

General reference

HELPFUL PRODUCT INFORMATION

This section contains background information to supplement the product discussions on the preceding pages. You will find a glossary of terms, safety and trademark information, and discussions of the mechanical and chemical properties of the materials used in the manufacturing of our products. Additional information, including a complete library of technical notes and manuals, can be found in the support section of our website at www.vici.com.

Safety

1. Never tighten or loosen a fitting or valve connection while it is pressurized. Provisions should be made within the system to release pressure via suitable valve components.
2. Do not exceed pressure or temperature specifications. Note that in many cases, the system pressure is limited by the tubing used, not the fittings.
3. The use of toxic or hazardous fluids requires extra caution during operation or maintenance. The user is responsible for ensuring safe operation and for understanding the nature of the fluids and chemistry involved.
4. The use of thread lubricants or sealants is required only on tapered pipe threads. These sealants and lubricants may have different temperature limits or chemical compatibility than the valves or fittings.

CAUTION

The improper selection or use of components or systems described herein can cause personal injury or property damage.

The system designer and user are solely responsible for the selection of products suitable for the specific requirements of the application, as well as proper installation, operation, and maintenance of these products.

Compatibility with hazardous fluid streams, environmental conditions, and mechanical requirements are the responsibility of the user.



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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.

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 attack 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.

**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
PEEK

Ferrules**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

Electroformed nickel
(EFNI)
ETFE
FEP
Hastelloy C
Nickel 200
PEEK
PTFE
Stainless steel, Type 316
Titanium

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**statators/ bodies****Cheminert**

CTFE
Hastelloy C
Nitronic 60 stainless
PAEK
PPS
PVDF
Stainless steel, Type 316
Titanium

Diaphragm

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
Zirconium

Titanium

Although it is more difficult to machine than common alloys containing aluminum and vanadium, Valco uses Grade 2 pure titanium in order to avoid possible contamination of the sample stream with these metals.

Good for organic and inorganic salts except aluminum and calcium chlorides, and all alkalis except boiling concentrated potassium hydroxide. Good with dilute, low temperature formic, lactic, sulfuric, hydrochloric, and phosphoric acids, but rapidly attacked by hydrofluoric acid. Good with dilute nitric acid at low temperatures; corrodes at high concentrations and temperatures. Can ignite with fuming nitric acid. Attacked by oxalic acid, concentrated phosphoric acid, hot trichloroacetic acid, and zinc chloride.

Due to the nature of this metal, valves made of titanium typically have a shorter lifetime than HPLC grade stainless steel or Hastelloy C-22.

Zirconium

Excellent resistance to hydrochloric acid, good with hot sulfuric acid at concentrations up to 70% and boiling nitric acid at up to 90%. Attacked by hydrofluoric acid.

Brass

Used where a soft metal ferrule is desirable but no corrosive materials are present. Although Valco brass ferrules work as replacements in inexpensive commercial brass fittings, they are generally not recommended for chromatography applications.

GENERAL REFERENCE

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 known 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 high-strength composite resists all common HPLC solvents and dilute acids and bases. However, concentrated or prolonged use of halogenated solvents may cause the polymer to swell. Avoid concentrated sulfuric or nitric acids (over 10%).

Valcon H

This composite, a carbon fiber reinforced, PTFE-lubricated inert engineering polymer, has long been the standard for typical HPLC applications in which pressures are around 5000 psi and temperatures are not more than 75°C. It is not unusual for these valves to be ordered for use at 7000 psi, and less frequently for use at 10,000 psi. However, at that point the lifetime may be shortened by as much as 50%.

Valcon H is the rotor material used in the W and UW series, where no rotor material letter is added (as: C10W or AC6UW).

Valcon M

This material, basically a hydrocarbon in structure, is the most impermeable to light gases of all the rotor materials currently available, with wide acceptance in low-temperature (50°C maximum) trace gas applications. Avoid use with aromatic hydrocarbons.

Valcon P

This composite, the majority of which is PTFE and carbon, was the standard choice for most GC applications before the development of Valcon E. (Standard specs are 400 psi at 175°C.) Routinely used at 1000 psi, 75°C, it can also be used at temperatures approaching 200°C with decreased sealing tension; however, at that point Valcon E is probably a better choice from a lifetime standpoint. Valcon E can replace P in most applications.

Valcon R

While rarely used today, Valcon R (a PTFE composite) still finds use in low temperature/pressure situations which require its nearly universal chemical inertness. Of the chemicals encountered in commercial practice, only molten sodium and fluorine at elevated temperatures and pressures produce any detrimental effects. Its most severe limitation is that it cannot go over 75°C, even at only 400 psi.

Valcon T

This polyimide/PTFE/carbon composite has been used successfully for many years and still cannot be surpassed when applications demand operating temperatures in the 250°C – 350°C range. (Standard specs for most series are 300 psi at 330°C.) However, at temperatures below 150°C there is a tendency for the seal material to stick to the valve body, making the valve difficult to turn and causing the rotor to crack in extreme cases. 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.

GENERAL REFERENCE

A

Adapter: a type of fitting which provides a method of joining two components of differing thread types or systems.

Analytical column: a long narrow tube packed or coated with one of many available chemically diverse compounds that can separate the components in a sample according to their boiling point, polarity, molecular size, or combination thereof. A column of some kind is used with most chromatographic techniques.

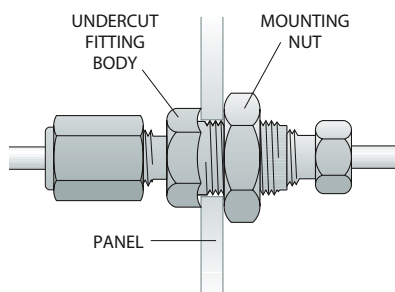
B

Backflush: the use of valving to reverse the flow through a column in order to "backflush" or purge heavier components from the column.

Biocompatibility: defines the materials used in a system (i.e. fittings, tubing, and valves) that do not change the bioactivity of the biological substances that come into contact with the surface of these materials. Note that in chromatographic systems, the tubing and column contribute over 99% of the surface area and the valves and fittings are insignificant.

Bore: the diameter of the minimum orifice through the fitting; see **capillary bore**, **through-type bore**, and **large bore**.

Bulkhead fitting: a type of fitting in which the fitting body is inserted through an instrument panel or mounting bracket, to which it is affixed with a mounting nut. The Valco fitting body is uniquely undercut so that it "bites" into the panel when the mounting nut is tightened, eliminating the need for a lock washer.



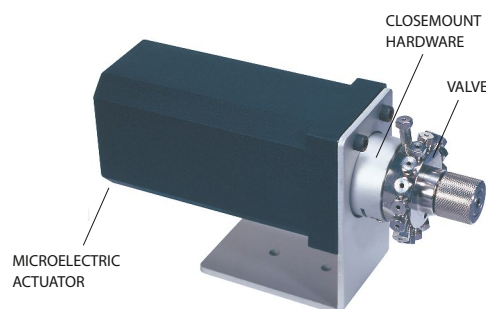
Butt connection: a type of connection in which the two tube ends are directly and squarely in contact, usually effected with a through-type union. Typically used with fused silica connections, or small bore metal tubing.

C

Cap: a cap is used to dead-end a piece of tubing which has a nut and ferrule installed.

Capillary bore: the smallest available standard orifice in a given fitting design (usually 0.25 mm). Typically denoted by suffix "C" in the product number.

Closemount hardware: the mounting components providing the most direct, shortest attachment of valve to actuator.



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

Connecting volume: the volume between two or more connections. This may be cleanly swept, thus not contributing to peak distortion, or may be "dead volume" such as that found in fittings with larger bores than the connecting tubing.

Cross: a type of distribution fitting which connects four pieces of tubing, arranging them in the pattern of a cross.

D

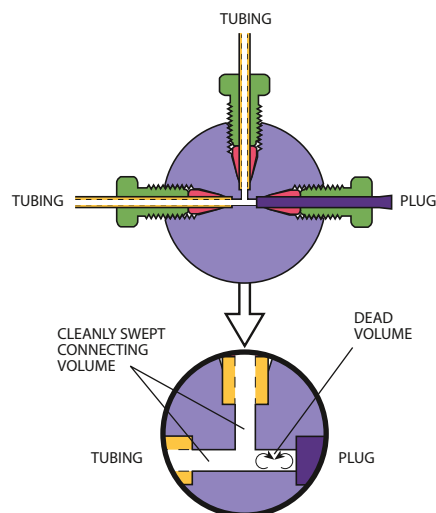
Dead volume:

(drawing at right)
any volume which a component introduces to a system that is not cleanly swept and relies on diffusion to clear the space. See **Connecting volume**.

Detail: see **Fitting detail**.

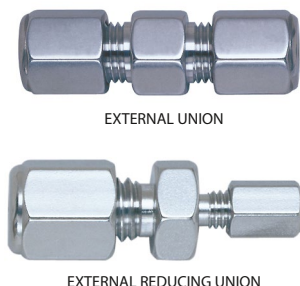
Distribution fitting:

a generic term for tees, crosses, and manifolds, which provide multiple access points to "distribute" a gas or liquid through a system. **CAUTION!** Using a distribution fitting in reverse to coalesce multiple streams may create dead volume. Special manifolds are available for this application.



E

External fitting: a type of compression fitting in which the fitting body has male threads; an external *nut* has female threads.

**F**

FIA: Flow Injection Analysis. A simple and versatile analytical technique for automating wet chemical analyses based on the manipulation of a sample zone formed from the injection of the sample into a continuous stream of fluid used as a carrier.

Ferrule: one of the components of a compression fitting; the conical piece of metal or plastic that compresses onto the tube as it is forced into a tapered seat. Valco metal ferrules are unique in that they attach to and seal at the tube by cutting a shallow ring into it, instead of by actually swaging it. This is preferable since it introduces no flow restriction.

Filter: a type of union or reducing union which traps the particulates in a stream. The filtering element is typically a mesh screen or sintered frit.

Fitting detail: one of the components of a compression fitting; if the tube, nut, and ferrule comprise the male part of the fitting, the fitting detail is the female part. It includes the threads for the nut, the tapered ferrule seat, and the pilot.

Flanged fitting: a type of fitting used with fluoropolymer tubing (PTFE, FEP) in which a flange is made at the tube end. Connections are made at the flange either by compressing the flange into a flat detail (typically 1/4-28 threaded) or by butting two flanges together. A special flanging tool forms the flanges.

Flangeless fitting: similar in application to the flanged fitting, but the flange is not required. A ferrule system is used which grips/compresses the tube. This fitting type can be used with virtually any polymeric tubing since the tube end does not have to be formed, but simply square cut. Typically used in 1/4-28 threaded fittings, it is usually interchangeable with flanged fittings.

Frit: a filter element typically made of stainless, Hastelloy, Titanium, or polymers, usually 0.75 mm or 1 mm thick. Frits may provide better filtration than screens, but because they are thicker there is greater mixing potential, and they typically result in increased pressure drop.

G

GC: Gas Chromatography. An analytical method incorporating an injection system, analytical column, controlled temperature zone, and detector. An inert carrier gas moves the sample through the column, which separates the sample components into discrete bands which are measured as they pass through the detector.

Guard column: a column used in series between the injector and analytical column to prevent certain types of components from entering the analytical column.

H

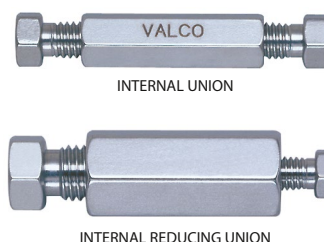
HPLC: High Performance Liquid Chromatography. An analytical system consisting of an injector, pump, analytical column, and detector. Using a liquid mobile phase, the sample is pumped through the column, where it is separated into discrete sample component bands which are detected and measured as the bands elute from the column.

I

ID: internal diameter.

Inert: technically, unreactive with other substances; however, in the instrumentation field, "inert" is a relative term. Often polymers are termed inert but are soluble in some fluids and can react with some compounds.

Internal fitting: a type of compression fitting in which the fitting body has female threads; an internal *nut* has male threads.

L

LC: Liquid Chromatography. Any of a variety of low to medium pressure techniques which use a liquid mobile phase as the carrier to move sample. Similar to HPLC.

Large bore: a bore that is larger than the standard for a given fitting; a fitting ordered with a large bore will have a larger flow orifice than the standard or capillary bore fitting of the same design. Denoted by suffix "L" in the product number.

Luer adapter: an adapter that connects a tapered luer fitting (square nib) of a syringe to a tube or tube fitting.

GENERAL REFERENCE

M

Make up: the point at which a ferrule, nut, and tube are assembled in the fashion which will effect a leak-free seal. In most compression fittings, that is accomplished by compressing the tube with the small end of the ferrule. With Valco metal ferrules, the ferrule usually makes up on the tube by cutting a shallow ring in it.

Manifold: a type of distribution fitting in which a single source is directed to multiple outlets, or vice versa. *CAUTION!* Using a common distribution fitting in reverse to merge multiple streams may create dead volume. Special manifolds are available for this application.

Microbore column: a liquid chromatography column of narrow bore (typically 2 mm or less) for improved resolution.

N

Nanovolume®: a trademark registered to Valco Instruments Co. Inc, applied to our nanobore components with bore sizes less than 250 μm (0.010").

NPT: National Pipe Thread; a standardized tapered pipe fitting. See **pipe thread**.

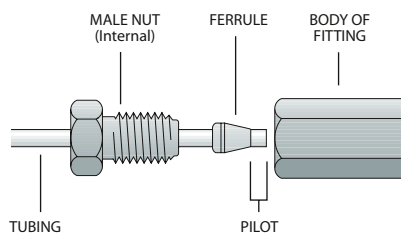
Nut: the tensioning component of a compression fitting. As the threaded nut is tightened into the fitting detail, it pushes the ferrule forward into the tapered ferrule seat, causing it to make up on the tube.

O

OD: outside diameter.

P

Pilot: the tubing which extends beyond the ferrule in a made-up fitting, or the integral portion of a ZRF internal reducing ferrule which extends beyond the ferrule. See also **Pilot depth**.



Pilot depth: the length of the tubing diameter cavity beyond the tapered ferrule seat within a fitting detail. Valco fitting pilot depths are tightly controlled to facilitate the interchangeability of components without the risk of leaks or dead volume. The one exception is Cheminert high pressure valves with polymeric stators which have a longer pilot depth.

Pipe thread: the external or internal threads of a fitting designed to effect a metal-to-metal seal on the conical thread faces. This type of fitting does not "bottom out" in the detail. Typically used with PTFE tape or other compound to lubricate the threads; however, since the diffusion rate of air components through the PTFE tape is considerable, pipe fittings should not be used in systems where leakage rates are critical.

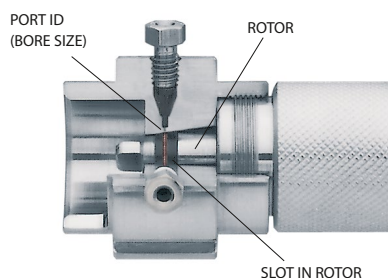
Port: the connection, orifice, seal, or septum, etc., through which sample may be added (injected) or withdrawn.

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

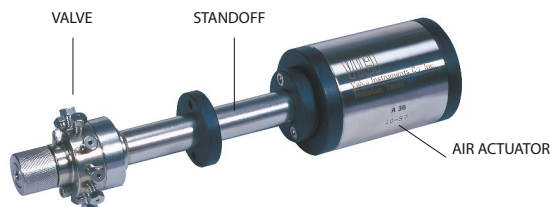
SFE: Supercritical Fluid Extraction. An extraction technique using a fluid in its supercritical state as the extraction medium. Some liquids and mixtures maintained above a critical temperature and pressure exhibit properties of both the liquid and gas phases of the element. These are defined as supercritical.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

Sideload: any force on the valve rotor other than the proper rotational force along the axis of the rotor, often resulting in leakage or increased wear. It is typically caused by actuation misalignment, over-rotation, or improper mounting of the valve.

Standard bore: a bore which was chosen as the standard for a particular fitting, typically based on the most common tubing ID used with that fitting.



Standoff: an extension between a valve and actuator which allows the valve to be installed in a different temperature zone than the actuator. Standoffs come in several different lengths.

Stator: the stationary component of a valve. Typically, it contains the fittings as well as one of the fluid sealing surfaces. In Valco valves, the stator is called the valve body.

T

Tee: a type of distribution fitting which connects three pieces of tubing, arranging them in the pattern of a "T".

Through-type bore: a bore which is slightly larger than the OD of the tubing which is used with the given fitting. A union with a through-type bore allows the tube ends to butt directly together, or for one tube to run completely through the fitting. Denoted by suffix "T" in the product number. In order to assure correct pilot lengths, we recommend that ferrules be made up on the tubing in a standard union.

U

Union: a fitting for connecting two pieces of tubing of the same OD.

Unswep volume: the volume of any portion of a fitting which is in the flowpath but which is a different diameter than the primary flow orifice through the tubing/fitting assembly, or any area not directly swept by the fluid flow. This can also be known as "dead volume" if it is very poorly swept.

W

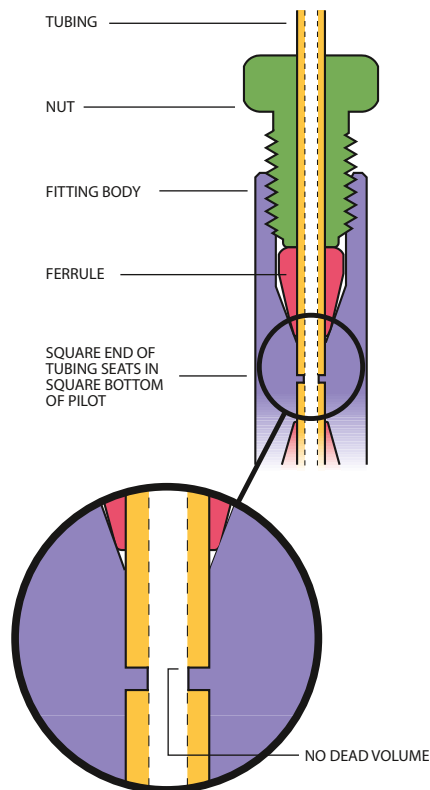
Wetted surfaces: the surfaces which are contacted by the sample stream.

Y

Y: a type of distribution fitting which connects three pieces of tubing, arranging them in the pattern of a "Y". Occasionally referred to as a "wye".

Z

Zero dead volume (ZDV): describes a connection which does not add volume to the system beyond what an extension of tubing would in its place.



Zero volume: while often used interchangeably with zero dead volume, it ideally describes a fitting design in which there is no internal volume, such as a through-type union designed to butt-fit two pieces of tubing.

GENERAL REFERENCE

PRESSURE CONVERSIONS

psi	KPa	BAR	Atm
1	6.8948	0.06895	0.06805
10	68.948	0.6895	0.6805
20	137.896	1.379	1.361
30	206.844	2.0685	2.0415
40	275.792	2.758	2.722
50	344.74	3.4475	3.4025
60	413.688	4.137	4.083
70	482.636	4.8265	4.7635
80	551.584	5.516	5.444
90	620.532	6.2055	6.1245
100	689.48	6.895	6.805
125	861.85	8.61875	8.50625
150	1034.22	10.3425	10.2075
175	1206.59	12.06625	11.90875
200	1378.96	13.79	13.61
225	1551.33	15.51375	15.31125
250	1723.7	17.2375	17.0125
275	1896.07	18.96125	18.71375
300	2068.44	20.685	20.415
325	2240.81	22.40875	22.11625
350	2413.18	24.1325	23.8175
375	2585.55	25.85625	25.51875
400	2757.92	27.58	27.22
425	2930.29	29.30375	28.92125
450	3102.66	31.0275	30.6225
475	3275.03	32.75125	32.32375
500	3447.4	34.475	34.025
525	3619.77	36.19875	35.72625
550	3792.14	37.9225	37.4275
575	3964.51	39.64625	39.12875
600	4136.88	41.37	40.83
625	4309.25	43.09375	42.53125
650	4481.62	44.8175	44.2325
675	4653.99	46.54125	45.93375
700	4826.36	48.265	47.635
725	4998.73	49.98875	49.33625
750	5171.1	51.7125	51.0375
775	5343.47	53.43625	52.73875

psi	KPa	BAR	Atm
800	5515.84	55.16	54.44
825	5688.21	56.88375	56.14125
850	5860.58	58.6075	57.8425
875	6032.95	60.33125	59.54375
900	6205.32	62.055	61.245
925	6377.69	63.77875	62.94625
950	6550.06	65.5025	64.6475
975	6722.43	67.22625	66.34875
1000	6894.8	68.95	68.05
1100	7584.28	75.845	74.855
1200	8273.76	82.74	81.66
1300	8963.24	89.635	88.465
1400	9652.72	96.53	95.27
1500	10342.2	103.425	102.075
1600	11031.68	110.32	108.88
1700	11721.16	117.215	115.685
1800	12410.64	124.11	122.49
1900	13100.12	131.005	129.295
2000	13789.6	137.9	136.1
2500	17237	172.375	170.125
3000	20684.4	206.85	204.15
3500	24131.8	241.325	238.175
4000	27579.2	275.8	272.2
4500	31026.6	310.275	306.225
5000	34474	344.75	340.25
5500	37921.4	379.225	374.275
6000	41368.8	413.7	408.3
6500	44816.2	448.175	442.325
7000	48263.6	482.65	476.35
7500	51711	517.125	510.375
8000	55158.4	551.6	544.4
8500	58605.8	586.075	578.425
9000	62053.2	620.55	612.45
9500	65500.6	655.025	646.475
10,000	68947.6	689.48	680.46
15,000	103,421.4	1,034.21	1,020.69
20,000	137,895.1	1,378.95	1,360.9
40,000	275,790.3	2,757.9	2,721.84

LENGTH CONVERSIONS

mm inches

0.12 .005"
0.15 .006"
0.25 .010"

0.40 .016"
0.50 .020"
0.75 .030"

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

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

7.0 .276"
10.0 .400"

inches mm

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

1/4" 6.4
3/8" 9.5
1/2" 12.7
1" 25.4

TEMPERATURE CONVERSIONS

°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

GENERAL REFERENCE

REGULATIONS



As a worldwide supplier of products for the analytical instrument market, we work hard to make sure those products comply with regulatory requirements around the world. All machined products (valves, fittings, etc.) are fully RoHS/REACH/WEEE* compliant. Most of the electrical products we manufacture are also CE tested and certified. Only a few legacy products are not CE certified.

Following is a list of items in this catalog which are **not** CE and/or RoHS compliant:

Cheminert® flanging tools	page 70
Cheminert starter kits	70
Digital valve interface	
DVI	199
DVI-220	199
Diluter/dispenser, M series	82
Dynacalibrator® Model 120	230
G-calibrators (all)	233
Heated valve enclosures (all)	201
Heated column enclosures (all)	203
Heater assemblies and cartridges (all)	202
Instrumentation temperature controller	
ITC10399	203
ITC10399-200	203

* CE	Conformité Européenne (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	Purification of CO ₂
6,099,619	
5,858,068	
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	Pulsed discharge detectors
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	
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

Cheminert	Valco Instruments Co. Inc. and VICI AG International
Condyne	VICI Metronics Inc.
Delrin	E.I. duPont de Nemours
Dynacal	VICI Metronics Inc.
Dynacalibrator	VICI Metronics Inc.
Fortron	Fortron Industries Corp.
Hamilton	Hamilton Company
Hastelloy C	Haynes International Inc.
HayeSep	Hayes Separations, Inc.
IBM	International Business Machines
Inconel 600	Huntington Alloys, Inc.
Kalrez	DuPont Dow Elastomers
Kel-F	3M Company
Kynar	Elf Atochem North America Inc.
Metronics	VICI Metronics Inc.
Micro-Flo	Valco Instruments Co. Inc.
Mininert	Valco Instruments Co. Inc.
Monel	Inco Alloys Intl Inc.
Nanovolume	Valco Instruments Co. Inc.
Nickel 200	Inco Alloys Intl Inc
Nitronic	AK Steel Corporation
Parker	Parker Hannifin Co.
PEEK	Victrex Manufacturing Ltd.
Perifit	Valco Instruments Co. Inc.
Pressure-Flo	Valco Instruments Co. Inc.
Pressure-Lok	Valco Instruments Co. Inc.
Ryton	Phillips Petroleum Co.
Swagelok	Crawford Fitting Company
Teflon	E.I. duPont de Nemours
Tefzel	E.I. duPont de Nemours
Tygon	Saint-Gobain Performance Plastics
Valco	Valco Instruments Co. Inc. and VICI AG International
ValcoBond	Valco Instruments Co. Inc.
ValcoPLOT	Valco Instruments Co. Inc.
Vespel	E.I. duPont de Nemours
Viton	DuPont Performance Elastomers
VICI	Valco Instruments Co. Inc. and VICI AG International
VICI Jour	Valco Instruments Co. Inc. and VICI AG International
Waters	Waters Associates

GENERAL REFERENCE



Cheminert valve product numbers all begin with the valve model (C1, C22, C25Z, C72MU, etc.) and a hyphen. Following the 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			(HYPHEN)	
1. Required.			2. Required.	
UHPLC injectors C72MH 10k psi Nanovolume® injector, 360 µm fittings C72MX 15k psi Nanovolume® injector, 360 µm fittings C72MU 20k psi Nanovolume® injector, 360 µm fittings C72NH 10k psi Nanovolume® injector, 1/32" fittings C72NX 15k psi Nanovolume® injector, 1/32" fittings C72NU 20k psi Nanovolume® injector, 1/32" fittings C74NX 15 psi Nanovolume® internal sample injector, 1/32" fittings C72H 10k psi Microbore injector C72X 15k psi Microbore injector C72U 20k psi Microbore injector C74H 10k psi Internal sample injector C74X 15k psi Internal sample injector HPLC injectors C2N 5k psi Nanovolume® injector, 1/32" fittings C4N 5k psi Nanovolume® internal sample injector, 1/32" fittings C1 5k psi Through-the-handle injector C1CF 5k psi Continuous flow through-the-handle injector C2 5k psi Microbore/analytical valve C4 5k psi Internal sample injector C6 5k psi Continuous flow injector			Low pressure injectors C22Z Injector with Valco ZDV fittings C22 Injector with 1/4-28 fittings C24Z Internal sample injector, Valco ZDV fittings C24 Internal sample injector, 1/4-28 fittings UHPLC selectors C75NH 10k psi Nanovolume® selector, 1/32" fittings C75NX 15k psi Nanovolume® selector, 1/32" fittings C75NU 20k psi Nanovolume® selector, 1/32" fittings C75H 10k psi Microbore selector C75X 15k psi Microbore selector C75U 20k psi Microbore selector HPLC selectors C5 5k psi Stream selector Low pressure selectors C25Z Stream selector, Valco ZDV fittings C25 Stream selector, 1/4-28 fittings C25G Stream selector, Cheminert fittings C45 Stream selector, 1/2-20 fittings <i>Note: All valves have 1/16" Valco ZDV fittings unless otherwise noted.</i>	Place a hyphen after the Cheminert valve type.
OEM injectors C2V 5k psi Vertical port injector C3 5k psi Centered port injector C52 5k psi HPLC integrated motor/valve C52V 5k psi HPLC integrated motor/valve with vertical port injector C62Z Low pressure integrated motor/valve, Valco ZDV fittings C62 Low pressure integrated motor/valve, 1/4-28 fittings			OEM selectors C55 5k psi HPLC integrated motor/valve selector C65Z Low pressure integrated motor/valve selector, Valco ZDV fittings C65 Low pressure integrated motor/valve selector, 1/4-28 fittings	

Examples:

C1 - 1 3 4 6**C1-1346:**C1 through-the-handle injector, 0.25 mm ports,
Valcon E rotor, PAEK stator, 6 ports, manual (blank = manual)**C5 - 2 0 0 6 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

PORT SIZE	ROTOR MATERIAL	STATOR MATERIAL	PORTS / POSITIONS	INTERNAL SAMPLE SIZE	ACTUATOR
3. Required.	4. Required.	5. Required.	6. Required.	7. Optional. For internal sample inj.	8. Required.
0 0.15 mm (.006")	0 Valcon H	0 Nitronic 60	Ports (Two position)	.004 0.004 µl (4 nl)	Air A 0-70°C
1 0.25 mm (.010")	1 Valcon E2	1 CTFE	4 4	.01 0.01 µl (10 nl)	Microelectric, two position
2 50 µm (.002")* or 0.40 mm (.016")	2 Valcon T	2 Hastelloy C **	6 6	.02 0.02 µl (20 nl)	EQ • highest speed
3 0.75 mm (.030")	3 Valcon E	3 Titanium **	8 8	.05 0.05 µl (50 nl)	EH • high speed
4 100 µm (.004")* or 1.00 mm (.040")	4 Valcon M	4 PAEK	0 10	.1 0.1 µl	EP • medium torque
5 1.25 mm (.050")	5 [not used]	5 Valcon E4	Positions (Selectors)	.2 0.2 µl	ED • high torque
6 150 µm (.006")* or 1.50 mm (.060")	6 Valcon E3	6 [not used]	4 4	.5 0.5 µl	ET • highest torque
7 2.00 mm (.080")	7 Valcon TF	7 PVDF (low pressure)	6 6	1 1.0 µl	Microelectric, for selectors
8 3.18 mm (.125")	8 Valcon P	Coated stainless ***	8 8	2 2.0 µl	EMH • high speed
9 4.60 mm (.180")	9 Valcon X	8 PPS	0 10	Put a hyphen (-) before the sample size in the product number.	EMT • high torque
* for nanovolume valves		9 Coated stainless	14 14		Universal See chart below.
		** These stator materials are coated when in a C72 / C74 / C75 series valve	20 20		Manual [blank] (no code letter; shipped with knob)
		*** Stator code "7" indicates coated stainless for C72 / C74 / C75 series valves	24 24		Driver only D (for use with existing actuator)
			26 26		
			28 28		

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	Medium speed/ medium torque	High torque
Without interface	EUH	EUD	EUT
With RS-232/485	EUHA	EUDA	EUTA
With USB	EUHB	EUDB	EUTB
With BCD	EUHC	EUDC	EUTC

GENERAL REFERENCE



The simplest way to determine a **Valco two position valve** product number is to call our sales department and discuss the features you require. But if you want to decipher an existing product number, refer to this chart and the examples on the facing page for guidelines. (Keep in mind that some combinations are not possible, so check with sales for your actual requirements.)

Every letter and number has a meaning in its proper order and sequence. The shaded columns indicate codes that are required in every product number, and the non-shaded columns offer possibilities of optional features.

NOTE!

This chart is for decoding existing product numbers, **not** for inventing new ones. Some options can not work with certain valve types and designs!

ACTUATOR	STANDOFF ASSEMBLY LENGTH	BORE SIZE	FITTINGS SIZE	INTERNAL SAMPLE INJECTOR
1. Required. Valve is shipped with manual knob unless specified otherwise.	2. Optional. Specify if required.	3. Optional. For standard bore, leave blank.	4. Required. For 1/8" fittings, leave blank.	5. Optional. Requires 4 ports. Also specify sample size (10.)
Air A 0-70°C AT 50-150°C Microelectric EH • high speed EP • medium torque ED • high torque ET • highest torque Universal See chart below. Manual [blank] (no code letter; wshipped with knob) Driver only D (for use with existing actuator)	2 2" standoff 3 3" standoff 4 4" standoff 6 6" standoff	[blank] Standard bore L Large bore	N 1/32" C 1/16" [blank] 1/8" VL 1/4"	I

UNIVERSAL ACTUATORS

	High speed	Medium speed/ medium torque	High torque
Without interface	EUH	EUD	EUT
With RS-232/485	EUHA	EUDA	EUTA
With USB	EUHB	EUDB	EUTB
With BCD	EUHC	EUDC	EUTC

Note: Valco valve product numbers require "-" (hyphen) after the universal actuator code.

Examples:

4 N 8 W T**4N8WT:**

Manual (blank = manual), 4" standoff, standard bore, 1/32" valve, 8 ports, W type, Valcon T rotor, standard Nitronic 60 body

EH C I 4 W E .1**EHCI4WE.1:**

Microelectric actuator, no standoff assembly, standard bore, 1/16" valve, internal sample, 4 ports, W type, Valcon E rotor, standard N60 body, 0.1 µl sample

A 3 6 UW 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- 2 L 6 UW E**EUDC-2L6UWE:**

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	VALVE TYPE	ROTOR MATERIAL	SPECIAL BODY MATERIAL	INTERNAL SAMPLE SIZE
6. Required.	7. Required.	8. Required.	9. Optional. Body material is Nitronic 60 SS unless specified otherwise.	10. Optional. Also specify "I" at Item 5.
3	W	[blank] Valcon H	S6 Type 316 SS	.06 0.06 µl
4	UW	E Valcon E	HC Hastelloy C	.1 0.1 µl
6	MW	E2 Valcon E2	IN Inconel 600	.2 0.2 µl
8		M Valcon M	M4 Monel 400	.5 0.5 µl
10		P Valcon P	NI Nickel 200	1 1.0 µl
12		R Valcon R	N5 Nitronic 50	2 2.0 µl
14		T Valcon T	TI Titanium	Put a hyphen (-) before the sample size in the product number.
		TF Valcon TF		

TECH TIP

The letter "C" after number of ports specifies smaller bore than standard.

Example:

DC6CW,
bore size 0.25 mm

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!

GENERAL REFERENCE



Product numbers for **Valco selectors**, like those for two position valves, are composed of letters and numbers which have their meaning based on the position in the product number. The simplest way to determine a Valco valve product number is to call our sales department and discuss the features you require. The chart below and the examples opposite may help decode the product number you have,

or direct you toward all the features you must specify for a selector. (Keep in mind that some combinations are not possible, so check with sales for your actual requirements.)

The shaded columns indicate codes that are required in every product number, and the non-shaded columns offer possibilities of optional features.

NOTE!

This chart is for decoding existing product numbers, **not** for inventing new ones. Some options can not work with certain valve types and designs!

ACTUATOR	STANDOFF ASSEMBLY LENGTH	BORE SIZE	FITTINGS SIZE	FLOWPATH
1. Required. Valve is shipped with manual knob unless specified otherwise.	2. Optional. Specify if required.	3. Optional. For standard bore, leave blank.	4. Required. For 1/8" fittings, leave blank.	5. Required.
Air A 0-70°C AH high torque AT 50-150°C Microelectric EMH • high speed EMT • high torque Universal See chart below. Manual [blank] (not recommended) Driver only D (for use with existing actuator)	2 2" standoff 3 3" standoff 4 4" standoff 6 6" standoff	[blank] Standard bore L Large bore	C 1/16" [blank] 1/8" VL 1/4"	SD SC SF ST STF

UNIVERSAL ACTUATORS

	High speed	Medium speed/ medium torque	High torque
Without interface	EUH	EUD	EUT
With RS-232/485	EUHA	EUDA	EUTA
With USB	EUHB	EUDB	EUTB
With BCD	EUHC	EUDC	EUTC

Note: Valco valve product numbers require "-" (hyphen) after the universal actuator code.

Examples:

A 2 VL SC 6 MW E2**A2VLSC6MWE2:**

Air actuated, 2" standoff, 1/4" valve, SC flowpath, 6 positions, MW type, Valcon E2 rotor, standard Nitronic 60 body

UMT 4 C SD 4 UW**UMT4CSD4UW:**

Modular universal actuator, 4" standoff, 1/16" valve, SD flowpath, 4 positions, UW type, Valcon E (blank = E) rotor, standard N60 body

EUT- 3 ST 10 MW T HC**EUT3ST10MWTHC:**

Universal actuator with no interface, 3" standoff, 1/8" (blank = 1/8") valve, ST flowpath, 10 positions, MW type, Valcon T rotor, Hastelloy C body

NUMBER OF POSITIONS	VALVE TYPE	ROTOR MATERIAL	SPECIAL BODY MATERIAL
6. Required.	7. Required.	8. Required.	9. Optional. Body material is Nitronic 60 SS unless specified otherwise.
4	MW	[blank] Valcon E	S6 Type 316 SS
6	Low pressure	E Valcon E	HC Hastelloy C
8	UW	E2 Valcon E2	IN Inconel 600
10	high pressure	M Valcon M	M4 Monel 400
12		P Valcon P	NI Nickel 200
16		R Valcon R	N5 Nitronic 50
		T Valcon T	TI Titanium
		TF Valcon TF	

TECH TIP

The letter "C" after number of ports specifies smaller bore than standard.

Example:

DCSD6**C**MWE,
bore size 0.25 mm

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!

Index by product number

GENERAL REFERENCE

.2FR.5-5.....	53, 60	2FR4HC-10.....	45, 53	4C6WT.....	110	A2NI4WE.1.....	104
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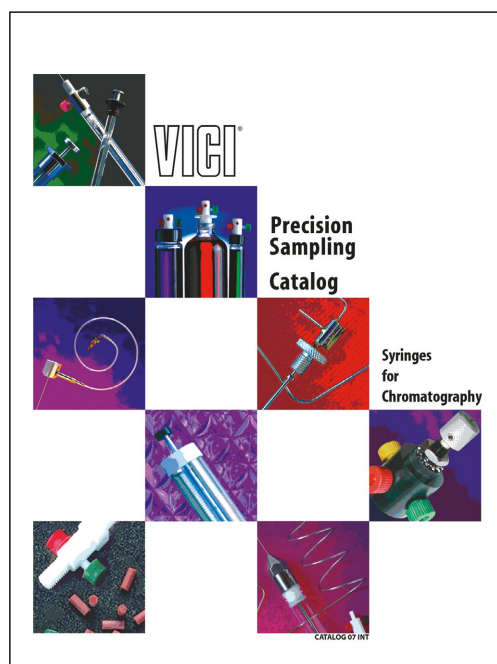


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