsible ferrules
- ² Tested with Isopropanol using 1/8" OD x 0.75 mm ID PTFE tubing with CTFE collapsible ferrules

MORE INFORMATION

1/4-28 fittings p. 68-9

TO ORDER

Toll-free 800-828-1653 Tel225-927-1128 Fax.....225-923-1331

FOR OUR COMPLETE **LINE OF PRODUCTS**

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ANALYTICAL 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

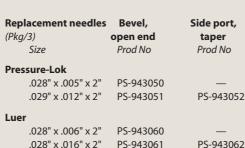
The A-2 features a push-button valve for 250 psi sample storage in syringes as small as 25 µl. Small liquid samples with low-boiling components are not lost through evaporation, as often occurs with ordinary syringes.

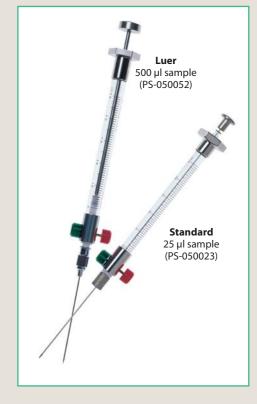
The positive rear stop (in 250 µl and larger sizes) prevents plunger blowout at elevated pressures. The Series A-2 syringe has all the standard Pressure-Lok features such as a PTFE plunger tip, PTFE-sealed needle, and ultrasmooth bore. Replacement components are available for easy repairs.

	Standard	Luer
Sample size	Prod No	Prod No
25 μl	PS-050023	PS-050043
50 μl	PS-050024	PS-050044
100 μl	PS-050025	PS-050045
250 μl	PS-050031	PS-050051
500 μl	PS-050032	PS-050052
1 ml	PS-050033	PS-050053
2 ml	PS-050034	PS-050054
5 ml	PS-050035	PS-050055
10 ml	PS-050036	PS-050056

Replacement needles	Bevel,	Side port,
(Pkg/3)	open end	taper
Size	Prod No	Prod No
Pressure-Lok .028" x .005" x 2"	PS-943050	_
.029" x .012" x 2"	PS-943051	PS-943052
.028" x .006" x 2"	PS-943060	—
.028" x .016" x 2"	PS-943061	PS-943062

SPECS 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







cylinders such as syringes.

Not for medical use.

SAFETY NOTE To prevent possible injury, proper safety precautions should always be observed when pressurizing glass

Gas and liquid syringes

ANALYTICAL SYRINGES

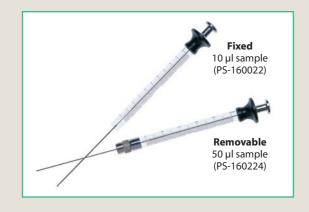
Series C-160 for GC

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..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.

	Fixed needle	Removable needle
Sample		
size	Prod No	Prod No
5 μΙ	PS-160021	PS-160221
10 μl	PS-160022	PS-160222
25 µl	PS-160023	PS-160223
50 µl	PS-160024	PS-160224
100 μΙ	PS-160025	PS-160225
Replacement needles	Bevel,	
(Pkg/3)	open end	
Size	Prod No	
019" x .005" x 2.25"	PS-123050	

SPECS 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



Syringes for Valco, Cheminert, and Rheodyne HPLC injectors

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.

		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
eplacemer	nt needles		
kg/3)		Prod No	

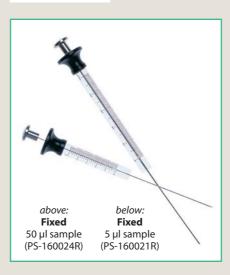
PS-123050R

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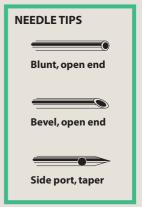
SPECS

Removable needles Blunt tip, open end Needle size: 22 gauge x 2" 250 psi max



MORE INFORMATION

Fill ports..... page 40 Luer adapters41



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ANALYTICAL SYRINGES

Mininert™ push-button valves are highly dependable, leak-tight closures for screw-cap vials and other laboratory containers. When used with a glass vial, only PTFE and glass are in contact with the contents. Their unique features make Mininert valves the ideal closure for calibration standards, air- or

moisture-sensitive fluids, derivatizing reagents, or volatile chemicals.

Operation is extremely simple – push the green button to open the valve, insert the needle through the septum and take a sample, withdraw the needle, and push the red button to close the valve.



Valves for vials

In-line valves

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.

Pkg/12:	Cap / thread size	Prod No
	13 mm-425	PS-614158
	15 mm-425	PS-614160
	18 mm-400	PS-614161
	20 mm-400	PS-614170
	24 mm-400	PS-614163
	Crimp top	PS-614250

SPECS

TEMPERATURES

Mininert valves can be used at temperature up to 40°C. 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 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

	1/4-28 male to male 1/4-28 female to female	PS-631205 PS-631206
Terminatio	n valves	
	1/4-28 male 1/4-28 female 1/8" NPT male 1/8" NPT female	PS-631201 PS-631203 PS-631202 PS-631204



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



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



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

- 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.
- 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.



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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.

SPECIFIC TERMS AND CONDITIONS OF SALE

Download specific terms and conditions of sales of VICI AG, Switzerland, from www.vici.ch.



Properties of materials ■ Metals

GENERAL REFERENCE

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.

Nickel 200

Excellent resistance to caustics, high temperature halogens and hydrogen halides, and salts other than oxidizing halides. Good resistance to caustic soda and other alkalis except ammonium hydroxide.

The industry standard nickel alloy tubing, containing trace amounts of copper, carbon, silicon, and other elements which impart certain mechanical characteristics. Like our 316 stainless, this tubing is cold drawn to close ID and OD specifications, and is suitable for many applications where a relatively inert and low cost nickel is required. While more inert than 316 SS in most applications, it is still absorptive and has a relatively rough interior. Use electroformed nickel tubing for applications requiring a high level of inertness or finish.

Nitronic 50

Good resistance to chlorides, sulfuric acid, and sea water. Resistant to sulfur gases such as hydrogen sulfide and sulfur dioxide.

Nitronic 60

Chemical resistance is similar to Type 316 stainless, but its resistance to galling and oxidation make it superior to Type 316 or 303 in the majority of applications. This is the standard material in Valco and Cheminert metal valve lines.

Titanium

Although it is more difficult to machine than common alloys containing aluminum and vanadium, Valco uses Grade 2 pure titanium in order to avoid possible contamination of the sample stream with these metals.

Good for organic and inorganic salts except aluminum and calcium chlorides, and all alkalis except boiling concentrated potassium hydroxide. Good with dilute, low temperature formic, lactic, sulfuric, hydrochloric, and phosphoric acids, but rapidly attacked by hydrofluoric acid. Good with dilute nitric acid at low temperatures; corrodes at high concentrations and temperatures. Can ignite with fuming nitric acid. Attacked by oxalic acid, concentrated phosphoric acid, hot trichloroacetic acid, and zinc chloride.

Due to the nature of this metal, valves made of titanium typically have a shorter lifetime than HPLC grade stainless steel or Hastelloy C-22.

Zirconium

Excellent resistance to hydrochloric acid, good with hot sulfuric acid at concentrations up to 70% and boiling nitric acid at up to 90%. Attacked by hydrofluoric acid.

Brass

Used where a soft metal ferrule is desirable but no corrosive materials are present. Although Valco brass ferrules work as replacements in inexpensive commercial brass fittings, they are generally not recommended for chromatography applications.

MATERIAL AVAILABILITY BY PRODUCT LINE

Note: This list represents materials available in at least some of the products in the lines listed. Not all products in a line are available in all the materials mentioned.

Fittings

Cheminert

CTFE
PEEK
PFA
Polypropylene
Stainless steel, Type 316

Valco

300 series stainless steel PFFK

Ferrules Diaphrag

Valco CTFE

FEP Hastelloy C Nickel PFA Polyimide, graphite Polyimide, Valcon Polyimide, virgin PTFE, virgin PTFE, glass-filled Stainless, Type 303 Stainless, Type 316 Stainless, gold-plated

Titanium Brass

Cheminert

PEEK

Tubing

Titanium

Electroformed nickel (EFNI) ETFE FEP Hastelloy C Nickel 200 PEEK PTFE Stainless steel, Type 316

Valve rotors

Cheminert Valcon E Valcon E2

Valcon E3 Valcon H Valcon M Valcon P Valcon T Valcon TF

Diaphragm

A specialized polyimide

Valco

Valcon E Valcon E2 Valcon H Valcon M Valcon P Valcon R Valcon T Valcon TF

Valve

stators/bodies

Cheminert

CTFE
Hastelloy C
Nitronic 60 stainless
PAEK
PPS
PVDF
Stainless steel, Type 316

Diaphragm

Titanium

Hastelloy C Nitronic 60 Stainless steel, Type 316

Valco

Hastelloy C Inconel 600 Monel 400 Nickel 200 Nitronic 50 Nitronic 60 Stainless steel, Type 316 Titanium

Properties of materials ■ Polymers

GENERAL REFERENCE

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*.

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 highstrength 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. Literature provided at the time of purchase contains 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.



Glossary

GENERAL REFERENCE

Α

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.

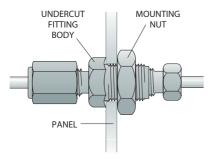
В

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.



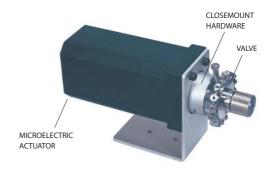
Butt connection: a type of connection in which the two tube ends are directly and squarely in contact, usually effected with a through-type union. Typically used with fused silica connections, or small bore metal tubing.

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

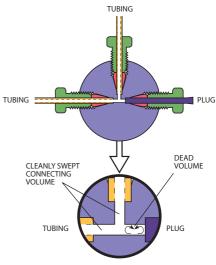
Dead volume:

(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.

Ε

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.

Н

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.

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.

L



LC: Liquid Chromatography. Any of a variety of low to medium pressure techniques which use a liquid mobile phase as the carrier to move sample. Similar to HPLC.

Large bore: a bore that is larger than the standard for a given fitting; a fitting ordered with a large bore will have a larger flow orifice than the standard or capillary bore fitting of the same design. Denoted by suffix "L" in the product number.

Luer adapter: an adapter that connects a tapered luer fitting (square nib) of a syringe to a tube or tube fitting.

M

Make up: the point at which a ferrule, nut, and tube are assembled in the fashion which will effect a leak-free seal. In most compression fittings, that is accomplished by compressing the tube with the small end of the ferrule. With Valco metal ferrules, the ferrule usually makes up on the tube by cutting a shallow ring in it.

Manifold: a type of distribution fitting in which a single source is directed to multiple outlets, or vice versa. *CAUTION!* Using a common distribution fitting in reverse to merge multiple streams may create dead volume. Special manifolds are available for this application.

Microbore column: a liquid chromatography column of narrow bore (typically 2 mm or less) for improved resolution.

N

Nanovolume®: a trademark registered to Valco Instruments Co. Inc, applied to our nanobore components with bore sizes less than 250 µm (0.010").

NPT: National Pipe Thread; a standardized tapered pipe fitting. See **pipe thread**.

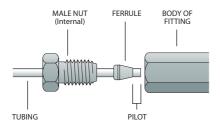
Nut: the tensioning component of a compression fitting. As the threaded nut is tightened into the fitting detail, it pushes the ferrule forward into the tapered ferrule seat, causing it to make up on the tube.

0

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.

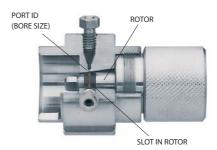
Port: the connection, orifice, seal, or septum, etc., through which sample may be added (injected) or withdrawn.

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.

Т

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

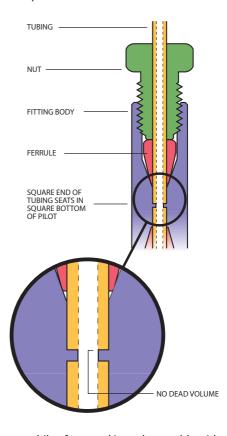
Wetted surfaces: the surfaces which are contacted by the sample stream.

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.

	psi	KPa	BAR	Atm	psi	KPa	BAR	Atm
	1 10 20	6.8948 68.948 137.896	0.06895 0.6895 1.379	0.06805 0.6805 1.361	800 825 850	5515.84 5688.21 5860.58	55.16 56.8837 58.6075	
	30 40 50	206.844 275.792 344.74	2.0685 2.758 3.4475	2.0415 2.722 3.4025	875 900 925	6032.95 6205.32 6377.69	62.055	5 59.54375 61.245 5 62.94625
	60 70 80	413.688 482.636 551.584	4.137 4.8265 5.516	4.083 4.7635 5.444	950 975 1000	6550.06 6722.43 6894.8	65.5025 67.2262 68.95	
LENGTH CONVERSIONS mm inches	90 100 125	620.532 689.48 861.85	6.2055 6.895 8.61875	6.1245 6.805 8.50625	1100 1200	7584.28 8273.76	75.845 82.74	74.855 81.66
0.12 .005" 0.15 .006"	175	1034.22 1206.59 1378.96	10.3425 12.06625 13.79	10.2075 11.90875 13.61	1300 1400 1500 1600	8963.24 9652.72 10342.2 11031.68	89.635 96.53 103.425 110.32	88.465 95.27 102.075 108.88
0.25 .010" 0.40 .016" 0.50 .020"	250 275	1551.33 1723.7 1896.07	15.51375 17.2375 18.96125	17.0125 18.71375	1700 1800 1900	11721.16 12410.64 13100.12	117.215 124.11 131.005	115.685 122.49 129.295
0.75 .030" 1.0 .040" 1.5 .060"	325 350		20.685 22.40875 24.1325	23.8175	2000 2500 3000	13789.6 17237 20684.4	137.9 172.375 206.85	136.1 170.125 204.15
2.0 .080" 4.6 .180"	400 425	2585.55 2757.92 2930.29	25.85625 27.58 29.30375	27.22	3500 4000 4500	24131.8 27579.2 31026.6	241.325 275.8 310.275	238.175 272.2 306.225
6.0 .236" 6.4 .253" 7.0 .276"	475	3102.66 3275.03 3447.4	31.0275 32.75125 34.475	30.6225 32.32375 34.025	5000 5500 6000	34474 37921.4 41368.8	344.75 379.225 413.7	340.25 374.275 408.3
10.0 .400" inches mm	550	3619.77 3792.14 3964.51	36.19875 37.9225 39.64625	37.4275	6500 7000 7500	44816.2 48263.6 51711	448.175 482.65 517.125	442.325 476.35 510.375
1/32" 0.8 1/16" 1.6 1/8" 3.2	625 650	4136.88 4309.25 4481.62 4653.99	41.37 43.09375 44.8175 46.54125	44.2325	8000 8500 9000	55158.4 58605.8 62053.2	551.6 586.075 620.55	544.4 578.425 612.45
1/4" 6.4 3/8" 9.5 1/2" 12.7 1" 25.4	700 725 750	4826.36 4998.73 5171.1 5343.47	48.265 49.98875 51.7125 53.43625	47.635 49.33625 51.0375	9500 10,000 15,000 20,000 40,000	65500.6 68947.6 103,421.4 137,895.1 275,790.3	1,378.95	646.475 680.46 1,020.69 1,360.9 2,721.84

TEMPE	RATURE	CONV	ERSION	IS									
°C	°F	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F	°C	°F
-40	-40	35	95	110	230	185	365	260	500	335	635	650	1202
-35	-31	40	104	115	239	190	374	265	509	340	644	675	1247
-30	-22	45	113	120	248	195	383	270	518	345	653	700	1292
-25	-13	50	122	125	257	200	392	275	527	350	662	725	1337
-20	-4	55	131	130	266	205	401	280	536	375	707	750	1382
-15	5	60	140	135	275	210	410	285	545	400	752	775	1427
-10	14	65	149	140	284	215	419	290	554	425	797	800	1472
-5	23	70	158	145	293	220	428	295	563	450	842	825	1517
0	32	75	167	150	302	225	437	300	572	475	887	850	1562
5	41	80	176	155	311	230	446	305	581	500	932	875	1607
10	50	85	185	160	320	235	455	310	590	525	977	900	1652
15	59	90	194	165	329	240	464	315	599	550	1022	925	1697
20	68	95	203	170	338	245	473	320	608	575	1067	950	1742
25	77	100	212	175	347	250	482	325	617	600	1112	975	1787
30	86	105	221	180	356	255	491	330	626	625	1157	1000	1832
								1		1			

REGULATIONS



* CE





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 toolspage 70	0
Cheminert starter kits 70	0
Digital valve interface	
DVI199	9
DVI-220199	9
Diluter/dispenser, M series 82	2
Dynacalibrator® Model 120230	0
G-calibrators (all)	3
Heated valve enclosures (all)20	1
Heated column enclosures (all)202	3
Heater assemblies and cartridges (all)202	2
Instrumentation temperature controller	
ITC1039920	3
ITC10399-20020	3

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.	
6,575,501	Tube sealing bushing (collapsible bushing
6,247,731	Nut w/ controlled radius
6,511,528 6,099,619 5,858,068	Purification of CO ₂
6,074,459	Ultra pure gas process
6,193,213	XL valves
6,030,436	Permeation tube
6,202,698	Diaphragm valve
5,153,519 5,317,271 5,394,090 5,394,091 5,394,092 5,541,519 5,532,599 5,528,150 5,594,346 5,767,683 5,858,068 6,133,740 6,842,008 6,933,771 7,091,044 7,507,586 7,601,543	Pulsed discharge detectors
5,329,966	Calibrated flow controllers
4,064,908	Combo valves
7,316,777	No-twist one-piece fitting
7,442,902	Adaptive temperature controller

TRADEMARKS

INADEMANN	•
Cheminert	Valco Instruments Co. Inc. and VICI AG International
C	
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

C62

Decoding product numbers ■ Cheminert valves

GENERAL REFERENCE



Cheminert valve product numbers all begin with the valve model (C1, C22, C25Z, C72MU, etc.) and a hyphen. Following the valve model are four numbers – as shown at right, the position of each number determines the category of the specification; the number indicates the actual spec. The final letters

indicate actuation. Internal sample injectors also include the sample size. (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 Low pressure injectors C72MH 10k psi Nanovolume® injector, 360 µm fittings C22Z Injector with Valco ZDV fittings C72MX 15k psi Nanovolume® injector, 360 µm fittings C22 Injector with 1/4-28 fittings C72MU 20k psi Nanovolume® injector, 360 µm fittings Internal sample injector, Valco ZDV fittings C247 Internal sample injector, 1/4-28 fittings C72NH 10k psi Nanovolume® injector, 1/32" fittings C24 C72NX 15k psi Nanovolume® injector, 1/32" fittings **UHPLC** selectors C72NU 20k psi Nanovolume® injector, 1/32" fittings C75NH 10k psi Nanovolume® selector, 1/32" fittings C74NX 15 psi Nanovolume® internal sample C75NX 15k psi Nanovolume® selector, 1/32" fittings injector, 1/32" fittings C75NU 20k psi Nanovolume® selector, 1/32" fittings C72H 10k psi Microbore injector C75H 10k psi Microbore selector C72X 15k psi Microbore injector C75X 15k psi Microbore selector C72U 20k psi Microbore injector C75U 20k psi Microbore selector C74H 10k psi Internal sample injector **HPLC** selectors C74X 15k psi Internal sample injector C5 5k psi Stream selector **HPLC** injectors Low pressure selectors C2N 5k psi Nanovolume® injector, 1/32" fittings C25Z Stream selector, Valco ZDV fittings C4N 5k psi Nanovolume® internal sample injector, 1/32" fittings C25 Stream selector, 1/4-28 fittings Through-the-handle injector C25G Stream selector, Cheminert fittings C1 5k psi C1CF Continuous flow through-the-C45 Stream selector, 1/2-20 fittings 5k psi handle injector C25k psi Microbore/analytical valve C4 5k psi Internal sample injector Note: All valves have 1/16" Valco ZDV fittings C6 Continuous flow injector unless otherwise noted. 5k psi **OEM** injectors **OEM selectors** C2V 5k psi Vertical port injector C55 5k psi HPLC integrated motor/valve selector C3 5k psi Centered port injector C65Z Low pressure integrated motor/valve selector, Valco ZDV fittings C52 5k psi HPLC integrated motor/valve C65 Low pressure integrated motor/valve selector, C52V 5k psi HPLC integrated motor/valve 1/4-28 fittings with vertical port injector C62Z Low pressure integrated motor/valve, Valco ZDV fittings

(HYPHEN)

2. Required.

Place a hyphen after the Cheminert valve type.

Low pressure integrated motor/valve, 1/4-28 fittings

Examples:

C1 - 1346

C1 through-the-handle injector, 0.25 mm ports, Valcon E rotor, PAEK stator, 6 ports, manual (blank = manual)

C5 - 2006 EMH

C5-2006EMH:

C5 stream selector, 0.40 mm ports, Valcon H rotor, Nitronic 60 stator, 6 positions, microelectric actuator

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

C74NX - 6 6 7 4 -.01 EH

C74NX-6674-.01EH:

C74NX 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, microelectric actuator

SIZE 3. Required. 0 0.15 mm (.006") 1 0.25 mm (.010") 2 50 um (.002")* 0.40 mm (.016") 3 0.75 mm (.030") 4 100 µm (.004")* 1.00 mm (.040") 5 1.25 mm (.050") 150 μm (.006")* 1.50 mm (.060") 7 2.00 mm (.080") 3.18 mm (.125") 4.60 mm (.180") * for nanovolume valves

STATOR ROTOR MATERIAL MATERIAL 4. Required. 5. Required. 0 Valcon H 0 Nitronic 60 Valcon E2 CTFE Valcon T Hastelloy C** Valcon E Titanium ** PAEK Valcon M [not used] Valcon E4 Valcon F3 [not used] Valcon TF (low pressure) Valcon P Coated stainless *** Valcon X PPS Coated stainless ** These stator materials are coated when in a C72 / C74 / C75 series valve *** Stator code "7" indicates coated stainless for C72 / C74 / C75 series valves

PORTS / POSITIONS					
6. Requ	ired.				
Ports (Two po	sition)				
4	4				
6	6				
8	8				
0	10				
Position (Selecto					
4	4				
6	6				
8	8				
0	10				
14	14				
20	20				
24	24				
26	26				
28	28				

INTERNAL SAMPLE SIZE	ACTUATOR
7. Optional. For internal sample inj.	8. Required.
.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.	Air A 0-70°C Microelectric, two position EQ • highest speed EH • high speed EP • medium torque ED • high torque ET • highest torque Microelectric, for selectors EMH • high speed EMT • high torque Universal See chart below. Manual [blank] (no code letter; shipped with knob) Driver only D (for use with existing actuator)

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!

UNIVERSAL ACTUATORS High speed

Without interface **FUH** With RS-232/485 **EUHA** With USB **EUHB** With BCD FLIHC

EUD EUDA EUDB EUDC

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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 nonshaded 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.

Air Α AΤ

0-70°C 50-150°C

Microelectric

EH · high speed ΕP

medium

torque

ED · high torque

FT highest torque

Universal

See chart below.

[blank] (no code letter; wshipped with knob)

Driver only

(for use with existing actuator)

STANDOFF **ASSEMBLY** LENGTH

2. Optional. Specify if required.

2 2" standoff

3" standoff

4" standoff

6" standoff

BORE SIZE

3. Optional.

For standard bore, leave blank.

[blank] Standard bore

Large bore

FITTINGS SIZE

4. Required.

For 1/8" fittings, leave blank.

> 1/32" N C 1/16"

[blank] 1/8"

1/4"

VL

5. Optional.

Requires 4 ports. Also specify sample size (9).

I

UNIVERSAL ACTUATORS

High speed Medium speed/ **High torque** medium torque Without interface **EUH** EUD **EUT** With RS-232/485 **EUHA EUDA EUTA** With USB **EUHB EUDB EUTB** With BCD **EUHC EUDC**

Note: Valco valve product numbers require "-" (hyphen) after the universal actuator code.

Examples:

4 N 8 W T

Manual (blank = manual), 4" standoff, standard bore, 1/32" valve, 8 ports, W type, Valcon T rotor, standard Nitronic 60 body

EH C | 4 W E .1

Microelectric actuator, no standoff assembly, standard bore, 1/16" valve, internal sample, 4 ports, W type, Valcon E rotor, standard N60 body,

A 3 6 UW E HC

A36UWEHC:

Air actuator, 3" standoff, standard bore, 1/8" (blank = 1/8"), 6 ports, UW type, Valcon E rotor, Hastelloy C body material

EUDC-2L6UWE

FUDC-2L6UWF:

Universal actuator with BCD interface, 2" standoff, large bore (.067" instead of .030"), 1/8" (blank = 1/8"), 6 ports, UW type, Valcon E rotor, standard Nitronic 60 body

NUMBER OF PORTS
6. Required .
3
4
6
8
10
12
14

VALVE TYPE
7. Required.
W
UW
MW

M <i>i</i>	ATERIAL
8. Rec	quired.
[blank]	Valcon H
Е	Valcon E
E2	Valcon E2
М	Valcon M
Р	Valcon P
R	Valcon R
T	Valcon T
TF	Valcon TF

ROTOR

	SPECIAL BODY MATERIAL
9. 0	ptional.
Nitro	material is nic 60 SS unless ified otherwise.
S6	Type 316 SS
НС	Hastelloy C
IN	Inconel 600
M4	Monel 400
NI	Nickel 200
N5	Nitronic 50
TI	Titanium

SA	ERNAL MPLE SIZE
	ptional. pecify "I" at i.
.06	0.06 µl
.1	0.1 µl
.2	0.2 µl
.5	0.5 µl
1	1.0 µl
2	2.0 µl
(-) be samp	hyphen efore the ele size in roduct oer.

TECH TIP

The letter "C" after number of ports specifies smaller bore than standard. Example:

DC6CW,

bore size 0.25 mm

This chart is for decoding existing product numbers, not for inventing new ones. Some options can not work with certain valve types and designs!





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!

Δ	c	П	V	Vi	n	Ŀ

1. Required.

Valve is shipped with manual knob unless specified otherwise.

Air

AT

0-70°C AΗ high torque 50-150°C

Microelectric

EMH · high speed high torque **EMT**

Universal

See chart below.

Manual

[blank] (not recommended)

Driver only

(for use with existing actuator)

STANDOFF ASSEMBLY LENGTH

2. Optional. Specify if required.

2 2" standoff

3" standoff

4" standoff

6" standoff

BORE SIZE

3. Optional.

For standard bore, leave blank.

[blank] Standard bore

Large bore

FITTINGS SIZE

4. Required. For 1/8" fittings, leave blank.

1/16" \mathcal{C}

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

5. Required.

SD SC

SF

ST

STF

UNIVERSAL ACTUATORS

High speed Medium speed/ **High torque** medium torque Without interface EUT EUH EUD With RS-232/485 **EUDA EUHA EUTA** With USB **EUHB EUDB EUTB** With BCD **EUHC EUDC EUTC**

Note: Valco valve product numbers require "-" (hyphen) after the universal actuator code.

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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 H (blank = H) 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

MAILMAL		
8. Rec	quired.	
[blank]	Valcon H	
Е	Valcon E	
E2	Valcon E2	
М	Valcon M	
Р	Valcon P	
R	Valcon R	
Т	Valcon T	
TF	Valcon TF	

SPECIAL BODY MATERIAL 9. Optional. Body material is Nitronic 60 SS unless specified otherwise. Type 316 SS S6 HC Hastelloy C Inconel 600 M4 Monel 400 NI Nickel 200 Nitronic 50 N5 Titanium

TECH TIP

The letter "C" after number of ports specifies smaller bore than standard. Example:

DCSD6CMWE, bore size 0.25 mm

This chart is for decoding existing product numbers, not for inventing new ones. Some options can not work with certain valve types and designs!



.2FR.5-5 53,60	2FR4HC-1045,53	4C6WT 110	A2NI4WE.1104
.5FR.5-553,60	2FR4TI-1045,53	4C8UWE109	A2NI4WE.2104
.5FR1-1053	2FR645	4C8UWT111	A2NI4WE.5104
.5FR1HC-10 45,53	2FR6HC45	4C8WE108	A2SC10MWE127
.5FR2-10	2FR6TI	4C8WT	A2SC12MWE
	2FR8	4N10WE	
.5FR2HC-10			A2SC16MWE
.5FR4-10 45,53	2I4UWE.2	4N10WT107	A2SD10MWE
.5SR.5-1053	2I4UWE.5	4N4WE 106	A2SD12MWE125
.5SR1-1053	2I4UWE1105	4N4WT 107	A2SD16MWE125
.5SR2-1053	2I4UWE2105	4N6WE	A2SD6MWE125
.5SR4-1053	2L10UW	4N6WT	A2SF10MWE129
10FR1-10 45,53	2NI4WE.06	4N8WE	A2SF12MWE129
	2NI4WE.1	4N8WT 107	A2SF16MWE
10FR2-10 45,53			
10FR4-10 45,53	2NI4WE.2104	4SOA 205	A2ST10MWE
10FR4HC-10 45,53	2NI4WE.5	4SOAMP205	A2ST12MWE131
10SR.5-1053	2RAD 204	4SOAMPCP83	A2ST16MWE131
10SR1-10	2SC10MWE 127	4SOUTH 205	A2STF10MWE133
10SR2-1053	2SC12MWE 127	4SOUTHMP205	A2STF12MWE133
10SR4-10	2SC16MWE	4SOWK 205	A2STF16MWE
1FR2-1053	2SC6MWE	4SOWKMP	A30197
1FR2HC-1053	2SD10MWE125	4SOWKMP205	A304 197
1SR.5-1053	2SD12MWE125	4UW 117	A30S 197
1SR1-1053	2SD16MWE125	4UWE 112	A36 197
1SR2-1053	2SD6MWE 125	4VL4MWE2	A364 197
1SR4-1053	2SF10MWE 129	4VL6MWE2	A36S
210UW 117	2SF12MWE	4VL8MWE2	A4196
2301233	2SF16MWE	6SOAMPCP83	A410UWE112
2310-10 233	2SF6MWE129	6UW117	A410UWT113
2310-20 233	2SOA 205	6UWE112	A42 196
2330-10 233	2SOA 205	8UW 117	A44UWE112
2330-20 233	2SOAMMP	8UWE 112	A44UWT113
2CI4UWE.2105	2SOAMMP205	A10 196	A45197
2CI4UWE.5	2SOAMP	A102 196	A454
2CI4UWE1 105	2SOAMP	A10S 196	A45S
2CI4UWE2 105	2SOAMP	A10UW	A46UWE112
2CI4WE.06	2SOAMP	A12 196	A46UWT113
2CI4WE.1	2SOAMP205	A122 196	A48UWE112
2CI4WE.2	2SOAMPCP83	A12S 196	A48UWT113
2CI4WE.5	2SR.5-1053	A16196	A4C10UWE 109
2CSC10MWE126	2SR1-10	A162 196	A4C10UWT
2CSC12MWE	2SR2-1053	A16S	A4C10WE
2CSC12MWE	2SR4-10	A2CI4UWE.2 105	A4C10WT110
2CSC6MWE	2ST10MWE 131		A4C4UWE 109
		A2CI4UWE.5 105	
2CSD10MWE124	2ST12MWE 131	A2CI4UWE1 105	A4C4UWT 111
2CSD12MWE124	2ST16MWE 131	A2CI4UWE2105	A4C4WE108
2CSD16MWE124	2ST6MWE131	A2CI4WE.06104	A4C4WT110
2CSD6MWE124	2STF10MWE 133	A2CI4WE.1104	A4C6UWE 109
2CSF10MWE128	2STF12MWE 133	A2CI4WE.2104	A4C6UWT 111
2CSF12MWE	2STF16MWE	A2CI4WE.5	A4C6WE108
2CSF16MWE128	2STF6MWE	A2CSC10MWE 126	A4C6WT110
2CSF6MWE			A4C8UWE 109
	3SOAMPCP83	A2CSC12MWE	
2CST10MWE	410UWE	A2CSC16MWE 126	A4C8UWT 111
2CST12MWE	410UWT113	A2CSD10MWE 124	A4C8WE
2CST16MWE130	44UWE 112	A2CSD12MWE 124	A4C8WT110
2CST6MWE	44UWT	A2CSD16MWE 124	A4N10WE
2CSTF10MWE132	46UWE 112	A2CSD6MWE 124	A4N10WT107
2CSTF12MWE132	46UWT	A2CSF10MWE128	A4N4WE106
2CSTF16MWE	48UWE 112	A2CSF12MWE	A4N4WT107
2CSTF6MWE			
	48UWT	A2CSF16MWE	A4N6WE
2FR.5-5 53,60	4C10UWE	A2CST10MWE	A4N6WT107
2FR1-10 45,53	4C10UWT111	A2CST12MWE 130	A4N8WE106
2FR1HC-1045,53	4C10WE 108	A2CST16MWE130	A4N8WT107
2FR1K45	4C10WT	A2CSTF10MWE 132	A4S196
2FR1KHC45	4C4UWE109	A2CSTF12MWE 132	A4UW
2FR1KTI	4C4UWT111	A2CSTF16MWE 132	A4VL4MWE2112
2FR1TI-10	4C4WE	A2I4UWE.2	A4VL6MWE2112
· · · · · · · · · · · · · · · · · · ·			A4VL8MWE2112
2FR2-10	4C4WT 110	A2I4UWE.5	
2FR2HC-10	4C6UWE	A2I4UWE1	A6
2FR2TI-1045,53	4C6UWT111	A2I4UWE2 105	A60 197
2FR4-10 45,53	4C6WE108	A2NI4WE.06 104	A604 197

107	ACELICOLITA 242		L C1 13DC
A60S 197	ASFVO2HT4213	C-2C38H163	C1-13R6 162
A62 196	ASFVO40K.5	C-2C40H163	C1-20R6
A6S 196	ASFVO40K185	C-2C44	C1-23R6
A6UW	ASFVO40K36085	C-2C46 163	C10UW
A8196	ASFVOD40K.585	C-2C48H163	C10UWE109
A82196	ASFVOD40K1	C-BOT16	C10W
A8S 196	ASFVOD40K36085	C-BOT3281	C10WE108
A8UW 117	ASFVOHT 213	C-EN.5FPKB59	C12-310 166
A90 197	ASFVOHT4213	C-F1.5Tl78	C12-314
A904 197	ASFVOL213	C-LFP41	C12-316
A90S	ASFVOLHT213	C-LZP1PK64	C12-318 166
AC10UW			C15-310
	ASFVOLHT4	C-MPFTI1079	,
AC10W 115	AT10 196	C-MPFTI2	C1CF-1C06162
AC4UW	AT104 196	C-MPR281	C1CF-1C46162
AC4W 115	AT10S 196	C-MPR381	C1CF-2C06165
AC6UW116	AT12 196	C-MZP1PK	C1CF-2C46165
AC6W 115	AT124	C-NEF.5FPK.15S161	C1CFI-1006 162
AC8UW	AT125	C-NEF.5FPK.20S161	C1CFI-1346 162
AC8W 115	AT16 196	C-NEF.5FPK.25S1	C1CFI-2006 165
ACI4UW.2114	AT164 196	C-NEF.5FPK.30S1	C1CFI-2346 165
ACI4UW.5 114	AT16S 196	C-NEF.5FPK.35S1	C2-1004
ACI4UW1	AT30197	C-NEF.5XFPK.15S161	C2-1004A160
ACI4UW2	AT302 197	C-NEF.5XFPK.20S161	C2-1004D
ACI4W.06	AT30S 197		
		C-NEF.5XFPK.25S161	C2-1004EH160
ACI4W.1	AT36 197	C-NEF.5XFPK.30S161	C2-1006 160
ACI4W.2	AT362 197	C-NEF.5XFPK.35S161	C2-1006A160
ACI4W.5	AT36S 197	C-NERU1FPK59	C2-1006D160
ACSD10UW134	AT4196	C-NEU.5FPK59	C2-1006EH160
ACSD4UW	AT44196	C-NEU.5FPK.1560	C2-1034 160
ACSD6UW 134	AT45 197	C-NEU.5FPK.2060	C2-1034A160
ACST4UW 135	AT452 197	C-NEU.5FPK.2560	C2-1034D160
ACST6UW135	AT45S 197	C-NEU.5FPK.3060	C2-1034EH160
AH2CSC6MWE	AT4S196	C-NEU.5FPK.3560	C2-1036 160
AH2CSF6MWE	AT6196	C-NEU.5XFPK	C2-1036A
AH2CST6MWE 130	AT60 197	C-NEU.5XFPK.1560	C2-1036D160
AH2CSTF6MWE132	AT602 197	C-NEU.5XFPK.2060	C2-1036EH160
AH2SC6MWE 127	AT60S 197	C-NEU.5XFPK.25	C2-10R0H160, 180
AH2SF6MWE129	AT64196	C-NEU.5XFPK.30	C2-10R4
AH2ST6MWE	AT6S196	C-NEU.5XFPK.3560	C2-10R6 160, 180, 181
AH2STF6MWE	AT8196	C-NL S1.1561	C2-10R8H160, 180
AH2VLSC4MWE2127	AT84 196	C-NL.15L-560	C2-1344 160
AH2VLSC6MWE2127	AT8S 196	C-NL.15S-560	C2-1344A160
AH2VLSC8MWE2 127	AT90 197	C-NL.20L-560	C2-1344D160
AH2VLSD10MWE2 125	AT902 197	C-NL.20S-560	C2-1344EH160
AH2VLSD4MWE2	AT90S	C-NL.25L-5	C2-1346 160
		C-NL.25S-5	
AH2VLSD6MWE2	BNV1 218		C2-1346A160
AH2VLSD8MWE2 125	BNV1-D218	C-NL.30L-560	C2-1346D160
AH2VLSF4MWE2129	BNV1-KZ218	C-NL.30S-560	C2-1346EH160
AH2VLSF6MWE2129	BNV1LF218	C-NL.35L-560	C2-13R0H160, 180
AH2VLSF8MWE2129	BNV1LF-D	C-NL.35S-560	C2-13R4
AL10UW	BNV1LF-KZ	C-NLS1.20	C2-13R6 160, 162, 180, 181
AL4UW	C-1C00H		
		C-NLS1.2561	C2-13R8H160, 180
AL6UW 118	C-1C04 160	C-NLS1.3061	C2-2004
AL8UW 118	C-1C06	C-NLS1.3561	C2-2004A163
ASD4UW 134	C-1C08H 160	C-NNFFPK59	C2-2004D163
ASD6UW134	C-1C30H160	C-NPFPK59	C2-2004EH163
ASD8UW	C-1C34	C-NTFPK	C2-2006
ASFV	C-1C36		
		C-NTXFPK59	C2-2006A
ASFV2HT 213	C-1C38H160	C-NXFPK59	C2-2006D163
ASFV2HT4 213	C-1C40H160	C-NXXFPK59	C2-2006EH163
ASFV40K.585	C-1C44 160	C-NYFPK59	C2-2034 163
ASFV40K185	C-1C46	C-NYXFPK59	C2-2034A163
ASFV40K36085	C-1C48H	C-PF	C2-2034D
ASFVHT	C-2C00H	C-PFL78	C2-2034EH
ASFVHT4 213	C-2C04 163	C-PFM	C2-2036 163
ASFVL 213	C-2C06	C-PFS78	C2-2036A163
ASFVLHT213	C-2C08H163	C-VISF-1	C2-2036D163
ASFVLHT4 213	C-2C30H163	C-VISF-1H40	C2-2036EH163
ASFVO	C-2C34	C-ZP1FPK64	C2-20R0H163,182
		C1-10R6	C2-20R4
ASFVO2HT 213	C-2C36		

C2-20R6 163, 165, 182, 183	C22Z-3184EH 166	C25-6184EMH 177	C2H-2000163
C2-20R8H163, 182	C22Z-3186166	C25-6186 177	C2H-2000A
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FS1.8V1-516	HVE6X201	JR-35P67	LZP.5FPK64
FS1.9-516	HVEA 201	JR-367008-10	LZP111
FS1.9PK-516	HVEAN 201	JR-367008-2	LZP1H11
FS1.9V1-516	HVEANX	JR-367008-20	LZP1PK64
FS11.0-5	HVEAX 201	JR-367016-10	LZP1PK71
FS11.0PK-516	HVEB 201	JR-367016-280	LZP211
FS11.0V1-516	HVEBN	JR-367016-20	LZP2H11
FS1L.15PK-517	HVEBNX 201	JR-55010-566	MR55, 211
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FS1L.2PK-517	HVEC 201	JR-55012-566	MRX.5S623
FS1L.4-517	HVECX201	JR-55013-566	MRX1PK23
FS1L.4PK-517	HWSC-SC8-6	JR-55014-566	MRX1S623
FS1L.5-5	HWSC-SC8-8B	JR-55015-566	MRY.5PK
FS1L.5PK-517	HWSC-SC8-8B	JR-55016-1266	MRY.5S6
FS1L.8-5	HWSC-SC8-8B 205	JR-55020-566	MRY1PK23
FS1L.8PK-517	HWSC-SC8-8B 205	JR-55021-566	MRY1S623
FS1L1.0-517	HWSC-SC8-8B	JR-55022-566	MT.5CHC23
FS1L1.0PK-517	HWSC-SC8-8B	JR-55023-566	MT.5CKF23
FS1R.15PK-517	HWSC-SC8-8TDH	JR-55024-566	MT.5CPK23
FS1R.2-517	HWSC-SC8-8TDH205	JR-55025-566	MT.5CS623
FS1R.2PK-517	I-21014-01203	JR-5508-566	MT.5CTI23
FS1R.4-5	I-21208-05202	JR-797	MT.5XCHC
FS1R.4PK-517	l-21208-06	JR-79892	MT.5XCKF23
FS1R.5-517		JR-9000-0520	MT.5XCPK23
	l-21208-33		
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FS1R.8-5	l-22897-02191,195	JR-9000-0602	MT.5XCTI23
FS1R.8PK-517	I-22897-03191.195	JR-9000-0640	MT1CHC23
FS1R1.0-517	I-22897-04191,195	JR-9001-592	MT1CKF23
FS1R1.0PK-517	l-22897-05191,195	JR-S-1100181	MT1CPK23
FSL.25-5	I-22897-06191,195	JR-S-1100281	MT1CS623
FSL.4-517	I-22897-08191,195	JR-S-1100381	MT1CTI
FSL.5-517	I-23572HP2 226	JR-T-580491	MT1XCHC23
FSMUA1.5	I-23572NP2	JR-T-599991	MT1XCKF23
FSMUAS1.520	I4UWE.2	JR-T-600091	MT1XCPK23
FSMUAS1.5L	I4UWE.5	JR-T-600191	MT1XCS6
FSMUAS1.5M	I4UWE1 105	JR-T-600291	MT1XCTI23
FSR.25-517	I4UWE2 105	JR-T-600391	MU.5CHC
FSR.3-5	ITC10399 203	JR-T-6003191	MU.5CKF23
FSR.4-517	ITC10399-220203	JR-T-9801391	MU.5CPK23
FSR.5-517	IZERA1.521	JR-T-9801791	MU.5CS623
FSZA-HP18	IZERA1.5C21	JR-T-9802591	MU.5CTI23
FSZNA-HP18	IZERA1.5M21	JR-T-9805091	MU.5XCHC23
HA1			
HA1T202		IR_T_08075 01	
	IZN1-1010	JR-T-9807591	MU.5XCKF23
	IZR1.538	JR-T-9820091	MU.5XCKF
HA2 202	IZR1.5	JR-T-9820091 JR-TD-580491	MU.5XCKF23 MU.5XCPK23 MU.5XCS623
	IZR1.538	JR-T-9820091	MU.5XCKF
HA2 202	IZR1.5	JR-T-9820091 JR-TD-580491	MU.5XCKF23 MU.5XCPK23 MU.5XCS623
HA2	IZR1.5 .38 IZR1.5F .38 IZR1.5L .38	JR-T-98200	MU.5XCKF 23 MU.5XCPK 23 MU.5XCS6 23 MU.5XCTI 23
HA2 202 HA3 202 HA6 202 HB. 202	IZR1.5 .38 IZR1.5F .38 IZR1.5L .38 IZR1.5LF .38 IZR1.5T .38	JR-T-98200. 91 JR-TD-5804 91 JR-TD-6007 91 JR-TD-6008 91 JR-TD-6009 91	MU.5XCKF 23 MU.5XCPK 23 MU.5XCS6 23 MU.5XCTI 23 MU1CHC 23 MU1CKF 23
HA2 202 HA3 202 HA6 202 HB. 202 HB1N 202	IZR1.5 38 IZR1.5F 38 IZR1.5L 38 IZR1.5LF 38 IZR1.5T 38 IZR21 38	JR-T-98200. 91 JR-TD-5804 91 JR-TD-6007 91 JR-TD-6008 91 JR-TD-6009 91 JR-TD-6010 91	MU.5XCKF 23 MU.5XCPK 23 MU.5XCS6 23 MU.5XCTI 23 MU1CHC 23 MU1CKF 23 MU1CPK 23
HA2 202 HA3 202 HA6 202 HB. 202 HB1N 202 HBS. 202	IZR1.5 38 IZR1.5F 38 IZR1.5L 38 IZR1.5LF 38 IZR1.5T 38 IZR21 38 IZR21C 38	JR-T-98200. 91 JR-TD-5804 91 JR-TD-6007 91 JR-TD-6008 91 JR-TD-6009 91 JR-TD-6010 91 JR-TD-6011 91	MU.5XCKF 23 MU.5XCPK 23 MU.5XCS6 23 MU.5XCTI 23 MU1CHC 23 MU1CKF 23 MU1CPK 23 MU1CS6 23
HA2 202 HA3 202 HA6 202 HB. 202 HB1N 202	IZR1.5 38 IZR1.5F 38 IZR1.5L 38 IZR1.5LF 38 IZR1.5T 38 IZR21 38	JR-T-98200. 91 JR-TD-5804 91 JR-TD-6007 91 JR-TD-6008 91 JR-TD-6009 91 JR-TD-6010 91 JR-TD-6011 91 L4UW. 118	MU.5XCKF 23 MU.5XCPK 23 MU.5XCS6 23 MU.5XCTI 23 MU1CHC 23 MU1CKF 23 MU1CPK 23
HA2 202 HA3 202 HA6 202 HB. 202 HB1N 202 HBS. 202	IZR1.5 38 IZR1.5F 38 IZR1.5L 38 IZR1.5LF 38 IZR1.5T 38 IZR21 38 IZR21C 38	JR-T-98200. 91 JR-TD-5804 91 JR-TD-6007 91 JR-TD-6008 91 JR-TD-6009 91 JR-TD-6010 91 JR-TD-6011 91	MU.5XCKF 23 MU.5XCPK 23 MU.5XCS6 23 MU.5XCTI 23 MU1CHC 23 MU1CKF 23 MU1CPK 23 MU1CS6 23
HA2 202 HA3 202 HA6 202 HB. 202 HBIN 202 HBS. 202 HCE1 203 HCE1X 203	IZR1.5 38 IZR1.5F 38 IZR1.5L 38 IZR1.5LF 38 IZR1.5T 38 IZR21 38 IZR21C 38 IZR21CF 38	JR-T-98200. 91 JR-TD-5804 91 JR-TD-6007 91 JR-TD-6008 91 JR-TD-6009 91 JR-TD-6010 91 JR-TD-6011 91 L4UW. 118	MU.5XCKF 23 MU.5XCPK 23 MU.5XCS6 23 MU.5XCTI 23 MU1CHC 23 MU1CKF 23 MU1CPK 23 MU1CS6 23 MU1CTI 23 MU1XCHC 23
HA2 202 HA3 202 HA6 202 HB. 202 HBIN 202 HBS. 202 HCE1 203 HCE1X 203 HCE2 203	IZR1.5 38 IZR1.5F 38 IZR1.5L 38 IZR1.5LF 38 IZR1.5T 38 IZR21 38 IZR21C 38 IZR21CF 38 IZR21F 38 IZR21F 38 IZR21L 38	JR-T-98200. 91 JR-TD-5804 91 JR-TD-6007 91 JR-TD-6008 91 JR-TD-6009 91 JR-TD-6010 91 JR-TD-6011 91 L4UW 118 L6UW 118 L8UW 118	MU.5XCKF 23 MU.5XCPK 23 MU.5XCS6 23 MU.5XCTI 23 MU1CHC 23 MU1CKF 23 MU1CPK 23 MU1CS6 23 MU1CTI 23 MU1XCHC 23 MU1XCKF 23
HA2 202 HA3 202 HA6 202 HB. 202 HBIN 202 HBS. 202 HCE1 203 HCE1X 203 HCE2 203 HCE2X 203	IZR1.5 38 IZR1.5F 38 IZR1.5L 38 IZR1.5LF 38 IZR1.5T 38 IZR21 38 IZR21C 38 IZR21CF 38 IZR21F 38 IZR21F 38 IZR21L 38 IZR21L 38 IZR21LF 38	JR-T-98200. 91 JR-TD-5804 91 JR-TD-6007 91 JR-TD-6008 91 JR-TD-6009 91 JR-TD-6010 91 JR-TD-6011 91 L4UW 118 L6UW 118 L8UW 118 LNR-CIS4-B-5 245	MU.5XCKF 23 MU.5XCPK 23 MU.5XCS6 23 MU.5XCTI 23 MU1CHC 23 MU1CKF 23 MU1CPK 23 MU1CS6 23 MU1CTI 23 MU1XCHC 23 MU1XCKF 23 MU1XCPK 23
HA2 202 HA3 202 HA6 202 HB. 202 HBIN 202 HBS. 202 HCE1 203 HCE1X 203 HCE2 203 HCE2X 203 HCEB 203	IZR1.5 38 IZR1.5F 38 IZR1.5L 38 IZR1.5LF 38 IZR1.5T 38 IZR21 38 IZR21C 38 IZR21CF 38 IZR21F 38 IZR21L 38 IZR21L 38 IZR21L 38 IZR21LF 38 IZR21LF 38 IZR21T 38	JR-T-98200. 91 JR-TD-5804 91 JR-TD-6007 91 JR-TD-6008 91 JR-TD-6009 91 JR-TD-6010 91 JR-TD-6011 91 L4UW 118 L6UW 118 L8UW 118 LNR-CIS4-B-5 245 LNR-DGS4-5 245	MU.5XCKF 23 MU.5XCPK 23 MU.5XCS6 23 MU.5XCTI 23 MU1CHC 23 MU1CKF 23 MU1CPK 23 MU1CS6 23 MU1CTI 23 MU1XCHC 23 MU1XCKF 23 MU1XCPK 23 MU1XCS6 23
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HA2 202 HA3 202 HA6 202 HB. 202 HBIN 202 HBS. 202 HCE1 203 HCE1X 203 HCE2 203 HCE2X 203 HCEB 203	IZR1.5 38 IZR1.5F 38 IZR1.5L 38 IZR1.5LF 38 IZR1.5T 38 IZR21 38 IZR21C 38 IZR21CF 38 IZR21F 38 IZR21L 38 IZR21L 38 IZR21L 38 IZR21LF 38 IZR21LF 38 IZR21T 38	JR-T-98200. 91 JR-TD-5804 91 JR-TD-6007 91 JR-TD-6008 91 JR-TD-6009 91 JR-TD-6010 91 JR-TD-6011 91 L4UW 118 L6UW 118 L8UW 118 LNR-CIS4-B-5 245 LNR-DGS4-5 245	MU.5XCKF 23 MU.5XCPK 23 MU.5XCS6 23 MU.5XCTI 23 MU1CHC 23 MU1CKF 23 MU1CPK 23 MU1CS6 23 MU1CTI 23 MU1XCHC 23 MU1XCKF 23 MU1XCPK 23 MU1XCS6 23
HA2 202 HA3 202 HA6 202 HB. 202 HB. 202 HBIN 202 HBS. 202 HCE1 203 HCE1X 203 HCE2 203 HCE2X 203 HCEB 203 HCEBX 203	IZR1.5 38 IZR1.5F 38 IZR1.5L 38 IZR1.5LF 38 IZR1.5T 38 IZR21 38 IZR21C 38 IZR21CF 38 IZR21F 38 IZR21L 38 IZR21L 38 IZR21LF 38 IZR21T 38 IZR21T 38 IZR41 38 IZR41F 38	JR-T-98200. 91 JR-TD-5804 91 JR-TD-6007 91 JR-TD-6008 91 JR-TD-6009 91 JR-TD-6010 91 JR-TD-6011 91 L4UW 118 L6UW 118 L8UW 118 LNR-CIS4-B-5 245 LNR-DGS4-5 245 LNR-GS2-5 245	MU.5XCKF 23 MU.5XCPK 23 MU.5XCS6 23 MU.5XCTI 23 MU1CHC 23 MU1CKF 23 MU1CPK 23 MU1CS6 23 MU1CTI 23 MU1XCHC 23 MU1XCKF 23 MU1XCPK 23 MU1XCPK 23 MU1XCS6 23 MU1XCTI 23
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HA2 202 HA3 202 HA6 202 HB. 202 HB. 202 HBS. 202 HCE1 203 HCE1X 203 HCE2X 203 HCE2X 203 HCEB 203 HCECC 203 HCECC 203 HCECX 203	IZR1.5 38 IZR1.5F 38 IZR1.5L 38 IZR1.5LF 38 IZR1.5T 38 IZR21 38 IZR21C 38 IZR21CF 38 IZR21F 38 IZR21F 38 IZR21L 38 IZR21LF 38 IZR41T 38 IZR41 38 IZR41F 38 IZR42F 38 IZR42L 38 IZR42L 38 IZR42L 38 IZR42L 38 IZR42L 38 IZR42L 38	JR-T-98200. 91 JR-TD-5804 91 JR-TD-6007 91 JR-TD-6008 91 JR-TD-6009 91 JR-TD-6010 91 JR-TD-6011 91 L4UW. 118 L6UW. 118 L8UW. 118 LNR-CIS4-B-5 245 LNR-GS2-5 245 LNR-GS2-5 245 LNR-GS4-5 245 LNR-GS4-5 245 LNR-GS4-5 245 LNR-GS4-5 245 LNR-HP4-5 245 LNR-HP4-5 245	MU.5XCKF 23 MU.5XCPK 23 MU.5XCS6 23 MU.5XCTI 23 MU1CHC 23 MU1CKF 23 MU1CPK 23 MU1CS6 23 MU1CTI 23 MU1XCHC 23 MU1XCFK 23 MU1XCPK 23 MU1XCTI 23 MX.5CHC 23 MX.5CKF 23 MX.5CPK 23 MX.5CPK 23 MX.5CS6 23 MX.5CS6 23 MX.5CTI 23
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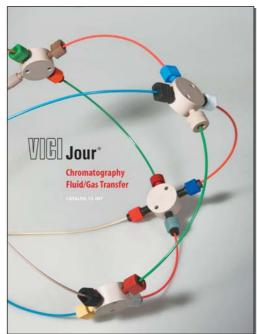
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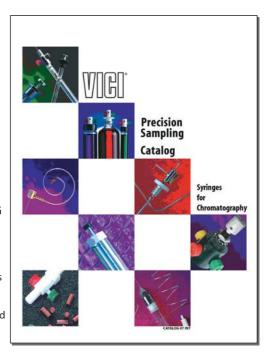


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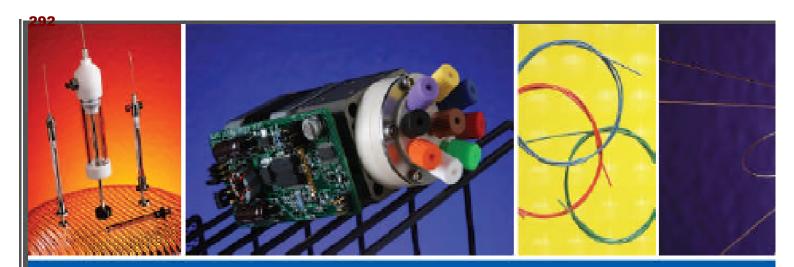




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