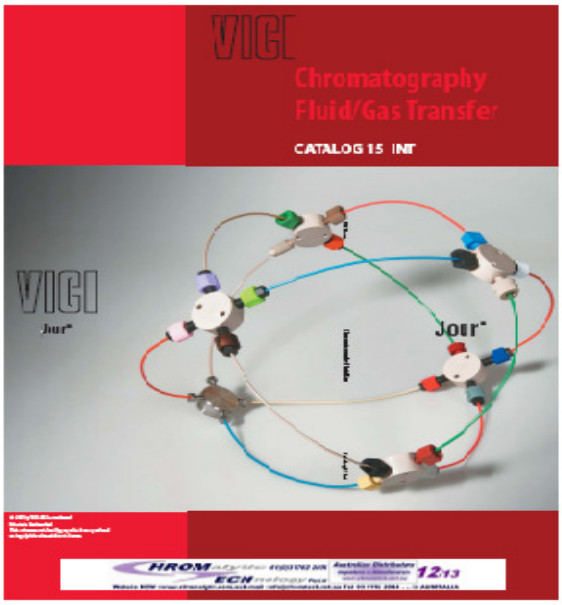
# Fittings - Chromatography



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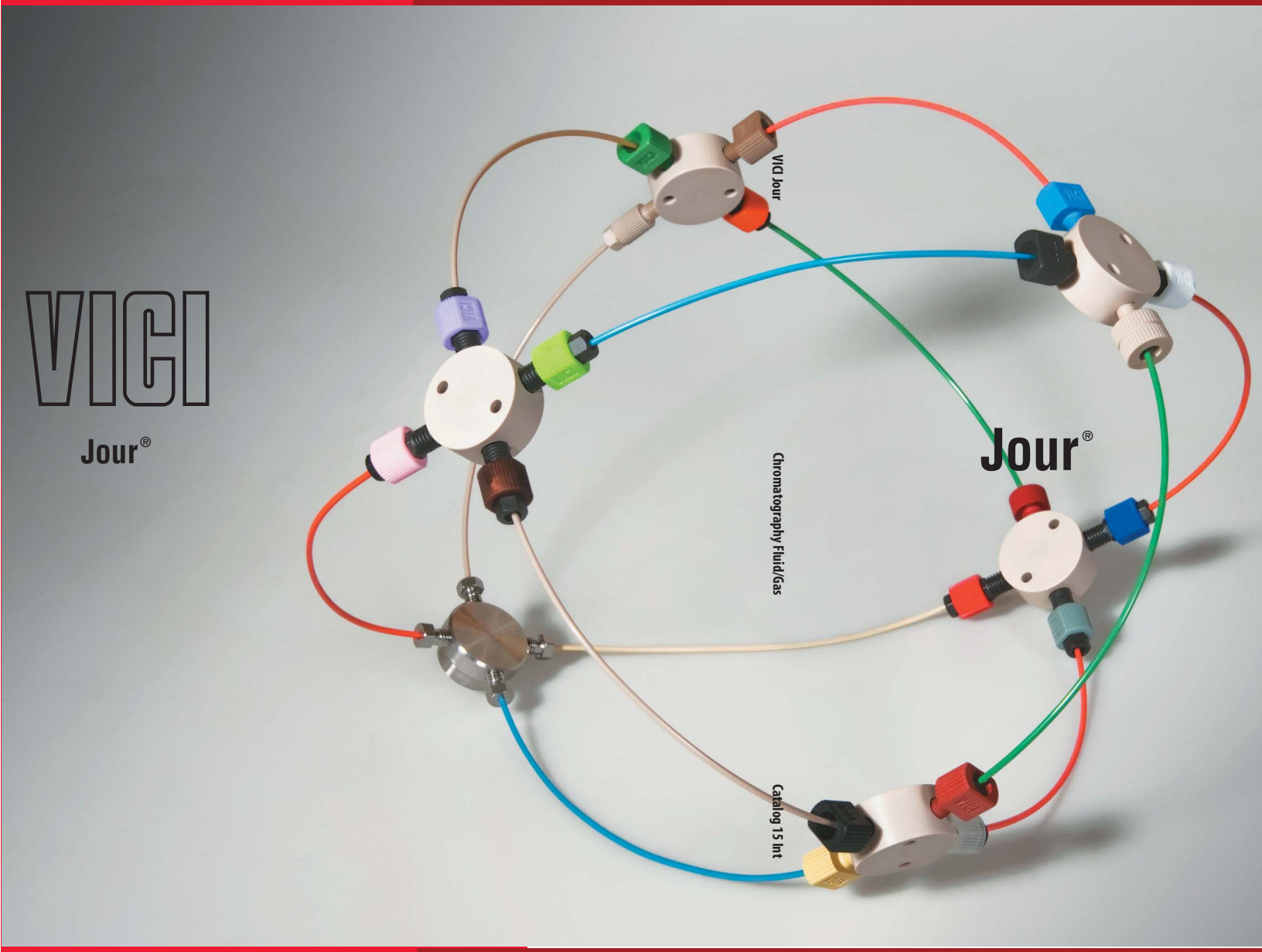
VICI

# Chromatography Fluid/Gas Transfer

## CATALOG 15 INT

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Jour®

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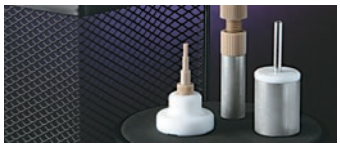
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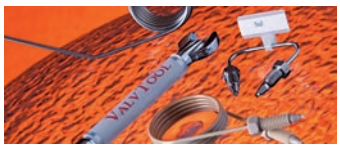
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**NOTE**
Our products could also be available from your local disributor. Please contact VICI AG International for other countries.

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## VICI AG International

VICI Jour has been a part of VICI AG International in Switzerland since 2004. The complete Jour line of accessories and consumables for fluid transfer in GC and LC is available from VICI AG International, VICI Valco Canada, VICI Precision Sampling, and through our international distributor network.

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.

VICI AG International has obtained the ISO certificate to the standard of 9001:2008, and is the first ISO-certified manufacturer of high pressure and low pressure valves for scientific equipment.

## VICI Jour product line

Jour products include a complete line of tubing and capillaries in a wide variety of diameters and materials, high and low pressure fingertight fittings and connection accessories, column hardware, high and low pressure filters, cutters and other tools, backpressure regulators, and much more.

We offer accessories and consumables for fluid transfer in GC and LC, including:

- Fittings - high pressure polymeric and stainless, Nanovolume® PEEK and stainless, and low pressure
- Tubing and sample loops
- Safety products and mobile phase handling systems
- Filters and frits
- PEEK columns and guard columns

IQNet

THE INTERNATIONAL CERTIFICATION NETWORK

CERTIFICATE

IQNet and SQS

VICI AG International
CH-6214 Schenkon

Certified area
Whole Company

Field of activity
Sales and Production of analytical components

has implemented and maintains a
Management System
which fulfils the requirements of the following standard

ISO 9001:2008

Certificate

VICI AG International
CH-6214 Schenkon

Certified area
Whole Company

Field of activity
Sales and Production of analytical components

Normative base
ISO 9001:2008 Quality Management System

VICI Jour now offers high quality, high pressure fittings, filters, and tubing for use in Ultra-High Performance Liquid Chromatography (UHPLC).

*Page 15* **Stainless steel tubing – premium grade** ***UHPLC***

- Seamless Type 316 stainless steel
- Variety of sizes for UHPLC, HPLC, and GC applications
- Smooth internal surface
- Soft annealed OD for easy ferrule connections
- Available in 3 m and 10 m lengths

*Page 19* **PEEK one-piece hex-head fittings** ***NEW*** ***UHPLC***

- Made of special PEEK HT™ for better pressure resistance
- One-piece – no ferrule required
- Biocompatible

*Page 22* **PEEK ferrules** ***NEW*** ***UHPLC***

- Biocompatible 1/16" ferrule for ultra-high pressures
- Alternative to titanium ferrules in applications with titanium valves
- Excellent in combination with stainless nuts

*Pages 38-39* **Nanovolume® 360 micron fittings** ***UHPLC***

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

Our high pressure fittings permit direct connection of 360 micron OD fused silica, PEEK, stainless, or electroformed nickel tubing without the use of liners.

*Pages 31, 32* **Valco® stainless steel nuts and ferrules** ***UHPLC***

- Excellent fit to Valco fitting details
- Different lengths available

These fittings are for use with all standard Valco internal fittings and most valves. They may be used with fittings from other manufacturers as well. 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.

*Page 32* **Stainless steel plugs and caps** ***UHPLC***

- For 1/32", 1/16", and 1/8" OD tubing

Plugs close off an usused port in a valve, manifold, or HPLC column. Caps close off a tube with a ferrule and internal nut already made up.

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*Page 34* **Stainless steel unions** ***UHPLC***

- Choice of four bores: 0.15 mm, 0.25 mm, 0.50 mm, or 0.75 mm
- For 1/16" OD tubing

*Page 34* **Stainless steel reducing unions, imperial** ***UHPLC***

These reducing unions join 1/16" OD to 1/8" OD tubing.

*Page 35* **Stainless steel reducing unions, imperial to metric** ***NEW*** ***UHPLC***

- For 1 mm, 2 mm, and 3 mm OD tubing

With these new reducing unions, metric tubing can be connected to imperial fittings, valves, and chromatographic systems.

*Page 33* **Stainless steel tees and crosses** ***UHPLC***

- For 1/16" OD tubing
- 0.25 mm, 0.50 mm, and 0.75 mm bores

*Page 56* **Stainless steel precolumn filter** **NEW** ***UHPLC***

- Fewer connections compared to in-line filters
- Works with 1/16" column connections from all manufacturers
- Three porosity options: 0.5 µm, 2 µm, and 5 µm

The design of this precolumn filter reduces the number of connections compared to a standard in-line filter, increasing the stability and reducing the potential of leakage.

*Page 57* **Stainless steel in-line filter** ***UHPLC***

- Minimized hold-up volume
- Two bores for analytical and semi-prep flow rates
- Three porosity options: 0.5 µm, 2 µm, and 5 µm

The stainless steel in-line filter has virtually no hold-up volume and can be used in various applications without significant band broadening or loss of efficiency.

*Page 90* **Stainless steel starter kit** ***UHPLC***

The kit consists of stainless fittings, ferrules, tubing, and solvent filters, as well as a union, our cutting-wheel type metal tubing cutter, and other useful items like our ValvTool. All boxed together for a very competitive price.

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# Tubing

## METAL AND POLYMERIC

We offer chromatography grade tubing in a variety of polymers as well as stainless steel. Outside diameters are 360 µm, 1/32", 1/16", 1/8", and 1/4".

## Tubing index


### PEEK tubing

Natural PEEK . . . . . page 5
Available in ODs from 360 micron to 1/4", in custom lengths (priced per meter) and packages of 3 and 10 meters.

Striped color-coded PEEK . . . . . 6
A stripe is added to the outside of the tubing, so dye never contacts the fluid stream.

Dual-layer PEEK . . . . . 7
With an inner layer of natural PEEK and an outer layer of color-coded PEEK, there is no possibility of stream contents coming in contact with coloring agents.

Solid color-coded PEEK. . . . . 8
Color coding identifies the ID or your PEEK tubing. Each ID is coded with a different color.

### Other polymeric tubing

ETFE . . . . . 9

FEP
- Solid color-coded . . . . . 10
- Natural . . . . . 11

PFA . . . . . 9

PTFE
- Solid color-coded . . . . . 12
- Natural . . . . . 12

Thermo-formed polymeric tubing . . . . . 13

Impermeable tubing . . . . . 13
FEP coated with PVDF combines the chemical resistance of FEP with the tight, impermeable structure of PVDF.

### Stainless steel tubing

Pre-cut SS tubing
- Pre-cut tubing . . . . . 14
- Flexible pre-cut tubing . . . . . 14
  1/32" tubing with 1/16" ends.

Bulk SS tubing
- Premium grade, seamless . . . . . 15
- Standard grade, welded seam . . . . . 15


**DISCLAIMER**

The maximum holding pressure for any type of connections involving tubing and a ferrule varies considerably with the tubing material, the ferrule material, the clearance between tubing OD and ferrule ID, and the shape of the fitting detail.

**RELATED PRODUCTS**


SolviFlex coiled tubing . . . . . 70

**Tubing tools and accessories**

Easy-Flange kit . . . . . 85
Easy-Flange combi kit . 85
PEEK tubing elbows . . . 86
Tubing cutters for polymeric tubing
- Clean-cut . . . . . 86
- Guillotine. . . . . 86

Tubing cutters for stainless tubing
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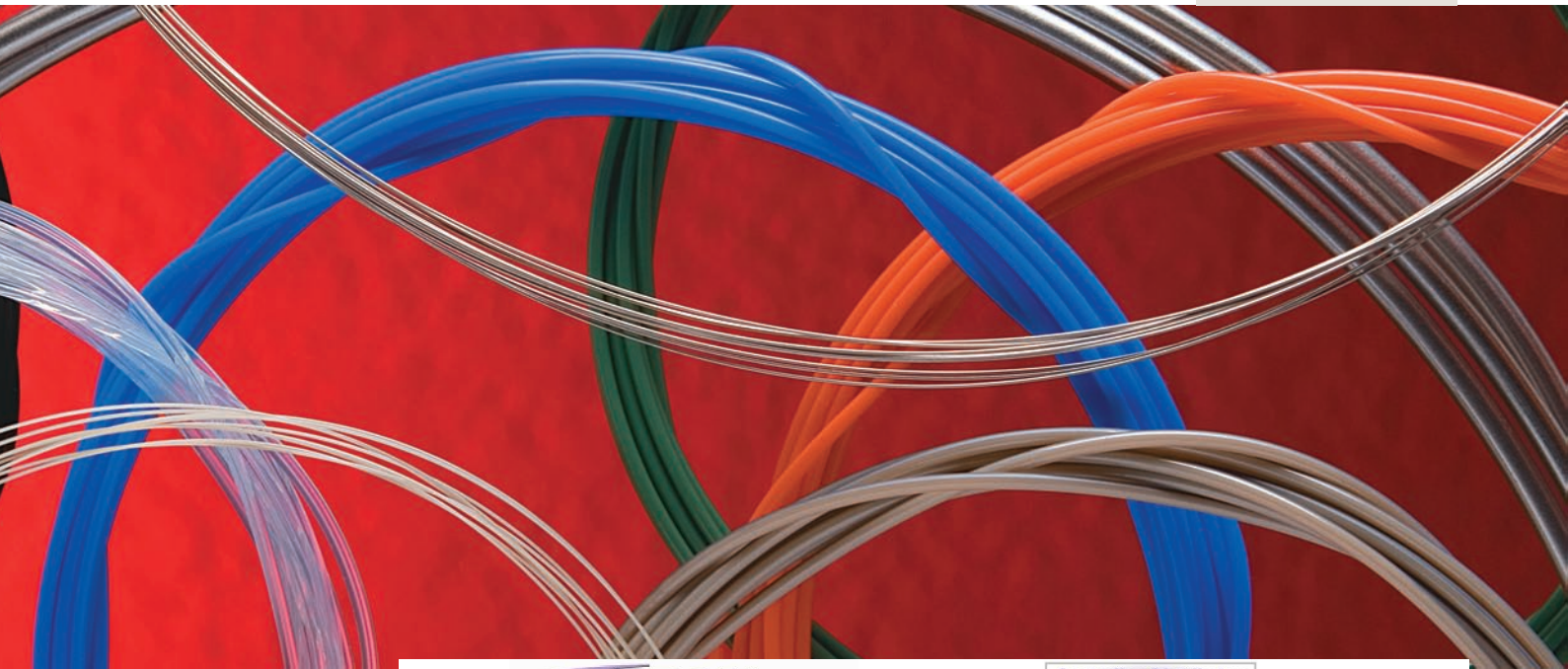
Tubing clip – the LC tubing organizer. . . . . 86



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VICI offers natural and color-coded 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.

### PEEK TUBING TOLERANCES

Due to tighter tolerances, VICI Jour PEEK tubing is the best choice for chromatography applications in which exact flow rates or tube volume are of importance. The tighter tolerance ensures a more consistent internal volume of transfer lines.

| Tubing OD | OD (±) (mm) | ID (±) (mm) |
|---|---|---|
| 360 µm | 0.025 | 0.013 |
| 1/32" | 0.025 | 0.013 |
| 1/16" * | 0.025 | 0.013 |
| 1/16" ** | 0.025 | 0.025 |
| 1/8" | 0.05 | 0.05 |

* For ID up to 0.25 mm
** For ID over 0.25 mm

### OPTIONS

Contact your distributor for more information about:

- Longer bulk tubing lengths
- Customized ODs and IDs (30 m minimum quantity)

### TECH TIP

- A clean burr-free perpendicular cut can be achieved with our Clean-Cut tubing cutter . . . . . 86
- To bend PEEK tubing at the optimal radius, use our tubing elbows. . . 86

### MORE INFORMATION

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### RELATED PRODUCTS

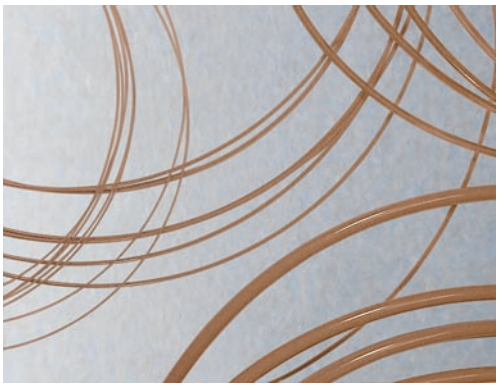
Clean-cut tubing cutter . . . . . 86
Easy-Flange kit . . . . . 85
PEEK fittings
High pressure . . . . 19-29
Low pressure . 42, 44-47
PEEK tubing elbows . . . 86

## PEEK tubing – natural

| Qty/pkg: OD | ID | 3 m Product No. | 10 m Product No. | per meter Product No. |
|---|---|---|---|---|
| 360 µm | 75 µm | JR-T-6060-M3 | JR-T-6060-M10 | — |
| 1/32" | 0.13 mm | JR-T-5993-M3 | JR-T-5993-M10 | — |
| 1/16" | 0.064 mm | JR-T-5998-M3 | JR-T-5998-M10 | — |
| 1/8" | 0.75 mm | JR-T-6004-M3 | JR-T-6004-M10 | — |
| | 1.59 mm | JR-T-60041-M3 | JR-T-60041-M10 | — |
| | 2.00 mm | JR-T-60042-M3 | JR-T-60042-M10 | — |
| 1/4" | 3.17 mm | — | — | JR-T-6006 |

### SPECS

- Maximum recommended working temp: 100°C (continuous) for 1/16" OD tubing with ID up to 0.75 mm
- Max working pressures: see page 94
- Tubing tolerances: see page 95



**Natural PEEK tubing**
shown with ODs of 1/8", 1/16", 1/32", and 360 µm

### WHICH PEEK TUBING FOR WHICH APPLICATION?

| Application | Tubing |
|---|---|
| Standard HPLC* | 1/16" OD x 0.25 mm ID |
| High pressure semi-prep LC* | 1/8" OD |
| Agilent 1100 LC systems** | 1/32" |
| Most capillary systems | 360 µm |

* Smaller ID for low flow rates/higher ID for high flow rates. Note that a low linear flow rate (cm/min) causes peak broadening.
** For some 1100 LC systems with high pressure flow paths

### TECH TIP: STRAIGHTENING PEEK TUBING

1. Start with stainless steel tubing:
   ID slightly larger than OD of PEEK
   Length = 2 cm shorter than PEEK
2. Slide PEEK tubing into stainless tubing, extending 1 cm out each end of the stainless
3. Place sleeved PEEK tubing into oven:
   220°C for 30 minutes, or
   180°C for 60 minutes
4. Allow sleeved tubing to cool in oven to ambient temperature
5. Once tubing is cooled, remove PEEK tubing from the SS sleeve
6. Check for straightness
7. Repeat if necessary

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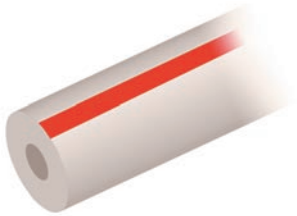
## Striped color-coded PEEK tubing

### SPECS

- Maximum recommended working temp: 100°C (continuous) for 1/16" OD tubing with ID up to 0.75 mm
- Max working pressures: see page 94
- Tubing tolerances: see page 95

We recommend striped PEEK tubing for easy color-coded identification of tubing ID, with maximum chemical resistance and biocompatibility. The stripe is added to the outside, so dye never contacts the fluid stream.

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



| Qty/pkg: | | | 1 m | 3 m |
|---|---|---|---|---|
| *Tubing OD* | *Color* | *ID (µm)* | *Product No.* | *Product No.* |
| 360 µm | Orange | 50 | JR-T-3650-M1 | JR-T-3650-M3 |
| | Green | 75 | JR-T-3675-M1 | JR-T-3675-M3 |
| | Grey | 100 | JR-T-36100-M1 | JR-T-36100-M3 |
| | Red | 125 | JR-T-36125-M1 | JR-T-36125-M3 |
| | Black | 150 | JR-T-36150-M1 | JR-T-36150-M3 |

| | | | 1 m | 3 m |
|---|---|---|---|---|
| | *Color* | *ID (mm)* | *Product No.* | *Product No.* |
| 1/32" | Orange | 0.050 | JR-T-5702-M1 | JR-T-5702-M3 |
| | Pink | 0.064 | JR-T-5764-M1 | JR-T-5764-M3 |
| | Green | 0.075 | JR-T-5703-M1 | JR-T-5703-M3 |
| | Black | 0.100 | JR-T-5704-M1 | JR-T-5704-M3 |
| | Red | 0.13 | JR-T-5705-M1 | JR-T-5705-M3 |
| | Yellow | 0.18 | JR-T-5707-M1 | JR-T-5707-M3 |
| | Orange | 0.20 | JR-T-5608-M1 | JR-T-5608-M3 |
| | Blue | 0.25 | JR-T-5710-M1 | JR-T-5710-M3 |
| | Orange | 0.50 | JR-T-5720-M1 | JR-T-5720-M3 |

| | | | 3 m | 5m |
|---|---|---|---|---|
| | *Color* | *ID (mm)* | *Product No.* | *Product No.* |
| 1/16" | Orange | 0.050 | JR-T-5802-M3 | JR-T-5802-M5 |
| | Pink | 0.064 | JR-T-5998C-M3 | JR-T-5998C-M5 |
| | Green | 0.075 | JR-T-5803-M3 | JR-T-5803-M5 |
| | Black | 0.10 | JR-T-5804-M3 | JR-T-5804-M5 |
| | Red | 0.13 | JR-T-5999-M3 | JR-T-5999-M5 |
| | Yellow | 0.18 | JR-T-6000-M3 | JR-T-6000-M5 |
| | Blue | 0.25 | JR-T-6001-M3 | JR-T-6001-M5 |
| | Orange | 0.50 | JR-T-6002-M3 | JR-T-6002-M5 |
| | Green | 0.75 | JR-T-6003-M3 | JR-T-6003-M5 |
| | Grey | 1.00 | JR-T-60031-M3 | JR-T-60031-M5 |
| | Black | 1.40 | JR-T-60032-M3 | JR-T-60032-M5 |

| | | | 10 m | 25m |
|---|---|---|---|---|
| | *Color* | *ID (mm)* | *Product No.* | *Product No.* |
| | Orange | 0.050 | JR-T-5802-M10 | JR-T-5802-M25 |
| | Pink | 0.064 | JR-T-5998C-M10 | JR-T-5998C-M25 |
| | Green | 0.075 | JR-T-5803-M10 | JR-T-5803-M25 |
| | Black | 0.100 | JR-T-5804-M10 | JR-T-5804-M25 |
| | Red | 0.13 | JR-T-5999-M10 | JR-T-5999-M25 |
| | Yellow | 0.18 | JR-T-6000-M10 | JR-T-6000-M25 |
| | Blue | 0.25 | JR-T-6001-M10 | JR-T-6001-M25 |
| | Orange | 0.50 | JR-T-6002-M10 | JR-T-6002-M25 |
| | Green | 0.75 | JR-T-6003-M10 | JR-T-6003-M25 |
| | Grey | 1.00 | JR-T-60031-M10 | JR-T-60031-M25 |
| | Black | 1.40 | JR-T-60032-M10 | JR-T-60032-M25 |

### TECH TIP

VICI Jour sample loops for analytical applications are made of PEEK striped color-coded tubing.

PEEK loops . . . . . 81

### OPTIONS

Contact your distributor or VICI about:

- Longer bulk tubing lengths
- Customized ODs and IDs (30 m minimum quantity)

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## Dual layer color-coded PEEK tubing

- Inner layer of natural PEEK, outer layer of color-coded PEEK
- No possibility of stream coming in contact with coloring agents
- Pressure performance equivalent to single layer tubing
- 1/16" OD, IDs from 0.10 to 0.75 mm

**SPECS**
- Maximum recommended working temp: 100°C (continuous)
- Max working pressures: see page 94
- Tubing tolerances: see page 95

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

The ID tolerance of ±0.025 mm (.001") is equivalent to or better than that of tubing typically sold as premium grade.

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

| **Qty/pkg:** | | | | | **3 m** | **10 m** | **25 m** |
|---|---|---|---|---|---|---|---|
| *Tubing OD* | *Color* | *ID (mm)* | *bar* | *psi* | *Product No.* | *Product No.* | *Product No.* |
| 1/16" | Black | 0.10 | 460 | 6700 | JR-TD-5804-M3 | JR-TD-5804-M10 | JR-TD-5804-M25 |
| | Red | 0.13 | 420 | 6100 | JR-TD-6007-M3 | JR-TD-6007-M10 | JR-TD-6007-M25 |
| | Yellow | 0.18 | 400 | 5800 | JR-TD-6008-M3 | JR-TD-6008-M10 | JR-TD-6008-M25 |
| | Blue | 0.25 | 386 | 5600 | JR-TD-6009-M3 | JR-TD-6009-M10 | JR-TD-6009-M25 |
| | Orange | 0.50 | 350 | 4500 | JR-TD-6010-M3 | JR-TD-6010-M10 | JR-TD-6010-M25 |
| | Green | 0.75 | 240 | 3500 | JR-TD-6011-M3 | JR-TD-6011-M10 | JR-TD-6011-M25 |

**OPTIONS AND MORE INFORMATION**
See facing page.

**RELATED PRODUCTS**
Solid color-coded PEEK tubing . . . . . 8

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## Solid color-coded PEEK tubing

### SPECS

- Maximum recommended working temp: 100°C (continuous) for 1/16" OD tubing with ID up to 0.75 mm
- Max working pressures: see page 94
- Tubing tolerances: see page 95

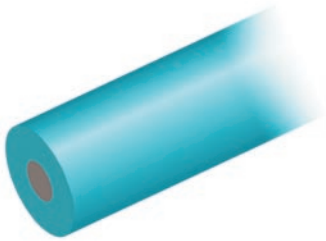
Color-coding identifies the ID of your PEEK tubing – each ID is coded with a different color. Solid colored tubing is made of pre-dyed raw material.

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

| **Qty/pkg:** | | | **1 m** | **3 m** | **10 m** |
|---|---|---|---|---|---|
| *Tubing OD* | *Color* | *ID (µm)* | *Product No.* | *Product No.* | *Product No.* |
| 360 µm | Orange | 50 | JR-T-3750-M1 | JR-T-3750-M3 | — |
| | Natural | 75 | — | JR-T-6060-M3 | JR-T-6060-M10 |
| | Green | 75 | JR-T-3775-M1 | JR-T-3775-M3 | — |
| | Grey | 100 | JR-T-37100-M1 | JR-T-37100-M3 | — |
| | Red | 125 | JR-T-37125-M1 | JR-T-37125-M3 | — |
| | Black | 150 | JR-T-37150-M1 | JR-T-37150-M3 | — |

| | | | **1 m** | **3 m** | **10 m** |
|---|---|---|---|---|---|
| | *Color* | *ID (mm)* | *Product No.* | *Product No.* | *Product No.* |
| 1/32" | Orange | 0.050 | JR-T-5602-M1 | JR-T-5602-M3 | — |
| | Pink | 0.064 | JR-T-5664-M1 | JR-T-5664-M3 | — |
| | Green | 0.075 | JR-T-5603-M1 | JR-T-5603-M3 | — |
| | Black | 0.100 | JR-T-5604-M1 | JR-T-5604-M3 | — |
| | Natural | 0.13 | — | JR-T-5993-M3 | JR-T-5993-M10 |
| | Red | 0.13 | JR-T-5605-M1 | JR-T-5605-M3 | — |
| | Purple | 0.15 | JR-T-5606-M1 | JR-T-5606-M3 | — |
| | Natural | 0.18 | — | JR-T-5994-M3 | JR-T-5994-M10 |
| | Yellow | 0.18 | JR-T-5607-M1 | JR-T-5607-M3 | — |
| | Orange | 0.20 | JR-T-5608-M1 | JR-T-5608-M3 | — |
| | Natural | 0.25 | — | JR-T-5995-M3 | JR-T-5995-M10 |
| | Blue | 0.25 | JR-T-5610-M1 | JR-T-5610-M3 | — |
| | Natural | 0.38 | — | JR-T-5715-M3 | JR-T-5715-M10 |
| | Orange | 0.50 | JR-T-5620-M1 | JR-T-5620-M3 | — |

| | | | **3 m** | **10 m** | **25 m** |
|---|---|---|---|---|---|
| | *Color* | *ID (mm)* | *Product No.* | *Product No.* | *Product No.* |
| 1/16" | Natural | 0.064 | JR-T-5998-M3 | JR-T-5998-M10 | JR-T-5998-M25 |
| | Black | 0.10 | JR-T-6020-M3 | JR-T-6020-M10 | JR-T-6020-M25 |
| | Red | 0.13 | JR-T-6007-M3 | JR-T-6007-M10 | JR-T-6007-M25 |
| | Purple | 0.15 | JR-T-6030-M3 | JR-T-6030-M10 | JR-T-6030-M25 |
| | Yellow | 0.18 | JR-T-6008-M3 | JR-T-6008-M10 | JR-T-6008-M25 |
| | Blue | 0.25 | JR-T-6009-M3 | JR-T-6009-M10 | JR-T-6009-M25 |
| | Grey | 0.38 | JR-T-6040-M3 | JR-T-6040-M10 | JR-T-6040-M25 |
| | Orange | 0.50 | JR-T-6010-M3 | JR-T-6010-M10 | JR-T-6010-M25 |
| | Green | 0.75 | JR-T-6011-M3 | JR-T-6011-M10 | JR-T-6011-M25 |



### TECH TIP

See our dual layer PEEK tubing for solid colored PEEK tubing with no possibility of stream coming into contact with coloring agents. . . . . 7

### OPTIONS

Contact your distributor or VICI about:

- Longer bulk tubing lengths
- Customized ODs and IDs (30 m minimum quantity)

### MORE INFORMATION

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### RELATED PRODUCTS

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Easy-Flange kit . . . . . 85
PEEK fittings
High pressure . . . . 19-29
Low pressure . 42, 44-47
PEEK tubing elbows . . . 86



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## ETFE tubing

ETFE (ethyltrifluoroethylene) tubing is particularly suitable for HPLC, since it has a higher burst pressure as compared to PTFE. 1/16" OD x 0.25 mm ID tubing will withstand up to 186 bar (2700 psi) with water as mobile phase. However, it is important to note that when used with organic solvents, ETFE tubing may swell, reducing that maximum pressure to 70 bar (1000 psi).

**SPECS**
- Max working pressures: see page 94
- Tubing tolerances: see page 95

This is the ideal polymer for applications with chloride salts, which typically corrode stainless steel.

| **Qty/pkg:** | | **3 m** | **10 m** | **25 m** |
|---|---|---|---|---|
| *Tubing OD* | *ID (mm)* | *Product No.* | *Product No.* | *Product No.* |
| 1/32" | 0.25 | JR-T-084-M3 | JR-T-084-M10 | JR-T-084-M25 |
| 1/16" | 0.18 | JR-T-078-M3 | JR-T-078-M10 | JR-T-078-M25 |
| | 0.25 | JR-T-080-M3 | JR-T-080-M10 | JR-T-080-M25 |
| | 0.50 | JR-T-082-M3 | JR-T-082-M10 | JR-T-082-M25 |
| | 0.75 | JR-T-083-M3 | JR-T-083-M10 | JR-T-083-M25 |
| | 1.00 | JR-T-085-M3 | JR-T-085-M10 | JR-T-085-M25 |
| 1/8" | 1.59 | JR-T-086-M3 | JR-T-086-M10 | JR-T-086-M25 |

| | | **1 m** | **3 m** |
|---|---|---|---|
| | *ID (mm)* | *Product No.* | *Product No.* |
| 3.0 mm | 1.0 | JR-T-087-M1 | JR-T-087-M3 |
| 6.0 mm | 4.0 | JR-T-088-M1 | JR-T-088-M3 |

**TECH TIP**
- When selecting tubing for low pressure applications, give careful consideration to gas permeability characteristics.
- Use PFA instead of PTFE if gas permeability is an issue.

**OPTIONS**

Contact your distributor or VICI about:
- Longer tubing lengths at competitive bulk prices
- Customized ODs and IDs (30 m minimum quantity)

**MORE INFORMATION**

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**RELATED PRODUCTS**

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Easy-Flange kit . . . . . 85
Low pressure fittings . . . . . 40-47
SolviFlex coiled PFA tubing . . . . . 70

## PFA tubing

PFA (perfluoroalkoxy) tubing from VICI Jour has excellent chemical stability and mechanical strength. 1/16" OD high purity tubing has a maximum pressure rating of up to 100 bar (1450 psi), while 1/8" OD tubing can be used at up to 72 bar (1050 psi).

**SPECS**
- Max working pressures: see page 94
- Tubing tolerances: see page 95

Always use PFA instead of PTFE if gas permeability is an issue.

| **Qty/pkg:** | | **1 m** | **3 m** |
|---|---|---|---|
| *Tubing OD* | *ID (mm)* | *Product No.* | *Product No.* |
| 360 µm | 50 µm | JR-T-43650-M1 | JR-T-43650-M3 |
| | 75 µm | JR-T-43675-M1 | JR-T-43675-M3 |
| | 100 µm | JR-T-436100-M1 | JR-T-436100-M3 |

| | | **3 m** | **10 m** | **25 m** |
|---|---|---|---|---|
| | *ID (mm)* | *Product No.* | *Product No.* | *Product No.* |
| 1/16" | 0.50 mm | JR-T-4001-M3 | JR-T-4001-M10 | JR-T-4001-M25 |
| | 0.75 mm | JR-T-4002-M3 | JR-T-4002-M10 | JR-T-4002-M25 |
| | 1.00 mm | JR-T-4007-M3 | JR-T-4007-M10 | JR-T-4007-M25 |
| 1/8" | 1.59 mm | JR-T-4003-M3 | JR-T-4003-M10 | JR-T-4003-M25 |

| | | **per meter** |
|---|---|---|
| | *ID (mm)* | *Product No.* |
| 1/8" | 1.70 mm | JR-T-4005 |
| 3/16" | 3.20 mm | JR-T-4009 |
| 1/4" | 4.35 mm | JR-T-4004 |



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## FEP tubing, solid color-coded

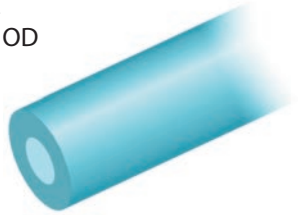
### SPECS

- Maximum recommended working temp: 80°C (continuous)
- Max working pressures: see page 94
- Tubing tolerances: see page 95

FEP (FluorinatedEthylenePropylene) tubing is chemically inert to most HPLC solvents, and is recommended for low pressure applications. Typically 1/16" OD tubing holds up to 117 bar (1700 psi), and 1/8" OD holds up to 70 bar (1000 psi).

Solid colors identify the tubing ID.

We recommend FEP for ion chromatography applications.



| Qty/pkg: | | | 3 m | 10 m | 25 m |
|---|---|---|---|---|---|
| *Tubing OD* | *Color* | *ID (mm)* | *Product No.* | *Product No.* | *Product No.* |
| 1/32" | Black | 0.10 | JR-T-6604C-M3 | JR-T-6604C-M10 | JR-T-6604C-M25 |
| | Red | 0.13 | JR-T-6605C-M3 | JR-T-6605C-M10 | JR-T-6605C-M25 |
| | Purple | 0.15 | JR-T-6606C-M3 | JR-T-6606C-M10 | JR-T-6606C-M25 |
| | Yellow | 0.18 | JR-T-6607C-M3 | JR-T-6607C-M10 | JR-T-6607C-M25 |
| | Blue | 0.25 | JR-T-6610C-M3 | JR-T-6610C-M10 | JR-T-6610C-M25 |
| | Orange | 0.50 | JR-T-6620C-M3 | JR-T-6620C-M10 | JR-T-6620C-M25 |
| | | | **3 m** | **10 m** | **25 m** |
| | *Color* | *ID (mm)* | *Product No.* | *Product No.* | *Product No.* |
| 1/16" | Black | 0.10 | JR-T-6704C-M3 | JR-T-6704C-M10 | JR-T-6704C-M25 |
| | Red | 0.13 | JR-T-6705C-M3 | JR-T-6705C-M10 | JR-T-6705C-M25 |
| | Purple | 0.15 | JR-T-6706C-M3 | JR-T-6706C-M10 | JR-T-6706C-M25 |
| | Yellow | 0.18 | JR-T-6707C-M3 | JR-T-6707C-M10 | JR-T-6707C-M25 |
| | Blue | 0.25 | JR-T-6812C-M3 | JR-T-6812C-M10 | JR-T-6812C-M25 |
| | Orange | 0.50 | JR-T-6802C-M3 | JR-T-6802C-M10 | JR-T-6802C-M25 |
| | Green | 0.75 | JR-T-6803C-M3 | JR-T-6803C-M10 | JR-T-6803C-M25 |
| | Black | 1.00 | JR-T-6806C-M3 | JR-T-6806C-M10 | JR-T-6806C-M25 |

### TECH TIP

When selecting tubing for low pressure applications, give careful consideration to gas permeability characteristics.

### OPTIONS

Contact your distributor or VICI about:

- Longer tubing lengths at competitive bulk prices
- Customized ODs and IDs (30 m minimum quantity)

### MORE INFORMATION

About FEP . . . . . 99
Chemical resistance 96-98
Maximum working pressure . . . . . 94
Tubing ID chart: volume per length . . . 93
Tubing tolerances . . . . . 95

### RELATED PRODUCTS

Clean-cut tubing cutter . . . . . 86
Easy-Flange kit . . . . . 85
Low pressure fittings . . . . . 40-47



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## FEP tubing, natural color

FEP (FluorinatedEthylenePropylene) tubing is chemically inert to most HPLC solvents, and is recommended for low pressure applications. Typically 1/16" OD tubing holds up to 117 bar (1700 psi), and 1/8" OD holds up to 70 bar (1000 psi).

We recommend FEP for ion chromatography applications.

**SPECS**
- Maximum recommended working temp: 80°C (continuous)
- Max working pressures: see page 94
- Tubing tolerances: see page 95

| **Qty/pkg:** | | **1 m** | **3 m** | **10 m** |
|---|---|---|---|---|
| *Tubing OD* | *ID (mm)* | *Product No.* | *Product No.* | *Product No.* |
| 1/32" | 0.10 | JR-T-6794-M1 | JR-T-6794-M3 | JR-T-6794-M10 |
| | 0.13 | JR-T-6605-M1 | JR-T-6605-M3 | JR-T-6605-M10 |
| | 0.15 | JR-T-6606-M1 | JR-T-6606-M3 | JR-T-6606-M10 |
| | 0.18 | JR-T-6607-M1 | JR-T-6607-M3 | JR-T-6607-M10 |
| | 0.25 | JR-T-6610-M1 | JR-T-6610-M3 | JR-T-6610-M10 |
| | 0.38 | JR-T-6615-M1 | JR-T-6615-M3 | JR-T-6615-M10 |
| | 0.50 | JR-T-6620-M1 | JR-T-6620-M3 | JR-T-6620-M10 |



| | | **3 m** | **10 m** | **25 m** |
|---|---|---|---|---|
| | *ID (mm)* | *Product No.* | *Product No.* | *Product No.* |
| 1/16" | 0.10 | JR-T-6704-M3 | JR-T-6704-M10 | JR-T-6704-M25 |
| | 0.13 | JR-T-6705-M3 | JR-T-6705-M10 | JR-T-6705-M25 |
| | 0.15 | JR-T-6706-M3 | JR-T-6706-M10 | JR-T-6706-M25 |
| | 0.18 | JR-T-6707-M3 | JR-T-6707-M10 | JR-T-6707-M25 |
| | 0.20 | JR-T-6708-M3 | JR-T-6708-M10 | JR-T-6708-M25 |
| | 0.25 | JR-T-6812-M3 | JR-T-6812-M10 | JR-T-6812-M25 |
| | 0.30 | JR-T-6702-M3 | JR-T-6702-M10 | JR-T-6702-M25 |
| | 0.50 | JR-T-6802-M3 | JR-T-6802-M10 | JR-T-6802-M25 |
| | 0.75 | JR-T-6803-M3 | JR-T-6803-M10 | JR-T-6803-M25 |
| | 1.00 | JR-T-6806-M3 | JR-T-6806-M10 | JR-T-6806-M25 |
| 1/8" | 1.59 | JR-T-6804-M3 | JR-T-6804-M10 | JR-T-6804-M25 |
| | 2.10 | JR-T-6813-M3 | JR-T-6813-M10 | JR-T-6813-M25 |
| 3/16" | 3.18 | JR-T-6835-M3 | JR-T-6835-M10 | JR-T-6835-M25 |
| 1 mm | 0.50 | JR-T-6105-M3 | JR-T-6105-M10 | JR-T-6105-M25 |
| 2 mm | 1.00 | JR-T-6210-M3 | JR-T-6210-M10 | JR-T-6210-M25 |
| 3 mm | 1.00 | JR-T-6310-M3 | JR-T-6310-M10 | JR-T-6310-M25 |
| | 2.00 | JR-T-6320-M3 | JR-T-6320-M10 | JR-T-6320-M25 |

| **Qty/pkg:** | | **per meter** |
|---|---|---|
| *Tubing OD* | *ID (mm)* | *Product No.* |
| 1/4" | 4.35 | JR-T-6809 |

**OPTIONS AND MORE INFORMATION**
See facing page.

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## PTFE tubing, solid color-coded

**SPECS**
- Maximum recommended working temp: 100°C (continuous)
- Maximum working pressures: see page 94
- Tubing tolerances: see page 95

PTFE (polytetrafluoroethylene) tubing is chemically inert and suitable for lower pressure applications. Typically 1/16" OD tubing holds up to 62 bar (900 psi) and 1/8" up to 35 bar (500 psi). Maximum continuous operating temperature is 100°C.

Black PTFE, available in two IDs, is recommended for light sensitive applications such as enzymatic reactions, luminescent reactions, connecting to a flow cell, and radioactive HPLC.

Solid colors identify the tubing ID.

| Qty/pkg: | | | 3 m | 10 m | 25 m |
|---|---|---|---|---|---|
| *OD* | *Color* | *ID (mm)* | *Product No.* | *Product No.* | *Product No.* |
| 1/16" | Blue | 0.25 | JR-T-4011C-M3 | JR-T-4011C-M10 | JR-T-4011C-M25 |
| | Black | 0.25 | JR-T-6808-M3 | JR-T-6808-M10 | JR-T-6808-M25 |
| | | 0.50 | JR-T-6811-M3 | JR-T-6811-M10 | JR-T-6811-M25 |
| | Orange | 0.50 | JR-T-4183C-M3 | JR-T-4183C-M10 | JR-T-4183C-M25 |
| | Green | 0.75 | JR-T-4136C-M3 | JR-T-4136C-M10 | JR-T-4136C-M25 |

## PTFE tubing, natural color

**SPECS**
- Maximum recommended working temp: 100°C (continuous)
- Max working pressures: see page 94
- Tubing tolerances: see page 95

PTFE tubing is chemically inert and suitable for lower pressure applications. Typically 1/16" OD tubing holds up to 62 bar (900 psi) and 1/8" up to 35 bar (500 psi). Maximum continuous operating temperature is 100°C.

| Qty/pkg: | | 3 m | 5 m | 10 m | 25 m |
|---|---|---|---|---|---|
| *Tubing OD* | *ID (mm)* | *Product No.* | *Product No.* | *Product No.* | *Product No.* |
| 1/16" | 0.18 | JR-T-6805-M3 | JR-T-6805-M5 | JR-T-6805-M10 | JR-T-6805-M25 |
| | 0.25 | JR-T-4011-M3 | JR-T-4011-M5 | JR-T-4011-M10 | JR-T-4011-M25 |
| | 0.50 | JR-T-4183-M3 | JR-T-4183-M5 | JR-T-4183-M10 | JR-T-4183-M25 |
| | 0.75 | JR-T-4036-M3 | JR-T-4036-M5 | JR-T-4036-M10 | JR-T-4036-M25 |
| | 1.00 | JR-T-6807-M3 | JR-T-6807-M5 | JR-T-6807-M10 | JR-T-6807-M25 |
| 1/8" | 1.59 | JR-T-6800-M3 | JR-T-6800-M5 | JR-T-6800-M10 | JR-T-6800-M25 |
| | 2.40 | JR-T-4037-M3 | JR-T-4037-M5 | JR-T-4037-M10 | JR-T-4037-M25 |

| | | 3 m | 10 m | 25 m |
|---|---|---|---|---|
| | *ID (mm)* | *Product No.* | *Product No.* | *Product No.* |
| 2 mm | 1.70 | JR-T-6801-M3 | JR-T-6801-M10 | JR-T-6801-M25 |
| 4 mm | 3.00 | JR-T-4039-M3 | JR-T-4039-M10 | — |

| Qty/pkg: | | | per meter |
|---|---|---|---|
| *Tubing OD* | | *ID (mm)* | *Product No.* |
| *in.* | *mm* | | |
| 3/16" | 4.76 | 3.76 | JR-T-4041 |
| 1/4" | 6.35 | 4.35 | JR-T-6810 |



**TECH TIP**
Use PFA instead of PTFE if gas permeability is an issue.

**TECH TIP**
Use black PTFE for for light sensitive applications such as enzymatic reactions, luminescent reactions, connectioning to a flow cell, and radioactive HPLC.

**OPTIONS**
Contact your distributor or VICI about:
- Longer tubing lengths at competitive bulk prices
- Customized ODs and IDs (30 m minimum quantity)

**MORE INFORMATION**
About PTFE. . . . . 99
Chemical resistance 96-98
Maximum working pressure . . . . . 94
Tubing ID chart: volume per length . . . 91
Tubing tolerances . . . . . 95

**RELATED PRODUCTS**
Clean-cut tubing cutter . . . . . 86
Easy-Flange kit . . . . . 85
Flanged fittings. . . . . 40, 43
Flangeless fittings . . 41-42



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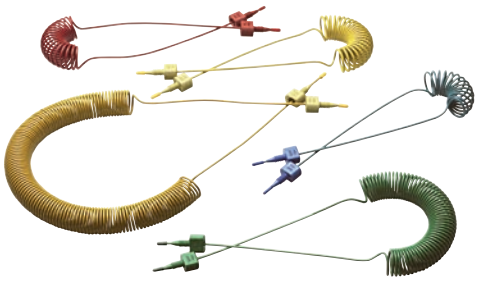


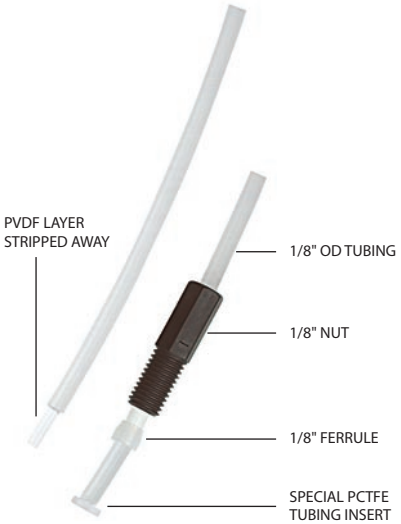
## Thermo-formed polymeric tubing

- Available in a variety of polymers
- Provides axial flexibility
- Telephone cables or customer-specified shapes

VICI Jour offers thermo-formed tubing in various geometric shapes and polymers. The form will maintain its shape so long as the temperature does not exceed 100°C.

**FOR PRICING**
Contact VICI or your local distributor for more information or a quotation.

Straight tubing, spirals, or even more complex forms – just define your form and material on a drawing for us.




## Impermeable polymeric tubing

- FEP coated with PVDF
- Prevents "re-gassing"
- Excellent chemical resistance

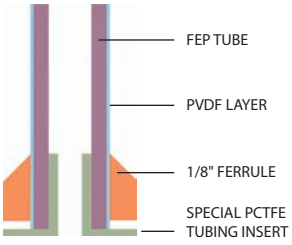
PTFE and FEP have very good chemical resistance, but are too permeable to be suitable for mobile phase transfer lines. PVDF, on the other hand, lacks chemical resistance but is a very tight polymer with no observable micropores. Our impermeable tubing is produced by co-extruding PVDF over FEP to combine the best features of both polymers, ensuring that degassed solvent will stay degassed until it reaches the HPLC pump.

**SPECS**
- Low pressure only
- 1/8" OD, 1.65 mm ID
- OD and ID tolerances: ±0.05 mm (.002")
- Materials
  *Tubing:* FEP coated with PVDF
  *Insert:* PCTFE
  *Ferrule:* ETFE
  *Fitting:* PPS

The PVDF layer can easily be stripped away with our Clean-Cut tubing cutter or a razor blade, leaving a length of exposed FEP to extend into the solvent reservoir.

When making connections, a special PCTFE tubing insert fits into the ID of the tubing and seals against the bottom of the port, preventing the solvent from contacting the PVDF layer at the end of the tube.

| **Qty/pkg:** | | **3 m** *Product No.* | **10 m** *Product No.* |
|---|---|---|---|
| Impermeable tubing, 1/8" OD x 1.65 mm ID | | JR-T-6130-M3 | JR-T-6130-M10 |
| | *Qty/pkg* | *Product No.* | |
| Additional spare parts | | | |
| PCTFE tubing inserts | 10 | JR-6141-10 | |
| 1/8" PPS nuts | 10 | JR-55071-10 | |
| 1/8" ETFE ferrules | 10 | JR-051-10 | |
| Fitting kit | | JR-6140 | |
| contains: | | | |
| PCTFE tubing inserts | 2 | | |
| 1/8" PPS nuts | 2 | | |
| 1/8" ETFE ferrules | 2 | | |




**TECH TIP**
Use FEP or PFA tubing inside the solvent reservoir, since PVDF has limited chemical resistance.

**TECH TIP**
Always use the specially-designed tubing insert to prevent solvent contact with the PVDF layer.

**OPTIONS**
Contact us for more info about longer tubing lengths at competitive bulk prices.

**MORE INFORMATION**
About FEP . . . . . 99
About PVDF . . . . . 100
Chemical resistance 96-98
Tubing ID chart:
volume per length . . . 93
Tubing tolerances . . . . . 95

**RELATED PRODUCTS**
Clean-cut
tubing cutter . . . . . 86
Color-sleeve
fingertight adapters . 17

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## Pre-cut stainless steel tubing

UHPLC

**SPECS**
- Pressure rating varies with ID; minimum is 365 bar (5300 psi) (see page 93)
- Tolerances
  - OD ±0.05mm (.002")
  - ID ±0.025mm (.001")

- For zero dead volume connections
- Steam-cleaned and ready to use
- Soft annealed OD for easy ferrule connections
- Color bands for quick identification of tubing ID

VICI Jour offers pre-cut 1/16" stainless steel tubing in lengths most commonly required in UHPLC and HPLC systems. The tubes are cut to square, burr-free ends for zero dead volume connections. Colored bands allow quick ID identification.

VICI pre-cut tubing is specially cleaned with steam from micro-filtered deionized water, which removes both organic and inorganic contaminants. Longer tubes are cleaned with liquid hexane. Softener-free polyethylene caps are used to prevent any contamination during shipment and storage.

| Length): | | | 50 mm | 100 mm | 200 mm | 300 mm |
|---|---|---|---|---|---|---|
| *OD* | *Color* | *ID (mm)* | *Product No.* | *Product No.* | *Product No.* | *Product No.* |
| 1/16" | Red | 0.13 | JR-T-97005 | JR-T-97010 | JR-T-97015 | JR-T-97020 |
| | Yellow | 0.18 | JR-T-97025 | JR-T-97030 | JR-T-97035 | JR-T-97040 |
| | Blue | 0.25 | JR-T-97045 | JR-T-97055 | JR-T-97060 | JR-T-97065 |
| | Orange | 0.50 | JR-T-97075 | JR-T-97080 | JR-T-97085 | JR-T-97090 |
| | Green | 0.75 | JR-T-97095 | JR-T-97100 | JR-T-97105 | JR-T-97110 |

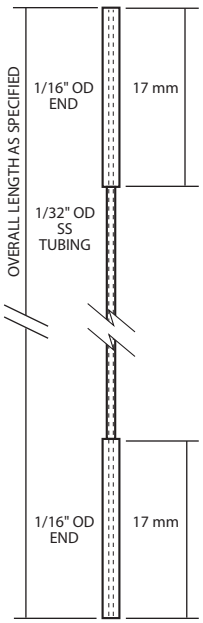
## Pre-cut flexible stainless steel tubing

UHPLC

**SPECS**
- Pressure rating varies with ID; minimum is 365 bar (5300 psi) (see page 93)
- Tolerances
  - OD ±0.05mm (.002")
  - ID ±0.025mm (.001")

- Seamless 1/32" tubing with 1/16" laser-welded ends
- For zero dead volume connections
- Steam-cleaned and ready to use
- Soft annealed OD for easy ferrule connections
- Color bands for quick identification

Our flexible pre-cut stainless steel tubing is made of 1/32" premium grade 316 stainless steel tubing with ends laser-welded into 1/16" tubing of the same premium grade. Available in lengths most commonly required in UHPLC and HPLC systems.




The tubes are cut to square, burr-free ends for zero dead volume connections. Colored bands allow quick ID identification.

VICI pre-cut tubing is specially cleaned with steam from micro-filtered deionized water, which removes both organic and inorganic contaminants. Longer tubes that cannot be steam-cleaned are cleaned with liquid hexane. Softener-free polyethylene caps are used to prevent any contamination during shipment and storage.

| Length: | | | 105 mm | 150 mm | 200 mm | 280 mm | 400 mm |
|---|---|---|---|---|---|---|---|
| *OD* | *Color* | *ID (mm)* | *Product No.* | *Product No.* | *Product No.* | *Product No.* | *Product No.* |
| 1/16" | Red | 0.13 | JR-T-96005 | JR-T-96010 | JR-T-96015 | JR-T-96020 | JR-T-96025 |
| | Yellow | 0.18 | JR-T-96105 | JR-T-96110 | JR-T-96115 | JR-T-96120 | JR-T-96125 |
| | Blue | 0.25 | JR-T-96205 | JR-T-96210 | JR-T-96215 | JR-T-96220 | JR-T-96225 |
| | Orange | 0.50 | JR-T-96305 | JR-T-96310 | JR-T-96315 | JR-T-96320 | JR-T-96325 |

| | | | 600 mm | 700 mm | 800 mm | 900 mm |
|---|---|---|---|---|---|---|
| | | | *Product No.* | *Product No.* | *Product No.* | *Product No.* |
| | Red | 0.13 | JR-T-96030 | JR-T-96035 | JR-T-96040 | — |
| | Yellow | 0.18 | JR-T-96130 | JR-T-96135 | JR-T-96140 | JR-T-96145 |
| | Blue | 0.25 | JR-T-96230 | JR-T-96235 | JR-T-96240 | — |
| | Orange | 0.50 | JR-T-96330 | JR-T-96335 | JR-T-96340 | — |

**TECH TIP**
Contact your local distributor or VICI for custom lengths.



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## Stainless steel tubing – premium grade

*UHPLC*

- Seamless Type 316 stainless steel
- Variety of sizes for UHPLC, HPLC, and GC applications
- Smooth internal surface
- Soft annealed OD for easy ferrule connections

Our premium grade seamless stainless steel tubing is the base for all high pressure and ultra-high pressure lines in your equipment.

Note that this tubing is roughly cut with tubing pliers so the ends must be properly cut before use.

| Qty/pkg: | | 3 m | 10 m |
|---|---|---|---|
| *Tubing OD* | *ID (mm)* | *Product No.* | *Product No.* |
| 1/32" | 0.13 | JR-TSS.505-M3 | JR-TSS.505-M10 |
| | 0.18 | JR-TSS.507-M3 | JR-TSS.507-M10 |
| | 0.25 | JR-TSS.510-M3 | JR-TSS.510-M10 |
| | 0.50 | JR-TSS.520-M3 | JR-TSS.520-M10 |
| 1/16" | 0.13 | JR-TSS105-M3 | JR-TSS105-M10 |
| | 0.25 | JR-TSS110-M3 | JR-TSS110-M10 |
| | 0.38 | JR-TSS115-M3 | JR-TSS115-M10 |
| | 0.50 | JR-TSS120-M3 | JR-TSS120-M10 |
| | 0.75 | JR-TSS130-M3 | JR-TSS130-M10 |
| | 1.00 | JR-TSS140-M3 | JR-TSS140-M10 |
| 1/8" | 0.75 | JR-TSS230-M3 | JR-TSS230-M10 |
| | 1.00 | JR-TSS240-M3 | JR-TSS240-M10 |
| | 1.52 | JR-TSS260-M3 | JR-TSS260-M10 |
| | 1.70 | JR-TSS267-M3 | JR-TSS267-M10 |
| | 2.16 | JR-TSS285-M3 | JR-TSS285-M10 |

### SPECS

- Pressure rating (values shown are minimum; rating varies with ID; (see page 93)

| OD | bar | psi |
|---|---|---|
| 1/32" | 400 | 5800 |
| 1/16" | 365 | 5300 |
| 1/8" | 315 | 4600 |

- Tolerances
  - OD ±0.05mm (.002")
  - ID ±0.025mm (.001")

## Stainless steel tubing – standard grade

*UHPLC*

- Type 316 stainless steel, welded under inert gas
- Variety of sizes for HPLC and GC applications
- Smooth internal surface
- Soft annealed OD for easy ferrule connections

| Qty/pkg: | | 3 m | 10 m |
|---|---|---|---|
| *Tubing OD* | *ID (mm)* | *Product No.* | *Product No.* |
| 1/16" | 0.13 | JR-T-625-04-M3 | JR-T-625-04-M10 |
| | 0.18 | JR-T-625-05-M3 | JR-T-625-05-M10 |
| | 0.25 | JR-T-625-10-M3 | JR-T-625-10-M10 |
| | 0.50 | JR-T-625-20-M3 | JR-T-625-20-M10 |
| | 0.75 | JR-T-625-30-M3 | JR-T-625-30-M10 |
| | 1.00 | JR-T-625-40-M3 | JR-T-625-40-M10 |
| 1/8" | 2.1 | JR-T-626-00-M3 | JR-T-626-00-M10 |

| Qty/pkg: | | per meter |
|---|---|---|
| *Tubing OD* | *ID (mm)* | *Product No.* |
| 1/4" | 4.65 | JR-T-628-00 |

### SPECS

- Pressure rating (values shown are minimum; rating varies with ID; (see page 93)

| OD | bar | psi |
|---|---|---|
| 1/16" | 315 | 4600 |
| 1/8" | 315 | 4600 |

- Tolerances
  - OD ±0.05mm (.002")
  - ID ±0.05mm (.002")

**TECH TIP**
For zero dead volume connections, we strongly recommend pre-cut stainless steel tubing . . 14

**NOTE**
ID dimensions in mm are converted from nominal inch dimensions.

**OPTIONS**
Contact us for more info about longer tubing lengths at competitive bulk prices.

**MORE INFORMATION**
About Type 316 stainless steel. . . . . 100
Maximum working pressure . . . . . 93
Tubing ID chart: volume per length . . . 93

**RELATED PRODUCTS**
Stainless steel tubing cutter . . . . . 87
Stainless fittings . . . . 30-35

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# Fittings

## HIGH AND LOW PRESSURE

### High pressure polymeric fittings ... page 18

High pressure polymeric fittings are useful in applications involving proteins, peptides, and other samples of biological origin where metal systems may interact with samples.

### High pressure stainless fittings .... page 30

Our stainless steel fittings are typically compression fittings, in which a ferrule is compressed onto the tube as a nut is tightened. They offer the best reliability in high pressure situations.

### Nanovolume® HPLC fittings ..... page 36

With bore sizes of 100 and 150 microns, (.004" -.006"), the minimal transfer volume contributed by Nanovolume® components makes them especially beneficial in applications with flow rates in the µl/min range, when the transfer volume can be critical.

### Low pressure fittings ..... page 40

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.

**MORE INFORMATION**

**Tools for fittings**

Ferrule removal kit..... 89
Tweezer..... 89
ValvTool..... 88
Wrench ..... 89

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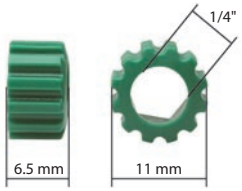
## Color-It fingertight adapters

- For high and low pressure
- Fit all hex-head PEEK and SS fittings for 1/16" tubing
- Available in six colors for easy solvent line identification

**SPECS**
- For 1/4" hex-head nuts
- Material: Polypropylene

Color-It snap-on fingertight adapters are used with for our 1/4" PEEK and stainless hex-head nuts, converting them into color-coded fingertight fittings in an instant. Available in six colors.

| *Color* | *Qty/pkg* | *Product No.* |
|---|---|---|
| Blue | 5 | JR-55010-5 |
| Yellow | 5 | JR-55011-5 |
| Green | 5 | JR-55012-5 |
| Black | 5 | JR-55013-5 |
| White | 5 | JR-55014-5 |
| Red | 5 | JR-55015-5 |
| Assorted | 2 each | JR-55016-12 |



## Color-Sleeve fingertight adapters

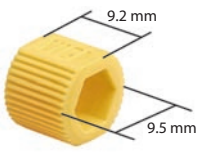
- For high and low pressure
- Designed for our PPS fittings for 1/16" tubing
- Available in twelve colors for easy solvent line identification

**SPECS**
- For 1/4" hex-head nuts
- Material: Polypropylene

This adapter is useful for color coding different solvent lines, and turns VICI Jour PPS nuts into fingertight fittings in an instant.

| *Color* | | *Qty/pkg* | *Product No.* |
|---|---|---|---|
| | Natural | 5 | JR-55080-5 |
| | | 10 | JR-55080-10 |
| | White | 5 | JR-55081-5 |
| | | 10 | JR-55081-10 |
| | Dark grey | 5 | JR-55082-5 |
| | | 10 | JR-55082-10 |
| | Black | 5 | JR-55083-5 |
| | | 10 | JR-55083-10 |
| | Lavender | 5 | JR-55084-5 |
| | | 10 | JR-55084-10 |
| | Red | 5 | JR-55085-5 |
| | | 10 | JR-55085-10 |
| | Yellow | 5 | JR-55086-5 |
| | | 10 | JR-55086-10 |
| | Orange | 5 | JR-55087-5 |
| | | 10 | JR-55087-10 |

| *Color* | | *Qty/pkg* | *Product No.* |
|---|---|---|---|
| | Brown | 5 | JR-55088-5 |
| | | 10 | JR-55088-10 |
| | Green | 5 | JR-55089-5 |
| | | 10 | JR-55089-10 |
| | Blue | 5 | JR-55090-5 |
| | | 10 | JR-55090-10 |
| | Purple | 5 | JR-55091-5 |
| | | 10 | JR-55091-10 |
| Assorted | | | |
| All 12 colors | | 2 each | JR-5508X-24 |
| Blue, red, green, yellow, black, white | | 2 each | JR-5508X-12 |




**MORE INFORMATION**

Hex head nuts
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Stainless. . . . . 31
PPS
High pressure. . . 19, 25
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# High pressure fittings

## POLYMERIC

Our high pressure fittings are rated up to 350 bar (5000 psi) with fingertight nuts, well beyond the burst strength of most PEEK tubing. These fittings are manufactured from high quality inert polymers to exacting tolerances.

## High pressure polymeric fittings index


**One-piece fittings**

PEEK hex-head
- Over 5,000 psi ..... *NEW*.... page 19
- 5,000 psi.....19

PEEK fingertight
- Color-coded .....20
- Natural .....20

PPS hex-head .....19

PEEK no-twist one piece fittings .....21

**Nuts and ferrules**

PEEK ferrules, over 5,000 psi .. *NEW*.....22

Single ferrule connections.....22

Double ferrule connections .....23

1/4-28 connections .....25

**Plugs and caps**

PEEK plugs.....24

PEEK caps.....24

**PEEK unions**

Unions.....26

Bulkhead unions.....26

Reducing unions.....27

**PEEK tees and crosses**

Standard tees and crosses.....28

Biocompatible mixing tee .....28

**PEEK adapters**

PEEK port and Luer adapters .....29


**DISCLAIMER**

The maximum holding pressure for any type of connections involving tubing and a ferrule varies considerably with the tubing material, the ferrule material, the clearance between tubing OD and ferrule ID, and the shape of the fitting detail.

**RELATED PRODUCTS**


ChromBox kit..... 91
- HPLC parts kit with PEEK and stainless fittings and tubing

Fingertight adapters
- Color-It ..... 17
- Color-Sleeve..... 17

Nanovolume® high pressure fittings..36-39

PEEK starter kits ..... 90

Tools for fittings ....88-89

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## PEEK one-piece hex-head fittings *NEW* *UHPLC*

- Made of special PEEK™ HT for better pressure resistance
- One-piece – no ferrule required
- Biocompatible
- Handy tightening tool included

These fittings are machined from special PEEK material to reach a higher pressure rating than standard PEEK fittings.

Sold in packages of 10.

Includes a tightening tool (*page 89*) for easy installation.

| *Tubing ID* | *Thread* | *Product No.* |
|---|---|---|
| 1/32" | 6-40 | JR-5525-10 |
| 1/16" | 10-32 | JR-5520-10 |

**SPECS**
- Material: PEEK, special black
- Threads:
  1/32" 6-40
  1/16" 10-32
- Pressure ratings, fingertight, on SS tubing:
  1/32" 625 bar (9,000 psi)
  1/16" 700 bar (10,000 psi)

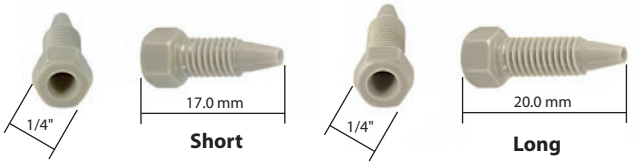
## PEEK one-piece hex-head fittings *10-32*

- Fingertight up to 350 bar (5000 psi)
- Excellent chemical and mechanical properties
- One-piece – no ferrule required
- Biocompatible
- For any 10-32 high pressure fitting

PEEK one-piece hex-head fittings are easy to use with the ValvTool or with the Color-It color-coded fingertight adapters. The 10-32 thread will fit virtually all standard high pressure female connections, and will withstand pressures of up to 350 bar (5000 psi). Available in short and long versions.

Sold in packages of 5.

| *Description* | *Product No.* |
|---|---|
| Short | JR-55100-5 |
| Long | JR-55110-5 |




**SPECS**
- For 1/16" OD tubing
- Material: PEEK
- 10-32 threads
- Tolerance: ±0.05 mm (.002")
- Pressure rating: <350 bar (5000 psi) *(Varies with tubing material and ID)*

**TECH TIP**
Coloration pigments are carefully chosen so as to contain no heavy metals or hazardous chemicals.

**MORE INFORMATION**
About PEEK . . . . . 99
About PPS. . . . . 99
Chemical resistance 96-98

**RELATED PRODUCTS**
1/16" OD tubing for high pressure applications . . . . . 5-8
PEEK starter kit . . . . . 90
Color-Sleeve adapters . 17

1/32" and 1/16" tightening tools for PEEK fittings. . . . . 89

## PPS one-piece hex-head fittings *10-32*

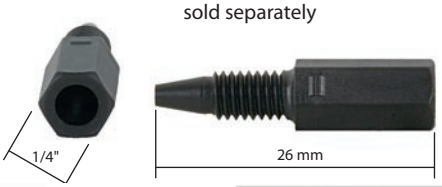
- Economically-priced alternative to PEEK
- Excellent chemical and mechanical properties
- One-piece – no ferrule required
- Slim design – finger-tight with Color-Sleeve adapter

The VICI Jour PPS one-piece hex-head (fingertight with adapter) fitting offers excellent chemical and pressure resistance.

Sold in packages of 5.

| *Product No.* |
|---|
| JR-58000-5 |

Shown with Color-Sleeve adapter, sold separately




**SPECS**
- For 1/16" OD tubing
- Material: Black PPS (Polyphenylene sulfide)
- 10-32 threads
- Tolerance: ±0.05 mm (.002")
- Pressure rating: <350 bar (5000 psi) *(Varies with tubing material and ID)*

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## PEEK one-piece fingertight fittings – color-coded *10-32*

**SPECS**
- For 1/16" OD tubing
- Material: PEEK
- 10-32 threads
- Tolerance: ±0.05 mm (.002" )
- Pressure rating: <350 bar (5000 psi) *(Varies with tubing material and ID)*

- Fingertight up to 350 bar (5000 psi)
- Excellent chemical and mechanical properties
- One-piece – no ferrule required
- Biocompatible

Our PEEK fingertight fittings are available in six colors, for easy identification of tubing lines. They are rated to 350 bar (5000 psi) and can be used in virtually any type of 10-32 thread HPLC fitting detail on the market.

Sold in packages of 5.

| *Color* | *Product 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 |

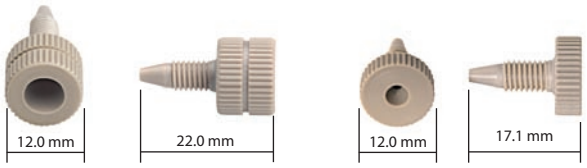
## PEEK one-piece fingertight fittings *10-32*

**SPECS**
- For 1/16" OD tubing
- Material: PEEK
- 10-32 threads
- Tolerance: ±0.05 mm (.002")
- Pressure rating: <350 bar (5000 psi) *(Varies with tubing material and ID)*

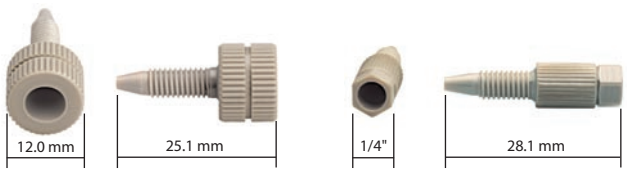
- Natural PEEK versions fingertight up to 350 bar (5000 psi)
- One-piece – no ferrule required
- Biocompatible
- Four styles, machined for extra precision

Sold in packages of 5.

| *Description* | *Product No.* |
|---|---|
| Standard | JR-5502-5 |
| Short | JR-5504-5 |
| Long | JR-5507-5 |
| Narrow hex-head/fingertight | JR-5508-5 |




**Standard** **Short**




**Long** **Narrow hex-head/fingertight**

**TECH TIP**
Coloration pigments are carefully chosen so as to contain no heavy metals or hazardous chemicals.

**MORE INFORMATION**
About PEEK ..... 99
About CTFE ..... 99
Chemical resistance 96-98



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## PEEK no-twist "one-piece" fittings

*10-32*

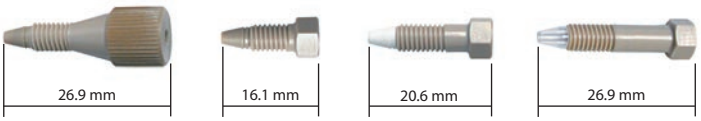
- Snap-in ferrule rotates freely
- Choice of ferrule materials
- Choice of fitting lengths

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

Since the ferrule is not machined onto the nut, it can be made from a different material. We offer several PEEK nuts, with ferrules of PEEK, CTFE, or glass-filled PEEK.

Sold in packages of 5.

| **Ferrule material:** | **PEEK** | **Glass-filled PEEK** | **CTFE** |
|---|---|---|---|
| *Description* | *Product No.* | *Product No.* | *Product No.* |
| Fingertight | JR-ZNF1FPK-5 | JR-ZNF1FPKG-5 | JR-ZNF1FKF-5 |
| Hex, short | JR-ZNF1PK-5 | JR-ZNF1PKG-5 | JR-ZNF1KF-5 |
| Hex, medium | JR-MZNF1PK-5 | JR-MZNF1PKG-5 | JR-MZNF1KF-5 |
| Hex, long | JR-LZNF1PK-5 | JR-LZNF1PKG-5 | JR-LZNF1KF-5 |
| Replacement ferrules | JR-ZNF1PK-F-5 | JR-ZNF1PKG-F-5 | JR-ZNF1KF-F-5 |




**Fingertight** **Hex, short** **Hex, medium** **Hex, long**

### SPECS

- For 1/16" OD tubing
- Materials:
  Nut: PEEK
  Ferrule: PEEK, glass-filled PEEK, or CTFE
- 10-32 threads
- Pressure rating: <350 bar (5000 psi) *(Varies with tubing material and ID)*

### OPTIONS

- Optional ferrule materials available: FEP, PFA, PTFE, and glass-filled PTFE. Contact us for availability.
- Some 1/32" versions are available. Call for details.

### RELATED PRODUCTS

1/16" OD tubing for high pressure applications . . . . . 5-8
PEEK starter kit . . . . . 90
ValvTool for tightening hex-head fittings . . . . 88
Color-It fingertight adapters. . . . . 17

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## PEEK ferrules *NEW* *UHPLC*

### SPECS
- For 1/16" OD tubing
- Material: PEEK, special black
- Pressure rating on SS tubing and with SS nut: (preliminary) 1170 bar (17,000 psi)

- Biocompatible 1/16" ferrule for ultra-high pressures
- Alternative to titanium ferrules in applications with titanium valves
- Excellent in combination with stainless nuts

Sold in packages of 5.

| *Product No.* | |
|---|---|
| JR-5010-5 | |

## PEEK nuts with single ferrules *10-32*

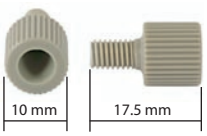
### SPECS
- Material: PEEK
- Pressure rating: <280 bar (4000 psi) *(Varies with tubing material and ID)*

- Reuseable nut, replaceable ferrule
- For 1/32", 1/16", and 1/8" tubing
- Suitable for pressures to 280 bar (4000 psi)

Fingertight nuts have a knurled surface designed to allow sufficient sealing force to be applied to the ferrule without wrenches. Hex style nuts allow wrench tightening; however, since they are polyeric, they can break, and are recommended for use only when space is limited and fingers will not fit.

Sold in packages of 5.

| | *Tubing OD* | *Description* | *Thread* | *Product No.* |
|---|---|---|---|---|
| Nuts | 1/32" | Fingertight | 6-40 | JR-ZN.5FPK-5 |
| | 1/16" | Fingertight | 10-32 | JR-5570-5 |
| | 1/8" | Hex-head | 5/16-24 | JR-ZN2PK-5 |
| Single ferrules | 1/32" | | | JR-ZF.5PK-5 |
| | 1/16" | | | JR-5003-5 |
| | 1/8" | | | JR-ZF2PK-5 |




**1/16" fingertight**

**1/8" hex-head**

### MORE INFORMATION
About PEEK . . . . . 99
Chemical resistance 96-98

### RELATED PRODUCTS
1/16" OD tubing for high pressure applications . . . . . 5-8
PEEK starter kit . . . . . 90
PEEK tubing . . . . . 5-8
Stainless steel nuts . . . . 31
ValvTool for tightening hex-head fittings . . . . 88
Color-It fingertight adapters. . . . . 17

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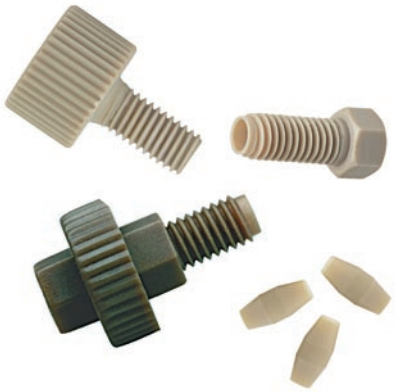


## PEEK nuts with double ferrules

*10-32*

- High pressure rating - up to 420 bar (6000 psi)
- Ideal for 1/16" PEEK tubing
- Fit any 10-32 fitting

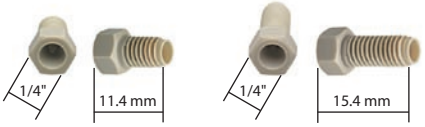
These nuts are for use with VICI Jour double ferrules, which grip the tubing twice for added stability. The fingertight version may be hand-tightened for operation at up to 420 bar (6000 psi). The hex-head version can be used for connections that are difficult to reach, or are closely spaced. The fittings work in virtually any female 1/16" fitting.

Sold in packages of 5.

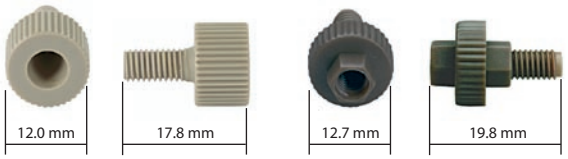
**SPECS**
- For 1/16" OD tubing
- Material: PEEK
- 10-32 threads
- Pressure rating: <420 bar (6000 psi) *(Varies with tubing material and ID)*

| *Description* | | *Product No.* |
|---|---|---|
| 1/16" nuts | Hex-head, short | JR-5511-5 |
| | Hex-head, long | JR-5510-5 |
| | Fingertight | JR-5580-5 |
| | Universal fingertight* | JR-5503-5* |
| 1/16" ferrule | Double | JR-5004-5 |

*Limited to existing stock.




**Hex-head, short** **Hex-head, long**




**Fingertight** **Universal fingertight**

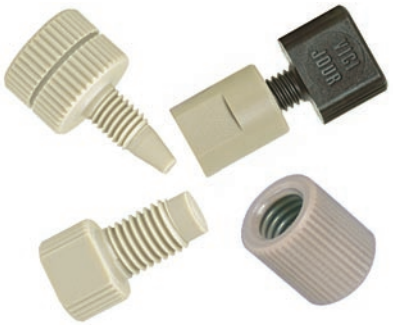
## PEEK plugs and caps

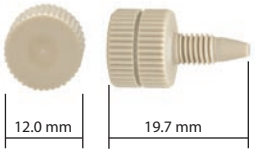
**SPECS**
- Material: PEEK
- Pressure rating: <350 bar (5000 psi) *(Varies with tubing material and ID)*

- For plugging ports and capping solvent lines
- Available in all common thread sizes

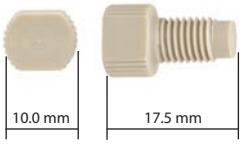
Sold individually.

| | *Threads* | | *Product No.* |
|---|---|---|---|
| Plugs | 6-40 | | JR-ZP.5FPK |
| | 10-32 | | JR-408 |
| | | fingertight | JR-ZP1FPK |
| | | hex | JR-MZP1PK |
| | | long hex | JR-LZP1PK |
| | 1/4-28 | | JR-409 |
| | M6 | | JR-410 |
| Caps | 6-40 | | JR-ZC.5FPK |
| | 10-32 | | JR-ZC1PK |
| | 1/4-28 | | JR-CCPK-1 |

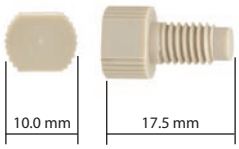




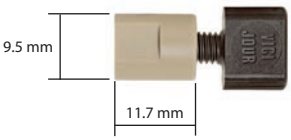

**10-32 plug**
(JR-408)



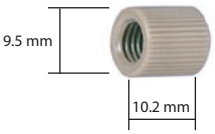

**1/4-28 plug**




**M6 plug**




**10-32 cap**




**1/4-28 cap**



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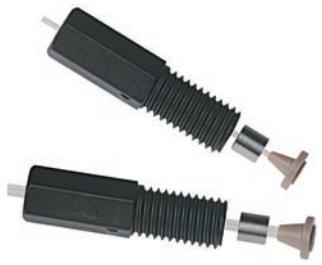


## Nut, ferrule, and bushing

*1/4-28*

- High pressure rating – up to 480 bar (7000 psi) with 1/16" tubing
- For 1/4-28 connections
- Available for 1/32" and 1/16" tubing

This combination of PPS nut, PEEK ferrule, and stainless steel bushing allows a high pressure connection in a 1/4-28 flat-bottomed fitting detail.

Sold in packages of 10.

Order nuts and bushing/ferrules separately.

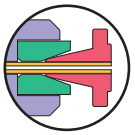
| *Description* | *Tubing OD* | *Product No.* |
|---|---|---|
| PPS hex-head nut | 1/32" or 1/16" | JR-55050-10 |
| Bushing and ferrule | 1/32" | JR-FPKBSS.5-10 |
| | 1/16" | JR-FPKBSS1-10 |

### SPECS

- For 1/32" and 1/16" OD tubing
- Materials
  *Nut:* PPS
  *Ferrule:* PEEK
  *Bushing:* SS
- 1/4-28 connection
- Pressure rating

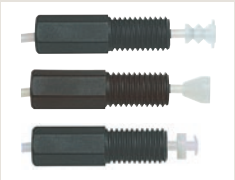
| OD | bar | psi |
|---|---|---|
| 1/32" | 175 | 2500 |
| 1/16" | 480 | 7000 |

*(Varies with tubing material and ID)*



### LOW PRESSURE 1/4-28 NUTS AND FERRULES

1/4-28 PPS hex-head nuts are available with three different sealing designs for flangeless and flanged fittings . . . . . 41



### TECH TIP

To make up high pressure connection with nut, ferrule, and bushing, first slide the nut on the tubing, then the bushing, and then the PEEK ferrule as shown in the product photo.

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## PEEK unions

*10-32*

**SPECS**
- For 1/16" OD tubing
- Material: PEEK
- 10-32 threads
- Pressure rating: <350 bar (5000 psi) *(Varies with tubing material and ID)*

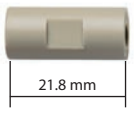
- Easy connection of transfer/solvent lines
- Low dead volume
- Completely inert and biocompatible

VICI Jour PEEK unions are usable with most common organic and inorganic HPLC solvents without risking corrosion, metal contamination, or protein degradation that might occur with stainless steel.

Small diameter bores are used to ensure low dead volume connections. These unions have the standardized Valco fitting details with smooth transition of the taper into the threaded part. Connections to these PEEK unions can be made with any 10-32 fitting that uses polymeric ferrules.

PEEK unions are available in body-only versions as well as complete with our PEEK one-piece fingertight fittings ready to connect to any 1/16" OD tubing.

| | *Bore (mm)* | *Qty/pkg* | *Product No.* |
|---|---|---|---|
| Union with fittings | 0.25 | 1 | JR-1061 |
| | 0.50 | 1 | JR-1066 |
| | 0.75 | 1 | JR-1067 |
| Body only | 0.25 | 1 | JR-061 |
| | 0.50 | 1 | JR-066 |
| | 0.75 | 1 | JR-067 |
| **Replacement fittings** | | *Qty/pkg* | *Product No.* |
| PEEK 1/16" one-piece fingertight fittings, 10-32, black | | 5 | JR-55021-5 |



## PEEK bulkhead unions

*10-32*

**SPECS**
- For 1/16" OD tubing
- Material: PEEK
- 10-32 threads
- Pressure rating: <350 bar (5000 psi) *(Varies with tubing material and ID)*

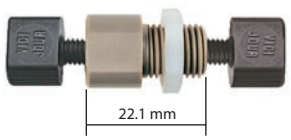
- Designed for panel mounting
- Easy connection of transfer/solvent lines
- Low dead volume
- Completely inert and biocompatible

Bulkhead unions are designed to be mounted through an instrument panel or on a bracket. Typically the mounting nut goes inside the instrument, so that the long threaded portion will be out of sight.

Bulkhead unions require a minimum 10 mm panel hole, 9 mm maximum thickness.

Includes fittings.

| *Bore (mm)* | *Qty/pkg* | *Product No.* |
|---|---|---|
| 0.25 | 1 | JR-ZBU1CFPK |
| 0.50 | 1 | JR-ZBU1MFPK |
| 0.75 | 1 | JR-ZBU1FPK |




| **Replacement fittings** | *Qty/pkg* | *Product No.* |
|---|---|---|
| PEEK 1/16" one-piece fingertight fittings, 10-32, black | 5 | JR-55021-5 |
| JAM-Nut replacement mounting nut for bulkhead fittings | 1 | JR-CBN |

**RELATED PRODUCTS**
Low pressure PEEK 1/4-28 unions. . . . . 44
PEEK one-piece fingertight fittings 19-21



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## PEEK reducing unions

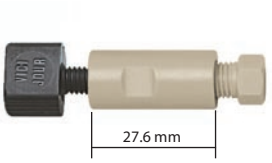
- Connects 1/16" to 1/32" tubing, or 1/8" to 1/16" tubing
- Easy connection of transfer/solvent lines
- Completely inert and biocompatible

VICI Jour PEEK reducing unions are usable with most common organic and inorganic HPLC solvents without risking corrosion, metal contamination, or protein degradation that might occur with stainless steel. These reducing unions have the standardized Valco fitting details with smooth transition of the taper into the threaded part.

Includes fittings.

**SPECS**
- Material: PEEK
- Threads: 1/32": 6-40 1/16": 10-32 1/8": 5/16-24
- Pressure rating: <350 bar (5000 psi) *(Varies with tubing material and ID)*

| *Tubing OD* | *Bore (mm)* | *Qty/pkg* | *Product No.* |
|---|---|---|---|
| 1/16" to 1/32" | 0.25 | 1 | JR-ZRU1.5FPK |
| 1/8" to 1/16" | 0.75 | 1 | JR-ZRU21FPK |




| **PEEK replacement fittings** | | *Qty/pkg* | *Product No.* |
|---|---|---|---|
| For 1/16" to 1/32" reducing unions | | | |
| 1/16" | One-piece fitting, black | 5 | JR-55021-5 |
| 1/32" | Fingertight nut | 1 | JR-ZN.5FPK |
| 1/32" | Ferrule | 1 | JR-ZF.5PK |
| For 1/8" to 1/16" reducing unions | | | |
| 1/8" | Hex-head PEEK nut | 5 | JR-ZN2PK-5 |
| 1/8" | PEEK ferrule | 5 | JR-ZF2PK-5 |
| 1/16" | One-piece fitting, black | 5 | JR-55021-5 |

**RELATED PRODUCTS**

Low pressure PEEK 1/4-28 reducing unions . . . . . 45

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## PEEK tees and crosses

*10-32*

**SPECS**
- For 1/16" OD tubing
- Material: PEEK
- 10-32 threads
- Body size: 25.0 mm OD 12.0 mm thick
- Pressure rating: <350 bar (5000 psi) *(Varies with tubing material and ID)*

- Easy connection of transfer/solvent lines
- Low dead volume
- Completely inert and biocompatible

The 100% PEEK flowpath makes VICI Jour PEEK tees and crosses usable with most common organic and inorganic HPLC solvents without risking corrosion, metal contamination, or protein degradation that might occur with stainless steel.

Small diameter through-holes are used to ensure low dead volume connections. These unions have the standardized Valco fitting details with smooth transition of the taper into the threaded part. Connections to these PEEK tees and crosses can be made with any 10-32 fitting that uses polymeric ferrules.

PEEK tees and crosses are available in body-only versions as well as complete with our PEEK one-piece fingertight fittings ready to connect to any 1/16" OD tubing.

| | *Bore (mm)* | *Qty/pkg* | **With fittings** *Product No.* | **Body only** *Product No.* |
|---|---|---|---|---|
| Tee | 0.25 | 1 | JR-1030 | JR-2030 |
| | 0.50 | 1 | JR-1032 | JR-2032 |
| | 0.75 | 1 | JR-1033 | JR-2033 |
| Cross | 0.25 | 1 | JR-1040 | JR-2040 |
| | 0.50 | 1 | JR-1042 | JR-2042 |
| | 0.75 | 1 | JR-1043 | JR-2043 |

| **Replacement fittings** | *Qty/pkg* | *Product No.* |
|---|---|---|
| PEEK 1/16" one-piece fingertight fittings, 10-32, black | 5 | JR-55021-5 |

## Biocompatible mixing tee

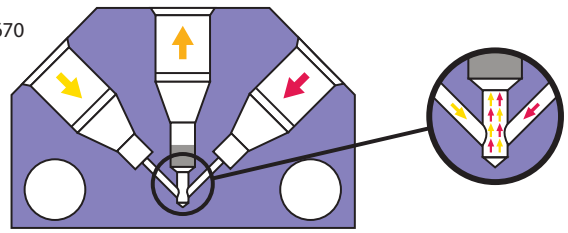
*10-32*

**SPECS**
- For 1/16" OD tubing
- Material: PEEK
- 10-32 threads
- Pressure rating: <350 bar (5000 psi) *(Varies with tubing material and ID)*

- High pressure gradient mixing
- Post column reactions
- Completely biocompatible
- Built-in protein-friendly titanium filter, 10 µm

A unique, more thorough mixing results from the turbulence generated by the introduction angle of the solvents as well as by the flow through our titanium filter element. The biocompatible tee can be used for high pressure gradient mixing as well as for post column reactions.

| | *Product No.* |
|---|---|
| Mixing tee with fittings | JR-9000-0670 |



**The two solvent streams are well-mixed in the vortex mixing chamber**

**TECH TIP**
Use our color-coded one-piece fingertight fittings for easy solvent line identification. . . . . 20

**MORE INFORMATION**
About PEEK . . . . . 99
Chemical resistance 96-98

**RELATED PRODUCTS**
Low pressure 1/4-28 tees and crosses . . . . . 46
Low pressure 1/4-28 mixing tees . . . . . 47



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## PEEK adapters

- Connect various combinations of thread types, male and female
- Includes male and female Luer adapters
- Low dead volume
- For any 10-32 high pressure fitting

We offer male and female Luer adapters as well as adapters to connect standard LC fittings to standard LC ports.

The 100% PEEK flowpath makes VICI Jour PEEK adapters usable with most common organic and inorganic HPLC solvents without risking corrosion, metal contamination, or protein degradation that might occur with stainless steel.

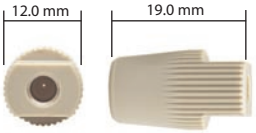
Sold individually.

**SPECS**
- Material: PEEK
- Bore: 0.40 mm
- Pressure ratings:
  M6, 1/4-28 <70 bar (1000 psi)
  Luer <35 bar (502 psi)
  *(Varies with tubing material and ID)*

| *Description* | | *Product No.* |
|---|---|---|
| 1/4-28 female to | 10-32 male | JR-0612 |
| | 10-32 female | JR-062 |
| | M6 male | JR-0622 |
| | Luer female | JR-0625 |
| | Luer male | JR-0626 |
| 10-32 female to | 1/4-28 male | JR-0617 |
| | M6 female (Pharmacia*) | JR-5595 |
| | Luer female | JR-0623 |
| Waters female to | 10-32 male | JR-0611 |
| M6 female to | 10-32 male | JR-5505 |
| Female Luer to | 1/4-28 | JR-CFLAPK |
| | 10-32 | JR-ZUFLPK |
| Male Luer to | 1/4-28 | JR-CMLAPK |

**1/4-28 female to:**

**10-32 male**




**10-32 female**

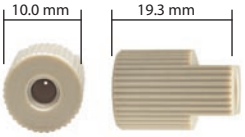
**M6 male**

**Luer female**

**Luer male**

**10-32 female to:**

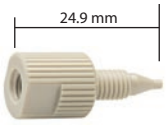
**1/4-28 male**




**M6 female (Pharmacia)**

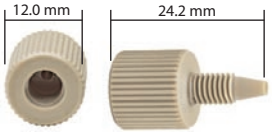
**Luer female**

**Waters female to:**




**10-32 male**

**M6 female to:**




**10-32 male**

* Pharmacia is a division of GE Healthcare.

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# High pressure fittings

## STAINLESS STEEL

Our stainless steel fittings are typically compression fittings, in which a ferrule is compressed onto the tube as a nut is tightened. They offer the best reliability in high pressure situations.

## High pressure stainless fittings index


**Nuts**

Valco nuts ..... page 31
Valco nuts are available for 1/32", 1/16", and 1/8" tubing, in several lengths.

Rheodyne® compatible nuts .....31
These nuts are sized for 1/16" tubing, and come in three lengths.

**Ferrules**

Valco .....32
Rheodyne compatible.....32

**Plugs and caps** .....32

**Tees and crosses**

Tees .....33
Crosses .....33

**Unions and reducing unions**

Unions.....34
Reducing unions
Imperial .....34
Imperial to metric ***NEW*** .....35


**DISCLAIMER**

The maximum holding pressure for any type of connections involving tubing and a ferrule varies considerably with the tubing material, the ferrule material, the clearance between tubing OD and ferrule ID, and the shape of the fitting detail.

**MORE INFORMATION**


ChromBox kit..... 91
HPLC parts kit with PEEK and stainless fittings and tubing
Fingertight adapters
Color-It ..... 17
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## Valco® stainless nuts

*UHPLC*

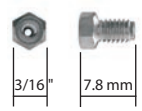
- Excellent fit to Valco fitting details
- Different lengths available
- For 1/32", 1/16", and 1/8" OD tubing

These nuts are for use with all standard Valco internal fittings and most valves. They may be used with fittings from other manufacturers as well. The medium and long types are ideal for metal Valco and Cheminert valves with more than 8 ports, or where the fitting head may be otherwise inaccessible.

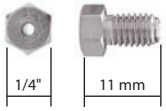
Sold in packages of 5.

| *Tubing OD* | *Length* | *Product No.* |
|---|---|---|
| 1/32" | Standard | JR-ZN.5-5 |
| 1/16" | Standard | JR-ZN1-5 |
| | Medium | JR-MZN1-5 |
| | Long | JR-LZN1-5 |
| 1/8" | Standard | JR-ZN2-5 |

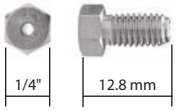
**SPECS**
- For 1/32", 1/16", and 1/8" OD tubing
- Material: Type 303 SS
- Threads: 1/32": 6-40 1/16": 10-32 1/8": 5/16-24
- Pressure rating with premium SS tubing and ZF1S6 ferrule: 1375 bar (20,000 psi)



**1/32" standard**

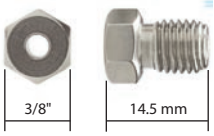


**1/16" standard**



**1/16" medium**

**1/16" long**



**1/8" standard**

## Rheodyne® compatible stainless nuts

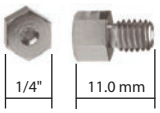
- Excellent fit to Rheodyne fitting details
- Different lengths available
- For 1/16" OD tubing

These nuts are for use with metal Rheodyne valves. Three different length nuts are available, in order to accommodate any possible connecting situation. The standard nut is suitable for easily accessible connections (couplers, detectors, columns, etc.) For very tight and difficult to reach areas, we recommend the long and extra long nut.

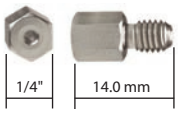
Sold in packages of 5.

| *Tubing OD* | *Length* | *Product No.* |
|---|---|---|
| 1/16" | Short | JR-56-5 |
| | Long head | JR-57-5 |
| | Extra long | JR-58-5 |

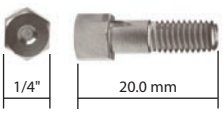
**SPECS**
- For 1/16" OD tubing
- Material: Type 316 SS
- Threads: 10-32
- Pressure rating: <500 bar (7,250 psi) *(Varies with tubing material and ID)*



**Short**



**Long head**



**Extra long**

**TECH TIP**
Using nuts with different lengths will create more space, for better wrench access.

**MORE INFORMATION**
About stainless steel . . 100

**RELATED PRODUCTS**
Ferrules
Rheodyne . . . . . 32
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## Valco® stainless ferrules

*UHPLC*

**SPECS**
- For 1/32", 1/16", and 1/8" OD tubing
- Material: Type 316 SS
- Pressure rating: 1375 bar (20,000 psi) *(Varies with tubing material and ID)*

- Excellent fit to Valco fitting details
- For 1/32", 1/16", and 1/8" OD tubing

These ferrules are for use with all standard Valco internal fittings and most valves, and with those of most other manufacturers as well. 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.)

Sold in packages of 5.

| *Size* | | *Product No.* |
|---|---|---|
| 1/32" | | JR-ZF.5-5 |
| 1/16" | | JR-ZF1-5 |
| 1/8" | | JR-ZF2-5 |

## Rheodyne® compatible stainless ferrules

**SPECS**
- For 1/16" OD tubing
- Material: Type 316 SS
- Pressure rating: <500 bar (7,250 psi) *(Varies with tubing material and ID)*

- Excellent fit to Rheodyne fitting details
- For 1/16" OD tubing

These ferrules are for use with metal Rheodyne valves.

Sold in packages of 5.

| *Description* | | *Product No.* |
|---|---|---|
| Standard ferrule | | JR-59-5 |
| 2-step Rheodyne-type ferrule | | JR-60-5 |

## Stainless steel plugs

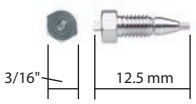
*UHPLC*

**SPECS**
- For 1/16", and 1/8" OD tubing
- Material: 1/16": SS 316 1/8": SS 313
- Threads: 1/16": 10-32 1/8": 5/16-24

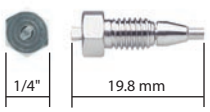
Use a plug to close off an usused port in a valve, manifold, or HPLC column. The standard stainless plug consists of a zero volume nut with a ferrule made up on a piece of solid rod.

Sold individually.

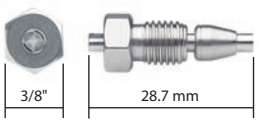
| *Tubing OD* | *Product No.* |
|---|---|
| 1/32" | JR-ZP.5 |
| 1/16" | JR-ZP1 |
| 1/8" | JR-ZP2 |



**1/32" plug**



**1/16" plug**



**1/8" plug**

## Stainless steel caps

*UHPLC*

**SPECS**
- For 1/16", and 1/8" OD tubing
- Material: Type 303 SS
- Threads: 1/16": 10-32 1/8": 5/16-24

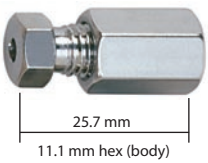
Use a cap to close off a tube with a ferrule and internal nut already made up. A cap is essentially a piece of hex stock with a zero volume fitting detail machined into it, but with no through-hole.

Sold individually.

| *Tubing OD* | *Product No.* |
|---|---|
| 1/32" | JR-ZC.5 |
| 1/16" | JR-ZC1 |
| 1/8" | JR-ZC2 |

**1/32" cap**

**1/16" cap**



**1/8" cap**

**RELATED PRODUCTS**
UHPLC PEEK ferrules . . . 22



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- Easy connection of solvent lines
- Low dead volume
- For 1/16" OD tubing

VICI stainless steel tees and crosses are for joining solvent lines. They are precision machined with a focus on the concentricity of the bore as well as on the finish of the surfaces to gave an absolute leak-free connection.

These tees and crosses have internal threads, which we recommend for most applications. Internal threads make stronger connections and internal fitting details provide the lowest dead volume for high performance instrumentation.

## Stainless tees

*UHPLC*

VICI stainless steel tees join three solvent lines.

Three nuts and ferrules ship with each tee.

| *Description* | *Bore (mm)* | *Qty/pkg* | *Product No.* |
|---|---|---|---|
| 1/16" tee | 0.25 | 1 | JR-ZT1C |
| | 0.50 | 1 | JR-ZT1M |
| | 0.75 | 1 | JR-ZT1 |
| Replacement nut | | 5 | JR-ZN1-5 |
| Replacement ferrule | | 5 | JR-ZF1S6-5 |

### SPECS

- For 1/16" OD tubing
- Material:
  Body Type 316 SS
  Nuts Type 303 SS
  Ferrules 316 SS
- Pressure rating: 1375 bar (20,000 psi) *(Varies with tubing material and ID)*

## Stainless crosses

*UHPLC*

VICI stainless steel crosses join four solvent lines.

Four nuts and ferrules ship with each tee.

| *Description* | *Bore (mm)* | *Qty/pkg* | *Product No.* |
|---|---|---|---|
| 1/16" cross | 0.25 | 1 | JR-ZX1C |
| | 0.50 | 1 | JR-ZX1M |
| | 0.75 | 1 | JR-ZX1 |
| Replacement nut | | 5 | JR-ZN1-5 |
| Replacement ferrule | | 5 | JR-ZF1S6-5 |

### SPECS

- For 1/16" OD tubing
- Material:
  Body Type 316 SS
  Nuts Type 303 SS
  Ferrules 316 SS
- Pressure rating: 1375 bar (20,000 psi) *(Varies with tubing material and ID)*

### MORE INFORMATION

About stainless steel . . 100

### RELATED PRODUCTS

Open end wrench . . . . . 89
Stainless steel starter kit . . . . . 90
ValvTool for tightening hex-head fittings . . . . 88

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## HIGH PRESSURE FITTINGS ■ STAINLESS STEEL

- Easy connection of solvent lines
- Low dead volume

VICI stainless steel unions and reducing unions are precision machined with a focus on the concentricity of the bore as well as on the finish of the surfaces to gave an absolute leak-free connection.

These unions have internal threads, which we recommend for most applications. Internal threads make stronger connections and internal fitting details provide the lowest dead volume for high performance instrumentation.

### Stainless unions

*UHPLC*

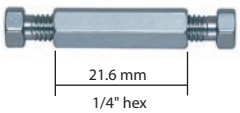
**SPECS**
- For 1/16" OD tubing
- Material:
  Body Type 316 SS
  Nuts Type 303 SS
  Ferrules 316 SS
- Pressure rating: 1375 bar (20,000 psi) *(Varies with tubing material and ID)*

- Choice of four bores
- For 1/16" OD tubing

VICI stainless steel unions join two pieces of 1/16" OD metal tubing.

Two nuts and ferrules ship with each union.

| *Description* | *Bore (mm)* | *Qty/pkg* | *Product No.* |
|---|---|---|---|
| 1/16" union | 0.15 | 1 | JR-ZU1XC |
| | 0.25 | 1 | JR-ZU1CS6 |
| | 0.50 | 1 | JR-ZU1MS6 |
| | 0.75 | 1 | JR-ZU1S6 |
| Replacement nut | | 5 | JR-ZN1-5 |
| Replacement ferrule | | 5 | JR-ZF1S6-5 |




### Stainless reducing unions *Imperial*

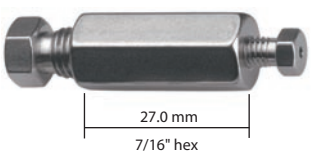
*UHPLC*

**SPECS**
- For joining 1/8" to 1/16" OD tubing
- Material:
  Body Type 316 SS
  Nuts Type 303 SS
  Ferrules 316 SS
- Pressure rating: 1375 bar (20,000 psi) *(Varies with tubing material and ID)*

These reducing unions join 1/16" OD to 1/8" OD tubing.

Two nuts and ferrules ship with each union.

| *Description* | *Size* | *Qty/pkg* | *Product No.* |
|---|---|---|---|
| Reducing union | 1/8" to 1/16" | 1 | JR-ZRU21 |
| Replacement nut | 1/8" | 5 | JR-ZN2-5 |
| | 1/16" | 5 | JR-ZN1-5 |
| Replacement ferrule | 1/8" | 5 | JR-ZF2S6-5 |
| | 1/16" | 5 | JR-ZF1S6-5 |




**RELATED PRODUCTS**

Nanovolume® high pressure fittings . . 36-39
Stainless starter kit . . . . 90
*HPLC parts kit with stainless fittings and tubing*
ChromBox kit. . . . . 91
*HPLC parts kit with PEEK and stainless fittings and tubing*



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## Stainless reducing unions *NEW* *Imperial to metric* *UHPLC*

- Ultra-high pressure
- For 1 mm, 2 mm, and 3 mm OD tubing

With these new reducing unions, metric tubing can be connected to imperial fittings, valves, and chromatographic systems. The unions are manufactured from Type 303 stainless steel.

For easy identification, the metric end is marked by a groove.

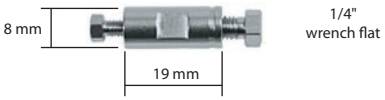
Two nuts and ferrules ship with each reducing union.

**SPECS**

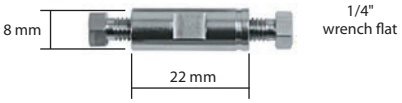
- Material:
  Body Type 303 SS
  Nuts Type 303 SS
  Ferrules 316 SS
- Tube reducing OD
  1/32" to 1.0 mm
  1/16" to 2.0 mm
  1/8" to 3.0 mm
- Pressure rating:
  1375 bar
  (20,000 psi)
  *(Varies with tubing material and ID)*

| *Description* | *Bore (mm)* | *Threads* | *Qty/pkg* | *Product No.* |
|---|---|---|---|---|
| Reducing union | | | | |
| 1/32" to 1.0 mm | 0.25 | 6-40 to 10-32 | 1 | JR-096 |
| 1/16" to 2.0 mm | 0.75 | 10-32 | 1 | JR-082 |
| 1/8" to 3.0 mm | 0.75 | 5/16-24 | 1 | JR-086 |

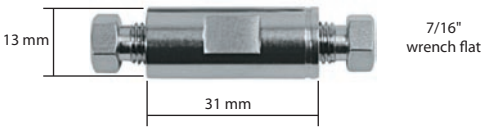
| *Description* | *Size* | *Threads* | *Qty/pkg* | *Product No.* |
|---|---|---|---|---|
| Replacement nut | 1/32" | 6-40 | 5 | JR-ZN.5-5 |
| | 1/16" | 10-32 | 5 | JR-ZN1-5 |
| | 1/8" | 5/16-24 | 5 | JR-ZN2-5 |
| | for 1.0 mm | 10-32 | 5 | JR-ZN1-5 |
| | for 2.0 mm | 10-32 | 5 | JR-80-5 |
| | for 3.0 mm | 5/16-24 | 5 | JR-ZN2-5 |
| Replacement ferrule | 1/32" | | 5 | JR-ZF.5S6-5 |
| | 1/16" | | 5 | JR-ZF1S6-5 |
| | 1/8" | | 5 | JR-ZF2S6-5 |
| | 1.0 mm | *NEW* | 5 | JR-097-5 |
| | 2.0 mm | *NEW* | 5 | JR-083-5 |
| | 3.0 mm | *NEW* | 5 | JR-087-5 |




**1/32" to 1.0 mm**




**1/16" to 2.0 mm**




**1/8" to 3.0 mm**

**Metric ferrules**

**WRENCH SIZE FOR BODY FLAT**

| *Wrench size* | *Reducing union* | *P/N* |
|---|---|---|
| 1/4" | 1/32" to 1.0 mm | JR-096 |
| 1/4" | 1/16" to 2.0 mm | JR-082 |
| 7/16" | 1/8" to 3.0 mm | JR-086 |

# High pressure fittings

## NANOVOLUME® FITTINGS ■ FOR 360 MICRON AND 1/32" TUBING

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

## High pressure Nanovolume® fittings index

### 1/32" Nanovolume® Fittings

Nuts, ferrules, unions, reducing unions . . . . . 37

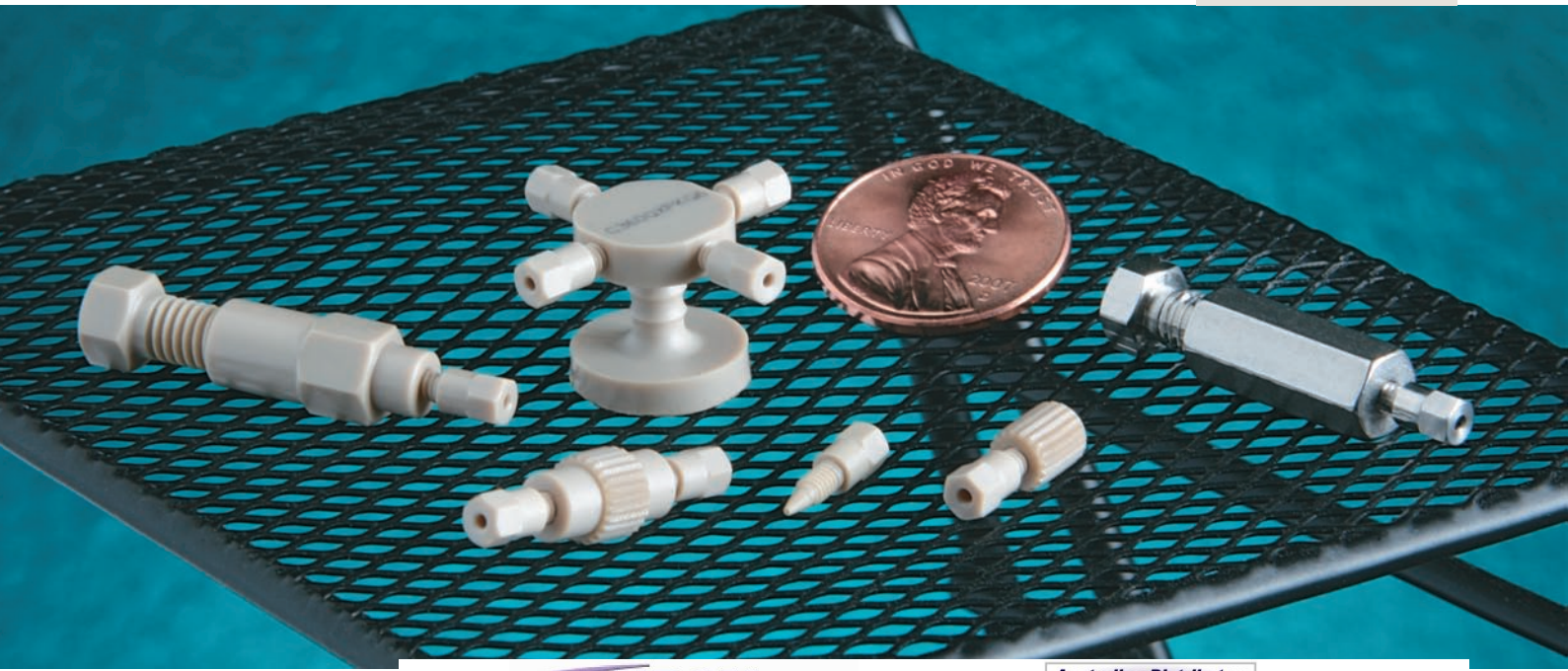
1/32" fittings, with 100 µm or 150 µm bore, are ideal for high resolution capillary chromatography. Rated at 5,000 psi with fingertight nuts, they will remain leak-tight well beyond the burst strength of most PEEK tubing. These fittings are machined from high quality inert polymers to the same exacting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

### 360 Micron Nanovolume® Fittings

For PEEK or FS tubing, <10K psi . . . . . 38
For fused silica tubing, 10K psi . . . . . 39
For metal tubing, <20K psi. . . . . 39

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.

**DISCLAIMER**
The maximum holding pressure for any type of connections involving tubing and a ferrule varies considerably with the tubing material, the ferrule material, the clearance between tubing OD and ferrule ID, and the shape of the fitting detail.





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- 100 and 150 µm bores available
- Nuts, ferrules, and unions
- For PEEK tubing

VICI Nanovolume® fittings are designed for capillary LC, used in HTS techniques, proteomics, genomics, and other newer developments in industrial research requiring small sample size for reduction of analysis time.

VICI Nanovolume connectors include our one-piece fingertight fittings for 1/32" OD tubing, featuring our patented* collapsible ferrule. PEEK ferrules for use with our external nuts also feature the collapsible, grooved design. 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.

VICI Nanovolume fittings are as easy to handle as our standard analytical fittings and unions. The only difference is their size.

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

## Nanovolume® fittings

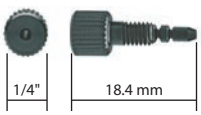
*1/32"*

The internal nut includes a collapsible ferrule as an integral part of the fitting; the external nut must be used with the separate ferrule listed below.

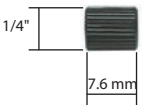
| *Description* | *Tubing OD* | *Product No.* | |
|---|---|---|---|
| One-piece nut/ferrule | 1/32" | JR-C-NNFFPK | |
| External nut | 1/32" | JR-C-EN.5FPKB | |
| | 1/16" | JR-C-EN1FPKB | |
| Ferrule, collapsible | 1/32" | JR-ZGF.5PK | |
| | 1/16" | JR-ZGF1PK | |
| **Bore size:** | *Tubing OD* | **100 micron** *Product No.* | **150 micron** *Product No.* |
| Union (external to internal) | 1/32" | JR-C-NEU.5XFPK | JR-C-NEU.5FPK |
| Reducing union | 1/16" to 1/32" | — | JR-C-NERU1FPK |

### SPECS

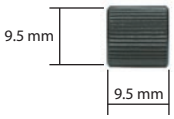
- For 1/32" OD PEEK
- Material: PEEK
- Threads:
  Nut/ferrule 6-40
  External nut
  1/32" 8-36
  1/16" 10-32
- Pressure rating: <350 bar (5,000 psi) *(Varies with tubing material and ID)*
- Tolerances: ±0.05mm (.002")



**Nut/ferrule**



**1/32" external nut**



**1/16" external nut**

**1/32" union**

**1/16" to 1/32" reducing union**

## 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 JR-C-NNFFPK or JR-C-NNFLFPK



| *For tubing OD* | *Prod No* |
|---|---|
| 125 - 175 µm | JR-C-NL.15L-5 |
| 175 - 225 µm | JR-C-NL.20L-5 |
| 225 - 275 µm | JR-C-NL.25L-5 |
| 275 - 325 µm | JR-C-NL.30L-5 |
| 325 - 375 µm | JR-C-NL.35L-5 |

**10 mm liners**
Use with external nut JR-C-EN.5FPKB



| *For tubing OD* | *Prod No* |
|---|---|
| 125 - 175 µm | JR-C-NL.15S-5 |
| 175 - 225 µm | JR-C-NL.20S-5 |
| 225 - 275 µm | JR-C-NL.25S-5 |
| 275 - 325 µm | JR-C-NL.30S-5 |
| 325 - 375 µm | JR-C-NL.35S-5 |

**MORE INFORMATION**
360 µm Nanovolume® fittings .....38-39

**CONVERSIONS**

| | | |
|---|---|---|
| 50 µm | = | .002" |
| 100 µm | = | .004" |
| 150 µm | = | .006" |
| 0.25 mm | = | .010" |
| 0.50 mm | = | .020" |
| 0.75 mm | = | .030" |

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## HIGH PRESSURE FITTINGS ■ NANOVOLUME®

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

Our 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.

VICI Nanovolume® 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 "quick-mount" 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

*360 µm*

**SPECS**
- For PEEK or FS tubing, 360 µm
- Material: PEEK
- Threads: 2-56
- Pressure rating: <689.5 bar (10,000 psi) *(Varies with tubing material and ID)*

These fittings are constructed from premium grade natural PEEK material. They are intended for use with PEEK or fused silica tubing at pressures up to 10,000 psi, or the maximum pressure for which the tubing is rated, whichever is lower. Quick-mount versions have integral base with double stick tape to secure fittings to a surface.

| | *Product No.* |
|---|---|
| Nut/ferrule | JR-C360NFPK |
| Cap | JR-C360CPK |
| Plug | JR-C360PPK |
| Tightening tool | JR-C360ET |

| **Bore size:** | **50 micron** *Product No.* | **100 micron** *Product No.* | **150 micron** *Product No.* |
|---|---|---|---|
| Union | JR-C360UPK2 | JR-C360UPK4 | JR-C360UPK6 |
| Reducing union, 1/16" to 360 µm | — | — | JR-C360RU1PK6 |
| Union, quick mount | JR-C360QUPK2 | JR-C360QUPK4 | JR-C360QUPK6 |
| Tee, quick mount | JR-C360QTPK2 | JR-C360QTPK4 | JR-C360QTPK6 |
| Cross, quick mount | JR-C360QXPK2 | JR-C360QXPK4 | JR-C360QXPK6 |

**360 µm union**

**1/16" to 360 µm reducing union**

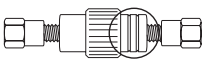
**Union, quick mount**

**Tee, quick mount**

**Cross, quick mount**

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

**TECH TIP**
Grooves on the fitting body indicate the bore size:



Grooves indicate bore size
1 groove: 50 µm
2 grooves: 100 µm
no grooves: 150 µm



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## For fused silica tubing — 10,000 psi and above

*360 µm*

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

**SPECS**
- For FS tubing, 360 µm
- Materials
  *Body and nut:* HPLC grade SS
  *Ferrule:* Gold-plated nickel
- Threads: 2-56
- Pressure rating: ≥ 689.5 bar (10,000 psi) *(Varies with tubing material and ID)*

| | | *Product No.* |
|---|---|---|
| Nut/ferrule | | JR-C360NFFS |
| Cap | | JR-C360CFS |

| **Bore size:** | **50 micron** *Product No.* | **100 micron** *Product No.* | **150 micron** *Product No.* |
|---|---|---|---|
| Union | JR-C360UFS2 | JR-C360UFS4 | JR-C360UFS6 |
| Reducing union, 1/32" to 360 µm | JR-C360RU.5FS2 | JR-C360RU.5FS4 | JR-C360RU.5FS6 |
| Reducing union, 1/16" to 360 µm | — | — | JR-C360RU1FS6 |

**360 µm union**

**1/32" to 360 µm reducing union**

**1/16" to 360 µm reducing union**

## For metal tubing — up to 20,000 psi

*360 µm*

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.

**SPECS**
- For metal tubing, 360 µm
- Materials
  HPLC grade SS
- Threads: 2-56
- Pressure rating: <1375 bar (20,000 psi) *(Varies with tubing material and ID)*

| | | *Product No.* |
|---|---|---|
| Nut/ferrule | | JR-C360NFS6 |
| Cap | | JR-C360C |

| **Bore size:** | **50 micron** *Product No.* | **100 micron** *Product No.* | **150 micron** *Product No.* |
|---|---|---|---|
| Union | JR-C360US62 | JR-C360US64 | JR-C360US66 |
| Reducing union, 1/32" to 360 µm | JR-C360RU.5S62 | JR-C360RU.5S64 | JR-C360RU.5S66 |
| Reducing union, 1/16" to 360 µm | — | — | JR-C360RU1S66 |

**360 µm union**

**1/32" to 360 µm reducing union**

**1/16" to 360 µm reducing union**

**MORE INFORMATION**
1/32" Nanovolume® fittings . . . . . 37

**CONVERSIONS**

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

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

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# Low pressure fittings

POLYMERIC

Our 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.

## Low pressure polymeric fittings index


**Nuts, ferrules, and washers for 1/4-28 flat-bottom fitting details**

PPS hex head nuts
- Flangeless ..... page 41
- Flanged ..... 41

Flangeless ferrules
- Collapsible ..... 41
- Inverted ..... 41

Flangeless nuts
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Manifolds with 5 and 9 ports ..... 46

**Plugs**

10-32 and 1/4-28 polypropylene plugs ..... 48

**Adapters, polypropylene** ..... 48

A wide offering of adapters, including male and female Luer to barbed, 10-32, and 1/4-28 male and female, plus many other combinations.

**Micro valves for LC and GC** ..... 49

Simplify your liquid or gas handling application. The unique design of the fitting detail allows a leak-free seal with no potential for rotor damage from overtightening.

**Peristaltic tubing adapter set** ..... 49

Connect soft tubing to PTFE and PTFE-like tubing with this biocompatible adapter set, which works with peristaltic tubing up to 4.50 mm OD.


**FITTING DESIGNS**

VICI Jour offers two types of low pressure fittings for 1/4-28 flat-bottomed fitting details:

- **Flangeless** connections utilize several ferrule designs. The ferrule grips the tubing as the fitting is tightened, without significantly reducing the tubing ID.
- **Flanged** tube end fittings are retained on polymeric tubing by a flange formed around a polypropylene washer. The washer never comes in contact with the mobile phase.

**DISCLAIMER**

The maximum holding pressure for any type of connections involving tubing and a ferrule varies considerably with the tubing material the ferrule material, the clearance between tubing OD and ferrule ID, and the shape of the fitting detail.

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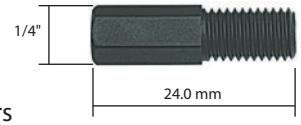
- Economically priced alternative to PEEK
- Excellent chemical resistance
- For 1/16" or 1/8" OD tubing
- Fingertight when used with Color-Sleeve adapters

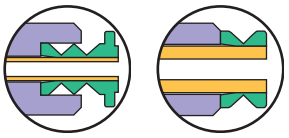



Our PPS 1/4-28 fitting series offers excellent chemical and pressure resistance. Three different sealing options are available.

## PPS hex-head nuts and collapsible ferrules (flangeless) *1/4-28*

Patented* collapsible ferrules are not included. Order separately.

* Patent No. 6,575,501




| *Description* | *Material* | *Tubing OD* | *Qty/pkg* | *Product No.* |
|---|---|---|---|---|
| Nut for use with collapsible ferrule | PPS | 1/16" | 10 | JR-55050-10 |
| | | 1/8" | 10 | JR-55051-10 |
| Collapsible ferrules | CTFE | 1/16" | 10 | JR-CFL-CB1KF |
| | | 1/8" | 10 | JR-CFL-CB2KF |
| | PEEK | 1/16" | 10 | JR-CFL-CB1PK |

### SPECS

- For 1/16" and 1/8" OD tubing
- Threads: 1/4-28
- Pressure rating:

| OD | Bar | Psi |
|---|---|---|
| 1/16" | 105 | 1500 |
| 1/8" | 35 | 500 |

*(Varies with tubing material and ID)*

- * Patent No. 6,575,501

## PPS hex-head nuts and inverted ferrules (flangeless) *1/4-28*

Ferrules are not included. Order separately.

| *Description* | *Material* | *Tubing OD* | *Qty/pkg* | *Product No.* |
|---|---|---|---|---|
| Nut for use with inverted ferrule | PPS | 1/32" | 10 | JR-55073-10 |
| | | 1/16" | 10 | JR-55070-10 |
| | | 1/8" | 10 | JR-55071-10 |
| | | 1.0 mm | 10 | JR-55073-10 |
| | | 2.0 mm | 10 | JR-55072-10 |
| Inverted ferrules | ETFE | 1/32" ***NEW*** | 10 | JR-032-10 |
| | | 1/16" | 10 | JR-041-10 |
| | | 1/8" | 10 | JR-051-10 |
| | | 1.0 mm ***NEW*** | 10 | JR-031-10 |
| | | 2.0 mm ***NEW*** | 10 | JR-042-10 |
| | | 3.0 mm ***NEW*** | 10 | JR-049-10 |

### SPECS

- For 1/32"–1/8"OD tubing
- Threads: 1/4-28
- Pressure rating:

| OD | Bar | Psi |
|---|---|---|
| 1/16" | 105 | 1500 |
| 1/8" | 35 | 500 |

*(Varies with tubing material and ID)*

## PPS hex-head nuts and washers (flanged connections) *1/4-28*

Washers are not included. Order separately.

| *Description* | *Material* | *Tubing OD* | *Qty/pkg* | *Product No.* |
|---|---|---|---|---|
| Nut for flange/ washer connection | PPS | 1/16" | 10 | JR-55060-10 |
| | | 1/8" | 10 | JR-55061-10 |
| Washer | PP | 1/16" | 10 | JR-201926-10 |
| | | 1/8" | 10 | JR-201928-10 |
| Easy-Flange kit *(see page 85)* | | | | JR-201540 |

### SPECS

- For 1/16" and 1/8" OD tubing
- Threads: 1/4-28
- Pressure rating:

| OD | Bar | Psi |
|---|---|---|
| 1/16" | 105 | 1500 |
| 1/8" | 35 | 500 |

*(Varies with tubing material and ID)*

**HIGH PRESSURE 1/4-28 NUTS AND FERRULES**
A PPS nut, PEEK ferrule, and stainless steel bushing allow a high pressure connection in a 1/4-28 flat-bottomed fitting detail.. . . . . 25

**TECH TIP**
Color-Sleeve adapters turn PPS nuts into fingertight fittings and color-code different solvent lines. . . . . 17

**CHEMICAL RESISTANCE OF PPS**

A = suitable
B = marginal
C = not recommended

| Chemical class | Resistance |
|---|---|
| Acids, organic | A |
| Acids, inorganic | B/C* |
| Aldehydes | A |
| Alcohols | A |
| Bases | B |
| Esters | A |
| Halogenated org. | A/B |
| Hydrocarbons | A |
| Ketones | A |

* Concentrated halogen acids

See detailed chemical resistance chart . . . . 96-98

**MORE INFORMATION**
About polymers . . . 99-100

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## PEEK fingertight nuts (flangeless) *1/4-28*

### SPECS
- For 1/16" and 1/8" OD tubing
- Materials
  *Nut:* PPS
  *Ferrules:* ETFE
- 1/4-28 threads
- Pressure rating:

| OD | Bar | Psi |
|---|---|---|
| 1/16" | 105 | 1500 |
| 1/8" | 35 | 500 |

*(Varies with tubing material and ID)*

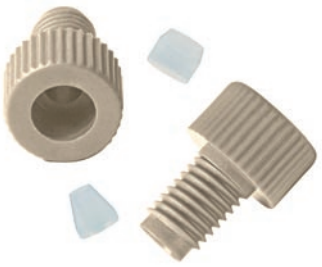
- Compatible with all 1/4-28 flat-bottom ports
- Excellent chemical resistance
- For 1/16" or 1/8" OD tubing
- True fingertight – no tools required

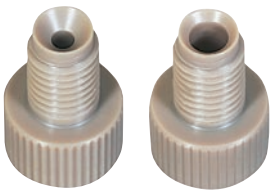
PEEK flangeless nuts in combination with our inverted ferrule do not a require flanging tool. A hand-tightening procedure makes leak-free seals.

With this fitting system, the inert ETFE ferrule is the only part besides the tubing which comes into contact with the fluid stream – the nut is never in contact.

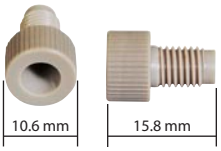
Ferrules are not included. Order separately.

| Tubing OD: | | | 1/16" | 1/8" |
|---|---|---|---|---|
| *Description* | *Material* | *Qty/pkg* | *Product No.* | *Product No.* |
| Nut for use with inverted ferrule | PEEK | 10 | JR-20124-10 | JR-20116-10 |
| Inverted ferrules | ETFE | 10 | JR-041-10 | JR-051-10 |





1/16" 1/8"




## Color-coded fingertight nuts (flangeless) *1/4-28*

### SPECS
- For 1/16" and 1/8" OD tubing
- Materials
  *Nut:* Polyacetal
  *Ferrules:* ETFE
- 1/4-28 threads
- Pressure rating:

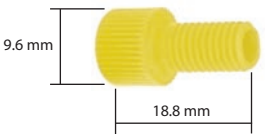
| OD | Bar | Psi |
|---|---|---|
| 1/16" | 70 | 1000 |
| 1/8" | 35 | 500 |

*(Varies with tubing material and ID)*

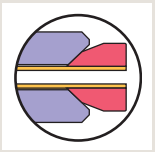
- Polyacetal – economical alternative to PEEK
- Compatible with all 1/4-28 flat-bottom ports
- For 1/16" or 1/8" OD tubing
- True fingertight – no tools required

Polyacetal flangeless nuts in combination with the inverted ferrule do not require a flanging tool. A hand-tightening procedure makes leak-free seals. With this fitting system, the inert ETFE ferrule is the only part besides the tubing which comes into contact with the fluid stream – the nut is never in contact. Six colors are available.

| Tubing OD: | | | | 1/16" | 1/8" |
|---|---|---|---|---|---|
| *Description* | | *Color* | *Qty/pkg* | *Product No.* | *Product No.* |
| Nuts | | Green | 10 | JR-040GR-10 | JR-050GR-10 |
| | | Blue | 10 | JR-040BL-10 | JR-050BL-10 |
| | | Yellow | 10 | JR-040YL-10 | JR-050YL-10 |
| | | Red | 10 | JR-040RE-10 | JR-050RE-10 |
| | | White | 10 | JR-040WH-10 | JR-050WH-10 |
| | | Black | 10 | JR-040BK-10 | JR-050BK-10 |
| 1" long nuts | | White | 10 | JR-040WL-10 | JR-050WL-10 |
| Inverted ETFE ferrules | | | 10 | JR-041-10 | JR-051-10 |




### TECH TIP
The inert ETFE ferrule used with these nuts is the only part besides the tubing which is in contact with the fluid stream.





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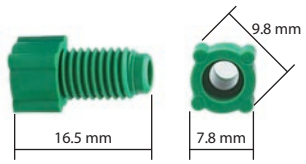
## Color-coded fingertight nuts (flanged connections) *1/4-28*

- For flanged connections
- Compatible with all 1/4-28 flat-bottom ports
- For 1/16" or 1/8" OD tubing
- Fiberglass-reinforced PP with PP washers

For those systems requiring or preferring flanged connections, use these fiberglass-reinforced fittings with our Easy-Flange flanging tool and polypropylene washers to make a clean connection. The flange on the tubing ensures that the washer never comes in contact with the mobile phase.

Six colors are available.

**SPECS**
- For 1/16" and 1/8" OD tubing
- Material: Fiberglass-reinforced polypropylene
- 1/4-28 threads
- Pressure rating: <30 bar (435 psi) *(Varies with tubing material and ID)*



| Description | | Color | Qty/pkg | Tubing OD: 1/16" Product No. | 1/8" Product No. |
|---|---|---|---|---|---|
| Nuts | | Green | 10 | JR-202123-10 | JR-202143-10 |
| | | Blue | 10 | JR-202122-10 | JR-202142-10 |
| | | Yellow | 10 | JR-202124-10 | JR-202144-10 |
| | | Red | 10 | JR-202125-10 | JR-202145-10 |
| | | White | 10 | JR-201094WH-10 | JR-201580WH-10 |
| | | Black | 10 | JR-201094BK-10 | JR-201580BK-10 |
| 1" long nuts | | White | 10 | JR-202120-10 | JR-202119-10 |
| | | Black | 10 | JR-202118-10 | JR-202121-10 |
| Polypropylene washer | | | 10 | JR-201926-10 | JR-201928-10 |

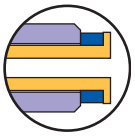
## Union body for flanged connections *1/4-28*

- Through bore low pressure union
- For flanged 1/4-28 flat-bottom connections
- For 1/16" or 1/8" OD tubing
- Completely inert and biocompatible

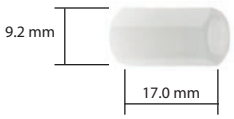
Flanged fittings are not included.

Order PPS hex-head flanged nuts or color-coded fingertight flanged nuts separately.

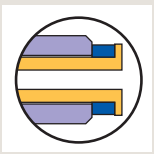
**SPECS**
- For 1/16" and 1/8" OD tubing
- Material: Polyamide
- 1/4-28 threads



| Description | Qty/pkg | Product No. |
|---|---|---|
| Union body, polyamide | 5 | JR-060-5 |




**TECH TIP**
Use our Easy-Flange kit for forming flanges on tubing . . . . . 85



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## PEEK unions

*1/4-28*

### SPECS

- For 1/16" and 1/8" OD tubing
- Materials
  *Body:* PEEK
  *Nut:* PPS
  *Ferrules:* ETFE
- 1/4-28 threads
- Pressure rating:

| OD | Bar | Psi |
|---|---|---|
| 1/16" | 105 | 1500 |
| 1/8" | 35 | 500 |

*(Varies with tubing material and ID)*

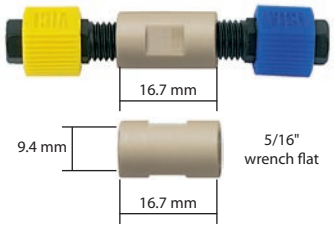
- For easy connection of low pressure solvent lines
- Low dead volume
- For 1/16" or 1/8" OD tubing
- Flat-bottomed 1/4-28 fitting details
- Completely inert and biocompatible

These unions facilitate the quick and reliable connection of two pieces of 1/16" or 1/8" OD tubing. Use with color-coded adapters for easy solvent line identification.

These are available as the body only, or complete with fittings.

A union with fittings includes:
- PEEK low pressure union
- 2 PPS flangeless hex-head nuts
- ETFE inverted ferrules
- Color-Sleeve adapters

| | Bore (mm) | Tubing OD | Qty/pkg | Product No. |
|---|---|---|---|---|
| Union, with fittings | 0.50 | 1/16" | 1 | JR-1064 |
| | 0.75 | 1/8" | 1 | JR-1068 |
| | 1.30 | 1/8" | 1 | JR-1065 |
| Body only | 0.50 | 1/16" | 1 | JR-064 |
| | 0.75 | 1/8" | 1 | JR-068 |
| | 1.30 | 1/8" | 1 | JR-065 |




| Spare parts | Tubing OD | Qty/pkg | Product No. |
|---|---|---|---|
| PPS flangeless nuts | 1/16" | 10 | JR-55070-10 |
| | 1/8" | 10 | JR-55071-10 |
| Inverted ETFE ferrules | 1/16" | 10 | JR-041-10 |
| | 1/8" | 10 | JR-051-10 |

## PEEK bulkhead unions

*1/4-28*

### SPECS

- For 1/16" and 1/8" OD tubing
- Materials
  *Body:* PEEK
  *Nut:* PPS
  *Ferrules:* ETFE
- 1/4-28 threads
- Pressure rating:

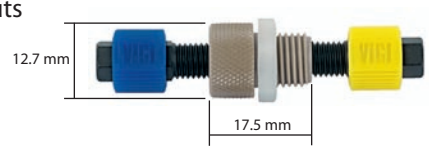
| OD | Bar | Psi |
|---|---|---|
| 1/16" | 105 | 1500 |
| 1/8" | 35 | 500 |

*(Varies with tubing material and ID)*

- Panel mounting (10 mm hole required, max 9 mm thick)
- For easy connection of low pressure solvent lines
- Low dead volume
- For 1/16" or 1/8" OD tubing
- Completely inert and biocompatible

Bulkhead unions are designed to be mounted through an instrument panel or on a bracket.

They are sold complete with fittings, and include:
- 2 PPS flangeless hex-head nuts
- 2 ETFE inverted ferrules
- 2 Color-Sleeve adapters



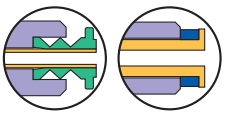

| | Bore (mm) | Tubing OD | Qty/pkg | Product No. |
|---|---|---|---|---|
| Bulkhead union, with fittings | 0.75 | 1/16" | 1 | JR-CBUMPK |
| | 1.50 | 1/8" | 1 | JR-CBULPK |

| Spare parts | Tubing OD | Qty/pkg | Product No. |
|---|---|---|---|
| PPS flangeless nuts | 1/16" | 10 | JR-55070-10 |
| | 1/8" | 10 | JR-55071-10 |
| Inverted ETFE ferrules | 1/16" | 10 | JR-041-10 |
| | 1/8" | 10 | JR-051-10 |

### TECH TIP

While our PEEK unions are typically used with inverted ferrules, collapsible ferrules or flanged connections can also be used.

**Standard: Inverted ferrule**



**Collapsible ferrule** **Flanged**

### TECH TIP

Use our impermeable tubing to avoid gas diffusion in the solvent lines . . . . . 13

### RELATED PRODUCTS

Color-coded fingertight flanged nuts . . . . . 43
Color-Sleeve adapters, in 12 colors . . . . . 17
High pressure PEEK unions . . . . . 26
PPS hex-head flanged nuts . . . . . 41



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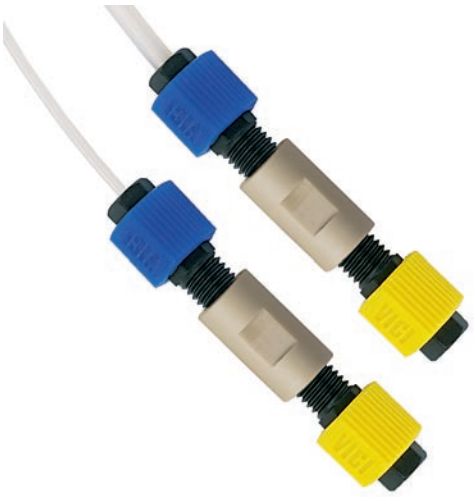


## PEEK reducing unions NEW *Imperial to metric, 1/4-28*

- Connects 1/16", 1/8", 1 mm, 2 mm, and 3 mm OD polymeric tubing
- Completely inert and biocompatible

With these new reducing unions, metric tubing can be connected to imperial fittings on valves and LC systems.

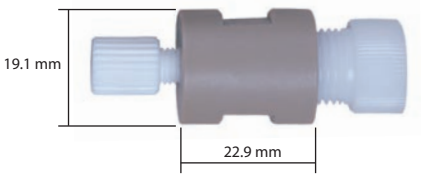
A reducing union with fittings includes:
- PEEK low pressure reducing union
- 1 PPS flangeless hex-head nut, imperial size noted
- 1 PPS flangeless hex-head nut, metric size noted
- ETFE inverted ferrules
- Color-Sleeve adapters

| *Tubing OD* | *Bore (mm)* | *Qty/pkg* | *Product No.* |
|---|---|---|---|
| Reducing union, with fittings | | | |
| 1/32" to 1 mm | 0.50 | 1 | JR-0640 |
| 1/16" to 2 mm | 0.75 | 1 | JR-0680 |
| 1/8" to 3 mm | 1.30 | 1 | JR-0650 |

| **Spare parts** | *Tubing OD* | *Qty/pkg* | *Product No.* |
|---|---|---|---|
| PPS flangeless nuts | 1/16" | 10 | JR-55070-10 |
| | 1/8" | 10 | JR-55071-10 |
| | 1.0 mm/ 1/32" | 10 | JR-55073-10 |
| | 2.0 mm | 10 | JR-55072-10 |
| Inverted ETFE ferrules | 1/32" | 10 | JR-032-10 |
| | 1/16" | 10 | JR-041-10 |
| | 1/8" | 10 | JR-051-10 |
| | 1.0 mm | 10 | JR-031-10 |
| | 2.0 mm | 10 | JR-042-10 |
| | 3.0 mm | 10 | JR-049-10 |

**Metric ferrules**

### SPECS
- For 1/32"–1/8"OD tubing, flangeless connections
- Materials
  *Body:* PEEK
  *Nuts:* PPS
  *Ferrules:* ETFE
- 1/4-28 threads
- Pressure rating: ≤48 bar (700 psi) *(Varies with tubing material and ID)*




## PEEK reducing unions *Imperial, 1/2-20 to 1/4-28*

- Connects 1/4" and 1/8" OD tubing
- Low dead volume
- Completely inert and biocompatible

PEEK reducing unions are sold complete with fittings, and include:
- One 1/8" flangeless nut, white polypropylene
- One 1/8" ferrule, CTFE
- One 1/4" flangeless nut, polyacetal
- One 1/4" ferrule, CTFE

| | *Bore (mm)* | *Tubing OD* | *Qty/pkg* | *Product No.* |
|---|---|---|---|---|
| Reducing union with fittings | 1.5 | 1/4" to 1/8" | 1 | JR-CU4LPK |

**Spare parts**

| *Tubing OD* | *Description* | *Qty/pkg* | *Product No.* |
|---|---|---|---|
| 1/8" | Flangeless nut, white propylene | 1 | JR-CFL-2W-S |
| | Ferrule, CTFE | 1 | JR-CFL-CB2KF-S |
| 1/4" | Flangeless nut, polyacetal | 1 | JR-CFL-4D |
| | Ferrule, CTFE | 1 | JR-CFL-CB4KF-S |

### SPECS
- For 1/4" to 1/8" OD tubing, flangeless connections
- Materials
  *Body:* PEEK
  *Nuts:*
  1/8" PP
  1/4" Polyacetal
  *Ferrules:* CTFE
- Threads: 1/2-20 to 1/4-28
- Pressure rating: <35 bar (500 psi) *(Varies with tubing material and ID)*

### TECH TIP
While our PEEK bulkhead unions are typically used with inverted ferrules, collapsible ferrules or flanged connections can also be used.

### RELATED PRODUCTS
Color-Sleeve adapters, in 12 colors . . . . . 17

## PEEK tees, crosses, and manifolds

*1/4-28*

### SPECS

- For 1/16" and 1/8" OD tubing
- Materials
  *Body:* PEEK
  *Nut:* PPS
  *Ferrules:* ETFE
- 1/4-28 threads
- Body sizes: see chart below
- Pressure rating:

| OD | Bar | Psi |
|---|---|---|
| 1/16" | 105 | 1500 |
| 1/8" | 35 | 500 |

*(Varies with tubing material and ID)*

- For 1/16" or 1/8" OD tubing
- Flat-bottomed 1/4-28 fitting details
- Completely inert and biocompatible

These VICI Jour connectors for low pressure applications are machined from PEEK. The bodies have 1/4-28 female ports which accept any flanged or flangeless fittings for 1/8" or 1/16" OD tubing.

Choose smaller through-holes for applications where low flowrate or low dead volume is required. Fittings with 1.50 mm through-holes are preferred for high flowrate applications.

These are available as the body only, or complete with fittings.

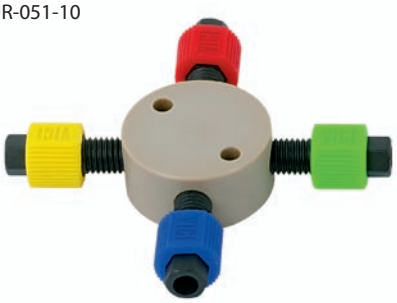
The appropriate number of the following are included when fittings are ordered:

- PPS flangeless hex-head nuts
- ETFE inverted ferrules
- Color-Sleeve adapters

Sold individually.

| | | Tubing OD | Bore (mm) | With fittings Product No. | Body only Product No. |
|---|---|---|---|---|---|
| Tees | | 1/16" | 0.50 | JR-6029 | JR-6034 |
| | | | 0.80 | JR-6030 | JR-6032 |
| | | 1/8" | 1.50 | JR-6031 | JR-6033 |
| Crosses | | 1/16" | 0.50 | JR-6039 | JR-6044 |
| | | | 0.80 | JR-6040 | JR-6042 |
| | | 1/8" | 1.50 | JR-6041 | JR-6043 |
| Manifolds | 5 ports | 1/16" | 0.75 | JR-C5M1PK | JR-B-C5M1PK |
| | | 1/8" | 1.50 | JR-C5M2PK | JR-B-C5M2PK |
| | 9 ports | 1/16" | 0.75 | JR-C9M1PK | JR-B-C9M1PK |
| | | 1/8" | 1.50 | JR-C9M2PK | JR-B-C9M2PK |

| **Spare parts** | *Tubing OD* | *Qty/pkg* | *Product No..* |
|---|---|---|---|
| PPS flangeless nuts | 1/16" | 10 | JR-55070-10 |
| | 1/8" | 10 | JR-55071-10 |
| Inverted ETFE ferrules | 1/16" | 10 | JR-041-10 |
| | 1/8" | 10 | JR-051-10 |



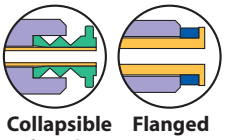
### BODY SIZES

| | *Diameter* | *Thickness* |
|---|---|---|
| Tees | 25.0 mm | 17.1 mm |
| Crosses | 25.0 mm | 17.1 mm |
| Manifolds | | |
| 5 ports | 25.0 mm | 17.1 mm |
| 9 ports | 25.0 mm | 28.6 mm |

### TECH TIP

While our PEEK tees and crosses are typically used with inverted ferrules, collapsible ferrules or flanged connections can also be used.

**Standard: Inverted ferrule**



**Collapsible ferrule** **Flanged**

### TECH TIP

Use our impermeable tubing to avoid gas diffusion in the solvent lines . . . . . 13

### RELATED PRODUCTS

Color-Sleeve adapters, in 12 colors . . . . . 17
High pressure PEEK tees . . . . . 28
PPS hex-head flanged nuts . . . . . 41



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## PEEK mixing tees

*1/4-28*

- For 1/16" or 1/8" OD tubing
- Mountable
- Completely inert and biocompatible

A unique mixing results from the the turbulence created by the introduction angle of the solvents. The mixing is much more thorough than with a conventional tee.

Typically our inverted ferrules are used in these fittings, but the 1/4-28 flat-bottomed details will also accept collapsible ferrule or flanged fittings.

These are available as the body only, or complete with fittings. A mixing tee with fittings includes:

- 3 PPS flangeless hex-head nuts
- 3 ETFE inverted ferrules
- 3 Color-Sleeve adapters

Sold individually.

| | *Tubing OD* | *Bore (mm)* | *Product No..* |
|---|---|---|---|
| Mixing tee, with fittings | 1/16" | 0.75 | JR-CM1XPK |
| | 1/8" | 1.50 | JR-CM2XPK |
| Body only | 1/16" | 0.75 | JR-B-CM1XPK |
| | 1/8" | 1.50 | JR-B-CM2XPK |
| **Spare parts** | *Tubing OD* | *Qty/pkg* | *Product No..* |
| PPS flangeless nuts | 1/16" | 10 | JR-55070-10 |
| | 1/8" | 10 | JR-55071-10 |
| Inverted ETFE ferrules | 1/16" | 10 | JR-041-10 |
| | 1/8" | 10 | JR-051-10 |

### SPECS

- For 1/16" and 1/8" OD tubing
- Materials
  *Body:* PEEK
  *Nut:* PPS
  *Ferrules:* ETFE
- 1/4-28 threads
- Pressure rating:

| OD | Bar | Psi |
|---|---|---|
| 1/16" | 105 | 1500 |
| 1/8" | 35 | 500 |

*(Varies with tubing material and ID)*

- Mixing volume

| *Bore* | *Volume* |
|---|---|
| 0.75 mm | 25 µl |
| 1.50 mm | 100 µl |

### RELATED PRODUCTS

Color-Sleeve adapters, in 12 colors . . . . . 17

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## Polypropylene plugs

*1/4-28 or 10-32*

**SPECS**
- Material: Polypropylene
- 10-32 or 1/4-28 threads

Sold in packages of 10.

| *Description* | | *Product No.* |
|---|---|---|
| 10-32 male | | JR-072450-10 |
| 1/4-28 male | | JR-072350-10 |
| 1/4-28 male, flat bottom | | JR-201999-10 |

## Polypropylene adapters

**SPECS**
- Material: Polypropylene

Sold in packages of 10.

| *Inlet* | | *Outlet* | | | *Product No.* |
|---|---|---|---|---|---|
| Male | Luer | Barbed | 1/16" | | JR-070211-10 |
| | | | 3/32" | | JR-070212-10 |
| | | | 1/8" | | JR-070213-10 |
| | | Male | 10-32 | | JR-070224-10 |
| | | | 1/4-28 | | JR-070225-10 |
| Male | 1/4-28 | Barbed | 1/16" | | JR-071123-10 |
| | | | 1/8" | | JR-071323-10 |
| Male | 10-32 | Barbed | 1/16" | | JR-071124-10 |
| | | | 1/8" | | JR-071324-10 |
| Female | Luer | Barbed | 1/16" | | JR-070111-10 |
| | | | 3/32" | | JR-070112-10 |
| | | | 1/8" | | JR-070113-10 |
| | | Female | Luer | | JR-070101-10 |
| | | Male | 10-32 | | JR-070124-10 |
| | | | 1/4-28 | | JR-070123-10 |

Sold individually.

| | | | | | |
|---|---|---|---|---|---|
| Flat bottom | 1/4-28 | Barbed | 1/8" ID | | JR-075013 |

**RELATED PRODUCTS**
High pressure PEEK adapters . . . . . 29
High pressure plugs . . . 24



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## Micro valves for GC and LC

*1/4-28*

- Compact 1" design
- Convenient panel mount, hole diameter 8 mm (0.3125"), 6 mm maximum thickness
- Biocompatible and inert
- Variety of configurations

Simplify your liquid or gas handling application with a VICI Jour 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.

**SPECS**
- For 1/16" and 1/8" OD tubing
- Materials
  - *Wetted parts:* PEEK, PTFE
  - *Body:* POM
  - *Nuts :* PPS
  - *Ferrules:* CTFE
- 1/4-28 threads
- 1.50 mm bore
- Pressure rating: see notes at left

Includes flangeless PPS fittings and CTFE collapsible ferrules for 1/8" OD tubing. Sold individually.

| | | *Product No.* |
|---|---|---|
| "T" flow path | 3 ports | JR-660100 |
| | 4 ports | JR-660110 |
| 180° flow path | 2 ports | JR-660200 |
| | 4 ports | JR-660210 |
| 90° flow path | 2 ports | JR-660300 |
| | 3 ports | JR-660310 |
| | 4 ports | JR-660320 |

| **Spare parts** | *Material* | *Tubing OD* | *Qty/pkg* | *Product No.* |
|---|---|---|---|---|
| Nuts | PPS | 1/16" | 10 | JR-55050-10 |
| | | 1/8" | 10 | JR-55051-10 |
| Collapsible ferrules | PEEK | 1/16" | 10 | JR-CFL-CB1PK |
| | CTFE | 1/8" | 10 | JR-CFL-CB2KF |

**"T" flow path**

**180° flow path**

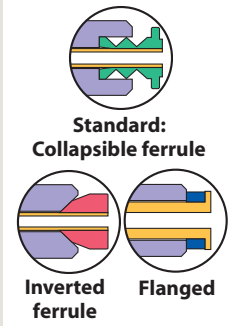
**90° flow path**

### MICRO VALVE PRESSURE RATINGS

- 200 psi gas
  Tested with helium using 1/16" OD x 0.84 mm ID PTFE tubing with PEEK collapsible ferrules
- 500 psi liquid
  Tested with isopropanol using 1/8" OD x 0.75 mm ID PTFE tubing with CTFE collapsible ferrules

### TECH TIP

While micro valves are typically used with collapsible ferrules, inverted ferrules or flanged connections can also be used.




### TECH TIP

Use our impermeable tubing to avoid gas diffusion in the solvent lines . . . . . 13

### RELATED PRODUCTS

Color-Sleeve adapters, in 12 colors . . . . . 17

High pressure PEEK tees . . . . . 28
PPS hex-head flanged nuts . . . . . 41

## Peristaltic tubing adapter set

*1/4-28*

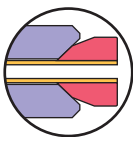
- For connecting soft tubing to PTFE and PTFE-like tubing
- Works with peristaltic tubing up to 4.50 mm OD
- For 1/16" and 1/8" PTFE and PTFE-like tubing
- Biocompatible
- Low dead volume

This "one-fits-all" set consists of everything needed to connect 1/16" or 1/8" OD PTFE and PTFE-like tubing to soft tubing (such as silicone), up to 4.5 mm in OD, minimum 0.5 mm ID.

The adapter includes:
- 3 different bushings (for the different soft tubing ODs)
- 2 PPS nuts (one each for 1/16" and 1/8" OD tubing)
- 2 ETFE inverted ferrules (one each for 1/16" and 1/8" OD tubing)
- 2 Color-Sleeve adapters

Sold individually.

**SPECS**
- For 1/16" and 1/8" OD tubing
- Materials
  - *Body:* PEEK
  - *Bushings:* PPS
  - *Nut:* PPS
  - *Ferrules:* ETFE
- 1/4-28 threads
- 1.50 mm bore
- Body size: 28 mm long 12 mm diameter.



| | *Product No.* |
|---|---|
| PEEK adapter for peristaltic to PTFE tubing connection | JR-PTAS |

# Filters

## AND MOBILE PHASE FILTERS

Filters trap foreign particulates from sample and mobile phase streams before they can damage valuable columns and instruments.

## Filters index


### Low pressure filters

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Filter/spargers
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### High pressure filters

PEEK high pressure filters
- In-line filter kit ..... 54
- Precolumn filter kit ..... 55
- Sure-Guard ..... 54

Stainless UHPLC filters ..... 56
Stainless inline filter ..... 57


### In-line filter cartridges

*Low pressure*

**SPECS**

- Materials
  - *Cartridge:* PTFE/CTFE
  - *Filter screen:* 316 stainless
- 1/4-28 detail
- Dimensions
  - *OD* 5.20 mm
  - *Thickness* 2.03 mm
  - *Bore* 0.8 mm
  - *Filter surface diameter* 2 mm
- Tolerances ±0.05 mm (.002")

- Easy to replace
- Compact design
- Fit all 1/4-28 fitting details
- Three porosity options

These convenient-to-use filters can be simply dropped into any 1/4-28 fitting detail, such as in a union. The filters are constructed of PTFE and CTFE, with a Type 316 stainless low-pressure-drop screen. The inner design of the cartridge ensures the equal distribution of the solvent to the screen.

| *Pore size* | *Maximum flow rate ** | *Qty/pkg* | *Product No.* |
|---|---|---|---|
| 2 µm | 30 ml/min | 5 | JR-CFE-S2-5 |
| 10 µm | 30 ml/min | 5 | JR-CFE-S10-5 |
| 75 µm | 30 ml/min | 5 | JR-CFE-S75-5 |

**NOTES**

* Flowrate measured with methanol/water (1:1), ultrasonic degassed, helium sparging to prevent regassing.

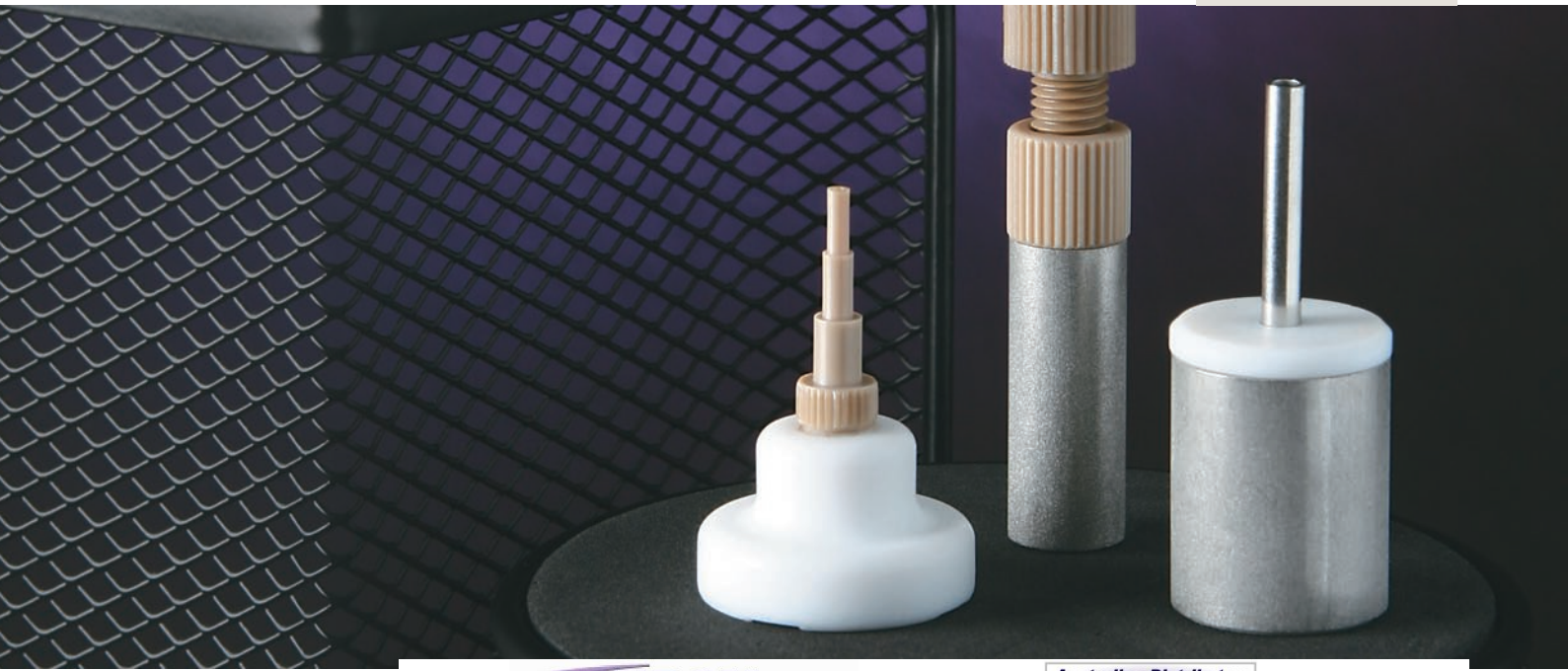
**TECH TIP**

We recommend using these in-line filter cartridges in combination with our low pressure fittings:


PEEK unions ..... 44
Tees and crosses ..... 46
Manifolds ..... 46
Micro valves ..... 49


**DISCLAIMER**

The maximum holding pressure for any type of connections involving tubing and a ferrule varies considerably with the tubing material, the ferrule material, the clearance between tubing OD and ferrule ID, and the shape of the fitting detail.





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## Last Drop mobile phase filters

*Low pressure*

- No loss of mobile phase
- Biocompatible PTFE frits or stainless steel frits
- Three porosity options
- Two connector types: stepped tubing and 1/4-28 fitting

**SPECS**
- Materials
  *Body:* PTFE
  *Frits:* PTFE/316 SS/PE
- Stepped tubing version is for 1.5, 2.2, and 3.5 mm ID tubing
- Fitting version (for 1/8" OD tubing) includes PEEK 1/4-28 nut with ETFE ferrule

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 steel, PTFE 2.5 µm, or a hydrophobic PE filter element pressed into an inert PTFE housing. The top of the housing has a 1/4-28 nut and ferrule or a stepped PEEK fitting connector which slips into 1.5, 2.2, or 3.5 mm ID pump inlet lines.

| **Connector type:** | | | **Stepped tubing connector** | **Fitting connector** |
|---|---|---|---|---|
| *Filter material* | *Pore size* | *Maximum flow rate ** | *Product No.* | *Product No.* |
| PTFE | 2.5 µm | 1.2 ml/min | JR-9000-0520 | JR-9000-0520F |
| | 5 µm | 2.6 ml/min | JR-9000-0521 | JR-9000-0521F |
| | 10 µm | 3.5 ml/min | JR-9000-0522 | JR-9000-0522F |
| Polyethylene | 10 µm | 11 ml/min | JR-9000-0522H | JR-9000-0522HF |
| Stainless | 2 µm | 28 ml/min | JR-9000-0530 | JR-9000-0530F |
| | 5 µm | 30 ml/min | JR-9000-0531 | JR-9000-0531F |
| | 10 µm | 30 ml/min | JR-9000-0532 | JR-9000-0532F |

**NOTES**
* Flowrate measured with methanol/water (1:1), ultrasonic degassed, helium sparging to prevent regassing.

**TECH TIPS**
- Economy Last Drop mobile phase filters are easy to replace - easy to clean. Use ultrasound or replace with a new filter.
- Connect the Economy Last Drop filter with 1/8" OD/ 1.59 mm OD tubing:
  PFA tubing . . . . . 9
  PTFE tubing . . . . . 12
- We recommend metal-free PTFE or glass filters for sensitive biochromatography applications where metal surfaces may corrode or interact with samples.

**RELATED PRODUCTS**
Last Drop mobile phase filter/spargers . . . . . 53

## Economy Last Drop mobile phase filters

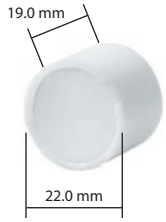
*Low pressure*

- Very competitively priced
- Biocompatible PTFE frits or stainless steel frits
- Three porosity options
- Two diameters

**SPECS**
- Materials
  *Body:* PTFE
  *Frits:* PTFE/316 SS
- For 1/8" OD tubing

Economy mobile phase filters come in two body diameters, for various dimensions of bottle necks. The filter body is made of PTFE, which is resistant to virtually all common mobile phases.

| *Frit material* | *Body OD* | *Pore size* | *Maximum flow rate ** | *Product No.* |
|---|---|---|---|---|
| PTFE | 19 mm | 2.5 µm | 1.2 ml/min | JR-4676-2.5TF |
| | | 5 µm | 2.6 ml/min | JR-4676-5TF |
| | | 10 µm | 3.5 ml/min | JR-4676-10TF |
| | 22 mm | 2.5 µm | 1.2 ml/min | JR-4677-2.5TF |
| | | 5 µm | 2.6 ml/min | JR-4677-5TF |
| | | 10 µm | 3.5 ml/min | JR-4677-10TF |
| Stainless steel | 19 mm | 2 µm | 30 ml/min | JR-4676-2 |
| | | 10 µm | 30 ml/min | JR-4676-10 |
| | 22 mm | 2 µm | 30 ml/min | JR-4677-2 |
| | | 10 µm | 30 ml/min | JR-4677-10 |

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## Last Drop biocompatible glass mobile phase filters *Low pressure*

**SPECS**
- Materials
  *Body:* Glass
  *Frit:* Glass
- For use with 1/8" tubing

- The solution for biocompatibility and high flowrates
- Easy-push tubing connection

Because it has a glass frit, the flowrate can be much higher with this filter than with PTFE mobile phase filters. The glass foot allows withdrawal of nearly all of the mobile phase – less than 2% is left in the bottle.

Includes 1/8" tubing connector.

| *Frit material* | *Pore size* | *Maximum flow rate ** | *Product No.* |
|---|---|---|---|
| Glass | 1.0 - 1.6 µm | 30 ml/min | JR-9000-0520B |
| | 10-16 µm | 50 ml/min | JR-9000-0526G |
| | 40-100 µm | 200 ml/min | JR-9000-0528G |

**Replacement connectors**

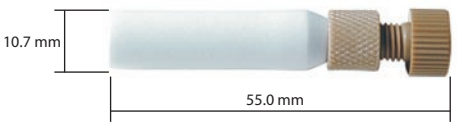
| For tubing | Size | Qty/pkg | Product No. |
|---|---|---|---|
| 1/8" OD | 6.8 mm | 1 | JR-9000-0525GC |



## No-Met biocompatible mobile phase filters *Low pressure*

**SPECS**
- Materials
  *Body:* PTFE/ Polyethylene
  *Adapter:* PEEK
  *Fitting:* PEEK
  *Ferrule:* ETFE
- For use with 1/8" tubing

- Very competitively priced
- Inert and biocompatible
- Replacement filters
- Also recommended for IC



Stainless steel in the flowpath is not acceptable in a growing number of applications involving the separation of biomolecules. 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 for 1/8" tubing and a 20 µm filter effectively eliminating metal contamination from the fluid path. Use them for IC and biochromatography applications.

No-Met filters can be used at flow rates up to 500 ml/min, measured with methanol/water (1:1), ultrasonically degassed. Flow rates can vary with solvent and tubing ID.

The economy version can easily be slipped over 1/8" OD tubing, with no fitting required.

| *Connection* | *Filter material* | *Pore size* | *Maximum flow rate ** | *Product No.* |
|---|---|---|---|---|
| 1/4-28 nut and ferrule | PTFE | 5 µm | 2.2 ml/min | JR-32171 |
| | Polyethylene | <20 µm | 500 ml/min | JR-32178 |
| Economy slip-on connection | Polyethylene | 5 µm | 300 ml/min | JR-32174 |

**Replacement element**

| *Filter material* | *Pore size* | *Maximum flowrate ** | *Product No.* |
|---|---|---|---|
| PTFE | 5 µm | 2.2 ml/min | JR-32172 |
| Polyethylene | <20 µm | 500 ml/min | JR-32179 |

**NOTES**
* Flowrate measured with methanol/water (1:1), ultrasonic degassed, helium sparging to prevent regassing.

**TECH TIPS**
- Because they are hydrophobic, No-Met filters may initially require some priming with methanol or acetonitrile.
- Connect the No-Met filter with 1/8" OD/ 1.59 mm OD tubing:
  PFA tubing . . . . . 9
  PTFE tubing . . . . . 12



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## Last Drop filter/sparger

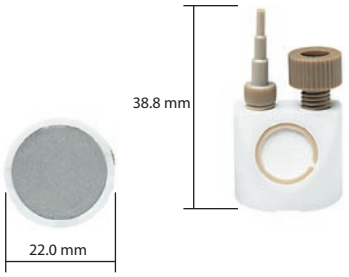
*Low pressure*

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

Spargers have a porosity of 10 microns.

The filter/sparger includes:

- PEEK tripod connector which slips into 1.5, 2.2, or 3.5 mm ID solvent lines
- 1/4-28 nut and ferrule for the sparging line




| *Filter material* | *Pore size* | *Maximum flow rate ** | *Product No.* |
|---|---|---|---|
| PTFE | 2.5 µm | 1.2 ml/min | JR-9000-0602 |
| | 5 µm | 2.6 ml/min | JR-9000-0603 |
| | 10 µm | 3.5 ml/min | JR-9000-0604 |
| Polyethylene | 10 µm | 11 ml/min | JR-9000-0604H |
| Stainless | 2 µm | 28 ml/min | JR-9000-0640 |
| | 5 µm | 30 ml/min | JR-9000-0641 |
| | 10 µm | 30 ml/min | JR-9000-0642 |

### SPECS

- Materials
  - *Body:* PTFE
  - *Frits:* PTFE/316 SS/PE
  - *Stepped tubing connector:* PEEK
  - *Nut:* PEEK
  - *Ferrule:* ETFE
- Stepped tubing connector for 1.5, 2.2, and 3.5 mm ID tubing
- PEEK 1/4-28 nut with ETFE ferrule for 1/8" OD tubing

## Stainless steel mobile phase filter/helium sparger

*Low pressure*

- Ideal for helium sparging
- Four porosities
- Fitting and pipe connectors

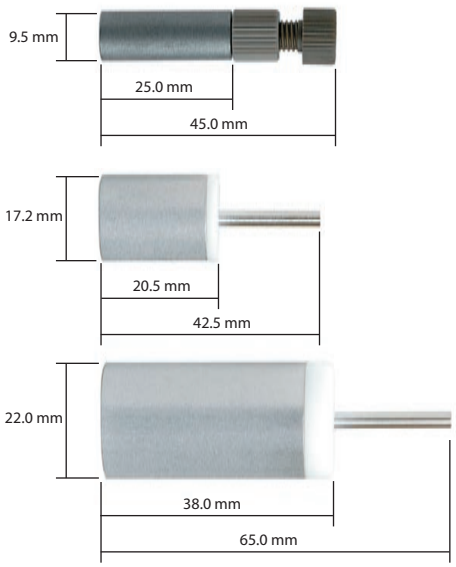
VICI Jour mobile phase filters protect HPLC systems from small particles in the mobile phase. These filters are made from SS316 with PEEK or PTFE connectors and are suitable for most solvents. The complete line has versions for both analytical and preparative applications.

VICI Jour helium spargers (2 µm versions) offer an inexpensive way to prepare and maintain mobile phases free of dissolved gases. Connected to a regulated supply of helium gas (0-400 mL/min.) they effectively remove dissolved oxygen, nitrogen, and other atmospheric gases from the mobile phase.

### SPECS

- Materials
  - *Body:* SS316
  - *Pipe:* SS316
  - *Pipe adapter:* PTFE
  - *Fitting adapter:* PEEK
  - *Fittings:* PEEK
  - *Ferrules:* ETFE

| *Fitting type* | *Tubing/ pipe size* | *Pore size* | *Maximum flow rate ** | *Product No.* |
|---|---|---|---|---|
| 1/4-28 fitting | 1/16" | 2 µm | 35 ml/min | JR-367016-2 |
| | | 10 µm | 35 ml/min | JR-367016-10 |
| | | 20 µm | 35 ml/min | JR-367016-20 |
| | 1/8" | 2 µm | 35 ml/min | JR-367008-2 |
| | | 10 µm | 100 ml/min | JR-367008-10 |
| | | 20 µm | 120 ml/min | JR-367008-20 |
| Pipe | 1/8" | 2 µm | 50 ml/min | JR-3675-2 |
| Pipe | 1/8" | 2 µm | 95 ml/min | JR-3678-2 |
| | | 25 µm | 100 ml/min | JR-3678-25 |




### TECH TIPS

- We recommend metal free PTFE filters for sensitive biochromatography applications where metal surfaces may corrode or itneract with samples.
- We recommend our impermeable tubing to prevent "regassing" of helium-degassed solvents.

### RELATED PRODUCTS

Last Drop mobile phase filters . . . . . 51

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## PEEK in-line filter kit

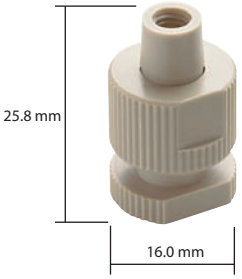
*HPLC*

**SPECS**
- For 1/16" OD tubing
- Materials
  *Body:* PEEK
  *Frit:* Titanium, Polyethylene
- 0.25/0.4 mm bore
- 10-32 threads
- Pressure rating: <350 bar (< 5000 psi)

- Replaceable metal-free polyetheylene frits and biocompatible titanium frits
- 100% biocompatible
- Minimal hold-up volume
- Different porosities

The PEEK in-line filter traps fines and other particles from samples and mobile phases before they damage valuable instruments and columns.

This female-to-female design is made entirely of PEEK, with PEEK-encased titanium or polyethylene filter elements, for biocompatibility and chemical resistance. The design has virtually no hold-up volume and can be used in analytical applications with virtually no band broadening or loss of efficiency.




Sold individually.

| *Frit material* | *Pore size* | *Internal volume (µL) ** | *Maximum flow rate *** | *Product No.* |
|---|---|---|---|---|
| Titanium | 0.5 µm | 9.50 | 25 ml/min | JR-68247 |
| | 2 µm | 11.85 | 30 ml/min | JR-68253 |
| | 5 µm | 12.7 | 30 ml/min | JR-68256 |
| | 10 µm | 13.2 | 30 ml/min | JR-68257 |
| Polyethylene | 10 µm | 13.9 | 30 ml/min | JR-68257PE |

## Sure-Guard in-line filter kit

*HPLC*

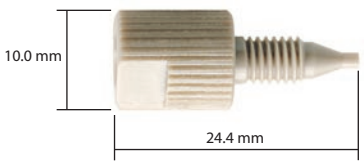
**SPECS**
- Materials
  *Body:* PEEK
  *Frit:* Stainless, Titanium
- 0.4 mm bore
- 10-32 female to 10-32 male threads
- Pressure rating: <350 bar (< 5000 psi)

- Disposable filter guard
- Minimal hold-up volume
- Titanium (biocompatible) and stainless steel frits, permanently pressed in place
- Two porosity options

The VICI Jour Sure-Guard disposable in-line filter offers an easy and inexpensive way to protect valuable columns against fines and particles. It is easily connected directly to any column, with an inlet for 1/16" OD tubes and 10-32 threads. The VICI Jour Sure-Guard can be changed in seconds without tools.

Sold in packages of three. Waters type filter kits are sold individually.

| *Frit material* | *Pore size* | *Internal volume ** | *Maximum flow rate *** | *Product No.* | *Product No.* **Waters type** |
|---|---|---|---|---|---|
| Stainless steel | 0.5 µm | 0.45 µL | 30 ml/min | JR-0611-SS05-3 | JR-0641-SS05 |
| | 2 µm | 0.61 µL | 30 ml/min | JR-0611-SS2-3 | JR-0641-SS2 |
| Titanium | 0.5 µm | 0.45 µL | 30 ml/min | JR-0611-TI05-3 | JR-0641-TI05 |
| | 2 µm | 0.61 µL | 30 ml/min | JR-0611-TI2-3 | JR-0641-TI2 |




**NOTES / TECH TIPS**
See facing page.



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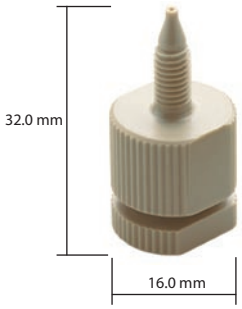


## PEEK precolumn filter kit

*HPLC*

- 100% biocompatible
- Minimal hold-up volume
- Replaceable metal-free polyetheylene frits and biocompatible titanium frits encased in PEEK
- Different porosities

**SPECS**
- Materials
  *Body:* PEEK
  *Frit:* Titanium, Polyethylene
- 0.25/0.4 mm bore
- 10-32 threads
- Pressure rating: <350 bar (< 5000 psi)

The VICI Jour precolumn filter kit has a standard 10-32 fitting and fits direct to most column types without introducing additional dead volume.

The filter kit protects expensive columns against fine particles, which may otherwise accumulate on the column frit and lead to split peaks and high backpressure.

Sold individually.

| *Frit material* | *Pore size* | *Internal volume (µL) ** | *Maximum flow rate *** | *Product No.* |
|---|---|---|---|---|
| Titanium | 0.5 µm | 11.5 | 30 ml/min | JR-68258 |
| | 2 µm | 13.85 | 30 ml/min | JR-68262 |
| | 5 µm | 14.7 | 30 ml/min | JR-68263 |
| | 10 µm | 15.2 | 30 ml/min | JR-68264 |
| Polyethylene | 10 µm | 15.9 | 30 ml/min | JR-68264P |

## Replacement frits

*for PEEK in-line and precolumn filter kits*

Replacement frits for PEEK precolumn filter kit and PEEK in-line filter kit (*see facing page*).

| *Frit material* | *Pore size* | *Internal volume (µL) ** | *Qty/pkg* | *Product No.* |
|---|---|---|---|---|
| Titanium | 0.5 µm | 6.87 | 5 | JR-1125-05P-5 |
| | 2 µm | 9.24 | 5 | JR-1125-2P-5 |
| | 5 µm | 10.04 | 5 | JR-1125-5P-5 |
| | 10 µm | 10.56 | 5 | JR-1125-10P-5 |
| Polyethylene | 10 µm | 11.31 | 5 | JR-1151-10P-5 |

**NOTES**

* The internal volume is the hold-up volume between the end of the connecting tube and the filter 10-32 connector outlet, including the frit volume.

** Flowrate measured with methanol/water (1:1), ultrasonic degassed, helium sparging to prevent regassing.

**TECH TIP**

We recommend 2 µm frits for columns with 5 µm or larger particles, and 0.5 µm frits for smaller particles.

**NOTE**

Polyethylene frits are for single use only.

**MORE INFORMATION**

Calculation of frit volume . . . . . 95
PEEK-encased stainless frits. . . . . 74

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## Stainless steel precolumn filter NEW UHPLC

**SPECS**
- Materials
  *Body:* 316 SS
  *Frit:* PEEK-encased SS
- 10-32 threads
  Female for inlet
  Male for outlet
- Pressure rating with ZN1 nut and ZF1S6 ferrule: 1375 bar (20,000 psi)

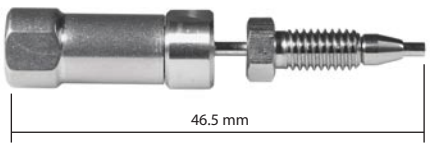
- UHPLC
- Mimimized hold-up volume
- Three porosity options
- Fewer connections compared to in-line filters
- Works with 1/16" column connections from all manufacturers

VICI Jour's new stainless steel precolumn filter is based on our well-known in-line filter. The design of this precolumn filter reduces the number of connections compared to a standard in-line filter, increasing the stability and reducing the potential of leakage.

The small bore sizes (0.15 mm in the nut/body and 0.13 mm in the tubing) guarantee a very small (virtually zero) hold-up volume.

With minimal dead-volume and available with three porosities, these filters are the best column protectors.

| *Bore size* | *Pore size* | *Internal volume* | *Product No.* |
|---|---|---|---|
| 0.13/0.15 mm | 0.5 µm | 0.61 µl | JR-69230-05 |
| | 2 µm | 0.66 µ | JR-69230-2 |
| | 5 µm | 0.68 µ | JR-69230-5 |




### Inlet nuts and ferrules

Includes one 1/16" stainless nut and one 1/16" stainless ferrule.

| *Pore size* | *Product No.* |
|---|---|
| 0.5 um | JR-69330-05 |
| 2 um | JR-69330-2 |
| 5 um | JR-69330-5 |

### Replacement PEEK-encased SS frits

| *Pore size* | *Frit volume* | *Qty/pkg* | *Product No.* |
|---|---|---|---|
| 0.5 um | 0.13 uL | 5 | JR-1110-05P-5 |
| 2 um | 0.18 uL | 5 | JR-1110-2P-5 |
| 5 um | 0.20 ul | 5 | JR-1110-5P-5 |

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## Stainless steel in-line filter

*UHPLC*

- UHPLC (up to 1375 bar / 20,000 psi)
- Minimized hold-up volume
- Two bores for analytical and semi-prep flow rates
- Three porosity options

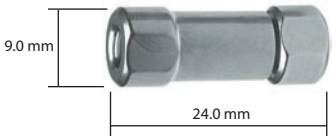
The stainless steel in-line filter has virtually no hold-up volume and can be used in various applications without significant band broadening or loss of efficiency.

The 0.25 mm bore versions are intended for analytical use between autosampler/injection valve and column. The 0.75 mm bore versions are suitable for higher flow rates in semi-prep systems or for solvent supply from pump to autosampler.

With minimal dead volume and available frit porosities of 0.5, 2 or 5 µm, these in-line filters are the ideal column protectors

Sold individually.

| *Bore size* | *Pore size* | *Internal volume ** | *Product No.* |
|---|---|---|---|
| 0.25 mm | 0.5 µm | 0.2 µL | JR-68230-05 |
| | 2 µm | 0.3 µL | JR-68230-2 |
| | 5 µm | 0.3 µL | JR-68230-5 |
| 0.75 mm | 0.5 µm | 1.7 µL | JR-68231-05 |
| | 2 µm | 1.9 µL | JR-68231-2 |
| | 5 µm | 1.9 µL | JR-68231-5 |




**SPECS**

- Materials
  *Body:* 316 SS
  *Frit:* PEEK-encased 316 stainless
- 0.25 or 0.75 mm bore
- 10-32 female to 10-32 male threads
- Pressure rating with ZN1 nut and ZF1S6 ferrule: 1375 bar (20,000 psi)

## Nuts and ferrules

Includes one 1/16" stainless nut and one 1/16" stainless ferrule.

| *Bore size* | *Pore size* | *Product No. volume ** |
|---|---|---|
| 0.25 mm | 0.5 µm | JR-68330-05 |
| | 2 µm | JR-68330-2 |
| | 5 µm | JR-68330-5 |
| 0.75 mm | 0.5 µm | JR-68331-05 |
| | 2 µm | JR-68331-2 |
| | 5 µm | JR-68331-5 |

## Replacement PEEK-encased SS frits

*for filter above*

| *Bore size* | *Pore size* | *Frit volume* | *Qty/pkg* | *Product No.* |
|---|---|---|---|---|
| 0.25 mm | 0.5 µm | 0.13 µL | 5 | JR-1110-05P-5 |
| | 2 µm | 0.18 µL | 5 | JR-1110-2P-5 |
| | 5 µm | 0.20 µL | 5 | JR-1110-5P-5 |
| 0.75 mm | 0.5 µm | 0.55 µL | 5 | JR-1111-05P-5 |
| | 2 µm | 0.74 µL | 5 | JR-1111-2P-5 |
| | 5 µm | 0.80 µL | 5 | JR-1111-5P-5 |
| | 10 µm | 0.87 µL | 5 | JR-1111-10P-5 |

**NOTES**

* The internal volume is the hold-up volume between the end of the connecting tube and the filter 10-32 connector outlet, including the frit volume.

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# Safety products

## AND MOBILE PHASE HANDLING SYSTEMS

- Save cost on solvents
- Avoid hazardous air in the laboratories
- Increase reproducibility of chromatographic analyses

VICI strives to provide customers with the best solutions for their problems, making the work better and/or easier with respect to environment and health.

## Safety products index


**VICI safety filters**

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Flexible coiled PFA tubing expands and contracts, giving flexibility to move mobile phase bottles on the bench.

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## Safety air inlet valves

- No evaporation of volatile compounds into lab air
- Better composition stability of the mobile phases
- Less shift of retention times
- No bacterial contamination
- Fit any VICI cap or VICI safety cap

**SPECS**
- Connections
  *Valve to cap:* 1/4-28
  *Filter:* Female Luer
- Materials
  *Housing:* Polypropylene
  *Filter:* Cellulose
  *O-ring:* NBR (O-ring is not a wetted part)

The air inlet valve has a check valve which blocks vapors of the solution in a bottle, preventing the vapors from escaping into the lab. The mobile phase composition remains stable, resulting in constant retention times.

The check valve regulates the pressure when the negative pressure reaches 1.5 psi or 0.1 bar. This small negative pressure prevents evaporation of the liquid (lower vapor pressure) and still guarantees the stability of the flow rate. A negative pressure which is too high can influence the aspiration of a constant flow.

Several tests have indicated that the 0.2 µm cellulose filter will keep mobile phase liquid free of bacteria and dust particles over time. If you use a filter and still have bacteria growth in your liquid, it is likely due to the presence of bacteria in the deionized water used.

Air inlet valves fit on any VICI safety cap or VICI cap.

| *Description* | *Product No.* |
|---|---|
| With 4 mm filter | JR-S-20003 |
| With 15 mm filter | JR-S-20009 |
| Without filter | JR-S-20006 |

**Spare parts**

| | |
|---|---|
| Replacement cellulose filter | |
| 0.2 µm x 4 mm | JR-S-20007 |
| 0.2 µm x 15 mm | JR-S-20008 |

**with 4 mm filter**

**with 15 mm filter**

**with no filter**

## Safety air outlet filters

The VICI safety air outlet filter regulates the pressure during helium sparging.

Air outlet filters fit on any VICI safety cap or VICI cap.

| *Description* | *Product No.* |
|---|---|
| Safety air outlet filter | JR-S-20004 |

**SPECS**
- Connections
  *Valve to cap:* 1/4-28
  *Filter:* Female Luer
- Materials
  *Housing:* Polypropylene
  *Filter:* Cellulose
  *O-ring:* NBR (O-ring is not a wetted part)

**TECH TIPS**
- The air inlet valve is not suitable when helium sparging is used.
- We recommend that safety air inlet valves and safety air outlet valves be replaced every 6-7 months to guarantee correct operation of the check valve. The lifetime of the check valve and the filter depend on the intensity of use and the quality of the ambient air.

**RELATED PRODUCTS**

Safety caps . . . . . 62-63
VICI caps . . . . . 64-65

- Prevents pollution of ambient air with volatile compounds
- Large capacity and long lifetime
- Break-through detector available, alerting users to saturation of the filter absorbent
- Universal 1/4-28 connection – fit all VICI safety caps and VICI caps
- Adapter to competitor products available

Our improved exhaust filter is the center of the VICI Jour safety program, ridding ambient air of solvent vapors which could adversely affect the health of lab workers. When placed on the waste bottle of an HPLC system, the specially-treated absorbent filters out nearly all organic solvent vapor evaporationg out of the waste solution.

Our new absorbent as an increased capacity over our previous filter and definitely over a competing brand. Excellent capacity leads to longer lifetime of the exhaust filter: up to 10 months* for methanol, and up to 8 months* for acetonitile. The new design also has improved stability at the connecting threads.

The optional break-through detector recognizes trace amounts of acetone, acetonitrile, ethanol, ethyl acetate, methanol, methylene chloride and THF. When the absorbent is saturated, break-through is indicated by a color change in the detector from orange/pink to dark purple. A small charcoal filter absorbs the vapors after they pass the detector.

**Detector is unexposed**
(Color is orange/pink)

**Detector is exposed**
(Color is dark purple)

**Exhaust filter without detector**

**Exhaust filter with detector**

*Based on results of our tests (water/organics = 50/50; flow rate 1.0 ml/min during the day, 0.5 ml/min overnight, 0.1 ml/min during weekends).

## Safety exhaust filters

*1/4-28*

### SPECS

- Connections: 1/4-28
- Materials
  - *Filter housing:* POM
  - *Detector housing:* PC
  - *Frits:* Polyethylene
  - *O-ring:* NBR (O-ring is not a wetted part)

| *Description* | *Product No.* |
|---|---|
| Exhaust filter | |
| With detector | JR-S-20005 |
| Without detector | JR-S-20002 |
| Adapter Connects VICI safety exhaust filter to SCAT® waste caps and A.I.T. smart waste caps | JR-S-40004 |

See additional information about VICI safety exhaust filters on the facing page.

### NOTE

Disposal of the saturated filters must be done according to the local regulations for chemical waste.

### TECH TIPS

- Larger capacity = longer lifetime = lower costs
- As a general rule, halving the flow rate doubles the lifetime at constant composition and temperature. Doubling the flow rate halves it.

### RELATED PRODUCTS

Carbon dioxide filter . . . 71
Humidity filter . . . . . 71
Safety caps . . . . . 62-63
VICI caps . . . . . 64-65



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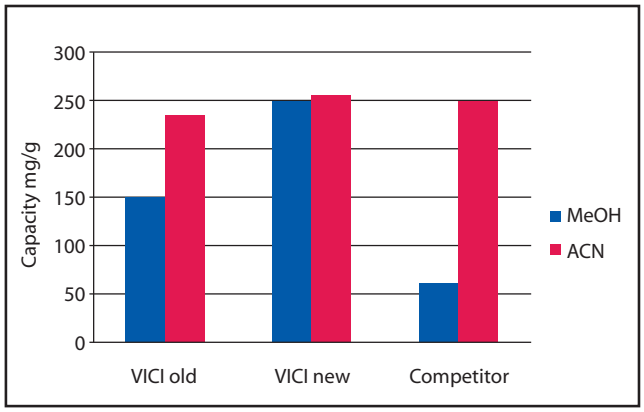
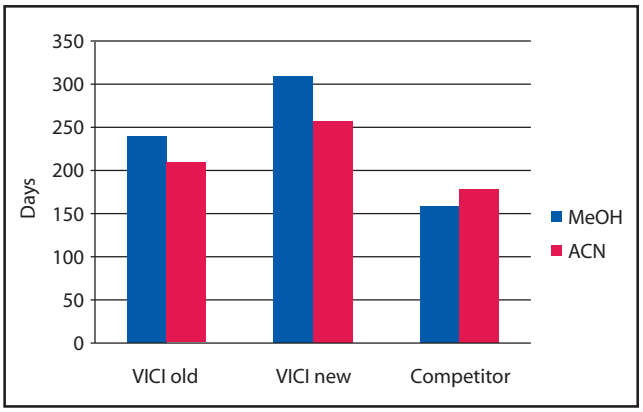


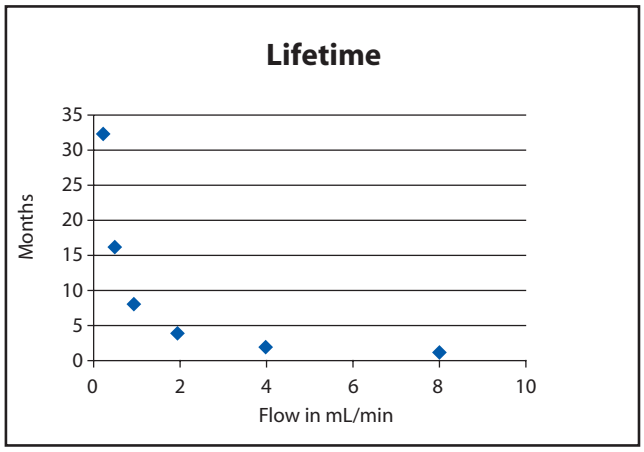

## Optimized absorbent of safety exhaust filters

In our continuous work to improve our products, VICI has optimized the absorbent for increased capacity.




The excellent capacity of our new absorbent leads to longer lifetimes – up to 10 months for methanol and 8 months for acetonitrile.*

*Based on results of our tests (water/organics = 50/50; flow rate 1.0 ml/min during the day, 0.5 ml/min overnight, 0.1 ml/min during weekends).




## Safety exhaust filter lifetime

The lifetime of the filter depends on:

- Composition of the mobile phase
- Flow rate
- Ambient temperature: a higher temperature leads to an increased vapor pressure of the volatile compound

The theoretical lifetime of an exhaust filter, depending on the flow rate, is shown here.

**TECH TIP**

Acetonitile and water form an "azeotropic" mixture at 85% acetonitrile. Due to this physical property, the vapor of an acetonitrile/water mixture always corresponds to the 85/15 mixture. This explains the non-linearity of the lifetime for acetonitrile compared to methanol.

**ADDITIONAL APPLICATIONS**

Other applications for safety filters are possible, e.g. an exhaust filter for the GC split vent.

Contact Tech Support for more information.

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Safety caps have built-in stopcocks to close off unused ports or to provide a convenient cut off of the liquid stream when tubing is removed.

- Stopcocks rated up to 72 psi gas at 25°C
- Prevent evaporation of volatile compounds
- Ideal for delivery of mobile phase or collection of waste LC solutions
- 2, 3, or 4 ports with 1/4-28 threads for 1/8" or 1/16" tubing
- Optional bottom-sealing barbed adapter to connect 1/8" (3.2 mm) ID tubing *(shown at right – order separately from "Spare Parts")*

## Safety cap kit

*GL45 threads*

### SPECS

- Connections: 1/4-28
- Materials
  - *Closure:* PP (polypropylene)
  - *Insert:* PTFE
  - *Stopcock:* CTFE
  - *O-ring:* EPDM (alternative: FEP-coated)
  - *Nuts:* PPS
  - *Ferrules:* ETFE
  - *Sleeves:* PP
  - *Bottle:* Borosilicate 3.3, safety coated
  - *Filter:* Polyethylene

* GL45 caps produced beginning in 2012 will seal with an O-ring behind a PTFE lip.

In addition to a GL45 safety cap with color-coded fittings, this kit offers a safety bottle (1 or 2 liter), PFA tubing, and a mobile phase filter.

GL45 safety caps seal to the bottle with an O-ring* (EPDM) which is resistant to commonly used HPLC solvents. If improved chemical resistance is required (*e.g.* for halogenated hydrocarbons), order an FEP-coated O-ring separately.

| **Bottle size:** | | **1 Liter** | **2 Liters** |
|---|---|---|---|
| | *No. of ports* | *Product No.* | *Product No.* |
| Safety cap kit, GL45 | 2 | JR-S-11111 | JR-S-11211 |
| | 3 | JR-S-11112 | JR-S-11212 |
| | 4 | JR-S-11113 | JR-S-11213 |
| | | *Qty/pkg* | *Product No.* |
| O-ring, FEP-coated, GL45 | | 1 | JR-S-40008 |

### INCLUDES

1 safety cap, GL45 thread, with fittings
1 safety-coated glass bottle (option: 1L or 2L)
3 m, PFA tubing
1 No-Met mobile phase filter, 5 µm
- Additional nuts and ferrules for the bottom side connections

## Spare parts

*for safety cap kit*

| | *Tubing OD* | *Qty/pkg* | *Product No.* |
|---|---|---|---|
| 1/4-28 flangeless nuts, PPS | 1/16" OD | 10 | JR-55070-10 |
| | 1/8" OD | 10 | JR-55071-10 |
| Inverted ferrules, ETFE | 1/16" OD | 10 | JR-041-10 |
| | 1/8" OD | 10 | JR-051-10 |
| Safety-coated bottle with solid cap | | | |
| 1 Liter | | 1 | JR-9000-0005 |
| 2 Liters | | 1 | JR-9000-0010 |
| Plug, 1/4-28 , PEEK | | 1 | JR-409 |
| Barbed hose adapter for 1/8" ID tubing | | 1 | JR-075013 |
| Color-Sleeve adapters, 12 colors (2 each) | | 24 | JR-5508X-24 |
| No-Met biocompatible mobile phase filter, economy slip-on connection, 5 µm pore | | 1 | JR-32174 |
| PFA tubing, 1/8" x 1.59 mm x 3m | | 1 | JR-T-4003-M3 |

### TECH TIP

PFA tubing provides less re-gassing of the mobile phase.

### RELATED PRODUCTS

Color-Sleeve adapters . . . . . 17

No-Met mobile phase filters . . . . . 52
PFA tubing . . . . . 9
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## Safety caps

*GL45 threads*

**INCLUDES**
1 cap, GL45 thread, with stopcocks
1 O-ring, EPDM
1 set: 1/16" nut/ferrule/ color-sleeve adapter
1, 2, or 3 sets: 1/8" nut/ferrule/ color-sleeve adapter
- Additional nuts and ferrules for the bottom side connections

- Fit all bottles or canisters with GL45 thread
- Built-in stopcocks for easy interruption of solvent lines
- 2, 3, or 4 ports with 1/4-28 threads for 1/8" or 1/16" tubing

GL45 safety caps seal to the bottle with an O-ring* (EPDM) which is resistant to commonly used HPLC solvents. If improved chemical resistance is required (*e.g.* for halogenated hydrocarbons), order an FEP-coated O-ring separately.

| | *No. of ports* | *Product No.* |
|---|---|---|
| Safety cap, GL45 | 2 | JR-S-11011 |
| | 3 | JR-S-11012 |
| | 4 | JR-S-11013 |
| O-ring, FEP-coated, GL45 | | JR-S-40008 |

**SPECS**
- Connections: 1/4-28
- Materials
  *Closure:* PP (Polypropylene)
  *Insert:* PTFE
  *Stopcock:* CTFE
  *O-ring:* EPDM (alternative: FEP-coated)
  *Nuts:* PPS
  *Ferrules:* ETFE
  *Sleeves:* PP

* GL45 caps produced beginning in 2012 will seal with an O-ring behind a PTFE lip.

## Safety caps

*DIN50 threads*

**INCLUDES**
1 cap, DIN50 thread, with stopcocks
1 O-ring,
1 set: 1/16" nut/ ferrule/ color-sleeve adapter
1, 2, or 3 sets: 1/8" nut/ferrule/ color-sleeve adapter
- Additional nuts and ferrules for the bottom side connections

- Fit all bottles or canisters with DIN50 thread
- Built-in stopcocks for easy interruption of solvent lines
- 2, 3, or 4 ports with 1/4-28 threads for 1/8" or 1/16" tubing

DIN50 safety caps seal to the bottle/canister with an O-ring behind a PTFE lip, so the O-ring is therefore not a wetted part.

| | *No. of ports* | *Product No.* |
|---|---|---|
| Safety cap, DIN50 | 2 | JR-S-15011 |
| | 3 | JR-S-15012 |
| | 4 | JR-S-15013 |

**SPECS**
- Connections: 1/4-28
- Materials
  *Closure:* PP (Polypropylene)
  *Insert:* PTFE
  *Stopcock:* CTFE
  *O-ring:* EPDM/ NBR
  *Nuts:* PPS
  *Ferrules:* ETFE
  *Sleeves:* PP

**NOTE**
One port must be reserved for the exhaust filter or the air inlet valve.

**MORE INFORMATION**
Chemical resistance 96-98

**RELATED PRODUCTS**
Air inlet valves . . . . . 59
Exhaust filters . . . . . 60-61

## Spare parts

*for safety caps*

| | *Tubing OD* | *Qty/pkg* | *Product No.* |
|---|---|---|---|
| 1/4-28 flangeless nuts, PPS | 1/16" | 10 | JR-55070-10 |
| | 1/8" | 10 | JR-55071-10 |
| Inverted ferrules, ETFE | 1/16" | 10 | JR-041-10 |
| | 1/8" | 10 | JR-051-10 |
| Barbed hose adapter for 1/8" ID tubing | | 1 | JR-075013 |
| Color-Sleeve adapters, 12 colors (2 each) | | 24 | JR-5508X-24 |

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VICI caps seal to the bottle with an O-ring (EPDM) which is resistant to commonly used HPLC solvents. If improved chemical resistance is required (*e.g.* for halogenated hydrocarbons), order an FEP-coated O-ring separately. Unused ports should be closed with plugs, available in PEEK or polypropylene. *(See "Spare Parts," below)*

- Prevent evaporation of volatile compounds
- 2, 3, or 4 ports with 1/4-28 threads for 1/8" or 1/16" tubing
- 6 or 7 ports available in some models
- Optional bottom-sealing barbed adapter to connect 1/8" (3.2 mm) ID tubing *(shown at right – order separately from "Spare Parts")*

## VICI cap kit

*GL45 threads*

### SPECS

- Connections: 1/4-28
- Materials
  - *Closure:* PP (polypropylene)
  - *Insert:* PTFE
  - *O-ring:* EPDM (alternative: FEP-coated)
  - *Nuts:* PPS
  - *Ferrules:* ETFE
  - *Sleeves:* PP
  - *Bottle:* Borosilicate 3.3, safety coated
  - *Filter:* Polyethylene

In addition to a GL45 VICI cap with fittings, this kit includes a safety bottle (1 or 2 liter), PFA tubing, and a mobile phase filter.

| **Bottle size:** | | **1 Liter** | **2 Liters** |
|---|---|---|---|
| | *No. of ports* | *Product No.* | *Product No.* |
| VICI cap kit, GL45 | 2 | JR-S-11101 | JR-S-11201 |
| | 3 | JR-S-11102 | JR-S-11202 |
| | 4 | JR-S-11103 | JR-S-11203 |
| | | *Qty/pkg* | *Product No.* |
| O-ring, FEP-coated, GL45 | | 1 | JR-S-40008 |

### INCLUDES

1 VICI cap, GL45 thread, with fittings
1 safety-coated glass bottle (option: 1L or 2L)
3 m, PFA tubing
1 No-Met mobile phase filter, 5 µm

## VICI caps

*GL45 threads*

### SPECS

- Connections: 1/4-28
- Materials
  - *Closure:* PP (Polypropylene)
  - *Insert:* PTFE
  - *Stopcock:* CTFE
  - *O-ring:* EPDM (alternative: FEP-coated)
  - *Nuts:* PPS
  - *Ferrules:* ETFE
  - *Sleeves:* PP

* GL45 caps produced beginning in 2012 will seal with an O-ring behind a PTFE lip.

- Fit all bottles or canisters with GL45 thread
- 2, 3, 4, 6, and 7 ports with 1/4-28 threads for 1/8" or 1/16" tubing

GL45 safety caps seal to the bottle with an O-ring* (EPDM) which is resistant to commonly used HPLC solvents. If improved chemical resistance is required (e.g. for halogenated hydrocarbons), order an FEP-coated O-ring separately.

| | *No. of ports* | *Product No.* |
|---|---|---|
| VICI cap, GL45 | 2 | JR-S-11001 |
| | 3 | JR-S-11002 |
| | 4 | JR-S-11003 |
| | 6 | JR-S-11005 |
| | 7 | JR-S-11006 |
| O-ring, FEP-coated, GL45 | | JR-S-40008 |

### INCLUDES

1 cap, GL45 thread
1 O-ring, EPDM
1 set: 1/16" nut/ferrule/ color-sleeve adapter
1, 2, 3, 5, or 6 sets: 1/8" nut/ferrule/ color-sleeve adapter

**PTFE insert for 6 port cap**

**PTFE insert for 7 port cap**

## Spare parts

*for VICI caps*

| | *Tubing OD* | *Qty/pkg* | *Product No.* |
|---|---|---|---|
| 1/4-28 flangeless nuts, PPS | 1/16" | 10 | JR-55070-10 |
| | 1/8" | 10 | JR-55071-10 |
| Inverted ferrules, ETFE | 1/16" | 10 | JR-041-10 |
| | 1/8" | 10 | JR-051-10 |
| Plug, 1/4-28 PEEK | | 1 | JR-409 |
| Polypropylene | | 1 | JR-201999 |
| Barbed hose adapter for 1/8" ID tubing | | 1 | JR-075013 |
| Color-Sleeve adapters, 12 colors (2 each) | | 24 | JR-5508X-24 |

| **Additional spare parts for VICI cap kits** | *Qty/pkg* | *Product No.* |
|---|---|---|
| Safety-coated bottle with solid cap | | |
| 1 Liter | 1 | JR-9000-0005 |
| 2 Liters | 1 | JR-9000-0010 |
| No-Met biocompatible mobile phase filter, economy slip-on connection, 5 µm pore | 1 | JR-32174 |
| PFA tubing, 1/8" x 1.59 mm x 3m | 1 | JR-T-4003-M3 |



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## VICI caps *NEW* — *S40 threads*

**INCLUDES**
1 cap, S40 thread
1 set: 1/16" nut/ ferrule/ color-sleeve adapter
2 sets: 1/8" nut/ferrule/ color-sleeve adapter

- Fit all bottles with S40 thread
- 3 ports with 1/4-28 threads for 1/8" or 1/16" tubing

The latest addition to the Jour Safety product line, the S40 VICI cap seals to the bottle with an O-ring (EPDM) which is resistant to commonly used HPLC solvents.

| | *No. of ports* | *Product No.* |
|---|---|---|
| VICI cap, S40 | 3 | JR-S-14002 |

**SPECS**
- Connections: 1/4-28
- Materials
  *Closure:* PP* (Polypropylene)
  *Insert:* PTFE
  *O-ring:* EPDM
  *Nuts:* PPS*
  *Ferrules:* ETFE
  *Sleeves:* PP*
  *not a wetted part

## VICI caps — *DIN50 threads*

**INCLUDES**
1 cap, DIN50 thread
1 O-ring,
1 set: 1/16" nut/ ferrule/ color-sleeve adapter
1, 2, or 3 sets: 1/8" nut/ferrule/ color-sleeve adapter

- Fit all bottles or canisters with DIN50 thread
- 2, 3, or 4 ports with 1/4-28 threads for 1/8" or 1/16" tubing

DIN50 safety caps seal to the bottle/canister with an O-ring behind a PTFE lip, so the O-ring is therefore not a wetted part.

| | *No. of ports* | *Product No.* |
|---|---|---|
| VICI cap, DIN50 | 2 | JR-S-15001 |
| | 3 | JR-S-15002 |
| | 4 | JR-S-15003 |

**SPECS**
- Connections: 1/4-28
- Materials
  *Closure:* PP (Polypropylene)
  *Insert:* PTFE
  *Stopcock:* CTFE
  *O-ring:* EPDM/ NBR
  *Nuts:* PPS
  *Ferrules:* ETFE
  *Sleeves:* PP

## VICI caps — *GL38 threads*

**INCLUDES**
1 cap, GL37/430 thread
1 O-ring
1 set: 1/16" nut/ ferrule/ color-sleeve adapter
1, 2, or 3 sets: 1/8" nut/ferrule/ color-sleeve adapter
1 adapter ring

- Fit all bottles or canisters with GL38/430 thread *(See NOTES, below)*
- 2, 3, or 4 ports with 1/4-28 threads for 1/8" or 1/16" tubing

Color-coded PP sleeves fit on all ports on 2 and 3 port caps. With 4 port caps, the use of PP sleeves is limited to two sleeves per cap. (Four colors are included.)

| | *No. of ports* | *Product No.* |
|---|---|---|
| VICI cap, GL38 | 2 | JR-S-13001 |
| | 3 | JR-S-13002 |
| | 4 | JR-S-13003 |
| O-ring, FEP-coated, GL38 | | JR-S-40009 |

**SPECS**
- Connections: 1/4-28
- Materials
  *Closure:* PP (Polypropylene)
  *Insert:* PTFE
  *O-ring:* EPDM (alternative: FEP-coated)
  *Adapter ring:* PA/PP
  *Nuts:* PPS
  *Ferrules:* ETFE
  *Sleeves:* PP

**TECH TIP**
PFA tubing provides less re-gassing of the mobile phase.

**MORE INFORMATION**
Chemical resistance 96-98

**RELATED PRODUCTS**
Color-Sleeve adapters . 17
No-Met mobile phase filters . . . . . 52
PFA tubing . . . . . 9
Safety-coated bottles (for additional sizes) . 70
Safety air inlet valves . . 59

**NOTES**
GL38 thread is available in different variations. Please check the inside diameter of the neck:
- For 21-24 mm ID (e.g. Wheaton® bottles), use the GL38 cap as is, without an adapter.
- For 24-28 mm ID (e.g. Nalgene® bottles), use the adapter ring (JR-S-40006) which is included with this VICI cap.

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Waste caps seal the bottle/canister with an O-ring behind a PTFE lip, so the O-ring is therefore not a wetted part. Unused ports should be closed with plugs, available in PEEK or polypropylene.
*(See "Spare Parts" on page 66.)*

- Prevent evaporation of volatile compounds
- 3 or 4 ports with 1/4-28 threads for 1/8" or 1/16" tubing
- Additional port with 1/2-20 thread for 1/4" OD tubing or M10 x 1 thread for a barbed adapter
- Thread-sealing barbed adapters available in three sizes, to connect 4 mm, 6 mm, or 8 mm ID tubing *(shown at right – order separately)*

## Waste caps *NEW*

*GL45 threads*

### SPECS
- Connections: 1/4-28, 1/2-20
- Materials
  - *Closure:* PP (Polypropylene)
  - *Insert:* PTFE
  - *O-ring:* NBR
  - *Nuts:* PPS/POM
  - *Ferrules:* ETFE/CTFE
  - *Plug:* PTFE
  - *Barbed adapter:* PA/PP

- Fits all bottles or canisters with GL45 thread
- 4 ports with with one M10 x 1 port for barbed/angled adapters

This waste cap seals the bottle/cannester with an O-ring behind a PTFE lip, so the O-ring is therefore not a wetted part.

| | *No. of ports* | *Product No.* |
|---|---|---|
| Waste cap, GL45 | 4 | JR-S-11023 |

### INCLUDES
1 cap
1 O-ring
1 set: 1/16" nut/ ferrule/ color-sleeve adapter
2 sets: 1/8" nut/ferrule/ color-sleeve adapter

## Waste caps

*GLS80 threads*

### SPECS
- Connections: 1/4-28, 1/2-20
- Materials
  - *Closure:* PP (Polypropylene)
  - *Insert:* PTFE
  - *O-ring:* NBR
  - *Nuts:* PPS/POM
  - *Ferrules:* ETFE/CTFE
  - *Plug:* PTFE
  - *Barbed adapter:* PA/PP

- Fits all bottles or canisters with GLS80 thread
- 4 ports with 1/4-28 thread for 1/8" or 1/16" tubing
- Fifth port with choice of threads

| | *Product No.* |
|---|---|
| Waste cap, GLS80 | |
| Fifth port: | |
| 1/2-20 thread for 1/4" OD tubing, with 1/4" plug | JR-S-18004 |
| M10 x 1 thread for barbed adapter | JR-S-18014 |
| *(Order barbed adapter from "Spare Parts" on page 66)* | |

### INCLUDES
1 cap
1 O-ring
1 set: 1/16" nut/ ferrule/ color-sleeve adapter
1 set: 1/4" nut/ferrule
3 sets: 1/8" nut/ferrule/ color-sleeve adapter
1 plug, 1/4" (1/2-20), where noted in product number chart

### NOTES
One port must be reserved for the exhaust filter or the air inlet valve.

### MORE INFORMATION
Spare parts for waste caps ..... 68
Chemical resistance 96-98

### RELATED PRODUCTS
Waste caps
B53 threads ..... 68
B83 threads ..... 68



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## Waste caps

*DIN60 threads*

**INCLUDES**
1 cap
1 O-ring
1 set: 1/16" nut/ ferrule/ color-sleeve adapter
1 set: 1/4" nut/ferrule
2 sets: 1/8" nut/ferrule/ color-sleeve adapter
1 plug, 1/4" (1/2-20), where noted in product number chart

- Fits all bottles or canisters with DIN60 thread
- 3 ports with 1/4-28 thread for 1/8" or 1/16" tubing
- Fourth port with choice of threads

| | *Product No.* |
|---|---|
| Waste cap, DIN60 | |
| Fourth port: | |
| 1/2-20 thread for 1/4" OD tubing, with 1/4" plug | JR-S-16003 |
| M10 x 1 thread for barbed adapter | JR-S-16013 |

*(Order barbed adapter from "Spare Parts" on page 64)*

**SPECS**
- Connections: 1/4-28, 1/2-20
- Materials
  - *Closure:* PP (Polypropylene)
  - *Insert:* PTFE
  - *O-ring:* NBR
  - *Nuts:* PPS/POM
  - *Ferrules:* ETFE/ CTFE
  - *Plug:* PTFE
  - *Barbed adapter:* PA/PP

## Waste caps

*S51 threads*

**INCLUDES**
1 cap
1 O-ring
1 set: 1/16" nut/ ferrule/ color-sleeve adapter
1 set: 1/4" nut/ferrule
2 sets: 1/8" nut/ferrule/ color-sleeve adapter
1 plug, 1/4" (1/2-20), where noted in product number chart

- Fits all bottles or canisters with S51 thread
- 3 ports with 1/4-28 thread for 1/8" or 1/16" tubing
- Fourth port with choice of threads

| | *Product No.* |
|---|---|
| Waste cap, S51 | |
| Fourth port: | |
| 1/2-20 thread for 1/4" OD tubing, with 1/4" plug | JR-S-15103 |
| M10 x 1 thread for barbed adapter | JR-S-15113 |

*(Order barbed adapter from "Spare Parts" on page 66)*

**SPECS**
- Connections: 1/4-28, 1/2-20
- Materials
  - *Closure:* PP (Polypropylene)
  - *Insert:* PTFE
  - *O-ring:* NBR
  - *Nuts:* PPS/POM
  - *Ferrules:* ETFE/ CTFE
  - *Plug:* PTFE
  - *Barbed adapter:* PA/PP

## Waste caps

*S61 threads*

**INCLUDES**
1 cap
1 O-ring
1 set: 1/16" nut/ ferrule/ color-sleeve adapter
1 set: 1/4" nut/ferrule
2 sets: 1/8" nut/ferrule/ color-sleeve adapter
1 plug, 1/4" (1/2-20), where noted in product number chart

- Fits all bottles or canisters with S61 thread
- 3 ports with 1/4-28 thread for 1/8" or 1/16" tubing
- Fourth port with choice of threads

| | *Product No.* |
|---|---|
| Waste cap, S61 | |
| Fourth port: | |
| 1/2-20 thread for 1/4" OD tubing, with 1/4" plug | JR-S-16103 |
| M10 x 1 thread for barbed adapter | JR-S-16113 |

*(Order barbed adapter from "Spare Parts" on page 66)*

**SPECS**
- Connections: 1/4-28, 1/2-20
- Materials
  - *Closure:* PP (Polypropylene)
  - *Insert:* PTFE
  - *O-ring:* NBR
  - *Nuts:* PPS/POM
  - *Ferrules:* ETFE/ CTFE
  - *Plug:* PTFE
  - *Barbed adapter:* PA/PP

**RELATED PRODUCTS**
Color-Sleeve adapters. . . . . 17
Exhaust filters . . . . . 60-61
Air inlet valves. . . . . 59

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## Waste caps

*B53 threads*

**SPECS**
- Connections: 1/4-28, 1/2-20
- Materials
  *Closure:* PP (Polypropylene)
  *Insert:* PTFE
  *O-ring:* NBR
  *Nuts:* PPS/POM
  *Ferrules:* ETFE/CTFE
  *Plug:* PTFE
  *Barbed adapter:* PA/PP

- Fits all bottles or canisters with B53 thread
- 3 ports with 1/4-28 thread for 1/8" or 1/16" tubing
- Fourth port with choice of threads

| | Product No. |
|---|---|
| Waste cap, B53 | |
| Fourth port: | |
| 1/2-20 thread for 1/4" OD tubing, with 1/4" plug | JR-S-15303 |
| M10 x 1 thread for barbed adapter | JR-S-15313 |
| *(Order barbed adapter from "Spare Parts" below)* | |

**INCLUDES**
1 cap
1 O-ring
1 set: 1/16" nut/ ferrule/ color-sleeve adapter
1 set: 1/4" nut/ferrule
2 sets: 1/8" nut/ferrule/ color-sleeve adapter
1 plug, 1/4" (1/2-20), where noted in product number chart

## Waste caps

*B83 threads*

**SPECS**
- Connections: 1/4-28, 1/2-20
- Materials
  *Closure:* PP (Polypropylene)
  *Insert:* PTFE
  *O-ring:* NBR
  *Nuts:* PPS/POM
  *Ferrules:* ETFE/CTFE
  *Plug:* PTFE
  *Barbed adapter:* PA/PP

- Fits all bottles or canisters with B83 thread
- 4 ports with 1/4-28 thread for 1/8" or 1/16" tubing
- Fifth port with choice of threads

| | Product No. |
|---|---|
| Waste cap, B83 | |
| Fifth port: | |
| 1/2-20 thread for 1/4" OD tubing, with 1/4" plug | JR-S-18304 |
| M10 x 1 thread for barbed adapter | JR-S-18314 |
| *(Order barbed adapter from "Spare Parts" below)* | |

**INCLUDES**
1 cap
1 O-ring
1 set: 1/16" nut/ ferrule/ color-sleeve adapter
1 set: 1/4" nut/ferrule
3 sets: 1/8" nut/ferrule/ color-sleeve adapter
1 plug, 1/4" (1/2-20), where noted in product number chart

## Spare parts

*for waste caps*

| | Material | Tubing OD | Qty/pkg | Product No. |
|---|---|---|---|---|
| 1/4-28 flangeless nuts | PPS | 1/16" | 10 | JR-55070-10 |
| | | 1/8" | 10 | JR-55071-10 |
| Inverted ferrules | ETFE | 1/16" | 10 | JR-041-10 |
| | | 1/8" | 10 | JR-051-10 |
| 1/2-20 nut | POM | 1/4" | 1 | JR-CFL-4D |
| Collapsible ferrule | CTFE | 1/4" | 1 | JR-CFL-CB4KF-S |
| Adapter | | | | |
| 1/2-20 to 1/4-28 | POM | ***NEW*** | 1 | JR-S-40200 |
| Barbed adapter, M10 x 1 | | | | |
| For 4 mm ID tubing | PA | | 1 | JR-S-40104 |
| For 6 mm ID tubing | PA | | 1 | JR-S-40106 |
| For 8 mm ID tubing | PA | | 1 | JR-S-40108 |
| Barbed hose adapter | | | | |
| For 1/8" ID tubing | PA/PP | | 1 | JR-075013 |
| Plug, 1/4-28 | PEEK | | 1 | JR-409 |
| | Polypropylene | | 1 | JR-201999 |
| Plug, 1/2-20 | PTFE | | 1 | JR-S-40007 |
| Color-Sleeve adapters, 12 colors (2 each) | | | 24 | JR-5508X-24 |

**NOTES**
One port must be reserved for the exhaust filter or the air inlet valve.

**MORE INFORMATION**
Chemical resistance 96-98

**RELATED PRODUCTS**
Waste caps
- DIN60 threads . . . . . 67
- GL45 threads . . . . . 66
- GLS80 threads . . . . . 66
- S51 threads. . . . . 67
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Color-Sleeve adapters. . . . . 17
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## Eco cap kit

*GL45 threads*

**INCLUDES**
1 cap, GL45 thread, with three ports
1 safety-coated glass bottle (option: 1 L or 2 L)
1 male Luer plug, polypropylene

In addition to an Eco cap with polypropylene male Luer plug, this kit offers a safety bottle (1 or 2L).

The Eco cap consists of a three-hole ETFE insert with a polyethylene collar, compatible with all standard GL45 thread bottles. The Eco cap has no threading for fittings on the inside of the tubing ports – the tubing is just inserted.

| | *Product No.* |
|---|---|
| Eco cap kit | |
| 1 Liter bottle | JR-9000-0013 |
| 2 Liter bottle | JR-9000-0014 |

**SPECS**
- Materials
  *Screw collar:* PP (polypropylene)
  *Pouring ring:* PP
  *Insert:* ETFE
  *O-rings:* EPDM
  *Luer plug:* PP

## Eco cap

*GL45 threads*

**INCLUDES**
1 cap, GL45 thread, with three ports
1 male Luer plug, polypropylene

- Competitively priced alternative to sparge and deliver mobile phases
- Also available as bottle kit

The Eco cap consists of a three-hole ETFE insert with a polyethylene collar, compatible with all standard GL45 thread bottles. The Eco cap has no threading for fittings on the inside of the tubing ports – the tubing is just inserted.

| | *Product No.* |
|---|---|
| Eco cap | JR-9000-0007 |

**SPECS**
- Materials
  *Screw collar:* PP (polypropylene)
  *Pouring ring:* PP
  *Insert:* ETFE
  *O-rings:* EPDM
  *Luer plug:* PP

## Spare parts

*for Eco cap*

| | *Product No.* |
|---|---|
| Male Luer plug, polypropylene 10/pkg | JR-070350-10 |

**NOTE**
These caps are not usable for building up a helium atmosphere within in the solvent bottle, but only for continuous helium sparging.

**TECH TIP**
Once the mobile phase is degassed, we recommend our impermeable tubing between bottle cap and pump to prevent regassing of helium degassed solvents.

**RELATED PRODUCTS**
Impermeable tubing . . 13
Polymeric tubing . . . . 9-13
Waste caps . . . . . .66-68

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## Safety-coated glass bottles

### SPECS

- Pressure rating 0.8 bar (11.6 psi)
- Materials
  *Bottle:* Borosilicate 3.3 glass
  *Cap:* PP (Polypropylene)
  *Pouring ring:* PP

- Special design for helium sparging of LC mobile phases
- Safety coating to minimize risk of injury
- Available in 0.25, 0.5, 1 and 2 Liter sizes

These glass bottles with GL45 screw threading are made of chemical resistant Borosilicate 3.3 and are coated on the outside with a layer of sturdy polymer, decreasing the chances of breakage if the bottle is dropped. Even if the bottle breaks, glass fragments will be kept within the polymer coating. Solvents will be kept within the coating for a short while. The coating also protects solvents against UV light up to 385 nm.

These safety-coated glass bottles cannot be autoclaved.

Bottles include a solid cap.

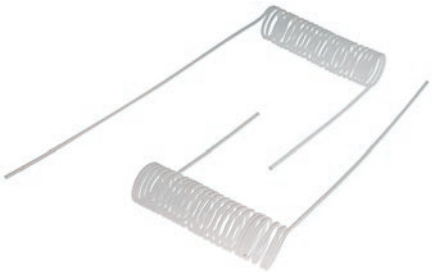
| | *Bottle size* | *Product No.* |
|---|---|---|
| Safety-coated bottle | 0.25 L | JR-9000-0011 |
| | 0.5 L | JR-9000-0012 |
| | 1 L | JR-9000-0005 |
| | 2 L | JR-9000-0010 |

## SolviFlex

### SPECS

- 1/18" OD tubing
- Materials
  *Tubing:* PFA
  *Nuts:* PPS
  *Ferrules:* ETFE
  *Filter:* PE (Polyethylene)

- Be "mobile" with mobile phase bottles
- Ideal for with VICI safety caps or VICI caps
- Customized version on request



The SolviFlex is made of flexible telephone cable-like PFA tubing which expands and contracts, providing flexibility to move mobile phase bottles up to 1.5 m radius on the bench. Approximately 3 m of tubing is coiled with straight stretches of tubing at each end.

Includes:

- ~3 m coiled 1/8" PFA tubing
- 2 sets: 1/4-28 nut/ferrules for 1/8" OD tubing
- 1 No-Met mobile phase filter with economy slip-on connection (JR-32174)

| | *Product No.* |
|---|---|
| SolviFlex assembly | JR-6120-50030 |

**A typical use of SolviFlex**
Shown installed on a VICI cap and bottle, along with an exhaust filter

### NOTES

- The bottles are not suitable to be stressed with pressures above 0.8 bar (11.6 psi), but only for continuous helium sparging.
- The safety coating on a bottle is not intended to replace safe working conditions and precautions in laboratories.

### RELATED PRODUCTS

No-Met biocompatible mobile phase filter . . . 52
Safety caps . . . . . 63
Safety cap kit . . . . . 62
Safety exhaust filter 60-61
VICI caps . . . . . 64-65
VICI cap kit . . . . . 64



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## Carbon dioxide filter *NEW* $CO_2$

In ion chromatography, a basic solution is often used as mobile phase. The buffer capacity of such solutions is small, so the pH of the solution can be affected by the carbon dioxide in the air.

Using a bottle in combination with a VICI cap and a carbon dioxide filter prevents any change in the pH of the mobile phase, thus increasing the stability of the analysis. In this application, the carbon dioxide filter also functions as an air inlet valve.

| *Description* | *Product No.* |
|---|---|
| Carbon dioxide filter | JR-S-20100 |

## Humidity filter *NEW* $H_20$

In applications requiring a non-aquaeous organic solvent, the moisture in the ambient air can influence the results. The use of a humidity filter in combination with a VICI cap solves this problem.

| *Description* | *Product No.* |
|---|---|
| Humidity filter | JR-S-20200 |

**RELATED PRODUCTS**
Safety exhaust filters. . . 60

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# Frits

## REPRODUCIBILITY AND PRECISION

VICI Jour unidense frits, with uniform flow across the entire frit, offer unexcelled reproducibility and precision. Proprietary manufacturing processes ensure uniformity and precise, repeatable dimensional control.

PEEK-encased frits surround the frit with a ring of PEEK, reducing the actual porous surface to the ID of an HPLC column or filter.

## Frits index


**Unidense frits**

Stainless . . . . . page 73
Titanium . . . . . 73
Polyethylene . . . . . 72

**PEEK-encased frits**

Stainless . . . . . 74
Titanium . . . . . 75
Polyethylene . . . . . 75


### Polyethylene frits – unidense type

**SPECS**

- Material: UHMWPE
- Tolerances: ±0.08 mm (.003")

- Biocompatible
- Metal free

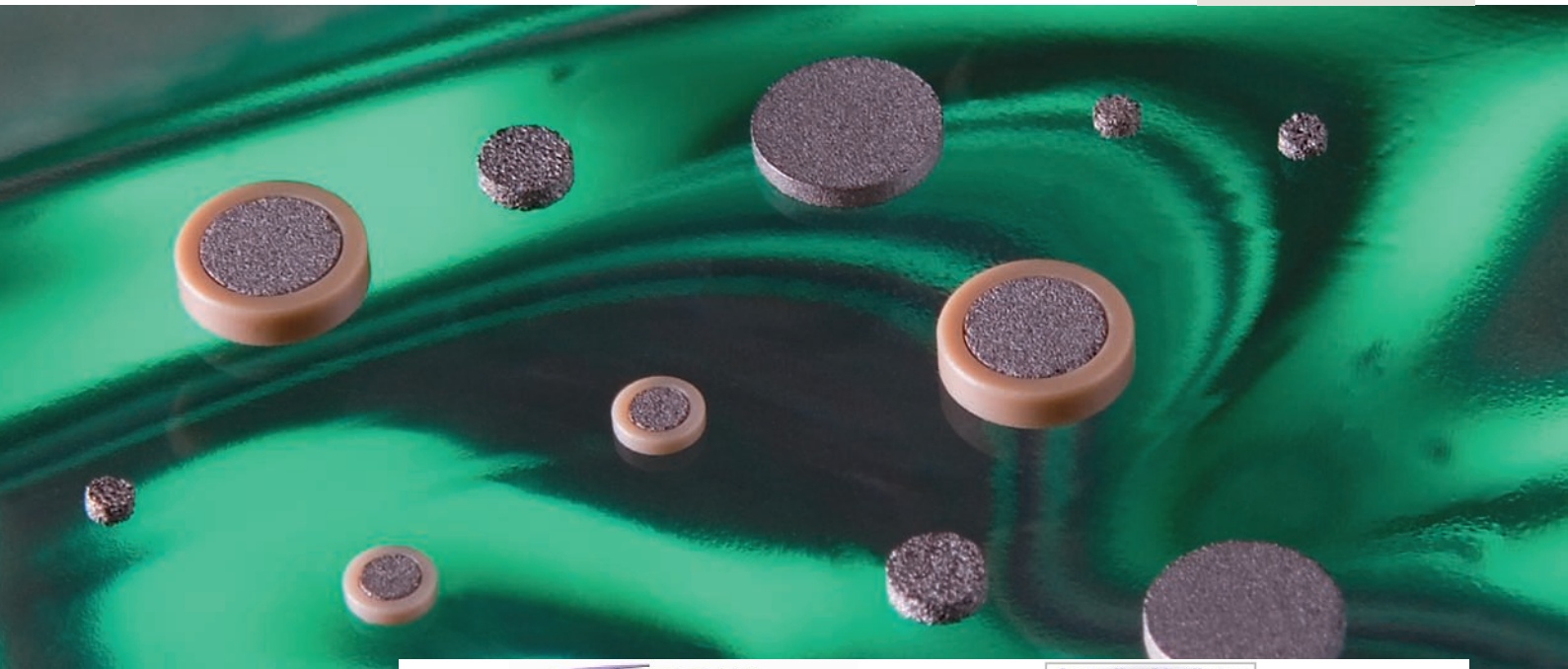
Our completely metal-free polymer frits are made of UHMWPE (Ultra High Molecular Weight PolyEthylene), and offer a competitively priced alternative to titanium.

For single use only. Sold in packages of 5.

| *OD* | | *Thickness* | | *Porosity* | *Frit volume* | *Product No.* |
|---|---|---|---|---|---|---|
| *inches* | *mm* | *inches* | *mm* | *µm* | *µL* | |
| .255" | 6.50 | ..079"" | 2.00 | 10 | 26.5 | JR-F-255-079-10PE-5 |

**OPTIONS AND MORE INFORMATION**
See facing page.

**RELATED PRODUCTS**
PEEK-encased polyethylene frits . . . . 75





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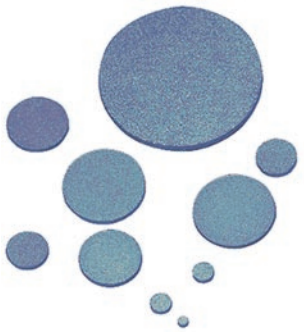
## Stainless steel frits – unidense type



For both standard frits and those produced to custom specifications, these frits offer unexcelled reproducibility and precision. Proprietary manufacturing processes ensure uniformity and precise, repeatable dimensional control.

Stainless steel frits are manufactured of SS316L, which has extra-low carbon content. The sintering process used results in a strong bonding of the sinter metal particles. Depending on the grade of powder used, the porosity of the frit can be precisely tuned.

Sold in packages of 5.

**SPECS**
- Material: Stainless steel Type 316L sintered
- Tolerances: See chart below

| OD | | Thickness | | Porosity | Frit volume | Product No. |
|---|---|---|---|---|---|---|
| inches | mm | inches | mm | µm | µL | |
| 1/16" | 1.59 | .030" | 0.76 | 0.5 | 0.39 | JR-.5FR1-5 |
| | | | | 1 | 0.45 | JR-1FR1-5 |
| | | | | 2 | 0.53 | JR-2FR1-5 |
| | | | | 10 | 0.60 | JR-10FR1-5 |
| 1/8" | 3.18 | .040" | 1.02 | 0.5 | 2.10 | JR-.5FR2-5 |
| | | | | 1 | 2.43 | JR-1FR2-5 |
| | | | | 2 | 2.83 | JR-2FR2-5 |
| | | | | 10 | 3.24 | JR-10FR2-5 |
| 1/4" | 6.35 | .040 | 1.02 | 0.5 | 8.39 | JR-.5FR4-5 |
| | | | | 2 | 11.30 | JR-2FR4-5 |
| | | | | 10 | 12.91 | JR-10FR4-5 |
| 3/8" | 9.53 | .040" | 1.02 | 0.5 | 18.91 | JR-.5FR6-5 |
| | | | | 2 | 25.45 | JR-2FR6-5 |
| | | | | 10 | 29.09 | JR-10FR6-5 |
| 1/2" | 12.70 | .040" | 1.02 | 0.5 | 33.58 | JR-.5FR8-5 |
| | | | | 2 | 45.2 | JR-2FR8-5 |
| | | | | 10 | 51.66 | JR-10FR8-5 |
| 1" | 25.40 | .060" | 1.52 | 2 | 269.43 | JR-2FR1K-5 |
| | | | | 10 | 307.92 | JR-10FR1K-5 |

**OPTIONS**
- Standard frits do not have chamfers. Chamfered frits are available on request.
- Other dimensions and porosities are available on request. Minimum order quantity: 100 pieces. Please contact your local distributor or VICI directly.

**TOLERANCES**

| OD (mm) | Tolerance |
|---|---|
| <5 | ±0.05 mm (.002") |
| 5-12 | ±0.08 mm (.003") |
| 12.5-25.4 | ±0.20 mm (.008") |

**NOTES**
- Stated porosities are only nominal and do not reflect the maximum pore size of a frit.
- See frit volume chart for help chosing the right frit and porosity for your application. . . . . 95
- Frit volumes are theoretical and are calculated by multiplying overall frit volume times the porosity proportion.

**RELATED PRODUCTS**

PEEK-encased frits
- Stainless . . . . . 74
- Titanium . . . . . 75

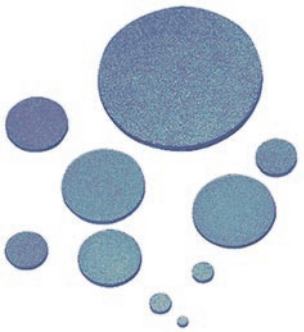
## Titanium frits – unidense type

- Biocompatible
- Recommended for protein analysis
- High corrosion resistance
- Various pore sizes and diameters

**SPECS**
- Material: Titanium, sintered
- Tolerances: See chart at left

Titanium is preferred over stainless steel for applications related to the analysis of sensitive substances in general and large biomolecules in particular. Evidently proteins have a tendency to adsorb on the stainless steel (iron) frit and consequently reduce recovery or may even decompose. Titanium also offers higher corrosion resistance and can be used with solvents containing halides.

Sold in packages of 5.



| OD | | Thickness | | Porosity | Frit volume | Product No. |
|---|---|---|---|---|---|---|
| inches | mm | inches | mm | µm | µL | |
| 1/16" | 1.59 | .030" | 0.76 | 0.5 | 0.82 | JR-.5FR1TI-5 |
| | | | | 2 | 0.71 | JR-2FR1TI-5 |
| 1/8" | 3.18 | .040 | 1.02 | 2 | 2.83 | JR-2FR2TI-5 |
| 1/4" | 6.35 | .040 | 1.02 | 2 | 11.30 | JR-2FR4TI-5 |
| 3/8" | 9.53 | .040 | 1.02 | 2 | 25.45 | JR-2FR6TI-5 |
| 1/2" | 12.70 | .040 | 1.02 | 2 | 45.2 | JR-2FR8TI-5 |
| | | | | 10 | 51.66 | JR-10FR8TI-5 |
| 1" | 25.40 | .060" | 1.52 | 2 | 180.80 | JR-2FR1KTI-5 |

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PEEK-encased frits surround the frit with a ring of PEEK, reducing the actual porous surface to the ID of an HPLC column or filter.

The compressed PEEK ring forms a seal between the bottom of the fitting and the column end, preventing the mobile phase and the sample from entering the previously accessible poorly swept areas.

## Stainless steel frits – PEEK-encased

### SPECS

- Material:
  Frit Stainless SS316L
  Ring PEEK
- Tolerances: ±0.05 mm (.002")

- For HPLC columns or in-line filters
- Eliminate poorly swept volume and improves peak symmetry
- Various porosities and dimensions available

Our PEEK-encased frits with 0.118" or 1/4" OD ring are intended for HPLC columns with IDs of 3.2, 3.9, and 4.6 mm. With the frit surrounded by a PEEK ring, the actual porous surface is reduced to the column ID.

The compressed PEEK ring forms a seal between the bottom of the fitting and the column end, preventing the mobile phase and the sample from entering the previously accessible poorly swept areas.

Sold in packages of 5.

| *Ring OD* | | *Frit OD* | | *Thickness* | | *Porosity* | *Frit volume* | *Product No.* |
|---|---|---|---|---|---|---|---|---|
| *inches* | *mm* | *inches* | *mm* | *inches* | *mm* | *µm* | *µL* | |
| .118" | 3.00 | .038" | 0.97 | .028" | 0.70 | 0.5 | 0.13 | JR-1110-05P-5 |
| | | | | | | 2 | 0.18 | JR-1110-2P-5 |
| | | | | | | 5 | 0.20 | JR-1110-5P-5 |
| | | .077" | 1.96 | 028" | 0.70 | 0.5 | .0.55 | JR-1111-05P-5 |
| | | | | | | 2 | 0.74 | JR-1111-2P-5 |
| | | | | | | 5 | 0.80 | JR-1111-5P-5 |
| | | | | | | 10 | 0.87 | JR-1111-10P-5 |
| .25" | 6.35 | .078" | 2.00 | 062" | 1.59 | 0.5 | 1.30 | JR-1104-05P-5 |
| | | | | | | 2 | 1.74 | JR-1104-2P-5 |
| | | .125" | 3.20 | 062" | 1.59 | 0.5 | 3.32 | JR-1102-05P-5 |
| | | | | | | 2 | 4.47 | JR-1102-2P-5 |
| | | .153" | 3.90 | 062" | 1.59 | 0.5 | 4.94 | JR-1101-05P-5 |
| | | | | | | 2 | 4.47 | JR-1101-2P-5 |
| | | .181" | 4.60 | 062" | 1.59 | 0.5 | 6.87 | JR-1100-05P-5 |
| | | | | | | 2 | 9.24 | JR-1100-2P-5 |
| | | .125" | 3.20 | .062"" | 1.59 | 0.5 | 1.75 | JR-1103-05P-5 |
| | | | | | | 2 | 2.25 | JR-1103-2P-5 |

### OPTIONS

- Other dimensions and porosities are available on request. Minimum order quantity: 100 pieces. Please contact your local distributor or VICI directly.

### NOTES

- Stated porosities are only nominal and do not reflect the maximum pore size of a frit.
- See frit volume chart for help chosing the right frit and porosity for your application. . . . . .95
- Frit volumes are theoretical and are calculated by multiplying overall frit volume times the porosity proportion.

### RELATED PRODUCTS

Unidense type frits
Polyethylene . . . . . 72
Stainless . . . . . 73
Titanium . . . . . 73



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## Titanium frits – PEEK-encased

- For HPLC columns or in-line filters
- Biocompatible – recommended for protein analysis
- Eliminate poorly swept volume and improves peak symmetry
- Higher corrosion resistance
- Various porosities and dimensions available

**SPECS**
- Material:
  Frit Titanium
  Ring PEEK
- Tolerances:
  ±0.05 mm
  (.002")

In terms of biocompatibility, the frit is the critical spot for contributing metal ions to the mobile phase and for interaction with protein samples.

VICI Jour PEEK-encased frits with 1/5" or 1/4" OD ring are intended for HPLC columns with IDs of 3.2 and 4.6 mm. With the frit surrounded by a PEEK ring, the actual porous surface is reduced to the column ID.

The compressed PEEK ring forms a seal between the bottom of the fitting and the column end, preventing the mobile phase and the sample from entering the previously accessible poorly swept areas.

Sold in packages of 5.

| *Ring OD* | | *Frit OD* | | *Thickness* | | *Porosity* | *Frit volume* | *Product No.* |
|---|---|---|---|---|---|---|---|---|
| *inches* | *mm* | *inches* | *mm* | *inches* | *mm* | *µm* | *µL* | |
| 1/5" | 5.08 | .102" | 2.60 | .062" | 1.59 | 5 | 3.20 | JR-1128-5P-5 |
| .25" | 6.35 | .125" | 3.20 | .062" | 1.59 | 0.5 | 3.32 | JR-1127-05P-5 |
| | | | | | | 2 | 4.47 | JR-1127-2P-5 |
| | | .181" | 4.60 | .062" | 1.59 | 0.5 | 6.87 | JR-1125-05P-5 |
| | | | | | | 2 | 2.94 | JR-1125-2P-5 |
| | | | | | | 5 | 10.04 | JR-1125-5P-5 |
| | | | | | | 10 | 10.56 | JR-1125-10P-5 |

## Polyethylene frits – PEEK-encased

- Biocompatible
- Metal free

**SPECS**
- Material:
  Frit UHMWPE
  Ring PEEK
- Tolerances:
  ±0.05 mm
  (.002")

Our polymer frits are made of UHMWPE (Ultra High Molecular Weight PolyEthylene). They are a competitively priced alternative to titanium and are completely metal free.

With the frit surrounded by a PEEK ring, the actual porous surface is reduced to the column ID. The compressed PEEK ring forms a seal between the bottom of the fitting and the column end, preventing the mobile phase and the sample from entering the previously accessible poorly swept areas.

Sold in packages of 5.

| *Ring OD* | | *Frit OD* | | *Thickness* | | *Porosity* | *Frit volume* | *Product No.* |
|---|---|---|---|---|---|---|---|---|
| *inches* | *mm* | *inches* | *mm* | *inches* | *mm* | *µm* | *µL* | |
| 1/5" | 5.08 | .098" | 2.50 | .059" | 1.50 | 10 | 2.94 | JR-1150-10P-5 |
| .25" | 6.35 | .181" | 4.60 | .059" | 1.50 | 10 | 11.31 | JR-1151-10P-5 |

**OPTIONS AND MORE INFORMATION**
See facing page.

**TECH TIPS**
- PEEK-encased titanium frits can also be used as spare parts frits for the PEEK in-line filter kit . .54
- PEEK-encased polyethylene frits can be used as spare parts for:
  PEEK in-line filter kit. . . . . .54
  PEEK columns . . . . .77

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# Columns



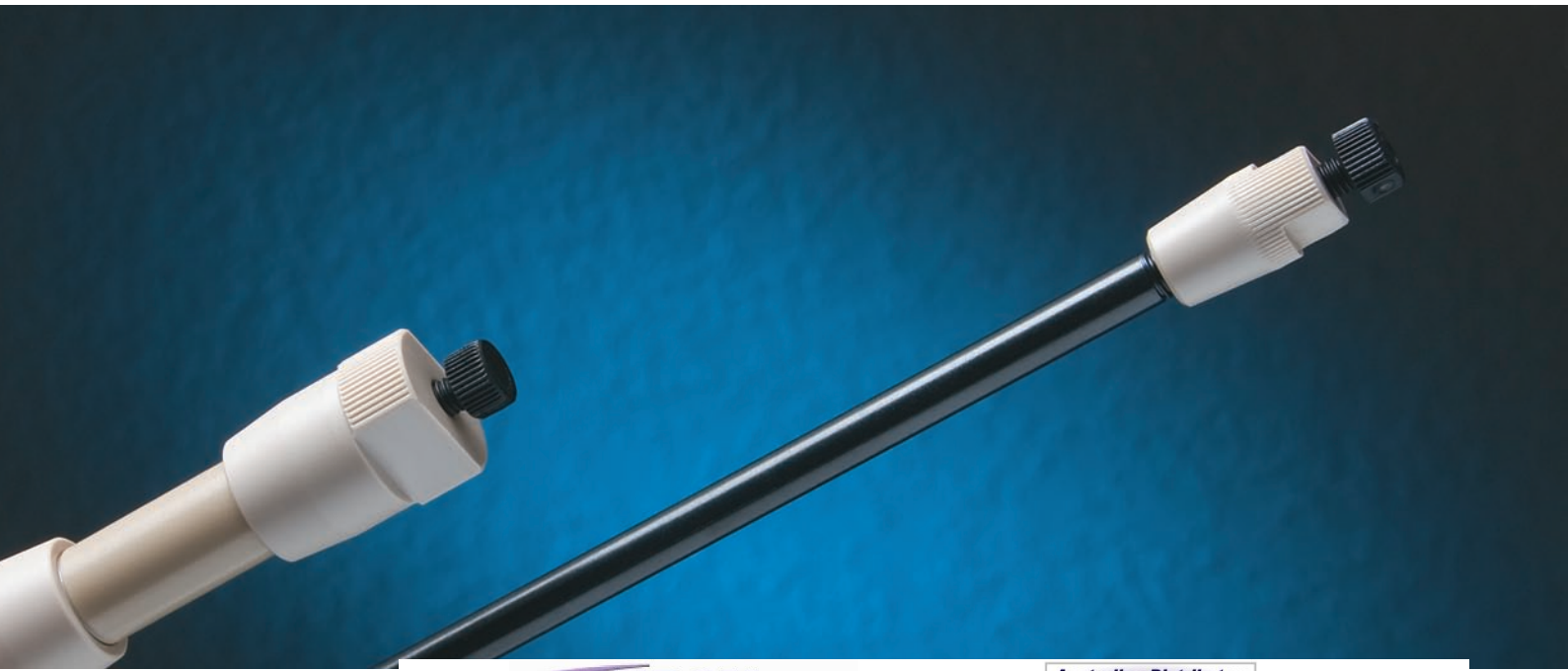
## Columns index

**PEEK columns**
2.1 mm ID ..... page 77
4.0 mm ID ..... 77

**In-line biocompatible guard columns** ..... 78
This PEEK guard column system extends the life of valuable analytical columns by trapping contaminants from the sample and mobile phase. Only PEEK and titanium contact the mobile phase and sample.

**Column couplers and plugs**
Column coupler, one-piece fingertight ..... 79
Column end plugs ..... 79
Column end plugs, logotype ..... 79

**Packing kits** ..... 78
VICI Jour column packing kits are ready-to-use tools to pack our PEEK columns and PEEK guard columns. Includes needed slurry reservoir, packing adapter, and packing seals.





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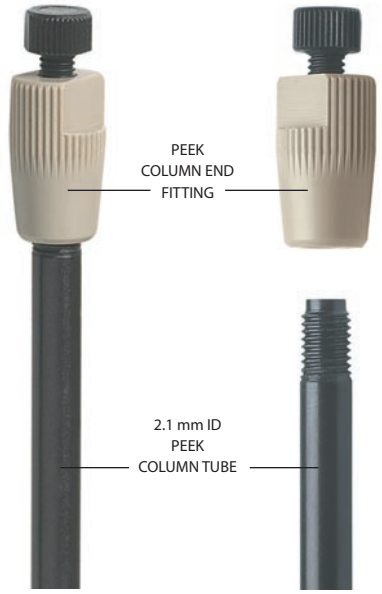



## 2.1 mm ID PEEK columns

- Biocompatible
- High pressure applications
- Packing devices available

We have designed this column for narrow-bore applications, and for those when a limit amount of sample is available for analysis.

Because 2.1 mm ID columns operate at 1/5th of the flow rate of their 4.6 mm counterparts, the same sample mass injected on a 2.1 mm column will produce five times the detector signal. This greater mass sensitivity provides the same analysis as on a 4.6 mm column with only 20% of the sample.

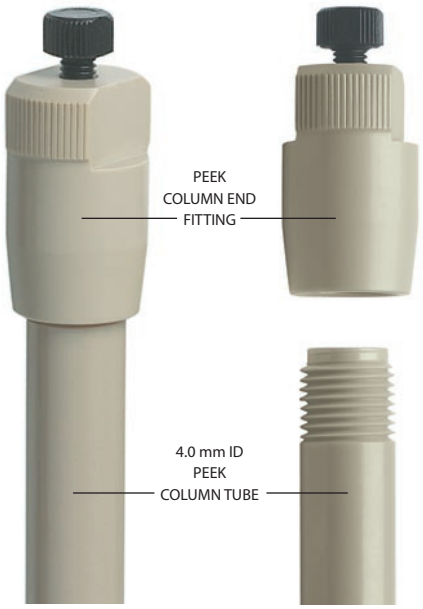
**SPECS**
- Material: PEEK, black and natural
- Tolerances: ±0.05 mm (.002")
- Pressure rating maximum: 210 bar (3000 psi)
  During packing, using a VICI Jour packing kit: 350 bar (5000 psi)

All our columns are delivered without frits. Purchase frits separately.

| *Length* | *Product No.* |
|---|---|
| 30 mm | JR-65001NF |
| 50 mm | JR-65002NF |
| 100 mm | JR-65003NF |
| 150 mm | JR-65005NF |
| 250 mm | JR-65006NF |

**Spare parts**

| *Description* | *Qty/pkg* | *Product No.* |
|---|---|---|
| Column end fitting | 1 | JR-062 |
| PEEK-encased frit | | |
| Titanium, 5 µm | 5 | JR-1128-5P-5 |
| Polyethylene, 10 µm | 5 | JR-1150-10P-5 |




## 4.0 mm ID PEEK columns

- Biocompatible
- High pressure applications
- Packing devices available

Today's HPLC and IC applications are more demanding than ever. The limitations of traditional stainless steel pose significant problems for a growing number of important biotechnology and ion chromatography applications.

**SPECS**
- Material: PEEK, black and natural
- Tolerances: ±0.05 mm (.002")
- Pressure rating maximum: 350 bar (5000 psi)
  During packing, using a VICI Jour packing kit: 560 bar (8000 psi)

All our columns are delivered without frits. Purchase frits separately.

| *Length* | *Product No.* |
|---|---|
| 50 mm | JR-68181NF |
| 100 mm | JR-68182NF |
| 125 mm | JR-68183NF |
| 150 mm | JR-68184NF |
| 250 mm | JR-68185NF |
| 300 mm | JR-68186NF |

**Spare parts**

| *Description* | *Qty/pkg* | *Product No.* |
|---|---|---|
| Column end fitting | 1 | JR-66140 |
| PEEK-encased frit | | |
| Titanium, 5 µm | 5 | JR-1125-2P-5 |
| Polyethylene, 10 µm | 5 | JR-1151-10P-5 |

**RELATED PRODUCTS**

Column packing kit . . . . 78
PEEK-encased frits
Titanium . . . . . 75
Polyethylene frits . . . . 75

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PEEK COLUMNS ■ GUARD COLUMNS

## In-line biocompatible guard column

**SPECS**
- Material: PEEK, titanium
- Pressure rating: < 350 bar (< 5000 psi)

- Biocompatible
- Easy to fill
- Packing device for self-packing available

The VICI Jour in-line PEEK guard column system extends the life of valuable analytical columns by trapping contaminants from the sample and mobile phase, thereby preventing loss of retention.

Only PEEK and titanium contact the mobile phase and sample. This system is ideal for use with proteins or other biopolymers that may be contaminated or absorbed by steel surfaces. VICI Jour guard columns can be easily dry packed or slurry packed. Guard columns may be changed in minutes without the use of tools – all connections may be made by hand.

Guard column system includes:
- Guard column cartridge
- 2 Titanium frits
- Housing
- O-ring

Guard column cartridge includes:
- Guard column cartridge
- 2 Titanium frits (2 µm or 5 µm)

| *Description* | | *Product No.* |
|---|---|---|
| Guard column system | 2 µm | JR-68252TI2 |
| | 5 µm | JR-68252TI |
| Guard cartridge with 2 frits | 2 µm | JR-68242TI2 |
| | 5 µm | JR-68242TI |

**Spare parts**

| *Description* | | *Qty/pkg* | *Product No.* |
|---|---|---|---|
| Replacement frit, titanium | 2 µm | 1 | JR-F-197-062-2TINC |
| | 5 µm | 1 | JR-F-197-062-5TI |
| Packing seal | | 1 | JR-9 |

## Packing kits

**SPECS**
- Material: PEEK
- Pressure ratings during packing, using a VICI Jour packing kit:

| Column ID | Packing pressure |
|---|---|
| 2.1 mm | 350 bar (5000 psi) |
| 4.0 mm | 560 bar (8000 psi) |

See column pages for operating pressure ratings.

VICI Jour column packing kits are ready-to-use tools to pack our PEEK columns and PEEK guard columns. Every kit consists of the needed slurry reservoir, packing adapter, and packing seals.

| *Description* | *Product No.* |
|---|---|
| **For 2.1 mm ID columns** | |
| Packing kit | JR-67-250-2A |
| Replacement PEEK packing adapter | JR-67140-1A |
| Replacement PEEK packing seal | JR-65011 |
| **For 4.0 mm ID columns** | |
| Packing kit | JR-67-250-4 |
| Replacement PEEK packing adapter | JR-67140-2B |
| Replacement PEEK packing seal | JR-65158 |
| **For in-line biocompatible guard columns** | |
| Packing kit | JR-27305 |
| Replacement CTFE packing seal | JR-9 |

**TECH TIP**
Our packing kit is a "ready-to-use" tool to pack our PEEK guard cartridges. Every kit consists of the needed slurry reservoir, packing adapter, and packing seals.

**RELATED PRODUCTS**
PEEK columns
2.1 mm ID . . . . . 77
4.0 mm ID . . . . . 77



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## One-piece fingertight column couplers

- Self-adjusting – zero dead volume for all fitting types
- Four bore sizes
- Biocompatible

Choose from a variety of coupler IDs, indicated by the color of the sleeve. 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.

Sold individually.

**SPECS**
- Material:
  *Tubing* PEEK
  *Fittings* PEEK
  *Sleeve* PP (Polypropylene)
- Threads: 10-32 male to 10-32 male
- Pressure rating: <350 bar (5000 psi)

| *Color* | *ID* | *Product No.* |
|---|---|---|
| Red | 0.13 mm | JR-26501 |
| Yellow | 0.17 mm | JR-26502 |
| Blue | 0.25 mm | JR-26503 |
| Orange | 0.50 mm | JR-26504 |

**Coupler shown installed between two columns**
(columns not included)

## Column end plugs – logotype

- Customizable with your logo and color (OEM version)
- Same features as column end plugs below

Ensure safe closure of valuable columns with your own customized column end plugs. Easy handling is guaranteed by the 5/16" wrench flat. Fit all columns with 10-32 thread.

Sold in packages of 10.

**SPECS**
- Material: Nylon
- Threads: 10-32
- Tolerances: ±0.05 mm (.002")

| *Color* | *Product No.* |
|---|---|
| White | JR-4081-10 |
| Black | JR-4082-10 |
| Red | JR-4083-10 |
| Green | JR-4084-10 |
| Blue | JR-4085-10 |

## Column end plugs

- Seal analytical columns
- One size fits all
- Fingertight, with wrench flats as well

Fingertight column end plugs fit all columns with 10-32 threads. Easy handling is guaranteed by an additional 5/16" wrench flat, which allows the plug to be loosened by a wrench if it gets stuck. The long design and threading down to the ferrule ensure safe closing of valuable columns.

Sold in packages of 10.

**SPECS**
- Material: Nylon
- Threads: 10-32
- Tolerances: ±0.05 mm (.002")

| *Color* | *Product No.* |
|---|---|
| White | JR-4071-10 |
| Black | JR-4072-10 |
| Red | JR-4073-10 |
| Green | JR-4074-10 |
| Blue | JR-4075-10 |

**RELATED PRODUCTS**
Color-coded
PEEK tubing . . . . . 6-8

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# Sample loops

**VALCO ■ CHEMINERT® ■ RHEODYNE®**

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 volume and loop appearance may differ from batch to batch.

## Sample loops index


**PEEK loops**

PEEK loops for:

Cheminert ..... page 81
Rheodyne ..... 81
Valco ..... 81

**Stainless steel loops**

Stainless loops for:

Cheminert ..... 82
Rheodyne ..... 83
Valco ..... 82


**SPECS**

- Material:
  - *Loops* PEEK
  - *Nuts* PEEK
  - *Ferrules* PEEK
  - *Caps* PE (Polyethylene)
- Tolerances: ±0.025 mm (.001")

## PEEK loops

- Wide range of volumes available
- Biocompatible

VICI Jour PEEK sample loops are made from striped color-coded PEEK tubing and PEEK fittings. PEEK is a mechanically strong, chemically inert polymer ideal for HPLC applications. Since our PEEK sample loops contain no metals or other extractable compounds, no foreign materials will be introduced into the system. Softener-free polyethylene caps are used to avoid contamination of the tubing.

PEEK sample loops are particularly well suited for separations involving proteins, peptides, nucleic acids or other samples of biological origin as well as in IC systems where metal traces may interact with ionic samples or release transition metals that may deactivate ion exchange columns.

PEEK hex-head nuts and PEEK ferrules provide reliable connections, and avoid twisting of the tube.

**DISCLAIMER**

The maximum holding pressure for any type of connections involving tubing and a ferrule varies considerably with the tubing material the ferrule material, the clearance between tubing OD and ferrule ID, and the shape of the fitting detail.

**MORE INFORMATION**

ValvTool ..... 88

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## PEEK loops *for Cheminert valves*

Fit all Cheminert C1, C1CF, C2, C2V, and C3 type valves.

| Sample size | Pressure * bar | psi | Product No. | Sample size | Pressure * bar | psi | Product No. |
|---|---|---|---|---|---|---|---|
| 5 µl | 400 | 5800 | JR-SLC-85-5 | 250 µl | 240 | 3500 | JR-SLC-85-250 |
| 10 µl | 400 | 5800 | JR-SLC-85-10 | 300 µl | 240 | 3500 | JR-SLC-85-300 |
| 20 µl | 400 | 5800 | JR-SLC-85-20 | 500 µl | 240 | 3500 | JR-SLC-85-500 |
| 50 µl | 400 | 5800 | JR-SLC-85-50 | 1 ml | 240 | 3500 | JR-SLC-85-1000 |
| 100 µl | 400 | 5800 | JR-SLC-85-100 | | | | |
| 200 µl | 240 | 3500 | JR-SLC-85-200 | | | | |

## PEEK loops *for Rheodyne valves*

Fit all Rheodyne metal and metal-free valves.

| Sample size | Pressure * bar | psi | Product No. | Sample size | Pressure * bar | psi | Product No. |
|---|---|---|---|---|---|---|---|
| 1 µl | 435 | 6300 | JR-SLR-2190 | 50 µl | 350 | 4500 | JR-SLR-2202 |
| 2 µl | 420 | 6100 | JR-SLR-2191 | 100 µl | 350 | 4500 | JR-SLR-2204 |
| 3 µl | 420 | 6100 | JR-SLR-2192 | 200 µl | 240 | 3500 | JR-SLR-2206 |
| 4 µl | 420 | 6100 | JR-SLR-2193 | 250 µl | 240 | 3500 | JR-SLR-2207 |
| 5 µl | 400 | 5800 | JR-SLR-2194 | 500 µl | 240 | 3500 | JR-SLR-2210 |
| 10 µl | 400 | 5800 | JR-SLR-2196 | 1 ml | 240 | 3500 | JR-SLR-2222 |
| 20 µl | 386 | 5600 | JR-SLR-2195 | | | | |
| 30 µl | 386 | 5600 | JR-SLR-2200 | | | | |
| 40 µl | 386 | 5600 | JR-SLR-2201 | | | | |

* Recommended maximum permanent working pressure

### TECH TIPS

- See general information about PEEK loops on facing page.
- The tighter ID tolerance of the tubing minimizes the tolerance of the loop volume.
- The ValvTool tightens nuts with tube or loop installed, providing easy access to many hard-to-reach areas. . . . . 88

### OPTIONS

Other sample sizes are available on request. Please contact your distributor or VICI Jour directly.

### MORE INFORMATION

Chemical resistance 96-98
About PEEK . . . . . 99

## PEEK loops *for Valco valves*

Fit all 1/16" Valco W and UW type valves.

| Sample size | Pressure * bar | psi | Product No. |
|---|---|---|---|
| 5 µl | 400 | 5800 | JR-SLV-75-5 |
| 10 µl | 400 | 5800 | JR-SLV-75-10 |
| 20 µl | 400 | 5800 | JR-SLV-75-20 |
| 50 µl | 400 | 5800 | JR-SLV-75-50 |
| 100 µl | 400 | 5800 | JR-SLV-75-100 |
| 250 µl | 240 | 3500 | JR-SLV-75-250 |
| 500 µl | 240 | 3500 | JR-SLV-75-500 |
| 1 ml | 240 | 3500 | JR-SLV-75-1000 |

## Spart parts *for PEEK Cheminert, Rheodyne, and Valco loops*

Sold in packages of 5.

| Description | Product No. |
|---|---|
| PEEK nuts for use with double ferrules, 1/16" hex head long, 10-32 | JR-5510-5 |
| PEEK single ferrules, 1/16" (Use 2 per nut, as shown at right.) | JR-5005-5 |

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## SAMPLE LOOPS

### SPECS

- Material:
  - *Loops* SS316
  - *Nuts* SS303
  - *Ferrules* SS316
  - *Caps* PE (Polyethylene)
- Tolerances: ±0.05 mm (.002")
- Pressure rating: ≤ 1375 bar (≤ 20,000 psi)

- Wide range of volumes available
- Ultra high pressure resistance

VICI Jour stainless steel sample loops are made of high quality SS316. They are cut using an electrolytic cutting process, cleaned with ultrasound and high pressure steam to remove contaminants, dried, and capped with softener-free caps to avoid recontamination of the tubing.

All loops are supplied with stainless hex-head nuts and stainless ferrules for reliable connections.

### Stainless steel loops *for Cheminert valves*

Fit all Cheminert C1, C1CF, C2, C2V, and C3 type valves.

| *Sample size* | *Product No.* |
|---|---|
| 5 µl | JR-SLC-86-5 |
| 10 µl | JR-SLC-86-10 |
| 20 µl | JR-SLC-86-20 |
| 50 µl | JR-SLC-86-50 |
| 100 µl | JR-SLC-86-100 |
| 250 µl | JR-SLC-86-250 |
| 500 µl | JR-SLC-86-500 |
| 1 ml | JR-SLC-86-1000 |

### Stainless steel loops *for Valco valves*

Fit all 1/16" Valco W and UW type valves.

| *Sample size* | *Product No.* |
|---|---|
| 5 µl | JR-SLV-76-5 |
| 10 µl | JR-SLV-76-10 |
| 20 µl | JR-SLV-76-20 |
| 50 µl | JR-SLV-76-50 |
| 100 µl | JR-SLV-76-100 |
| 250 µl | JR-SLV-76-250 |
| 500 µl | JR-SLV-76-500 |
| 1 ml | JR-SLV-76-1000 |

### Spart parts *for stainless Cheminert and Valco loops*

Sold in packages of 5.

| *Description* | *Product No.* |
|---|---|
| 1/16" stainless nuts, 10-32 | JR-ZN1-5 |
| 1/16" stainless ferrules | JR-ZF1S6-5 |

**TECH TIPS AND OPTIONS**
See facing page.



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## Stainless steel loops *for Rheodyne valves*

- Fit all Rheodyne valves
- Special loops for valve Model 7725

| *Sample size* | *Product No.* |
|---|---|
| 5 µl | JR-SLR-111 |
| 10 µl | JR-SLR-112 |
| 20 µl | JR-SLR-113 |
| 50 µl | JR-SLR-114 |
| 100 µl | JR-SLR-115 |
| 200 µl | JR-SLR-116 |
| 500 µl | JR-SLR-117 |
| 1 ml | JR-SLR-118 |

**Loops for Rheodyne valve 7725, 1/16"**

| Sample size | Product No. |
|---|---|
| 5 µl | JR-SLR-111-77 |
| 10 µl | JR-SLR-112-77 |
| 20 µl | JR-SLR-113-77 |
| 50 µl | JR-SLR-114-77 |
| 100 µl | JR-SLR-115-77 |
| 200 µl | JR-SLR-116-77 |
| 500 µl | JR-SLR-117-77 |
| 1 ml | JR-SLR-118-77 |

## Spart parts *for stainless Rheodyne loops*

Sold in packages of 5.

| *Description* | *Product No.* |
|---|---|
| 1/16" Rheodyne type stainless nuts | |
| For valve 7725, long head | JR-57-5 |
| X-long | JR-58-5 |
| Stainless ferrules | |
| 1/16" | JR-59-5 |
| 2-step Rheodyne type, 1/16" | JR-60-5 |

### TECH TIPS

- Not recommended for use with halides.
- We offer nuts in three lengths to facilitate wrench access on valves. For loops that will be replaced frequently, we recommend our longest nut – particularly when space is restricted. See long nuts . . . . . .31
- The ValvTool tightens nuts with tube or loop installed, providing easy access to many hard-to-reach areas. . . . . . .88

### OPTIONS

Other sample sizes are available on request. Please contact your distributor or VICI Jour directly.

### MORE INFORMATION

About stainless steel. . 100

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# Accessories

## TOOLS ■ STARTER KITS ■ BACK-PRESSURE REGULATOR

Our 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.

## Accessories index


**Accessories for tubing**

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LC tubing organizer ..... 86
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**Accessories for fittings**

Color-It fingertight adapters ..... 17
Work great with all our PEEK and stainless hex head nuts for 1/16" tubing.

Color-Sleeve adapters ..... 17
Designed to be used with our black PPS nuts and one-piece fittings.

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Our back-pressure regulator improves baseline stability by preventing bubble formation in the flow cell.

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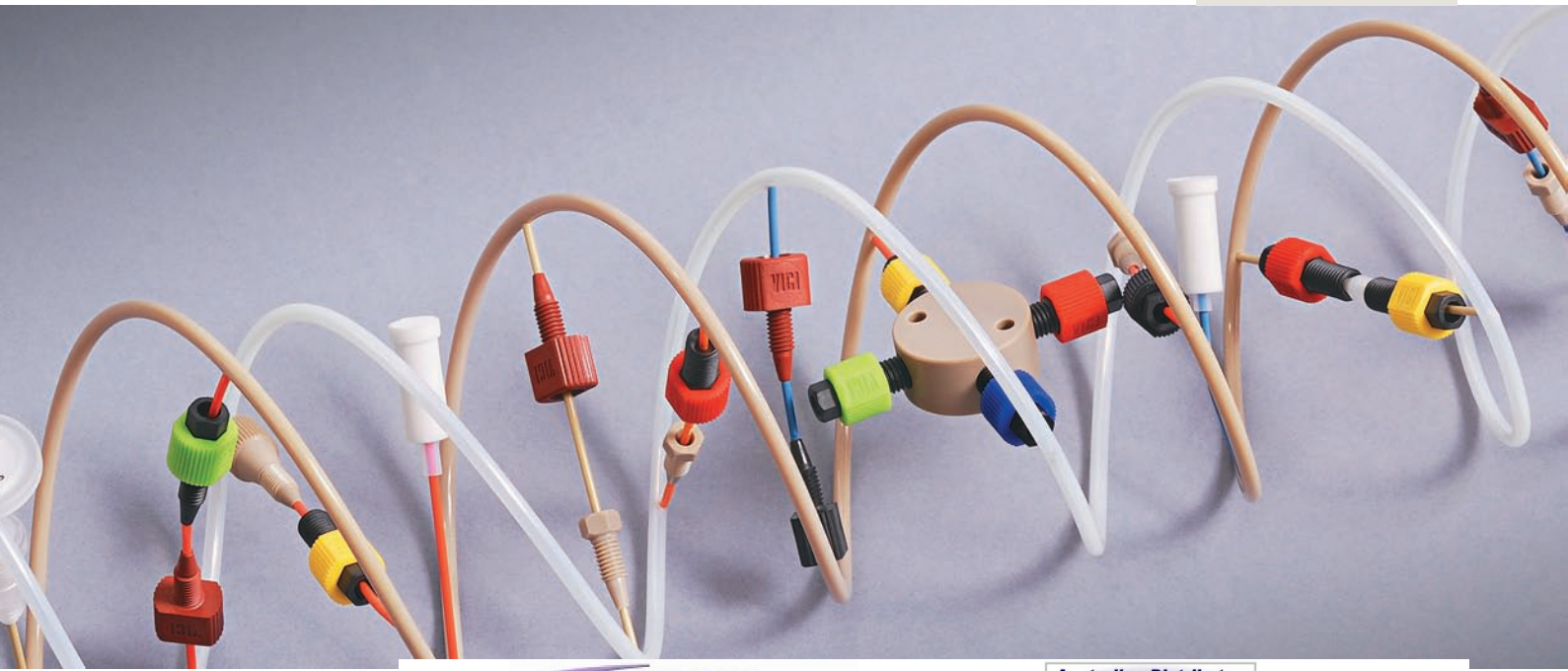
**RELATED PRODUCTS**

Color-Sleeve adapters turn PPS nuts into fingertight fittings and color-code different solvent lines. ..... 17

Color-It fingertight adapters work great with all our PEEK and stainless hex head nuts for 1/16" tubing. ..... 17





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## Easy-Flange kit

- Handy tool for perfect flanges
- No heat or electricity required
- No contamination

The Easy-Flange flange-rolling tool for flanged fittings is suitable for PTFE and PTFE-like tubes with OD between 1/16" and 1/8". The tool forms the flange by applying a mechanical force and does not require electrical power.

The quality of the flange is considerably improved over other available methods, since the tubing is not stressed by heat and because the specially-designed negative conical profile of the flange-forming part yields an ideal shape for optimized sealing properties.

| *Description* | | *Product No.* |
|---|---|---|
| Easy-Flange kit | | JR-201540 |
| Kit includes: | *Qty* | *Product No.* |
| Flanging clamp | 1 pair | JR-201531 |
| Flanging discs with: | | |
| 0.5 mm SS pin for PEEK tubing | 1 | JR-202235 |
| 0.8 mm polymer pin | 1 | JR-201541 |
| 0.8 mm titanium pin | 1 | JR-201554 |
| 1.3 mm polymer pin | 1 | JR-201536 |
| 1.3 mm titanium pin | 1 | JR-201537 |
| Clean-Cut tubing cutter | 1 | JR-797 |
| Tubing, PTFE, 1/16" x 0.75 mm ID | 2 m | JR-T-4036 |
| Plastic box | 1 | JR-201540L |
| Flanger/distance gauge | 1 | JR-201532 |

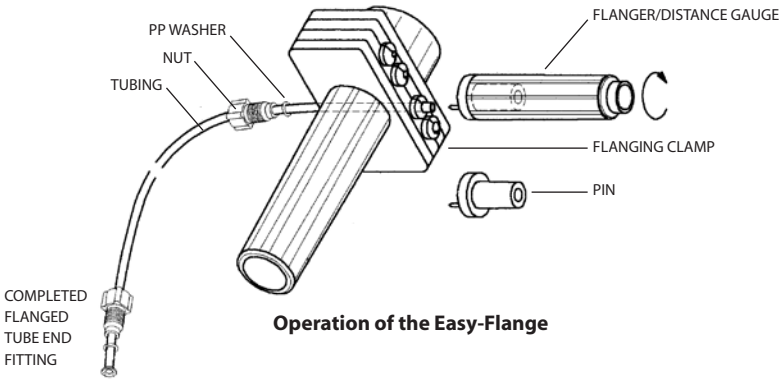
## Easy-Flange combi kit

In addition to the contents of the Easy-Flange kit, the combi kit includes 1/8" PTFE tubing, nuts/rings for tube end fittings, and color-coded adapters.

| *Description* | | | *Product No.* |
|---|---|---|---|
| Easy-Flange combi Kit | | | JR-201539 |
| Includes: | | *Qty* | *Product No.* |
| Easy-Flange kit above | | 1 | JR-201540 |
| PPS nuts, 1/4-28, flanged | | | |
| | White, for 1/16" tubing | 10 | JR-201094WH-10 |
| | Black, for 1/8" tubing | 10 | JR-201580BK-10 |
| PP washers | For 1/16" tubing | 10 | JR-201926-10 |
| | For 1/8" tubing | 10 | JR-201928-10 |
| PTFE tubing | 1/16" x 0.75 mm ID | 3m | JR-T-4036-M3 |
| | 1/8" x 1/16" ID | 3m | JR-T-680 0-M3 |

**OPTIONS**
Additional sizes of flanging discs are available.
Flanging disc with
1.0 mm
polymer pin JR-201662
1.5 mm
polymer pin JR-201663

**MORE INFORMATION**
Flanged fittings. . . . 41, 43
Polymeric
tubing. . . . . 9-13




**Operation of the Easy-Flange**

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## 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.

Sold in packages of 5.

| *Description* | *Product No.* |
|---|---|
| 90° elbow | JR-357090 |
| 180° elbow | JR-357180 |

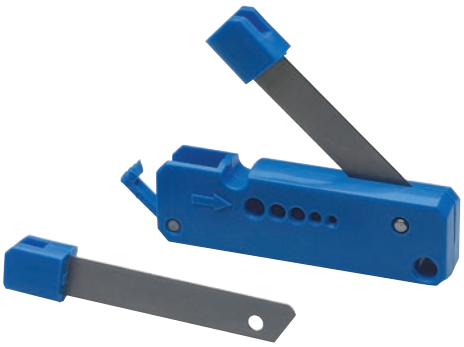
## Tubing clip – the LC tubing organizer

- Fixes 1/16" and 1/8" tubing to beakers, flasks, or bottles
- Stainless steel spring for long life

This convenient device holds both 1/16" and 1/8" polymer tubes precisely where they should be in your beakers, flasks and bottles etc. up to 4 mm wall thickness. The stainless steel spring will keep your tubing clip working for a long time, and helps keep the solvent line in the solvent.

| *Description* | *Product No.* |
|---|---|
| Tubing clip | JR-9001 |

## Clean-Cut tubing cutter *for polymeric tubing*



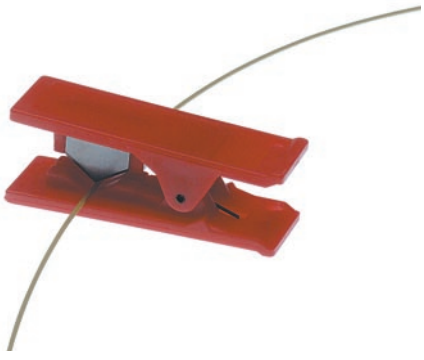
- Cuts PEEK, PTFE, ETFE, and other polymeric tubing
- No distortion to OD or ID
- Ideal for the most demanding LC applications
- Safety lock secures the blade

Right angles and clean cuts are essential in LC to avoid leaks and dead volume. This handy tool makes it easy to get burr-free, perpendicular ends on polymeric tubing without distorting the outside diameter and/or closing the inside diameter of the tubing.

It is designed to cut PTFE, ETFE and polymers in general and PEEK capillary tubing in particular. The compact design and unique safety locking mechanism allow every chromatographer to keep one in their pocket.

| *Description* | *Product No.* |
|---|---|
| Clean-Cut tubing cutter | JR-797 |
| Replacement blade | JR-798 |

## Guillotine tubing cutter *for polymeric tubing*



- Cuts PEEK, PTFE, ETFE, and other polymeric tubing
- Ideal for less demanding LC applications

| *Description* | *Product No.* |
|---|---|
| Guillotine tubing cutter | JR-794 |
| Replacement blade | JR-795 |



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## Stainless steel tubing cutter – cutting wheel type

- For 1/16" and 1/8" SS tubing
- Leaves smooth, uniform cuts
- Minimal deburring and/or reaming required
- Easy replacement of the cutting wheel

This is the ideal tool for cutting 1/16" and 1/8" stainless steel tubing, leaving smooth, uniform cuts requiring a minimum of deburring and/or reaming. The easily replaced cutting wheel scores tubing, leaving cuts which allow tube-to-tube and tube-to-frit connections.

| *Description* | *Product No.* |
|---|---|
| Tubing cutter for metal tubing | JR-792 |
| Replacement cutting wheel | JR-793 |

## Stainless steel tubing cutter – plier type

- For easy cutting of 1/16" tubing off a coil
- Reach "hard-to-get" places in an HPLC system
- Delivered in a plastic sheath

These pliers can be used for quick cuts for non-critical applications or at "hard to get" places. However, for scientific equipment, we strongly recommend our pre-cut and cleaned stainless tubing.

| *Description* | *Product No.* |
|---|---|
| Tubing pliers for metal tubing | JR-796 |

## File

This deburring file is handy tool for cleaning up metal tubing ends.

| *Description* | *Product No.* |
|---|---|
| Deburring file | JR-802 |

**TECH TIP**
Between the sample injector, column, and detector, use our pre-cut stainless steel tubing, which has been electrolytically cut and steam cleaned. . . . . . 14

**MORE INFORMATION**
Pre-cut stainless steel tubing. . . . . . 14

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## Backpressure regulator

**SPECS**
- For 1/16" OD tubing
- Materials
  *Wetted parts:*
  *Housing:* PEEK/ CTFE
  *Membrane:* Polyimide
- 10-32 threads
- Dead volume: 0.25 µl (theoretical)

- Improves baseline stability by preventing bubble formation in the flow cell
- Adjust backpressure without disconnecting anything
- Completely biocompatible fluid path, with low dead volume
- Easy mount with 17 mm panel hole, 9 mm maximum thickness

Even properly degassed mobile phases may contain some dissolved gases that can release bubbles in the detector flow cell resulting in baseline noise and drift. The VICI Jour backpressure regulator provides a quick and convenient way to improve the stability of detector baseline by providing a constant back-pressure on the flow cell, which stops the release of dissolved gases from the mobile phase.

Because of the unique design, the backpressure regulator has a very small internal volume. The peak shape is not affected when the regulator is installed between two detectors in a multi-detector system, or between a detector and a fraction collector or fraction collector system. Typically, 90% or more of a given component's efficiency will be retained upon passing through the regulator.

A spring-loaded diaphragm provides the force that generates the back-pressure. Spring tension may be adjusted using the backpressure adjustment screw on the top of the regulator to vary the backpressure without disconnecting any lines.

Backpressure regulators are available in two ranges: 1-20 bar (15-300 psi) and 20-103 bar (300-1500 psi)., and two housing types: PEEK and CTFE.

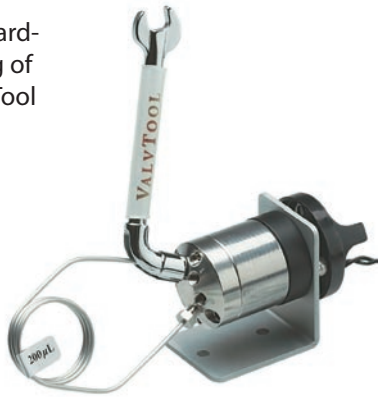
| *Range* | | *Housing* | *Product No.* |
|---|---|---|---|
| 1-20 bar | 15-300 psi | PEEK | JR-BPR1 |
| | | CTFE | JR-BPR1KF |
| 20-103 bar | 300-1500 psi | PEEK | JR-BPR2 |
| | | CTFE | JR-BPR2KF |

## ValvTool

- For making connections in hard-to-reach areas
- Ideal for nuts with 1/4" hex and 5/16" heads

The ValvTool is a time-saving device which provides easy access to many hard-to-reach areas. The unique design with its slotted wrench allows tightening of nuts where a loop or a capillary might otherwise make it difficult. The ValvTool is ideal for Valco and Rheodyne® valves and fittings, as well as most of the HPLC and PEEK fittings on the market with 1/4" and 5/16" heads.

| *Description* | *Product No.* |
|---|---|
| ValvTool wrench 1/4" and 5/16" | JR-800 |




**ValvTool shown loosening a nut on a valve**
(Valve and loop not included)



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**Ferrule removal kit**
For 360 µm and 1/32" ferrules

**Ferrule removal kit**
For 1/16" and 1/8" ferrules

## Ferrule removal kits

- Remove polymeric ferrules stuck in fitting details
- One version for 1/32" and 360 micron ferrules
- Another version for 1/16" and 1/8" ferrules

Ferrule removal kits are easy-to-handle tools for removing ferrules stuck in a fitting detail. Two versions cover four different ID's of ferrules.

| *Description* | *For use with* | *Product No.* |
|---|---|---|
| Ferrule removal kits | 360 µm and 1/32" ferrules | JR-FRK1 |
| | 1/16" and 1/8" ferrules | JR-FRK2 |

## Tightening tools for PEEK fittings

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

| *Color* | *For use with* | *Prod No* |
|---|---|---|
| Green | 1/32" fittings (6-40 threads) | JR-CNFT |
| Blue | 1/16" fittings | JR-ZNFT |

## 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".

| *Description* | *Product No.* |
|---|---|
| Hex ket set | JR-HKS3 |

## Tweezer

Ideal for picking up small fittings, etc.

| *Description* | *Product No.* |
|---|---|
| Tweezer | JR-806 |

## Wrenches

Open end wrenches for nuts with 1/4", 5/16", 3/8", or 7/16" heads.

| *Description* | *Product No.* |
|---|---|
| Open end wrench | |
| 1/4" and 5/16" | JR-804 |
| 3/8" and 7/16" | JR-805 |

**RELATED PRODUCTS**
Deburring file . . . . . 87
Tools for tubing . . . . 86-87

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## PEEK starter kit

- All parts biocompatible
- Ideal kit for all HPLC users

The PEEK starter kit is ideal for anyone working in the field of biochromatography. It consists of fittings, ferrules, tubing, and mobile phase filters, as well as a union, our Clean-Cut tubing cutter, and other useful accessories like our tubing elbows – all boxed together for a very competitive price.

For a number of interesting 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. Replacing stainless steel parts (such as tubing fittings, ferrules, filters, etc.) with PEEK creates a biocompatible environment for samples and mobile phase.

| *Description* | | | *Product No.* |
|---|---|---|---|
| **PEEK starter kit** | | | **JR-35P** |
| Kit includes: | | *Qty* | *Product No.* |
| PEEK fittings | One-piece 10-32 fittings | 10 | JR-55020-5 |
| | Fingertight 10-32 nuts | 5 | JR-5580-5 |
| | Hex-head long 10-32 nuts | 5 | JR-5510-5 |
| | 1/16" double ferrules | 20 | JR-5004-10 |
| | Union body, 0.25 mm bore | 1 | JR-061 |
| PEEK tubing, 1/16" OD | | | |
| | 0.25 mm ID x 3 m, blue stripe | 1 | JR-T-6001-M3 |
| | 0.50 mm ID x 3 m, orange stripe | 1 | JR-T-6002-M3 |
| Filters | PEEK in-line filter kit | 1 | JR-68256 |
| | Last Drop mobile phase filter, 5 µm, PTFE | 1 | JR-9000-0521 |
| Accessories | Tubing elbow, 90° | 2 | JR-357090 |
| | Tubing elbow, 180° | 2 | JR-357180 |
| Tools | Clean-Cut polymeric tubing cutter | 1 | JR-797 |
| | Tweezer | 1 | JR-806 |

## Stainless steel starter kit *UHPLC*

The kit consists of stainless fittings, ferrules, tubing, and solvent filters, as well as a union, our cutting-wheel type metal tubing cutter, and other useful items like our ValvTool. All boxed together for a very competitive price.

| *Description* | | | *Product No.* |
|---|---|---|---|
| **Stainless steel starter kit** | | | **JR-35S** |
| Kit includes: | | *Qty* | *Product No.* |
| Stainless fittings | | | |
| | 1/16" nuts, 10-32 | 10 | JR-ZN1-5 |
| | 1/16" nuts, 10-32, 19 mm long | 10 | JR-LZN1-5 |
| | 1/16" ferrules | 20 | JR-ZF1S6-5 |
| | 1/16" union with nuts/ferrules, 0.25 mm bore | 1 | JR-ZU1CS6 |
| Stainless tubing | | | |
| | 1/16" x 0.25 mm x 3 m | 1 | JR-T-625-10-M3 |
| | 1/16" x 0.50 mm ID x 3 m | 1 | JR-T-625-20-M3 |
| | 1/16" x 0.18 mm ID x 100 mm | 2 | JR-T-97030 |
| | 1/16" x 0.25 mm ID x 200 mm | 2 | JR-T-97060 |
| Filters | Mobile phase, 2 µm, 1/8" pipe OD | 1 | JR-3675-2 |
| | Stainless in-line, 0.25 mm ID | 1 | JR-68230-5 |
| | Last Drop, 10 µm | 1 | JR-9000-0532 |
| Tools | ValvTool 1/4" x 5/16" wrench | 1 | JR-800 |
| | Open end wrench, 1/4" x 5/16" | 1 | JR-804 |
| | Tubing cutter | 1 | JR-792 |
| | Tweezer | 1 | JR-806 |

### RELATED PRODUCTS

**IN THE PEEK KIT**

PEEK fittings
One-piece 10-32 fittings ..... 20
Nuts for double ferrule
Fingertight ..... 23
Hex-head, long .... 23
Double ferrules ..... 23
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**IN THE STAINLESS KIT**

Stainless fittings
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## ChromBox kit

Includes
- PEEK, PTFE, and stainless tubing
- PEEK and stainless nuts, ferrules, and unions
- Tubing cutters and wrenches
- More accessories, all in a convenient carrying case

The ChromBox is an all-purpose analytical spare parts kit for all our customers using HPLC. It contains the most often used spare parts made both of high quality Type 316L stainless steel as well as PEEK and PTFE.

| *Description* | | | *Product No.* |
|---|---|---|---|
| **ChromBox kit** | | | **JR-34N** |
| ChromBox kit includes: | | | |
| PEEK fittings | One-piece 10-32 fittings | 5 | JR-55020-5 |
| | Fingertight 10-32 nuts | 5 | JR-5580-5 |
| | Long hex-head 10-32 nuts | 5 | JR-5510-5 |
| | 1/16" double ferrules | 10 | JR-5004-10 |
| | Union, 0.25 mm bore, body only | 1 | JR-061 |
| SS fittings | 1/16" nuts, 10-32, 13 mm long | 5 | JR-MZN1-5 |
| | 1/16" nuts, 10-32, 19 mm long | 5 | JR-LZN1-5 |
| | 1/16" ferrules | 10 | JR-ZF1S6-5 |
| | 1/16" union with nuts and ferrules, 0.50 mm bore | 1 | JR-ZU1MS6 |
| Tubing | | | |
| PEEK | 1/16" x 0.25 mm ID x 3 m, blue stripe | 1 | JR-T-6001-M3 |
| | 1/16" x 0.50 mm ID x 3 m, orange stripe | 1 | JR-T-6002-M3 |
| PTFE | 1/8" x 1/16" ID x 3 m | 1 | JR-T-6800-M3 |
| Stainless | 1/16" x 0.25 mm x 3 m | 1 | JR-T-625-10-M3 |
| | 1/16" x 0.50 mm ID x 3 m | 1 | JR-T-625-20-M3 |
| Filters | PEEK in-line filter kit | 1 | JR-68256 |
| | Stainless Last Drop, 2 µm | 1 | JR-9000-0530 |
| Accessories | Tubing elbow, 90° | 1 | JR-357090 |
| | Tubing elbow, 180° | 1 | JR-357180 |
| | Tubing clip | 2 | JR-9001 |
| Tools | Clean-Cut polymeric tubing cutter | 1 | JR-797 |
| | Plier style SS tubing cutter | 1 | JR-796 |
| | ValvTool 1/4" x 5/16" wrench | 1 | JR-800 |
| | Open end wrench, 1/4" x 5/16" | 1 | JR-804 |
| | Deburring file | 1 | JR-802 |
| | Tweezer | 1 | JR-806 |

### RELATED PRODUCTS

**IN THE CHROMBOX KIT**

PEEK fittings
One-piece 10-32 fittings ..... 20
Nuts for double ferrule
Fingertight ..... 23
Hex-head, long .... 23
Double ferrules ..... 23
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# General reference

**CHEMICAL RESISTANCE ■ MATERIALS ■ GLOSSARY**

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### General conversion factors

| | |
|---|---|
| inches to mm | inches x 25.4 = mm |
| feet to meters | feet x 0.3048 = meters |
| meters to feet | meter x 3.28 = feet |

| | |
|---|---|
| bar to psi | bar x 14.5 = psi |
| psi to bar | psi x 0.069 = bar |
| psi to kPa | psi x 6.9 = kPa |

**RELATED PRODUCTS**


Tubing

- ETFE..... 9
- FEP
  - Natural ..... 11
  - Solid-color..... 11
- PEEK ..... 5-8
  - Dual-layer ..... 7
  - Natural ..... 5
  - Solid-color..... 8
  - Striped ..... 6
- PFA..... 9
- PTFE ..... 12
  - Natural ..... 12
  - Solid-color..... 12
- Stainless steel
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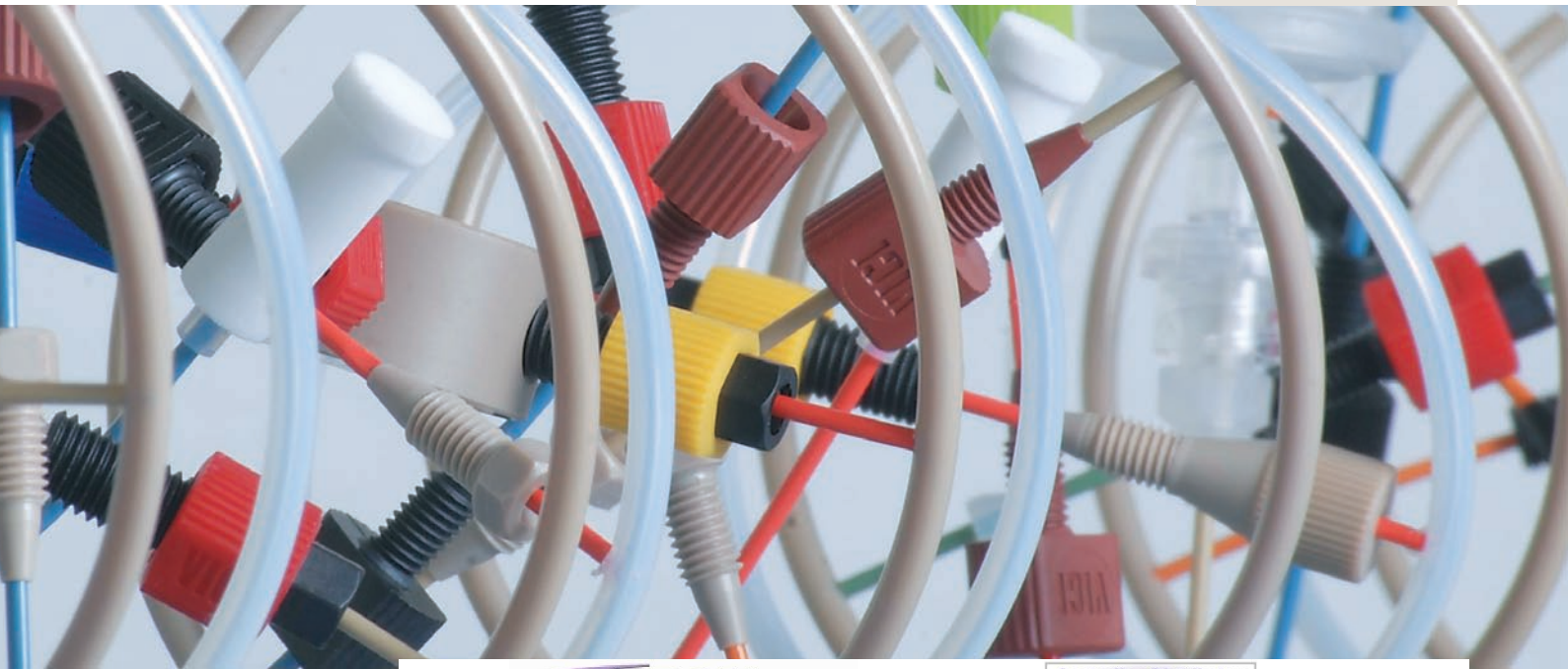



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## Tubing volume/length conversion chart

1/16" OD tubing sold by VICI typically has an ID tolerance of ±0.025 mm. 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, according to the equation $V = \Pi (½ D)^2 L$.

| Tubing ID | | Volume/ length | |
|---|---|---|---|
| mm | inches | µl/cm | µl/in |
| 0.050 | .002" | 0.02 | 0.05 |
| 0.064 | .0025" | 0.03 | 0.08 |
| 0.075 | .003" | 0.04 | 0.12 |
| 0.10 | .004" | 0.08 | 0.21 |
| 0.13 | .005" | 0.13 | 0.32 |
| 0.17 | .0067" | 0.23 | 0.58 |
| 0.18 | .007" | 0.25 | 0.63 |
| 0.25 | .010" | 0.51 | 1.29 |
| 0.38 | .015" | 1.14 | 2.90 |
| 0.50 | .020" | 2.03 | 5.15 |
| 0.64 | .025" | 3.17 | 8.04 |
| 0.75 | .030" | 4.56 | 11.58 |

| Tubing ID | | Volume/length | |
|---|---|---|---|
| mm | inches | µl/cm | µl/in |
| 1.00 | .040" | 8.11 | 20.59 |
| 1.40 | .055" | 15.39 | 38.93 |
| 1.52 | .060" | 18.24 | 46.33 |
| 1.59 | .062" | 19.86 | 49.47 |
| 1.65 | .065" | 21.38 | 54.38 |
| 1.70 | .067" | 22.70 | 57.78 |
| 1.78 | .070" | 24.83 | 63.06 |
| 2.00 | .079" | 31.42 | 80.32 |
| 2.10 | .083" | 34.64 | 88.66 |
| 2.16 | .085" | 36.61 | 92.99 |
| 2.40 | .094" | 45.24 | 113.72 |
| 3.18 | .125" | 79.4 | 201 |
| 3.76 | .148" | 111 | 282 |
| 4.35 | .171" | 149 | 376 |

## Maximum recommended working pressures for stainless steel tubing

| PREMIUM GRADE STAINLESS TUBING | | | |
|---|---|---|---|
| OD | ID (mm) | bar | psi |
| 1/32" | 0.13 | 1735 | 25,160 |
| | 0.18 | 1601 | 23,225 |
| | 0.25 | 1395 | 20,230 |
| | 0.50 | 734 | 10,645 |
| 1/16" | 0.13 | 1902 | 27,580 |
| | 0.18 | 1835 | 26,610 |
| | 0.25 | 1735 | 25,160 |
| | 0.50 | 1395 | 20,230 |
| | 0.75 | 1067 | 15,480 |
| | 1.00 | 734 | 10,645 |
| 1/8" | 0.68 | 1622 | 23,520 |
| | 0.75 | 1572 | 22,800 |
| | 1.00 | 1406 | 20,400 |
| | 1.50 | 1075 | 15,600 |
| | 1.70 | 960 | 13,920 |
| | 2.16 | 662 | 9,600 |
| 1/4" | 4.65 | 554 | 8,040 |

| WELDED STAINLESS TUBING | | | |
|---|---|---|---|
| OD | ID (mm) | bar | psi |
| 1/16" | 0.13 | 1871 | 27,140 |
| | 0.18 | 1794 | 26,025 |
| | 0.25 | 1717 | 24,910 |
| | 0.50 | 1384 | 20,080 |
| | 0.75 | 1076 | 15,610 |
| | 1.00 | 743 | 10,780 |
| 1/8" | 2.10 | 680 | 9,860 |
| 1/4" | 4.65 | 538 | 7,800 |

**WORKING PRESSURE FOR STAINLESS STEEL TUBING**

The working pressure for stainless tubing is calculated from the burst pressure by dividing by 2.5. The theoretical burst pressure(s) were calculated using Lame's formula and a safety factor of 2. Additionally, these results assume the tubing is not subject to any other stresses (e.g. temperaure different from ambient, bends) that would influence the calculations. the end user must decide the safe maximum working pressure based on this information and the specific application.

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## Maximum recommended working pressures for PEEK tubing

| PEEK TUBING | | | |
|---|---|---|---|
| **OD** | **ID** (µm) | **bar** | **psi** |
| 360 µm | 50 | 358 | 5200 |
| | 75 | 345 | 5000 |
| | 100 | 300 | 4400 |
| | 125 | 275 | 4000 |
| | 150 | 240 | 3500 |

| | | | |
|---|---|---|---|
| **OD** | **ID** (mm) | **bar** | **psi** |
| 1/32" | 0.050 | 455 | 6600 |
| | 0.064 | 455 | 6600 |
| | 0.075 | 455 | 6600 |
| | 0.100 | 455 | 6600 |
| | 0.13 | 414 | 6000 |
| | 0.15 | 400 | 5800 |
| | 0.18 | 386 | 5600 |
| | 0.20 | 369 | 5350 |
| | 0.25 | 338 | 4900 |
| | 0.38 | 269 | 3900 |
| | 0.50 | 207 | 3000 |

| | | | |
|---|---|---|---|
| **OD** | **ID** (mm) | **bar** | **psi** |
| 1/16" | 0.050 | 480 | 7000 |
| | 0.064 | 480 | 7000 |
| | 0.075 | 470 | 6800 |
| | 0.100 | 460 | 6700 |
| | 0.13 | 460 | 6700 |
| | 0.18 | 440 | 6400 |
| | 0.25 | 420 | 6100 |
| | 0.50 | 345 | 5000 |
| | 0.75 | 262 | 3800 |
| | 1.00 | 179 | 2600 |
| | 1.40 | 55 | 800 |
| 1/8" | 0.75 | 379 | 5500 |
| | 1.59 | 248 | 3600 |
| | 2.00 | 179 | 2600 |
| 1/4" | 3.17 | 227 | 3300 |

## Maximum recommended working pressures for polymeric tubing

| FEP TUBING | | | |
|---|---|---|---|
| **OD** | **ID** (mm) | **bar** | **psi** |
| 1/32" | 0.10 | 82 | 1200 |
| | 0.13 | 78 | 1100 |
| | 0.15 | 78 | 1100 |
| | 0.18 | 72 | 1050 |
| | 0.25 | 68 | 980 |
| | 0.38 | 51 | 750 |
| | 0.50 | 35 | 500 |

| | | | |
|---|---|---|---|
| **OD** | **ID** (mm) | **bar** | **psi** |
| 1/16" | 0.10 | 124 | 1800 |
| | 0.13 | 124 | 1800 |
| | 0.15 | 117 | 1700 |
| | 0.18 | 117 | 1700 |
| | 0.20 | 117 | 1700 |
| | 0.25 | 117 | 1700 |
| | 0.50 | 96 | 1400 |
| | 0.75 | 76 | 1100 |
| | 1.00 | 52 | 750 |

| | | | |
|---|---|---|---|
| **OD** | **ID** (mm) | **bar** | **psi** |
| 1/8" | 1.59 | 69 | 1000 |
| | 2.10 | 41 | 600 |
| 3/16" | 3.18 | 41 | 600 |
| 1/4" | 4.35 | 45 | 650 |
| 1.0 mm | 0.50 | 62 | 900 |
| 2.0 mm | 1.00 | 62 | 900 |
| 3.0 mm | 1.00 | 82 | 1200 |
| | 2.00 | 41 | 600 |

| ETFE TUBING | | | |
|---|---|---|---|
| **OD** | **ID** (mm) | **bar** | **psi** |
| 1/32" | 0.25 | 152 | 2200 |
| 1/16" | 0.17 | 200 | 2900 |
| | 0.25 | 186 | 2700 |
| | 0.50 | 152 | 2200 |
| | 0.75 | 117 | 1700 |
| | 1.00 | 83 | 1200 |
| 1/8" | 1.59 | 110 | 1600 |
| 3.0 mm | 1.00 | 138 | 2000 |
| 6.0 mm | 4.00 | 69 | 1000 |

| PFA TUBING | | | |
|---|---|---|---|
| **OD** | **ID** (µm) | **bar** | **psi** |
| 360 µm | 50 | 103 | 1500 |
| | 75 | 96 | 1400 |
| | 100 | 90 | 1300 |
| | 150 | 75 | 1100 |

| | | | |
|---|---|---|---|
| **OD** | **ID** (mm) | **bar** | **psi** |
| 1/16" | 0.50 | 100 | 1450 |
| | 0.75 | 76 | 1100 |
| | 1.00 | 55 | 800 |
| 1/8" | 1.59 | 72 | 1050 |
| | 1.70 | 65 | 940 |
| 3/16" | 3.20 | 41 | 600 |
| 1/4" | 4.35 | 45 | 650 |

| PTFE TUBING | | | |
|---|---|---|---|
| **OD** | **ID** (mm) | **bar** | **psi** |
| 1/16" | 0.18 | 62 | 900 |
| | 0.25 | 55 | 800 |
| | 0.50 | 48 | 700 |
| | 0.75 | 37 | 550 |
| | 1.00 | 25 | 350 |
| 1/8" | 1.59 | 35 | 500 |
| | 2.40 | 18 | 250 |
| 1/4" | 4.75 | 17 | 250 |
| 2.0 mm | 1.70 | 10 | 150 |
| 4.0 mm | 3.00 | 17 | 250 |
| 4.76 mm | 3.76 | 14 | 200 |

**WORKING PRESSURE FOR POLYMERIC TUBING**

The quoted maximum working pressure(s) were calculated from the burst pressure and the factor 2.5.



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## Tolerances – PEEK tubing

Due to tighter tolerances, VICI Jour PEEK tubing is the best choice for chromatography applications in which exact flow rates or tube volume are of importance. The tighter tolerance ensures a more consistent internal volume of transfer lines.

| PEEK TUBING | | |
|---|---|---|
| **Tubing OD** | **OD** (±) (mm) | **ID** (±) (mm) |
| 360 µm | 0.025 | 0.013 |
| 1/32" | 0.025 | 0.013 |
| 1/16" * | 0.025 | 0.013 |
| 1/16" ** | 0.025 | 0.025 |
| 1/8" | 0.050 | 0.050 |
| * For ID up to 0.25 mm<br>** For ID over 0.25 mm | | |

## Tolerances – polymeric tubing

| POLYMERIC TUBING | | |
|---|---|---|
| **Tubing OD** | **OD** (±) (mm) | **ID** (±) (mm) |
| 360 µm | 0.025 | 0.013 |
| 1/32" | 0.025 | 0.025 |
| 1/16" | 0.050 | 0.025 |
| 1/8" | 0.10 | 0.10 |
| 3/16' | 0.10 | 0.10 |
| 1/4" | 0.10 | 0.10 |

## Frit volume

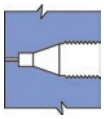
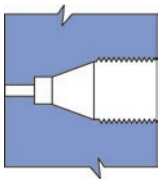
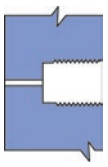
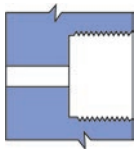
### Stainless, titanium, and polymer frits

Internal frit volumes are theoretical and are calculated by multiplying the total frit volume by the proportion of the pores in the frit (porosity proportion). Stated frit porosities are only nominal and do not relect the maximum pore size of a frit. The chart below will help you in selecting the right frit for your application.

| Porosity in µm | Max pore size in µm | Particles retained in µm | Porosity in % |
|---|---|---|---|
| 0.2 | 1 | ≥ 1.0 | 22 |
| 0.5 | 2 | ≥ 1.5 | 26 |
| 1 | 3 | ≥ 3.0 | 30 |
| 2 | 5 | ≥ 3.5 - 5.0 | 35 |
| 5 | 15 | ≥ 15.0 | 38 |
| 10 | 30 | ≥ 30 | 40 |

## Standard threads

Following are illustrations of standard threads for VICI Jour fittings. Place your fitting on the drawings below to identify the thread size.

| 2-56 | 6-40 | 10-32 | 5/16-24 | 1/4-28 | 1/2-20 |
|---|---|---|---|---|---|
| for 360 µm OD tubing | for 1/32" OD tubing | for 1/16" OD tubing | for 1/8" OD tubing | for 1/16" and 1/8" OD tubing | for 1/4" OD tubing |
| | |  |  |  |  |

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## Chemical resistance of PEEK at high temperature

| Chemical | °C | °F | Rating |
|---|---|---|---|
| Acetic acid | 200 | 420 | □ |
| Ammonia gas | 200 | 420 | ■ |
| Carbon monoxide gas | 200 | 420 | ■ |
| Ethylene glycol | 200 | 420 | □ |
| Ethylene glycol (50%) | 140 | 284 | ■ |
| Hydrogen sulphide gas | 200 | 420 | ■ |
| Liquid ammonia | 200 | 420 | □ |
| Methane | 200 | 420 | ■ |
| Methylethylketone | 200 | 420 | ■ |
| Nitrobenzene | 200 | 420 | ■ |
| Phosphoric acid (50%) | 200 | 420 | ■ |
| Sodium hydroxide solution | 200 | 420 | ■ |
| Sulphuric acid (50%) | 200 | 420 | □ |
| Sulphur dioxide gas | 200 | 420 | ■ |

## Chemical characteristics of PEEK®

PEEK exhibits excellent resistance to a wide range of organic and inorganic chemicals. The compatibility of PEEK with many chemicals at 20°C (68°F) has been investigated and the results for unreinforced grades are given in the table below.

PEEK is compatible with almost any of the solvents used in HPLC. The only solvents which will attack PEEK are concentrated nitric acid and sulphuric acids. However, PEEK tubing can safely withstand 20-30% nitric acid when passivating a system.

Methylene chloride, DMSO, and THF may cause swelling in PEEK. The highest temperature we recommend for PEEK is 100°C. The tubing will maintain the stated pressure rating up to this temperature.

## Chemical resistance of PEEK and other polymers

### A

| Resistance at 20°C | PEEK | PA | PE | PP | PPS | FEP | ETFE | PFA | PTFE | NBR | EPDM |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Acetaldehyde | ■ | ■ | – | – | – | ■ | – | ■ | – | ■ | ■ |
| Acetic acid (20 %) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | □ | ■ |
| Acetic acid (80 %) | ■ | ■ | ■ | ■ | ■ | ■ | – | ■ | ■ | – | – |
| Acetic acid (glacial) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Acetone | ■ | ■ | □ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Acetonitrile | ■ | ■ | – | – | ■ | ■ | ■ | ■ | ■ | □ | ■ |
| Acrylic acid | ■ | – | – | – | ■ | ■ | – | ■ | – | – | – |
| Ammonia, anhydrous | ■ | □ | – | – | ■ | ■ | – | ■ | – | – | – |
| Ammonia (10 %) | ■ | □ | □ | ■ | ■ | ■ | ■ | ■ | ■ | – | – |
| Ammonia (Liquid) | □ | ■ | – | – | ■ | ■ | – | ■ | – | – | – |
| Ammonium hydroxide | ■ | – | ■ | ■ | ■ | ■ | ■ | ■ | ■ | – | – |
| Aqua regia | ■ | ■ | – | – | ■ | ■ | – | ■ | – | ■ | ■ |
| Aromatic hydrocarbons | ■ | – | □ | ■ | ■ | ■ | – | ■ | – | – | – |

### B

| Resistance at 20°C | PEEK | PA | PE | PP | PPS | FEP | ETFE | PFA | PTFE | NBR | EPDM |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Benzene | ■ | ■ | □ | ■ | ■ | ■ | ■ | ■ | ■ | – | – |
| Benzoic acid | ■ | – | – | – | ■ | ■ | – | ■ | – | – | – |
| Benzaldehyde | ■ | – | – | – | ■ | ■ | – | ■ | – | – | – |
| Bromine/dibromoethane | ■ | – | – | – | ■ | ■ | – | ■ | – | – | – |
| Bromine (dry) | ■ | – | – | – | ■ | ■ | – | ■ | – | – | – |
| Bromine (wet) | ■ | □ | – | – | ■ | ■ | – | ■ | – | ■ | ■ |
| Boric acid | ■ | – | – | – | ■ | ■ | – | ■ | – | – | – |
| Butanol | ■ | – | ■ | ■ | ■ | ■ | ■ | ■ | ■ | – | – |

**LEGEND**

- ■ Suitable
- □ Marginal; dependent on application
- ■ Not recommended
- – No data available



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## C

| Resistance at 20°C | PEEK | PA | PE | PP | PPS | FEP | ETFE | PFA | PTFE | NBR | EPDM |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Calcium hydroxide | ■ | – | – | – | ■ | ■ | – | ■ | – | – | – |
| Carbon tetrachloride | ■ | – | – | – | ■ | ■ | – | ■ | – | – | – |
| Chlorine (gas) | ■ | ■ | – | – | ■ | ■ | – | ■ | – | ■ | ■ |
| Chlorine (liquid) | ■ | ■ | – | – | ■ | ■ | – | ■ | – | – | – |
| Chloroacetic acid | ■ | – | □ | □ | ■ | ■ | ■ | ■ | ■ | – | – |
| Chlorobenzene | ■ | ■ | – | – | ■ | ■ | – | ■ | – | – | – |
| Chloroform | ■ | ■ | □ | □ | ■ | ■ | ■ | ■ | ■ | – | – |
| Cyclohexane | ■ | ■ | □ | ■ | ■ | ■ | ■ | ■ | ■ | – | – |
| Cyclohexanone | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |

## D

| Resistance at 20°C | PEEK | PA | PE | PP | PPS | FEP | ETFE | PFA | PTFE | NBR | EPDM |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Diethylamine | ■ | – | ■ | ■ | – | ■ | ■ | ■ | ■ | – | – |
| Diethylether | ■ | ■ | – | – | ■ | ■ | – | ■ | – | – | – |
| Diethylformamide | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Dioxane | ■ | ■ | – | – | ■ | ■ | ■ | ■ | – | – | – |

## E

| Resistance at 20°C | PEEK | PA | PE | PP | PPS | FEP | ETFE | PFA | PTFE | NBR | EPDM |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ethanol | ■ | ■ | □ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Ether | ■ | ■ | □ | ■ | ■ | ■ | ■ | ■ | ■ | – | – |
| Ethyl acetate | ■ | ■ | □ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Ethylene chloride | – | ■ | □ | □ | ■ | ■ | ■ | ■ | ■ | – | – |
| Ethlene glycol | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |

## H

| Resistance at 20°C | PEEK | PA | PE | PP | PPS | FEP | ETFE | PFA | PTFE | NBR | EPDM |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Heptane | ■ | □ | □ | □ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Hexane | ■ | ■ | □ | □ | ■ | ■ | ■ | ■ | ■ | – | – |
| Hydrobromic acid (100%) | ■ | – | □ | □ | ■ | ■ | – | ■ | ■ | – | – |
| Hydrobromic acid (20%) | ■ | – | □ | ■ | – | ■ | ■ | ■ | ■ | – | – |
| Hydrochloric acid (100%) | ■ | – | – | □ | ■ | ■ | ■ | ■ | ■ | – | – |
| Hydrochloric acid (20%) | ■ | – | ■ | □ | ■ | ■ | ■ | ■ | ■ | – | – |
| Hydrofluoric acid (100%) | ■ | – | – | □ | ■ | ■ | ■ | ■ | ■ | – | – |
| Hydrofluoric acid (20%) | – | – | ■ | ■ | ■ | ■ | ■ | ■ | ■ | – | – |
| Hydrogen peroxide (100%) | ■ | – | □ | □ | ■ | ■ | – | ■ | ■ | – | – |
| Hydrogen peroxide (50%) | ■ | – | □ | □ | – | ■ | ■ | ■ | ■ | – | – |
| Hydrogen peroxide (10%) | ■ | – | ■ | ■ | ■ | ■ | ■ | ■ | ■ | – | – |

## I

| Resistance at 20°C | PEEK | PA | PE | PP | PPS | FEP | ETFE | PFA | PTFE | NBR | EPDM |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Iso-octane | ■ | – | – | ■ | ■ | ■ | – | ■ | ■ | – | – |
| Isopropanol | ■ | □ | ■ | ■ | ■ | ■ | – | ■ | ■ | □ | ■ |
| Isopropyl ether | – | ■ | ■ | □ | – | ■ | – | ■ | ■ | – | – |

## K

| Resistance at 20°C | PEEK | PA | PE | PP | PPS | FEP | ETFE | PFA | PTFE | NBR | EPDM |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ketones | ■ | – | □ | □ | ■ | ■ | – | ■ | ■ | – | – |

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## GENERAL REFERENCE

### M

| Resistance at 20°C | PEEK | PA | PE | PP | PPS | FEP | ETFE | PFA | PTFE | NBR | EPDM |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Methanol | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Methyl dichloride | – | □ | – | ■ | – | ■ | – | ■ | – | – | – |
| Methyl ethylketone | ■ | ■ | □ | □ | ■ | ■ | ■ | ■ | ■ | – | – |
| Methlyene chloride | □ | □ | □ | □ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |

### N

| Resistance at 20°C | PEEK | PA | PE | PP | PPS | FEP | ETFE | PFA | PTFE | NBR | EPDM |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Nitric acid (100%) | ■ | – | □ | ■ | ■ | ■ | ■ | ■ | ■ | – | – |
| Nitric acid (20%) | ■ | – | □ | ■ | ■ | ■ | ■ | ■ | ■ | – | – |

### P

| Resistance at 20°C | PEEK | PA | PE | PP | PPS | FEP | ETFE | PFA | PTFE | NBR | EPDM |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Pentane | ■ | – | ■ | ■ | – | ■ | – | ■ | ■ | – | – |
| Perchloric acid | ■ | – | □ | □ | – | □ | – | □ | ■ | – | – |
| Phenol (dilute) | ■ | – | – | – | ■ | ■ | – | ■ | – | – | – |
| Phenol (concentrated) | ■ | – | – | – | ■ | ■ | – | ■ | – | – | – |
| Phosphoric acid (100%) | ■ | – | □ | ■ | ■ | ■ | ■ | ■ | ■ | – | – |
| Phosphoric acid (40%) | ■ | – | ■ | ■ | ■ | ■ | ■ | ■ | ■ | – | – |
| Potassium hydroxide (dilute) | ■ | – | – | – | ■ | ■ | – | ■ | – | – | – |
| Potassium hydroxide (70%) | ■ | – | – | – | ■ | ■ | – | ■ | – | – | – |
| Propanol | ■ | □ | – | – | – | ■ | – | ■ | – | ■ | ■ |
| Pyridine | ■ | – | □ | ■ | ■ | ■ | ■ | ■ | ■ | – | – |

### S

| Resistance at 20°C | PEEK | PA | PE | PP | PPS | FEP | ETFE | PFA | PTFE | NBR | EPDM |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sodium hydroxide (80%) | ■ | □ | □ | ■ | ■ | ■ | – | ■ | ■ | – | – |
| Sodium hydroxide (20%) | ■ | □ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | – | – |
| Sulfuric acid (100%) | ■ | ■ | □ | □ | ■ | ■ | ■ | ■ | ■ | – | – |
| Sulfuric acid (75%) | ■ | □ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | – | – |
| Sulfuric acid (40%) | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | – | – |

### T

| Resistance at 20°C | PEEK | PA | PE | PP | PPS | FEP | ETFE | PFA | PTFE | NBR | EPDM |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Tetrahydrofuran | □ | | □ | □ | ■ | ■ | ■ | ■ | ■ | – | – |
| Toluene | ■ | | □ | □ | ■ | ■ | ■ | ■ | ■ | – | – |
| Trichloroacetic acid | ■ | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | – | – |
| Trichloroethane | ■ | | – | □ | – | ■ | – | ■ | ■ | – | – |
| Trichloroethylene | ■ | | – | – | ■ | ■ | – | ■ | – | – | – |
| Triethylamine | – | | – | ■ | – | ■ | ■ | ■ | ■ | – | – |

### W

| Resistance at 20°C | PEEK | PA | PE | PP | PPS | FEP | ETFE | PFA | PTFE | NBR | EPDM |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Water | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| Water (distilled) | ■ | – | ■ | ■ | ■ | ■ | ■ | ■ | ■ | – | – |

### X

| Resistance at 20°C | PEEK | PA | PE | PP | PPS | FEP | ETFE | PFA | PTFE | NBR | EPDM |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Xylene | ■ | – | – | – | ■ | ■ | – | ■ | – | – | – |

**LEGEND**

- ■ Suitable
- □ Marginal; dependent on application
- ■ Not recommended
- – No data available



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# Properties of polymers

**CTFE**
Chlorotrifluoroethylene, is the generic name for the material produced as Kel-F®. 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.

**EPDM**
Ethylene Propylene Diene Monomer. Ethylene-propylene synthetic rubbers offer excellent heat resistance as well as resistance to aging from oxidation, ozone, and weather due to their stable, saturated polymer backbone structure. As non-polar elastomers, they have good electrical resistivity as well as resistance to polar solvents such as water, acids, alkanes, phosphates, esters, and many ketones and alcohols.

**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.

**FFKM**
FFKM (perfluorinated rubber) is a perfluoroelastomer, a class of materials such as Kalrez®. It is chemically resistant to polar solvents, organic solvents, inorganic and organic acids and bases, fuels, oils, lubricants, inorganic salts, aldehydes, metal halogen compounds, chlorine, sodium hydroxide, aromatics, alcohols, steam, and strong oxidizing agents. The normal temperature service range is -40°C to 315°C, with up to 343°C in intermittent service.

**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 will be substantially reduced at elevated temperatures and in contact with some solvents or acids.

Its mechanical properties allow PEEK to be used instead of 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. This tubing is highly prone to "kinking", or sealing off, if held in a sharp bend over time.

**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 Techtron®. 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.

**Polyacetal**
Polyacetal or polyoxymethylene (POM) is the generic name for the material produced as Delrin®. It is an engineering polymer with high mechanical strength and rigidity, excellent dimensional stability and excellent resistance to moisture and solvents. It has a wide useful temperature range in air of -50°C to +90°C.
It is not suitable for use with acids, alkalis, or oxidizing agents, and has limited resistance to dichloromethane and methyl ethyl ketone.

*Continued, next page.*

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**Polyamide**
Polyamide is a thermoplastic polymer also known as nylon. Nylon has very good physical properties, but moisture can have a significant effect. It exhibits very good heat resistance and excellent chemical and wear resistance.

**Polyethylene**
Polyethylene is a semi-crystalline material with excellent chemical resistance, plus good fatigue and wear resistance. Polyethylenes provide good resistance to organic solvents and staining, and have low moisture absorption rates.

**Polypropylene**
Widely used polymer for non-wetted parts. Attacked by strong oxidizers as well as aromatic and chlorinated hydrocarbons.

**PVDF**
PVDF, or polyvinylidene fluoride, has excellent resistance to most mineral and organic acids, aliphatic and aromatic hydrocarbons, and halogenated solvents. Poor resistance to acetone, MEK, THF, and potassium and sodium hydroxide. Often supplied as Kynar®.

## Properties of metals

**Stainless steel, Type 316**
This is the standard tubing material for chromatography, suitable for a wide variety of applications. It is cold drawn seamless, not welded, with close tolerances held on both ID and OD. We neither recommend nor offer Type 304 stainless steel for analytical applications.

Austenitic stainless steels may be used for most chromatographic applications. Type 316 is most commonly used for HPLC because of its superior chloride ion resistance.

**Stainless steel, Type 303**
Recommended for GC use and general purpose connections, combining excellent machining characteristics with good resistance to corrosion and high temperature oxidation. Susceptible to attach by chlorides, iodides, and bromides.

**Titanium**
Although it is more difficult to machine than common alloys containing aluminum and vanadium, VICI 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.



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## 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 insuring 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.

## Trademarks

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| Duran® | Schott AG |
| Fortron® | Fortron Industries LLC |
| Kalrez® | DuPont Dow Elastomers |
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**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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## A

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

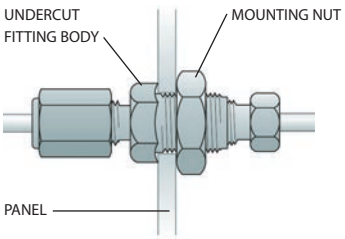
**Analytical column**
A long narrow tube packed or coated with one of many available chemically diverse compounds that can separate the components in a sample according to their boiling point, polarity, molecular size, or combination thereof. A column of some kind is used with most chromatographic techniques.

## B

**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 with a nut and ferrule attached.

**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.

**Collapsible ferrule**
A one-piece ferrule engineered to collapse as it is tightened. The collapse takes place in two very narrow areas, and results in a very effective seal with virtually no distortion of the tubing ID and no dead volume. Patent No. 6,575,501

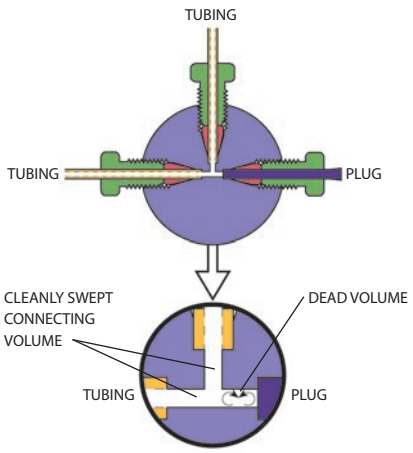
**Compression fitting**
A style of fitting in which a threaded nut compresses a tapered ferrule onto tubing as the nut is tightened. Valco metal ferrules cut a ring into the tubing wall while polymer types rely on surface compression to form a seal.

**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**
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.



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**Detail**
*See fitting detail.*

**Distribution fitting**
A generic term for tees, crosses, and manifolds, used to 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.

## 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.

**Female nut**
A nut with female threads; also called external nut.

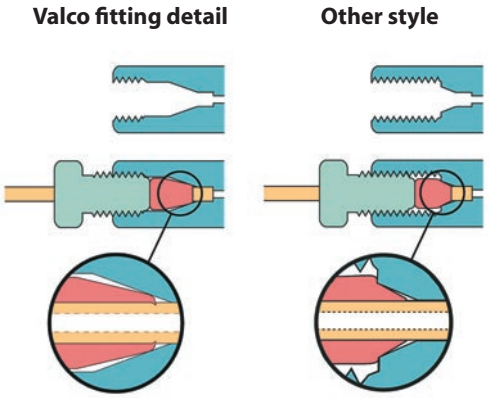
**Ferrule**
One of the components of a compression fitting; the conical piece of metal or plastic that compresses onto the tube as it is forced into a tapered seat. Valco metal ferrules are unique in that they attach to and seal at the tube by cutting a shallow ring into it, instead of by actually swaging 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.

**Fingertight fitting**
A fingertight fitting is a knurled or winged nut which is hand tightened to compress the ferrule. Note: Polymeric ferrules rely on surface compression to form a seal and hold the tube by friction.

**Fitting detail**
A fitting detail includes the thread to accept the nut, a tapered ferrule seat, and the pilot for the tube. The nut, ferrule, and tube go into the fitting detail to make the seal.

Valco fitting details have the perfect shape, with a smooth transition from the ferrule seat into the cylindrical and threaded part. Many other fitting details are poor in design where the ferrule is forced in a too shallow ferrule seat. The result is a "nicked" ferrule which can no longer apply its sealing force to the front of the ferrule.




**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.

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## 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.

## M

**Male nut**
A nut with male threads.

**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

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

**Nanobore**
Nanobore generally refers to components with bore sizes less than 250 µm (0.010").

**Nanovolume®**
The trademark registered to Valco Instruments Co. Inc. and VICI AG International, applied to our nanobore components with bore sizes less than 250 µm (0.010").



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**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.

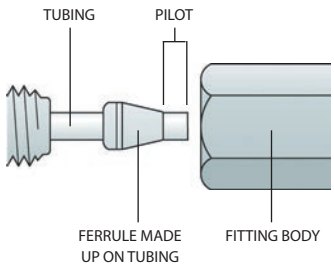
## O

**OD**
Outside diameter.

**One-piece fingertight**
A one-piece fingertight fitting is a knurled or winged nut with integrated ferrule. It is convenient to use since the ferrule is retrieved from the port with the nut. Note: Polymer type ferrules rely on surface compression to form a seal and hold the tube by friction.

## 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, below.




**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.

**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.

**Plug**
A plug is used to block a fitting detail in a union, tee, cross, or valve.

## 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 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.

## 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.

**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.

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## 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.
*See also reducing union*.

**Female union**
A type of compression fitting in which the fitting body has female threads. Also referred to as internal union.

**Male union**
A type of compression fitting in which the fitting body has male threads. Also referred to as external union.

**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.

## V

**VICI**
VICI® is an acronym for Valco Instruments Company Inc.

VICI now defines multiple companies which manufacture various products for the analytical industry.

## W

**Wetted surfaces**
The surfaces which are contacted by the sample stream.

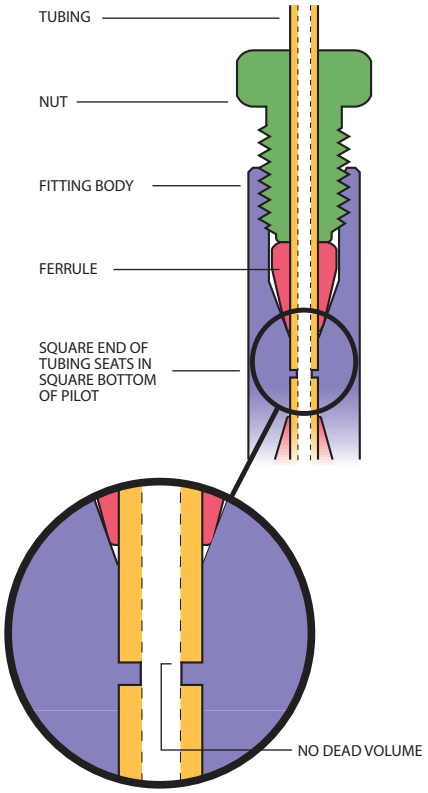
## Y

**Y ("Wye")**
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

**ZDV**
Zero dead volume. See definition below.

**Zero dead volume**
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.



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## Temperature conversions

| °C | °F | °C | °F | °C | °F | °C | °F | °C | °F |
|---|---|---|---|---|---|---|---|---|---|
| -40 | -40 | 65 | 149 | 170 | 338 | 275 | 527 | 500 | 932 |
| -35 | -31 | 70 | 158 | 175 | 347 | 280 | 536 | 525 | 977 |
| -30 | -22 | 75 | 167 | 180 | 356 | 285 | 545 | 550 | 1022 |
| -25 | -13 | 80 | 176 | 185 | 365 | 290 | 554 | 575 | 1067 |
| -20 | -4 | 85 | 185 | 190 | 374 | 295 | 563 | 600 | 1112 |
| -15 | 5 | 90 | 194 | 195 | 383 | 300 | 572 | 625 | 1157 |
| -10 | 14 | 95 | 203 | 200 | 392 | 305 | 581 | 650 | 1202 |
| -5 | 23 | 100 | 212 | 205 | 401 | 310 | 590 | 675 | 1247 |
| 0 | 32 | 105 | 221 | 210 | 410 | 315 | 599 | 700 | 1292 |
| 5 | 41 | 110 | 230 | 215 | 419 | 320 | 608 | 725 | 1337 |
| 10 | 50 | 115 | 239 | 220 | 428 | 325 | 617 | 750 | 1382 |
| 15 | 59 | 120 | 248 | 225 | 437 | 330 | 626 | 775 | 1427 |
| 20 | 68 | 125 | 257 | 230 | 446 | 335 | 635 | 800 | 1472 |
| 25 | 77 | 130 | 266 | 235 | 455 | 340 | 644 | 825 | 1517 |
| 30 | 86 | 135 | 275 | 240 | 464 | 345 | 653 | 850 | 1562 |
| 35 | 95 | 140 | 284 | 245 | 473 | 350 | 662 | 875 | 1607 |
| 40 | 104 | 145 | 293 | 250 | 482 | 375 | 707 | 900 | 1652 |
| 45 | 113 | 150 | 302 | 255 | 491 | 400 | 752 | 925 | 1697 |
| 50 | 122 | 155 | 311 | 260 | 500 | 425 | 797 | 950 | 1742 |
| 55 | 131 | 160 | 320 | 265 | 509 | 450 | 842 | 975 | 1787 |
| 60 | 140 | 165 | 329 | 270 | 518 | 475 | 887 | 1000 | 1832 |

## Pressure conversions

| bar | psi | kPa | MPa | bar | psi | kPa | MPa | bar | psi | kPa | MPa |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.1 | 1.5 | 10 | 0.01 | 6 | 87.0 | 600 | 0.6 | 100 | 1,450 | 10,000 | 10 |
| 0.2 | 2.9 | 20 | 0.02 | 7 | 101.5 | 700 | 0.7 | 200 | 2,900 | 20,000 | 20 |
| 0.3 | 4.4 | 30 | 0.03 | 8 | 116.0 | 800 | 0.8 | 300 | 4,350 | 30,000 | 30 |
| 0.4 | 5.8 | 40 | 0.04 | 9 | 130.5 | 900 | 0.9 | 400 | 5,800 | 40,000 | 40 |
| 0.5 | 7.3 | 50 | 0.05 | 10 | 145 | 1,000 | 1 | 500 | 7,250 | 50,000 | 50 |
| 0.6 | 8.7 | 60 | 0.06 | 20 | 290 | 2,000 | 2 | 600 | 8,700 | 60,000 | 60 |
| 0.7 | 10.2 | 70 | 0.07 | 30 | 435 | 3,000 | 3 | 700 | 10,150 | 70,000 | 70 |
| 0.8 | 11.6 | 80 | 0.08 | 40 | 580 | 4,000 | 4 | 800 | 11,600 | 80,000 | 80 |
| 0.9 | 13.1 | 90 | 0.09 | 50 | 725 | 5,000 | 5 | 900 | 13,050 | 90,000 | 90 |
| 1 | 14.5 | 100 | 0.1 | 60 | 870 | 6,000 | 6 | 1,000 | 14,500 | 100,000 | 100 |
| 2 | 29.0 | 200 | 0.2 | 70 | 1,015 | 7,000 | 7 | 1,100 | 15,950 | 110,000 | 110 |
| 3 | 43.5 | 300 | 0.3 | 80 | 1,160 | 8,000 | 8 | 1,200 | 17,400 | 120,000 | 120 |
| 4 | 58.0 | 400 | 0.4 | 90 | 1,305 | 9,000 | 9 | 1,300 | 18,850 | 130,000 | 130 |
| 5 | 72.5 | 500 | 0.5 | | | | | | | | |

## Length

| µm | inches |
|---|---|
| 100 | .004" |
| 150 | .006" |

| mm | inches |
|---|---|
| 0.050 | .002" |
| 0.064 | .0025" |
| 0.075 | .003″ |
| 0.100 | .004" |
| 0.13 | .005" |
| 0.15 | .006" |
| 0.18 | .007" |
| 0.20 | .008" |
| 0.25 | .010" |
| 0.38 | .015" |
| 0.40 | .016" |
| 0.50 | .020" |
| 0.75 | .030" |
| 1.00 | .039" |
| 1.50 | .059" |
| 2.00 | .079" |
| 3.00 | .118" |
| 4.00 | .157" |
| 4.60 | .181" |
| 6.00 | .236" |
| 6.35 | .250" |
| 6.40 | .252" |
| 7.00 | .276" |
| 10.00 | .394" |
| 12.70 | .500" |

| inches | mm |
|---|---|
| 1/32" | 0.79 |
| 1/16" | 1.59 |
| 3/32" | 2.38 |
| 1/8" | 3.18 |
| 1/4" | 6.35 |
| 5/16" | 7.94 |
| 3/8" | 9.50 |
| 1/2" | 12.70 |
| 1" | 25.40 |

| feet | mm |
|---|---|
| 1 ft | 304.8 |

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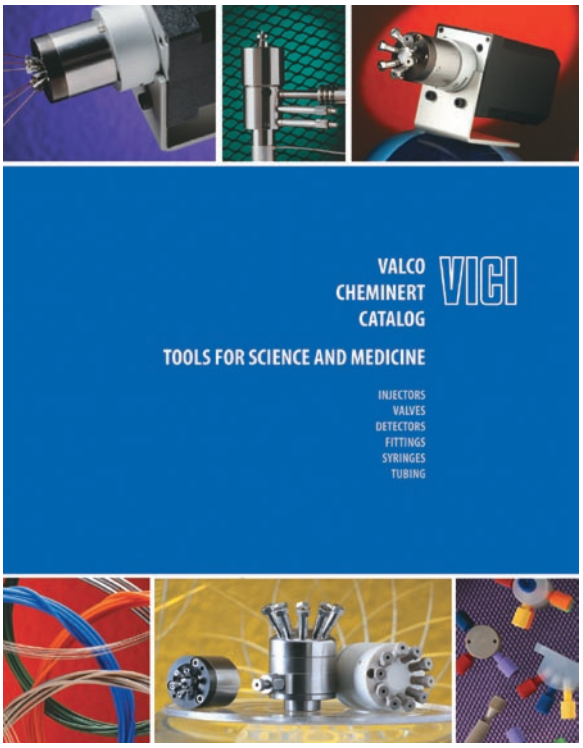
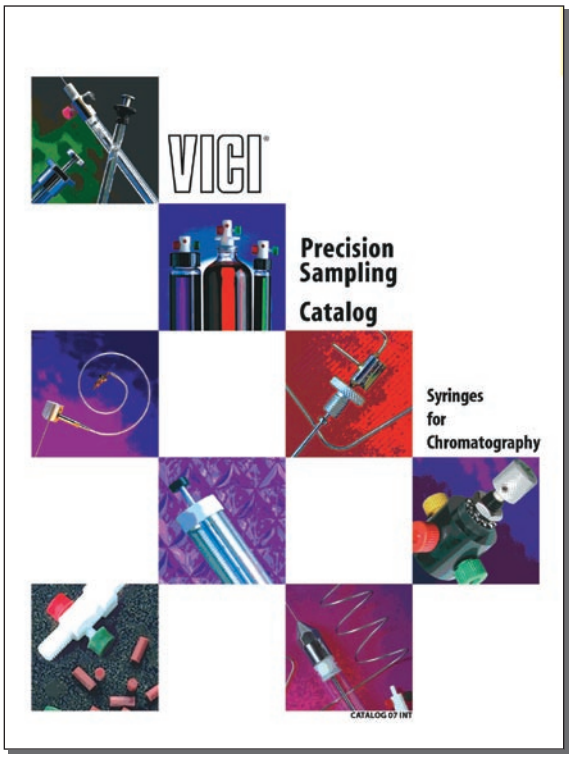



- Valco valves
- Cheminert valves
- Actuators
- Valco fittings
- Cheminert fittings
- Tubing
- Flow, pressure, and on/off devices
- Dynacal® permeation devices
- Instrumentation
- GC columns
- GC purifiers




- Gas tight syringes
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- Magnum syringes up to 500 mL
- Syringes for sampling from gas cylinders
- Mininert™ – Valves for vials
- Customized probes and shaped tubing

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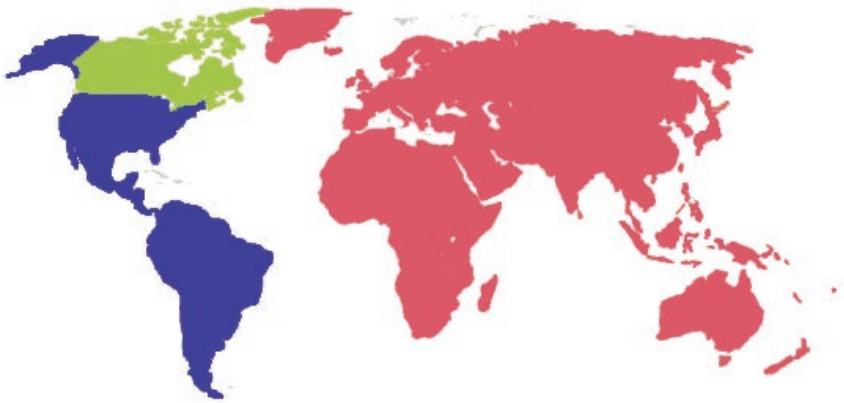

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## Conditions of Sale

There is no minimum order.
Terms are net 30 days.
Prices subject to change without notice.

## Repairs

For repair return authorization or information about factory refurbishments, contact our Service Department.

## Technical Service

Our capable staff is waiting to assist you with your technical questions and application needs.

## Notice

VICI reserves the right to correct errors and change prices, designs, or specifications without notice or liability. The information in this catalog is correct to the best of our knowledge but is not guaranteed to be so. VICI assumes no responsibility with respect thereto.

## Returns

No returns will be accepted more than 90 days after shipment for any reason. Before 90 days, no returns will be accepted without prior authorization. If it is necessary to return material to us, please contact our Sales Department for a return authorization number and forwarding instructions. Inspect shipments upon receipt and report shortages and incorrect or damaged material to us immediately.

*Important!* Damaged shipments must remain with the original packaging for freight company inspection.

Returned material will be subject to a restocking charge of 20% for catalog items. Special orders cannot be returned unless defective.



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# Valco Fittings

The two piece compression fitting (**Figure 1**), in which a 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.

**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.

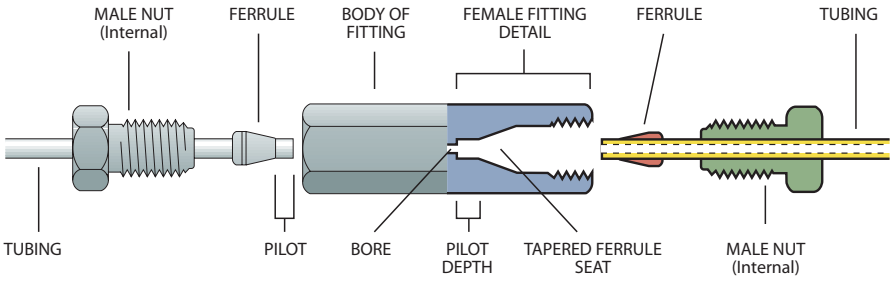


**Figure 1**
Valco compression fitting

**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 |

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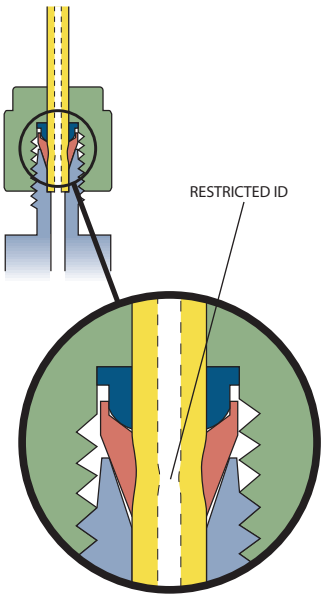



**Figure 2**
ID restriction
in common compression fitting

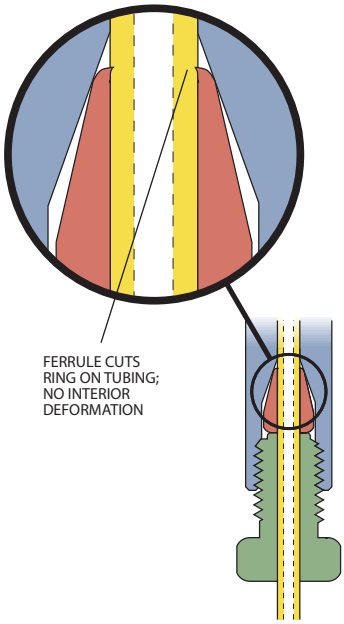



**Figure 3**
No ID restriction
in Valco compression fitting

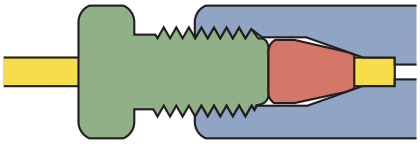
## Interchangeability

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.

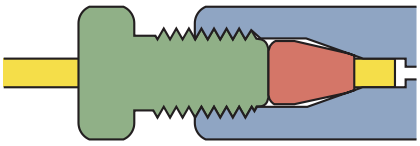
Because of variations in tubing OD and in pilot and taper designs from manufacturer to manufacturer, the amount of tubing extending beyond the made up ferrule can vary. (The most radical variation is in the fittings manufactured by Waters. Based on the old Swagelok design, they have a pilot depth considerably 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

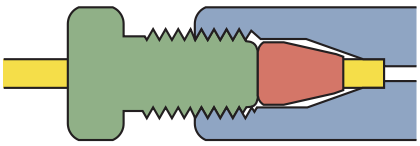
Most of our state of the art CNC machines use water-based lubricants. After each part comes off the machine, it is cleaned with water-soluble detergents and then rinsed in hot deionized water. Finally, every metal fitting that we make is given a thorough cleaning with steam from deionized water at 140°C. 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**

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## Introduction

### Precision Machining, Finishing, and Tolerances

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

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

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

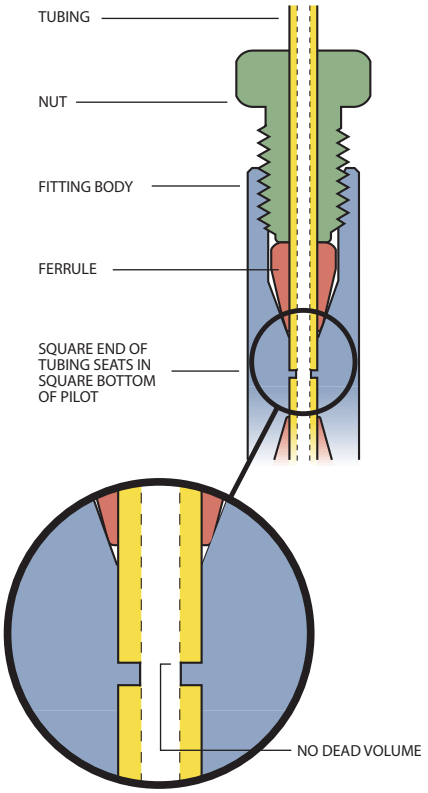


**Figure 5**
Valco/Cheminert high pressure compression fitting

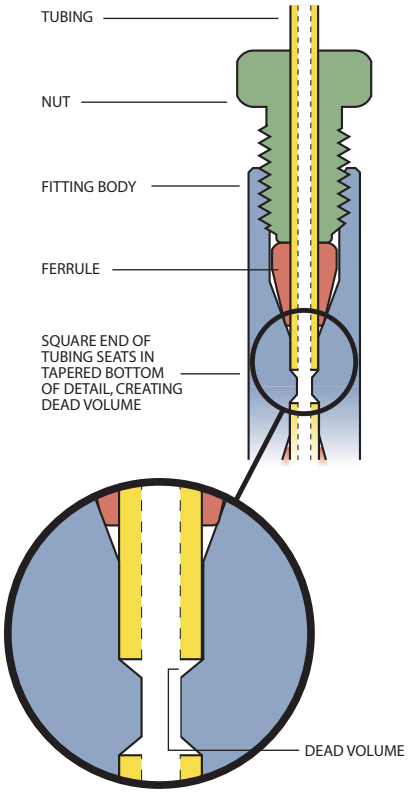


**Figure 6**
Poor quality compression fitting

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## Comparison of Compression Fitting Designs

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

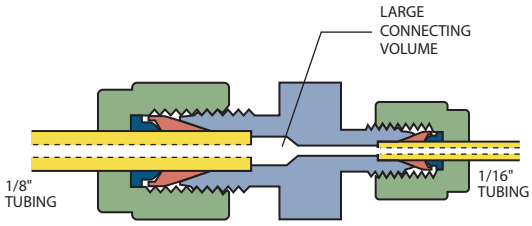


**Figure 7**
Common commercial reducing union

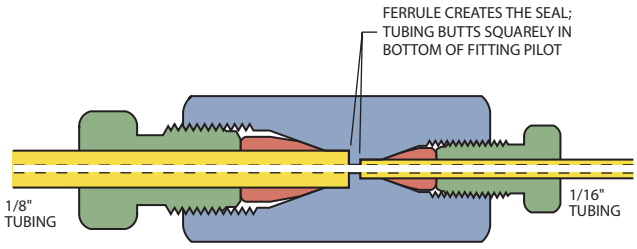


**Figure 8**
Valco zero dead volume reducing union

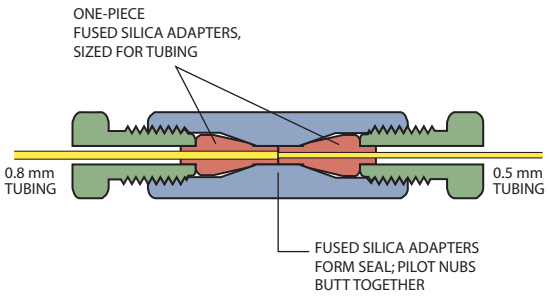


**Figure 9**
Valco zero dead volume through-bore union

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 impossible to get the nut on, and the tube end often flares out in the fitting detail so that it's difficult to remove the tube.

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

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

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

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## Nuts

### Internal nuts – stainless steel

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

**Stainless nuts**

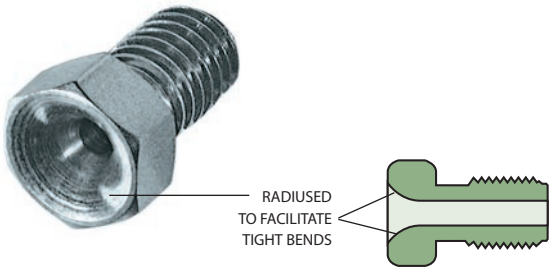
| *Package of 10:* | *Length* | *Prod No* | *Price* |
|---|---|---|---|
| 1/32" nut | .30" | ZN.5-10 | |
| 1/32" nut | .45" | LZN.5-10 | |
| 1/16" nut | .43" | ZN1-10 | |
| 1/16" nut | .50" | MZN1-10 | |
| 1/16" nut | .75" | LZN1-10 | |
| 1/16" nut | 1.00" | XLZN1-10 | |
| 1/8" nut | .57" | ZN2-10 | |
| 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 | |

### *NEW* Specialty nuts – stainless steel

These special purpose nuts facilitate a tight bend as the tube exits the fitting, and can also help prevent kinks in very thin wall tubing. Quick bend nuts are available in standard length (.43") and in a short version (.30") for certain custom applications. Note that the short version (ZSN1) can *only* be used in certain applications. Call for more information.

**Stainless nuts**

| *Description* | *Length* | *Prod No* | *Price* | |
|---|---|---|---|---|
| 1/16", standard | .43" | ZN1Q | | |
| 1/16", short | .30" | ZSN1 | | |




**Specialty nut**
Standard length

**MORE INFORMATION**

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Unions
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External .....27
External/internal.....27

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

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

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

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

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

27.0 mm = 1.08"

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

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

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## 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.

| | Stainless nuts | |
|---|---|---|
| *Description* | *Prod No* | *Price* |
| 1/32″ external 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.

| | | Stainless plugs | | High pressure Stainless plugs | |
|---|---|---|---|---|---|
| *Description* | *Length of nut** | *Prod No* | *Price* | *Prod No* | *Price* |
| 1/32" | .30" | ZP.5 | | ZP.5H | |
| 1/16" | .43" | ZP1 | | ZP1H | |
| 1/16" | .75" | LZP1 | | LZP1H | |
| 1/8" | .57" | ZP2 | | ZP2H | |
| 1/8" | .82" | LZP2 | | LZP2H | |
| 1/4" | .70" | 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.

| | | Stainless caps | |
|---|---|---|---|
| *Description* | *Length of nut** | *Prod No* | *Price* |
| 1/32" | .30" | ZC.5 | |
| 1/16" | .43" | ZC1 | |
| 1/8" | .57" | ZC2 | |
| 1/4" | .70" | ZC4 | |

**MORE INFORMATION**

PEEK plugs . . pages 64, 71
PEEK plugs for high pressure Cheminert valves . . . . . 64
PEEK caps . . . . . .57, 64

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## Ferrules

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

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

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

**MORE INFORMATION**
For more detailed information on metals, refer to the discussion on pages 254-255.

### Metal ferrules

| | *Prod No* | *Price* | *Prod No* | *Price* | *Prod No* | *Price* |
|---|---|---|---|---|---|---|
| *Package of 10:* | **Stainless, Type 303** | | **Stainless, Type 316** | | **Stainless, Gold-plated** | |
| 1/32" | ZF.5-10 | | ZF.5S6-10 | $40 | ZF.5GP-10 | |
| 1/16" | ZF1-10 | | ZF1S6-10 | 30 | ZF1GP-10 | |
| 1/8" | ZF2-10 | | ZF2S6-10 | 22 | ZF2GP-10 | |
| 1/4" | – | | ZF4S6-10 | 19 | ZF4GP-10 | |
| *Sold individually:* | **Hastelloy C** | | **Nickel** | | **Titanium** | |
| 1/32" | ZF.5HC | | ZF.5NI | $9 | ZF.5TI | |
| 1/16" | ZF1HC | | ZF1NI | 8 | ZF1TI | |
| 1/8" | ZF2HC | | ZF2NI | 8 | ZF2TI | |
| 1/4" | ZF4HC | | ZF4NI | 9 | ZF4TI | |
| *Package of 10:* | **Brass** | | | | | |
| 1/32" | ZF.5B-10 | | | | | |
| 1/16" | ZF1B-10 | | | | | |
| 1/8" | ZF2B-10 | | | | | |
| 1/4" | 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-plated .....GP
*More inert than standard stainless*

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

Stainless steel, Type 316 ..... S6
*LC with high chloride ion in solutions*

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

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

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

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

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

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

27.0 mm = 1.08"

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

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

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## Polymeric ferrules

| | Prod No | Price | Prod No | Price | Prod No | Price |
|---|---|---|---|---|---|---|
| *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** | |
| 1/32" | ZF.5PFA-10 | ZF.5KF-10 | |
| 1/16" | ZF1PFA-10 | ZF1KF-10 | |
| 1/8" | ZF2PFA-10 | ZF2KF-10 | |
| 1/4" | ZF4PFA-10 | ZF4KF-10 | |
| 3/8" | ZF6PFA-10 | ZF6KF-10 | |
| 1/2" | ZF8PFA-10 | ZF8KF-10 | |

| | | | |
|---|---|---|---|
| *Package of 5:* | **Polyimide, Graphite** | **Polyimide, Valcon** | **Polyimide, 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 |

**MORE INFORMATION**

PEEK ferrules .... page 63
Grooved PEEK ferrules..... 63

For more detailed information on polymers, refer to the discussion on page 256.

**POLYMERS AT A GLANCE**

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

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

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

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

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

Polyimide, Valcon..... V
*High temp, graphite reinforced*

Polyimide, Virgin..... V1
*High temp, electrical insulator*

**FERRULE IDENTIFICATION**

To differentiate among the most commonly ordered metal ferrules, ring(s) are engraved on the non-sealing surfaces.

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## Reducing Ferrules

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.

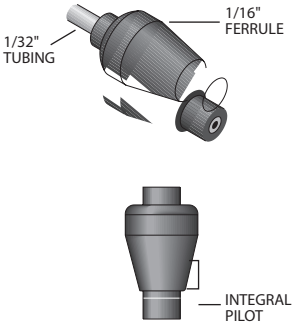
**External** ZDV reducing ferrules are designed for use with all standard external style fittings – that is, those with a female nut and a male fitting detail. This ferrule has a slightly longer pilot than the internal version, to accommodate the longer external detail. The result is a zero dead volume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

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

### nternal reducing ferrules

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

| | *Prod No* | *Price* | *Prod No* | *Price* | *Prod No* | *Price* |
|---|---|---|---|---|---|---|
| *Package of 5:* | **PTFE, Glass-filled** | | **PEEK** | | **Polyimide, Valcon** | |
| 1/16" to 1/32" | ZRF1.5TFG-5 | | ZRF1.5PK-5 | | ZRF1.5V-5 | |
| 1/8" to 1/32" | ZRF2.5TFG-5 | | ZRF2.5PK-5 | | ZRF2.5V-5 | |
| 1/8" to 1/16" | ZRF21TFG-5 | | ZRF21PK-5 | | ZRF21V-5 | |
| 1/4" to 1/16" | ZRF41TFG-5 | | ZRF41PK-5 | | ZRF41V-5 | |
| 1/4" to 1/8" | ZRF42TFG-5 | | ZRF42PK-5 | | ZRF42V-5 | |
| *Package of 5:* | **CTFE** | | **Polyimide, Virgin** | | | |
| 1/16" to 1/32" | ZRF1.5KF-5 | | ZRF1.5V1-5 | | | |
| 1/8" to 1/32" | ZRF2.5KF-5 | | ZRF2.5V1-5 | | | |
| 1/8" to 1/16" | ZRF21KF-5 | | ZRF21V1-5 | | | |
| 1/4" to 1/16" | ZRF41KF-5 | | ZRF41V1-5 | | | |
| 1/4" to 1/8" | ZRF42KF-5 | | ZRF42V1-5 | | | |




**Internal reducing ferrule**
(ZRF)

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

**MORE INFORMATION**

Internal reducers (IZR) . . . . . page 34
External reducers (EZR) . . . . . 35
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.

**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 ®.

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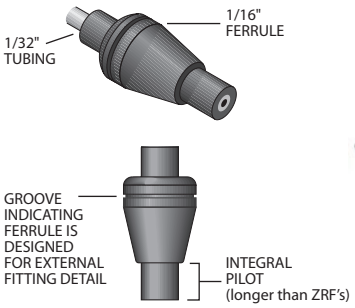
**OPTION**
Available in Virgin Polyimide.

## External reducing ferrules

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

| | *Prod No* | *Price* | *Prod No* | *Price* | *Prod No* | *Price* |
|---|---|---|---|---|---|---|
| *Package of 5:* | **PTFE, Glass-filled** | | **PEEK** | | **Polyimide, Valcon** | |
| 1/16" to 1/32" | EZRF1.5TFG-5 | | EZRF1.5PK-5 | | EZRF1.5V-5 | |
| 1/8" to 1/32" | EZRF2.5TFG-5 | | EZRF2.5PK-5 | | EZRF2.5V-5 | |
| 1/8" to 1/16" | EZRF21TFG-5 | | EZRF21PK-5 | | EZRF21V-5 | |
| 1/4" to 1/16" | EZRF41TFG-5 | | EZRF41PK-5 | | EZRF41V-5 | |
| 1/4" to 1/8" | EZRF42TFG-5 | | EZRF42PK-5 | | EZRF42V-5 | |
| *Package of 5:* | **CTFE** | | | | | |
| 1/16" to 1/32" | EZRF1.5KF-5 | | | | | |
| 1/8" to 1/32" | EZRF2.5KF-5 | | | | | |
| 1/8" to 1/16" | EZRF21KF-5 | | | | | |
| 1/4" to 1/16" | EZRF41KF-5 | | | | | |
| 1/4" to 1/8" | EZRF42KF-5 | | | | | |



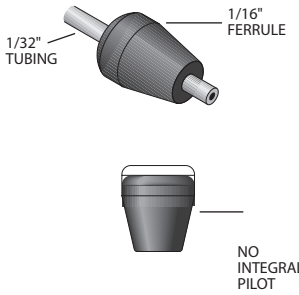

**External reducing ferrule**
(EZRF)

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




**Standard reducing ferrule**
(RF)

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

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

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

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

27.0 mm = 1.08"

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

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

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## Fused Silica Adapters

Fused silica adapters are available in Valcon polyimide for use up to 350°C and in PEEK for lower temperature applications (up to 175°C). Valcon polyimide is a unique graphite-reinforced composite, specially prepared to maximize mechanical stability at high temperatures. Small blocks are subjected to extreme loads by a process known as hot isostatic pressing, with individual ferrules subsequently machined from these blocks. The result of this two-step process is a fused silica adapter with high temperature stability which far exceeds that of parts produced by conventional molding. 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* | *Price* | *Prod No* | *Price* | *Prod No* | *Price* |
| **1/32" Adapters** | Tubing OD: | | | | | | |
| | < 0.25 mm | FS.25-5 | | FS.25PK-5 | | FS.25V1-5 | |
| | 0.25 ≤ 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 ≤ 0.80 mm | ZF.5V-5 | | ZF.5PK-5 | | ZF.5V1-5 | |
| **1/16" Adapters** | Tubing OD: | | | | | | |
| | <0.25 mm | FS1.2-5 | | FS1.2PK-5 | | FS1.2V1-5 | |
| | 0.25 ≤ 0.30 mm | FS1.25-5 | | FS1.25PK-5 | | FS1.25V1-5 | |
| | 0.30 ≤ 0.35 mm | FS1.3-5 | | FS1.3PK-5 | | FS1.3V1-5 | |
| | 0.35 ≤ 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 ≤ 0.80 mm | FS1.8-5 | | FS1.8PK-5 | | FS1.8V1-5 | |
| | 0.80 ≤ 0.90 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 kit

These tapered tools have teeth designed to grip and remove fused silica adapters if they get stuck in a fitting detail. Each kit has two sizes of tools, so they can retrieve 1/32" and 1/16" adapters.

| *Prod No* | *Price* |
|---|---|
| FRK1 | $23 |

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

Our **ferrule removal kit**, left, can be used to remove ferrules from all types of fittings.

**WHICH ADAPTER FOR WHICH COLUMN?**

| Column ID | Typical column OD | 1/32" adapter | 1/16" adapter |
|---|---|---|---|
| < 0.20 mm | 0.25 mm | FS.25 | FS1.25 |
| 0.25 mm | 0.4 mm | FS.4 | FS1.4 |
| 0.32 mm | 0.5 mm | FS.5 | FS1.5 |
| 0.53 mm | 0.8 mm | ZF.5V | FS1.8 |

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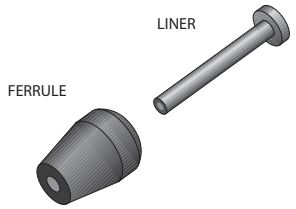
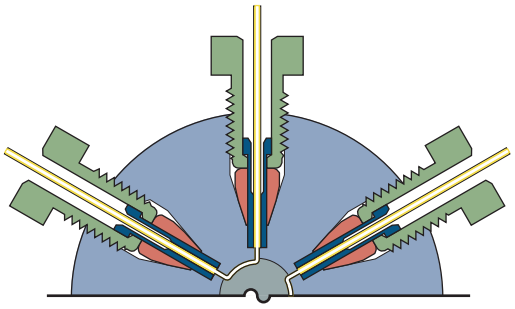



## Removable fused silica adapters (FSR)

The FSR adapter is the only adapter recommended for use in valves. It consists of a liner which slides over the fused silica tubing and a ferrule which makes up on the liner. The polyimide liner has an enlarged diameter at one end which is captured by the nut, so the liner and the tube within it are removed as the nut is unscrewed from the valve. The 1/16" FSR adapter includes a special counter-bored 1/16" nut. The 1/32" FSR adapter uses standard Valco 1/32" nuts.

| *Package of 5:* | | **Polyimide, Valcon** *Prod No* | *Price* |
|---|---|---|---|
| **1/32"** | | | |
| **Removable adapters** | Tubing OD: | | |
| | < 0.25 mm | FSR.25-5 | |
| | 0.30 ≤ 0.35 mm | FSR.3-5 | |
| | 0.35 ≤ 0.40 mm | FSR.4-5 | |
| | 0.40 ≤ 0.50 mm | FSR.5-5 | |
| **1/32"** | | | |
| **Replacement liners** | Tubing OD: | | |
| | < 0.25 mm | FSL.25-5 | |
| | 0.25 ≤ 0.40 mm | FSL.4-5 | |
| | 0.40 ≤ 0.50 mm | FSL.5-5 | |

| *Package of 5:* | | **Polyimide, Valcon** *Prod No* | *Price* | **PEEK** *Prod No* | *Price* |
|---|---|---|---|---|---|
| **1/16"** | Tubing OD: | | | | |
| **Removable adapters** | < 0.15 mm | – | | FS1R.15PK-5 | |
| | < 0.20 mm | FS1R.2-5 | | FS1R.2PK-5 | |
| | 0.20 ≤ 0.40 mm | FS1R.4-5 | | FS1R.4PK-5 | |
| | 0.40 ≤ 0.50 mm | FS1R.5-5 | | FS1R.5PK-5 | |
| | 0.50 ≤ 0.80 mm | FS1R.8-5 | | FS1R.8PK-5 | |
| | 0.90 ≤ 1.0 mm | FS1R1.0-5 | | FS1R1.0PK-5 | |
| **1/16"** | | | | | |
| **Replacement liners** | Tubing OD: | | | | |
| | < 0.15 mm | – | | FS1L.15PK-5 | |
| | < 0.20 mm | FS1L.2-5 | | FS1L.2PK-5 | |
| | 0.20 ≤ 0.40 mm | FS1L.4-5 | | FS1L.4PK-5 | |
| | 0.40 ≤ 0.50 mm | FS1L.5-5 | | FS1L.5PK-5 | |
| | 0.50 ≤ 0.80 mm | FS1L.8-5 | | FS1L.8PK-5 | |
| | 0.90 ≤ 1.0 mm | FS1L1.0-5 | | FS1L1.0PK-5 | |



**Removable FSR adapters in a valve**

**MORE INFORMATION**

Fused silica
Unions . pp 18-19, 58, 61
Fittings . . . . . 18-21
A pin vise and drill index are useful for enlarging the inner diameters of the FS adapters.
Pin vise and drill index . . . . . 55

**REPLACEMENT PARTS**

| **Ferrules** | | *(package of 5)* |
|---|---|---|
| 1/32" Polyimide | ZF.5V-5 | $30 |
| 1/16" Polyimide | ZF1V-5 | 25 |
| | *(package of 10)* | |
| 1/16" PEEK | ZF1PK-10 | 33 |
| **Nuts** | | *(package of 10)* |
| 1/32" SS | ZN.5-10 | 29 |
| *Special nuts for FSRs:* | | |
| 1/16" SS | ZCN1-10 | 30 |
| 1/16" SS long | LZCN1-10 | 45 |

100 µm = .004"
150 µm = .006"

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

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

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

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

27.0 mm = 1.08"

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

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

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## Fused Silica Fittings

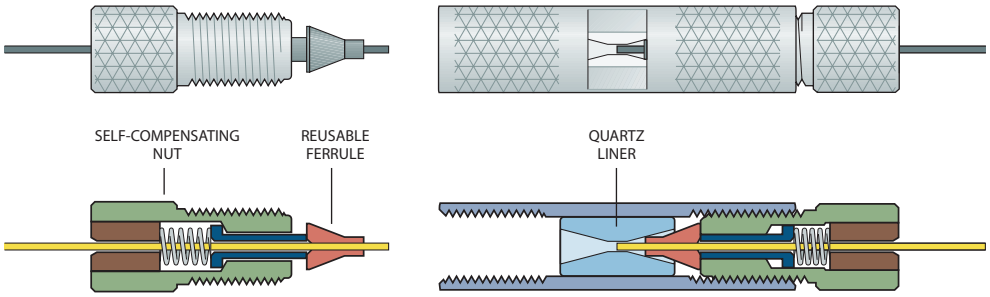
The patented design of our fused silica fittings ensures stable, leak-free connections at temperatures up to 400°C, and undistorted ferrules that are easily removed and reused. Columns may be changed without the risk of the leaks which can devastate systems such as mass spectrometers or atomic emission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

Self-compensating nuts are currently employed in two basic designs: a fused silica-lined union and an injector/detector nut for Agilent 6890 and 5890 GCs.

### Fused silica unions

The fused silica union* has a quartz liner, providing an inert connection zone of minimal volume. Since the seal occurs only at the ferrule tip, the total sealing force is minimized, leaving the ferrule undistorted and reusable.
*Note:* The ferrules used in this union are unique, due to the seal at the tip. Standard ferrules will not work in this union.

| *Description* | *Prod No* | *Price* |
|---|---|---|
| Fused silica union | FSKZU1 | |
| Replacement liner | FSQ1 | |
| Replacement nut | FSZN1 | |




**Fused silica union**
with self-compensating nut

### Replacement ferrules for fused silica unions and self-compensating nuts (Agilent injector nuts)

These reusable ferrules seal at the tip, and are different from standard ferrules. Order for use with FSKZU1 fused silica unions and FSZNA-HP nuts on these two pages.

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

*U.S. patent numbers 5,234,235 and 4,991,883.

100 µm = .004"
150 µm = .006"

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

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

4.6 mm = .180"
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27.0 mm = 1.08"

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

1/4" = 6.4 mm
3/8" = 9.5 mm
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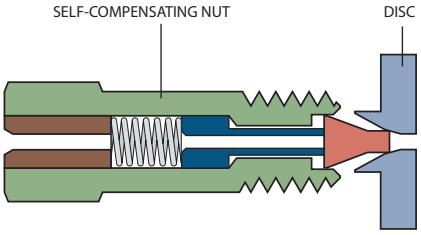
## Injector nut for Agilent 6890 and 5890, Series I and II

This self-compensating nut is a direct replacement for the standard nut on the split/splitless injectors of Agilent 6890 and 5890 series GCs. This retrofit offers enhanced ferrule reusability and temperature stability, resulting in fingertight leak-free connections over the full programmed temperature range of mass spectrometry and gas chromatography. To use this nut, the split/splitless disk must also be upgraded; the new disk will also work with older HP nuts and ferrules.

| | *Prod No* | *Price* |
|---|---|---|
| Injector nut system<br>Includes nut and seal disk | FSZA-HP | |
| Replacement parts | | |
| Self-compensating nut | FSZNA-HP | |
| HP-5890 split/splitless seal disk | SEAL1-HP | |

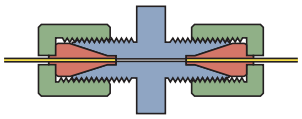



**Self-compensating nut**
for the 6890/5890 GC

## 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 *(see box at left)*.

| *Bore* | *Prod No* | *Price* |
|---|---|---|
| 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

**MORE INFORMATION**
1/32" fused silica adapter ferrules..... page 16

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

Tubing OD:

| | | | |
|---|---|---|---|
| | ≤ 0.25 mm | FS.25-5 | $25 |
| 0.25 mm | ≤ 0.4 mm | FS.4-5 | 25 |
| 0.4 mm | ≤ 0.5 mm | FS.5-5 | 25 |
| 0.5 mm | ≤ 0.8 mm | ZF.5V-5 | 25 |

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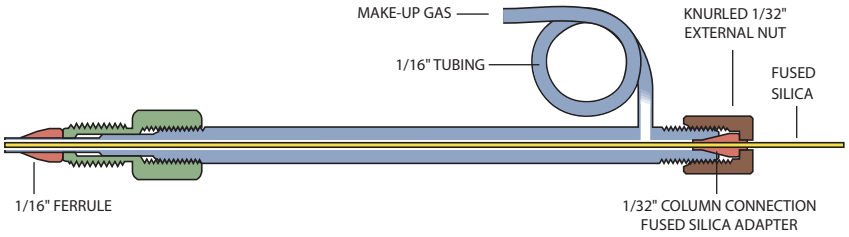
## Fused Silica Adapters

### 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* | *Price* |
|---|---|---|---|---|
| 1/16" to 1/32" | 1.5" | 0.5 mm | FSMUAS1.5M | |
| | 1.5" | 0.75 mm | FSMUAS1.5 | |
| | 1.5" | 1.0 mm | FSMUAS1.5L | |
| | 3.5" | 0.75 mm | FSMUA1.5 | |




**Fused silica make-up adapter**
(FSMUA1.5)

100 µm = .004"
150 µm = .006"

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

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

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

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

27.0 mm = 1.08"

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

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

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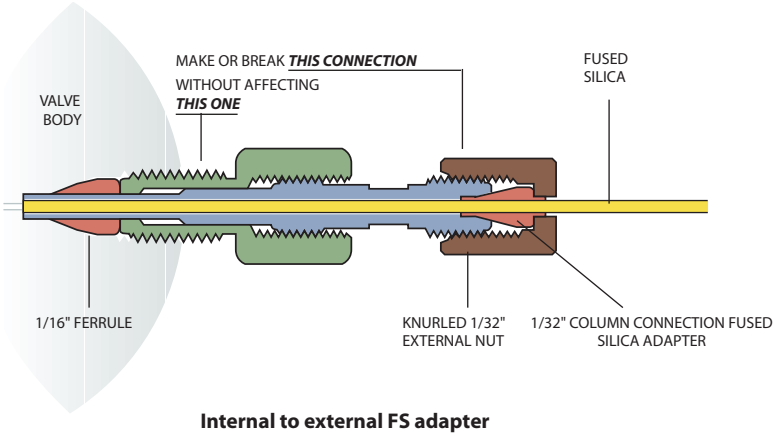
## Internal to external reducer/adapters

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 without affecting the 1/16" connection. Order 1/32" fused silica adapter ferrules separately *(see box below)*.

| *Description* | *Bore* | *Prod No* | *Price* |
|---|---|---|---|
| 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

**MORE INFORMATION**
1/32" fused silica adapter ferrules..... page 16

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

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

Tubing OD:

| | | | |
|---|---|---|---|
| | ≤ 0.25 mm | FS.25-5 | $30 |
| 0.25 mm | ≤ 0.4 mm | FS.4-5 | 30 |
| 0.4 mm | ≤ 0.5 mm | FS.5-5 | 30 |
| 0.5 mm | ≤ 0.8 mm | ZF.5V-5 | 30 |

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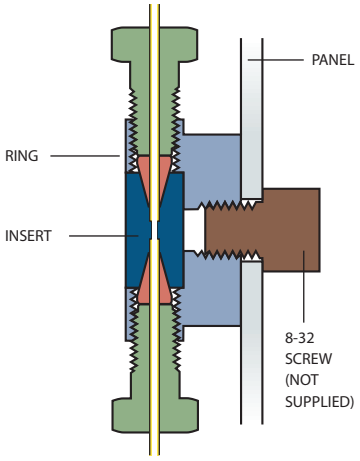
## Microvolume Connectors

Micro-unions, -tees, -crosses, and -Y's have a unique two-piece 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.

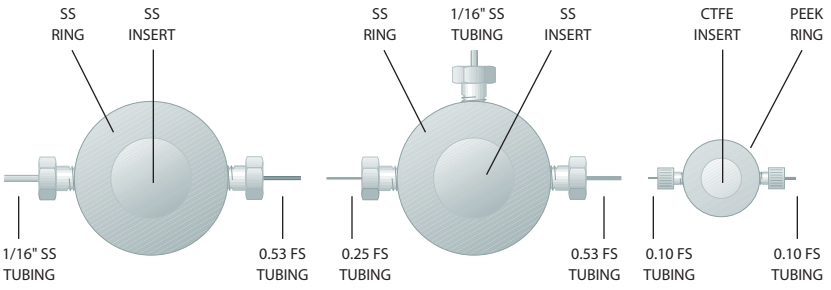
Valco microvolume fittings make it possible to couple 100 micron ID capillary GC, HPLC, or CZE columns without special nuts and ferrules. A stainless ring with one of the plastic inserts provides electrical insulation within the insert, while the PEEK ring achieves total isolation.

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 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

**MORE INFORMATION**

FS fused silica adapters. . . . . page 16
FSR fused silica adapters. . . . . 17
ZRF internal reducing ferrules . . . . . 14

Ferrules
Metal. . . . . 12
Polymeric . . . . . 13

100 µm = .004"
150 µm = .006"

0.25 mm = .010"
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## 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* | *Price* | *Prod No* | *Price* | *Prod No* | *Price* | *Prod No* | *Price* | *Prod No* | *Price* |
| **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 | |
| Y | 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 | |
| Y | 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 Material: | Stainless steel | | Hastelloy C | | Titanium | | PEEK | | CTFE | |
|---|---|---|---|---|---|---|---|---|---|---|
| | *Prod No* | *Price* | *Prod No* | *Price* | *Prod No.* | *Price* | *Prod No* | *Price* | *Prod No* | *Price* |
| **0.15 mm bore** | | | | | | | | | | |
| Union | MU1XCS6 | | MU1XCHC | | MU1XCTI | | MU1XCPK | | MU1XCKF | |
| Tee | MT1XCS6 | | MT1XCHC | | MT1XCTI | | MT1XCPK | | MT1XCKF | |
| Y | 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 | |
| Y | MY1CS6 | | MY1CHC | | MY1CTI | | MY1CPK | | MY1CKF | |
| Cross | MX1CS6 | | MX1CHC | | MX1CTI | | MX1CPK | | MX1CKF | |

## Replacement components

| | 1/32" connectors | | 1/16" connectors | |
|---|---|---|---|---|
| *Description* | *Prod No* | *Price* | *Prod No* | *Price* |
| 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, and deduct $5 from the connector price.
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.

**NANOVOLUME CONNECTIONS**
For 0.10 mm (100 µm) bore fittings, see pages 57- 60.

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## Unions

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

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

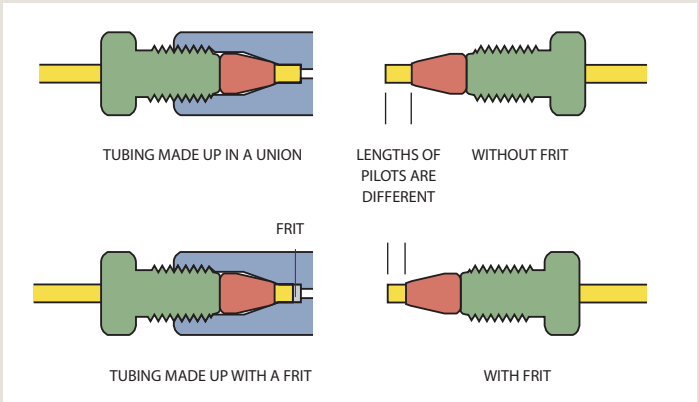
Internal fittings are almost always the best with tubing of 1/8" OD or smaller. They make a stronger connection and offer the lower volume necessary for high performance instrumentation. Also, because 1/16" external fittings have very thin, easily distorted walls, they are not as durable as 1/16" internal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

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

**TECH TIP**

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

Filters . . . . . pages 50-52
Frits and screens. . . . . 53




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

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

4.6 mm = .180"
6.0 mm = .236"
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1/32" = 0.8 mm
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1/4" = 6.4 mm
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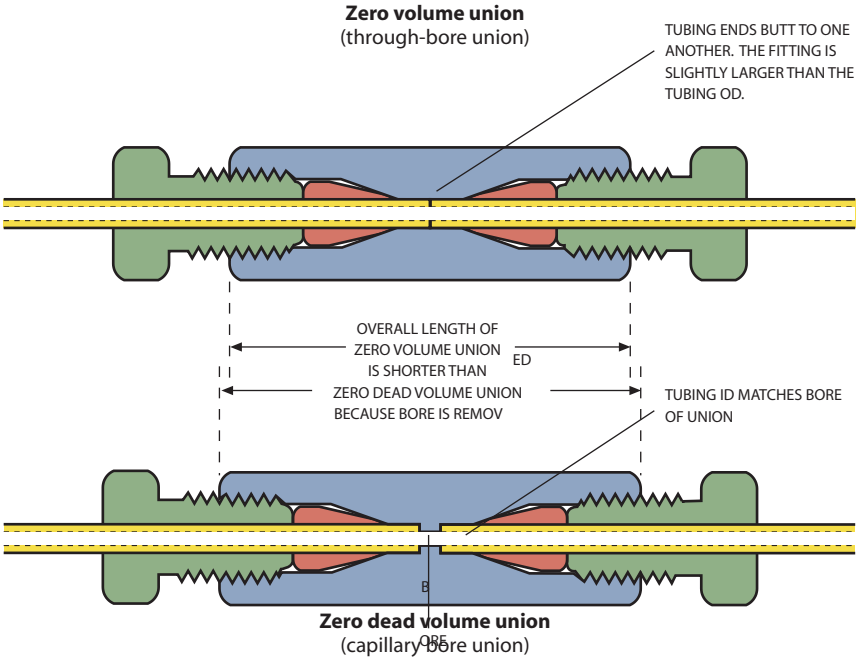
## Zero Volume vs. Zero Dead Volume

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.




**MORE INFORMATION**

Reducing unions to connect two tubes with different ODs . . . . . p 29-31
Unions with 1/4-28 fittings . . . . . 72

**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.

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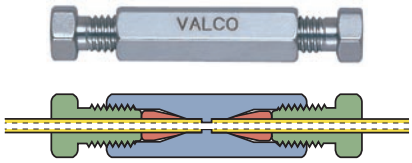
## Unions

### Internal unions – stainless steel

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

**Standard internal unions**

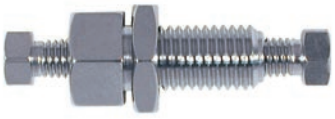
| *Tubing OD* | *Bore* | *Prod No* | *Price* |
|---|---|---|---|
| 1/32" | 0.15 mm | ZU.5XC | |
| | 0.25 mm | ZU.5 | |
| | 0.50 mm | ZU.5L | |
| | 1/32" | ZU.5T | |
| 1/16" | 0.15 mm | ZU1XC | |
| | 0.25 mm | ZU1C | |
| | 0.50 mm | ZU1M | |
| | 0.75 mm | ZU1 | |
| | 1.0 mm | ZU1L | |
| | 1/16" | ZU1T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




**Internal union – metal**
Standard bore version
(ZU1)
Ends of tubing seat squarely
at bottoms of fitting details

**Bulkhead internal unions**

| *Tubing OD* | *Bore* | *Prod No* | *Price* | **Bulkhead panel 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.

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

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

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27.0 mm = 1.08"

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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

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

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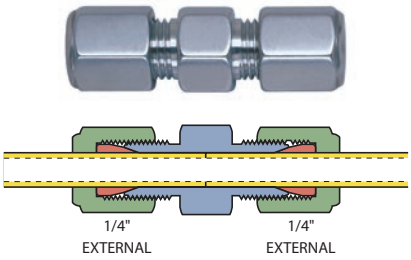
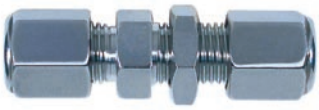



**External union**
Through-bore version
(EU4T)
Ends of tubing butt together



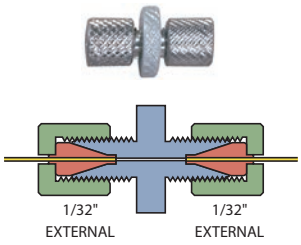
**Bulkhead external union**
(EBU2L)

## 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 OD* | *Bore* | **Standard** *Prod No* | *Price* | **Bulkhead** *Prod No* | *Price* | **Bulkhead panel hole diameter** |
|---|---|---|---|---|---|---|
| 1/16" | See note above | | | | | |
| 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" |

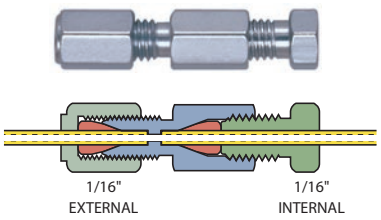



**1/32" external union**
(EU.5)
For use with GC capillary columns

## 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* | *Price* |
|---|---|---|
| 0.25 mm | EU.5 | |
| 0.50 mm | EU.5L | |
| 1/32" | EU.5T | |




**External/internal union**
Standard bore
(EZU1)
Adapts existing external fittings
to Valco zero volume internal fittings

**Bulkhead external/internal union**
(EZBU1)

## External/internal unions

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

| *Tubing OD* | *Bore* | **Standard** *Prod No* | *Price* | **Bulkhead** *Prod No* | *Price* | **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" |

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## Reducing Unions

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

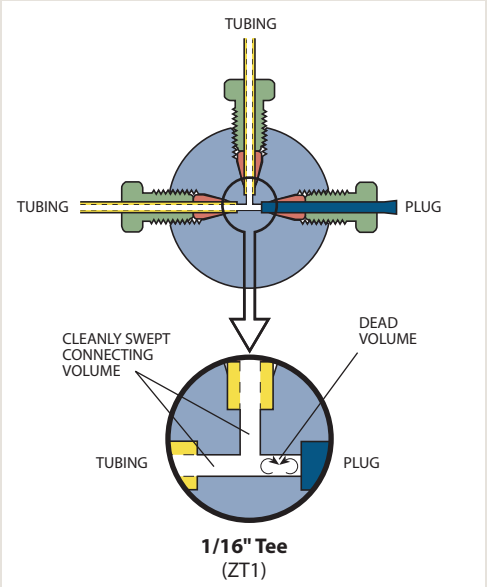
- Internal reducing unions have female threads and a fitting detail for zero volume fittings. The nuts have male (external) threads.
- External reducing unions have male threads, requiring a nut with internal threads.
- External/internal and internal/external reducing unions have male threads on one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

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

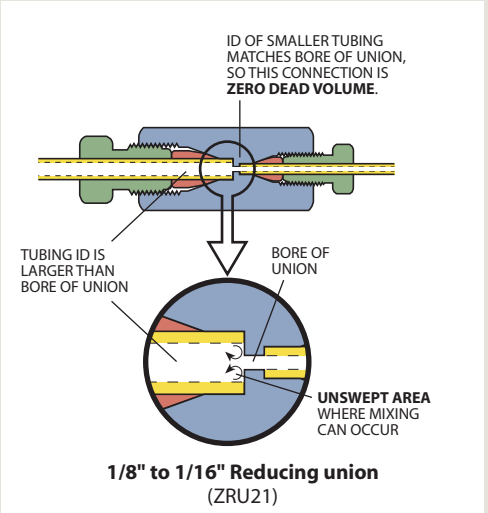
"Dead volume" is created in obvious situations such as the one shown.




**1/16" Tee**
(ZT1)

### UNSWEPT VOLUME

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




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

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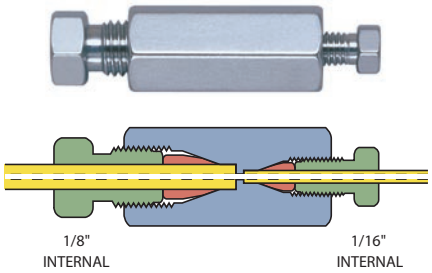



**Internal reducing union – metal**
Standard bore
(ZRU21)

## 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.

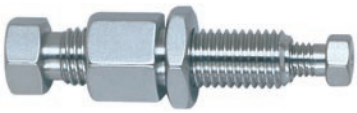
Standard material is 300 series stainless. Also available in Hastelloy C, gold-plated stainless, and titanium.

**Standard internal reducing unions**

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

**Bulkhead internal reducing unions**

| *Tubing OD* | *Bore* | *Prod No* | *Price* | **Bulkhead panel 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 . . . . . page 65
External/internal reducing unions . . . . . 31
Internal/external reducing unions . . . . . 31
Standard unions. . . . . 26
Unions with 1/4-28 fittings . . . . . 72

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

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

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

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

27.0 mm = 1.08"

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

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

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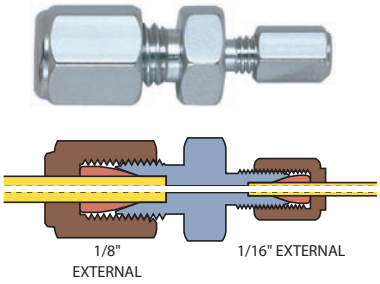
## Reducing Unions

### 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**

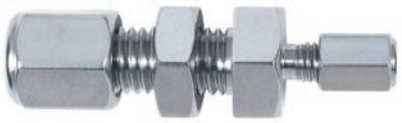
| *Tubing OD* | *Bore* | *Prod No* | *Price* |
|---|---|---|---|
| 1/8" to 1/16" | 0.75 mm | ERU21 | |
| | 1.00 mm | ERU21L | |
| | 1/16" | ERU21T | |
| 1/4" to 1/16" | 0.75 mm | ERU41 | |
| | 1/16" | ERU41T | |
| 1/4" to 1/8" | 1.0 mm | ERU42 | |
| | 2.0 mm | ERU42L | |
| | 1/8" | ERU42T | |




**External reducing union**
Standard bore
(ERU21)

**Bulkhead external reducing unions**

| *Tubing OD* | *Bore* | *Prod No* | *Price* | **Bulkhead panel hole diameter** |
|---|---|---|---|---|
| 1/8" to 1/16" | 1.0 mm | EBRU12L | | 5/16" |
| | 1/16" | EBRU12T | | 5/16" |
| 1/4" to 1/16" | 1.0 mm | EBRU14L | | 7/16" |
| | 1/16" | EBRU14T | | 7/16" |
| 1/4" to 1/8" | 2.0 mm | EBRU24L | | 7/16" |



**Bulkhead external reducing union**
(EBRU12L)

**TECH TIP**
***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.

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

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

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

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

27.0 mm = 1.08"

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

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

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

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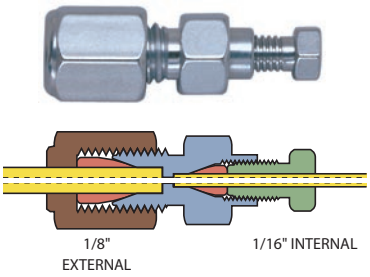
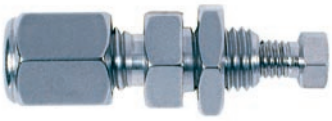



**External/internal reducing union**
Standard bore
(EZRU21)



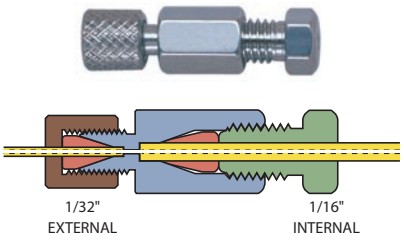
**Bulkhead external/internal reducing union**
(EZBRU21)

## External/internal reducing unions

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

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

| | | Standard | | Bulkhead | | Bulkhead |
|---|---|---|---|---|---|---|
| *Tubing OD* | *Bore* | *Prod No* | *Price* | *Prod No* | *Price* | **panel hole diameter** |
| 1/16" to 1/32" | 0.25 mm | EZRU1.5 | | – | | – |
| | 0.50 mm | EZRU1.5L | | EZBRU1.5L | | 5/16" |
| | 1/32" | EZRU1.5T | | EZBRU1.5T | | 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 | | |




**Internal/external reducing union**
Standard bore
(EZRU.51)

**Bulkhead internal/external reducing union**
(EZBRU.51)

## Internal/external reducing unions

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

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

Only polymeric ferrules should be used with 1/32" external details – metal ferrules will distort them. 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.)*

| | | Standard | | Bulkhead | | Bulkhead |
|---|---|---|---|---|---|---|
| *Tubing OD* | *Bore* | *Prod No* | *Price* | *Prod No* | *Price* | **panel 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" |

**MORE INFORMATION**

Fused silica adapters. . . . page 16-17
Polymeric ferrules . . . . . 13
External unions. . . . . 27
Internal reducing unions . . . . . 29
Internal unions . . . . . 26

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## Tees and Crosses

### 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* | *Price* |
|---|---|---|---|
| 1/32" | 0.25 mm | ZT.5 | |
| | 0.50 mm | ZT.5L | |
| 1/16" | 0.25 mm | ZT1C | |
| | 0.50 mm | ZT1M | |
| | 0.75 mm | ZT1 | |
| | 1.00 mm | ZT1L | |
| 1/8" | 0.75 mm | ZT2 | |
| | 2.00 mm | ZT2L | |
| 1/4" | 1.00 mm | ZT4 | |
| | 4.60 mm | 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* | *Price* |
|---|---|---|---|
| 1/32" | 0.25 mm | ZX.5 | |
| | 0.50 mm | ZX.5L | |
| 1/16" | 0.25 mm | ZX1C | |
| | 0.50 mm | ZX1M | |
| | 0.75 mm | ZX1 | |
| | 1.00 mm | ZX1L | |
| 1/8" | 0.75 mm | ZX2 | |
| | 2.00 mm | ZX2L | |
| 1/4" | 1.00 mm | ZX4 | |
| | 4.60 mm | ZX4L | |

**MORE INFORMATION**

PEEK tees. . . . pages 57, 64
PEEK crosses . . . . . .57, 64

**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 connectors . . . .pp 22-23
High pressure PEEK connectors. . 63-66
Nanovolume connectors . . . . . .57-61

**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 34

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
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## 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* | *Price* |
|---|---|---|---|---|---|
| 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 | 0.40 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 37.*) Standard material is 300 series stainless steel.

| | *Inlet bore* | *Outlet bore* | *Prod No* | *Price* |
|---|---|---|---|---|
| 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 | |
| 12 inlets | 2.00 mm | 2.00 mm | Z12M2 | |

**TECH TIP**
A manifold used with an SD flowpath multiposition valve allows HPLC column selection with a single valve. See page 139 for an illustration.

SD UW valves. . . . . .pg 132

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## Internal Reducers

### *NEW* Internal reducers — *for 360 µm tubing*

Directly connect 360 µm tubing into a 1/32" Valco valve or fitting detail, providing a positive leak-free seal with zero dead volume. The same patented design as our larger internal reducers (below). Both versions have a stainless steel body.

| *Tubing OD* | *Nut/ferrule material* | *Prod No* | *Price* |
|---|---|---|---|
| 1/32" to 360 µm | Stainless | C360IZR.5S6 | |
| | PEEK | C360IZR.5S6PKG | |

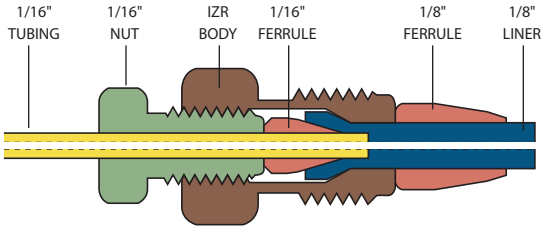
### Internal reducers

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

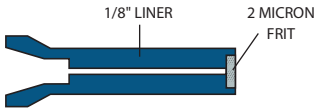
A second version has a 2 micron stainless steel frit pressed into the end of the liner, adding filtering capability. However, we suggest using these only as a final or backup filter, with a standard filter (*see page 52*) as the primary filter. Because IZRs have a much smaller surface area than the standard filter, they tend to plug too often if used in a stand-alone capacity.

Patent No. 4,173,363.

| | | **Without frit** | | **With 2µ frit** | |
|---|---|---|---|---|---|
| *Tubing OD* | *Bore* | *Prod No* | *Price* | *Prod No* | *Price* |
| 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**
(IZR21)




**IZR liner with pressed-in frit**

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

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

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

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

27.0 mm = 1.08"

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

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

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## External to internal adapters (injector/detector adapters)

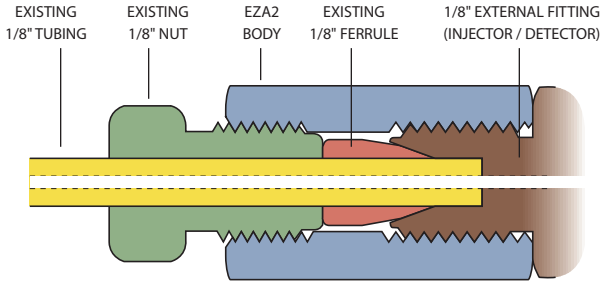
EZAs (external adapters) and EZRs (external reducers) adapt an external tee or union or the external type fittings common on injectors and detectors to Valco zero dead volume connections. Since EZAs are commonly used to connect an external fitting to an existing tube already made up with a Valco internal 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.

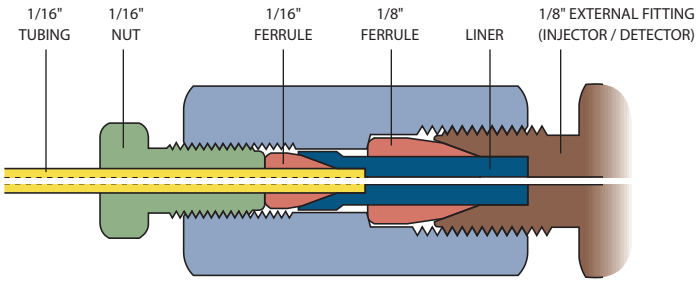
Standard material is 300 series stainless. The EZA does not include a nut or ferrule. The EZR includes a liner, one nut, and two ferrules.

Patent No. 4,173,363

| *Description* | *Bore* | *Prod No* | *Price* |
|---|---|---|---|
| **External to internal adapters** | | | |
| 1/16" ext. to 1/16" int. | – | EZA1 | |
| 1/8" ext. to 1/8" int. | – | EZA2 | |
| **External reducers** | | | |
| 1/16" ext. to 1/32" int. | 0.25 mm | EZR1.5 | |
| | 1/32" | EZR1.5T | |
| 1/8" ext. to 1/32" int. | 0.25 mm | EZR2.5 | |
| 1/8" ext. to 1/16" int. | 0.50 mm | EZR21 | |
| | 1/16" | EZR21T | |
| 1/4" ext. to 1/16" int. | 1.00 mm | EZR41 | |
| | 1/16" | EZR41T | |
| 1/4" ext. to 1/8" int. | 1.00 mm | EZR42 | |
| | 1/8" | EZR42T | |




**External to internal adapter** (EZA2)




**External to internal reducer** (EZR21)

**MORE INFORMATION**

Ferrules ..... page 12
Nuts ..... 10

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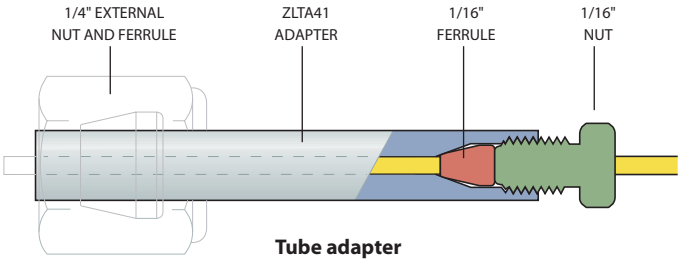
## Special Fittings

### 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.

| *Description* | *Bore* | *Prod No* | *Price* |
|---|---|---|---|
| 1/4" to 1/16" | | | |
| 0.975" long | 1/16" | ZTA41 | |
| 2.075" long | 1/16" | ZLTA41 | |
| 2.800" long | 1/16" | ZXLTA41 | |



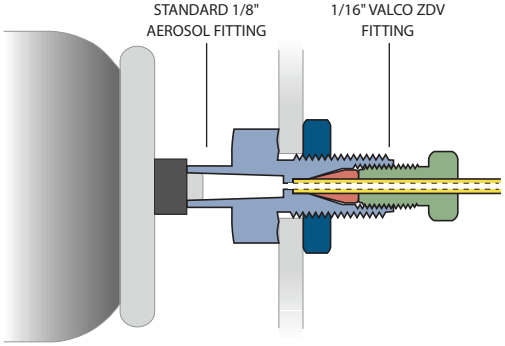

**Tube adapter**
(ZLTA41)

### Aerosol adapter bulkhead union

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

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

| *Description* | *Prod No* | *Price* |
|---|---|---|
| Aerosol adapter bulkhead union | ZBAA1 | |




**Aerosol adapter bulkhead union**
(ZBAA1)

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

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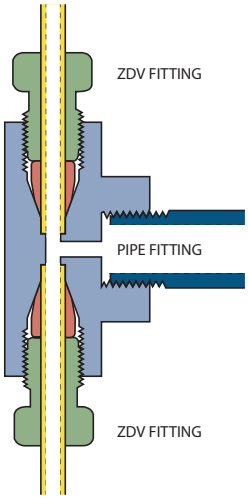
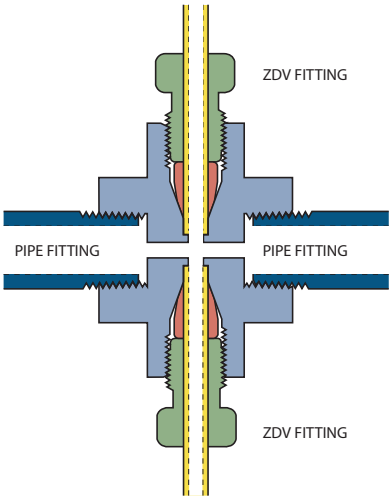
## Manifold pipe adapters

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.

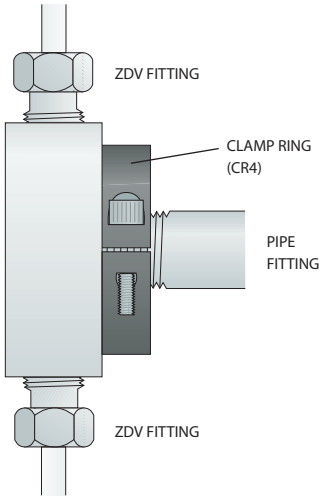
| *Description* | *Bore* | *Prod No* | *Price* |
|---|---|---|---|
| One 1/8" female pipe to: | | | |
| three 1/16" ZDV fittings | 1.0 mm | FP1Z3M21 | |
| three 1/8" ZDV fittings | 2.0 mm | FP1Z3M22 | |
| three 1/4" ZDV fittings | 4.6 mm | FP1Z3M24 | |
| One 1/4" female pipe to: | | | |
| three 1/16" 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 | |




**One pipe fitting**
to Valco ZDV fittings




**Two pipe fittings**
to Valco ZDV fittings




**Adapter with optional mounting clamp ring**

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## Pipe Adapters

### 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* | *Price* |
|---|---|---|---|
| 1/8" NPT male 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 male 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 male 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 | |

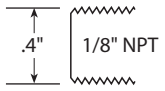
**MORE INFORMATION**
Our manifold pipe adapters on page 37 allow you to connect one or two pipe fittings to three Valco zero dead volume fittings.

### Female pipe to Valco internal adapters

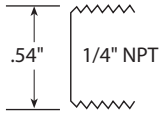
Female pipe adapters make a minimum volume connection from the male pipe fittings typically found in gas distribution plumbing to Valco zero dead volume internal fittings. Standard material is 300 series stainless. Also available in Hastelloy C and titanium.

| *Description* | *Bore* | *Prod No* | *Price* |
|---|---|---|---|
| 1/8" NPT female to: | | | |
| 1/16" ZDV fitting | 1.0 mm | FPZA21 | |
| 1/8" ZDV fitting | 1.0 mm | FPZA22 | |
| 1/8" ZDV fitting | 2.0 mm | FPZA22L | |
| 1/4" NPT female to: | | | |
| 1/16" ZDV fitting | 1.0 mm | FPZA41 | |
| 1/8" ZDV fitting | 1.0 mm | FPZA42 | |
| 1/8" ZDV fitting | 2.0 mm | FPZA42L | |
| 1/4" ZDV fitting | 4.6 mm | FPZA44L | |
| 1/2" NPT female to: | | | |
| 1/16" ZDV fitting | 1.0 mm | FPZA81 | |
| 1/8" ZDV fitting | 1.0 mm | FPZA82 | |
| 1/8" ZDV fitting | 2.0 mm | FPZA82L | |
| 1/4" ZDV fitting | 4.6 mm | FPZA84L | |

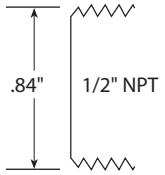
**TECH TIP**
NPT, National Pipe Thread, is a standard developed a long time ago by people without rulers. 1/8" NPT is nowhere close to 1/8"! Measure the diameter of the fitting across the narrow end. You can also count the number of threads in a 1" section. Then look at the diagrams below to determine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



27 threads per inch



18 threads per inch



14 threads per inch

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## 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 facing page.

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

**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.)*

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

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

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

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

27.0 mm = 1.08"

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

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

## 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 facing page.

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

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## Syringe Adapters

### *NEW* 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* | *Price* |
|---|---|---|---|
| **For high pressure 1/16" 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 | |
| **For low pressure 1/16" Cheminert injectors, fittings, and most Valco injectors** | | | |
| 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* | *Price* |
|---|---|---|
| **For high pressure injectors (C2, C3, C4, and C52 series injectors)** | C-VISF-1H | |
| **For fittings and low pressure injectors (C22Z and C62Z series injectors)** | C-VISF-1 | |
| **Replacement liners and ferrules** | | |
| Liner for C-VISF-1 | VISL-1 | |
| Liner for C-VISF-1H | VISL-1H | |
| Ferrule for C-VISF-1 (or 1H) | ZF1VISF | |

### Fill ports *for metal Valco and 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* | *Price* |
|---|---|---|
| **For use with blunt tip needle** | | |
| For 1/16" fittings and injectors - 22 ga | VISF-1 | |
| For 1/32" fittings and injectors - 26 ga | VISF.5FPK | |
| **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 | ZF1VISF | |

**TECH TIP**
When using Cheminert Nanovolume® CN2 injectors and valves, use fill ports designed just for them.

Nanovolume fill ports ..... page 60

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*for Cheminert C2 and C4 valves*

## Loop fill port assembly

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 µl, and the other is 0.50 mm ID and 17 µl.

| *Description* | *Prod No* | *Price* |
|---|---|---|
| Loop fill port assembly | C-LFP | |

## Female luer adapters

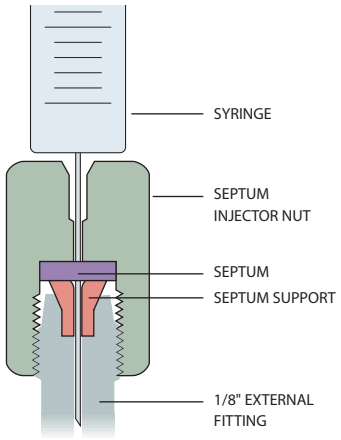
Female luer adapters provide direct syringe connections to zero dead volume fittings and valves.

| *Description* | | *Prod No* | *Price* |
|---|---|---|---|
| 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* | *Price* |
|---|---|---|
| Septum injector nut with support | EN2SI | |
| Replacement support | ZF2SI | |
| Septum, low bleed, pkg. of 10 | SI4G | |




**Septum injector nut**
with septum and support (EN2SI)

**MORE INFORMATION**

External/internal reducing unions . . pg 31
External/internal unions . . . . . 27

**Cheminert valves**

Model C2 . . . . . 158, 161
Model C4 . . . . . 159, 162

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

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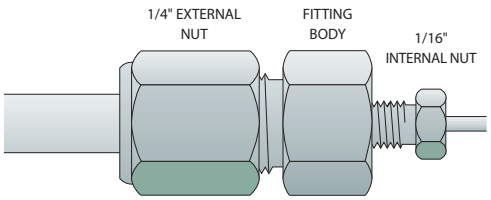
## HPLC Column End Fittings

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

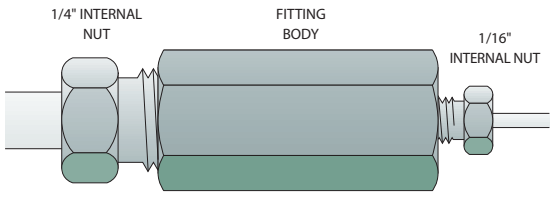
If a temporary frit is used during column packing, the frit OD should match the column OD. Permanent frits should have an OD matched to the column ID, and should be pressed in to give the lowest dead volume. Our frits are available in a variety of pore sizes, and we offer titanium and Hastelloy C frits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

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

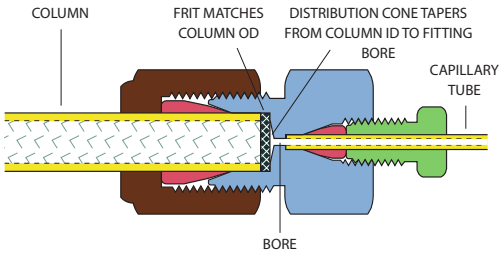
The newest addition to the line is the Nanovolume® column end fitting. *(See page 62.)* These all-PEEK fittings feature fingertight zero dead volume connections with 100 or 150 micron bore. PEEK sleeves permit use with any fused silica tubing.

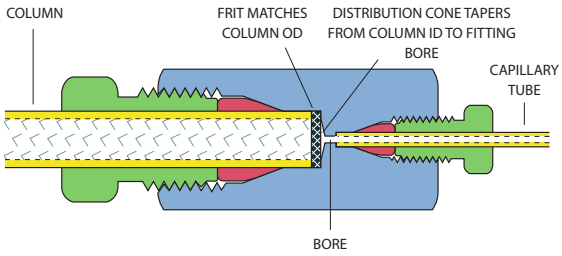



**External column end fitting**
1/4" to 1/16", 4.6 mm column ID, with removable frit
(ECEF414.6F)




**Internal column end fitting**
1/4" to 1/16", 4.6 mm column ID, with removable frit
(CEF414.6F)




**MORE INFORMATION**
Frits . . . . . page 45

**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

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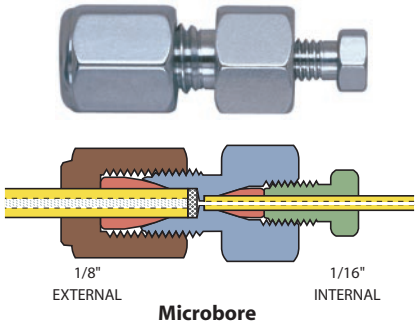
## Microbore column end fittings *(1.0 mm – 2.0 mm column ID)*

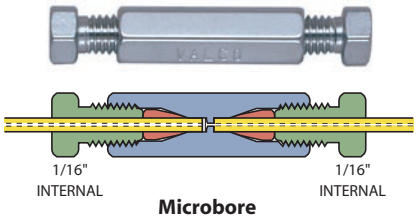
Standard material is Type 316 stainless.

| | Bore | Column ID | Without frit Prod No | Price | Removable 2µ frit Prod No | Price |
|---|---|---|---|---|---|---|
| **External column end fittings** | | | | | | |
| 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 | |




**Microbore external column end fitting**
(ECEF211.0F)

| | Bore | Column ID | Without frit Prod No | Price | Removable 2µ frit Prod No | Price |
|---|---|---|---|---|---|---|
| **Internal column end fittings** | | | | | | |
| 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 | |




**Microbore internal column end fitting**
(CEF1F)

**NANOBORE COLUMN END FITTINGS**
See our complete line of 100 µm and 150 µm bore fittings on page 62.

100 µm = .004"
150 µm = .006"

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

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

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

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

27.0 mm = 1.08"

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

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

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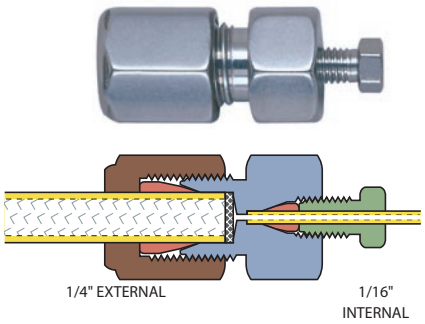
## HPLC Column End Fittings

### Analytical column end fittings *(2.0 mm – 4.6 mm column ID)*

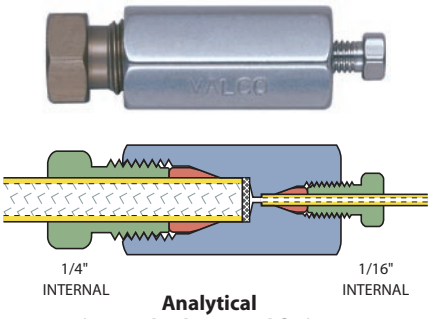
Standard material is Type 316 stainless.

| | Bore | Column ID | Without frit Prod No | Price | Removable 2µ frit Prod No | Price |
|---|---|---|---|---|---|---|
| **External column end fittings** | | | | | | |
| 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 | |




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

| | Bore | Column ID | Without frit Prod No | Price | Removable 2µ frit Prod No | Price |
|---|---|---|---|---|---|---|
| **Internal column end fittings** | | | | | | |
| 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 | CEF414.6 | | CEF414.6F | |




**Analytical internal column end fitting** with removable frit (CEF414.6F)

**NANOBORE COLUMN END FITTINGS**
See our complete line of 100 µm and 150 µm bore fittings on page 62.

100 µm = .004"
150 µm = .006"

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

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

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

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

27.0 mm = 1.08"

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

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

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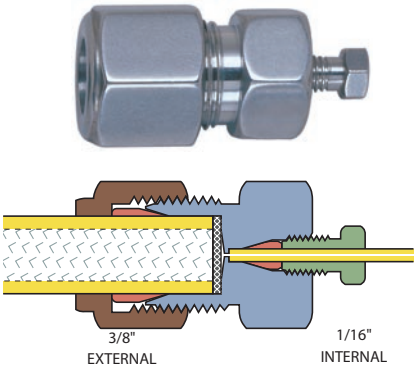
## Semi-preparative and preparative column end fittings

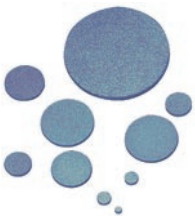
Standard material is Type 316 stainless.

| | Bore | Column ID | Without frit Prod No | Price | Removable 2µ frit Prod No | Price |
|---|---|---|---|---|---|---|
| **External column end fittings** | | | | | | |
| 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.

| | Pore Size | Frit thickness | Stainless steel Prod No | Price | Hastelloy C Prod No | Price | Titanium Prod No | Price |
|---|---|---|---|---|---|---|---|---|
| *Package 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 | | – | | – | |
| 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 | |

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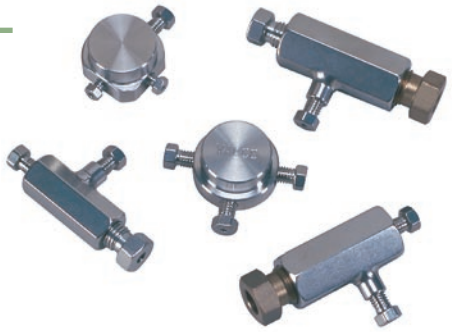
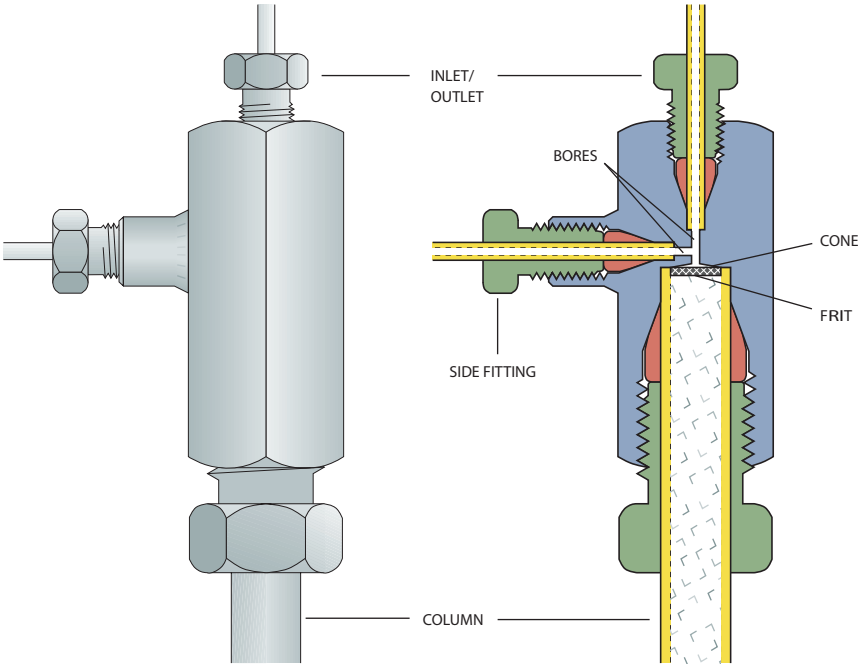
## Post-Column Reaction Tee Fittings

### 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* | *Price* |
|---|---|---|---|---|---|---|---|
| 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" | 0.50 mm | 1/16" | 0.50 mm | TCEF211 | |
| 1/8" | 1.0 mm | 1/16" | 1.65 mm | 1/16" | 0.40 mm | TCEF211T | |
| 1/4" | 4.6 mm | 1/16" | 0.25 mm | 1/16" | 0.25 mm | TCEF411C | |
| 1/4" | 4.6 mm | 1/16" | 0.75 mm | 1/16" | 0.75 mm | TCEF411 | |
| 1/4" | 4.6 mm | 1/16" | 1.65 mm | 1/16" | 0.75 mm | TCEF411T | |
| 1/4" | 4.6 mm | 1/8" | 0.75 mm | 1/16" | 0.75 mm | TCEF421 | |
| 3/8" | 6.0 mm | 1/16" | 0.75 mm | 1/16" | 0.75 mm | TCEF611 | |
| 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)

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

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

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

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

27.0 mm = 1.08"

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

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

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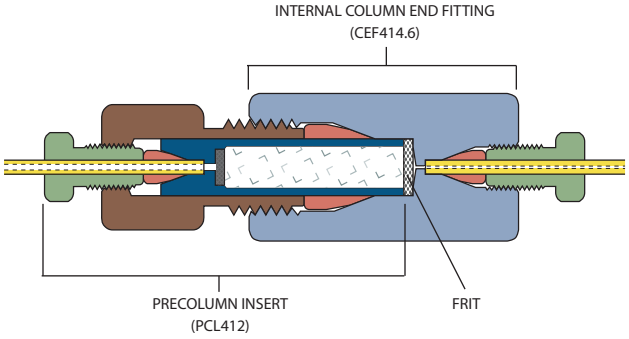
## Precolumns (guard columns)

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* | *Price* |
|---|---|---|
| 1/4" x 2 cm precolumn system | PCS412F | |
| Includes: | | |
| One precolumn insert | | |
| One internal column end fitting | | |
| One 2µ frit | | |
| 1/4" x 5 cm precolumn system | PCS415F | |
| 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* | *Price* |
|---|---|---|
| 0.25 ml (4.0 mm ID x 2 cm) | | |
| Fin gertight cartridge assembly | SFECH412 | |
| Replaceable cartridge | SFEC42 | |

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

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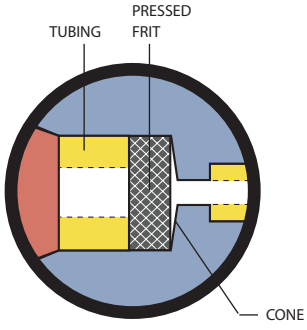
## Filters

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.

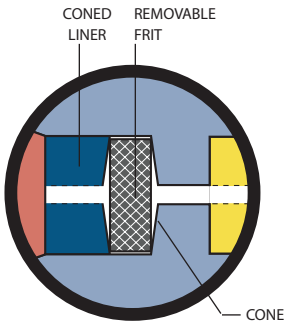
Valco's unique patented* filter design results in extremely low internal volume and simplifies filter element replacement. Filter bodies are "coned" for uniform flow and maximum filter surface area. The filters are made entirely of metal, so they can be used at any instrumentation temperature. While 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.)

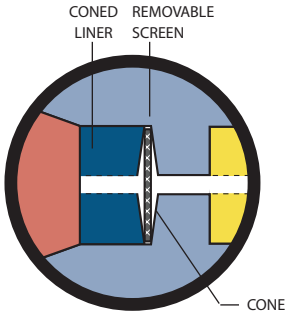
- **Pressed frits**, permanently installed in the filter, are recommended where contaminants are the exception and not the rule. The frits are 2µ stainless.
- **Removable frits** are the best choice for maximum filtration, or if the application requires Hastelloy C or titanium. However, they allow more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




**Pressed frit**




**Removable frit**




**Removable screen**

* Patent Numbers 4,281,679 and 4,173,363

**MORE INFORMATION**

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

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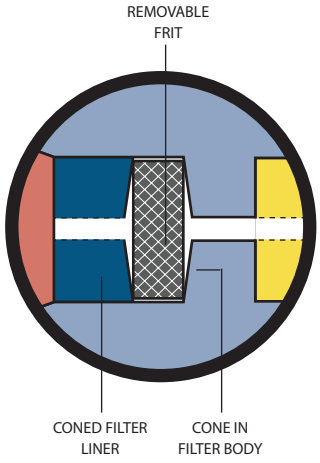
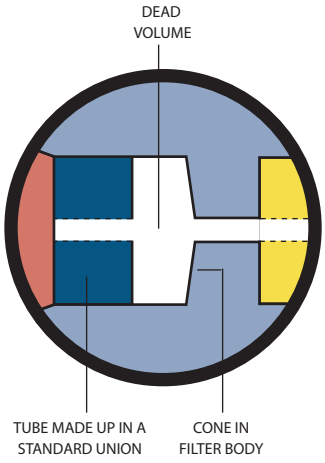
Filters with removable frits are designed to compensate for the thickness of the filter element – the resulting pilot depths are identical with the rest of the Valco product line, facilitating interchangeability of *made up* fittings. Therefore, although our filters look very much like our unions, they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

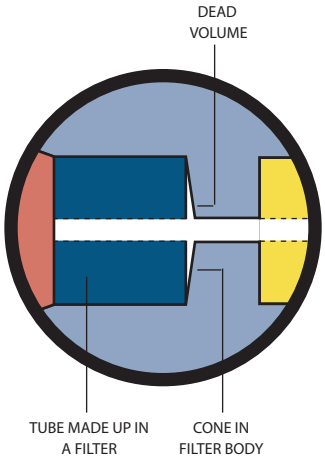
An arrow imprinted on all filter bodies serves to differentiate them from unions and to indicate recommended flow direction.



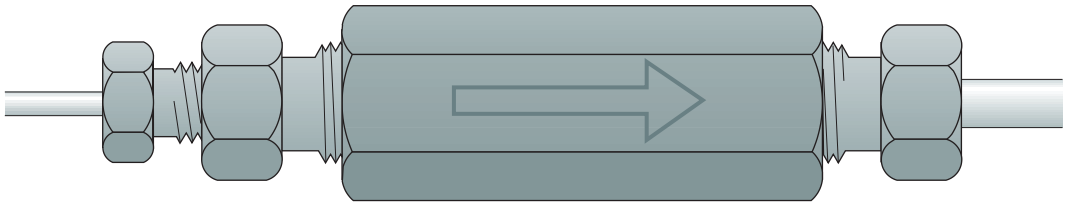

**Filter with removable frit**
Coned for uniform flow and maximum filter surface




**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**

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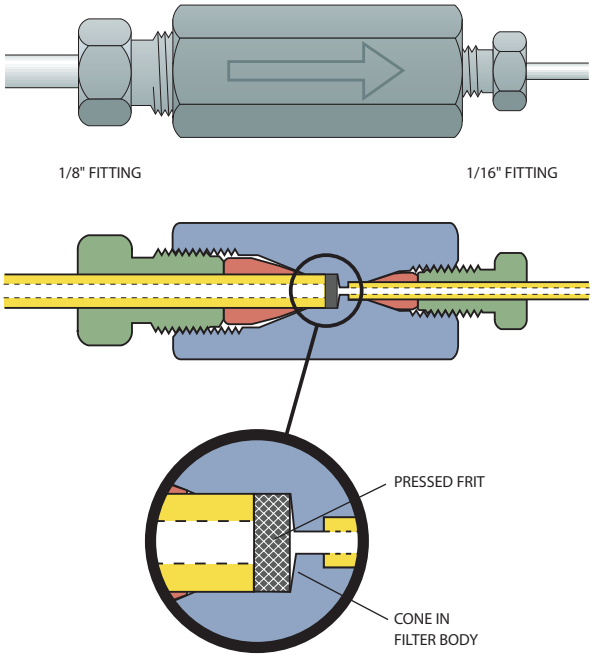
## Filters with a pressed frit

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* | *Price* | *Prod No* | *Price* |
| 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 | |




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

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

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

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

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

27.0 mm = 1.08"

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

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

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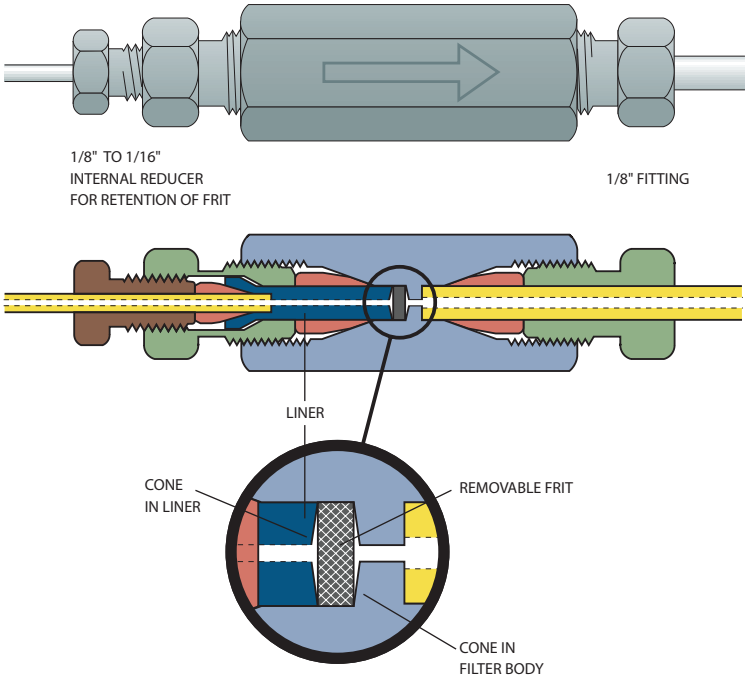
## Filters with a removable frit

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.

Patent Numbers 4,281,679 and 4,173,363

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




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

**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 frits ..... page 53

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## Filters

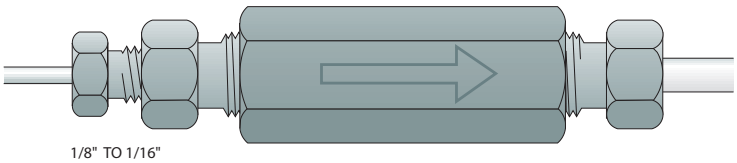
### ilters with a removable screen

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.

atent Numbers 4,281,679 and 4,173,363

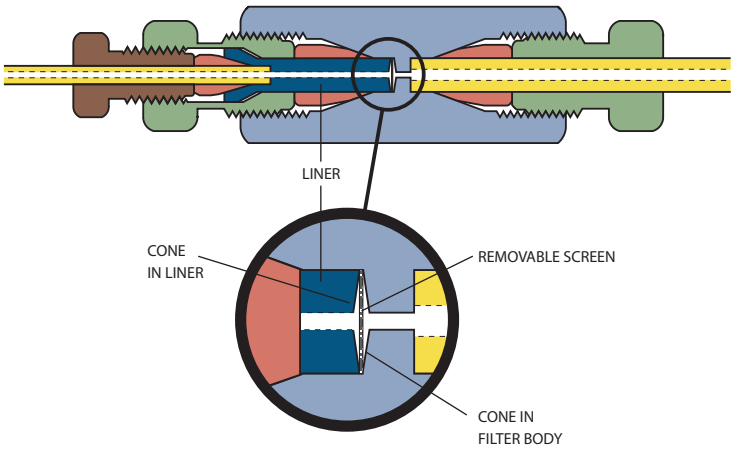
P

| | | Standard | | Bulkhead | |
|---|---|---|---|---|---|
| *Description* | *Bore* | *Prod No* | *Price* | *Prod No* | *Price* |
| 1/32" to 1/32" | 0.25 mm | ZUFR.5 | | ZBUFR.5 | |
| 1/16" to 1/32" | 0.25 mm | ZRUFR1.5 | | ZBRUFR1.5 | |
| 1/16" to 1/16" | 0.25 mm | ZUFR1C | | ZBUFR1C | |
| | 0.50 mm | ZUFR1 | | ZBUFR1 | |
| 1/8" to 1/16" | 0.75 mm | ZRUFR21 | | ZBRUFR21 | |
| 1/8" to 1/8" | 2.00 mm | ZUFR2 | | ZBUFR2 | |
| 1/4" to 1/16" | 1.00 mm | ZRUFR41 | | ZBRUFR41 | |
| 1/4" to 1/8" | 2.00 mm | ZRUFR42 | | ZBRUFR42 | |



1/8" TO 1/16"
INTERNAL REDUCER
TO HOLD SCREEN IN POSITION

1/8" FITTING




**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

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

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

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

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

27.0 mm = 1.08"

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

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

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

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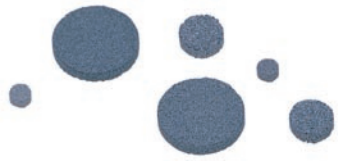
## Replacement frits

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.



| *Package of 10:* | *Pore Size* | *Frit Thickness* | Stainless Steel *Prod No* | *Price* | Hastelloy C *Prod No* | *Price* | Titanium *Prod No* | *Price* |
|---|---|---|---|---|---|---|---|---|
| 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 | | .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 | | – | | – | |
| 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 | | – | |

**WHICH FRIT FITS MY FILTER?**

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

ZRUFR1.5F
ZBRUFR1.5F

**1/8" frit fits:**
ZUFR1CF
ZBUFR1CF

ZUFR1F
ZBUFR1F

ZRUFR21F
ZBRUFR21F

**1/4" frit fits:**
ZUFR2F
ZBUFR2F

ZRUFR41F
ZBRUFR41F

ZRUFR42F
ZBRUFR42F

**WHICH SCREEN FITS MY FILTER?**

**1/16" screen fits:**
ZUFR.5
ZBUFR.5

ZRUFR1.5
ZBRUFR1.5

**1/8" screen fits:**
ZUFR1C
ZBUFR1C

ZUFR1
ZBUFR1

ZRUFR21
ZBRUFR21

**1/4" screen fits:**
ZUFR2
ZBUFR2

ZRUFR41
ZBRUFR41

ZRUFR42
ZBRUFR42

## Replacement screens

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

| *Package of 10:* | *Pore Size* | *Screen Thickness* | Stainless Steel *Prod No* | *Price* |
|---|---|---|---|---|
| 1/32" screens | 0.5µ | 0.040 mm | .5SR.5-10 | |
| | 1µ | 0.050 mm | 1SR.5-10 | |
| | 2µ | 0.075 mm | 2SR.5-10 | |
| | 10µ | 0.125 mm | 10SR.5-10 | |
| 1/16" screens | 0.5µ | 0.040 mm | .5SR1-10 | |
| | 1µ | 0.050 mm | 1SR1-10 | |
| | 2µ | 0.075 mm | 2SR1-10 | |
| | 10µ | 0.125 mm | 10SR1-10 | |
| 1/8" screens | 0.5µ | 0.040 mm | .5SR2-10 | |
| | 1µ | 0.050 mm | 1SR2-10 | |
| | 2µ | 0.075 mm | 2SR2-10 | |
| | 10µ | 0.125 mm | 10SR2-10 | |
| 1/4" screens | 0.5µ | 0.040 mm | .5SR4-10 | |
| | 1µ | 0.050 mm | 1SR4-10 | |
| | 2µ | 0.075 mm | 2SR4-10 | |
| | 10µ | 0.125 mm | 10SR4-10 | |

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## Tools

### Custom socket wrench

This 1/4" socket wrench with a slot to slip over 1/16" tubing works great for all types of 1/4" hex nuts (such as Valco 1/16" ZDV fitting nuts). It's especially useful when nuts are difficult to access with an open end wrench.

| *Prod No* | *Price* |
|---|---|
| SWH4 | |

### Ferrule removal kit

When polymeric ferrules get stuck in a fitting detail, these little ferrule spears will save you from becoming so irritated that you tear up your entire lab in frustration. Each kit includes two sizes of tapered stabbers for retrieving capillary size ferrules.

| *Prod No* | *Price* |
|---|---|
| FRK1 | |

### Hex key set

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

| *Prod No* | *Price* |
|---|---|
| HKS | |

**TECH TIP**

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

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

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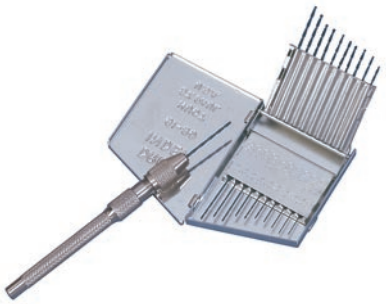
## Open end wrenches

| *Size* | *For use with* | *Prod No* | *Price* |
|---|---|---|---|
| 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

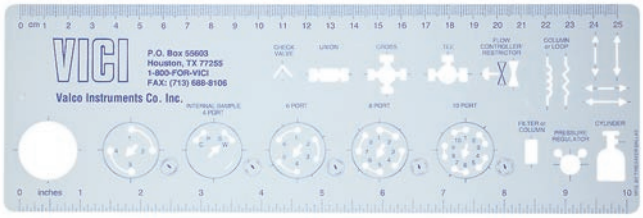
The drill index has drills sized from 0.0135" to 0.039" (0.34 to 1 mm). These are useful tools when a fused silica tube breaks in a union (see Tech Tip on the facing page) and for enlarging the inner diameter of fused silica adapters.

| *Prod No* | *Price* |
|---|---|
| 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* | *Price* |
|---|---|
| TEMPLATE1 | |




**MORE INFORMATION**

Tools for valves
Pencil magnet . . . . p 210
Valve spanner handle. . . . . 211
Tightening tools for PEEK fittings. . . . . 67
Tubing accessories . . . . 90

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# Cheminert® Fittings and Accessories

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

**MORE INFORMATION**

High pressure Cheminert fittings.....pp 63-67
Low pressure Cheminert fittings .....68-81
Nanovolume fittings .....57-62
Valco fittings .....6-55

**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 |

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

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

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

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

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

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

27.0 mm = 1.08"

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

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

## 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

Nanovolume generally refers to components with bore sizes of 100-150 µm (.004" - .006"). The minimal transfer volume contributed by nanovolume components makes them especially beneficial in applications with flow rates in the µl/min range, when the transfer volume can be critical.

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

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## 360 µm Nanovolume Fittings *NEW*

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

**MORE INFORMATION**

Nanovolume fittings
For fused silica tubing, 10,000+ psi . . . . . pg 58
For metal tubing, up to 20,000 psi. . . . 58

1/32" Nanovolume fittings . . . . . 59-60
Injectors with 360 micron fittings. . 152

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

These fittings are constructed from premium grade natural PEEK material. They are intended for use with PEEK or fused silica tubing at pressures up to 10,000 psi, or the maximum pressure for which the tubing is rated, whichever is lower. Quick-mount versions have integral base with double stick tape to secure fittings to a surface.

### Nut/ferrules, caps, plugs, tightening tool

*for 360 µm tubing*

| | *Prod No* | *Price* |
|---|---|---|
| Nut/ferrule | C360NFPKG | |
| Cap | C360CPKG | |
| Plug | C360PPK | |
| Tightening tool | C360ET | |

### Unions and reducing unions

*for 360 µm tubing*

| **Bore size:** | **50 micron** | | **100 micron** | | **150 micron** | |
|---|---|---|---|---|---|---|
| | *Prod No* | *Price* | *Prod No* | *Price* | *Prod No* | *Price* |
| Union, quick mount | C360QUPKG2 | | C360QUPKG4 | $65 | C360QUPKG6 | |
| Union | C360UPKG2 | | C360UPKG4 | 48 | C360UPKG6 | |
| Reducing union, 1/16" to 360 µm | — | | — | | C360RU1PK6 | |

### Tees and crosses

*for 360 µm tubing*

| **Bore size:** | **50 micron** | | **100 micron** | | **150 micron** | |
|---|---|---|---|---|---|---|
| | *Prod No* | *Price* | *Prod No* | *Price* | *Prod No* | *Price* |
| Tee, quick mount | C360QTPKG2 | | C360QTPKG4 | $82 | C360QTPKG6 | |
| Cross, quick mount | C360QXPKG2 | | C360QXPKG4 | 100 | C360QXPKG6 | |

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## *NEW* 360 µm Nanovolume Fittings

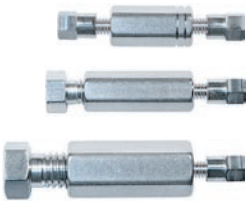
### For fused silica tubing — 10,000 psi and above

These fittings are constructed from HPLC grade stainless steel, with 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* | *Price* |
|---|---|---|
| Nut/ferrule | C360NFFS | |
| Cap | C360CFS | |

#### Unions and reducing unions — *for 360 µm FS tubing*



| **Bore size:** | **50 micron** | | **100 micron** | | **150 micron** | |
|---|---|---|---|---|---|---|
| | *Prod No* | *Price* | *Prod No* | *Price* | *Prod No* | *Price* |
| Union | C360UFS2 | | C360UFS4 | | C360UFS6 | |
| Reducing unions, 1/32" to 360 µm | C360RU.5FS2 | | C360RU.5FS4 | | C360RU.5FS6 | |
| Reducing unions, 1/16" to 360 µm | — | | — | | C360RU1FS6 | |

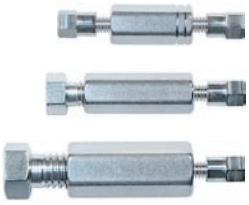
### For metal tubing — up to 20,000 psi

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.

#### Nut/ferrules and caps — *for 360 µm tubing*

| | *Prod No* | *Price* |
|---|---|---|
| Nut/ferrule | C360NFS6 | |
| Cap | C360C | |

#### Unions and reducing unions — *for 360 µm tubing*



| **Bore size:** | **50 micron** | | **100 micron** | | **150 micron** | |
|---|---|---|---|---|---|---|
| | *Prod No* | *Price* | *Prod No* | *Price* | *Prod No* | *Price* |
| Union | C360US62 | | C360US64 | | C360US66 | |
| Reducing unions, 1/32" to 360 µm | C360RU.5S62 | | C360RU.5S64 | | C360RU.5S66 | |
| Reducing unions, 1/16" to 360 µm | — | | — | | C360RU1S66 | |

***NEW*** **INTERNAL REDUCERS FOR 360 µm TUBING**

Directly connect 360 µm tubing into a 1/32" Valco valve or fitting detail, providing a positive leak-free seal with zero dead volume.
The same patented design as our larger internal reducers (page 34).
Both versions have a stainless steel body.

| *Tubing OD* | *Nut/ferrule material* | *Prod No* | *Price* |
|---|---|---|---|
| 1/32" to 360 µm | Stainless | C360IZR.5S6 | $34 |
| | PEEK | C360IZR.5S6PK | 34 |

**MORE INFORMATION**

360 µm fittings for use below 10,000 psi. . . . . 57
360 µm tubing
Electroformed nickel. 87
PEEK . . . . . 88
1/32" Nanovolume fittings . . . . . 59-60

**TECH TIP**

Use these **metal 360 micron nuts** with nano injectors:
C72MU . . . . . p 152
C72MX . . . . . 152

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

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

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

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

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

27.0 mm = 1.08"

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

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

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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 and ferrules

*for 1/32" tubing*

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

| | | *Prod No* | *Price each:* |
|---|---|---|---|
| | **Internal nut** with collapsible ferrule<br>*For use with:*<br>*Fittings on pages 60-62*<br>*6 port valve CN2-4346, page 154*<br>*4 port internal sampling injector CN4-4344, page 155* | C-NNFFPK | |
| | **Internal nut** with collapsible ferrule<br>*For use with:*<br>*10 port nanovolume valve CN2-4340*, page 154 | C-NNFLFPK | |
| | **External nut**<br>*For use with:*<br>*Unions on page 61*<br>*Column end fittings on page 62*<br>Note: Requires collapsible PEEK ferrule, below | C-EN.5FPKB | |
| | **Collapsible PEEK ferrule**<br>*For use with:*<br>*External nut, above* | ZGF.5PK | |

## Plugs

*for 1/32" tubing*

| | | *Prod No* | *Price each:* |
|---|---|---|---|
| | **Internal plug**<br>*For use with:*<br>*Fittings on page 60*<br>*Nanovolume valves on pages 154-155* | C-NPFPK | |

**MORE INFORMATION**

360 µm fittings . .pp 57-58
1/32" Nanovolume
column end fittings . . 62
Tubing
PEEK . . . . . 88-89
Electroformed
nickel. . . . . 87

**TECH TIP**

Use these **collapsible ferrule-nuts** with:

1/32" Nanovolume
fittings . . . . . pp 60-62
and with injectors:
CN2 . . . . . 154
CN4 . . . . . 155

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# Nanovolume Unions, Tees, Y's, and Crosses for 1/32" Tubing

## Unions *for 1/32" tubing*

| | 100 µm bore | | 150 µm bore | |
|---|---|---|---|---|
| | *Prod No* | *Price* | *Prod No* | *Price* |
| Union for 1/32" PEEK or electroformed nickel tubing<br>Does not require or include liners. | C-NEU.5XFPK | $43 | C-NEU.5FPK | |

## Reducing unions *for 1/32" tubing*

| | 200 µm bore |
|---|---|
| | *Prod No* |
| Reducing union, 1/32" to 1/16" tubing, natural PEEK | ZERU1.5FPK |

## Tees, y's, and crosses *for 1/32" tubing or FS* tubing*

| | | 100 µm bore | | 150 µm bore | |
|---|---|---|---|---|---|
| | | *Prod No* | *Price* | *Prod No* | *Price* |
| Tee | 1/32" tubing or fused silica* | C-NTXFPK | $105 | C-NTFPK | |
| Y | 1/32" tubing or fused silica* | C-NYXFPK | 105 | C-NYFPK | |
| Cross | 1/32" tubing or fused silica* | C-NXXFPK | 120 | C-NXFPK | |

*A liner is needed for use with fused silica. Order 27 mm length, page 61.

## Fill ports *for 1/32" nanovolume® valves*

These fill ports provide direct syringe connections to Model CN2 nanovolume valves. For use with 26 gauge blunt tip needle.

| | *Prod No* |
|---|---|
| Fill port for 1/32" CN2 series HPLC injectors | C-NVISF |

## 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 |

**MORE INFORMATION**
Unions for fused silica
. . . p. 18, 19, 57-58, 61

100 µm = .004"
150 µm = .006"

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

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

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

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

27.0 mm = 1.08"

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

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

**TECH TIP**
Liners adapt nanovolume fittings for use with fused silica tubing. They are included with nanovolume **unions** for fused silica, but must be ordered separately for other fittings.

Liners . . . . . page 61

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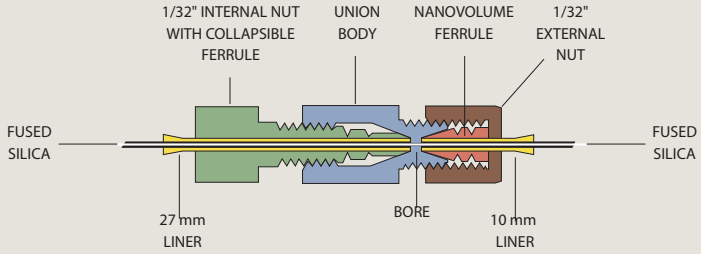
## Unions

*for fused silica tubing*

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




**Union for use with fused silica**
liners included
(C-NEU.5FPK.35)

## Liners for 1/32" connectors

*for use with fused silica tubing*

Use these liners with nanovolume connectors to adapt to the most common sizes of fused silica tubing. Natural PEEK.

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-NNFFPK or C-NNFLFPK

| For tubing OD | Prod No |
|---|---|
| 125 - 175 µm | C-NL.15L-5 |
| 175 - 225 µm | C-NL.20L-5 |
| 225 - 275 µm | C-NL.25L-5 |
| 275 - 325 µm | C-NL.30L-5 |
| 325 - 375 µm | C-NL.35L-5 |

**10 mm liners**
Use with external nut C-EN.5FPKB



| For tubing OD | Prod No |
|---|---|
| 125 - 175 µm | C-NL.15S-5 |
| 175 - 225 µm | C-NL.20S-5 |
| 225 - 275 µm | C-NL.25S-5 |
| 275 - 325 µm | C-NL.30S-5 |
| 325 - 375 µm | C-NL.35S-5 |

**MORE INFORMATION**
360 µm fittings . .pp 57-58
1/32" nanovolume
Fittings . . . . . 59-60
External nuts . . . . . 59
Internal nuts with collapsible ferrules . 59
Liners for column end fittings . . . . . 62

**TECH TIP**
Use **27 mm liners**



with internal nuts with collapsible ferrules:

Use **10 mm liners**



with external nuts:

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## Nanovolume Column End Fittings for FS Capillaries

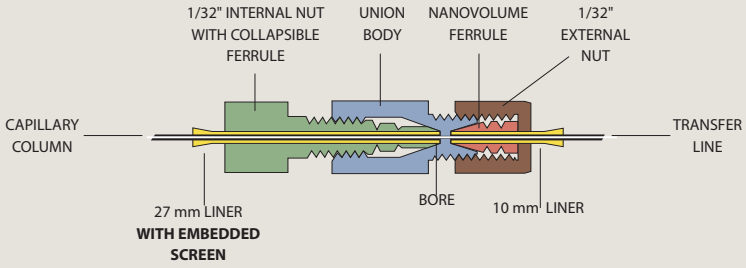
Nanovolume column end fittings include two liners to adapt the 1/32" fitting to fused silica. The 27 mm liner, used inside the internal nut, has a 1 µm 316 stainless steel screen embedded in the PEEK to provide closure for fused silica columns. The 10 mm liner is used with the external nut.

Like other nanovolume fittings, they include 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.

**Screen embedded in end of liner for column end fittings**

### Column end fittings *for 1/32" tubing*

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




**Cross-section**
Column end fitting (C-NEF.5FPK.35S1)

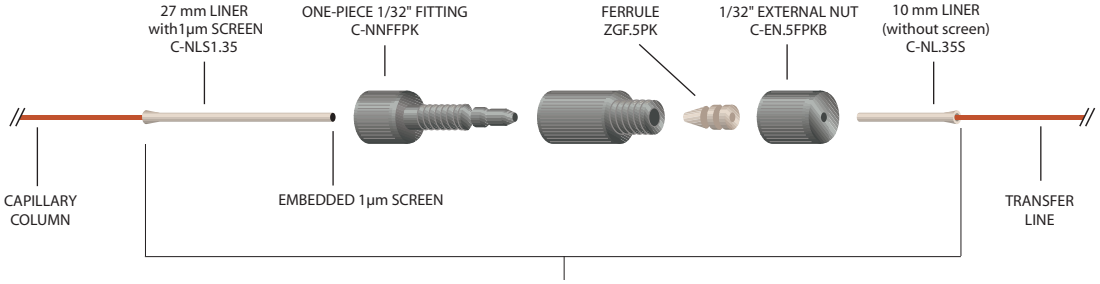
### Replacement liners for column end fittings *for FS capillaries*

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**



| *For tubing OD* | *Prod No* |
|---|---|
| 125 - 175 µm | C-NL S1.15 |
| 175 - 225 µm | C-NLS1.20 |
| 225 - 275 µm | C-NLS1.25 |
| 275 - 325 µm | C-NLS1.30 |
| 325 - 375 µm | C-NLS1.35 |




**Column end fitting for 360 µm fused silica columns**
(C-NEF.5FPK.35S1)

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

**MORE INFORMATION**
Liners for 1/32" fittings . . page 61

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

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## No twist one-piece fittings

*10-32 for 1/16" tubing*

These new 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.

| *Package of 5:* | **Glass-filled PEEK ferrule** | **PEEK ferrule** | **CTFE ferrule** |
|---|---|---|---|
| *Nut type Length* | *Prod No* | *Prod No* | *Prod No* |
| PEEK, hex short | ZNF1PKG-5 | ZNF1PK-5 | ZNF1KF-5 |
| PEEK, hex medium | MZNF1PKG-5 | MZNF1PK-5 | MZNF1KF-5 |
| PEEK, hex long | LZNF1PKG-5 | LZNF1PK-5 | LZNF1KF-5 |
| PEEK, fingertight | ZNF1FPKG-5 | ZNF1FPK-5 | ZNF1FKF-5 |

Optional ferrule materials available – FEP, PFA, PTFE, and glass-filled PTFE. Call for availability. Some 1/32" versions are available. Call for details.

Patent No. 7,316,777

## 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 175°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 | ZN.5FPK-10 | .42" |
| 1/32" fingertight | LZN.5FPK-10 | .54" |
| 1/16" fingertight | ZN1FPK-10 | .88" |
| 1/16" hex | ZN1PK-10 | .45" |
| 1/16" hex | MZN1PK-10 | .62" |
| 1/16" hex | LZN1PK-10 | .87" |
| 1/8" hex | ZN2PK-10 | .62" |

## Ferrules – high pressure PEEK

PEEK ferrules seal by the increased friction from compression.

| *Package of 10:* | *Prod No* | *Pkg of 10:* |
|---|---|---|
| 1/32" | ZF.5PK-10 | 1/4" |
| 1/16" | ZF1PK-10 | 3/8" |
| 1/8" | ZF2PK-10 | 1/2" |

## 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 generally recommended if the tubing is the same material as the ferrule.

| *Package of 10:* | *Prod No* |
|---|---|
| 1/32" | ZGF.5PK-10 |
| 1/16" | ZGF1PK-10 |

**MORE INFORMATION**
Tightening tool for hex-head PEEK nuts. . 67

**POLYMERS AT A GLANCE**
PEEK . . . . . PK
*Chemical resistance; up to 225°C*

100 µm = .004"
150 µm = .006"

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

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

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

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

27.0 mm = 1.08"

1/32" = 0.8 mm
1/16" = 1.6 mm
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1/4" = 6.4 mm
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1/2" = 12.7 mm

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## High Pressure PEEK Fittings

### Plugs and caps – high pressure PEEK

Polymeric plugs and caps are available in knurled finger-tight 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. For high pressure polymeric valve plugs, see below. For low pressure valve plugs, see page 71.

| | | PEEK plugs | PEEK caps |
|---|---|---|---|
| *Description* | *Length 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 polymeric valves (C1-C5 series) since the fitting detail in these valves is unique.

| *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.

| | | PEEK tees | PEEK crosses |
|---|---|---|---|
| *Tubing OD* | *Bore* | *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
*Chemical resistance; up to 225°C*

**TECH TIP**

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

PEEK ferrules . . . . page 63
PFA ferrules . . . . . 13

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

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

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

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

27.0 mm = 1.08"

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

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

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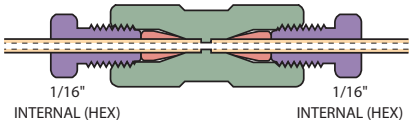
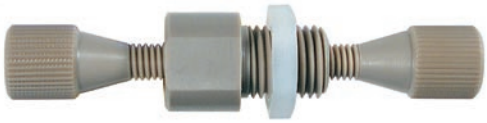
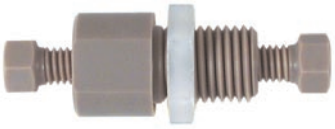



**Internal union – PEEK**
Standard bore version
(ZU1PK)



**Bulkhead fingertight internal union – PEEK**
(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* | **Bulkhead** *Prod No* | **Bulkhead panel hole diameter** |
|---|---|---|---|---|
| 1/32" fingertight | | | | |
| | 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" fingertight | | | | |
| | 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* | **Bulkhead** *Prod No* | **Bulkhead panel hole diameter** |
|---|---|---|---|---|
| 1/16" to 1/32" | 0.25 mm | ZRU1.5FPK | ZBRU1.5FPK | 5/16" |
| | 0.50 mm | ZRU1.5LFPK | ZBRU1.5LFPK | 5/16" |
| | 1/32" | ZRU1.5TFPK | ZBRU1.5TFPK | 5/16" |
| 1/8" to 1/32" | 0.25 mm | ZRU2.5FPK | ZBRU2.5FPK | 3/8" |
| | 0.50 mm | ZRU2.5LFPK | ZBRU2.5LFPK | 3/8" |
| | 1/32" | ZRU2.5TFPK | ZBRU2.5TFPK | 3/8" |
| 1/8" to 1/16" | 0.25 mm | ZRU21CFPK | ZBRU21CFPK | 3/8" |
| | 0.75 mm | ZRU21FPK | ZBRU21FPK | 3/8" |
| | 1.00 mm | ZRU21LFPK | ZBRU21LFPK | 3/8" |
| | 1/16" | ZRU21TFPK | ZBRU21TFPK | 3/8" |

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## High Pressure Specialty PEEK Fittings

### 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* |
|---|---|
| Natural | JR-5508-5 |

### 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 hex-head 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* |
|---|---|
| Multi-color (2 of each color) | JR-55016-12 |

**MORE INFORMATION**
Color-coded PEEK tubing . . . page 89

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

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

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## 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 handtight fittings |
| 5 | PEEK nuts, hex-head long |
| 20 | PEEK ferrules, double-ended 1/16" |
| 1 | PEEK union, HP body only, 10-32 |
| 2 | Tubing elbows 90° |
| 2 | Tubing elbows 180° |
| 1 | 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 PEEK fittings

These handy tools make it fast and easy to tighten PEEK hex-head fittings. The red version is for use with the C360 series fittings shown on page 57. The green tool is for any 1/32" PEEK fitting with a 3/16" hex head nut, and the blue version fits the 1/4" hex common in fittings for 1/16" tubing.

| *Color* | *For use with* | *Prod No* |
|---|---|---|
| Red | 360 µm fittings | C360ET |
| Green | 1/32" fittings | CNFT |
| Blue | 1/16" fittings | ZNFT |

**MORE INFORMATION**

Hex-head PEEK fittings
- 360 µm..... page 57
- 1/32".....63-65
- 1/16"
  - High pressure...63-65
  - Low pressure .....71

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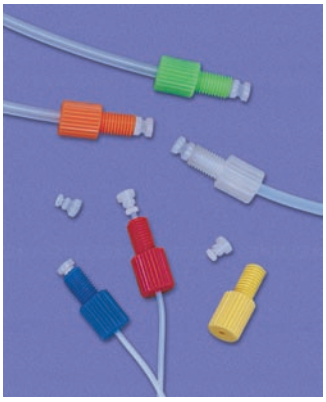
## Low Pressure Flangeless Tube End Fittings

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 our new 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*



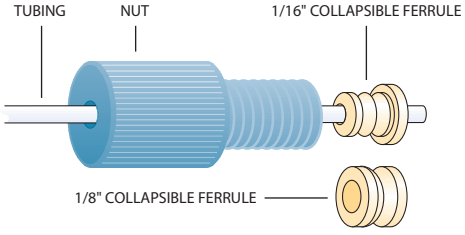
Flangeless tube end fittings eliminate the flanging tool required with standard tube end fittings. The nut turns on the tubing as freely as with our flanged fitting, eliminating the possibility of cracking or unscrewing that can occur when plastic tubing is subjected to twisting as fittings are connected.

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 takes place in a very 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. Use CTFE ferrules for soft tubing (PTFE, FEP, etc.), but use PEEK ferrules for harder tubing (PEEK, ETFE, polyurethane, etc.)

Cheminert tube end fittings work with any 1/16" or 1/8" OD polymeric tubing, and come in twelve different colors for system color coding.

| **Flangeless fittings** with CTFE ferrules | | **1/16" OD** | | **1/8" OD** | |
|---|---|---|---|---|---|
| | *(pkg/5)* | *Prod No* | *Price* | *Prod No* | *Price* |
| | Black | CFL-1BK | | CFL-2BK | |
| | Blue | CFL-1BE | | CFL-2BE | |
| | Brown | CFL-1BR | | CFL-2BR | |
| | Dark gray | CFL-1DG | | CFL-2DG | |
| | Green | CFL-1G | | CFL-2G | |
| | Lavender/pink | CFL-1L | | CFL-2L | |
| | Natural | CFL-1N | | CFL-2N | |
| | Orange | CFL-1E | | CFL-2E | |
| | Purple | CFL-1P | | CFL-2P | |
| | Red | CFL-1R | | CFL-2R | |
| | White | CFL-1W | | CFL-2W | |
| | Yellow | CFL-1Y | | CFL-2Y | |
| | Assorted *(pkg/12, one of each color)* with ferrule: | | | | |
| | CTFE | CFL-1A | | CFL-2A | |
| | PEEK | CFL-1A-PK | | CFL-2A-PK | |
| **Replacements** | | | | | |
| PEEK ferrules | *(pkg/10)* | CFL-CB1PK | | CFL-CB2PK | |
| CTFE ferrules | *(pkg/10)* | CFL-CB1KF | | CFL-CB2KF | |
| PEEK nuts | *(pkg/5)* | CFL-1PK | | CFL-2PK | |
| **Setting tool** | | CST | | CST | |

Patent No. 6,575,501




**Flangeless tube end fitting**

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

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

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

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

27.0 mm = 1.08"

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

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

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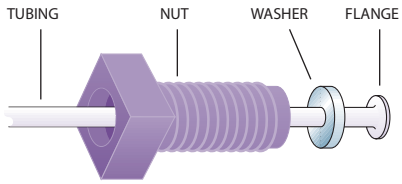
## Standard flanged tube end fittings *1/4-28*

The basic component of the Cheminert system is the polypropylene nut, retained on PTFE or FEP tubing by a flange formed with a Cheminert flanging tool *(page 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 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* | *Price* | *Prod No* | *Price* |
| | 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 *(pkg/12, one of each color)* | CF-1A | | CF-2A | |
| Washers | *(pkg/10)* | CF-W1 | | CF-W2 | |

**MORE INFORMATION**

High pressure fittings . . . . . .pp 63-66
PTFE and FEP tubing. . . . . 90

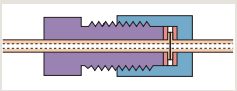
**TECH TIP**

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.



## 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* | *Price* | *Prod No* | *Price* |
| | 1/16" | CEN1PK | | CEN1KF | |
| | 1/8" | CEN2PK | | CEN2KF | |

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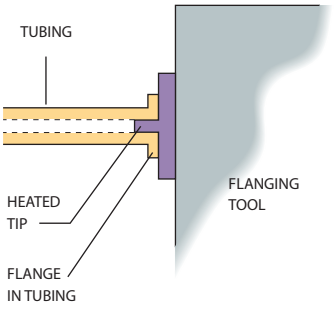
# Flanging Tool, Starter Kit

## Cheminert flanging tools

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.




**Flange being made on tubing**

| | | *Prod No* | *Price* |
|---|---|---|---|
| **Flanging tools** | 110 VAC | CFT-110 | |
| | 230 VAC | CFT-220 | |
| **Flanging tool accessories** | | | |
| Flanging tips | | | |
| | for tubing ID ≤ 0.25 mm | CFT-TXC | |
| | for tubing ID ≤ 0.75 mm | CFT-TC | |
| | for tubing ID ≤ 1.00 mm | CFT-TM | |
| | for tubing ID ≤ 1.50 mm | CFT-TL | |
| | for tubing ID ≤ 2.00 mm | CFT-TXL | |
| Razor blades *(pkg /10)* | | CFT-R | |
| Tubing holder | | CFT-H | |

## Cheminert starter kits

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* | *Price* | *Prod No* | *Price* |
| **Starter kits** | | | | |
| 1/16" tubing | CFT1K-110 | | CFT1K-220 | |
| 1/8" tubing | CFT2K-110 | | CFT2K-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

**MORE INFORMATION**

Standard tube end fittings ..... page 69
Stainless steel washers ..... 69
Couplings ..... 72
Male luer adapter ..... 76
Female luer adapter ... 76
Plug ..... 71
Tee ..... 74
Glass connector ..... 75

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## 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* | *Price* |
|---|---|---|
| Easy-Flange kit | JR-201540 | |
| *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 | | |
| PTFE tubing, 1/16" x 0.75 mm ID, 6 ft. | | |

## Plugs *1/4-28*

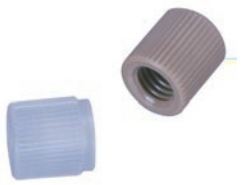
Plugs can be used to close off an unused port in a 1/4-28 valve or manifold.

| | **PEEK** | | **CTFE** | |
|---|---|---|---|---|
| *Package of 5:* | *Prod No* | *Price* | *Prod No* | *Price* |
| | CPPK | | CPKF | |

## Low pressure PEEK plugs *10-32*

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

| | | **PEEK** | |
|---|---|---|---|
| *Package of 1:Length of nut** | | *Prod No* | *Price* |
| 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* | *Price* | *Prod No* | *Price* |
| | CCPK-5 | | CCKF-5 | |

**MORE INFORMATION**

Clean-cut tubing cutter ..... page 90
Tightening tool for hex-head PEEK nuts. . 67

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

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

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

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

27.0 mm = 1.08"

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

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

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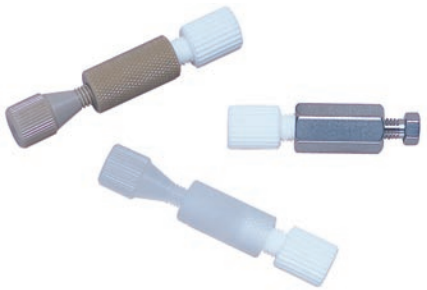
## Low Pressure Unions

### Unions — *Cheminert to Cheminert* — *1/4-28 to 1/4-28*

Includes flangeless 1/4-28 fittings for tubing OD indicated. Polypropylene unions are for use with flanged tubing only.

| *Tubing OD* | *Bore* | PEEK *Prod No* | *Price* | CTFE *Prod No* | *Price* | Polypropylene *Prod No* | *Price* |
|---|---|---|---|---|---|---|---|
| 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 | | – | |
| 1/8" | Butt connection | CUTPK | | CUTKF | | CUTPP * (* pkg/5) | |

### Unions — *Cheminert to 1/16" ZDV* — *1/4-28 to 10-32*



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

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

### Unions — *Cheminert to 1/4" tubing* — *1/4-28 to 1/2-20*

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

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

| **Components** | *Prod No* | *Price* |
|---|---|---|
| 1/2-20 nut, CTFE | CFL-4KF | |
| 1/2-20 nut, Delrin | CFL-4D | |
| CTFE ferrule | CFL-CB4KF-S | |

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

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

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

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

27.0 mm = 1.08"

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

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

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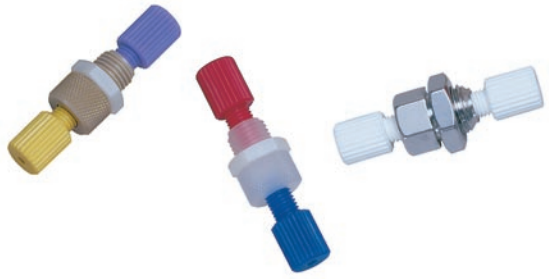
## Bulkhead unions *Cheminert to Cheminert* *1/4-28 to 1/4-28*

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

| *Tubing OD* | *Bore* | PEEK *Prod No* | *Price* | CTFE *Prod No* | *Price* | 316 Stainless *Prod No* | *Price* |
|---|---|---|---|---|---|---|---|
| 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*

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

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

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## Low Pressure Tees, Crosses, and Manifolds

### Tees *1/4-28*

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

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

### Crosses *1/4-28*

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

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

### Manifolds *1/4-28*

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

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

**MORE INFORMATION**

Flangeless tube end fittings ..... page 68

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

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

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

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

27.0 mm = 1.08"

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

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

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## Mixing tees

*1/4-28*

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

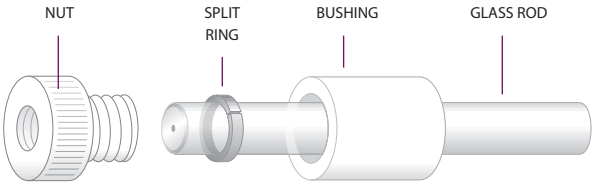
| *Tubing OD* | *Bore* | PEEK *Prod No* | *Price* | CTFE *Prod No* | *Price* |
|---|---|---|---|---|---|
| 1/16" | 0.75 mm | CM1XPK | | CM1XKF | |
| 1/8" | 1.50 mm | CM2XPK | | CM2XKF | |

## 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. They are available as individual components or as complete assemblies. 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.

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




**Glass connector**

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## Adapters

### 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* | *Price* | *Prod No* | *Price* | *Prod No* | *Price* |
| 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* | *Price* | *Prod No* | *Price* | *Prod No* | *Price* |
| Female luer | | | | | | | |
| to 1/4-28 | 1.50 mm | CFLAPK | | CFLAKF | | CFLAPFA | |
| to 10-32 | 0.75 mm | ZUFLPK | | ZUFLKF | | – | |
| Male luer | | | | | | | |
| to 1/4-28 | 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* | *Price* | *Prod No* | *Price* |
| 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 | |

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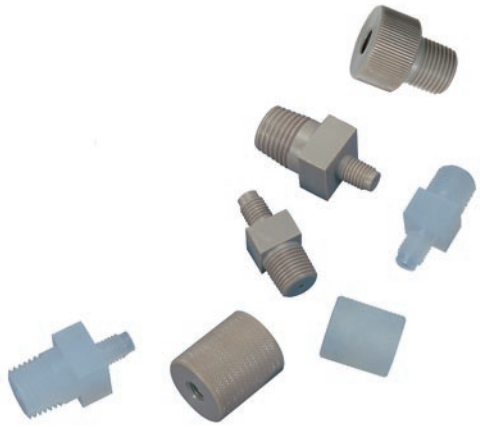
## Pipe adapters

*1/4-28 to NPT*



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

| | | PEEK | | CTFE | |
|---|---|---|---|---|---|
| *NPT* | *Bore* | *Prod No* | *Price* | *Prod No* | *Price* |
| **Female 1/4-28 to male NPT** | | | | | |
| 1/8" | 1.5 mm | CPA2PK | | CPA2KF | $18 |
| 1/4" | 1.5 mm | CPA4PK | | CPA4KF | |
| **Male 1/4-28 to male 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

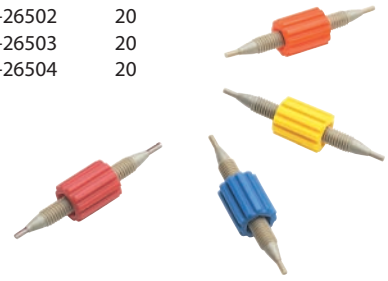
This adapter permits Valco 10-32 fittings to be installed into any 1/4-28 fitting detail. (Nut and ferrule are not included.)

| *Description* | *Bore* | *Prod No* | *Price* |
|---|---|---|---|
| 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 89). 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* | *Price* |
|---|---|---|---|
| Red | 0.13 mm ID | JR-26501 | $20 |
| Yellow | 0.17 mm ID | JR-26502 | 20 |
| Blue | 0.25 mm ID | JR-26503 | 20 |
| Orange | 0.50 mm ID | JR-26504 | 20 |



0.25 mm = .010"
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1.0 mm = .040"
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1/32" = 0.8 mm
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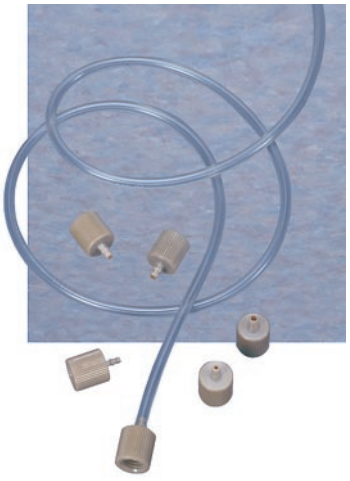
## Filters and Perifit Fittings

### Perifit fittings for peristaltic pump tubing



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

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

| *For use with tubing sizes* | *Prod No* | *Price* |
|---|---|---|
| 0.50 to 1.02 mm ID | C-PFS | |
| 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 316 stainless low-pressure-drop screen. (Fitting shown is not included.)

| *Pore size* | *Prod No* | *Price* |
|---|---|---|
| 2 micron | CFE-S2 | |
| 10 micron | 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 hand tightened.

| *Tubing OD* | *Bore* | *Prod No* | *Price* |
|---|---|---|---|
| 1/16" | 0.5 mm | ZU1FPK.5 | |

**Replacement elements (PEEK-encapsulated titanium)**

| *Pore size* | *Prod No* | *Price* |
|---|---|---|
| 0.5 micron | C-F1.5TI | |

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

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

4.6 mm = .180"
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## 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 where metal surfaces may corrode or interact with samples.

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

## Filters

### No-Met biocompatible mobile phase filter

Stainless steel in the flowpath is not acceptable in a growing number of applications involving the separation of biomolecules. 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.

| | *Prod No* | *Price* |
|---|---|---|
| No-met mobile phase filter, 1/8" | JR-32178 | |
| Replacement element | JR-32179 | |

### Stainless steel mobile phase filters and helium spargers

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* | *Price* |
|---|---|---|---|---|
| 1/16" | 2 µm | 8 | JR-367016-2 | |
| 1/16" | 10 µm | 20 | JR-367016-10 | |
| 1/16" | 20 µm | 20 | JR-367016-20 | |
| 1/8" | 2 µm | 8 | JR-367008-2 | |
| 1/8" | 10 µm | 20 | JR-367008-10 | |
| 1/8" | 20 µm | 20 | JR-367008-20 | |

### Mobile phase filters *Direct connect*

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

| *Pore size* | *Prod No* | *Price* |
|---|---|---|
| 2 micron | C-MPFTI2 | |
| 10 micron | C-MPFTI10 | |

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

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

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## 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 on the facing page.

| *Capacity* | *Cap* | *Prod No* | *Price* |
|---|---|---|---|
| 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-cap

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

The VICI-cap is available for either GL45 or S40 threaded bottles. It has a 1/4-28 female port and three ports for tubing insertion: two 1/8" tubing ports and a 1/16" tubing port. The tubing ports are made so that you push the tubing through the hole, while 1/4-28 fittings provide the best connection. Unused ports can be plugged as required.

| | *Prod No* | *Price* |
|---|---|---|
| VICI-cap GL-45 | JR-9000-0001 | |
| VICI-cap S40 | JR-9000-0006 | |

## Valves for vials

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

| *Pkg/12:* | *Cap/thread size* | *Prod No* | *Price* |
|---|---|---|---|
| | 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 | |

*Ethylene Propylene Diene Monomer

**MORE INFORMATION**

Bulkhead connectors .... page 73
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Polymeric tubing..... 90

**TECH TIP**

The VICI-cap is not usable for building up a helium atmosphere within the solvent bottle. It is only designed for continuous helium sparging.

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## Where we come from:

We're located in Fort Collins, Colorado, at the base of the Rocky Mountains, 55 miles north of Denver. Our facility is state-of-the-art and self-contained from in-house product design through tooling, manufacturing, assembly and packaging. Customer support, sales and marketing resources support the world from this single facility.

## Our quality commitment to you:

We are dedicated to exceeding your expectations. We operate a quality system registered under the guidelines of ISO 9001:2008 and maintain full traceability for all our manufactured products. We welcome our customers to conduct an on-site supplier audit with the knowledge that our systems have satisfied the most demanding requirements of medical device manufacturers worldwide.

## Your assurance of VP quality:

How can you be sure that you're getting a genuine Value Plastics® fitting? Look for our logo. Molded into every component we manufacture, our logo is your assurance you are producing the highest quality items. By relying on our superior tooling and craftsmanship, you can be assured that you will have the best OEM tubing components in your products.

To protect our intellectual property and our customers, it is important to be aware of the patents and trademarks that apply to our products. Look for the Value Plastics logo (℣) to ensure you do not mistakenly use a poor quality counterfeit of a Value Plastics® fitting, thereby jeopardizing the integrity and quality of your product. Many attributes of our components are covered by patent, including but not limited to, barb, grips, function and other design features.

## Quality Management System

At Value Plastics, quality is designed in from the outset; it's not an add-on at the end of the process. Our Quality Management System is registered under the auspices of ISO 9001:2008 and passes the most stringent evaluations possible – our customers' audits. We anticipate your needs and modify our systems to exceed your expectations. Our quality and consistency help you save money through your ability to implement dock-to-stock programs.

## Design, Engineering and R&D

Value Plastics' staff of product development professionals uses the most modern equipment to design the best fluid management products available anywhere. Whether your need is for new products or custom solutions, our focus on healthcare OEM means we understand your needs and don't need to be coached to your industry requirements. Designs incorporating human factors, finite element analysis, DFMA, rapid prototyping and concurrent engineering are just some of the tools used to bring you the components you require, when you want them.

## Manufacturing Consistency

Our all-electric injection molding presses are chosen for shot-to-shot consistency and outfitted with the most up-to-date process monitoring software available. Each operator is responsible for product quality at the press and has every tool at their disposal. All molding, secondary operations and packaging take place in a controlled environment to assure component readiness for your production floor.

## Clean Room Manufacturing

All Value Plastics' products are now manufactured and packaged in an environment that meets the requirements of ISO 14644-1:1999 (E) Class 8 (Class 100,000) standards.

Value Plastics supplies the world with precision molded components, which are designed, manufactured and distributed from our facility in Fort Collins, Colorado, USA.

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## BPL Series

Value Plastics introduces the BPL Series of tubing connectors, a new alternative to Luer fittings. The BPL Series of connectors incorporates a quarter-turn design that is commonly used in blood pressure applications – particularly blood pressure cuffs. Features such as Value Plastics' 10-point grip coupled with the BPL's patent pending winged male fitting provide superior ergonomics, while the snap-on design makes it easy to confirm that components are properly connected. **Pg 36**

## SCV Series Additions and Price Incentives

We are pleased to announce that we are extending our inline check valve product line this year with two new fittings, as well as some ground breaking innovations in the near future. There will also be new volume price incentives in the coming months, please call your account manager for futher details. **Pg 16**

## -6 Polypropylene Discontinuation

You will notice that there are no longer any parts with the -6 polypropylene resin available in this catalog. Value Plastics has received notice from LyondellBasell that they are discontinuing the manufacture of this resin. We are now offering an alternate polypropylene resin -6005 which has the added benefit of being animal-free, and USP Class VI.

We apologize for any inconvenience that this situation creates for our customers. Although this decision is entirely out of our control Value Plastics is here to assist our customers through this transition and will strive to ensure the timely delivery of our products. Please contact Value Plastics sales at 1-888-404-5837 or sales@valueplastics.com to get price and availability of parts in the -6005 polypropylene.

## PharmaLok™ Sanitary Clamps

Value Plastics' new clamp series is a revolutionary addition to the biopharm industry due to its unique, user-friendly design. The clamps can easily be closed with one hand, allowing end users the ability to work quickly and efficiently. The PharmaLok series may be found beginning on **page 19.**

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## What is ISO 80369

Hospitals and other healthcare facilities depend on a variety of catheters, tubing and syringes to deliver medications and other substances to patients through vascular, enteral, respiratory, epidural and intrathecal delivery systems. These delivery systems frequently employ fittings called luer connectors to link various system components. Unfortunately, because luer connectors are ubiquitous, easy-to-use and compatible between different delivery systems, clinicians can inadvertently connect wrong systems together, causing medication or other fluids to be delivered through the wrong route. Such errors can cause serious patient injuries and deaths. To further reduce the occurrence of these misconnections, the FDA is actively participating in an international effort to develop and implement standards for noninterchangeable connectors for small bore medical connectors. A joint working group established by the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC) leads this effort to develop a series of standards for incompatible connectors. ISO 80369-1 is the first in the series of standards and establishes the applications specified below that will have their own unique connector geometries.

**ISO 80369-2:** Breathing Systems and Driving Gases
**ISO 80369-3:** Enteral and Gastric
**ISO 80369-4:** Urethral and Urinary
**ISO 80369-5:** Limb Cuff Inflation
**ISO 80369-6:** Neuraxial
**ISO 80369-7:** Intravascular (IV)

## When will it come into effect?

Each section of the ISO 80369 standard is being defined separately. Currently, ISO 80369-2 and ISO 80369-7 are the farthest along in development, yet it is difficult to say when the entire standard will be complete.

## How does it impact me?

Compliance with the ISO 80369 standard may require major changes on the part of medical device manufacturers. In the next few years, if these standards are approved it could mean new designs, new parts, new moldings and updating or replacing millions of components. While you may choose to manufacture your own custom fittings, you must consider the significant costs associated with such an endeavor. There is also the possibility that these custom fittings may inadvertently connect with other applications' fittings that are not yet defined.

It is important to note that if this standard passes, it does not mean that luers can no longer be used in the referenced markets. Until connectors are defined and approved for each market, no definitive action can be taken.

## How can I prepare?

While the standards have not yet been completely established, the main precaution that medical device manufacturers can take to help prevent any future problems is to stay up-to-date on ISO 80369 news. Value Plastics is one of only a few connector companies worldwide actively participating on ISO 80369 committees. To keep the medical device community apprised of new developments, we have chosen to provide information in one web location. Value Plastics has set up an online resource to help medical device OEMs stay informed of the changes and updates to this standard.

To read the latest updates, subscribe to alerts, and view related resources, go to Value Plastics' online resource at **i8.valueplastics.com.**

**i8.valueplastics.com**

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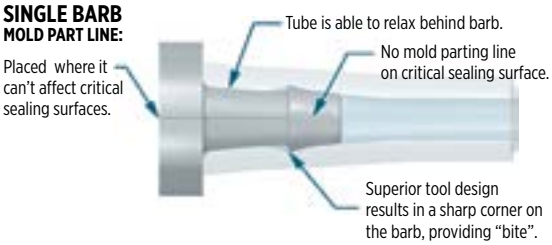
## Our Single Barb Concept

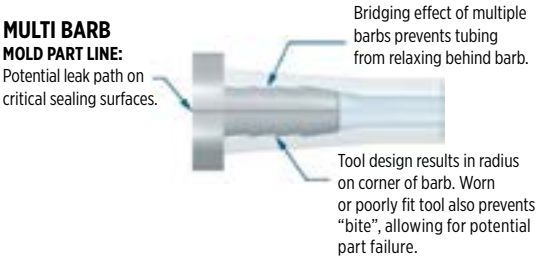
Many designers are not aware of the benefits of using a single barb versus a multi-barb fitting, but the barb design greatly affects the security of your tube connection.

Because of the shape of a barb, it is impossible to injection mold any but the first barb without a parting line. The parting line creates a potential leak path that becomes more pronounced as the tooling wears, increasing the likelihood of failure.

Two other problems exist with multiple barb fittings. First, it is impossible to fabricate tooling that creates a perfectly sharp




edge on each barb of a molded multi-barb fitting – a feature critical to the performance of the connection.
Second, multiple barb fittings do not allow the tubing to relax behind the first barb. Because the tubing "bridges" from barb to barb it is not allowed an uninterrupted interface with the fitting. This results in compromised pressure and tensile capacities. Value Plastics® single barb design avoids these shortcomings. Our expert tooling design assures the sharpest edge possible allowing the barb to "bite" into the tubing. Then, the cylindrical surface behind the barb allows the tubing to relax against the fitting. The result is a connection with excellent tensile and pressure performance.



The **CLASSIC SERIES** is characterized by a longer barb that extends the sealing surface of the fitting. Tubing is expanded from 42% to 69% above its nominal ID.

The **200 SERIES** offers outstanding performance characteristics when used with flexible tubing. Tubing is expanded by 50% above its nominal ID, permitting high-pressure capabilities.

The **300 SERIES** offers outstanding performance characteristics when used with flexible tubing. Tubing is expanded by 35% above its nominal ID, permitting high-pressure capabilities in the larger tube sizes.

The **400 Series** provides easy assembly while maintaining excellent pressure and tensile capabilities. Originally created for semi-rigid tubing, this series is preferred for applications where tensile/pressure properties are not highly critical, or when ease of assembly is desired. The 400 Series expands the tubing 25% above its nominal ID.

The **500 SERIES** profile is composed of blended radii, giving it the distinct look. Each barb is designed to accommodate a range of tube sizes and tube types. Consideration should be given to flow restriction, pressure capability, and the force required for assembly of the tube.

The **600 SERIES** barbs are designed for use with silicone, C-Flex® and PVC tubing sizes commonly used in biopharm and other applications. Tubing is expanded from 18% to 34% above its nominal ID to maintain a low profile and ease of assembly, and the straight barb stem facilitates use of recommended cable tie retainers or hose clamps.

The **700 SERIES** barb is designed for use with Value Plastics' XQ Series quick connect fittings. This unique single barb is available in sizes to fit the 1/4" (6.4 mm), 5/16" (7.9 mm) and 3/8" (9.5 mm) ID tubing sizes and materials commonly used in disposable and reusable medical equipment. Reinforced PVC, unreinforced PVC and polyurethane tubing materials work well with this barb style.

The **900 SERIES** offers outstanding performance characteristics when used with flexible tubing. Tubing is expanded from 8% to 17% above its nominal ID. This barb provides high flow efficiency and excellent tensile strength. A hose clamp is recommended for this series.

The data presented here is for reference only. It was compiled to provide our customers with a means of comparing the characteristics of components at the time of publication. The particular conditions of your use and application of our products are beyond our control. Thus, it is imperative that you test our products in your specific application to determine their suitability. All information is provided without implied or expressed warranty or guarantee by Value Plastics® or other manufacturers. None of the information provided constitutes a recommendation or endorsement of any kind by Value Plastics®.

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# DESIGN CENTER

*"It would have taken me two to three times as long and two to three times as much money without Value Plastics. This is who you want to work with. They have become part of our team."*

## Fitting The World's Most Fluid Designs

How it works:

**1 Define your product requirements:**
Describe your application and requirements or provide us with a drawing or simple sketch. From here we can determine what details are needed and can help define the most ideal and cost-effective connector concept for your application.

**2 Call the Design Center to explore your connector options:**
There may be a suitable off the shelf solution or perhaps we can adapt an existing connector to your application. Often the modification of an existing mold can be significantly faster and less expensive.

**3 Collaborate:**
Working with your requirements, we can help walk you through the most cost effective solutions to achieve your desired performance. That may mean simply taking 2 or 3 connectors and identifying a low-cost means to roll them into a single connector.

**4 Go-to-market:**
As we arrive at a solution together, we closely involve your team in the design and development process to ensure that as we approach production you have everything you need for qualification to get you to market both quickly and safely. The rest is up to you!

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# What happens when "off-the-shelf" just doesn't work? The Design Center builds a new shelf!

## Your Solution. Faster. For less.

With project requirements and timelines becoming increasingly demanding, it's critical to partner with a team who understands fluid management solutions and the rigors of today's medical device and biotech markets. Team up with the Value Plastics Design Center for your custom connector needs, whose market leading service, quality and delivery you've already come to know.

## Here's what you can expect from our Design Center and the "Specialists in Fluid Connections":

Save Time – Talk to someone who understands your application requirements. The Design Center works with you to determine the most suitable material and design options to deliver the best performing product as cost-effectively as possible. We also utilize state of the art rapid prototyping techniques and in-house testing facilities to keep your project moving quickly and economically.

Save Money – Start with our existing product offering of over 4,000 fluid connectors, or utilize some of our existing mold configurations toward perfectly customizing a part to your application. Don't forget, our technical and design assistance is FREE!

Save Trouble – Ensure that everything around your project will be done right the first time. Our dedicated and experienced staff will make sure that the finest details are covered from the time that we review your product requirements to the final product qualification.

The Design Center can also assist you in developing fluid connectors that comply to emerging standards. Value Plastics is an active member of the ISO 80369 standards group defining new standard connectors for small bore, medical device connections.

To get started today contact your Value Plastics Design Services Manager:

**Toll Free - +1 (866) 582-0965**

**Email - designcenter@valueplastics.com**

**dc.valueplastics.com**

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# Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

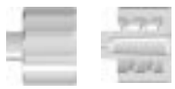
# Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties



## CUSTOM LUERS:

**CF104 (-6005)**
Male Luer Integral Lock Ring Plug, Ø.033 Orifice at Luer Tip



**CF226 (-6005)**
High Flow Connector to 500 Series Barb, 1/4" (6.4 mm) ID Tubing (May be used with separate rotating lock ring; CF227)

**CF015 (-1)**
Female Luer Lug Style Flare to M6x.75 Thread

**CF131 (-1)**
Male Luer Integral Lock Ring Plug, Closed at Grip (Short Luer)

**CF141 (-9)**
Male Luer to Female Luer Thread Style Coupler (Ø.045 Thru Bore with Ø.055 Male Side Bond-in Port)

**CF148 (-9002)**
Male Luer to Female Luer Thread Style Coupler (Ø.045 Thru Bore with Ø.080 Male Side Bond-in Port)

## CUSTOM LUERS:

**CF210 (-6005)**
Male Luer to Female Luer Thread Style Coupler (Ø.125 Center Bond-in Port)

**CF213 (-3)**
Male Luer Integral Lock Ring Plug, Closed at Grip (Ø.055 to Ø.060 Core)

**CF224 (-9)**
Male Luer Integral Lock Ring to 500 Series Barb, 5/32" (4 mm) ID Tubing (Ø.076 Bore)

**CF233 (-6005)**
Female Extended Luer Thread Style to 200 Series Barb, 1/16" (1.6 mm) ID Tubing

**CF235 (-9 -91)**
Male Luer to Female Luer Thread Style Coupler (Ø.023 Thru Bore with Ø.033 Male Side Bond-in Port)

**CF239 (-6005)**
Male Luer Integral Lock Ring to Female Luer Thread Style Extended Coupler

**CF322 (-1)**
Female Luer Lug Style Flare to 1/4-32 UNF Thread

## CUSTOM TUBE-TO-TUBE FITTINGS:

**CF079 (-1)**
1/8" Tee With Blank Single Leg to 200 Series Barb, for 1/8" (3.2 mm) ID Tubing

**CF128 (-1)**
Straight Through Connector for Orifice Insert, 200 Series Barbs, 1/8" (3.2 mm) ID Tubing

**CF302 (-1)**
Tee Reduction Connector with 400 Series Barbs, 1/16" (1.6 mm) and 3/32" (2.4 mm) ID Tubing

## CUSTOM THREADED:

**CF001 (-6005)**
Bottom Sealing 1/4-28 UNF Thread To Classic Series Barb, 1/16" (1.6 mm) ID Tubing

**CF165 (-6005)**
1/4-28 UNF Thread with O-Ring Seal and 5/16" Hex to Classic Series Barb 1/16" (1.6 mm) ID Tubing

**CF166 (-6005)**
1/4-28 UNF Thread Plug with O-Ring Seal and 5/16" Hex

**CF173 (-6005)**
Bottom Sealing 1/4-28 UNF To 200 Series Barb, 3/16" (4.8 mm) ID Tubing

**CF202 (-J1A)**
10-32 UNF To Tube Elbow With Custom Thread Orientation and 400 Series Barb, 3/32" (2.4 mm) ID Tubing

**Looking for Something Different?**

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*— Murat Kuru*
*Founder of Lipocosm, LLC*

**Need more details?**

Check out the Design Center Datasheet at **www.valueplastics.com** or contact Sales at **sales@valueplastics.com**

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**-9** Clear Polycarbonate
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**-91** White Polycarbonate
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**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
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**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

# QUICK CONNECT
## FITTINGS

Female Open Flow Straight
**PG-13**

Male Open Flow Straight
**PG-13**

Female Open Flow Straight
**PG-13**

Male Open Flow Straight
**PG-13**

Female Open Flow Straight
**PG-14**

Female Valved Straight
**PG-14**

Female Open Flow Panel Mount
**PG-14**

Female Valved Panel Mount
**PG-14**

Male Open Flow Straight
**PG-14**

Male Valved Straight
**PG-14**

Male Open Flow Panel Mount
**PG-15**

Male Valved Panel Mount
**PG-15**

Male Open Flow Elbow
**PG-15**

Male Valved Elbow
**PG-15**

Value Plastics offers three distinct families of quick connect fittings (quick disconnect couplings), the MQC, SBL and XQ Series products, for applications covering 1/8" (3.2 mm) through 3/8" (9.5 mm) ID tubing.

**The MQC Series** is an easy to use Push-to-Connect design and arguably one of the most versatile quick connect solutions on the market. With its large, ergonomic buttons and wide selection of colors, both designers and end users will embrace its unique features. The MQC Series of connectors are available in nylon and fit 1/8" (3.2 mm), 5/32" (4.0 mm) and 3/16" (4.8 mm) ID tubing. Between its versatility, one-of-a-kind design, and loud "click" indicating a secure fit, misconnects will be a problem of the past!

MQC Series

**The SBL Series** connector system is so intuitive that users just automatically know how to operate it the minute they pick it up. SBL Series quick connect fittings are cost effective and designed to meet your needs for a reusable component for small-bore applications in all fluid delivery areas. The SBL Series range is available in nylon, in two contrasting colors and fits 1/8" (3.2 mm) and 3/16" (4.8 mm) ID tubing for in-line applications.

SBL Series

**The XQ Series** quick connect fittings, available in open flow and with integral shutoff valves, bring performance, convenience and utility to your tubing applications. XQ Series products fit 1/4" (6.4 mm), 5/16" (7.9 mm) and 3/8" ID (9.5 mm) tubing and are produced in acetal and polypropylene in five basic configurations – in-line male, in-line female, male panel mount, female panel mount and elbow. For versatility, durable XQ Series couplings interchange with other plastic and metal button-type couplings. Bring performance and service to your tubing applications by specifying XQ Series quick connects.

XQ Series



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## MQC SERIES:
Female Open Flow

**MQCF230 (-1 -2 -3 -4 -5 -8)**
Dual Latch Quick Connect Female 200 Series Barb 1/8" (3.2 mm) ID Tubing

**MQCF240 (-1 -2 -3 -4 -5 -8)**
Dual Latch Quick Connect Female 200 Series Barb 5/32" (4.0 mm) ID Tubing

**MQCF250 (-1 -2 -3 -4 -5 -8)**
Dual Latch Quick Connect Female 200 Series Barb 3/16" (4.8 mm) ID Tubing

## MQC Series:
Male Open Flow

**MQCRM230 (-001 -002 -003 -004 -005 -08B) Nylon, Buna-N O Ring**
Dual Latch Quick Connect Male 200 Series Barb 1/8" (3.2 mm) ID Tubing

**-001 White Nylon**
**-005 Blue Nylon**

**MQCRM240 (-001 -002 -003 -004 -005 -08B) Nylon, Buna-N O Ring**
Dual Latch Quick Connect Male 200 Series Barb 5/32" (4.0 mm) ID Tubing

**-001 White Nylon**
**-005 Blue Nylon**

**MQCRM250 (-001 -002 -003 -004 -005 -08B) Nylon, Buna-N O Ring**
Dual Latch Quick Connect Male 200 Series Barb 3/16" (4.8 mm) ID Tubing

**-001 White Nylon**
**-005 Blue Nylon**

## SBL SERIES:
Female Open Flow

**SBLF013 (-1 -2 -8B -CM030)**
Side Latch Quick Connect Female 500 Series Barb, 1/8" (3.2 mm) ID Tubing

**SBLF035 (-1 -2 -8B -CM030)**
Side Latch Quick Connect Female 500 Series Barb, 3/16" (4.8 mm) ID Tubing

## SBL Series:
Male Open Flow

**SBLM013 (-001 -002 -004 -005) Nylon, Buna-N O Ring**
Side Latch Quick Connect Male 500 Series Barb, 1/8" (3.2 mm) ID Tubing

**-001 Gray Nylon**
**-002 Blue Nylon**

**SBLM035 (-001 -002 -004 -005) Nylon, Buna-N O Ring**
Side Latch Quick Connect Male 500 Series Barb, 3/16" (4.8 mm) ID Tubing

**-001 Gray Nylon**
**-002 Blue Nylon**

**Need samples for evaluation?**

You can call to request most of our standard product in quantities of 5, or less, for free **application evaluation.**
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**Need more details?**

Check out the MQC, SBL, and XQ Datasheets at **www.valueplastics.com** or contact Sales at **sales@valueplastics.com**

QUICK CONNECTS

# Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

# Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
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## Resin Reference


**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties




## XQ SERIES: Female Open Flow Straight

**XQSF755 (-1006)**
XQ Series Female Open Flow Connector, 700 Series Barb, 1/4" (6.4 mm) ID Tubing

**XQSF770 (-1006 -1007)**
XQ Series Female Open Flow Connector, 700 Series Barb, 3/8" (9.5 mm) ID Tubing

## XQ Series: Female Valved Straight

**XQSVF755 (-1006-B -1007-B -6006-EP)**
XQ Series Female Valved Connector, 700 Series Barb, 1/4" (6.4 mm) ID Tubing

**XQSVF765 (-1006-B -1007-B)**
XQ Series Female Valved Connector, 700 Series Barb, 5/16" (8.0 mm) ID Tubing

**XQSVF770 (-1006-B -1007-B -6006-EP)**
XQ Series Female Valved Connector, 700 Series Barb, 3/8" (9.5 mm) ID Tubing

## XQ Series: Female Open Flow Panel Mount

**XQSBF755 (-1006)**
XQ Series Female Open Flow Panel Mount Connector with 11/16-24 UNEF thread, 700 Series Barb, 1/4" (6.4 mm) ID Tubing, Nickel-Plated Brass Hex Nut (included)

**XQSBF770 (-1006)**
XQ Series Female Open Flow Panel Mount Connector with 11/16-24 UNEF thread, 700 Series Barb, 3/8" (9.5 mm) ID Tubing, Nickel-Plated Brass Hex Nut (included)

## XQ SERIES: Female Valved Panel Mount

**XQSVBF755 (-1006-B)**
XQ Series Female Valved Panel Mount Connector with 11/16-24 UNEF thread, 700 Series Barb, 1/4" (6.4 mm) ID Tubing, Nickel-Plated Brass Hex Nut (included)

**XQSVBF770 (-1006-B)**
XQ Series Female Valved Panel Mount Connector with 11/16-24 UNEF thread, 700 Series Barb, 3/8" (9.5 mm) ID Tubing, Nickel-Plated Brass Hex Nut (included)

## XQ Series: Male Open Flow Straight

**XQCM755 (-1006-B)**
XQ Series Male Open Flow Connector, 700 Series Barb, 1/4" (6.4 mm) ID Tubing

**XQCM770 (-1006-B)**
XQ Series Male Open Flow Connector, 700 Series Barb, 3/8" (9.5 mm) ID Tubing

## XQ Series: Male Valved Straight

**XQCVM755 (-1006-B -6006-EP)**
XQ Series Male Valved Connector, 700 Series Barb, 1/4" (6.4 mm) ID Tubing

**XQCVM765 (-1006-B -1007-B)**
XQ Series Male Valved Connector, 700 Series Barb, 5/16" (7.9 mm) ID Tubing

## XQ SERIES:
Male Valved Straight

**XQCVM770 (-1006-B -1007-B -6006-EP)**
XQ Series Male Valved Connector, 700 Series Barb, 3/8" (9.5 mm) ID Tubing

## XQ Series:
Male Open Flow Panel Mount

**XQCBM755 (-1006-B)**
XQ Series Male Open Flow Panel Mount Connector with 11/16-24 UNEF thread, 700 Series Barb, 1/4" (6.4 mm) ID Tubing, Nickel-Plated Brass Hex Nut (included)

**XQCBM770 (-1006-B)**
XQ Series Male Open Flow Panel Mount Connector with 11/16-24 UNEF thread, 700 Series Barb, 3/8" (9.5 mm) ID Tubing, Nickel-Plated Brass Hex Nut (included)

## XQ Series:
Male Valved Panel Mount

**XQCVBM755 (-1006-B)**
XQ Series Male Valved Panel Mount Connector with 11/16-24 UNEF thread, 700 Series Barb, 1/4" (6.4 mm) ID Tubing, Nickel-Plated Brass Hex Nut (included)

**XQCVBM770 (-1006-B)**
XQ Series Male Valved Panel Mount Connector with 11/16-24 UNEF thread, 700 Series Barb, 3/8" (9.5 mm) ID Tubing, Nickel-Plated Brass Hex Nut (included)

## XQ SERIES:
Male Open Flow Elbow

**XQCLM755 (-1006-B)**
XQ Series Male Open Flow Elbow Connector, 700 Series Barb, 1/4" (6.4 mm) ID Tubing

**XQCLM770 (-1006-B)**
XQ Series Male Open Flow Elbow Connector, 700 Series Barb, 3/8" (9.5 mm) ID Tubing

## XQ Series:
Male Valved Elbow

**XQCVLM755 (-1006-B)**
XQ Series Elbow Male Valved Connector, 700 Series Barbs, 1/4" (6.4 mm) ID Tubing

## XQ Series:
Panel Mount Nut

**PM4N (Nickel-Plated Brass)**
XQ Series 11/16-24 UNEF Panel Mount Nut

**Need it fast?**
You can order any of our 4,000+ parts online now with no order $ minimums, 24 hours a day, 7 days a week!
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**-X2** Buna-N Rubber
**-XO** Stainless Steel

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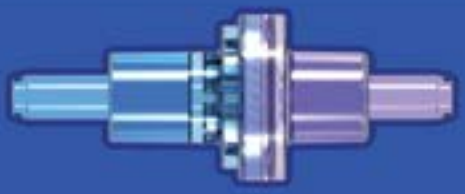
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

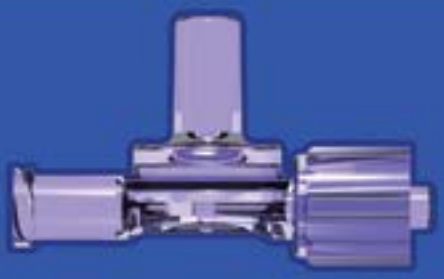
# CHECK VALVES

One Way Check Valves
**PG-16**



Anti-Siphon Check Valves
**PG-17**

Double Check Valves, Tubing Pocket Chimney Port
**PG-17**



Double Check Valves, Female Luer Chimney Port
**PG-17**

## SCV Series: One-Way Check Valve

**SCV01092 (Blue and Clear Polycarbonate w/Silicone Diaphragm)**
Check Valve, Socket for .122" (3.1 mm) ID x .165" (4.2 mm) OD Tubing x 2

Cracking Pressure: ≤ .174 psig
Max. Back Pressure: 87.023 psig
Flow Rate: ≥ 90ml/min
Flow Direction: Left to right

**SCV08053 (White SAN w/Silicone Diaphragm w/Natural LDPE)**
Check Valve, Female Locking Luer to Male Locking Luer w/Cap

Cracking Pressure: ≤ .174 psig
Max. Back Pressure: 87.023 psig
Flow Rate: ≥ 90ml/min
Flow Direction: Left to right

**SCV10090 (Clear Polycarbonate w/Silicone Diaphragm)**
Check Valve, Female Locking Luer to Pocket for .118" (3.0 mm) OD Tubing

Cracking Pressure: ≤ .174 psig
Max. Back Pressure: 87.023 psig
Flow Rate: ≥ 90ml/min
Flow Direction: Left to right

**SCV17090 (Clear Polycarbonate w/Silicone Diaphragm)**
Check Valve, Female Locking Luer to Socket for .118" (3.0 mm) ID x .161" (4.1 mm) OD Tubing

Cracking Pressure: ≤ .174 psig
Max. Back Pressure: 87.023 psig
Flow Rate: ≥ 90ml/min
Flow Direction: Left to right

**SCV21053 (Clear and White ABS w/Silicone Diaphragm)**
Check Valve, Socket for .118" (3.0 mm) ID x .161" (4.1 mm) OD Tubing x 2

Cracking Pressure: ≤ .174 psig
Max. Back Pressure: 87.023 psig
Flow Rate: ≥ 90ml/min
Flow Direction: Left to right

**SCV22050 (Clear SAN and Clear ABS w/Silicone Diaphragm)**
Check Valve, Socket for .118" (3.0 mm) ID x .161" (4.1 mm) OD to Male Locking Luer

Cracking Pressure: ≤ .174 psig
Max. Back Pressure: 87.023 psig
Flow Rate: ≥ 90ml/min
Flow Direction: Left to right

**SCV23050 (Clear SAN w/Silicone Diaphragm)**
Check Valve, Female Locking Luer to Male Locking Luer

Cracking Pressure: ≤ .174 psig
Max. Back Pressure: 87.023 psig
Flow Rate: ≥ 90ml/min
Flow Direction: Left to right

**SCV25052 (Clear ABS and Blue SAN w/Silicone Diaphragm)**
Air Pressure Relief Valve, Stem for .157" (4.0 mm) ID Tubing to Stem for .118" (3.0 mm) ID Tubing

Cracking Pressure: ≤ .174 psig
Max. Back Pressure: 87.023 psig
Flow Rate: ≥ 90ml/min
Flow Direction: Left to right

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**SCV03052 (Clear and Blue ABS w/Silicone Diaphragm)**
Check Valve, Pocket for .165" (4.2 mm) OD Tubing to Socket Fitting .122" (3.1 mm) ID x .165" (4.2 mm) OD Tubing

Cracking Pressure: 1.450-4.351 psig
Max. Back Pressure: 304.579 psig, max 30 sec.
Flow Rate: max 200 ml/min
Flow Direction: Left to right

**SCV04052 (Clear and Blue SAN w/Silicone Diaphragm)**
Check Valve, Female Locking Luer to Male Locking Luer

Cracking Pressure: 1.450-4.351 psig
Max. Back Pressure: 304.579 psig, max 30 sec.
Flow Rate: max 200 ml/min
Flow Direction: Left to right

**SCV05052 (Clear SAN and Blue Acrylic w/Silicone Diaphragm)**
Check Valve, Pocket for .165" (4.2 mm) OD Tubing to Male Locking Luer

Cracking Pressure: 1.450-4.351 psig
Max. Back Pressure: 304.579 psig, max 30 sec.
Flow Rate: max 200 ml/min
Flow Direction: Left to right

**SCV06052 (Clear and Blue ABS w/Silicone Diaphragm)**
Check Valve, Female Locking Luer to Socket for .122" (3.1 mm) ID to .165" (4.2 mm) OD Tubing

Cracking Pressure: 1.450-4.351 psig
Max. Back Pressure: 304.579 psig, max 30 sec.
Flow Rate: max 200 ml/min
Flow Direction: Left to right

**SCV06248 (Blue SAN and Clear MABS w/ Silicone Diaphragm)**
Check Valve, Pocket for .161" (4.0 mm) OD Tubing to Male Locking Luer

Cracking Pressure: 2.176 – 3.626 psig
Max. Back Pressure: 304.579 psig, max 30 sec.
Flow Rate: 170 ml/min
Flow Direction: Left to right

**SCV06272 (Clear SAN and Blue MABS w/ Silicone Diaphragm)**
Check Valve, Pocket for .161" (4.0 mm) OD Tubing to Female Locking Luer

Cracking Pressure: 2.176 – 3.626 psig
Max. Back Pressure: 304.579 psig, max 30 sec.
Flow Rate: 170 ml/min
Flow Direction: Left to right

**SCV07052 (Clear ABS and Blue SAN w/Silicone Diaphragm)**
Check Valve, Pocket for .122" (3.1 mm) OD Tubing to Male Locking Luer

Cracking Pressure: 1.450-4.351 psig
Max. Back Pressure: 87.023 psig
Flow Rate: max 200 ml/min
Flow Direction: Left to right

**SCV09093 (Clear and White Polycarbonate w/Silicone Diaphragm)**
Check Valve, Female Locking Luer to Pocket for .118" (3.0 mm) OD Tubing

Cracking Pressure: 1.450-4.351 psig
Max. Back Pressure: 87.023 psig
Flow Rate: max 200 ml/min
Flow Direction: Left to right

**SCV11095 (Clear and Green Polycarbonate w/Silicone Diaphragm)**
Check Valve, Female Locking Luer to Pocket for .098" (2.5 mm) OD Tubing

Cracking Pressure: 1.450-4.351 psig
Max. Back Pressure: 87.023 psig
Flow Rate: max 200 ml/min
Flow Direction: Left to right

SCV SERIES:
Anti-Siphon Check Valve



**SCV12052 (White and Blue SAN w/Silicone Diaphragm)**
Check Valve, Female Locking Luer to Male Locking Luer

Cracking Pressure: 1.450-4.351 psig
Max. Back Pressure: 87.023 psig
Flow Rate: max 200 ml/min
Flow Direction: Left to right

**SCV15050 (Clear ABS and Clear SAN w/Silicone Diaphragm)**
Check Valve, Pocket for .165" (4.2 mm) OD Tubing to Male Locking Luer

Cracking Pressure: 1.450-4.351 psig
Max. Back Pressure: 87.023 psig
Flow Rate: max 200 ml/min
Flow Direction: Left to right

**SCV16090 (Clear Polycarbonate w/Silicone Diaphragm)**
Check Valve, Female Locking Luer to Pocket for .118" (3.0 mm) OD Tubing

Cracking Pressure: 1.450-4.351 psig
Max. Back Pressure: 87.023 psig
Flow Rate: max 200 ml/min
Flow Direction: Left to right

## DCV Series:
Double Check Valve, Tubing Pocket Chimney Port

**DCV114 (-001) Radiation-Stable Polycarbonate**
Double Check Valve, Tubing Pocket Chimney Port

Cracking Pressure: 2-5 psi

**DCV115 (-001) Radiation-Stable Polycarbonate**
Double Check Valve, Tubing Pocket Chimney Port, Rotating Luer Lock Exit Port

Cracking Pressure: 2-5 psi

## DCV Series:
Double Check Valve, Female Luer Chimney Port

**DCV118 (-001) Radiation-Stable Polycarbonate**
Double Check Valve, Female Luer Chimney Port

Cracking Pressure: 2-5 psi

**DCV125 (-001) Radiation-Stable Polycarbonate**
Double Check Valve, Female Luer Chimney Port, Rotating Luer Lock Exit Port

Cracking Pressure: 2-5 psi

CHECK VALVES

# Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

# BIOPROCESS
## FITTINGS

PharmaLok™ Clamps
**PG-19**

Bag Ports
**PG-20**

Mini Flange Fittings 3/4”
**PG-22**

Maxi Flange Fittings 1-1/2”
**PG-23**

Mini Flange Accessories 3/4”
**PG-24**

Maxi Flange Accessories 1-1/2”
**PG-24**

# PHARMALOK™ Series

Value Plastics’ new sanitary fitting clamp was created with the end user in mind. Easily closed with one hand, the clamp’s unique and innovative design is one-of-a-kind!

The biopharmaceutical industry has made a strong move towards single-use technology so Value Plastics has developed a ground-breaking design that simplifies the assembly process by making it effortless to securely attach the fittings to bag ports and filters. Complies with ASME BPE 2009 DT-10.4 Hygienic Clamp Ferrule: Design Criteria.

## Features:

- ASME BPE 2009 DT-10.4 compliant
- Multiple colors for color coding applications
- Connects both plastic and stainless steel fittings
- Zip tie compatible
- Easy to use, one-handed closure (no tools needed)
- 360° compression
- Tamper evident
- SIP/CIP compatible

## Specifications:

**Material:** USP Class VI & ISO 11137 Certified glass-filled nylon

**Sterilization:** Gamma Radiation up to 50 kGy, Autoclavable up to 273°F (134° C) for a max of 30 min.

**Size:** .75” & 1.5”, for use with “Mini” & “Maxi” flange sanitary fittings

**Operating Temperature:** -94° (-70° C) to 140° (60° C)

**Maximum Pressure:** 80 psi



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**CPX150 (-U71)**
Single-Use Sanitary Fitting Clamp for "Maxi" Flange, TC Version 1" to 1.5"

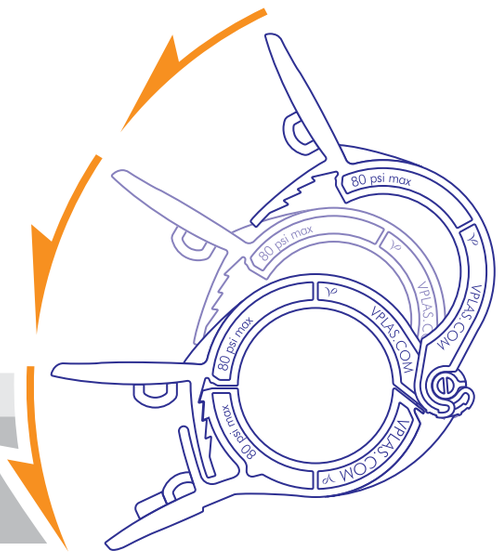
**CPN75 (-U71)**
Single-Use Sanitary Fitting Clamp for "Mini" Flange, TC Version .5" to .75"

**CPX150 (-U75)**
Single-Use Sanitary Fitting Clamp for "Maxi" Flange, TC Version 1" to 1.5"

**CPN75 (-U75)**
Single-Use Sanitary Fitting Clamp for "Mini" Flange, TC Version .5" to .75"

**Need more details?**

Check out the PharmaLok Datasheets at **www.valueplastics.com** or contact Sales at **sales@valueplastics.com**




# 1. 2. 3. Done!

BIOPROCESS FITTINGS

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**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

BIOPROCESS FITTINGS

# BAG PORTS

Value Plastics' new high tech series of bag ports offers a variety of benefits new to the biopharmaceutical industry through a combination of Value Pharma™ resin and a unique design. Value Pharma™ resin holds credentials that many manufacturers deem fundamental, such as animal derivative free qualification, USP Class VI certification, and the guarantee of heat sealing and conformance with polyethylene bags. The resin then goes even further to provide a strong, 24-hour resistance to alcohol stress cracking.

Their unique design sets these new ports apart from existing solutions. They not only conform with frequently utilized tubing sizes from 1/8" (3.2 mm) to 1" (25.4 mm), but they are also designed to ASME and BPE ferrule specifications, allowing them to work with leading industry fittings, filters and other devices. However, the most notable of the bag ports' specifications are those that are new to the industry – the parabolic lead and the alignment ribs. These two features, respectively, reduce the amount of time it takes to drain a bag by 24 percent and improve flow dynamics through the port.

### Compliant to ASME BPE ferrule specification

- Works with leading industry single-use bags

### Barb sizes consist of range from 1/8" (3.2 mm) to 1" (25.4 mm) and ferrule TC style

- Works with the frequently utilized tubing sizes found in the pharmaceutical industry

### Parabolic lead

- Reduces the time it takes to drain a bag by 18 to 24%
- Similar results for both fluid and powder applications

### Alignment ribs

- Improves fluid dynamics of flow through the port

### Value Pharma™ resin

- Ensures heat sealing with polyethylene bags
- Includes a USP Class VI certification
- Animal Derivative Free
- Resistant to alcohol stress cracking

**SFBP630 (-VP1) Value Pharma™ Resin**
Bag Port with 600 Series Barb, 1/8" (3.2 mm) Tubing ID

**SFBP655 (-VP1) Value Pharma™ Resin**
Bag Port with 600 Series Barb, 1/4" (6.4 mm) Tubing ID

**SFBP670 (-VP1) Value Pharma™ Resin**
Bag Port with 600 Series Barb, 3/8" (9.5 mm) Tubing ID

**Need more details?**

Check out all of our Bag Ports at **www.bagports.com** or contact Sales at **bagports@valueplastics.com**

**SFBP680 (-VP1) Value Pharma™ Resin**
Bag Port with 600 Series Barb, 1/2" (12.7 mm) Tubing ID

**SFBP6100 (-VP1) Value Pharma™ Resin**
Bag Port with 600 Series Barb, 3/4" (19.0 mm) Tubing ID

**SFBP6110 (-VP1) Value Pharma™ Resin**
Bag Port with 600 Series Barb, 1" (25.4 mm) Tubing ID

**SFBPF1 (-VP1) Value Pharma™ Resin**
Bag Port with Ferrule Fitting to 1-1/2" TC Connection

Innovative parabolic lead & alignment ribs

**Need it fast?**
You can order any of our 4,000+ parts online now with no order $ minimums, 24 hours a day, 7 days a week!
**www.valueplastics.com**



# Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

# Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
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**-X2** Buna-N Rubber
**-XO** Stainless Steel

# Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

BIOPROCESS FITTINGS

## SF Series

**The SF Series** sanitary fittings are based on design concepts calling for a heavy-duty part with superior side load strength, while providing superior flow-through characteristics, making them the connectors of choice for single-use bioprocesses. Pharmaceutical professionals find these plastic fittings offer all the benefits of disposable parts while offering performance capabilities not found in earlier versions of flanged fittings.

## Features & Benefits

- **Animal-free materials:** No BSE documentation required
- **Radiused flow surfaces:** Smooth uninterrupted flow
- **"Mini" & "Maxi" sizes:** Easy to retrofit current operations, works with commercially available biopharm clamps
- **No Particulate build-up:** Interior surface controlled to 15 Ra microinch

## Specifications

**Materials:** Animal-Free Polypropylene, Natural PVDF

**Tubing Sizes:** 1/4", 3/8", 1/2", 3/4", 1"

**Leak Resistance:** Tested at 80 psi air under water for 90 seconds with no leaks

**Tubing Removal Force:**

- 1/4" PP with C-Flex® shore A tubing: 21 lbs.
- 1/2" PP with C-Flex® shore A tubing: 89 lbs.
- 1" PP with C-Flex® shore A tubing: 121 lbs.

**Interior Surface Finish:** 15 Ra Microinch

**SFMN655 (-6005 -J1A)**
Sanitary Fitting, Mini Flange 3/4" to 600 Series Barb, 1/4" (6.4 mm) Tubing ID

**SFMN670 (-6005 -J1A)**
Sanitary Fitting, Mini Flange 3/4" to 600 Series Barb, 3/8" (9.5 mm) Tubing ID

**SFMN680 (-6005 -J1A)**
Sanitary Fitting, Mini Flange 3/4" to 600 Series Barb, 1/2" (12.7 mm) Tubing ID

**SFMN6100 (-6005 -J1A)**
Sanitary Fitting, Mini Flange 3/4" to 600 Series Barb, 3/4" (19.0 mm) Tubing ID

**SFMNC (-6005 -J1A)**
Sanitary Fitting Mini Cap 3/4"

**Did you know?**

You can find large bore 3/8" to 1" Tube-To-Tube fittings for your BioProcess needs starting on **Pg-44.**

**SFMX655 (-6005 -J1A)**
Sanitary Fitting, Maxi Flange 1-1/2" to 600 Series Barb, 1/4" (6.4 mm) Tubing ID

**SFMX670 (-6005 -J1A)**
Sanitary Fitting, Maxi Flange 1-1/2" to 600 Series Barb, 3/8" (9.5 mm) Tubing ID

**SFMX680 (-6005 -J1A)**
Sanitary Fitting, Maxi Flange 1-1/2" to 600 Series Barb, 1/2" (12.7 mm) Tubing ID

**SFMX6100 (-6005 -J1A)**
Sanitary Fitting, Maxi Flange 1-1/2" to 600 Series Barb, 3/4" (19.0 mm) Tubing ID

**SFMX6110 (-6005 -J1A)**
Sanitary Fitting, Maxi Flange 1-1/2" to 600 Series Barb, 1.0" (25.4 mm) Tubing ID

**SFMXC (-6005 -J1A)**
Sanitary Fitting Maxi Cap 1-1/2"

**Need samples for evaluation?**
You can call to request most of our standard product in quantities of 5, or less, for free **application evaluation.**
**+1 (970) 267-5200 Toll Free: (888) 404-5837**

**Need it fast?**
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**www.valueplastics.com**

BIOPROCESS FITTINGS

## Material Reference

**-001** (various, see part description)
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**-6006** White Polypropylene
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**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
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**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

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**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
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BIOPROCESS FITTINGS

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- **"Mini" & "Maxi" sizes:** Easy to retrofit current operations, works with commercially available biopharm clamps
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## Specifications

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**Leak Resistance:** Tested at 80 psi air under water for 90 seconds with no leaks

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- 1/2" PP with C-Flex® shore A tubing: 89 lbs.
- 1" PP with C-Flex® shore A tubing: 121 lbs.

**Interior Surface Finish:** 15 Ra Microinch

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Sanitary Fitting, Mini Flange 3/4" to 600 Series Barb, 1/4" (6.4 mm) Tubing ID

**SFMN670 (-6005 -J1A)**
Sanitary Fitting, Mini Flange 3/4" to 600 Series Barb, 3/8" (9.5 mm) Tubing ID

**SFMN680 (-6005 -J1A)**
Sanitary Fitting, Mini Flange 3/4" to 600 Series Barb, 1/2" (12.7 mm) Tubing ID

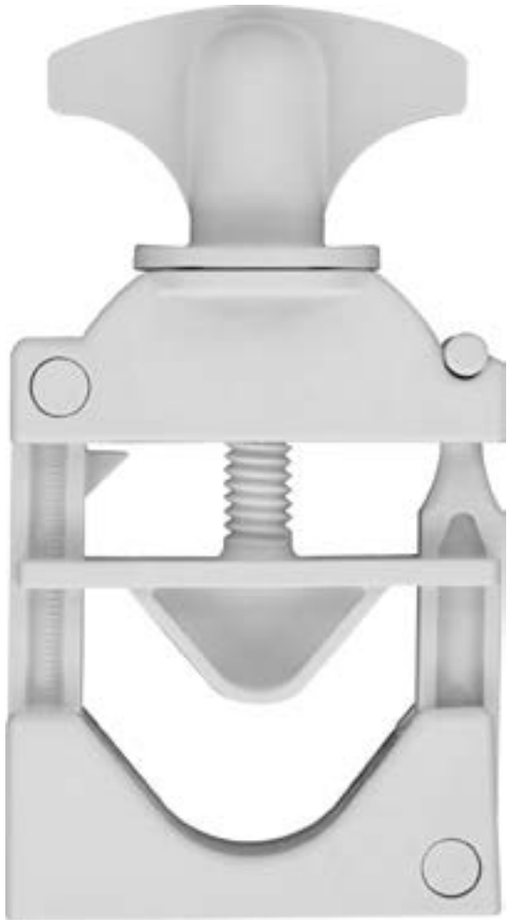
**SFMN6100 (-6005 -J1A)**
Sanitary Fitting, Mini Flange 3/4" to 600 Series Barb, 3/4" (19.0 mm) Tubing ID

**SFMNC (-6005 -J1A)**
Sanitary Fitting Mini Cap 3/4"

**Did you know?**

You can find large bore 3/8" to 1" Tube-To-Tube fittings for your BioProcess needs starting on **Pg-44.**

**VBV1000NW (Glass Reinforced White Nylon)**
Pinch Valve, Maxi, 1/2" (12.7 mm) to 1" (25.4 mm)



**VNG150WHT (Glass Reinforced White Nylon)**
Clamp, Maxi Flange, 1" (25.4 mm) to 1.5" (38.1 mm)

**VNG300WHT (Glass Reinforced White Nylon)**
Clamp, Maxi Flange, 3" (76.2 mm)

BIOPROCESS FITTINGS

# Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
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**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
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**-1006** Natural Acetal
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**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
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**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

# LUER CONNECTORS

Male Luers
**PG-27**

Female Luers
**PG-29**

Adapters
**PG-31**

Couplers
**PG-31**

Tees
**PG-31**

Elbows
**PG-31**

Plugs and Caps
**PG-32**

Luer to Thread
**PG-33**

Panel Mounts and Accessories
**PG-35**

Custom Luer Fittings
**PG-10**

## Our Luer Tapers

Value Plastics' luer tapers are made to the ISO 594-1 and ISO 594-2 standards, and may be connected to other luers meeting these ISO standards. Please test your application to verify the performance of the interconnection.

Value Plastics' luer fittings come in over 100 configurations and several materials for the device designer, joining tubing from 1/16" (1.6 mm) ID to 1/4" (6.4 mm) ID.

## Published ISO Design Standard

- Well understood worldwide
- Often assures interconnections without need to retrofit

## Rotating Lock Permits Tube Positioning Prior To Tightening

- Minimizes twisting and kinking of tubing

## Tapered Cone Seal

- Reliable
- Inexpensive
- Uncomplicated

## Available In Many Materials

- Facilitates optimal material selection for your application

## Inexpensive

- Facilitates single-use

## Easy To Understand

- Ease of use in field

## Many Configuration Options

- Adaptable to wide range of applications

## Security Options (Fixed Lock, Rotating Lock, No Lock)

- Tailorable to your specific application



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**MTLL004 (-1 -2 -3 -4 -5 -06 -6005 -07 -9 -9002)**
Male Luer Integral Lock Ring to 500 Series Barb, 1/16" (1.6 mm) ID Tubing

**MTLL210 (-1 -2 -3 -4 -5 -06 -6005 -07 -9 -9002 -J1A)**
Male Luer Integral Lock Ring to 200 Series Barb, 1/16" (1.6 mm) ID Tubing

**MTLL410 (-1 -6005 -9 -9002 -J1A)**
Male Luer Integral Lock Ring to 400 Series Barb, 1/16" (1.6 mm) ID Tubing

**MTLL007 (-1 -2 -3 -4 -5 -6005 -06 -07 -9 -9002)**
Male Luer Integral Lock Ring to 500 Series Barb, 3/32" (2.4 mm) ID Tubing

**MTLL220 (-1 -2 -3 -4 -5 -06 -6005 -07 -9 -9002 -J1A)**
Male Luer Integral Lock Ring to 200 Series Barb, 3/32" (2.4 mm) ID Tubing

**MTLL420 (-1 -6005 -9 -9002 -J1A)**
Male Luer Integral Lock Ring to 400 Series Barb, 3/32" (2.4 mm) ID Tubing

**MTLL013 (-1 -2 -3 -4 -5 -06 -6005 -07 -9 -9002)**
Male Luer Integral Lock Ring to 500 Series Barb, 1/8" (3.2 mm) ID Tubing

**MTLL230 (-1 -2 -3 -4 -5 -06 -6005 -07 -9 -9002 -J1A)**
Male Luer Integral Lock Ring to 200 Series Barb, 1/8" (3.2 mm) ID Tubing

**MTLL430 (-1 -3 -6005 -9 -9002 -J1A)**
Male Luer Integral Lock Ring to 400 Series Barb, 1/8" (3.2 mm) ID Tubing

**MTLL025 (-1 -2 -3 -4 -5 -6005 -06 -07 -9 -9002)**
Male Luer Integral Lock Ring to 500 Series Barb, 5/32" (4.0 mm) ID Tubing

**MTLL240 (-1 -2 -3 -4 -5 -6005 -06 -07 -9 -9002 -J1A)**
Male Luer Integral Lock Ring to 200 Series Barb, 5/32" (4.0 mm) ID Tubing

**MTLL445 (-1 -6005 -9 -9002 -J1A)**
Male Luer Integral Lock Ring to 400 Series Barb, .170" (4.3 mm) ID Tubing

**MTLL035 (-1 -2 -3 -4 -5 -06 -6005 -07 -9 -9002)**
Male Luer Integral Lock Ring to 500 Series Barb, 3/16" (4.8 mm) ID Tubing

**MTLL250 (-1 -2 -3 -4 -5 -06 -6005 -07 -8003 -9 -9002 -J1A)**
Male Luer Integral Lock Ring to 200 Series Barb, 3/16" (4.8 mm) ID Tubing

**MTLL450 (-1 -6005 -9 -9002 -J1A)**
Male Luer Integral Lock Ring to 400 Series Barb, 3/16" (4.8 mm) ID Tubing

**MTLL055 (-1 -2 -3 -4 -06 -6005 -07 -9 -9002)**
Male Luer Integral Lock Ring to 500 Series Barb, 1/4" (6.4 mm) ID Tubing

**MTLL360 (-1 -2 -6005 -9 -9002 -J1A)**
Male Luer Integral Lock Ring to 300 Series Barb, 1/4" (6.4 mm) ID Tubing

**Part Drawings Online!**

Value Plastics provides dimensional drawings available for download for all of its fittings.
**www.valueplastics.com**

LUER FITTINGS

# Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
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**-1** White Nylon
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**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
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**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
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**-VP1** Animal-free Polyethylene
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**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

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## Resin Reference


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# MALE LUER:
Slip, or for use with Lock Ring

LUER FITTINGS

**FSLLR (-1 -2 -3 -4 -5 -06 -6005 -07 -9 -9002)**
Finger Snap Luer Lock Ring

**MLRL004 (-1 -6005 -9)**
Male Luer to 500 Series Barb, 1/16" (1.6 mm) ID Tubing (May be used with separate rotating lock ring; FSLLR)

**MLRL007 (-1 -6005 -9)**
Male Luer to 500 Series Barb, 3/32" (2.4 mm) ID Tubing (May be used with separate rotating lock ring; FSLLR)

**MLRL013 (-1 -6005 -9)**
Male Luer to 500 Series Barb, 1/8" (3.2 mm) ID Tubing (May be used with separate rotating lock ring; FSLLR)

**MLRL025 (-1 -6005 -9)**
Male Luer to 500 Series Barb, 5/32" (4.0 mm) ID Tubing (May be used with separate rotating lock ring; FSLLR)

**MLRL035 (-1 -6005 -9 -9002)**
Male Luer to 500 Series Barb, 3/16" (4.8 mm) ID Tubing (May be used with separate rotating lock ring; FSLLR)

**MLRL055 (-1 -6005 -9)**
Male Luer to 500 Series Barb, 1/4" (6.4 mm) ID Tubing (May be used with separate rotating lock ring; FSLLR)

**MLSL004 (-1 -6005 -9)**
Male Luer to 500 Series Barb, 1/16" (1.6 mm) ID Tubing (May be used with separate stationary lock ring; FSLLR)

**MLSL007 (-1 -6005 -9)**
Male Luer to 500 Series Barb, 3/32" (2.4 mm) ID Tubing (May be used with separate stationary lock ring; FSLLR)

**MLSL013 (-1 -6005 -9)**
Male Luer to 500 Series Barb, 1/8" (3.2 mm) ID Tubing (May be used with separate stationary lock ring; FSLLR)

**MLSL025 (-1 -6005 -9)**
Male Luer to 500 Series Barb, 5/32" (4.0 mm) ID Tubing (May be used with separate stationary lock ring; FSLLR)

**MLSL035 (-1 -6005 -9)**
Male Luer to 500 Series Barb, 3/16" (4.8 mm) ID Tubing (May be used with separate stationary lock ring; FSLLR)

**MLSL055 (-1 -6005 -9)**
Male Luer to 500 Series Barb, 1/4" (6.4 mm) ID Tubing (May be used with separate stationary lock ring; FSLLR)

## It's a lock with Value Plastics!

Our MLRL and MLSL Series of fittings can be used both as a slip luer or as a locking luer with the addition of our FSLLR luer lock ring, which allows color coding without flow path contact. Our MLSL/FSLLR combination results in a stationary lock ring. Use a combination of MLRL and FSLLR to create a color coded rotating lock ring.

## MALE LUER:
Slip

**MTLS210 (-1 -6005 -9 -J1A)**
Male Luer Slip to 200 Series Barb, 1/16" (1.6 mm) ID Tubing

**MSL004 (-1 -6005 -9 -9002)**
Male Luer Slip to 500 Series Barb, 1/16" (1.6 mm) ID Tubing

**MTLS220 (-1 -3 -5 -6005 -81 -9 -J1A)**
Male Luer Slip to 200 Series Barb, 3/32" (2.4 mm) ID Tubing

**MSL007 (-1 -6005 -9 -9002)**
Male Luer Slip to 500 Series Barb, 3/32" (2.4 mm) ID Tubing

**MTLS230 (-1 -3 -5 -6005 -81 -9 -9002 -J1A)**
Male Luer Slip to 200 Series Barb, 1/8" (3.2 mm) ID Tubing

**MSL013 (-1 -6005 -9 -9002)**
Male Luer Slip to 500 Series Barb, 1/8" (3.2 mm) ID Tubing

**MTLS240 (-1 -2 -5 -6005 -81 -9 -J1A)**
Male Luer Slip to 200 Series Barb, 5/32" (4.0 mm) ID Tubing

**MSL025 (-1 -6005 -9 -9002)**
Male Luer Slip to 500 Series Barb, 5/32" (4.0 mm) ID Tubing

**MSL035 (-1 -6005 -9 -9002 -J1A)**
Male Luer Slip to 500 Series Barb, 3/16" (4.8 mm) ID Tubing

**MSL055 (-1 -6005 -9 -9002)**
Male Luer Slip to 500 Series Barb, 1/4" (6.4 mm) ID Tubing

## FEMALE LUER:
Thread Style

**FTLL004 (-1 -2 -3 -4 -5 -06 -6005 -07 -9 -9002 -J1A)**
Female Luer Thread Style to 500 Series Barb, 1/16" (1.6 mm) ID Tubing

**FTLL210 (-1 -2 -3 -4 -5 -6005 -9 -9002 -J1A)**
Female Luer Thread Style to 200 Series Barb, 1/16" (1.6 mm) ID Tubing

**FTLL410 (-1 -6005 -9 -9002 -J1A)**
Female Luer Thread Style to 400 Series Barb, 1/16" (1.6 mm) ID Tubing

**FTLL007 (-1 -2 -3 -4 -5 -06 -6005 -07 -9 -9002)**
Female Luer Thread Style to 500 Series Barb, 3/32" (2.4 mm) ID Tubing

**FTLL220 (-1 -2 -3 -5 -6005 -9 -9002 -J1A)**
Female Luer Thread Style to 200 Series Barb, 3/32" (2.4 mm) ID Tubing

**FTLL420 (-1 -6005 -9 -9002 -J1A)**
Female Luer Thread Style to 400 Series Barb, 3/32" (2.4 mm) ID Tubing

**FTLL013 (-1 -2 -3 -4 -5 -06 -6005 -07 -9 -9002)**
Female Luer Thread Style to 500 Series Barb, 1/8" (3.2 mm) ID Tubing

**FTLL230 (-1 -2 -3 -5 -6005 -9 -9002 -J1A)**
Female Luer Thread Style to 200 Series Barb, 1/8" (3.2 mm) ID Tubing

**FTLL430 (-1 -6005 -9 -9002 -J1A)**
Female Luer Thread Style to 400 Series Barb, 1/8" (3.2 mm) ID Tubing

LUER FITTINGS

# Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

# Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

LUER FITTINGS

## FEMALE LUER: Thread Style

**FTLL025 (-1 -2 -3 -4 -5 -06 -6005 -07 -9 -9002)**
Female Luer Thread Style to 500 Series Barb, 5/32" (4.0 mm) ID Tubing

**FTLL240 (-1 -2 -3 -5 -6005 -9 -9002 -J1A)**
Female Luer Thread Style to 200 Series Barb, 5/32" (4.0 mm) ID Tubing

**FTLL445 (-1 -6005 -9 -9002 -J1A)**
Female Luer Thread Style to 400 Series Barb, .170" (4.3 mm) ID Tubing

**FTLL035 (-1 -2 -3 -4 -5 -06 -6005 -07 -9 -9002 -J1A)**
Female Luer Thread Style to 500 Series Barb, 3/16" (4.8 mm) ID Tubing

**FTLL250 (-1 -3 -5 -6005 -9 -9002 -J1A)**
Female Luer Thread Style to 200 Series Barb, 3/16" (4.8 mm) ID Tubing

**FTLL450 (-1 -6005 -9 -9002 -J1A)**
Female Luer Thread Style to 400 Series Barb, 3/16" (4.8 mm) ID Tubing

**FTLL055 (-1 -2 -3 -4 -5 -06 -6005 -07 -9 -9002)**
Female Luer Thread Style to 500 Series Barb, 1/4" (6.4 mm) ID Tubing

**FTLL360 (-1 -3 -5 -6005 -9 -9002 -J1A)**
Female Luer Thread Style to 300 Series Barb, 1/4" (6.4 mm) ID Tubing

## FEMALE LUER: Smooth Bore Thread Style

**FTLLSB004 (-1 -6005 -9)**
Female Luer Thread Style Smooth Bore to 500 Series Barb, 1/16" (1.6 mm) ID Tubing

**FTLLSB007 (-1 -4 -6005 -9)**
Female Luer Thread Style Smooth Bore to 500 Series Barb, 3/32" (2.4 mm) ID Tubing

**FTLLSB013 (-1 -6005 -9)**
Female Luer Thread Style Smooth Bore to 500 Series Barb, 1/8" (3.2 mm) ID Tubing

### Why choose a smooth bore?

Our Smooth Bore Luers have a smooth inner transition providing for easy insertion of guide wires, probes and other devices.

## FEMALE LUER: Lug Style

**FTL10 (-1 -6005 -9 -J1A)**
Female Luer Lug Style to Classic Series Barb, 1/16" (1.6 mm) ID Tubing

**FTL210 (-1 -6005 -9 -J1A)**
Female Luer Lug Style to 200 Series Barb, 1/16" (1.6 mm) ID Tubing

**FTL20 (-1 -6005 -07 -81 -9 -J1A)**
Female Luer Lug Style to Classic Series Barb, 3/32" (2.4 mm) ID Tubing

**FTL220 (-1 -3 -5 -6005 -9 -J1A)**
Female Luer Lug Style to 200 Series Barb, 3/32" (2.4 mm) ID Tubing

**FTL30 (-1 -6005 -9 -J1A)**
Female Luer Lug Style to Classic Series Barb, 1/8" (3.2 mm) ID Tubing

## FEMALE LUER:
Lug Style

**FTL230 (-1 -3 -5 -6005 -9 -J1A)**
Female Luer Lug Style to 200 Series Barb, 1/8" (3.2 mm) ID Tubing

**FTL240 (-1 -6005 -9 -J1A)**
Female Luer Lug Style to 200 Series Barb, 5/32" (4.0 mm) ID Tubing

## LUER:
Adapters, Couplers, and Lock Rings

**FSLLR (-1 -2 -3 -4 -5 -06 -6005 -07 -9 -9002)**
Finger Snap Luer Lock Ring

**MLRLC (-1 -6005 -9)**
Male Luer Coupler (May be used with separate rotating lock rings; FSLLR)

**MTLCS (-1 -6005 -9 -J1A)**
Male Luer Slip Coupler

**FTLLC (-1 -6005 -9 -9002 -J1A)**
Female Luer Thread Style Coupler

**FTLC (-1 -6005 -9 -9002 -J1A)**
Female Luer Lug Style Coupler

**LC34 (-1 -6005 -9 -9002 -J1A)**
Male Luer Integral Lock Ring to Female Luer Thread Style Coupler

**LC78 (-1 -6005 -9 -9002 -J1A)**
Male Luer to Female Luer Thread Style Coupler (May be used with separate rotating lock ring; FSLLR)

**LT878 (-1 -6005 -9 -9002)**
Female Luer Thread Style (2) to Male Luer Tee (May be used with separate rotating lock ring; FSLLR)

**LT787 (-1 -6005 -8012 -9 -9002)**
Male Luer (2) to Female Luer Thread Style Tee (May be used with separate rotating lock ring; FSLLR)

**FTLT (-1 -6005 -9 -J1A)**
Female Luer Lug Style Tee

**FTLLE (-1 -6005 -9 -J1A)**
Female Luer Thread Style Elbow

**FTLE (-1 -6005 -9 -J1A)**
Female Luer Lug Style Elbow

**LE87 (-1 -6005 -8003 -9 -9002)**
Male Luer to Female Luer Thread Style Elbow (May be used with separate rotating lock ring; FSLLR)

**LE7220 (-1 -2 -9)**
Male Luer to 200 Series Barb Elbow, 3/32" (2.4 mm) ID Tubing (May be used with separate rotating lock ring; FSLLR)

LUER FITTINGS

# Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

# Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

LUER FITTINGS

## LUER: Adapters, Couplers, and Lock Rings

**LE7230 (-1 -2 -6005 -9 -9010)**
Male Luer to 200 Series Barb Elbow 1/8" (3.2 mm) ID Tubing (May be used with separate rotating lock ring; FSLLR)

**CA091 (-001) Gamma Stable Polycarbonate**
Male Luer Elbow to 3/16" Classic Series Barb, (CF361-9002) with Rotating Lock Ring (FSLLR-9002)

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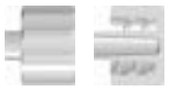
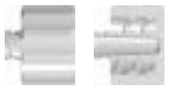
## LUER: Plugs and Caps

**MTLLP (-1 -2 -3 -6005 -07 -9 -J1A)**
Male Luer Integral Lock Ring Plug, Closed at Luer Tip

**LP4 (-1 -2 -3 -4 -5 -6005 -9 -9002 -J1A)**
Male Luer Integral Lock Ring Plug, Closed at Grip



**VLP4 (-1 -3 -6005 -81 -J1A)**
Male Luer Integral Lock Ring Vented Plug, Closed at Grip



**MLRLP (-1 -6005 -9)**
Male Luer Plug (May be used with separate rotating lock ring; FSLLR)

**MLSLP (-1 -6005 -9)**
Male Luer Plug (May be used with separate stationary lock ring; FSLLR)

**MTLP (-1 -6005 -9 -J1A)**
Male Luer Plug, Closed at Tether Loop (May be used with separate stationary lock ring; MLLR)

**MTLSP (-1 -6005 -81 -9 -J1A)**
Male Luer Slip Plug, Closed at Grip

**FTLP (-1 -6005 -9 -J1A)**
Female Luer Lug Style Cap with Tether Loop

**FTLLP (-1 -2 -3 -5 -6005 -07 -81 -9 -9002 -J1A)**
Female Luer Thread Style Cap

**LP34 (-1 -3 -5 -6005 -9 -9002 -J1A)**
Male Luer Integral Lock Ring to Female Luer Thread Style Plug

**ABSML-6005 UNDER (-1 -2 -3 -4 -5 -06 -07)**
Male Luer with Rotating Lock Ring and 5/16" Hex to 1/4-28 UNF Bottom Sealing Thread

**ABSML-J1A UNDER (-1 -2 -3 -4 -5 -06 -07)**
Male Luer with Rotating Lock Ring and 5/16" Hex to 1/4-28 UNF Bottom Sealing Thread

**XMTLL (-1 -6005 -9 -J1A)**
Male Luer Integral Lock Ring to 10-32 Special Tapered Thread

**SMTLL (-1 -6005 -9 -J1A)**
Male Luer Integral Lock Ring to 1/4-28 UNF Thread

**18MTLL (-1 -2 -6005 -J1A)**
Male Luer Integral Lock Ring with 7/16" Hex to 1/8-27 NPT Thread

**14MTLL (-1 -2 -6005)**
Male Luer Integral Lock Ring with 9/16" Hex to 1/4-18 NPT Thread

**XMLRL (-1 -6005 -9 -9002)**
Male Luer with 1/4" Hex to 10-32 Special Tapered Thread (May be used with separate rotating lock ring; FSLLR)

**SMLRL (-1 -6005 -9 -J1A)**
Male Luer with 5/16" Hex to 1/4-28 UNF Thread (May be used with separate rotating lock ring; FSLLR)

**BSMLRL (-6005 -J1A)**
Male Luer with 5/16" Hex to 1/4-28 Bottom-Sealing Thread (May be used with separate rotating lock ring; FSLLR)

## Part Drawings Online!

Value Plastics provides dimensional drawings available for download for all of its fittings.
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## Looking for Something Different?

Most of our best product ideas have come from you, our customers. While we pride ourselves on our extensive product offering, we recognize that your needs are ever-changing and that our products, too, must adapt to your needs.

If there's a new product you think Value Plastics should make, drop an email to designcenter@valueplastics.com describing your product concept in as much detail as you desire. We will contact you with any questions, and who knows - the next catalog edition could include products YOU told us to build.

See **page 8** for more information on the Design Center!

# Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

# Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties



## LUER TO THREAD: Female

**XFTLL (-1 -6005 -9 -J1A)**
Female Luer Thread Style with 1/4" Hex to 10-32 Special Tapered Thread

**KFTLL (-1 -6005 -9 -J1A)**
Female Luer Thread Style with 1/4" Hex to 10-32 UNF Thread

**SFTLL (-1 -2 -4 -06 -6005 -9 -J1A)**
Female Luer Thread Style with 5/16" Hex to 1/4-28 UNF Thread

**BSFTLL (-1 -6005 -J1A)**
Female Luer Thread Style with 5/16" Hex to 1/4-28 UNF Bottom Sealing Thread

**XFTL (-1 -6005 -9 -J1A)**
Female Luer Lug Style with 1/4" Hex to 10-32 Special Tapered Thread

**KFTL (-1 -6005 -9 -J1A)**
Female Luer Lug Style with 1/4" Hex to 10-32 UNF Thread

**SFTL (-1 -6005 -9)**
Female Luer Lug Style with 5/16" Hex to 1/4-28 UNF Thread

**18FTLL (-1 -6005 -J1A)**
Female Luer Thread Style with 7/16" Hex to 1/8-27 NPT Thread

**18LFTLL (-1 -4 -5 -6005 -J1A)**
Female Luer Thread Style Elbow with 7/16" Hex to 1/8-27 NPT Thread

## PANEL MOUNTS: Female Thread Style

**FTLLB210 (-1 -2 -6005 -9 -J1A)**
Female Luer Thread Style Panel Mount 1/4-28 UNF to 200 Series Barb, 1/16" (1.6 mm) ID Tubing

**FTLLB220 (-1 -2 -6005 -9 -J1A)**
Female Luer Thread Style Panel Mount 1/4-28 UNF to 200 Series Barb, 3/32" (2.4 mm) ID Tubing

**FTLLB230 (-1 -2 -6005 -9 -J1A)**
Female Luer Thread Style Panel Mount 1/4-28 UNF to 200 Series Barb, 1/8" (3.2 mm) ID Tubing

**FTLLBMLRL (-1 -6005)**
Female Luer Thread Style Panel Mount 1/4-28 UNF to Male Luer (May be used with separate rotating lock ring; FSLLR)

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## PANEL MOUNTS:
Female Lug Style and Male Luer

**FTLB210 (-1 -6005 -9 -J1A)**
Female Luer Lug Style Panel Mount 1/4-28 UNF to 200 Series Barb, 1/16" (1.6 mm) ID Tubing

**FTLB220 (-1 -6005 -9 -J1A)**
Female Luer Lug Style Panel Mount 1/4-28 UNF to 200 Series Barb, 3/32" (2.4 mm) ID Tubing

**FTLB230 (-1 -6005 -9 -J1A)**
Female Luer Lug Style Panel Mount 1/4-28 UNF to 200 Series Barb, 1/8" (3.2 mm) ID Tubing

**MLRLB210 (-1 -6005)**
Male Luer Panel Mount 10-32 UNF to 200 Series Barb, 1/16" (1.6 mm) ID Tubing, (May be used with separate rotating lock ring; FSLLR)

**MLRLB220 (-1 -6005)**
Male Luer Panel Mount 10-32 UNF to 200 Series Barb, 3/32" (2.4 mm) ID Tubing, (May be used with separate rotating lock ring; FSLLR)

**MLRLB230 (-1 -6005)**
Male Luer Panel Mount 1/4-28 UNF to 200 Series Barb, 1/8" (3.2 mm) ID Tubing, (May be used with separate rotating lock ring; FSLLR)

## PANEL MOUNT ACCESSORIES:
Lock Nuts and Color Coding Rings

**CCR (-1 -2 -3 -4 -5 -06 -07)**
Color Coded Ring (For use with PMS, PMK, FTLLB or FTLB panel mount fittings)

**CCLR (-1 -2 -3 -4 -5 -06 -07)**
Color Coded Lock Ring (For use with PMS, PMK, FTLLB or FTLB panel mount fittings)

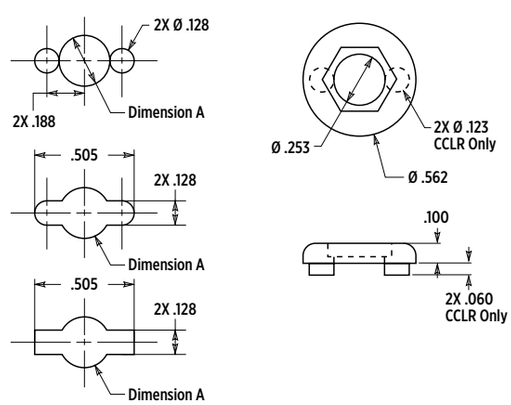
**PMKN (-XO)**
Panel Mount Nut 10-32 UNF with 3/8" Hex (For use with PMK panel mount fittings)

**PMSN (-XO)**
Panel Mount Nut 1/4-28 UNF with 7/16" Hex (For use with PMS, FTLB, and FTLLB panel mount fittings)

**LNS (-1 -2 -3 -4 -5 -06 -07 -6005 -81 -J1A)**
1/4-28 UNF Panel Mount Lock Nut (For use with PMS, FTLLB or FTLB panel mount fittings)

### Select the correct lock nut for your panel mount:

| PART | Dimension A | Use Lock Nut |
|---|---|---|
| FTLLB Series | .255" | PMSN or LNS |
| FTLB Series | .255" | PMSN or LNS |
| FTLLBMLRL | .255" | PMSN or LNS |
| MLRLB210 | .193" | PMKN |
| MLRLB220 | .193" | PMKN |
| MLRLB230 | .255" | PMSN or LNS |




LUER FITTINGS

# Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

# BLOOD PRESSURE FITTINGS

BPL Series 1/4 Turn Cuff Connectors
**PG-37**

BPF Series Female Bayonet Style Quick Connects
**PG-37**

Bayonet Male Cuff Connectors
**PG-38**

Bayonet Panel Mount Connectors
**PG-38**

Dinamap® Monitor Adapters
**PG-38**

Dinamap® Cuff Connectors
**PG-39**

## BPL Series

The BPL Series quick connect fittings offers superior ergonomics - a requirement for many designers in their effort to accommodate end users. The BPL's ease-of-use stems largely from a winged male fitting and Value Plastics' patented 10-point grip, making the quarter-turn connection simple and easy to accomplish. A solid snap, that can be both heard and felt, will then reassure the end user that a secure fit has been made.

Another unique characteristic of the BPL Series is the true tube stop on the rotating half of the two connectors. This allows tubing to be fully assembled onto the barb without its edge pushing against the body of the connector.

### Ergonomic wing-grip design

- Easier to connect and disconnect than market similars
- 360° of tubing rotation

### Quarter-turn design with closure feedback

- Positive reinforcement of secure connection

### Sizes to fit 1/8" (3.2 mm) and 5/32" (4.0 mm) ID tubing

- Fits almost all cuffs
- 5/32" hose barb perfectly fits most common cuff tube size

### 200 Series single barbs

- Ease of assembly
- Enhanced resistance to tube pulloff

### Medical grade ABS material (fluid path)

- Withstands bulk sterilization processes
- Holds up under demanding application conditions

### Acetal (Wing-grip shroud)

- Added strength



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**BPLF230 (-8012)**
Quarter-turn Female Blood Pressure Cuff Connector to 200 Series Barb, 1/8" (3.2 mm) Tubing ID

**BPLF240 (-8012)**
Quarter-turn Female Blood Pressure Cuff Connector to 200 Series Barb, 5/32" (4.0 mm) Tubing ID

**BPLM230 (-001) White ABS, White Acetal, Buna-N O-Ring**
Quarter-turn Male Blood Pressure Cuff Connector to 200 Series Barb, 1/8" (3.2 mm) Tubing ID

**BPLM240 (-001) White ABS, White Acetal, Buna-N O-Ring**
Quarter-turn Male Blood Pressure Cuff Connector to 200 Series Barb, 5/32" (4.0 mm) Tubing ID

**Part Drawings Online!**
Value Plastics provides dimensional drawings available for download for all of its fittings.
**www.valueplastics.com**





**BPF220 (-001) Black ABS Housing**
Bayonet-Style Female Quick Connect Fitting, 200 Series Barb, 3/32" (2.4 mm) ID Tubing

**BPF230 (-001) Black ABS Housing**
Bayonet-Style Female Quick Connect Fitting, 200 Series Barb, 1/8" (3.2 mm) ID Tubing

**BPF240 (-001) Black ABS Housing**
Bayonet-Style Female Quick Connect Fitting, 200 Series Barb, 5/32" (4.0 mm) ID Tubing

**BPF250 (-001) Black ABS Housing**
Bayonet-Style Female Quick Connect Fitting, 200 Series Barb, 3/16" (4.8 mm) ID Tubing

# Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

# Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

# Resin Reference


**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties






## BLOOD PRESSURE: Bayonet Male Cuff Connectors

**BPM013 (-1)**
Blood Pressure Monitor Bayonet Connector to 500 Series Barb, 1/8" (3.2 mm) ID Tubing

*works with...*

**BPM240 (-1)**
Blood Pressure Monitor Bayonet Connector to 200 Series Barb, 5/32" (4.0 mm) ID Tubing

*works with...*

**BPM025 (-1)**
Blood Pressure Monitor Bayonet Connector to 500 Series Barb, 5/32" (4.0 mm) ID Tubing

*works with...*

**BPM035 (-1)**
Blood Pressure Monitor Bayonet Connector to 500 Series Barb, 3/16" (4.8 mm) ID Tubing

*works with...*

**BPMMTLL (-1 -5)**
Blood Pressure Monitor Bayonet Connector to Male Luer Integral Lock Ring

*works with...*

## BLOOD PRESSURE: Bayonet Panel Mount Connectors

**BPMB230 (-1)**
Blood Pressure Monitor Bayonet Panel Mount Connector to 200 Series Barb, 1/4-28 UNF Thread, 1/8" (3.2 mm) ID Tubing

*works with...*

**BPMB240 (-1)**
Blood Pressure Monitor Bayonet Panel Mount Connector to 200 Series Barb, 5/16-24 UNF Thread, 5/32" (4.0 mm) ID Tubing

*works with...*

**BPMB250 (-1)**
Blood Pressure Monitor Bayonet Panel Mount Connector to 200 Series Barb, 3/8-24 UNF Thread, 3/16" (4.8 mm) ID Tubing

*works with...*

## BLOOD PRESSURE: Panel Mount Nuts

**PMSN (-XO)**
Panel Mount Nut 1/4-28 UNF with 7/16" Hex (For use with BPMB230)

**PM3N (-XO)**
Panel Mount Nut 5/16-24 UNF Zinc-Plated Class 2 Steel Nut (For use with BPMB240)

**PM2N (-XO)**
Panel Mount Nut 3/8-24 UNF Zinc-Plated Class 2 Steel Nut (For Use with BPMB250)

## BLOOD PRESSURE: Dinamap® Monitor Adapters

**BPAM (-001) Black Nylon over White Nylon**
Blood Pressure Monitor Bayonet Connector to Internal 5/16-24 UNF Thread and O-Ring

*works with...*

**BPA013 (-001) Black Nylon over White Nylon**
Blood Pressure Adapter with Internal 5/16-24 UNF Thread and O-Ring to 500 Series Barb, 1/8" (3.2 mm) ID Tubing

**BPA025 (-001) Black Nylon over White Nylon**
Blood Pressure Adapter with Internal 5/16-24 UNF Thread and O-Ring to 500 Series Barb, 5/32" (4.0 mm) ID Tubing

**BPA035 (-001) Black Nylon over White Nylon**
Blood Pressure Adapter with Internal 5/16-24 UNF Thread and O-Ring to 500 Series Barb, 3/16" (4.8 mm) ID Tubing

**BPA055 (-001) Black Nylon over White Nylon**
Blood Pressure Adapter with Internal 5/16-24 UNF Thread and O-Ring to 500 Series Barb, 1/4" (6.4 mm) ID Tubing

**BPCL220 (-10 -81)**
Blood Pressure Adapter with 5/16-24 UNF Thread and 6% Taper to 200 Series Barb, 3/32" (2.4 mm) ID Tubing

**BPC220 (-10)**
Blood Pressure Adapter with 5/16-24 UNF Thread to 200 Series Barb, 3/32" (2.4 mm) ID Tubing

**BPCL230 (-10 -81)**
Blood Pressure Adapter with 5/16-24 UNF Thread and 6% Internal Taper to 200 Series Barb, 1/8" (3.2 mm) ID Tubing

**BPC230 (-10)**
Blood Pressure Adapter with 5/16-24 UNF Thread to 200 Series Barb, 1/8" (3.2 mm) ID Tubing

**BPCL025 (-10)**
Blood Pressure Adapter with 5/16-24 UNF Thread 6% Internal Taper to 500 Series Barb, 5/32" (4.0 mm) ID Tubing

**BPC025 (-10)**
Blood Pressure Adapter with 5/16-24 UNF Thread to 500 Series Barb, 5/32" (4.0 mm) ID Tubing

**BPCL240 (-10 -81)**
Blood Pressure Adapter with 5/16-24 UNF Thread and 6% Internal Taper to 200 Series Barb, 5/32" (4.0 mm) ID Tubing

**BPC240 (-10)**
Blood Pressure Adapter with 5/16-24 UNF Thread to 200 Series Barb, 5/32" (4.0 mm) ID Tubing

**BPCL250 (-10 -81)**
Blood Pressure Adapter with 5/16-24 UNF Thread and 6% Internal Taper to 200 Series Barb, 3/16" (4.8 mm) ID Tubing

**BPC250 (-10)**
Blood Pressure Adapter with 5/16-24 UNF Thread to 200 Series Barb, 3/16" (4.8 mm) ID Tubing

**CF229 (-1)**
Neonatal Blood Pressure Slip Fit (non luer) with 200 Series Barb, 3/32" (2.4 mm) ID Tubing

**CF230 (-1)**
Neonatal Blood Pressure Slip Fit (non luer) with 200 Series Barb, 5/32" (4.0 mm) ID Tubing

**Did you know?**

Value Plastics has an Interactive PDF available online at **www.valueplastics.com**. Access part drawings, reference charts, data sheets, and more from just one location!

BLOOD PRESSURE

# Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

# TAPERED SEAL CONNECTORS

Small Bore
**PG-40**

Large Bore Male
**PG-41**

Large Bore Female
**PG-41**

Plugs and Caps
**PG-41**

## SMALL BORE CONNECTORS:
Male and Female

**TSC2M210 (-6005)**
Male Taper Seal Non-Luer Connector to 200 Series Barb, 1/16" (1.6 mm) ID Tubing

**TSC2M013 (-6005)**
Male Taper Seal Non-Luer Connector to 500 Series Barb, 1/8" (3.2 mm) ID Tubing

**TSC2M035 (-6005)**
Male Taper Seal Non-Luer Connector to 500 Series Barb, 3/16" (4.8 mm) ID Tubing

**TSC2F210 (-6005)**
Female Taper Seal Non-Luer Connector to 200 Series Barb, 1/16" (1.6 mm) ID Tubing

**TSC2F007 (-6005)**
Female Taper Seal Non-Luer Connector to 500 Series Barb, 3/32" (2.4 mm) ID Tubing

**TSC2F013 (-6005)**
Female Taper Seal Non-Luer Connector to 500 Series Barb, 1/8" (3.2 mm) ID Tubing

**TSC2F035 (-6005)**
Female Taper Seal Non-Luer Connector to 500 Series Barb, 3/16" (4.8 mm) ID Tubing

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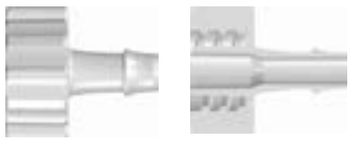
## SMALL BORE CONNECTORS: Female and Cap

**TSC2FB230 (-6005)**
Female Taper Seal Non-Luer with 1/4-28 UNF Panel Mount to 200 Series Barb, 1/8" (3.2 mm) ID Tubing

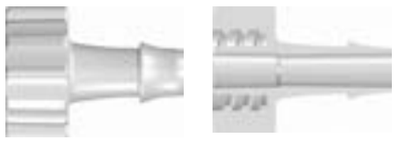
**TSC2MP (-6005) 1,000 piece minimum**
Male Taper Seal Non-Luer Plug with Tether Recess

## LARGE BORE CONNECTORS: Male

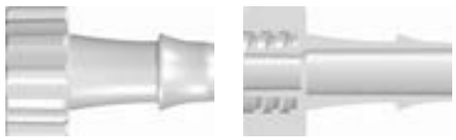
**MLB035 (-1 -8012 -9)**
Male Large Bore Non-Luer Connector to 500 Series Barb, 3/16" (4.8 mm) ID Tubing



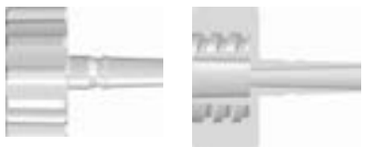
**MLB055 (-1 -8012 -9)**
Male Large Bore Non-Luer Connector to 500 Series Barb, 1/4" (6.4 mm) ID Tubing



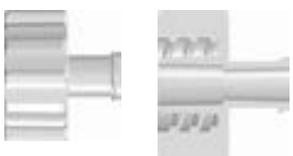
**MLB065 (-1 -8012 -9)**
Male Large Bore Non-Luer Connector to 500 Series Barb, 5/16" (8.0 mm) ID Tubing



**MLBC7 (-9002)**
Male Large Bore Non-Luer Connector with Integral Lock Ring to Male Slip Luer (May be Used with Separate Rotating Lock Ring; FSLLR)



**MLBC8 (-9002)**
Male Large Bore Non-Luer Connector with Integral Lock Ring to Female Thread-Style Locking Luer



## LARGE BORE CONNECTORS: Female

**FLB035 (-1 -8012 -9)**
Female Large Bore Non-Luer Connector to 500 Series Barb, 3/16" (4.8 mm) ID Tubing

**FLB055 (-1 -2 -8012 -9)**
Female Large Bore Non-Luer Connector to 500 Series Barb, 1/4" (6.4 mm) ID Tubing

**FLB065 (-1 -8012 -9)**
Female Large Bore Non-Luer Connector to 500 Series Barb, 5/16" (8.0 mm) ID Tubing

## LARGE BORE CONNECTORS: Plugs and Caps

**FLBP (-1 -8012 -9)**
Female Large Bore Non-Luer Cap

**MLBP (-1 -2 -8012 -9 -9002)**
Male Large Bore Non-Luer Plug

**Need more details?**

Part drawings, minimum order quantities, and CAD requests can be found online. Visit **www.valueplastics.com** or contact Sales at **sales@valueplastics.com**

TAPERED SEAL

# Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

# TUBE-TO-TUBE CONNECTORS

Straight Throughs
**PG-43**

Straight Through Reducers
**PG-45**

Elbows
**PG-48**

Elbow Reducers
**PG-49**

Tees
**PG-50**

Tee Reducers
**PG-51**

Ys
**PG-53**

Multiports
**PG-54**

Press-in Plugs
**PG-56**

Ultrasonically Weldable Barbs
**PG-57**

Panel Mounts and Accessories
**PG-57**

Custom Tube-To-Tube Fittings
**PG-11**

Value Plastics offers barbed tube fittings and tubing connectors in sizes ranging from 1/16" (1.6 mm) to 1" (25.4 mm) tubing ID in over 100 separate configurations in nylon, polypropylene, polycarbonate and PVDF, with other engineering resins available on special order. Available barbed fitting styles include straight tube connectors, elbow fittings, tee fittings, crosses, Y (wye) connectors, multi-port connectors, and multiple straight, elbow and tee reducer combinations.

Several barb styles are offered to provide designers the widest range of assembly forces, pulloff resistance and blowoff resistance – without the need for clamps. Review the descriptions for each of the styles to determine what's best for your application.

## Small Bore Barb Styles

| Tube ID | Classic | 200 Series | 400 Series | 500 Series |
|---|---|---|---|---|
| 1/16" (1.6 mm) | X | X | X | X |
| 3/32" (2.4 mm) | X | X | X | X |
| 1/8" (3.2 mm) | X | X | X | X |
| 5/32" (4.0 mm) | X | X | X | X |
| 3/16" (4.8 mm) | X | X | X | X |
| 1/4" (6.4 mm) | X | X | X | X |
| 5/16" (8.0 mm) | | | | X |

## Large Bore Barb Styles

| Tube ID | 500 Series | 600 Series | 900 Series |
|---|---|---|---|
| 3/8" (9.5 mm) | X | X | X |
| 1/2" (12.7 mm) | X | X | X |
| 5/8" (16.0 mm) | X | X | |
| 3/4" (19.0 mm) | X | X | |
| 1" (25.4 mm) | X | X | |

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**N004 (-1 -2 -6005 -9 -J1A)**
Straight Through Connector with 500 Series Barbs, 1/16" (1.6 mm) ID Tubing

**N210 (-1 -2 -6005 -9 -J1A)**
Straight Through Connector with 200 Series Barbs, 1/16" (1.6 mm) ID Tubing

**N410 (-1 -2 -6005 -J1A)**
Straight Through Connector with 400 Series Barbs, 1/16" (1.6 mm) ID Tubing

**AA (-1 -2 -6005 -9 -J1A)**
Straight Through Connector with Classic Series Barbs, 1/16" (1.6 mm) ID Tubing

**N007 (-1 -2 -6005 -9 -J1A)**
Straight Through Connector with 500 Series Barbs, 3/32" (2.4 mm) ID Tubing

**N220 (-1 -2 -6005 -9 -9002 -J1A)**
Straight Through Connector with 200 Series Barbs, 3/32" (2.4 mm) ID Tubing

**N420 (-1 -2 -6005 -J1A)**
Straight Through Connector with 400 Series Barbs, 3/32" (2.4 mm) ID Tubing

**DD (-1 -2 -6005 -9 -J1A)**
Straight Through Connector with Classic Series Barbs, 3/32" (2.4 mm) ID Tubing

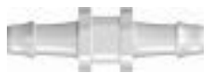
**N013 (-1 -2 -6005 -9 -J1A -9002)**
Straight Through Connector with 500 Series Barbs, 1/8" (3.2 mm) ID Tubing

**N230 (-1 -2 -3 -5 -6005 -9 -J1A)**
Straight Through Connector with 200 Series Barbs, 1/8" (3.2 mm) ID Tubing

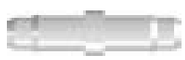
**N430 (-1 -2 -6005 -J1A)**
Straight Through Connector with 400 Series Barbs, 1/8" (3.2 mm) ID Tubing

**CC (-1 -2 -6005 -9 -J1A)**
Straight Through Connector with Classic Series Barbs, 1/8" (3.2 mm) ID Tubing

**N025 (-1 -2 -6005 -9 -J1A)**
Straight Through Connector with 500 Series Barbs, 5/32" (4.0 mm) ID Tubing



**N440 (-1 -2 -5 -6005 -9 -J1A)**
Straight Through Connector with 400 Series Barbs, 5/32" (4.0 mm) ID Tubing



**4040 (-1 -2 -6005 -9 -J1A)**
Straight Through Connector with Classic Series Barbs, 5/32" (4.0 mm) ID Tubing

**Need samples for evaluation?**
You can call to request most of our standard product in quantities of 5, or less, for free **application evaluation.**
**+1 (970) 267-5200 Toll Free: (888) 404-5837**

TUBE-TO-TUBE FITTINGS

# Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

# LARGE TUBE-TO-TUBE:
Straight Through

## Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

TUBE-TO-TUBE FITTINGS

**N035 (-1 -2 -6005 -9 -J1A)**
Straight Through Connector with 500 Series Barbs, 3/16" (4.8 mm) ID Tubing

**5050 (-1 -2 -6005 -9 -9002 -J1A)**
Straight Through Connector with Classic Series Barbs, 3/16" (4.8 mm) ID Tubing

**N055 (-1 -2 -6005 -9 -J1A)**
Straight Through Connector with 500 Series Barbs, 1/4" (6.4 mm) ID Tubing

**6060 (-1 -2 -6005 -9 -9002 -J1A)**
Straight Through Connector with Classic Series Barbs, 1/4" (6.4 mm) ID Tubing

**N065 (-1 -2 -6005 -9 -J1A)**
Straight Through Connector with 500 Series Barbs, 5/16" (8 mm) ID Tubing

**Part Drawings Online!**
Value Plastics provides dimensional drawings available for download for all of its fittings.
**www.valueplastics.com**

**Reference part shown: N670**

Due to size we are not able to display all large Tube-To-Tube connectors. Please see **www.valueplastics.com** for part reference. Minimum package quantities vary by tube IDs, please verify minimum package sizes when placing orders.

**N070 (-0 -6005 -9)**
Straight Through Connector with 500 Series Barbs, 3/8" (9.5 mm) ID Tubing

**N670 (-6005 -9 -J1A)**
Straight Through Connector with 600 Series Barbs, 3/8" (9.5 mm) ID Tubing

**N970 (-9)**
Straight Through Connector with 900 Series Barbs, 3/8" (9.5 mm) ID Tubing

**N080 (-0 -6005 -9)**
Straight Through Connector with 500 Series Barbs, 1/2" (12.7 mm) ID Tubing

**N680 (-6005 -9 -J1A)**
Straight Through Connector with 600 Series Barbs, 1/2" (12.7 mm) ID Tubing

**N975 (-9)**
Straight Through Connector with 900 Series Barbs, 1/2" (12.7 mm) ID Tubing

**N090 (-0 -6005 -9)**
Straight Through Connector with 500 Series Barbs, 5/8" (16.0 mm) ID Tubing

**N690 (-0 -6005 -9)**
Straight Through Connector with 600 Series Barbs, 5/8" (16.0 mm) ID Tubing

**N100 (-0 -6005)**
Straight Through Connector with 500 Series Barbs, 3/4" (19.0 mm) ID Tubing

**N110 (-0 -6005)**
Straight Through Connector with 500 Series Barbs, 1" (25.4 mm) ID Tubing

**N007/004 (-1 -2 -6005 -9 -J1A)**
Straight Through Reduction Connector with 500 Series Barbs, 3/32" (2.4 mm) and 1/16" (1.6 mm) ID Tubing

**N220/210 (-1 -2 -6005 -9 -J1A)**
Straight Through Reduction Connector with 200 Series Barbs, 3/32" (2.4 mm) and 1/16" (1.6 mm) ID Tubing

**N420/410 (-1 -2 -6005 -10 -J1A)**
Straight Through Reduction Connector with 400 Series Barbs, 3/32" (2.4 mm) and 1/16" (1.6 mm) ID Tubing

**AD (-1 -2 -6005 -9 -J1A)**
Straight Through Reduction Connector with Classic Series Barbs, 3/32" (2.4 mm) and 1/16" (1.6 mm) ID Tubing

**N013/004 (-1 -2 -6005 -9 -J1A)**
Straight Through Reduction Connector with 500 Series Barbs, 1/8" (3.2 mm) and 1/16" (1.6 mm) ID Tubing

**N230/210 (-1 -2 -6005 -9 -J1A)**
Straight Through Reduction Connector with 200 Series Barbs, 1/8" (3.2 mm) and 1/16" (1.6 mm) ID Tubing

**N430/410 (-1 -2 -6005 -J1A)**
Straight Through Reduction Connector with 400 Series Barbs, 1/8" (3.2 mm) and 1/16" (1.6 mm) ID Tubing

**AC (-0 -1 -2 -6005 -9 -J1A)**
Straight Through Reduction Connector with Classic Series Barbs, 1/8" (3.2 mm) and 1/16" (1.6 mm) ID Tubing

**N025/004 (-1 -2 -6005 -9 -J1A)**
Straight Through Reduction Connector with 500 Series Barbs, 5/32" (4.0 mm) and 1/16" (1.6 mm) ID Tubing

**1040 (-1 -2 -6005 -9 -J1A)**
Straight Through Reduction Connector with Classic Series Barbs, 5/32" (4.0 mm) and 1/16" (1.6 mm) ID Tubing

**1050 (-1 -2 -6005 -9 -J1A)**
Straight Through Reduction Connector with Classic Series Barbs, 3/16" (4.8 mm) and 1/16" (1.6 mm) ID Tubing

**N013/007 (-1 -2 -6005 -9 -9002 -J1A)**
Straight Through Reduction Connector with 500 Series Barbs, 1/8" (3.2 mm) and 3/32" (2.4 mm) ID Tubing

**N230/220 (-1 -2 -6005 -07 -9 -J1A)**
Straight Through Reduction Connector with 200 Series Barbs, 1/8" (3.2 mm) and 3/32" (2.4 mm) ID Tubing

**N430/420 (-1 -2 -6005 -J1A)**
Straight Through Reduction Connector with 400 Series Barbs, 1/8" (3.2 mm) and 3/32" (2.4 mm) ID Tubing

**DC (-1 -2 -6005 -9)**
Straight Through Reduction Connector with Classic Series Barbs, 1/8" (3.2 mm) and 3/32" (2.4 mm) ID Tubing

TUBE-TO-TUBE FITTINGS

# Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

# TUBE-TO-TUBE:
Straight Through Reducer

## Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

TUBE-TO-TUBE FITTINGS

**N025/007 (-1 -2 -6005 -9 -J1A)**
Straight Through Reduction Connector with 500 Series Barbs, 5/32" (4.0 mm) and 3/32" (2.4 mm) ID Tubing

**2040 (-1 -2 -6005 -9 -J1A)**
Straight Through Reduction Connector with Classic Series Barbs, 5/32" (4.0 mm) and 3/32" (2.4 mm) ID Tubing

**N035/007 (-1 -2 -6005 -9 -J1A)**
Straight Through Reduction Connector with 500 Series Barbs, 3/16" (4.8 mm) and 3/32" (2.4 mm) ID Tubing

**2050 (-1 -2 -6005 -9 -J1A)**
Straight Through Reduction Connector with Classic Series Barbs, 3/16" (4.8 mm) and 3/32" (2.4 mm) ID Tubing

**N025/013 (-1 -2 -6005 -9 -J1A)**
Straight Through Reduction Connector with 500 Series Barbs, 5/32" (4.0 mm) and 1/8" (3.2 mm) ID Tubing

**3040 (-1 -2 -6005 -9 -J1A)**
Straight Through Reduction Connector with Classic Series Barbs, 5/32" (4.0 mm) and 1/8" (3.2 mm) ID Tubing

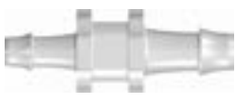
**N035/013 (-1 -2 -6005 -81 -9 -J1A)**
Straight Through Reduction Connector with 500 Series Barbs, 3/16" (4.8 mm) and 1/8" (3.2 mm) ID Tubing

**3050 (-1 -2 -5 -6005 -81 -9 -9002 -J1A)**
Straight Through Reduction Connector with Classic Series Barbs, 3/16" (4.8 mm) and 1/8" (3.2 mm) ID Tubing

**N055/013 (-1 -2 -6005 -9 -J1A)**
Straight Through Reduction Connector with 500 Series Barbs, 1/4" (6.4 mm) and 1/8" (3.2 mm) ID Tubing

**3060 (-1 -2 -6005 -9 -J1A -J1A2)**
Straight Through Reduction Connector with Classic Series Barbs, 1/4" (6.4 mm) and 1/8" (3.2 mm) ID Tubing

**N035/025 (-1 -2 -6005 -9 -J1A)**
Straight Through Reduction Connector with 500 Series Barbs, 3/16" (4.8 mm) and 5/32" (4.0 mm) ID Tubing



**4050 (-1 -2 -6005 -9 -J1A)**
Straight Through Reduction Connector with Classic Series Barbs, 3/16" (4.8 mm) and 5/32" (4.0 mm) ID Tubing

**N055/025 (-1 -2 -6005 -9 -J1A)**
Straight Through Reduction Connector with 500 Series Barbs, 1/4" (6.4 mm) and 5/32" (4.0 mm) ID Tubing

### Did you know?

Value Plastics has an Interactive PDF available online at **www.valueplastics.com**. Access part drawings, reference charts, data sheets, and more from just one location!

**4060 (-1 -2 -6005 -9 -J1A)**
Straight Through Reduction Connector with Classic Series Barbs, 1/4" (6.4 mm) and 5/32" (4.0 mm) ID Tubing

**N065/025 (-1 -2 -6005 -9 -J1A)**
Straight Through Reduction Connector with 500 Series Barbs, 5/16" (8.0 mm) and 5/32" (4.0 mm) ID Tubing

**N055/035 (-1 -2 -6005 -9 -J1A)**
Straight Through Reduction Connector with 500 Series Barbs, 1/4" (6.4 mm) and 3/16" (4.8 mm) ID Tubing

**5060 (-1 -2 -6005 -9 -9002 -J1A)**
Straight Through Reduction Connector with Classic Series Barbs, 1/4" (6.4 mm) and 3/16" (4.8 mm) ID Tubing

**N065/035 (-1 -2 -6005 -9 -J1A)**
Straight Through Reduction Connector with 500 Series Barbs, 5/16" (8.0 mm) and 3/16" (4.8 mm) ID Tubing

**N065/055 (-1 -2 -6005 -9 -J1A)**
Straight Through Reduction Connector with 500 Series Barbs, 5/16" (8.0 mm) and 1/4" (6.4 mm) ID Tubing

**Reference part shown: N070/013**

Due to size we are not able to display all large Tube-To-Tube connectors. Please see **www.valueplastics.com** for part reference. Minimum package quantities vary by tube IDs, please verify minimum package sizes when placing orders.

**N070/013 (-0 -6005 -9 -9002 -J1A)**
Straight Through Reduction Connector with 500 Series Barbs, 3/8" (9.5 mm) and 1/8" (3.2 mm) ID Tubing

**N670/655 (-6005 -9 -J1A)**
Straight Through Reduction Connector with 600 Series Barbs, 3/8" (9.5 mm) and 1/4" (6.4 mm) ID Tubing

**N680/655 (-6005 -9 -J1A)**
Straight Through Reduction Connector with 600 Series Barbs, 1/2" (12.7 mm) and 1/4" (6.4 mm) ID Tubing

**N680/670 (-6005 -9)**
Straight Through Reduction Connector with 600 Series Barbs, 1/2" (12.7 mm) and 3/8" (9.5 mm) ID Tubing

**N690/655 (-6005 -9)**
Straight Through Reduction Connector with 600 Series Barbs, 5/8" (16.0 mm) and 1/4" (6.4 mm) ID Tubing

**N690/670 (-6005 -9)**
Straight Through Reduction Connector with 600 Series Barbs, 5/8" (16.0 mm) and 3/8" (9.5 mm) ID Tubing

**N6110/6100 (-6005 -9)**
Straight Through Reduction Connector with 600 Series Barbs, 1" (25.4 mm) and 3/4" (19.0 mm) ID Tubing

**N070/055 (-0 -6005 -9)**
Straight Through Reduction Connector with 500 Series Barbs, 3/8" (9.5 mm) and 1/4" (6.4 mm) ID Tubing

**N080/055 (-0 -6005 -9)**
Straight Through Reduction Connector with 500 Series Barbs, 1/2" (12.7 mm) and 1/4" (6.4 mm) ID Tubing

**N090/055 (-0 -6005)**
Straight Through Reduction Connector with 500 Series Barbs, 5/8" (16.0 mm) and 1/4" (6.4 mm) ID Tubing

**N080/070 (-0 -6005 -9)**
Straight Through Reduction Connector with 500 Series Barbs, 1/2" (12.7 mm) and 3/8" (9.5 mm) ID Tubing

**N090/070 (-0 -6005)**
Straight Through Reduction Connector with 500 Series Barbs, 5/8" (16.0 mm) and 3/8" (9.5 mm) ID Tubing

**N100/080 (-0 -6005)**
Straight Through Reduction Connector with 500 Series Barbs, 3/4" (19.0 mm) and 1/2" (12.7 mm) ID Tubing

**N110/100 (-0 -6005)**
Straight Through Reduction Connector with 500 Series Barbs, 1" (25.4 mm) and 3/4" (19.0 mm) ID Tubing



# Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

## Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

TUBE-TO-TUBE FITTINGS

**L210 (-1 -2 -6005 -9 -J1A)**
Elbow Connector with 200 Series Barbs, 1/16" (1.6 mm) ID Tubing

**L410 (-1 -2 -6005 -J1A)**
Elbow Connector with 400 Series Barbs, 1/16" (1.6 mm) ID Tubing

**L10 (-1 -2 -6005 -J1A)**
Elbow Connector with Classic Series Barbs, 1/16" (1.6 mm) ID Tubing

**L220 (-1 -2 -6005 -9 -9002 -J1A)**
Elbow Connector with 200 Series Barbs, 3/32" (2.4 mm) ID Tubing

**L420 (-1 -2 -6005 -J1A)**
Elbow Connector with 400 Series Barbs, 3/32" (2.4 mm) ID Tubing

**L20 (-1 -2 -6005 -J1A)**
Elbow Connector with Classic Series Barbs, 3/32" (2.4 mm) ID Tubing

**L230 (-1 -2 -6005 -9 -J1A)**
Elbow Connector with 200 Series Barbs, 1/8" (3.2 mm) ID Tubing

**L430 (-1 -2 -6005 -J1A)**
Elbow Connector with 400 Series Barbs, 1/8" (3.2 mm) ID Tubing

**L30 (-1 -2 -6005 -J1A)**
Elbow Connector with Classic Series Barbs, 1/8" (3.2 mm) ID Tubing

**L440 (-2)**
Elbow Connector with 400 Series Barbs, 5/32" (4.0 mm) ID Tubing

**L40 (-1 -2 -6005 -J1A)**
Elbow Connector with Classic Series Barbs, 5/32" (4.0 mm) ID Tubing

**L50 (-1 -2 -6005 -J1A)**
Elbow Connector with Classic Series Barbs, 3/16" (4.8 mm) ID Tubing

**L60 (-1 -2 -6005 -J1A)**
Elbow Connector with Classic Series Barbs, 1/4" (6.4 mm) ID Tubing

**Need more details?**

Part drawings, minimum order quantities, and CAD requests can be found online. Visit **www.valueplastics.com** or contact Sales at **sales@valueplastics.com**

**Reference part shown: L070**

Due to size we are not able to display all large Tube-To-Tube connectors. Please see **www.valueplastics.com** for part reference. Minimum package quantities vary by tube IDs, please verify minimum package sizes when placing orders.

**L070 (-0 -6005)**
Elbow Connector with 500 Series Barbs, 3/8" (9.5 mm) ID Tubing

**L970 (-9)**
Elbow Connector with 900 Series Barbs, 3/8" (9.5 mm) ID Tubing

**L080 (-0 -6005)**
Elbow Connector with 500 Series Barbs, 1/2" (12.7 mm) ID Tubing

**L975 (-9)**
Elbow Connector with 900 Series Barbs, 1/2" (12.7 mm) ID Tubing

**L090 (-0 -6005)**
Elbow Connector with 500 Series Barbs, 5/8" (16.0 mm) ID Tubing

**L100 (-0 -6005)**
Elbow Connector with 500 Series Barbs, 3/4" (19.0 mm) ID Tubing

**L110 (-0 -6005)**
Elbow Connector with 500 Series Barbs, 1" (25.4 mm) ID Tubing

**L6110 (-6005)**
Elbow Connector with 600 Series Barbs, 1" (25.4 mm) ID Tubing

**CF494 (-6 -6005)**
Low-profile Elbow Connector with Custom 600 Series Barbs, 1" (25.4 mm) ID Tubing





**L220/210 (-1 -2 -6005 -9 -J1A)**
Elbow Reduction Connector with 200 Series Barbs, 3/32" (2.4 mm) and 1/16" (1.6 mm) ID Tubing

**L420/410 (-1 -2 -6005 -J1A)**
Elbow Reduction Connector with 400 Series Barbs, 3/32" (2.4 mm) and 1/16" (1.6 mm) ID Tubing

**L230/210 (-1 -2 -6005 -9 -J1A)**
Elbow Reduction Connector with 200 Series Barbs, 1/8" (3.2 mm) and 1/16" (1.6 mm) ID Tubing

**L430/410 (-1 -2 -6005 -J1A)**
Elbow Reduction Connector with 400 Series Barbs, 1/8" (3.2 mm) and 1/16" (1.6 mm) ID Tubing

**L230/220 (-1 -2 -6005 -9 -J1A)**
Elbow Reduction Connector with 200 Series Barbs, 1/8" (3.2 mm) and 3/32" (2.4 mm) ID Tubing

**L430/420 (-1 -2 -6005 -J1A)**
Elbow Reduction Connector with 400 Series Barbs, 1/8" (3.2 mm) and 3/32" (2.4 mm) ID Tubing

**L430/220 (-9002)**
Elbow Reduction Connector with a 400 Series Barb, 1/8" (3.2 mm) and a 200 Series Barb, 3/32" (2.4 mm) ID Tubing

TUBE-TO-TUBE FITTINGS

# Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

# Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference


**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties




## LARGE TUBE-TO-TUBE: Elbow Reducer

**Reference part shown: L070/055**

Due to size we are not able to display all large Tube-To-Tube connectors. Please see **www.valueplastics.com** for part reference. Minimum package quantities vary by tube IDs, please verify minimum package sizes when placing orders.

**L070/055 (-0 -6005)**
Elbow Reduction Connector with 500 Series Barbs, 3/8" (9.5 mm) and 1/4" (6.4 mm) ID Tubing

**L080/070 (-0 -6005)**
Elbow Reduction Connector with 500 Series Barbs, 1/2" (12.7 mm) and 3/8" (9.5 mm) ID Tubing

**L100/080 (-0 -6005)**
Elbow Reduction Connector with 500 Series Barbs, 3/4" (19.0 mm) and 1/2" (12.7 mm) ID Tubing

**L110/100 (-0 -6005)**
Elbow Reduction Connector with 500 Series Barbs, 1" (25.4 mm) and 3/4" (19.0 mm) ID Tubing

## TUBE-TO-TUBE: Tee

**T210 (-1 -2 -6005 -9 -J1A)**
Tee Connector with 200 Series Barbs, 1/16" (1.6 mm) ID Tubing

**T410 (-1 -2 -6005 -J1A)**
Tee Connector with 400 Series Barbs, 1/16" (1.6 mm) ID Tubing

**T10 (-1 -2 -6005 -J1A)**
Tee Connector with Classic Series Barbs, 1/16" (1.6 mm) ID Tubing

**T220 (-1 -2 -6005 -9 -J1A)**
Tee Connector with 200 Series Barbs, 3/32" (2.4 mm) ID Tubing

**T420 (-1 -2 -6005 -J1A)**
Tee Connector with 400 Series Barbs, 3/32" (2.4 mm) ID Tubing

## TUBE-TO-TUBE: Tee

**T20 (-1 -2 -6005 -J1A)**
Tee Connector with Classic Series Barbs, 3/32" (2.4 mm) ID Tubing

**T230 (-1 -2 -5 -6005 -9 -J1A)**
Tee Connector with 200 Series Barbs, 1/8" (3.2 mm) ID Tubing

**T250 (-1 -2 -6005 -9 -J1A)**
Tee Connector with 200 Series Barbs, 3/16" (4.8 mm) ID Tubing

**T430 (-1 -2 -6005 -9002 -J1A)**
Tee Connector with 400 Series Barbs, 1/8" (3.2 mm) ID Tubing

**T013 (-6005)**
Tee Connector with 500 Series Barbs, 1/8" (3.2 mm) ID Tubing

**T30 (-1 -2 -6005 -9 -J1A)**
Tee Connector with Classic Series Barbs, 1/8" (3.2 mm) ID Tubing

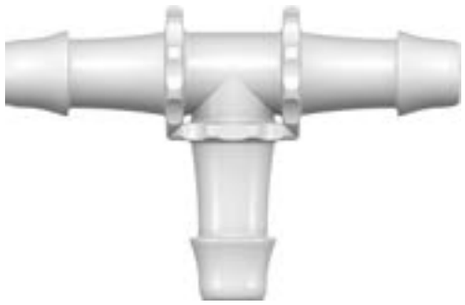
**T40 (-1 -2 -6005 -J1A)**
Tee Connector with Classic Series Barbs, 5/32" (4 mm) ID Tubing

**T055 (-6005)**
Tee Connector with 500 Series Barbs, 1/4" (6.4 mm) ID Tubing

TUBE-TO-TUBE FITTINGS

**T60 (-1 -2 -6005 -9 -J1A)**
Tee Connector with Classic Series Barbs, 1/4" (6.4 mm) ID Tubing

## LARGE TUBE-TO-TUBE:
Tee



**Reference part shown: T070**

Due to size we are not able to display all large Tube-To-Tube connectors. Please see **www.valueplastics.com** for part reference. Minimum package quantities vary by tube IDs, please verify minimum package sizes when placing orders.

**T070 (-0 -6005 -9)**
Tee Connector with 500 Series Barbs, 3/8" (9.5 mm) ID Tubing

**T670 (-1 -6005 -9 -J1A)**
Tee Connector with 600 Series Barbs, 3/8" (9.5 mm) ID Tubing

**T970 (-9)**
Tee Connector with 900 Series Barbs, 3/8" (9.5 mm) ID Tubing

**T080 (-0 -6005 -9)**
Tee Connector with 500 Series Barbs, 1/2" (12.7 mm) ID Tubing

**T680 (-6005 -9 -J1A)**
Tee Connector with 600 Series Barbs, 1/2" (12.7 mm) ID Tubing

**T975 (-9)**
Tee Connector with 900 Series Barbs, 1/2" (12.7 mm) ID Tubing

**T690 (-6005 -9)**
Tee Connector with 600 Series Barbs, 5/8" (16.0 mm) ID Tubing

**T100 (-0 -6005 -9)**
Tee Connector with 500 Series Barbs, 3/4" (19.0 mm) ID Tubing

**T110 (-0 -6005)**
Tee Connector with 500 Series Barbs, 1" (25.4 mm) ID Tubing

**T210/220 (-1 -2 -6005 -9 -J1A)**
Tee Reduction Connector with 400 Series Barbs, 3/32" (2.4 mm) and 1/16" (1.6 mm) ID Tubing

**T410/420 (-1 -2 -6005 -J1A)**
Tee Reduction Connector with 400 Series Barbs, 1/16" (1.6 mm) and 3/32" (2.4 mm) ID Tubing

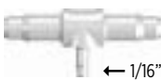
**T420/410 (-1 -2 -6005 -J1A)**
Tee Reduction Connector with 400 Series Barbs, 3/32" (2.4 mm) and 1/16" (1.6 mm) ID Tubing

**T220/210 (-1 -2 -6005 -9 -J1A)**
Tee Reduction Connector with 200 Series Barbs, 3/32" (2.4 mm) and 1/16" (1.6 mm) ID Tubing

**T220R210 (-1 -2 -6005 -9 -J1A)**
Tee Reduction Connector with 200 Series Barbs, 3/32" (2.4 mm) and 1/16" (1.6 mm) ID Tubing

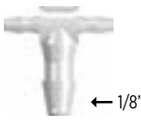
**T420R410 (-1 -2 -6005 -J1A)**
Tee Reduction Connector with 400 Series Barbs, 3/32" (2.4 mm) and 1/16" (1.6 mm) ID Tubing

**T430/410 (-1 -2 -6005 -J1A)**
Tee Reduction Connector with 400 Series Barbs, 1/8" (3.2 mm) and 1/16" (1.6 mm) ID Tubing




**T230/210 (-1 -2 -6005 -9 -J1A)**
Tee Reduction Connector with 200 Series Barbs, 1/8" (3.2 mm) and 1/16" (1.6 mm) ID Tubing

**T210/230 (-1 -2 -6005 -9 -J1A)**
Tee Reduction Connector with 200 Series Barbs, 1/16" (1.6 mm) and 1/8" (3.2 mm) ID Tubing




**T410/430 (-1 -2 -6005 -J1A)**
Tee Reduction Connector with 400 Series Barbs, 1/16" (1.6 mm) and 1/8" (3.2 mm) ID Tubing

TUBE-TO-TUBE FITTINGS

# Material Reference

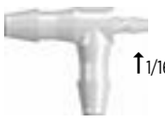
**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

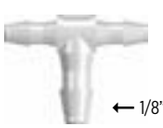
# TUBE-TO-TUBE:
Tee Reducer

**T230R210 (-1 -2 -6005 -9 -J1A)**
Tee Reduction Connector with 200 Series Barbs, 1/8" (3.2 mm) and 1/16" (1.6 mm) ID Tubing

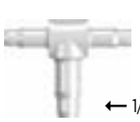



**T430R410 (-1 -2 -6005 -J1A)**
Tee Reduction Connector with 400 Series Barbs, 1/8" (3.2 mm) and 1/16" (1.6 mm) ID Tubing

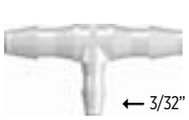
**T220/230 (-1 -2 -6005 -9 -J1A)**
Tee Reduction Connector with 200 Series Barbs, 3/32" (2.4 mm) and 1/8" (3.2 mm) ID Tubing




**T420/430 (-1 -2 -6005 -J1A)**
Tee Reduction Connector with 400 Series Barbs, 3/32" (2.4 mm) and 1/8" (3.2 mm) ID Tubing




**T230/220 (-1 -2 -6005 -9 -J1A)**
Tee Reduction Connector with 200 Series Barbs, 1/8" (3.2 mm) and 3/32" (2.4 mm) ID Tubing

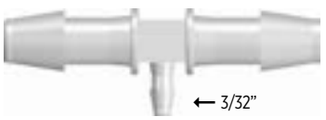



**T430/420 (-1 -2 -3 -6005 -J1A)**
Tee Reduction Connector with 400 Series Barbs, 1/8" (3.2 mm) and 3/32" (2.4 mm) ID Tubing

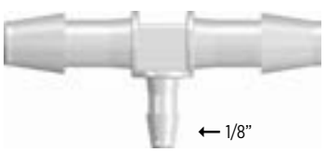
**T230R220 (-1 -2 -6005 -9 -J1A)**
Tee Reduction Connector with 200 Series Barbs, 1/8" (3.2 mm) and 3/32" (2.4 mm) ID Tubing

**T430R420 (-1 -2 -6005 -J1A)**
Tee Reduction Connector with 400 Series Barbs, 1/8" (3.2 mm) and 3/32" (2.4 mm) ID Tubing

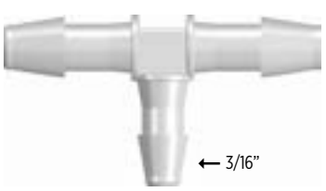
**T360/220 (-1 -2 -6005 -9 -J1A)**
Tee Reduction Connector with 200 and 300 Series Barbs, 1/4" (6.4 mm) and 3/32" (2.4 mm) ID Tubing



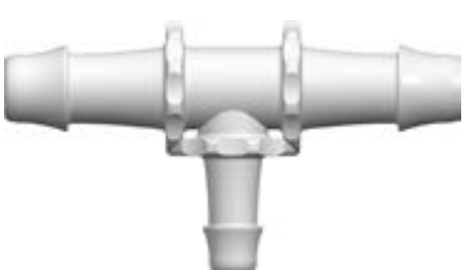

**T360/230 (-1 -2 -6005 -9 -J1A)**
Tee Reduction Connector with 200 and 300 Series Barbs, 1/4" (6.4 mm) and 1/8" (3.2 mm) ID Tubing




**T360/250 (-1 -2 -6005 -9 -J1A)**
Tee Reduction Connector with 200 and 300 Series Barbs, 1/4" (6.4 mm) and 3/16" (4.8 mm) ID Tubing




# LARGE TUBE-TO-TUBE:
Tee



**Reference part shown: T070/055**

Due to size we are not able to display all large Tube-To-Tube connectors. Please see **www.valueplastics.com** for part reference. Minimum package quantities vary by tube IDs, please verify minimum package sizes when placing orders.

**T070/055 (-0 -6005 -9)**
Tee Reduction Connector with 500 Series Barbs, 3/8" (9.5 mm) and 1/4" (6.4 mm) ID Tubing

**T080/055 (-0 -6005 -9)**
Tee Reduction Connector with 500 Series Barbs, 1/2" (12.7 mm) and 1/4" (6.4 mm) ID Tubing

**T080/070 (-0 -6005 -9)**
Tee Reduction Connector with 500 Series Barbs, 1/2" (12.7 mm) and 3/8" (9.5 mm) ID Tubing

**T100/080 (-0 -6005 -9)**
Tee Reduction Connector with 500 Series Barbs, 3/4" (19.0 mm) and 1/2" (12.7 mm) ID Tubing

**T110/100 (-0 -6005)**
Tee Reduction Connector with 500 Series Barbs, 1" (25.4 mm) and 3/4" (19.0 mm) ID Tubing

TUBE-TO-TUBE FITTINGS

# Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

# Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

**Y210 (-1 -2 -6005 -9 -J1A)**
Y Connector with 200 Series Barbs, 1/16" (1.6 mm) ID Tubing

**Y410 (-1 -2 -6005 -J1A)**
Y Connector with 400 Series Barbs, 1/16" (1.6 mm) ID Tubing

**Y220 (-1 -2 -6005 -9 -J1A)**
Y Connector with 200 Series Barbs, 3/32" (2.4 mm) ID Tubing

**Y420 (-1 -2 -6005 -J1A)**
Y Connector with 400 Series Barbs, 3/32" (2.4 mm) ID Tubing

**Y230 (-1 -2 -3 -6005 -9 -9002 -9010 -J1A)**
Y Connector with 200 Series Barbs, 1/8" (3.2 mm) ID Tubing

**Y430 (-1 -2 -6005 -J1A)**
Y Connector with 400 Series Barbs, 1/8" (3.2 mm) ID Tubing

**Y013 (-6005)**
Y Connector with 500 Series Barbs, 1/8" (3.2 mm) ID Tubing

**Y240 (-1 -2 -6005 -9 -J1A)**
Y Connector with 200 Series Barbs, 5/32" (4.0 mm) ID Tubing

**Y250 (-1 -2 -6005 -9 -9002 -J1A)**
Y Connector with 200 Series Barbs, 3/16" (4.8 mm) ID Tubing

**Y450 (-1 -2 -6005 -J1A)**
Y Connector with 400 Series Barbs, 3/16" (4.8 mm) ID Tubing

**Y260 (-1 -2 -6005 -9 -9002 -J1A)**
Y Connector with 200 Series Barbs, 1/4" (6.4 mm) ID Tubing

**Y460 (-1 -2 -6005 -9 -J1A)**
Y Connector with 400 Series Barbs, 1/4" (6.4 mm) ID Tubing

TUBE-TO-TUBE FITTINGS

# Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

# Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference


**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties




TUBE-TO-TUBE FITTINGS

## TUBE-TO-TUBE: Y

**Y055 (-6005)**
Y Connector with 500 Series Barbs, 1/4" (6.4 mm) ID Tubing

## LARGE TUBE-TO-TUBE: Y

**Reference part shown: Y070**

Due to size we are not able to display all large Tube-To-Tube connectors. Please see **www.valueplastics.com** for part reference. Minimum package quantities vary by tube IDs, please verify minimum package sizes when placing orders.

**Y070 (-0 -6005 -9)**
Y Connector with 500 Series Barbs, 3/8" (9.5 mm) ID Tubing

**Y670 (-6005 -9 -J1A)**
Y Connector with 600 Series Barbs, 3/8" (9.5 mm) ID Tubing

**Y080 (-0 -6005 -9)**
Y Connector with 500 Series Barbs, 1/2" (12.7 mm) ID Tubing

**Y680 (-6005 -9 -J1A)**
Y Connector with 600 Series Barbs, 1/2" (12.7 mm) ID Tubing

**Y090 (-0 -6005 -J1A)**
Y Connector with 500 Series Barbs, 5/8" (16.0 mm) ID Tubing

**Y100 (-0 -6005 -J1A)**
Y Connector with 500 Series Barbs, 3/4" (19.0 mm) ID Tubing

**Y110 (-0 -6005 )**
Y Connector with 500 Series Barbs, 1" (25.4 mm) ID Tubing

## TUBE-TO-TUBE: Multiport

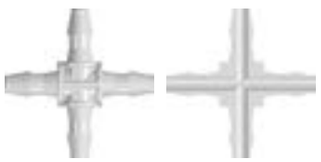
**3PF210 (-1 -6005)**
Three-port F Style Manifold with 200 Series Barbs for 1/16" (1.6 mm) ID Tubing

**3PF220 (-1 -6005)**
Three-port F Style Manifold with 200 Series Barbs for 3/32" (2.4 mm) ID Tubing

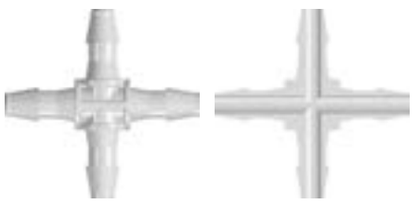
**3PF230 (-1 -6005)**
Three-port F Style Manifold with 200 Series Barbs for 1/8" (3.2 mm) ID Tubing

**4PX210 (-1 -6005)**
Four-port Cross Style Manifold with 200 Series Barbs for 1/16" (1.6 mm) ID Tubing

**4PX220 (-1 -6005)**
Four-port Cross Style Manifold with 200 Series Barbs for 3/32" (2.4 mm) ID Tubing



**4PX230 (-1 -6005)**
Four-port Cross Style Manifold with 200 Series Barbs for 1/8" (3.2 mm) ID Tubing



**4PDL210 (-1 -6005)**
Four-port Double Elbow Style Manifold with 200 Series Barbs, 1/16" (1.6 mm) ID Tubing

**4PDL220 (-1 -6005)**
Four-port Double Elbow Style Manifold with 200 Series Barbs, 3/32" (2.4 mm) ID Tubing

**4PDL230 (-1 -6005)**
Four-port Double Elbow Style Manifold with 200 Series Barbs, 1/8" (3.2 mm) ID Tubing

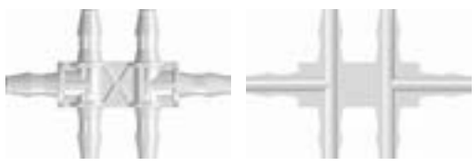
**4PLL210 (-1 -6005)**
Four-port Thru Flow Double Elbow Style Manifold with 200 Series Barbs, 1/16" (1.6 mm) ID Tubing

**4PLL220 (-1 -6005 -9)**
Four-port Thru Flow Double Elbow Style Manifold with 200 Series Barbs, 3/32" (2.4 mm) ID Tubing

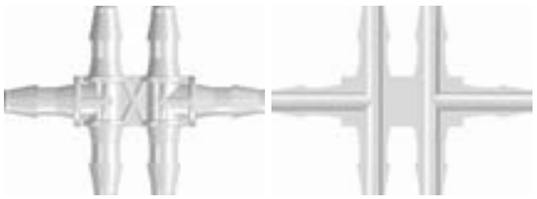
**4PLL230 (-1 -2 -6005)**
Four-port Thru Flow Double Elbow Style Manifold with 200 Series Barbs, 1/8" (3.2 mm) ID Tubing

**6PDT210 (-1 -6005)**
Six-port Double T Style Manifold with 200 Series Barbs for 1/16" (1.6 mm) ID Tubing

**6PDT220 (-1 -6005)**
Six-port Double T Style Manifold with 200 Series Barbs for 3/32" (2.4 mm) ID Tubing



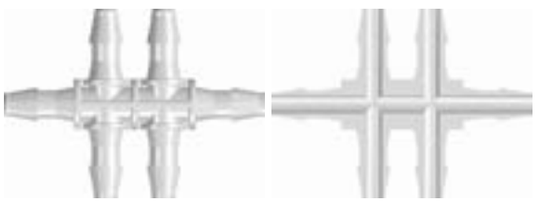
**6PDT230 (-1 -6005)**
Six-port Double T Style Manifold with 200 Series Barbs for 1/8" (3.2 mm) ID Tubing



**6PTT210 (-1 -6005)**
Six-port Thru Flow Double T Style Manifold with 200 Series Barbs for 1/16" (1.6 mm) ID Tubing

**6PTT220 (-1 -6005)**
Six-port Thru Flow Double T Style Manifold with 200 Series Barbs for 3/32" (2.4 mm) ID Tubing

**6PTT230 (-1 -6005)**
Six-port Thru Flow Double T Style Manifold with 200 Series Barbs for 1/8" (3.2 mm) ID Tubing



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# Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

# TUBE-TO-TUBE:
Press-In Plugs

## Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

TUBE-TO-TUBE FITTINGS

**PIP210 (-1 -2 -6005 -J1A)**
Press-In Plug with 200 Series Barb, 1/16" (1.6 mm) ID Tubing

**PIP10 (-1 -2 -6005 -J1A)**
Press-In Plug with Classic Series Barb, 1/16" (1.6 mm) ID Tubing

**PIP220 (-1 -2 -6005 -J1A)**
Press-In Plug with 200 Series Barb, 3/32" (2.4 mm) ID Tubing

**PIP20 (-1 -2 -6005 -J1A)**
Press-In Plug with Classic Series Barb, 3/32" (2.4 mm) ID Tubing

**PIP230 (-1 -2 -6005 -J1A)**
Press-In Plug with 200 Series Barb, 1/8" (3.2 mm) ID Tubing

**PIP30 (-1 -2 -6005 -J1A)**
Press-In Plug with Classic Series Barb, 1/8" (3.2 mm) ID Tubing

**PIP240 (-1 -2 -6005 -J1A)**
Press-In Plug with 200 Series Barb, 5/32" (4.0 mm) ID Tubing

**PIP40 (-1 -2 -6005 -J1A)**
Press-In Plug with Classic Series Barb, 5/32" (4.0 mm) ID Tubing

**PIP50 (-1 -2 -6005 -J1A)**
Press-In Plug with Classic Series Barb, 3/16" (4.8 mm) ID Tubing

**PIP60 (-1 -2 -6005 -J1A)**
Press-In Plug with Classic Series Barb, 1/4" (6.4 mm) ID Tubing

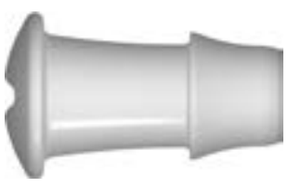
**PIP070 (-0 -6005)**
Press-In Plug with 500 Series Barb, 3/8" (9.5 mm) ID Tubing

**PIP670 (-6005)**
Press-In Plug with 600 Series Barb, 3/8" (9.5 mm) ID Tubing

**PIP080 (-6005)**
Press-In Plug with 500 Series Barb, 1/2" (12.7 mm) ID tubing

**PIP680 (-6005)**
Press-In Plug with 600 Series Barb, 1/2" (12.7 mm) ID Tubing

**PIP090 (-6005)**
Press-In Plug with 500 Series Barb, 5/8" (16.0 mm) ID Tubing



**U10 (-1 -2 -7 -9)**
Ultrasonically Weldable Fitting to Classic Series Barb, 1/16" (1.6 mm) ID Tubing

**U20 (-1 -2 -7)**
Ultrasonically Weldable Fitting to Classic Series Barb, 3/32" (2.4 mm) ID Tubing

**U30 (-1 -2 -7)**
Ultrasonically Weldable Fitting to Classic Series Barb, 1/8" (3.2 mm) ID Tubing

## TUBE-TO-TUBE PANEL MOUNTS:
Straight Through and Reducer

**PMK210 (-1 -6005)**
Panel Mount Connector 10-32 UNF to 200 Series Barbs, 1/16" (1.6 mm) ID Tubing

**PMK220 (-1 -6005)**
Panel Mount Connector 10-32 UNF to 200 Series Barbs, 3/32" (2.4 mm) ID Tubing

**PMS230 (-1 -6005)**
Panel Mount Connector 1/4-28 UNF to 200 Series Barbs, 1/8" (3.2 mm) ID Tubing

**PMK220-210 (-1 -6005)**
Panel Mount Reduction Connector 10-32 UNF to 200 Series Barbs, 3/32" (2.4 mm) and 1/16" (1.6 mm) ID Tubing

**PMS230-210 (-1 -6005 -J1A)**
Panel Mount Reduction Connector 1/4-28 UNF to 200 Series Barbs, 1/8" (3.2 mm) and 1/16" (1.6 mm) ID Tubing

**PMS230-220 (-1 -6005)**
Panel Mount Reduction Connector 1/4-28 UNF to 200 Series Barbs, 1/8" (3.2 mm) and 3/32" (2.4 mm) ID Tubing

**CCR (-1 -2 -3 -4 -5 -06 -07)**
Color Coded Ring (For use with PMS, PMK, FTLLB or FTLB panel mount fittings)

**CCLR (-1 -2 -3 -4 -5 -06 -07)**
Color Coded Lock Ring (For use with PMS, PMK, FTLLB or FTLB panel mount fittings)

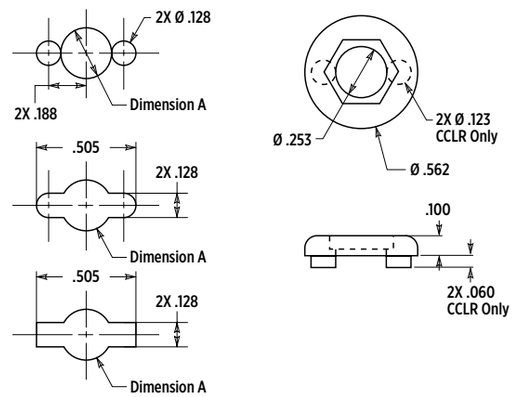
**PMKN (-XO)**
Panel Mount Nut 10-32 UNF with 3/8" Hex (For use with PMK panel mount fittings)

**PMSN (-XO)**
Panel Mount Nut 1/4-28 UNF with 7/16" Hex (For use with PMS, FTLB, and FTLLB panel mount fittings)

**LNS (-1 -2 -3 -4 -5 -06 -6005 -07 -81 -J1A)**
1/4-28 UNF Panel Mount Lock Nut (For use with PMS, FTLLB or FTLB panel mount fittings)

### Select the correct lock nut for your panel mount:

| PART | Dimension A | Use Lock Nut |
|---|---|---|
| PMK Series | .193" | PMKN |
| PMS Series | .255" | PMSN or LNS |




TUBE-TO-TUBE FITTINGS

# Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

# THREADED FITTINGS

10-32 UNF Special Tapered Thread **PG-59**

1/4-28 UNF **PG-62**

1/4-28 UNF Bottom Sealing **PG-63**

Metric - M6x1 **PG-64**

Metric - M5x.8 **PG-64**

1/16-27 NPT **PG-65**

1/8-27 NPT **PG-66**

1/4-18 NPT Reducers **PG-67**

Custom Threaded Fittings **PG-11**

## The X Thread

Value Plastics X Series components have a tapered 10-32 thread that functions like a pipe thread. In comparison to standard 10-32 UNF threaded fittings, the tapered design works better with oversized ports and ports which are not perpendicular to the face of the component.

The 120 degree chamfer under the hex provides a seal when the fitting is tightened into a port with a countersink as shown below. It also seals on the thread due to interference on the pitch diameter. When using an elbow or tee, the tapered thread tightens radially and facilitates directional alignment of the barb.

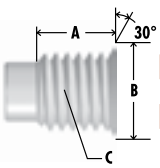
## Other Thread Series

K, B, C and D Series fittings, designed for use with 10-32 UNF ports, are straight-threaded components. These fittings seal against the 120 degree chamfer under the hex on the fitting and do not tighten radially as they are assembled. S Series fittings are straight threaded components for 1/4-28 UNF ports, M5 Series are for M5 x .8 ports and M6 Series are for M6 x 1 ports.

Part numbers for fittings with pipe threads are noted below. Those for use with 1/16-27 NPT ports have part numbers prefixed with 16; those for 1/8-27 NPT ports have part numbers prefixed with 18; and those for 1/4-18 NPT ports have part numbers prefixed with 14.

The features shown below must be incorporated into the port when using our B, C, D, X, K, S, M5 and M6 Series fittings. Failure to do so will jeopardize the performance of the seal between the fitting and port. For applications in which this seal is highly critical, we recommend that you contact a sealant specialist.

*When working with threaded parts, Value Plastics strongly recommends that you test sample parts in your application.*




| Value Plastics' Thread Series | Dimension A Thread Length | Clearance Needed to Achieve Chamfer Seal | Dimension B Countersink Diameter | Feature C Internal Screw Thread Series |
|---|---|---|---|---|
| X | .200" | .250" | .210"-.230" | 10-32 UNF 2B |
| K, B, C, D | .156" | .200" | .210"-.230" | 10-32 UNF 2B |
| S | .204" | .250" | .270"-.290" | 1/4-28 UNF 2B |
| M5 | .192" | .250" | .210"-.230" | M5 X .8 |
| M6 | .235" | .375" | .270"-.290" | M6 X 1 |

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**X210 (-1 -2 -3 -5 -6005 -J1A)**
10-32 Special Tapered Thread with 1/4" Hex to 200 Series Barb, 1/16" (1.6 mm) ID Tubing

**K210 (-1 -2 -3 -5 -6005 -J1A)**
10-32 UNF Thread with 1/4" Hex to 200 Series Barb, 1/16" (1.6 mm) ID Tubing

**X410 (-1 -2 -6005 -J1A)**
10-32 Special Tapered Thread with 1/4" Hex to 400 Series Barb, 1/16" (1.6 mm) ID Tubing

**K410 (-1 -2 -6005 -J1A)**
10-32 UNF Thread with 1/4" Hex to 400 Series Barb, 1/16" (1.6 mm) ID Tubing

**X10 (-1 -2 -6005 -J1A)**
10-32 Special Tapered Thread with 1/4" Hex to Classic Series Barb, 1/16" (1.6 mm) ID Tubing

**K10 (-1 -2 -6005 -J1A)**
10-32 UNF Thread with 1/4" Hex to Classic Series Barb, 1/16" (1.6 mm) ID Tubing

**X220 (-1 -2 -3 -6005 -J1A)**
10-32 Special Tapered Thread with 1/4" Hex to 200 Series Barb, 3/32" (2.4 mm) ID Tubing

**K220 (-1 -2 -6005 -J1A)**
10-32 UNF Thread with 1/4" Hex to 200 Series Barb, 3/32" (2.4 mm) ID Tubing

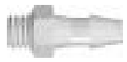
**X420 (-1 -2 -6005 -J1A)**
10-32 Special Tapered Thread with 1/4" Hex to 400 Series Barb, 3/32" (2.4 mm) ID Tubing

**K420 (-1 -2 -6005 -J1A)**
10-32 UNF Thread with 1/4" Hex to 400 Series Barb, 3/32" (2.4 mm) ID Tubing

**D (-1 -2 -3 -4 -5 -6005 -J1A)**
10-32 UNF Thread with 1/4" Hex to Classic Series Barb, 3/32" (2.4 mm) ID Tubing

**X230 (-1 -2 -3 -5 -6005 -J1A)**
10-32 Special Tapered Thread with 1/4" Hex to 200 Series Barb, 1/8" (3.2 mm) ID Tubing

**K230 (-1 -2 -6005 -J1A)**
10-32 UNF Thread with 1/4" Hex to 200 Series Barb, 1/8" (3.2 mm) ID Tubing



**X430 (-1 -2 -3 -6005 -J1A)**
10-32 Special Tapered Thread with 1/4" Hex to 400 Series Barb, 1/8" (3.2 mm) ID Tubing

**K430 (-1 -2 -6005 -J1A)**
10-32 UNF Thread with 1/4" Hex to 400 Series Barb, 1/8" (3.2 mm) ID Tubing

**B (-1 -2 -3 -4 -5 -6005 -J1A)**
10-32 UNF Thread with 1/4" Hex to Classic Series Barb, 1/8" (3.2 mm) ID Tubing

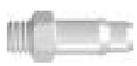
**C (-1 -2 -3 -4 -5 -6005 -J1A)**
10-32 UNF Thread with 1/4" Hex to Classic Series Barb, Short Neck, 1/8" (3.2 mm) ID Tubing

**K240 (-1 -2 -6005 -J1A)**
10-32 UNF Thread with 1/4" Hex to 200 Series Barb, 5/32" (4.0 mm) ID Tubing

**X240 (-1 -2 -6005 -J1A)**
10-32 Special Tapered Thread with 1/4" Hex to 200 Series Barb, 5/32" (4.0 mm) ID Tubing

**X445 (-1 -2 -6005 -J1A)**
10-32 Special Tapered Thread with 1/4" Hex to 400 Series Barb, .170" (4.3 mm) ID Tubing

**K445 (-1 -2 -6005 -J1A)**
10-32 UNF Thread with 1/4" Hex to 400 Series Barb, .170" (4.3 mm) ID Tubing



THREADED FITTINGS

## Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

# THREAD:
10-32 UNF, Special Tapered Thread Elbow

## Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

THREADED FITTINGS

**XL210 (-1 -2 -6005 -J1A)**
10-32 Special Tapered Thread Elbow with 1/4" Hex to 200 Series Barb, 1/16" (1.6 mm) ID Tubing

**KL210 (-1 -2 -6005 -J1A)**
10-32 UNF Thread Elbow with 1/4" Hex to 200 Series Barb, 1/16" (1.6 mm) ID Tubing

**XL410 (-1 -2 -6005 -J1A)**
10-32 Special Tapered Thread Elbow with 1/4" Hex to 400 Series Barb, 1/16" (1.6 mm) ID Tubing

**KL410 (-1 -2 -6005 -J1A)**
10-32 UNF Thread Elbow with 1/4" Hex to 400 Series Barb, 1/16" (1.6 mm) ID Tubing

**XL220 (-1 -2 -6005 -J1A)**
10-32 Special Tapered Thread Elbow with 1/4" Hex to 200 Series Barb, 3/32" (2.4 mm) ID Tubing

**KL220 (-1 -2 -6005 -J1A)**
10-32 UNF Thread Elbow with 1/4" Hex to 200 Series Barb, 3/32" (2.4 mm) ID Tubing

**XL420 (-1 -2 -6005 -J1A)**
10-32 Special Tapered Thread Elbow with 1/4" Hex to 400 Series Barb, 3/32" (2.4 mm) ID Tubing

**KL420 (-1 -2 -6005 -J1A)**
10-32 UNF Thread Elbow with 1/4" Hex to 400 Series Barb, 3/32" (2.4 mm) ID Tubing

**XL230 (-1 -2 -6005 -J1A)**
10-32 Special Tapered Thread Elbow with 1/4" Hex to 200 Series Barb, 1/8" (3.2 mm) ID Tubing

**KL230 (-1 -2 -6005 -J1A)**
10-32 UNF Thread Elbow with 1/4" Hex to 200 Series Barb, 1/8" (3.2 mm) ID Tubing

**XL430 (-1 -2 -6005 -J1A)**
10-32 Special Tapered Thread Elbow with 1/4" Hex to 400 Series Barb, 1/8" (3.2 mm) ID Tubing

**KL430 (-1 -2 -6005 -J1A)**
10-32 UNF Thread Elbow with 1/4" Hex to 400 Series Barb, 1/8" (3.2 mm) ID Tubing

**Technical Assistance**

Trying to choose the correct part? Need more material information than is published in this catalog? Call Value Plastics Technical support **(970) 267-5200**

**XT210 (-1 -2 -6005 -J1A)**
10-32 Special Tapered Thread Tee with 1/4" Hex to 200 Series Barb, 1/16" (1.6 mm) ID Tubing

**KT210 (-1 -2 -6005 -J1A)**
10-32 UNF Thread Tee with 1/4" Hex to 200 Series Barb, 1/16" (1.6 mm) ID Tubing

**XT410 (-1 -2 -6005 -J1A)**
10-32 Special Tapered Thread Tee with 1/4" Hex to 400 Series Barb, 1/16" (1.6 mm) ID Tubing

**KT410 (-1 -2 -6005 -J1A)**
10-32 UNF Thread Tee with 1/4" Hex to 400 Series Barb, 1/16" (1.6 mm) ID Tubing

**XT220 (-1 -2 -6005 -J1A)**
10-32 Special Tapered Thread Tee with 1/4" Hex to 200 Series Barb, 3/32" (2.4 mm) ID Tubing

**KT220 (-1 -2 -6005 -J1A)**
10-32 UNF Thread Tee with 1/4" Hex to 200 Series Barb, 3/32" (2.4 mm) ID Tubing

**Part Drawings Online!**

Value Plastics provides dimensional drawings available for download for all of its fittings.

**www.valueplastics.com**

**XT420 (-1 -2 -6005 -J1A)**
10-32 Special Tapered Thread Tee with 1/4" Hex to 400 Series Barb, 3/32" (2.4 mm) ID Tubing

**KT420 (-1 -2 -6005 -J1A)**
10-32 UNF Thread Tee with 1/4" Hex to 400 Series Barb, 3/32" (2.4 mm) ID Tubing

**XT230 (-1 -2 -6005 -J1A)**
10-32 Special Tapered Thread Tee with 1/4" Hex to 200 Series Barb, 1/8" (3.2 mm) ID Tubing

**KT230 (-1 -2 -6005 -J1A)**
10-32 UNF Thread Tee with 1/4" Hex to 200 Series Barb, 1/8" (3.2 mm) ID Tubing

**XT430 (-1 -2 -6005 -J1A)**
10-32 Special Tapered Thread Tee with 1/4" Hex to 400 Series Barb, 1/8" (3.2 mm) ID Tubing

**KT430 (-1 -2 -6005 -J1A)**
10-32 UNF Thread Tee with 1/4" Hex to 400 Series Barb, 1/8" (3.2 mm) ID Tubing

THREADED FITTINGS

# Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

# Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties



## THREAD:
10-32 UNF, Special Tapered Thread Couplers and Plugs

**XN (-1 -2 -6005 -J1A)**
10-32 Special Tapered Thread Coupler with 1/4" Hex

**KN (-1 -2 -6005 -J1A)**
10-32 UNF Thread Coupler with 1/4" Hex

**XP (-1 -2 -6005 -J1A)**
10-32 Special Tapered Thread Plug with 1/4" Hex

**KP (-1 -2 -6005 -J1A)**
10-32 UNF Thread Plug with 1/4" Hex

### Looking for Something Different?

Most of our best product ideas have come from you, our customers. While we pride ourselves on our extensive product offering, we recognize that your needs are ever-changing and that our products, too, must adapt to your needs.

If there's a new product you think Value Plastics should make, drop an email to designcenter@valueplastics.com describing your product concept in as much detail as you desire. We will contact you with any questions, and who knows - the next catalog edition could include products YOU told us to build.

See **page 8** for more information on the Design Center!

## THREAD:
1/4-28 UNF

**S210 (-1 -2 -6005 -J1A)**
1/4-28 UNF Thread with 5/16" Hex to 200 Series Barb, 1/16" (1.6 mm) ID Tubing

**S410 (-1 -2 -6005 -J1A)**
1/4-28 UNF Thread with 5/16" Hex to 400 Series Barb, 1/16" (1.6 mm) ID Tubing

**S10 (-1 -2 -6005 -J1A)**
1/4-28 UNF Thread with 5/16" Hex to Classic Series Barb, 1/16" (1.6 mm) ID Tubing

**S220 (-1 -2 -6005 -J1A)**
1/4-28 UNF Thread with 5/16" Hex to 200 Series Barb, 3/32" (2.4 mm) ID Tubing

**S420 (-1 -2 -6005 -J1A)**
1/4-28 UNF Thread with 5/16" Hex to 400 Series Barb, 3/32" (2.4 mm) ID Tubing

**S20 (-1 -2 -6005 -J1A)**
1/4-28 UNF Thread with 5/16" Hex to Classic Series Barb, 3/32" (2.4 mm) ID Tubing

**S230 (-1 -2 -6005 -J1A)**
1/4-28 UNF Thread with 5/16" Hex to 200 Series Barb, 1/8" (3.2 mm) ID Tubing

**S430 (-1 -2 -6005 -J1A)**
1/4-28 UNF Thread with 5/16" Hex to 400 Series Barb, 1/8" (3.2 mm) ID Tubing

**S30 (-1 -2 -6005 -J1A)**
1/4-28 UNF Thread with 5/16" Hex to Classic Series Barb, 1/8" (3.2 mm) ID Tubing

**S240 (-1 -2 -6005 -J1A)**
1/4-28 UNF Thread with 5/16" Hex to 200 Series Barb, 5/32" (4.0 mm) ID Tubing

**S40 (-1 -2 -6005 -J1A)**
1/4-28 UNF Thread with 5/16" Hex to Classic Series Barb, 5/32" (4.0 mm) ID Tubing

**S445 (-1 -2 -6005 -J1A)**
1/4-28 UNF Thread with 5/16" Hex to 400 Series Barb, .170" (4.3 mm) ID Tubing

**S250 (-1 -2 -6005 -J1A)**
1/4-28 UNF Thread with 5/16" Hex to 200 Series Barb, 3/16" (4.8 mm) ID Tubing

**S450 (-1 -2 -6005 -J1A)**
1/4-28 UNF Thread with 5/16" Hex to 400 Series Barb, 3/16" (4.8 mm) ID Tubing

**S50 (-1 -2 -6005 -J1A)**
1/4-28 UNF Thread with 5/16" Hex to Classic Series Barb, 3/16" (4.8 mm) ID Tubing

**SP (-1 -2 -6005 -J1A)**
1/4-28 UNF Thread Plug with 5/16" Hex

**ABR004-6005 UNDER (-1 -2 -3 -4 -5)**
1/4-28 UNF Bottom Sealing Rotating Thread with 5/16" Hex to 500 Series Barb, 1/16" (1.6 mm) ID Tubing

***Recommended torque:***
***Polypropylene - 1.5-2 in. lbs.***
***Kynar® - 2-4 in. lbs.***

**ABR004-J1A UNDER (-1 -2 -3 -4 -5 -J1A)**
1/4-28 UNF Bottom Sealing Rotating Thread with 5/16" Hex to 500 Series Barb, 1/16" (1.6 mm) ID Tubing

***Recommended torque:***
***Polypropylene - 1.5-2 in. lbs.***
***Kynar® - 2-4 in. lbs.***

**ABR007-6005 UNDER (-1 -2 -3 -4 -5)**
1/4-28 UNF Bottom Sealing Rotating Thread with 5/16" Hex to 500 Series Barb, 3/32" (2.4 mm) ID Tubing

***Recommended torque:***
***Polypropylene - 1.5-2 in. lbs.***
***Kynar® - 2-4 in. lbs.***

**ABR007-J1A UNDER (-1 -2 -3 -4 -5 -J1A)**
1/4-28 UNF Bottom Sealing Rotating Thread with 5/16" Hex to 500 Series Barb, 3/32" (2.4 mm) ID Tubing

***Recommended torque:***
***Polypropylene - 1.5-2 in. lbs.***
***Kynar® - 2-4 in. lbs.***

**ABR013-6005 UNDER (-1 -2 -3 -4 -5)**
1/4-28 UNF Bottom Sealing Rotating Thread with 5/16" Hex to 500 Series Barb, 1/8" (3.2 mm) ID Tubing

***Recommended torque:***
***Polypropylene - 1.5-2 in. lbs.***
***Kynar® - 2-4 in. lbs.***

**ABR013-J1A UNDER (-1 -2 -3 -4 -5 -J1A)**
1/4-28 UNF Bottom Sealing Rotating Thread with 5/16" Hex to 500 Series Barb, 1/8" (3.2 mm) ID Tubing

***Recommended torque:***
***Polypropylene - 1.5-2 in. lbs.***
***Kynar® - 2-4 in. lbs.***

**TECS116 (-6005 -J1A)**
1/4-28 UNF Bottom Sealing Thread Tube End Coupler with 5/16" Hex, 1/16" (1.6 mm) OD Tubing

**TECS118 (-6005 -J1A)**
1/4-28 UNF Bottom Sealing Thread Tube End Coupler with 5/16" Hex, 1/8" (3.2 mm) OD Tubing

# Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel



## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

# Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties



## THREAD: M6x1

**M6210 (-1 -2 -6005)**
M6x1 Thread with 5/16" Hex to 200 Series Barb, 1/16" (1.6 mm) ID Tubing

**M6410 (-1 -2 -6005 -J1A)**
M6x1 Thread with 5/16" Hex to 400 Series Barb, 1/16" (1.6 mm) ID Tubing

**M6220 (-1 -2 -6005 -J1A)**
M6x1 Thread with 5/16" Hex to 200 Series Barb, 3/32" (2.4 mm) ID Tubing

**M6420 (-1 -2 -6005 -J1A)**
M6x1 Thread with 5/16" Hex to 400 Series Barb, 3/32" (2.4 mm) ID Tubing

**M6230 (-1 -2 -6005 -J1A)**
M6x1 Thread with 5/16" Hex to 200 Series Barb, 1/8" (3.2 mm) ID Tubing

**M6430 (-1 -2 -6005 -J1A)**
M6x1 Thread with 5/16" Hex to 400 Series Barb, 1/8" (3.2 mm) ID Tubing

**M6240 (-1 -2 -6005 -J1A)**
M6x1 Thread with 5/16" Hex to 200 Series Barb, 5/32" (4.0 mm) ID Tubing

**M6445 (-1 -2 -6005 -J1A)**
M6x1 Thread with 5/16" Hex to 400 Series Barb, .170" (4.3 mm) ID Tubing

## Part Drawings Online!

Value Plastics provides dimensional drawings available for download for all of its fittings.
**www.valueplastics.com**

## THREAD: M6x1

**M6250 (-1 -2 -6005 -J1A)**
M6x1 Thread with 5/16" Hex to 200 Series Barb, 3/16" (4.8 mm) ID Tubing

**M6450 (-1 -2 -6005 -J1A)**
M6x1 Thread with 5/16" Hex to 400 Series Barb, 3/16" (4.8 mm) ID Tubing

**M6P (-1 -2 -6005 -J1A)**
M6x1 Thread Plug with 5/16" Hex

## THREAD: M5x.8

**M5210 (-1 -2 -6005)**
M5x.8 Thread with 1/4" Hex to 200 Series Barb, 1/16" (1.6 mm) ID Tubing

**M5220 (-1 -2 -6005)**
M5x.8 Thread with 1/4" Hex to 200 Series Barb, 3/32" (2.4 mm) ID Tubing

**M5230 (-1 -2 -6005)**
M5x.8 Thread with 1/4" Hex to 200 Series Barb, 1/8" (3.2 mm) ID Tubing

**M5240 (-1 -2 -6005)**
M5x.8 Thread with 1/4" Hex to 200 Series Barb, 5/32" (4.0 mm) ID Tubing

## Technical Assistance

Trying to choose the correct part? Need more material information than is published in this catalog? Call Value Plastics Technical support **(970) 267-5200**

**16210 (-1 -2 -6005 -J1A)**
1/16-27 NPT Thread with 5/16" Hex to 200 Series Barb, 1/16" (1.6 mm) ID Tubing

**16410 (-1 -2 -6005 -J1A)**
1/16-27 NPT Thread with 5/16" Hex to 400 Series Barb, 1/16" (1.6 mm) ID Tubing

**1610 (-1 -2 -6005 -J1A)**
1/16-27 NPT Thread with 5/16" Hex to Classic Series Barb, 1/16" (1.6 mm) ID Tubing

**16220 (-1 -2 -6005 -J1A)**
1/16-27 NPT Thread with 5/16" Hex to 200 Series Barb, 3/32" (2.4 mm) ID Tubing

**16420 (-1 -2 -6005 -J1A)**
1/16-27 NPT Thread with 5/16" Hex to 400 Series Barb, 3/32" (2.4 mm) ID Tubing

**1620 (-1 -2 -6005 -J1A)**
1/16-27 NPT Thread with 5/16" Hex to Classic Series Barb, 3/32" (2.4 mm) ID Tubing

**16230 (-1 -2 -6005 -J1A)**
1/16-27 NPT Thread with 5/16" Hex to 200 Series Barb, 1/8" (3.2 mm) ID Tubing

**16430 (-1 -2 -6005 -J1A)**
1/16-27 NPT Thread with 5/16" Hex to 400 Series Barb, 1/8" (3.2 mm) ID Tubing

**1630 (-1 -2 -6005 -J1A)**
1/16-27 NPT Thread with 5/16" Hex to Classic Series Barb, 1/8" (3.2 mm) ID Tubing

**16240 (-1 -2 -6005 -J1A)**
1/16-27 NPT Thread with 5/16" Hex to 200 Series Barb, 5/32" (4.0 mm) ID Tubing

**1640 (-1 -2 -6005 -J1A)**
1/16-27 NPT Thread with 5/16" Hex to Classic Series Barb, 5/32" (4.0 mm) ID Tubing

**16445 (-1 -2 -6005 -J1A)**
1/16-27 NPT Thread with 5/16" Hex to 400 Series Barb, .170" (4.3 mm) ID Tubing

**16250 (-1 -2 -6005 -J1A)**
1/16-27 NPT Thread with 5/16" Hex to 200 Series Barb, 3/16" (4.8 mm) ID Tubing

**16450 (-1 -2 -6005 -J1A)**
1/16-27 NPT Thread with 5/16" Hex to 400 Series Barb, 3/16" (4.8 mm) ID Tubing

**1650 (-1 -2 -6005 -J1A)**
1/16-27 NPT Thread with 5/16" Hex to Classic Series Barb, 3/16" (4.8 mm) ID Tubing

**1600 (-1 -2 -6005 -J1A)**
1/16-27 NPT Thread Plug with 5/16" Hex

THREADED FITTINGS

# Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

# THREAD:
1/8-27 NPT

## Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

THREADED FITTINGS

**18210 (-1 -2 -6005 -J1A)**
1/8-27 NPT Thread with 7/16" Hex to 200 Series Barb, 1/16" (1.6 mm) ID Tubing

**18410 (-1 -2 -6005 -J1A)**
1/8-27 NPT Thread with 7/16" Hex to 400 Series Barb, 1/16" (1.6 mm) ID Tubing

**1810 (-1 -2 -6005 -J1A)**
1/8-27 NPT Thread with 7/16" Hex to Classic Series Barb, 1/16" (1.6 mm) ID Tubing

**18220 (-1 -2 -6005 -J1A)**
1/8-27 NPT Thread with 7/16" Hex to 200 Series Barb, 3/32" (2.4 mm) ID Tubing

**18420 (-1 -2 -6005 -J1A)**
1/8-27 NPT Thread with 7/16" Hex to 400 Series Barb, 3/32" (2.4 mm) ID Tubing

**1820 (-1 -2 -6005 -J1A)**
1/8-27 NPT Thread with 7/16" Hex to Classic Series Barb, 3/32" (2.4 mm) ID Tubing

**18230 (-1 -2 -6005 -J1A)**
1/8-27 NPT Thread with 7/16" Hex to 200 Series Barb, 1/8" (3.2 mm) ID Tubing

**18430 (-1 -2 -6005 -J1A)**
1/8-27 NPT Thread with 7/16" Hex to 400 Series Barb, 1/8" (3.2 mm) ID Tubing

**1830 (-1 -2 -6005 -J1A)**
1/8-27 NPT Thread with 7/16" Hex to Classic Series Barb, 1/8" (3.2 mm) ID Tubing

**18240 (-1 -2 -6005 -J1A)**
1/8-27 NPT Thread with 7/16" Hex to 200 Series Barb, 5/32" (4.0 mm) ID Tubing

**1840 (-1 -2 -6005 -J1A)**
1/8-27 NPT Thread with 7/16" Hex to Classic Series Barb, 5/32" (4.0 mm) ID Tubing

**18445 (-1 -2 -6005 -J1A)**
1/8-27 NPT Thread with 7/16" Hex to 400 Series Barb, .170" (4.3 mm) ID Tubing

**1850 (-1 -2 -6005 -J1A)**
1/8-27 NPT Thread with 7/16" Hex to Classic Series Barb, 3/16" (4.8 mm) ID Tubing

**1860 (-1 -2 -6005 -J1A)**
1/8-27 NPT Thread with 7/16" Hex to Classic Series Barb, 1/4" (6.4 mm) ID Tubing

**18L230 (-1 -2 -6005 -J1A)**
1/8-27 NPT Thread Elbow with 7/16" Hex to 200 Series Barb, 1/8" (3.2 mm) ID Tubing

**18L250 (-1 -2 -6005 -J1A)**
1/8-27 NPT Thread Elbow with 7/16" Hex to 200 Series Barb, 3/16" (4.8 mm) ID Tubing

**18L260 (-1 -2 -6005 -J1A)**
1/8-27 NPT Thread Elbow with 7/16" Hex to 200 Series Barb, 1/4" (6.4 mm) ID Tubing

## THREAD:
1/8-27 NPT Tees

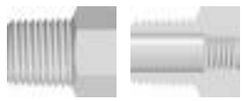
**18T250 (-1 -2 -6005 -J1A)**
1/8-27 NPT Thread Tee with 7/16" Hex to 200 Series Barb, 3/16" (4.8 mm) ID Tubing

**18T260 (-1 -2 -6005 -J1A)**
1/8-27 NPT Thread Tee with 7/16" Hex to 200 Series Barb, 1/4" (6.4 mm) ID Tubing

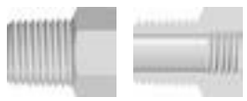
**1800 (-1 -2 -6005 -J1A)**
1/8-27 NPT Thread Plug with 7/16" Hex

## THREAD:
1/8-27 NPT Reducers

**1801 (-1 -2 -6005 -J1A)**
Reducer with 1/8-27 NPT Male Thread and 7/16" Hex to 10-32 UNF Female Thread

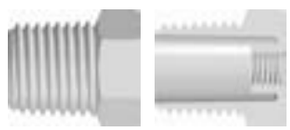


**1802 (-1 -2 -6005 -J1A)**
Reducer with 1/8-27 NPT Male Thread and 7/16" Hex to 1/4-28 UNF Female Thread

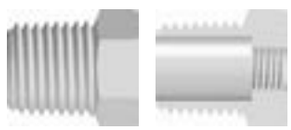


## THREAD:
1/4-18 NPT Reducers

**1401 (-1 -2 -6005 -J1A)**
Reducer with 1/4-18 NPT Male Thread and 9/16" Hex to 10-32 UNF Female Thread



**1402 (-1 -2 -6005 -J1A)**
Reducer with 1/4-18 NPT Male Thread and 9/16" Hex to 1/4-28 UNF Female Thread



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THREADED FITTINGS

# Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

# BUILD-A-PART FITTINGS

Junction Blocks
**PG-69**

Accessories
**PG-70**

Barbs
**PG-70**

Threads
**PG-71**

## Bonding Suggestions

Prior to actually bonding, press together a model of the manifold to use as a reference.

Do not mix plastic resins. Consult your adhesive specialist if you need to bond dissimilar materials.

These components are designed for bonding with any one of a number of solvents, but other adhesive systems may be used. When solvent bonding, use a very small gauge needle (typically 27 or 30) for best solvent control. Consult your adhesive specialist for guidance on other systems.

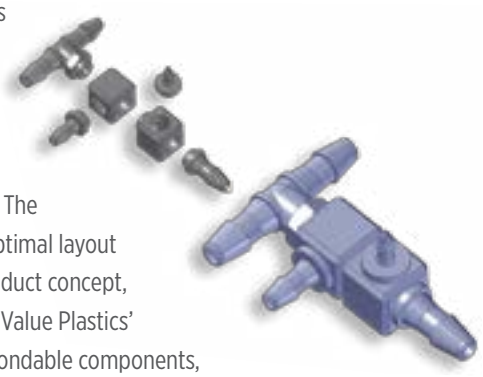
Apply solvent sparingly. Most solvents are low viscosity and readily wick into the bondline. Excessive solvent may compromise the aesthetics and the function of the assembly.

Press the mating components together leaving a .01-.03" gap between them for the solvent. Place the components in an orientation such that they may be rotated ¼ turn to their final position after applying the solvent.

After applying solvent, wait a few seconds, then rotate the components to their final position. When making a long manifold with bondable junction blocks it may be helpful to push the assembly against a flat surface to align the blocks before the solvent has set.

## Affordable Unique Solutions:

*Design Your New Component with Build-A-Part® bondable components!*



Component designers no longer need be constrained by the limitations of injection molding tool design. The exact fitting, in the optimal layout for the process or product concept, is now available with Value Plastics' line of Build-a-Part bondable components, designed for use with gases or liquids.

The Build-a-Part system is based on combining interchangeable components, joining junction blocks and luer, hose barb or threaded features to create the desired configuration. The features are bonded to the junction blocks using commonly available adhesives. Junction blocks and features may be bonded together to create multi-port, multi-axis products that receive and redirect fluid flow in whatever direction the designer desires. The only limitation is the designer's imagination.

114 component options are available from stock in two primary materials. Options include ISO 594-1 compliant male and female luers and hose barbs in 1/16" (1.6 mm), 3/32" (2.4 mm) and 1/8" (3.2 mm) in straight, elbow and branch tee configurations. Also available are male threads including 10-32 UNF, 1/16-27 NPT, 1/8-27 NPT, 1/4-28 UNF and M6x1 versions, and mounting devices.

The complete range is available in two primary resins: white ABS or translucent polysulfone. For ease of testing concepts, Value Plastics offers designer kits in both resins. Each kit contains hundreds of components for prototype purposes, enabling designs to be created and modified prior to production commitment.



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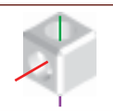
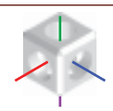
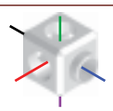
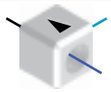
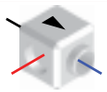
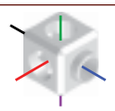
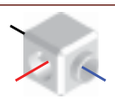
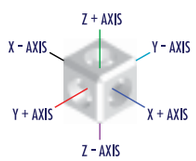
| BLOCK | NUMBER | MATERIAL |
|---|---|---|
| Build-A-Part Junction Blocks. See Configuration Table for specifications. | | |
| | BDJ01-40 | Polysulfone |
| | BDJ01-81 | Lace White ABS |
| | BDJ02-40 | Polysulfone |
| | BDJ02-81 | Lace White ABS |
|  | BDJ03-40 | Polysulfone |
| | BDJ03-81 | Lace White ABS |
| | BDJ04-40 | Polysulfone |
| | BDJ04-81 | Lace White ABS |
| | BDJ05-40 | Polysulfone |
| | BDJ05-81 | Lace White ABS |
|  | BDJ06-40 | Polysulfone |
| | BDJ06-81 | Lace White ABS |
| | BDJ07-40 | Polysulfone |
| | BDJ07-81 | Lace White ABS |
| | BDJ08-40 | Polysulfone |
| | BDJ08-81 | Lace White ABS |
|  | BDJ09-40 | Polysulfone |
| | BDJ09-81 | Lace White ABS |
| | BDJ10-40 | Polysulfone |
| | BDJ10-81 | Lace White ABS |
| | BDJ11-40 | Polysulfone |
| | BDJ11-81 | Lace White ABS |
| | BDJ12-40 | Polysulfone |
| | BDJ12-81 | Lace White ABS |
| | BDJ13-40 | Polysulfone |
| | BDJ13-81 | Lace White ABS |
| | BDJ14-40* | Polysulfone |
| | BDJ14-81* | Lace White ABS |
| | BDJ15-40* | Polysulfone |
| | BDJ15-81* | Lace White ABS |

*Check valve junction block. For use with RB01 and SB01

| BLOCK | NUMBER | MATERIAL |
|---|---|---|
| Build-A-Part Junction Blocks with Mounting Port. See Config. Table below for specifications. | | |
|  | BDJ16-40* | Polysulfone |
| | BDJ16-81* | Lace White ABS |
|  | BDJ17-40* | Polysulfone |
| | BDJ17-81* | Lace White ABS |
|  | BDJ18-40 | Polysulfone |
| | BDJ18-81 | Lace White ABS |
| | BDJ19-40 | Polysulfone |
| | BDJ19-81 | Lace White ABS |
| | BDJ20-40 | Polysulfone |
| | BDJ20-81 | Lace White ABS |
|  | BDJ21-40 | Polysulfone |
| | BDJ21-81 | Lace White ABS |
| | BDJ22-40 | Polysulfone |
| | BDJ22-81 | Lace White ABS |




| BLOCK | X+ AXIS | X- AXIS | Y+ AXIS | Y- AXIS | Z+ AXIS | Z- AXIS |
|---|---|---|---|---|---|---|
| BDJ01 | Female | Female | | | | |
| BDJ02 | | | Female | | Female | |
| BDJ03 | | | Female | | Female | Female |
| BDJ04 | Female | Female | Female | Female | | |
| BDJ05 | Female | | Female | | Female | |
| BDJ06 | Female | | Female | | Female | Female |
| BDJ07 | Female | Female | Female | Female | Female | |
| BDJ08 | Female | Female | Female | Female | Female | Female |
| BDJ09 | Male | Female | Female | | Female | Female |
| BDJ10 | Male | Female | Female | Female | Female | Female |
| BDJ11 | Male | Female | Female | Female | | |
| BDJ12 | Male | Female | Female | | | |
| BDJ13 | Male | Female | Female | | Female | |
| BDJ14 | Male | Female | | | | |
| BDJ15 | Female | Female | | | | |
| BDJ16 | Female | Female | | Female[a] | | |
| BDJ17 | Male | Female | Female[a] | | | |
| BDJ18 | Male[b] | Female | Female | | Female | Female |
| BDJ19 | Male[b] | Female | Female | Female | Female | Female |
| BDJ20 | Male[b] | Female | Female | Female | | |
| BDJ21 | Male[b] | Female | Female | | | |
| BDJ22 | Male[b] | Female | Female | | Female | |

[a]For non-flow manifolding [b]For use with BDMD

BUILD-A PART

# Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

# BUILD-A-PART:
Accessories, Barbs and Elbows

## Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
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**-U75** Blue Class VI Glass Filled Nylon
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**-XO** Stainless Steel

## Resin Reference

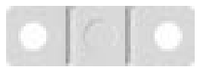
**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

BUILD-A PART

**RB01 (-X2) SB01 (-XO)**
Check Valve Ball 5/32" Diameter

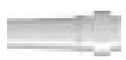
**BDMRP (-40 -81)**
Bondable Plug

**BDMD (-40 -81)**
Bondable Mounting Device



**BDMFTLL (-40 -81 -9)**
Bondable Female Luer Thread Style

**BDMMTL (-40 -81)**
Bondable Male Luer (May be used with separate rotating lock ring; RMLLR)



**RMLLR (-1 -2 -3 -4 -5 -06 -07 -6005 -9 -9002 -J1A)**
Rotating Male Luer Lock Ring (For use with BDMMTL)

**BDMR210 (-40 -81 -9 -9002)**
Bondable 200 Series Barb, 1/16" (1.6 mm) ID Tubing

**BDMR410 (-40 -81)**
Bondable 400 Series Barb, 1/16" (1.6 mm) ID Tubing

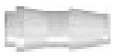
**BDMR220 (-40 -81)**
Bondable 200 Series Barb, 3/32" (2.4 mm) ID Tubing

**BDMR420 (-40 -81)**
Bondable 400 Series Barb, 3/32" (2.4 mm) ID Tubing

**BDMR230 (-40 -81)**
Bondable 200 Series Barb, 1/8" (3.2 mm) ID Tubing

**BDMR430 (-40 -81)**
Bondable 400 Series Barb, 1/8" (3.2 mm) ID Tubing

**BDMR240 (-40 -6005 -81)**
Bondable 200 Series Barb, 5/32" (4.0 mm) ID Tubing



**BDMR445 (-40 -81)**
Bondable 400 Series Barb, .170" (4.3 mm) ID Tubing

**BDML210 (-40 -81 -9)**
Bondable Elbow 200 Series Barb, 1/16" (1.6 mm) ID Tubing

**BDML410 (-40 -81)**
Bondable Elbow 400 Series Barb, 1/16" (1.6 mm) ID Tubing

**BDML220 (-40 -81 -9)**
Bondable Elbow 200 Series Barb, 3/32" (2.4 mm) ID Tubing

**BDML420 (-40 -81)**
Bondable Elbow 400 Series Barb, 3/32" (2.4 mm) ID Tubing

**BDML230 (-40 -81)**
Bondable Elbow 200 Series Barb, 1/8" (3.2 mm) ID Tubing

**BDML430 (-40 -81)**
Bondable Elbow 400 Series Barb, 1/8" (3.2 mm) ID Tubing

**BDMT210 (-40 -81)**
Bondable Tee 200 Series Barb, 1/16" (1.6 mm) ID Tubing

**BDMT410 (-40 -81)**
Bondable Tee 400 Series Barb, 1/16" (1.6 mm) ID Tubing

**BDMT220 (-40 -81)**
Bondable Tee 200 Series Barb, 3/32" (2.4 mm) ID Tubing

**BDMT420 (-40 -81)**
Bondable Tee 400 Series Barb, 3/32" (2.4 mm) ID Tubing

**BDMT230 (-40 -81)**
Bondable Tee 200 Series Barb, 1/8" (3.2 mm) ID Tubing

**BDMT430 (-40 -81)**
Bondable Tee 400 Series Barb, 1/8" (3.2 mm) ID Tubing

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**BDMX (-40 -81)**
Bondable 10-32 Special Tapered Thread with 1/4" Hex

**BDMK (-40 -81)**
Bondable 10-32 UNF Thread with 1/4" Hex

**BDMS (-81)**
Bondable 1/4-28 UNF Thread with 5/16" Hex

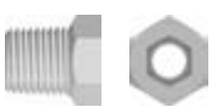
**BDMM6 (-40 -81)**
Bondable M6x1 Thread with 5/16" Hex

**BDM16 (-40 -81)**
Bondable 1/16-27 NPT Thread with 5/16" Hex

**BDM18 (-40 -81)**
Bondable 1/8-27 NPT Thread with 7/16" Hex

**BDF16 (-40 -81)**
Bondable 1/16-27 NPT Thread with 5/16" Hex

**BDF18 (-40 -81)**
Bondable 1/8-27 NPT Thread with 7/16" Hex



**BDFM6 (-40 -81)**
Bondable M6x1 Thread with 5/16" Hex

**BDFS (-40 -81)**
Bondable 1/4-28 UNF Thread with 5/16" Hex

BUILD-A PART

# Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

# OTHER COMPONENTS

Check Valves **PG-72**

Clamps **PG-72**

Injection Sites **PG-73**

Stopcocks **PG-73**

Spikes **PG-73**

Tubing **PG-74**

Designer Kits **PG-75**

Tubesetter Assembly Tool **PG-77**

## OTHER COMPONENTS: Components

**VPS5401068N (Polycarbonate with Silicone Disk)**
Check Valve, Male/Female Luer, 420 mL/min flow rate at 1 M head 30 psi back pressure, 1/4 psi inlet cracking pressure

**VPS5401020N (Polycarbonate with Silicone Disk)**
Check Valve, Male/Female Luer, 129 mL/min flow rate at 100mmHg, 45 psi back pressure, 1-5 psi inlet cracking pressure

**VPS5401036SN (Polycarbonate with Silicone Disk)**
Reflux Check Valve, Male/Female Luer, 350mL/min flow Rate at 1 M head, 45 psi back pressure, opens at 284 mmHg

**VPS5401001N (ABS Housing with Silicone Disk)**
Check Valve, Male Slip Luer, 420 mL/min flow rate at 1M head, 30 psi back pressure, 1/4 psi inlet cracking pressure

**VPM2930601N (White ABS)**
Tube Clamp with split, 1/8" (3.2 mm) OD Tubing

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**VPS3901074N (Polyisoprene with ABS Acrylic Body)**
IN-4000 Intermittent Injection Site to Male Luer Lock

**VPM1060200N (Clear Low Density Polyethylene)**
Long Spike Guard Closed at Tip

**VPM0480201N (White Polyethylene)**
Luer Tip Syringe Cap

**VPB0850400N (Clear ABS)**
Female Luer Thread Style Coupler

**VPM1080303N (Blue Polyethylene)**
Male Luer Integral Lock Ring Plug

**VPB1000050N (Polycarbonate Body with Polyethylene Handle)**
One Way Stopcock, Capped Male Luer Lock to Capped Female Luer Thread Style

**VPB1000055N (Polycarbonate Body with Polyethylene Handle)**
One way Stopcock, Male Slip Luer to Capped Female Luer Thread Style

**VPB1000079N (Polycarbonate Body with Polyethylene Handle)**
Three Way Stopcock, (2) Capped Female Luer Thread Style and Capped Male Luer Lock

**VPB1000062N (Polycarbonate Body with Polyethylene Handle)**
Three Way Stopcock, (2) Female Luer Thread Style and Male Slip Luer

**VPB1000099N (Polycarbonate Body with Polyethylene Handle)**
Four Way Stopcock, (2) Capped Female Luer Thread Style and Male Slip Luer

**VPB1000110N (Polycarbonate Body with Polyethylene Handle)**
Four Way Stopcock, (2) Capped Female Luer Thread Style & Capped Male Luer Lock

**VPS5069200N (White ABS Spike with Clear LDPE Guard)**
Bag Spike with vented guard (replaces VPS5069700N)

OTHER COMPONENTS

# Material Reference

**-001** (various, see part description)
**-06** Orange Nylon
**-07** Yellow Nylon
**-0** Natural Nylon
**-1** White Nylon
**-2** Black Nylon
**-3** Red Nylon
**-4** Green Nylon
**-5** Blue Nylon
**-7** Glass Filled Natural Nylon
**-8** Gray Nylon
**-8B** Gray Nylon
**-9** Clear Polycarbonate
**-10** Acetal
**-40** Polysulfone
**-81** Lace White ABS
**-91** White Polycarbonate
**-1006** Natural Acetal
**-1007** Black Acetal
**-6005** Animal-Free Polypropylene
**-6006** White Polypropylene
**-8003** Natural ABS
**-8012** White ABS
**-9002** Rad. Stable Polycarbonate
**-9010** Rad. Stable Polycarbonate
**-B** Buna-N O-ring
**-CM030** Dark Blue Nylon
**-E** PTEE/EPDM
**-EP** EPDM O-ring
**-J1A** Natural Kynar PVDF
**-J1A2** Black Kynar PVDF
**-PX** Platinum-Cured Silicone
**-U71** White Class VI Glass Filled Nylon
**-U75** Blue Class VI Glass Filled Nylon
**-VP1** Animal-free Polyethylene
**-X2** Buna-N Rubber
**-XO** Stainless Steel

## Resin Reference

**Pg 82** Chemical Resistance
**Pg 83** Regulatory Status
**Pg 84** Sterilization Stability
**Pg 85** Typical Properties

## POLYVINYL CHLORIDE (PVC) TUBING

### *75 Durometer*

Our PVC tubing is a very cost effective product that can satisfy a broad array of end use applications. It is flexible in nature, optically clear, and easily sterilized.

### *Resin Grade & Technical Information:*

This tubing is extruded from Unichem® 7511 G-015 resin, which is in compliance with all US Food & Drug Administration regulations for food grade use under Title 21 CFR. It is also certified USP Class VI. It can be sterilized by gamma radiation or Ethylene Oxide (EtO) gas. This tubing is not autoclavable.

| DIMENSION (ID X OD X LGTH) | NUMBER |
|---|---|
| 1/16" X 1/8" X 100' | PV00-1031C |
| 1/16" X 1/8" X 1000' | PV00-1031M |
| 3/32" X 3/16" X 100' | PV00-2047C |
| 1/8" X 1/4" X 100' | PV00-3062C |
| 1/8" X 1/4" X 1000' | PV00-3062M |
| 3/16" X 5/16" X 100' | PV00-5062C |
| 1/4" X 3/8" X 100' | PV00-6062C |

## POLYURETHANE TUBING

### *80 Durometer*

Our polyurethane tubing is extremely kink resistant. It is also highly resistant to abrasion and scuffing. It is widely accepted as a premium material for medical device use because of its flexible nature and easy sterilizability.

### *Resin Grade & Technical Information:*

This tubing is extruded from Dow's® compound Pellethane 2363-80AE, which has passed USP Class VI testing. It can be sterilized by gamma radiation or Ethylene Oxide (EtO) gas. Please do not autoclave this tubing, as it may alter the chemical nature of the resin.

| DIMENSION (ID X OD X LGTH) | NUMBER |
|---|---|
| 1/16" X 1/8" X 100' | UR00-1031C |
| 1/16" X 1/8" X 1000' | UR00-1031M |
| 3/32" X 3/16" X 100' | UR00-2047C |
| 3/32" X 3/16" X 1000' | UR00-2047M |
| 1/8" X 1/4" X 100' | UR00-3062C |

## LOW DENSITY POLYETHYLENE TUBING

### *92 Durometer*

Our polyethylene tubing has excellent mechanical and chemical resistance properties. However, please use caution if your application involves possible bending or kinking the tubing. It is a semi-rigid material and will be permanently deformed if kinked or bent too tight.

### *Resin Grade & Technical Information:*

This tubing is extruded from DuPont® 2020T, which is in compliance with all U.S. Food & Drug Administration regulations for food grade use under Title 21 CRF. It can be sterilized by gamma radiation or Ethylene Oxide (EtO) gas. Autoclaving is not recommended.

| DIMENSION (ID X OD X LGTH) | NUMBER |
|---|---|
| 1/16" X 1/10" X 100' | LDPE01-1019C |
| 1/16" X 1/10" X 1000' | LDPE01-1019M |
| 1/16" X 1/8" X 100' | LDPE01-1031C |
| 1/16" X 1/8" X 1000' | LDPE01-1031M |
| 3/32" X 5/32" X 100' | LDPE01-2031C |
| 3/32" X 5/32" X 1000' | LDPE01-2031M |
| 1/8" X 3/16" X 100' | LDPE01-3031C |
| 1/8" X 3/16" X 1000' | LDPE01-3031M |



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**ASSORTED DESIGNER KIT (Part number - ASSORTED KIT-001)**
Our Assorted Kit provides a cross section of many components designed and manufactured by Value Plastics. This kit contains a variety of our popular components, including luers, tube-to-tube and threaded fittings. Please see www.valueplastics.com for a complete list of all included parts.

**LUER DESIGNER KIT (Part Number - LUER KIT-001)**
Our Luer Kit contains male and female luers, luer plugs, couplers, tees, elbows as well as blood pressure cuff and monitor fittings. Luer tapers are made to ISO standards. Please see www.valueplastics.com for a complete list of all included parts.

Note: Due to our ever increasing product line, Kit contents are subject to change without notice. Kits may include one or more of each component in a variety of materials.

**TUBE-TO-TUBE DESIGNER KIT (Part Number - TUBE-TO-TUBE KIT-001)**
Our Tube-to-Tube Kit contains a variety of fittings in different configurations - and one that is sure to work for your application. Some of the fittings contained in this kit include straight-thru connectors, tees, elbows, Ys, and press-in plugs. Please see www.valueplastics.com for a complete list of all included parts.

Note: Due to our ever increasing product line, Kit contents are subject to change without notice. Kits may include one or more of each component in a variety of materials.

**XQ DESIGNER KIT (Part Number - XQ KIT-001)**
Our XQ Kit contains an assortment of XQ Series Quick Connect Fittings (Quick Disconnect Couplings). Please see www.valueplastics.com for a complete list of all included parts.

Note: Due to our ever increasing product line, Kit contents are subject to change without notice. Kits may include one or more of each component in a variety of materials.



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**BLOOD PRESSURE DESIGNER KIT (Part Number - BP KIT-001)**
Our Blood Pressure Kit contains a variety of blood pressure fittings that are manufactured by Value Plastics. Some of the fittings contained in this kit include quick connect fittings, connectors, panel mounts and adaptors. Includes 30 different parts and 138 pieces, please see www.valueplastics.com for a complete list of all included parts.

Note: Due to our ever increasing product line, Kit contents are subject to change without notice. Kits may include one or more of each component in a variety of materials.

**BIOPHARM DESIGNER KIT (Part Number - BIOPHARM KIT-001)**
Our Biopharm Designer Kit contains a variety of fittings that are commonly found within the BioPharm market. Some of the fittings contained in this kit include our larger fittings of Y's, T's, elbows, straight through and reducing connectors ranging from 3/8" to 1", sanitary fittings and gaskets. Please see www.valueplastics.com for a complete list of all included parts.

Note: Due to our ever increasing product line, Kit contents are subject to change without notice. Kits may include one or more of each component in a variety of materials.

**BUILD-A-PART DESIGNER KIT (Part Number - KIT01-81 -KIT01-40)**
Our Build-A-Part Kits are available in two different materials: White ABS or Polysulfone. Contained in these kits are luers, elbows, tees, and junction blocks. Please see www.valueplastics.com for a complete list of all included parts.

Note: Due to our ever increasing product line, Kit contents are subject to change without notice. Kits may include one or more of each component in a variety of materials.

**INK JET DESIGNER KIT (Part Number - INK JET KIT-001)**
A cross section of many components designed and manufactured by Value Plastics. Includes luers, tube-to-tube and threaded fittings commonly used by Ink Jet Printer Manufacturers. Please see www.valueplastics.com for a complete list of all included parts.

Note: Due to our ever increasing product line, Kit contents are subject to change without notice. Kits may include one or more of each component in a variety of materials.





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**MANUAL TUBESETTER**
Designed for rapid assembly of barb to tube connections, the Tubesetter assembly tool joins flexible tubing and Value Plastics' barbed fitting, applying the force necessary to push the tube over the barb. No external power source is needed. Made almost entirely of acetal plastic, the device is easy to clean and suitable for operation in most environments. Consider the Manual Small Fitting Tubesetter assembly tool for prototype assembly or lower-volume manufacturing needs.

Value Plastics' Tubesetter® assembly tool sets the standard for effortless tube set production. The Tubesetter product joins flexible tubing and Value Plastics' barbed fitting, applying the force necessary to push the tube over the barb, providing efficiency, economy and ease of use over other connection alternatives without adhesives or solvents!

## Manual Tubesetter

- Easy to use
- Excellent for volumes up to 1,000 assemblies per month
- Accommodates tubing from 3/32" to 3/8" OD
- Configurable for: Luers - Straights - Ys - Tees - Elbows
- Requires no electricity or pneumatic power
- Long-life acetal construction

| PART | DESCRIPTION |
|---|---|
| 930B1A | Manual TUBESETTER® Base |
| 930JS* | Standard Jaw Set |
| 930AS* | Standard Flip Top Anvil |
| 920PS* | Standard Pin Set Assembly |

*The base manual TUBESETTER® unit requires a jaw set, anvil assembly and pin set assembly. An additional engineering fee may be required for a custom application.



**Need more details?**
Part drawings, minimum order quantities, and CAD requests can be found online. Visit **www.valueplastics.com** or contact Sales at **sales@valueplastics.com**

**Technical Assistance**
Trying to choose the correct part? Need more material information than is published in this catalog? Call Value Plastics Technical support **(970) 267-5200**

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# TECHNICAL INFORMATION

Barb Dimensions **PG-79**

Barb Performance **PG-80**

BPF Series Performance **PG-81**

Panel Mount Instructions **PG-81**

Resin Information **PG-82**

Trademarks **PG-85**

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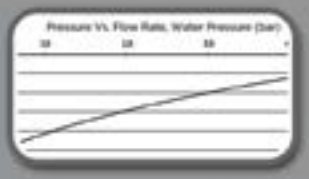

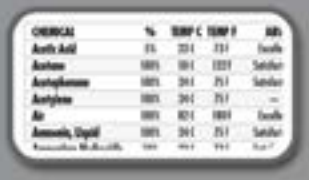

The **CLASSIC SERIES** is characterized by a longer barb that extends the sealing surface of the fitting. Tubing is expanded from 42% to 69% above its nominal ID.

The **200 SERIES** offers outstanding performance characteristics when used with flexible tubing. Tubing is expanded by 50% above its nominal ID, permitting high-pressure capabilities.

The **300 SERIES** offers outstanding performance characteristics when used with flexible tubing. Tubing is expanded by 35% above its nominal ID, permitting high-pressure capabilities in the larger tube sizes.

The **400 Series** provides easy assembly while maintaining excellent pressure and tensile capabilities. Originally created for semi-rigid tubing, this series is preferred for applications where tensile/pressure properties are not highly critical, or when ease of assembly is desired. The 400 Series expands the tubing 25% above its nominal ID.

The **500 SERIES** profile is composed of blended radii, giving it the distinct look. Each barb is designed to accommodate a range of tube sizes and tube types. Consideration should be given to flow restriction, pressure capability, and the force required for assembly of the tube.

The **600 SERIES** barbs are designed for use with silicone, C-Flex® and PVC tubing sizes commonly used in biopharm and other applications. Tubing is expanded from 18% to 34% above its nominal ID to maintain a low profile and ease of assembly, and the straight barb stem facilitates use of recommended cable tie retainers or hose clamps.

The **700 SERIES** barb is designed for use with Value Plastics' XQ Series quick connect fittings. This unique single barb is available in sizes to fit the 1/4" (6.4 mm), 5/16" (7.9 mm) and 3/8" (9.5 mm) ID tubing sizes and materials commonly used in disposable and reusable medical equipment. Reinforced PVC, unreinforced PVC and polyurethane tubing materials work well with this barb style.

The **900 SERIES** offers outstanding performance characteristics when used with flexible tubing. Tubing is expanded from 8% to 17% above its nominal ID. This barb provides high flow efficiency and excellent tensile strength. A hose clamp is recommended for this series.


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### CLASSIC SERIES

| Barb Size | Barb OD | Barb ID | Tube Internal Diameter | | |
|---|---|---|---|---|---|
| | | | Dec. | Frac. | Metric |
| 10 | 0.105 | 0.046 | 0.063 | 1/16" | 1.6 mm |
| 20 | 0.145 | 0.060 | 0.094 | 3/32" | 2.4 mm |
| 30 | 0.187 | 0.078 | 0.125 | 1/8" | 3.2 mm |
| 40 | 0.234 | 0.100 | 0.156 | 5/32" | 4.0 mm |
| 50 | 0.280 | 0.130 | 0.188 | 3/16" | 4.8 mm |
| 60 | 0.355 | 0.187 | 0.250 | 1/4" | 6.4 mm |

### 200 SERIES

| Barb Size | Barb OD | Barb ID | Tube Internal Diameter | | |
|---|---|---|---|---|---|
| | | | Dec. | Frac. | Metric |
| 210 | 0.094 | 0.047 | 0.063 | 1/16" | 1.6 mm |
| 220 | 0.141 | 0.070 | 0.094 | 3/32" | 2.4 mm |
| 230 | 0.188 | 0.094 | 0.125 | 1/8" | 3.2 mm |
| 240 | 0.234 | 0.117 | 0.156 | 5/32" | 4.0 mm |
| 250 | 0.282 | 0.141 | 0.188 | 3/16" | 4.8 mm |
| 260 | 0.375 | 0.188 | 0.250 | 1/4" | 6.4 mm |

### 300 SERIES

| Barb Size | Barb OD | Barb ID | Tube Internal Diameter | | |
|---|---|---|---|---|---|
| | | | Dec. | Frac. | Metric |
| 360 | 0.338 | 0.192 | 0.250 | 1/4" | 6.4 mm |

### 400 SERIES

| Barb Size | Barb OD | Barb ID | Tube Internal Diameter | | |
|---|---|---|---|---|---|
| | | | Dec. | Frac. | Metric |
| 410 | 0.078 | 0.046 | 0.063 | 1/16" | 1.6 mm |
| 420 | 0.117 | 0.068 | 0.094 | 3/32" | 2.4 mm |
| 430 | 0.156 | 0.092 | 0.125 | 1/8" | 3.2 mm |
| 440 | 0.206 | 0.125 | 0.156 | 5/32" | 4.0 mm |
| 445 | 0.213 | 0.125 | 0.170 | - | 4.3 mm |
| 450 | 0.234 | 0.137 | 0.188 | 3/16" | 4.8 mm |
| 460 | 0.313 | 0.184 | 0.250 | 1/4" | 6.4 mm |

### 600 SERIES

| Barb Size | Barb OD | Barb ID | Tube Internal Diameter | | |
|---|---|---|---|---|---|
| | | | Dec. | Frac. | Metric |
| N655 | 0.335 | 0.181 | 0.250 | 1/4" | 6.4 mm |
| N670 | 0.490 | 0.296 | 0.375 | 3/8" | 9.5 mm |
| T670 | 0.490 | 0.286 | 0.375 | 3/8" | 9.5 mm |
| Y670 | 0.490 | 0.296 | 0.375 | 3/8" | 9.5 mm |
| N680 | 0.625 | 0.403 | 0.500 | 1/2" | 12.7 mm |
| T680 | 0.625 | 0.399 | 0.500 | 1/2" | 12.7 mm |
| Y680 | 0.625 | 0.401 | 0.500 | 1/2" | 12.7 mm |
| N690 | 0.762 | 0.499 | 0.625 | 5/8" | 16.0 mm |
| T690 | 0.762 | 0.483 | 0.625 | 5/8" | 16.0 mm |
| N6100 | 0.900 | 0.615 | 0.750 | 3/4" | 19.0 mm |
| L6110 | 1.180 | 0.799 | 1.000 | 1" | 25.4 mm |
| N6110 | 1.180 | 0.804 | 1.000 | 1" | 25.4 mm |

### 500 SERIES

| Barb Size | Barb OD | Barb ID | Tube Internal Diameter | | |
|---|---|---|---|---|---|
| | | | Dec. | Frac. | Metric |
| 004 | 0.102 | 0.060 | 0.063 | 1/16" | 1.6 mm |
| 007 | 0.129 | 0.076 | 0.094 | 3/32" | 2.4 mm |
| 013 | 0.164 | 0.096 | 0.125 | 1/8" | 3.2 mm |
| 025 | 0.208 | 0.122 | 0.156 | 5/32" | 4.0 mm |
| 035 | 0.264 | 0.155 | 0.188 | 3/16" | 4.8 mm |
| 055 | 0.335 | 0.197 | 0.250 | 1/4" | 6.4 mm |
| 065 | 0.425 | 0.250 | 0.312 | 5/16" | 8.0 mm |
| N070 | 0.483 | 0.262 | 0.375 | 3/8" | 9.5 mm |
| L070 | 0.483 | 0.251 | 0.375 | 3/8" | 9.5 mm |
| T070 | 0.483 | 0.290 | 0.375 | 3/8" | 9.5 mm |
| Y070 | 0.483 | 0.290 | 0.375 | 3/8" | 9.5 mm |
| N080 | 0.613 | 0.333 | 0.500 | 1/2" | 12.7 mm |
| L080 | 0.613 | 0.319 | 0.500 | 1/2" | 12.7 mm |
| T080 | 0.613 | 0.356 | 0.500 | 1/2" | 12.7 mm |
| Y080 | 0.613 | 0.362 | 0.500 | 1/2" | 12.7 mm |
| N090 | 0.718 | 0.390 | 0.625 | 5/8" | 16.0 mm |
| L090 | 0.718 | 0.374 | 0.625 | 5/8" | 16.0 mm |
| T090 | 0.718 | 0.374 | 0.625 | 5/8" | 16.0 mm |
| Y090 | 0.718 | 0.390 | 0.625 | 5/8" | 16.0 mm |
| N100 | 0.853 | 0.465 | 0.750 | 3/4" | 19.0 mm |
| L100 | 0.853 | 0.443 | 0.750 | 3/4" | 19.0 mm |
| T100 | 0.853 | 0.447 | 0.750 | 3/4" | 19.0 mm |
| Y100 | 0.853 | 0.492 | 0.750 | 3/4" | 19.0 mm |
| N110 | 1.125 | 0.623 | 1.000 | 1" | 25.4 mm |
| L110 | 1.125 | 0.600 | 1.000 | 1" | 25.4 mm |
| T110 | 1.125 | 0.600 | 1.000 | 1" | 25.4 mm |
| Y110 | 1.125 | 0.623 | 1.000 | 1" | 25.4 mm |

### 700 SERIES

| Barb Size | Barb OD | Barb ID | Tube Internal Diameter | | |
|---|---|---|---|---|---|
| | | | Dec. | Frac. | Metric |
| 755 | 0.329 | 0.204 | 0.250 | 1/4" | 6.4 mm |
| 765 | 0.398 | 0.245 | 0.312 | 5/16" | 7.9 mm |
| 770 | 0.455 | 0.302 | .375 | 3/8" | 9.5 mm |

### 900 SERIES

| Barb Size | Barb OD | Barb ID | Tube Internal Diameter | | |
|---|---|---|---|---|---|
| | | | Dec. | Frac. | Metric |
| 970 | 0.437 | 0.269 | 0.375 | 3/8" | 9.5 mm |
| 975 | 0.573 | 0.358 | 0.500 | 1/2" | 12.7 mm |

The data presented here is for reference only. It was compiled to provide our customers with a means of comparing the characteristics of components at the time of publication. The particular conditions of your use and application of our products are beyond our control. Thus, it is imperative that you test our products in your specific application to determine their suitability. All information is provided without implied or express warranty or guarantee by Value Plastics' or other manufacturers. None of the information provided constitutes a recommendation or endorsement of any kind by Value Plastics'.

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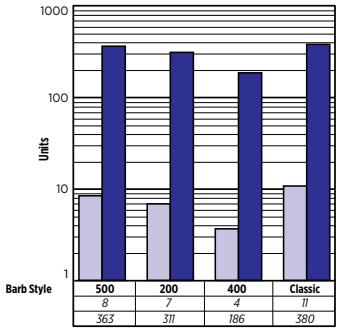
Tensile pull and burst tests were performed by an independent laboratory under controlled conditions to provide comparative performance data for the various barb styles and sizes offered by Value Plastics. Graph numbers 1 through 8 present the data from each of the tests for each barb size and each barb style connected to PVC tube.

The values shown are the means of a statistically significant sample quantity of each configuration. Value Plastics barbed fittings specifically designed for use with the tubing size indicated were used in these tests. No oversized barbs, solvents, adhesives, or secondary fasteners of any kind were used.

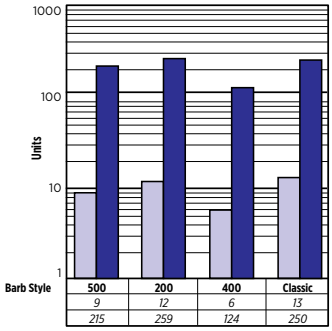
**Tensile Pull Test:** Tensile properties were measured to determine the force required to remove the barbed fitting from the tubing. Tensile specimens were mounted axially in a holding fixture and tested at a rate of 20 inches per minute. Failure mode was tubing separating from the barb.

**Hydrostatic Burst Test:** Hydrostatic burst testing was performed in general accordance with ASTM D1599. Failure mode was either tubing separating from the barb, the tubing bursting, or a combination of the two.

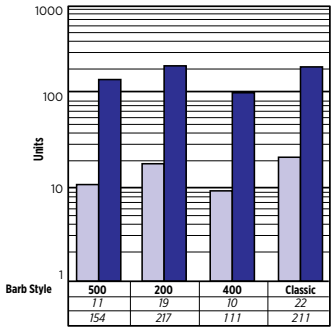
## Performance of Barb to Tube Connections – Tensile Pull Test (lbs) – Hydrostatic Burst Test (psi)



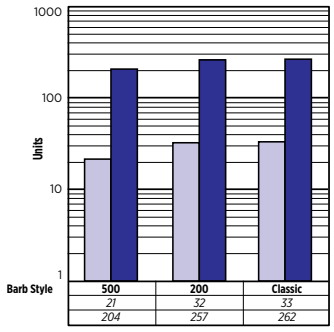

Graph 1: 1/16" Barb Performance



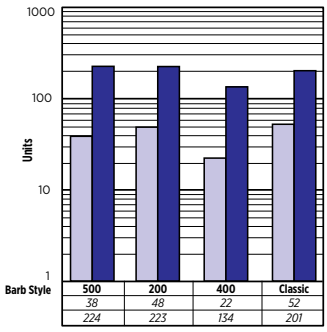

Graph 2: 3/32" Barb Performance



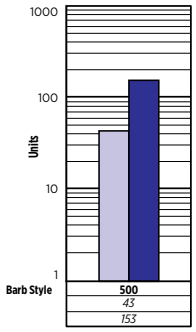

Graph 3: 1/8" Barb Performance




Graph 4: 5/32" Barb Performance

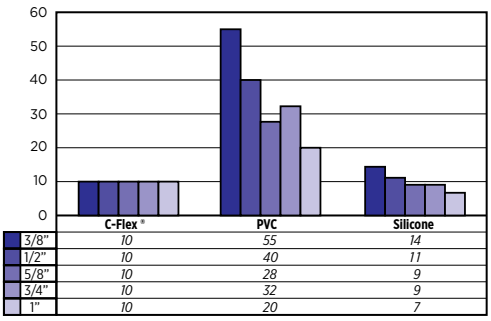



Graph 5: 3/16" Barb Performance



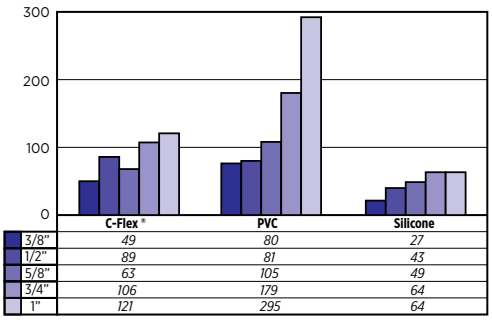

Graph 6: 1/4" Barb Performance

### 600 Series Leak Tests




| | C-Flex® | PVC | Silicone |
|---|---|---|---|
| 3/8" | 10 | 55 | 14 |
| 1/2" | 10 | 40 | 11 |
| 5/8" | 10 | 28 | 9 |
| 3/4" | 10 | 32 | 9 |
| 1" | 10 | 20 | 7 |

### 600 Series Tensile Pull Tests




| | C-Flex® | PVC | Silicone |
|---|---|---|---|
| 3/8" | 49 | 80 | 27 |
| 1/2" | 89 | 81 | 43 |
| 5/8" | 63 | 105 | 49 |
| 3/4" | 106 | 179 | 64 |
| 1" | 121 | 295 | 64 |

The data presented here is for reference only. It was compiled to provide our customers with a means of comparing the characteristics of components at the time of publication. The particular conditions of your use and application of our products are beyond our control. Thus, it is imperative that you test our products in your specific application to determine their suitability. All information is provided without implied or express warranty or guarantee by Value Plastics' or other manufacturers. None of the information provided constitutes a recommendation or endorsement of any kind by Value Plastics'.



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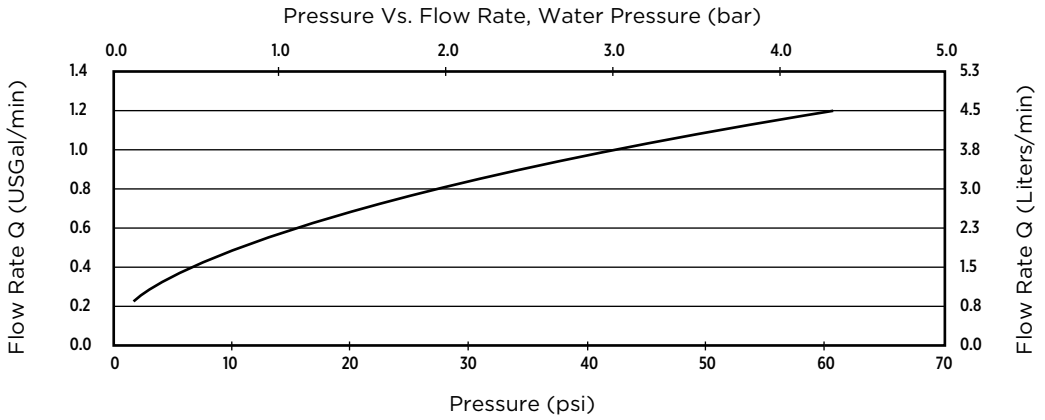
Maximum cycles _____ 50,000 connect-disconnect cycles
Maximum axial tensile resistance _____ 20 lbf.
Maximum working pressure _____ 60 psi, 4.14 bar

Maximum leak resistance _____ < .007 psi / 0.05 kPa / sec.
Minimum Fitting ID _____ .113" / 2.9 mm
Minimum Cv _____ .39




## TECHNICAL:
Panel Mount Instructions

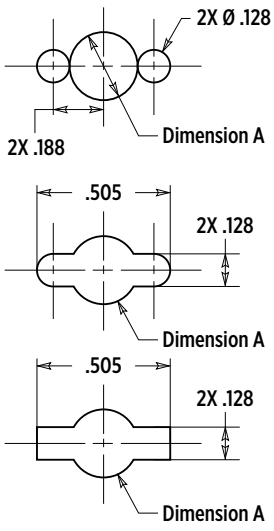
Panel-mounted female luers, in both FTLLB (thread style) and FTLB (lug style) series, are shown beginning on page 32. When used with our CCLR lock rings or CCR color coding rings and LNS lock nuts (see pages 33, 55 ), color coding of connections is easy.

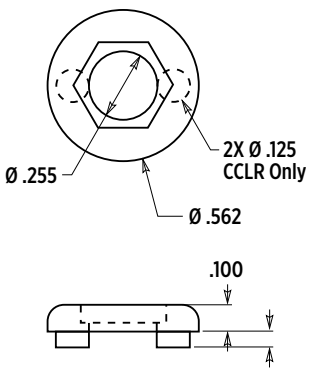
The information provided here will help you mount the panel mount luers. Please note that they are intended for panel thickness of 1/16" to 1/8" (1.5 to 3 mm).

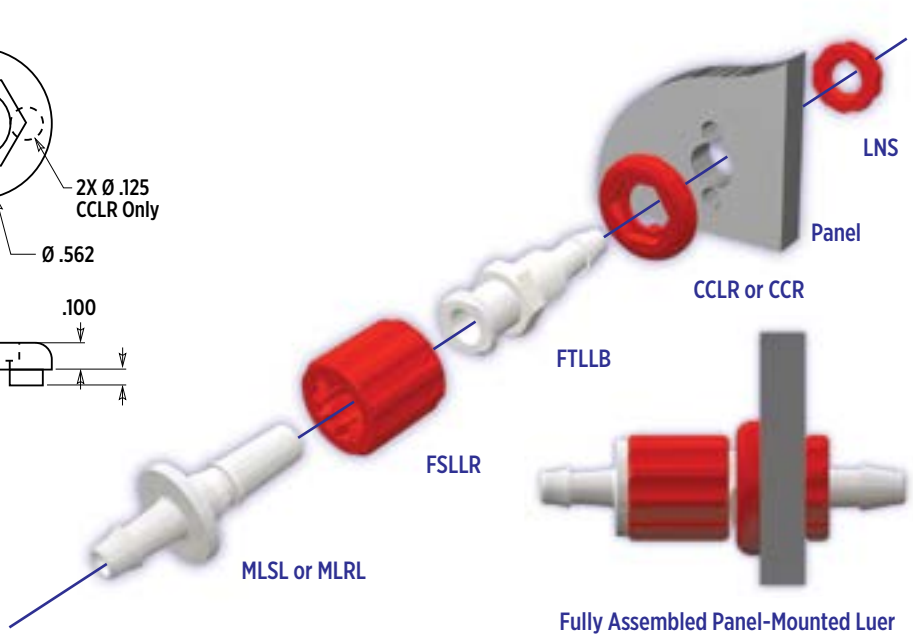
FTLLB series shown with MLSL luer, FSLLR lock ring, CCLR color coding lock ring, and LNS lock nut.

**Threaded Panel Openings:** Tap the panel with threads from tube fittings, panel mounts or BPMBs and use a CCR color coded ring. In this case, the fitting tightened into the panel prevents fitting rotation. Use an LNS lock nut for additional security; tighten snug plus 1/4 turn only.

**Non-Threaded Panel Openings:** Use any one of the three panel patterns shown below with a CCLR lock ring and LNS lock nut. Together, the panel opening and CCLR prevent the panel mount fitting from rotating. Tighten LNS snug plus 1/4 turn only.

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| CHEMICAL | % | TEMP C | TEMP F | ABS | ACETAL | PVDF | NYLON | POLYCARBONATE | POLYPROPYLENE | POLYSULFONE |
|---|---|---|---|---|---|---|---|---|---|---|
| Acetic Acid | 5% | 23 C | 73 F | Excellent | Unsatisfactory | Excellent | Satisfactory | Satisfactory | Excellent | Excellent |
| Acetone | 100% | 50 C | 122 F | Unsatisfactory | Unsatisfactory | Unsatisfactory | Satisfactory | Unsatisfactory | Excellent | Unsatisfactory |
| Acetophenone | 100% | 24 C | 75 F | Satisfactory | — | Unsatisfactory | Excellent | — | Satisfactory | — |
| Acetylene | 100% | 24 C | 75 F | — | — | Excellent | Excellent | — | — | — |
| Air | 100% | 82 C | 180 F | Excellent | Excellent | Excellent | Excellent | — | — | Excellent |
| Ammonia, Liquid | 100% | 24 C | 75 F | Satisfactory | — | Unsatisfactory | Satisfactory | Unsatisfactory | Excellent | Excellent |
| Ammonium Hydroxide | 10% | 23 C | 73 F | Satisfactory | — | Excellent | Excellent | Unsatisfactory | Excellent | Excellent |
| Ammonium Hydroxide | 10% | 70 C | 158 F | Unsatisfactory | — | Excellent | Unsatisfactory | Unsatisfactory | Excellent | Excellent |
| Barium Sulfide | 100% | 24 C | 75 F | Excellent | Excellent | Excellent | Satisfactory | | Excellent | — |
| Benzene | 100% | 23 C | 73 F | Satisfactory | Excellent | Excellent | Excellent | Unsatisfactory | Satisfactory | Unsatisfactory |
| Bleach | 100% | 23 C | 73 F | — | Unsatisfactory | Excellent | Satisfactory | Unsatisfactory | Satisfactory | Excellent |
| Boric Acid | 7% | 35 C | 95 F | Excellent | Excellent | Excellent | Unsatisfactory | Excellent | Excellent | — |
| Calcium Carbonate | Sat. sol. | 24 C | 75 F | Excellent | — | Excellent | — | — | Excellent | |
| Carbon Dioxide | 100% | 50 C | 122 F | Satisfactory | Excellent | Excellent | Excellent | — | Excellent | — |
| Carbon Monoxide | 100% | 50 C | 122 F | Satisfactory | — | Excellent | Excellent | — | Excellent | — |
| Carbon Tetrachloride | 100% | 50 C | 122 F | Unsatisfactory | — | Excellent | Excellent | Unsatisfactory | Unsatisfactory | Unsatisfactory |
| Chlorine Water | Dilute | 23 C | 73 F | Unsatisfactory | — | Excellent | Satisfactory | Unsatisfactory | Unsatisfactory | Satisfactory |
| Chlorine Water | Concen. | 23 C | 73 F | Unsatisfactory | — | Excellent | Unsatisfactory | Unsatisfactory | Unsatisfactory | Unsatisfatory |
| Chlorobenzene | 100% | 23 C | 73 F | Satisfactory | — | Excellent | Excellent | Unsatisfactory | Unsatisfactory | Unsatisfactory |
| Chlorofluorocarbon 11 | 100% | 24 C | 75 F | — | — | Excellent | Excellent | Satisfactory | | Excellent |
| Chloroform | 100% | 23 C | 73 F | Unsatisfactory | Satisfactory | Excellent | Satisfactory | Unsatisfactory | Unsatisfactory | Unsatisfactory |
| Cyclohexanone | 100% | 24 C | 75 F | Unsatisfactory | — | Excellent | Excellent | Unsatisfactory | Satisfactory | Unsatisfactory |
| Dichlorethylene | 100% | 23 C | 73 F | — | — | Excellent | Satisfactory | | Excellent | Unsatisfactory |
| Ethanol | 95% | 50 C | 122 F | Satisfactory | — | Excellent | Excellent | Satisfactory | Excellent | Satisfactory |
| Ethyl Acetate | 95% | 50 C | 122 F | Satisfactory | — | Unsatisfactory | Excellent | Unsatisfactory | Satisfactory | Unsatisfactory |
| Ethylene Glycol | 100% | 23 C | 73 F | Excellent | Satisfactory | Excellent | Excellent | Satisfactory | Excellent | Excellent |
| Ethylene Oxide | 100% | 24 C | 75 F | Unsatisfactory | — | Excellent | Satisfactory | Satisfactory | Satisfactory | Excellent |
| Ethylene Oxide | 100% | 79 C | 175 F | Unsatisfactory | — | Excellent | Unsatisfactory | Satisfactory | Unsatisfactory | Excellent |
| Fatty Acids | — | — | — | — | Excellent | Excellent | — | Satisfactory | Excellent | — |
| Fluorine | 100% | 23 C | 73 F | Unsatisfactory | — | Excellent | Unsatisfactory | — | — | — |
| Formaldehyde | 37% | 24 C | 75 F | Unsatisfactory | Excellent | Excellent | — | Unsatisfactory | Excellent | Unsatisfactory |
| Gasoline | 100% | 85 C | 185 F | Excellent | Satisfactory | Excellent | Excellent | Unsatisfactory | Satisfactory | Satisfactory |
| Glucose | Concen. | 24 C | 75 F | Excellent | — | Excellent | — | — | Excellent | — |
| Glycerin | 100% | 24 C | 75 F | Excellent | — | Excellent | — | Excellent | Excellent | Excellent |
| Hydrochloric Acid | 2% | 23 C | 73 F | Excellent | Satisfactory | Excellent | Excellent | Excellent | Excellent | Excellent |
| Hydrochloric Acid | 10% | 25 C | 77 F | Excellent | Satisfactory | Excellent | Unsatisfactory | Excellent | Excellent | Excellent |
| Hydrofluoric Acid | 10% | 23 C | 73 F | Satisfactory | — | Excellent | Unsatisfactory | | Excellent | Excellent |
| Hydrogen Peroxide | 1% | 24 C | 75 F | Excellent | Unsatisfactory | Excellent | Satisfactory | Excellent | Excellent | Excellent |
| Hydrogen Peroxide | 5% | 43 C | 110 F | Satisfactory | Unsatisfactory | Excellent | Unsatisfactory | Excellent | Satisfactory | Excellent |
| Isopropanol | 70% | 23 C | 73 F | — | Excellent | Excellent | Excellent | Call* | Excellent | Satisfactory |
| Kerosene | 100% | 85 C | 185 F | Satisfactory | — | Excellent | Excellent | Satisfactory | Satisfactory | Satisfactory |
| Methyl Ethyl Ketone | 100% | 50 C | 122 F | Unsatisfactory | — | Unsatisfactory | Excellent | Unsatisfactory | Satisfactory | Unsatisfactory |
| Methylene Chloride | 100% | 23 C | 73 F | Unsatisfactory | — | Excellent | Satisfactory | Unsatisfactory | Excellent | Unsatisfactory |
| Methanol | 100% | 23 C | 73 F | Unsatisfactory | — | Excellent | Excellent | Satisfactory | Excellent | Satisfactory |
| Nitric Acid | 10% | 23 C | 73 F | Satisfactory | — | Excellent | Unsatisfactory | Unsatisfactory | Excellent | Satisfactory |
| Oxygen | 100% | 24 C | 75 F | — | — | Excellent | Satisfactory | — | — | — |
| Ozone | 100% | 43 C | 110 F | Satisfactory | — | Satisfactory | Unsatisfactory | Unsatisfactory | — | — |
| Phenol | 90% | 23 C | 73 F | Unsatisfactory | Unsatisfactory | Excellent | Unsatisfactory | — | Excellent | — |
| Phosphoric Acid | 5% | 98 C | 208 F | Satisfactory | Unsatisfactory | Excellent | Unsatisfactory | Unsatisfactory | Excellent | Excellent |
| Propane | 100% | 23 C | 73 F | Satisfactory | — | Excellent | Excellent | — | — | — |
| Sodium Bicarbonate | Concen. | 24 C | 75 F | Excellent | Excellent | Excellent | Excellent | — | Excellent | Excellent |
| Sodium Chloride | 10% | 23 C | 73 F | Excellent | — | Excellent | Excellent | — | Excellent | Excellent |
| Sodium Chloride | Sat. sol. | 24 C | 75 F | Excellent | — | Excellent | Excellent | — | Excellent | Excellent |
| Sodium Hydroxide | 10% | 70 C | 158 F | Satisfactory | — | Excellent | Satisfactory | — | Excellent | Excellent |
| Steam | — | 120 C | 248 F | Unsatisfactory | — | Excellent | Unsatisfactory | Unsatisfactory | Satisfactory | Excellent |
| Sulfuric Acid | 30% | 23 C | 73 F | Satisfactory | Unsatisfactory | Excellent | Unsatisfactory | Excellent | Excellent | Excellent |
| Tetrahydrofuran | 100% | 23 C | 73 F | Satisfactory | — | Unsatisfactory | Excellent | — | Unsatisfactory | — |
| Toluene | 100% | 50 C | 122 F | Satisfactory | Unsatisfactory | Excellent | Excellent | Unsatisfactory | Unsatisfactory | Unsatisfactory |
| Trichloroethylene | 100% | 23 C | 73 F | Satisfactory | — | Excellent | Satisfactory | Unsatisfactory | Unsatisfactory | Unsatisfactory |
| Water | 100% | 79 C | 175 F | Excellent | — | Excellent | Excellent | Unsatisfactory | Excellent | Excellent |

* Call Value Plastics technical support to review your application and the concentration of Isopropanol that will be used.



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| **Material -** Manufacturer & Grade | **VP Code** | **Regulatory Compliance of Base Resin*** | **RoHS Compliant** | **BPA Free** | **DEHP Free** | **Animal Derivative Free*** |
|---|---|---|---|---|---|---|
| **ABS (Lace White) -** INEOS Lustran 348-000000 | **-81** | USP Class VI Certified; ISO 10993 Part I Compliant | Yes | Yes | Yes | No |
| **ABS, MABS (Methyl Methacrylate) -** BASF Terlux 2802 TR | **-8003, SCV Series** | USP Class VI Certified | Yes | Yes | Yes | Yes |
| **ABS (Sno White) -** INEOS Lustran 348-012002 | **-8012** | USP Class VI Certified; ISO 10993 Part I Compliant | Yes | Yes | Yes | No |
| **Acetal -** DuPont Delrin 500P | **-10** | 21 CFR 177.2480 FDA Approved | Yes | Yes | Yes | No |
| **l Copolymer -** BASF Ultraform N 23020 003 | **-1006, -1007** | 21 CFR 177.2470 FDA Approved | Yes | Yes | Yes | No |
| **ic -** Cyro Cyrolite Med 2 | **-50** | USP Class VI Certified; ISO 10993 Compliant; 21 CFR 177.1010 FDA Approved | Yes | Yes | Yes | Yes |
| **1 (PA 66) -** DuPont Zytel 101F | **-0, -1, -2, -3, -4, -5, -06, -07, -08B, -8, -8B, -CM030** | 21 CFR 177.1500 FDA Approved | Yes | Yes | Yes | No |
| **1 (PA 66) -** DuPont Zytel SC310 NC010 | **-U1, -U5, -U01, -U05** | USP Class VI Certified; ISO 10993 Compliant; 21 CFR 177.1500 FDA Approved | Yes | Yes | Yes | No |
| **1 (Glass Reinforced) -** DuPont Zytel FGFE5171 | **-U71, -U75** | USP Class VI Certified; ISO 10993 Compliant; 21 CFR 177.1500 FDA Approved | Yes | Yes | Yes | No |
| **1 (Glass Reinforced) -** DuPont Zytel 70G33L | **-7, -72** | 21 CFR 177.1500 FDA Approved | Yes | Yes | Yes | No |
| **arbonate (Clear) -** Bayer Makrolon 2558 550115 | **-9** | USP Class VI Certified; ISO 10993 Compliant; 21 CFR 177.1580 FDA Approved | Yes | No | Yes | No |
| **arbonate (Clear) -** Bayer Makrolon Rx 1805 451118 | **-9010, SCV Series** | USP Class VI Certified; ISO 10993 Compliant | Yes | No | Yes | Yes |
| **arbonate (Tinted) -** Styron Calibre Megarad 2081-15 | **-9002, DCV Series** | ISO 10993 Compliant | Yes | No | Yes | No |
| **thylene -** LyondellBasell Purell PE 1840 H | **SCV Series** | Please call for details | Yes | Yes | Yes | Yes |
| **ropylene -** Flint Hills P5M6K-080 | **-6005, -6006** | USP Class VI Certified; 21 CFR 177.1520 FDA Approved | Yes | Yes | Yes | Yes |
| **Polysulfone -** Solvay Udel P1700 CL2611 | **-40** | USP Class VI Certified; ISO 10993 Compliant; 21 CFR 177.1655 FDA Approved | Yes | Yes | Yes | Yes |
| **PVDF -** Arkema Kynar 1000 HD | **-J1A** | USP Class VI Certified; 21 CFR 177.2510 FDA Approved | Yes | Yes | Yes | Yes |
| **SAN -** BASF 388S TR 77770 | **SCV Series** | ISO 10993 Compliant | Yes | Yes | Yes | No |
| **Silicone -** Wacker Elastosil LR 3003 | **SCV Series** | USP Class VI Certified | Yes | Yes | Yes | Yes |

***As determined by resin manufacturer**

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| **Material -** Manufacturer & Grade | **VP Code** | **Gamma Radiation Sterilization*** | **Ethylene Oxide Sterilization** | **Autoclave Sterilization** |
|---|---|---|---|---|
| **ABS (Lace White) -** INEOS Lustran 348-000000 | **-81** | Compatible up to 5 Mrads | Good | Not suitable due to low heat deflection temperatures |
| **ABS, MABS (Methyl Methacrylate) -** BASF Terlux 2802 TR | **-8003, SCV Series** | Withstands up to 5 Mrad doses without yellowing | Good | Poor; components may distort due to low heat deflection temperatures |
| **ABS (Sno White) -** INEOS Lustran 348-012002 | **-8012** | Compatible up to 5 Mrads | Good | Not suitable due to low heat deflection temperatures |
| **Acetal -** DuPont Delrin 500P | **-10** | Compatible up to 1 Mrad | Excellent | Very Good |
| **Acetal Copolymer -** BASF Ultraform N 2320 003 | **-1006, -1007** | Compatible up to 1.5 Mrads | Excellent | Very Good |
| **Acrylic -** Cyro Cyrolite Med 2 | **-50** | Very good up to commonly used doses (6 Mrads) | Excellent | Not Recommended |
| **Nylon (PA 66) -** DuPont Zytel 101F | **-0, -1, -2, -3, -4, -5, -06, -07** | Very good; may discolor to brownish hue | Very good; some suceptibility to oxidizing agents | Very good; product may swell slig due to water absorption |
| **Nylon (PA 66) -** DuPont Zytel SC310 NC010 | **-U1, U5, -U01, -U05** | Very good; may discolor to brownish hue | Very good; some suceptibility to oxidizing agents | Very good; product may swell slig due to water absorption |
| **Nylon (Glass Reinforced) -** DuPont Zytel 70G30L | **-U71, -U75** | Very good; may discolor to brownish hue | Very good; some suceptibility to oxidizing agents | Excellent |
| **Nylon (Glass Reinforced) -** DuPont Zytel 70G33L | **-72** | Very good; may discolor to brownish hue | Very good; some suceptibility to oxidizing agents | Excellent |
| **Polycarbonate (Clear) -** Bayer Makrolon 2558 550115 | **-9** | Compatible up to 10 Mrads with minor loss of physical properties; will discolor to yellow-green hue | Highly compatible | Poor; may craze or stress crack due molding stresses |
| **Polycarbonate (Clear) -** Bayer Makrolon Rx 1805 451118 | **-9010, SCV Series** | Compatible up to 10 Mrads with minor loss of physical properties; may discolor slightly dependent upon dose/number of cycles | Highly compatible | Poor; may craze or stress crack due molding stresses |
| **Polycarbonate (Tinted) -** Styron Calibre Megarad 2081-15 | **-9002, DCV Series** | Excellent up to 10 Mrads with minor loss of physical properties; light violet hue turns clear upon sterilization | Highly compatible | Not Recommended |
| **Polyethylene -** LyondellBasell Purell PE 1840 H | **SCV Series** | Compatible up to 5 Mrads | Highly compatible | Not Recommended |
| **Polypropylene -** Flint Hills P5M6K-080 | **-6005, -6006** | Very good to commonly used sterilization doses (6 Mrads) | Highly compatible | Poor; components may distort due low heat deflection temperatures |
| **Polysulfone -** Solvay Udel P1700 CL2611 | **-40** | Highly compatible; will discolor to brownish hue | Excellent | Excellent |
| **PVDF -** Arkema Kynar 1000 HD | **-J1A** | Highly compatible; will discolor to brownish hue | Excellent | Highly Compatible |
| **SAN -** BASF 388S TR 77770 | **SCV Series** | Compatible up to 5 Mrads | Good | Not suitable due to low heat deflection temperatures |
| **Silicone -** Wacker Elastosil LR 3003 | **SCV Series** | Compatible up to 5 Mrads | Highly compatible | Very good |

***1 Megarad (Mrad) = 10 kiloGrays (kGy)**

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| Property | ASTM Test Method | PVDF | Polycarb | Radiation Stable PC | Polypro | Nylon[a] | GF Nylon[a] | ABS | MABS | Polysulfone | Acetal |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Tensile Strength** | D638 | 5,400 | 10,000 | 9,800 | — | 12,000 | 27,000 | 4,800 | — | — | — |
| **Elongation at Break, %** | D638 | 100-400 | 120 | 150 | 375 | 300 | 3 | 50 | 12 | 50-100 | 40 |
| **Tensile Yield Strength, psi** | D638 | 6,500 | 9,200 | 9,800 | 4,400 | 12,000 | — | 5,700 | 6,960 | 10,200 | 9,900 |
| **Flexural Modulus, kpsi** | D790 | 360 | 330 | 350 | 170 | 410 | 1,300 | 330 | — | 390 | 450 |
| **Rockwell Hardness D** | D785 | — | R118 | R118 | R80-102 | R121 | — | R107 | — | — | R122 |
| **Rockwell Hardness M** | — | — | M75 | M72 | — | M79 | M101 | — | — | M69 | M89 |
| **Shore Hardness D** | D2240 | D76-80 | — | — | — | — | — | — | — | — | — |
| **Coef. of Linear 10-5 in/in/°F** | D696 | 7.6 | 3.9 | 3.8 | — | 4 | 1.3 | 5.5 | — | 3.1 | — |
| **Deflection Temp°F @264psi** | D648 | 244 | 266 | 252 | — | 194 | 480 | 173 | 194 | 345 | 216 |
| **Deflection Temp°F @66psi** | D648 | — | 273 | — | 190 | 455 | — | — | 201 | 358 | 332 |
| **Water Absorption, %, 24 h** | D570 | 0.015 | 0.15 | 0.15 | 0 | 1.2 | 0.7 | 0.25- 0.40 | 0.7 | 0.3 | 0.4 |
| **Izod Impact, (Notched) ft-lb/in** | D256 | 3.1 | 16.0 | 14.0 | 0.5 | 1.0 | 2.2 | 6.0 | 1.31 | 1.3 | — |

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**Trademark** **1,887,178**

VALUE PLASTICS®

Corporate Trademark.

**Trademark** **3,838,623**

**BUILD-A-PART®**

Trademark for our non-metal bondable fittings

**Trademark** **1,727,081**

**TUBESETTER®**

Trademark for our rapid assembly devices

**OTHER TRADEMARKS**

1,827,467
1,817,921
1,817,922
2,655,263
2,616,170
2,535,232
2,535,234

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Dow® is a registered trademark of the Dow Chemical Company
DuPont® is a registered trademark of E.I. DuPont de Nemours & Co
Dinamap® is a registered trademark of GE Healthcare
Kynar® is a registered trademark of Atochem Atofina North America, Inc.
Tuf-Flex® is a registered trademark of Rubber Fab Technologies Group
Unichem® is a registered trademark of the Colorite Plastics Company

One or more components contained in this catalog may be covered by B. Braun OEM Division patents and trademarks. Patent numbers: 4,246,932; 4,535,820; 4,683,916.

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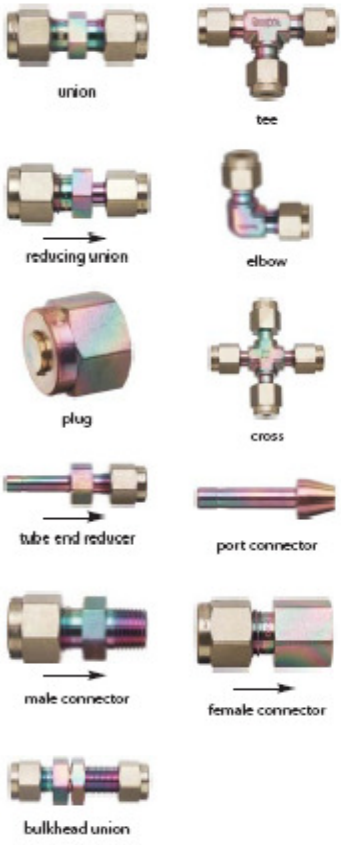
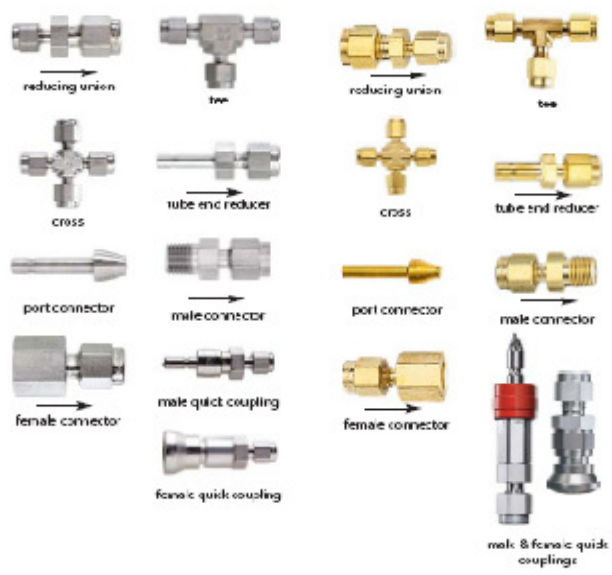
# GC Fittings -

## Restek Silco & Swagelok/Parker

### Stainless Steel

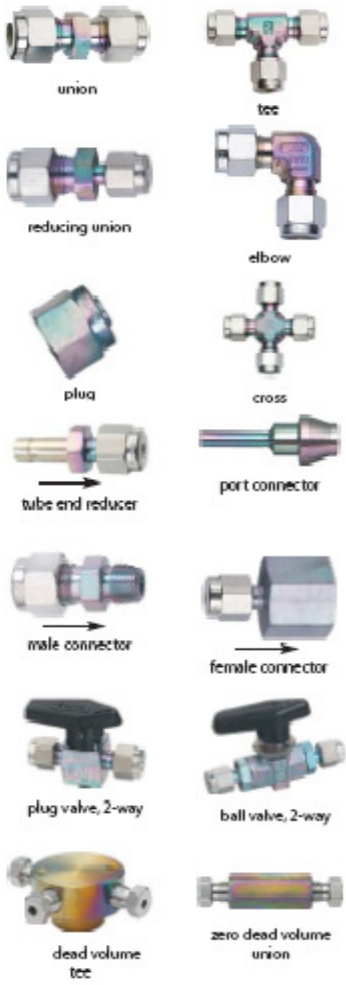
### Silco/Sulfinert






### Brass

### Silco/Sulfinert





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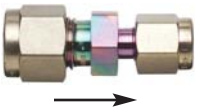
## Siltek®/Sulfinert® and Silcosteel®-CR Treated Swagelok® Fittings

- Full line of treated 1/16", 1/8", and 1/4" fittings.
- Silcosteel®-CR treatment enhances corrosion resistance by 10x, or more.
- Custom treatment available for any Swagelok® fitting, or other system parts not listed here (call for details).
- Description of custom Restek coatings listed below.

| | | | Siltek/Sulfinert Treated | | | Silcosteel-CR Treated | | |
|---|---|---|---|---|---|---|---|---|
| Fitting Type | Size | Swagelok # | qty. | cat.# | price | qty. | cat.# | price |
| Union | 1/16" | SS-100-6 | ea. | 22540 | | ea. | 22575 | |
| | 1/8" | SS-200-6 | ea. | 22541 | | ea. | 22576 | |
| | 1/4" | SS-400-6 | ea. | 22542 | | ea. | 22577 | |
| | 3/8" | SS-600-6 | ea. | 22909 | | ea. | 22904 | |
| Tee | 1/16" | SS-100-3 | ea. | 22543 | | ea. | 22578 | |
| | 1/8" | SS-200-3 | ea. | 22544 | | ea. | 22579 | |
| | 1/4" | SS-400-3 | ea. | 22545 | | ea. | 22580 | |
| | 3/8" | SS-600-3 | ea. | 22910 | | ea. | 22905 | |
| Reducing Union | 1/8" to 1/16" | SS-200-6-1 | ea. | 22546 | | ea. | 22581 | |
| | 1/4" to 1/16" | SS-400-6-1 | ea. | 22547 | | ea. | 22582 | |
| | 1/4" to 1/8" | SS-400-6-2 | ea. | 22548 | | ea. | 22583 | |
| | 3/8" to 1/4" | SS-600-6-4 | ea. | 22911 | | ea. | 22906 | |
| Elbow | 1/8" | SS-200-9 | ea. | 22549 | | ea. | 22584 | |
| | 1/4" | SS-400-9 | ea. | 22550 | | ea. | 22585 | |
| Plug | 1/8" | SS-200-P | ea. | 22573 | | ea. | 22620 | |
| | 1/4" | SS-400-P | ea. | 22574 | | ea. | 22597 | |
| Cross | 1/8" | SS-200-4 | ea. | 22551 | | ea. | 22586 | |
| | 1/4" | SS-400-4 | ea. | 22552 | | ea. | 22587 | |
| Tube End Reducer | 1/8" tube to 1/16" | SS-100-R-2 | ea. | 22553 | | ea. | 22588 | |
| | 1/4" tube to 1/16" | SS-100-R-4 | ea. | 22554 | | ea. | 22589 | |
| | 1/8" tube to 1/4" | SS-400-R-2 | ea. | 22555 | | ea. | 22590 | |
| | 1/4" tube to 1/8" | SS-200-R-4 | ea. | 22556 | | ea. | 22591 | |
| Port Connector | 1/8" | SS-201-PC | ea. | 22557 | | ea. | 22592 | |
| | 1/4" | SS-401-PC | ea. | 22558 | | ea. | 22593 | |
| | 1/8" tube to 1/4" | SS-401-PC-2 | ea. | 22559 | | ea. | 22594 | |
| Male Connector | 1/8" to 1/8" NPT | SS-200-1-2 | ea. | 22561 | | ea. | 22595 | |
| | 1/4" to 1/4" NPT | SS-400-1-4 | ea. | 22562 | | ea. | 22596 | |
| | 1/16" to 1/8" NPT | SS-100-1-2 | ea. | 22563 | | ea. | 22610 | |
| | 1/8" to 1/4" NPT | SS-200-1-4 | ea. | 22564 | | ea. | 22611 | |
| | 1/4" to 1/8" NPT | SS-400-1-2 | ea. | 22565 | | ea. | 22612 | |
| | 3/8" to 3/8" NPT | SS-600-1-6 | ea. | 22912 | | ea. | 22907 | |
| Female Connector | 1/8" to 1/8" NPT | SS-200-7-2 | ea. | 22566 | | ea. | 22613 | |
| | 1/4" to 1/4" NPT | SS-400-7-4 | ea. | 22567 | | ea. | 22614 | |
| | 1/4" to 1/8" NPT | SS-400-7-2 | ea. | 22568 | | ea. | 22615 | |
| | 1/8" to 1/4" NPT | SS-200-7-4 | ea. | 22569 | | ea. | 22616 | |
| Bulkhead Union | 1/8" | SS-200-61 | ea. | 22570 | | ea. | 22617 | |
| | 1/4" | SS-400-61 | ea. | 22571 | | ea. | 22618 | |

union

tee


reducing union

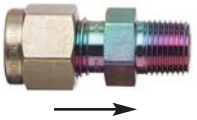
elbow

plug

cross

tube end reducer

port connector


male connector

female connector

bulkhead union

### Custom Restek Coatings

- **Siltek®**—The ultimate passivation of treated surfaces, from glass to high nickel alloys of steel; ideal for sulfurs, automotive exhaust testing, or stack gas sampling.
- **Sulfinert®**—A required treatment for metal components when analyzing for parts-per-billion levels of organo-sulfur compounds.
- **Silcosteel®-CR**—A corrosion resistant layer that increases the lifetime of system components in acidic environments containing hydrochloric acid, nitric acid, or seawater.

For more information on our custom coatings, see page 242.

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# Tube & Pipe Fittings

NEW!

## Swagelok® Fittings

Restek is pleased to offer one of the premier lines of fittings available for chromatographers in the market today. We can supply the entire line of Swagelok® fittings. If you don't see the exact product you're looking for, please call us for a quote.

nut

front ferrule

back ferrule

nut & ferrule set

plug

union

reducing union

tee

cross

tube end reducer

port connector

male connector

female connector

male quick coupling

female quick coupling

| Fitting Type | Size | Swagelok # | Brass qty. | Brass cat.# | Brass price | 316 Grade Stainless Steel qty. | 316 Grade Stainless Steel cat.# | 316 Grade Stainless Steel price |
|---|---|---|---|---|---|---|---|---|
| **Nut** | 1/16" | 102-1 | 20-pk. | 23100 | | 5-pk. | 23150 | |
| | 1/8" | 202-1 | 40-pk. | 23101 | | 10-pk. | 23151 | |
| | 1/4" | 402-1 | 40-pk. | 23102 | | 10-pk. | 23152 | |
| **Front Ferrule** | 1/16" | 103-1 | 20-pk. | 23103 | | 10-pk. | 23153 | |
| | 1/8" | 203-1 | 40-pk. | 23104 | | 20-pk. | 23154 | |
| | 1/4" | 403-1 | 40-pk. | 23105 | | 20-pk. | 23155 | |
| **Back Ferrule** | 1/16" | 104-1 | 20-pk. | 23106 | | 10-pk. | 23156 | |
| | 1/8" | 204-1 | 40-pk. | 23107 | | 20-pk. | 23157 | |
| | 1/4" | 404-1 | 40-pk. | 23108 | | 20-pk. | 23158 | |
| **Nut & Ferrule Set** | 1/16" | — | 10-pk. | 23109 | | 2-pk. | 23159 | |
| | 1/8" | — | 20-pk. | 23110 | | 5-pk. | 23160 | |
| | 1/4" | — | 20-pk. | 23111 | | 5-pk. | 23161 | |
| **Plug** | 1/16" | 100-P | 5-pk. | 23112 | | 2-pk. | 23162 | |
| | 1/8" | 200-P | 10-pk. | 23113 | | 4-pk. | 23163 | |
| | 1/4" | 400-P | 10-pk. | 23114 | | 4-pk. | 23164 | |
| **Union** | 1/16" | 100-6 | 3-pk. | 23115 | | ea. | 23165 | |
| | 1/8" | 200-6 | 5-pk. | 23116 | | 2-pk. | 23166 | |
| | 1/4" | 400-6 | 5-pk. | 23117 | | 2-pk. | 23167 | |
| **Reducing Union** | 1/8" to 1/16" | 200-6-1 | 5-pk. | 23118 | | ea. | 23168 | |
| | 1/4" to 1/16" | 400-6-1 | 5-pk. | 23119 | | 2-pk. | 23169 | |
| | 1/4" to 1/8" | 400-6-2 | 5-pk. | 23120 | | 2-pk. | 23170 | |
| **Tee** | 1/16" | 100-3 | 2-pk. | 23121 | | ea. | 23171 | |
| | 1/8" | 200-3 | 2-pk. | 23122 | | ea. | 23172 | |
| | 1/4" | 400-3 | 2-pk. | 23123 | | ea. | 23173 | |
| **Cross** | 1/8" | 200-4 | 2-pk. | 23124 | | ea. | 23174 | |
| | 1/4" | 400-4 | 2-pk. | 23125 | | ea. | 23175 | |
| **Tube End Reducer** | 1/8" to 1/16" | 100-R-2 | 5-pk. | 23126 | | 2-pk. | 23176 | |
| | 1/4" to 1/16" | 100-R-4 | 5-pk. | 23127 | | 2-pk. | 23177 | |
| | 1/8" to 1/4" | 400-R-2 | 5-pk. | 23128 | | 2-pk. | 23178 | |
| | 1/4" to 1/8" | 200-R-4 | 5-pk. | 23129 | | 2-pk. | 23179 | |
| **Port Connector** | 1/8" | 201-PC | 5-pk. | 23130 | | 2-pk. | 23180 | |
| | 1/4" | 401-PC | 10-pk. | 23131 | | 2-pk. | 23181 | |
| | 1/8" to 1/4" | 401-PC-2 | 5-pk. | 23132 | | 2-pk. | 23182 | |
| **Male Connector** | 1/8" to 1/8" NPT | 200-1-2 | 10-pk. | 23133 | | 2-pk. | 23183 | |
| | 1/4" to 1/4" NPT | 400-1-4 | 10-pk. | 23134 | | 2-pk. | 23184 | |
| | 1/16" to 1/8" NPT | 100-1-2 | 5-pk. | 23135 | | 2-pk. | 23185 | |
| | 1/8" to 1/4" NPT | 200-1-4 | 10-pk. | 23136 | | 2-pk. | 23186 | |
| | 1/4" to 1/8" NPT | 400-1-2 | 10-pk. | 23137 | | 2-pk. | 23187 | |
| **Female Connector** | 1/8" to 1/8" NPT | 200-7-2 | 5-pk. | 23138 | | 2-pk. | 23188 | |
| | 1/4" to 1/4" NPT | 400-7-4 | 5-pk. | 23139 | | 2-pk. | 23189 | |
| | 1/4" to 1/8" NPT | 400-7-2 | 5-pk. | 23140 | | 2-pk. | 23190 | |
| **Male & Female Quick Couplings** | 1/8" male* | QC4D-200 | — | — | — | ea. | 23191 | |
| | 1/8" male | QC4S-200 | — | — | — | ea. | 23192 | |
| | 1/8" female* | QC4B-200 | — | — | — | ea. | 23193 | |
| | 1/4" male* | QC4D-400 | — | — | — | ea. | 23194 | |
| | 1/4" male | QC4S-400 | — | — | — | ea. | 23195 | |
| | 1/4" female* | QC4B-400 | — | — | — | ea. | 23196 | |

*Includes self-sealing shut-off valve.

## also **available**

Restek also carries specialized tools for Swagelok® fittings.
See **page 249**.



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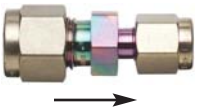
## Siltek®/Sulfinert® and Silcosteel®-CR Treated Swagelok® Fittings

- Full line of treated 1/16", 1/8", and 1/4" fittings.
- Silcosteel®-CR treatment enhances corrosion resistance by 10x, or more.
- Custom treatment available for any Swagelok® fitting, or other system parts not listed here (call for details).
- Description of custom Restek coatings listed below.

| | | | Siltek/Sulfinert Treated | | | Silcosteel-CR Treated | | |
|---|---|---|---|---|---|---|---|---|
| Fitting Type | Size | Swagelok # | qty. | cat.# | price | qty. | cat.# | price |
| Union | 1/16" | SS-100-6 | ea. | 22540 | | ea. | 22575 | |
| | 1/8" | SS-200-6 | ea. | 22541 | | ea. | 22576 | |
| | 1/4" | SS-400-6 | ea. | 22542 | | ea. | 22577 | |
| | 3/8" | SS-600-6 | ea. | 22909 | | ea. | 22904 | |
| Tee | 1/16" | SS-100-3 | ea. | 22543 | | ea. | 22578 | |
| | 1/8" | SS-200-3 | ea. | 22544 | | ea. | 22579 | |
| | 1/4" | SS-400-3 | ea. | 22545 | | ea. | 22580 | |
| | 3/8" | SS-600-3 | ea. | 22910 | | ea. | 22905 | |
| Reducing Union | 1/8" to 1/16" | SS-200-6-1 | ea. | 22546 | | ea. | 22581 | |
| | 1/4" to 1/16" | SS-400-6-1 | ea. | 22547 | | ea. | 22582 | |
| | 1/4" to 1/8" | SS-400-6-2 | ea. | 22548 | | ea. | 22583 | |
| | 3/8" to 1/4" | SS-600-6-4 | ea. | 22911 | | ea. | 22906 | |
| Elbow | 1/8" | SS-200-9 | ea. | 22549 | | ea. | 22584 | |
| | 1/4" | SS-400-9 | ea. | 22550 | | ea. | 22585 | |
| Plug | 1/8" | SS-200-P | ea. | 22573 | | ea. | 22620 | |
| | 1/4" | SS-400-P | ea. | 22574 | | ea. | 22597 | |
| Cross | 1/8" | SS-200-4 | ea. | 22551 | | ea. | 22586 | |
| | 1/4" | SS-400-4 | ea. | 22552 | | ea. | 22587 | |
| Tube End Reducer | 1/8" tube to 1/16" | SS-100-R-2 | ea. | 22553 | | ea. | 22588 | |
| | 1/4" tube to 1/16" | SS-100-R-4 | ea. | 22554 | | ea. | 22589 | |
| | 1/8" tube to 1/4" | SS-400-R-2 | ea. | 22555 | | ea. | 22590 | |
| | 1/4" tube to 1/8" | SS-200-R-4 | ea. | 22556 | | ea. | 22591 | |
| Port Connector | 1/8" | SS-201-PC | ea. | 22557 | | ea. | 22592 | |
| | 1/4" | SS-401-PC | ea. | 22558 | | ea. | 22593 | |
| | 1/8" tube to 1/4" | SS-401-PC-2 | ea. | 22559 | | ea. | 22594 | |
| Male Connector | 1/8" to 1/8" NPT | SS-200-1-2 | ea. | 22561 | | ea. | 22595 | |
| | 1/4" to 1/4" NPT | SS-400-1-4 | ea. | 22562 | | ea. | 22596 | |
| | 1/16" to 1/8" NPT | SS-100-1-2 | ea. | 22563 | | ea. | 22610 | |
| | 1/8" to 1/4" NPT | SS-200-1-4 | ea. | 22564 | | ea. | 22611 | |
| | 1/4" to 1/8" NPT | SS-400-1-2 | ea. | 22565 | | ea. | 22612 | |
| | 3/8" to 3/8" NPT | SS-600-1-6 | ea. | 22912 | | ea. | 22907 | |
| Female Connector | 1/8" to 1/8" NPT | SS-200-7-2 | ea. | 22566 | | ea. | 22613 | |
| | 1/4" to 1/4" NPT | SS-400-7-4 | ea. | 22567 | | ea. | 22614 | |
| | 1/4" to 1/8" NPT | SS-400-7-2 | ea. | 22568 | | ea. | 22615 | |
| | 1/8" to 1/4" NPT | SS-200-7-4 | ea. | 22569 | | ea. | 22616 | |
| Bulkhead Union | 1/8" | SS-200-61 | ea. | 22570 | | ea. | 22617 | |
| | 1/4" | SS-400-61 | ea. | 22571 | | ea. | 22618 | |

union

tee


reducing union

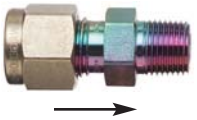
elbow

plug

cross

tube end reducer

port connector


male connector

female connector

bulkhead union

### Custom Restek Coatings

- **Siltek®**—The ultimate passivation of treated surfaces, from glass to high nickel alloys of steel; ideal for sulfurs, automotive exhaust testing, or stack gas sampling.
- **Sulfinert®**—A required treatment for metal components when analyzing for parts-per-billion levels of organo-sulfur compounds.
- **Silcosteel®-CR**—A corrosion resistant layer that increases the lifetime of system components in acidic environments containing hydrochloric acid, nitric acid, or seawater.

For more information on our custom coatings, see page 242.

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nut

front ferrule

back ferrule

nut & ferrule set

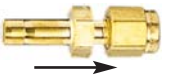
plug

union

reducing union

tee

cross


tube end reducer

port connector

male connector

female connector

male & female quick couplings

## Parker Fittings

Parker's (A-Lok) two-piece ferrules and NPT fittings are ideal for installing new equipment, modifying existing instrumentation, or replacing worn connections. Restek offers both brass and stainless steel fittings. If there is a particular Parker fitting that you are looking for and it is not listed here, please contact us to inquire about availability.

| | | | Brass | | | 316 Grade Stainless Steel | | |
|---|---|---|---|---|---|---|---|---|
| Fitting Type | Size | Parker # | qty. | cat.# | price | qty. | cat.# | price |
| Nut | 1/16" | 1 Nu 1 | 20-pk. | 21800 | | 5-pk. | 21900 | |
| | 1/8" | 2 Nu 2 | 40-pk. | 21801 | | 10-pk. | 21901 | |
| | 1/4" | 4 Nu 4 | 40-pk. | 21802 | | 10-pk. | 21902 | |
| Front Ferrule | 1/16" | 1 FF 1 | 20-pk. | 21803 | | 10-pk. | 21903 | |
| | 1/8" | 2 FF 2 | 40-pk. | 21804 | | 20-pk. | 21904 | |
| | 1/4" | 4 FF 4 | 40-pk. | 21805 | | 20-pk. | 21905 | |
| Back Ferrule | 1/16" | 1 BF 1 | 20-pk. | 21806 | | 10-pk. | 21906 | |
| | 1/8" | 2 BF 2 | 40-pk. | 21807 | | 20-pk. | 21907 | |
| | 1/4" | 4 BF 4 | 40-pk. | 21808 | | 20-pk. | 21908 | |
| Nut & Ferrule Set | 1/16" | — | 10-pk. | 21809 | | 2-pk. | 21909 | |
| | 1/8" | — | 20-pk. | 21810 | | 5-pk. | 21910 | |
| | 1/4" | — | 20-pk. | 21811 | | 5-pk. | 21911 | |
| Plug | 1/16" | 1 BLP 1 | 5-pk. | 21815 | | 2-pk. | 21915 | |
| | 1/8" | 2 BLP 2 | 10-pk. | 21816 | | 4-pk. | 21916 | |
| | 1/4" | 4 BLP 4 | 10-pk. | 21817 | | 4-pk. | 21917 | |
| Union | 1/16" | 1 SC 1 | 3-pk. | 21818 | | ea. | 21918 | |
| | 1/8" | 2 SC 2 | 5-pk. | 21819 | | 2-pk. | 21919 | |
| | 1/4" | 4 SC 4 | 5-pk. | 21820 | | 2-pk. | 21920 | |
| Reducing Union | 1/8" to 1/16" | 2 RU 1 | 5-pk. | 21823 | | ea. | 21923 | |
| | 1/4" to 1/16" | 4 RU 1 | 5-pk. | 21824 | | 2-pk. | 21924 | |
| | 1/4" to 1/8" | 4 RU 2 | 5-pk. | 21825 | | 2-pk. | 21925 | |
| Tee | 1/16" | 1 ET 1 | 2-pk. | 21826 | | ea. | 21926 | |
| | 1/8" | 2 ET 2 | 2-pk. | 21827 | | ea. | 21927 | |
| | 1/4" | 4 ET 4 | 2-pk. | 21828 | | ea. | 21928 | |
| Cross | 1/8" | 2 ECR 2 | 2-pk. | 21829 | | ea. | 21929 | |
| | 1/4" | 4 ECR 4 | 2-pk. | 21830 | | ea. | 21930 | |
| Tube End Reducer | 1/8" tube to 1/16" | 2 TUR 1 | 5-pk. | 21831 | | 2-pk. | 21931 | |
| | 1/4" tube to 1/16" | 4 TUR 1 | 5-pk. | 21832 | | 2-pk. | 21932 | |
| | 1/8" tube to 1/4" | 2 TUR 4 | 5-pk. | 21833 | | 2-pk. | 21933 | |
| | 1/4" tube to 1/8" | 4 TUR 2 | 5-pk. | 21834 | | 2-pk. | 21934 | |
| Port Connector | 1/8" | 2 PC 2 | 5-pk. | 21835 | | 2-pk. | 21935 | |
| | 1/4" | 4 PC 4 | 10-pk. | 21836 | | 2-pk. | 21936 | |
| | 1/8" tube to 1/4" | 2 PC 4 | 5-pk. | 21837 | | 2-pk. | 21937 | |
| Male Connector | 1/8" to 1/8" NPT | 2 MSC 2N | 10-pk. | 21841 | | 2-pk. | 21941 | |
| | 1/4" to 1/4" NPT | 4 MSC 4N | 10-pk. | 21842 | | 2-pk. | 21942 | |
| | 1/16" to 1/8" NPT | 1 MSC 2N | 5-pk. | 21843 | | 2-pk. | 21943 | |
| | 1/8" to 1/4" NPT | 2 MSC 4N | 10-pk. | 21844 | | 2-pk. | 21944 | |
| | 1/4" to 1/8" NPT | 4 MSC 2N | 10-pk. | 21845 | | 2-pk. | 21945 | |
| Female Connector | 1/8" to 1/8" NPT | 2 FSC 2N | 5-pk. | 21846 | | 2-pk. | 21946 | |
| | 1/4" to 1/4" NPT | 4 FSC 4N | 5-pk. | 21847 | | 2-pk. | 21947 | |
| | 1/4" to 1/8" NPT | 4 FSC 2N | 5-pk. | 21848 | | 2-pk. | 21948 | |
| Male & Female Quick Couplings | 1/8" male* | 2A-Q4VN | — | — | — | ea. | 21957 | |
| | 1/8" male | 2A-Q4P | — | — | — | ea. | 21958 | |
| | 1/8" female* | 2A-Q4CN | — | — | — | ea. | 21959 | |
| | 1/4" male* | 4A-Q4VN | — | — | — | ea. | 21960 | |
| | 1/4" male | 4A-Q4P | — | — | — | ea. | 21961 | |
| | 1/4" female* | 4A-Q4CN | — | — | — | ea. | 21962 | |

*Includes self-sealing shut-off valve.



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## Siltek®/Sulfinert® Treated and Silcosteel®-CR Treated Parker Fittings

A broad line of 1/16", 1/8" and 1/4" fittings are available with Siltek®/Sulfinert® or Silcosteel®-CR treatment. Because of expanding applications for these coatings, we have received many requests for a broader product offering. If you do not see everything you need, contact us for information on custom coating services.

| | | | Siltek/Sulfinert Treated | | | Silcosteel-CR Treated | | |
|---|---|---|---|---|---|---|---|---|
| Fitting Type | Size | Parker # | qty. | cat.# | price | qty. | cat.# | price |
| Union | 1/16" | 1 SC 1 | ea. | 22520 | | ea. | 22863 | |
| | 1/8" | 2 SC 2 | ea. | 22521 | | ea. | 22864 | |
| | 1/4" | 4 SC 4 | ea. | 22522 | | ea. | 22865 | |
| Tee | 1/16" | 1 ET 1 | ea. | 22526 | | ea. | 22866 | |
| | 1/8" | 2 ET 2 | ea. | 22527 | | ea. | 22867 | |
| | 1/4" | 4 ET 4 | ea. | 22528 | | ea. | 22868 | |
| Reducing Union | 1/8" to 1/16" | 2 RU 1 | ea. | 22523 | | ea. | 22869 | |
| | 1/4" to 1/16" | 4 RU 1 | ea. | 22524 | | ea. | 22870 | |
| | 1/4" to 1/8" | 4 RU 2 | ea. | 22525 | | ea. | 22871 | |
| Elbow | 1/16" | 1 EE 1 | — | — | — | ea. | 22874 | |
| | 1/8" | 1 EE 2 | ea. | 22530 | | ea. | 22875 | |
| | 1/4" | 1 EE 4 | ea. | 22531 | | ea. | 22876 | |
| Plug | 1/16" | 1 BLP 1 | ea. | 21539 | | ea. | 22877 | |
| | 1/8" | 2 BLP 2 | ea. | 21540 | | ea. | 22878 | |
| | 1/4" | 4 BLP 4 | ea. | 21541 | | ea. | 22879 | |
| Cross | 1/8" | 2 ECR 2 | ea. | 21542 | | ea. | 22872 | |
| | 1/4" | 4 ECR 4 | ea. | 21543 | | ea. | 22873 | |
| Tube End Reducer | 1/8" tube to 1/16" | 2 TUR 1 | ea. | 21544 | | ea. | 22880 | |
| | 1/4" tube to 1/16" | 4 TUR 1 | ea. | 21545 | | ea. | 22881 | |
| | 1/8" tube to 1/4" | 2 TUR 4 | ea. | 21546 | | ea. | 22882 | |
| | 1/4" tube to 1/8" | 4 TUR 2 | ea. | 21547 | | ea. | 22883 | |
| Port Connector | 1/8" | 2 PC 2 | ea. | 21548 | | ea. | 22884 | |
| | 1/4" | 4 PC 4 | ea. | 21549 | | ea. | 22885 | |
| | 1/8" tube to 1/4" | 2 PC 4 | ea. | 21550 | | ea. | 22886 | |
| Male Connector | 1/8" to 1/8" NPT | 2 MSC 2N | ea. | 21551 | | ea. | 22887 | |
| | 1/4" to 1/4" NPT | 4 MSC 4N | ea. | 21552 | | ea. | 22888 | |
| | 1/16" to 1/8" NPT | 1 MSC 2N | ea. | 21553 | | ea. | 22889 | |
| | 1/8" to 1/4" NPT | 2 MSC 4N | ea. | 21554 | | ea. | 22890 | |
| | 1/4" to 1/8" NPT | 4 MSC 2N | ea. | 21555 | | ea. | 22891 | |
| Female Connector | 1/8" to 1/8" NPT | 2 FSC 2N | ea. | 21556 | | ea. | 22892 | |
| | 1/4" to 1/4" NPT | 4 FSC 4N | ea. | 21557 | | ea. | 22893 | |
| | 1/4" to 1/8" NPT | 4 FSC 2N | ea. | 21558 | | ea. | 22894 | |
| | 1/8" to 1/4" NPT | 2 FSC 4N | ea. | 21559 | | ea. | 22895 | |
| Plug Valve, 2-Way | 1/8" | 2A PR4 VT SS | ea. | 21586 | | — | — | — |
| | 1/4" | 4A PR4 VT SS | ea. | 21587 | | — | — | — |
| Ball Valve, 2-Way | 1/8" | 2A B2LJ2 SSP | ea. | 21588 | | — | — | — |
| | 1/4" | 4A B2LJ2 SSP | ea. | 21589 | | — | — | — |

Please note: Nuts and ferrules are not treated unless requested (custom parts). Nuts and ferrules normally are not in contact with sample pathway, and thus do not require coating.

union

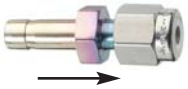
tee

reducing union

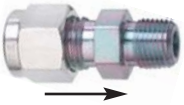
elbow

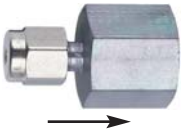
plug

cross


tube end reducer

port connector


male connector


female connector

plug valve, 2-way

ball valve, 2-way

## Siltek®/Sulfinert® Treated Treated Valco® Fittings

| | | Siltek/Sulfinert Treated | | |
|---|---|---|---|---|
| Fitting Type | Size | qty. | cat.# | price |
| Valco Zero Dead Volume Tee | 1/16" | ea. | 22534 | |
| | 1/8" | ea. | 22535 | |
| Valco Zero Dead Volume Union | 1/16" | ea. | 22532 | |
| | 1/8" | ea. | 22533 | |

zero dead volume tee

zero dead volume union

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## Swagelok® Brass & Stainless Steel Fitting Kits

Save more than 40% by purchasing a new Restek Swagelok® Fittings Kit, compared to prices for the individual parts!

NEW!

- Includes the most common assortment of 1/8" and 1/4" brass or stainless steel fittings.
- Parts list makes reordering easy.
- Parts come in sturdy tool box for easy and convenient storage.

40% savings

### Swagelok Brass Fitting Kit Includes:

| Swagelok # | Description, qty included in kit |
|---|---|
| B-202-1 | 1/8" brass nut (20) |
| B-402-1 | 1/4" brass nut (20) |
| B-203-1 | 1/8" brass front ferrule (20) |
| B-403-1 | 1/4" brass front ferrule (20) |
| B-204-1 | 1/8" brass back ferrule (20) |
| B-404-1 | 1/4" brass back ferrule (20) |
| B-200-C | 1/8" brass cap (6) |
| B-400-C | 1/4" brass cap (6) |
| B-200-P | 1/8" brass plug (6) |
| B-400-P | 1/4" brass plug (6) |
| B-200-6 | 1/8" brass union (2) |
| B-400-6 | 1/4" brass union (2) |
| B-400-6-2 | 1/4" to 1/8" brass reducing union (2) |
| B-200-3 | 1/8" brass tee (2) |
| B-400-3 | 1/4" brass tee (2) |
| B-400-R-2 | 1/8" to 1/4" brass tube end reducer (2) |
| B-200-R-4 | 1/4" to 1/8" brass tube end reducer (2) |
| MS-IG-200 | 1/8" inspection gauge (1) |
| MS-IG-400 | 1/4" inspection gauge (1) |

| Description | qty. | cat.# | price |
|---|---|---|---|
| Swagelok Brass Fitting Kit | kit | 23141 | |

### Swagelok Stainless Steel Fitting Kit Includes:

| Swagelok # | Description, qty included in kit |
|---|---|
| SS-202-1 | 1/8" SS nut (20) |
| SS-402-1 | 1/4" SS nut (20) |
| SS-203-1 | 1/8" SS front ferrule (20) |
| SS-403-1 | 1/4" SS front ferrule (20) |
| SS-204-1 | 1/8" SS back ferrule (20) |
| SS-404-1 | 1/4" SS back ferrule (20) |
| SS-200-C | 1/8" SS cap (6) |
| SS-400-C | 1/4" SS cap (6) |
| SS-200-P | 1/8" SS plug (6) |
| SS-400-P | 1/4" SS plug (6) |
| SS-200-6 | 1/8" SS union (2) |
| SS-400-6 | 1/4" SS union (2) |
| SS-400-6-2 | 1/4" to 1/8" SS reducing union (2) |
| SS-200-3 | 1/8" SS tee (2) |
| SS-400-3 | 1/4" SS tee (2) |
| SS-400-R-2 | 1/8" to 1/4" SS tube end reducer (2) |
| SS-200-R-4 | 1/4" to 1/8" SS tube end reducer (2) |
| MS-IG-200 | 1/8" inspection gauge (1) |
| MS-IG-400 | 1/4" inspection gauge (1) |

| Description | qty. | cat.# | price |
|---|---|---|---|
| Swagelok Stainless Steel Fitting Kit | kit | 23197 | |

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20147

## Zero-Dead-Volume Valco® Internal Union

Ends of tubing seat squarely at bottoms of fitting details. 300 series stainless steel. For 1/16" OD tubing. Stainless steel ferrules included.

| Description | Union Bore | Valco # | qty. | cat.# | price |
|---|---|---|---|---|---|
| Internal Union | 0.15mm | ZU1XC | ea. | 20147 | |
| Internal Union | 0.25mm | ZU1C | ea. | 20148 | |
| Internal Union | 0.75mm | ZU1 | ea. | 20149 | |
| Internal Union | 1/16" | ZU1T | ea. | 20150 | |

20151

## Zero-Dead-Volume Valco® Internal Reducing Union

Connect two sizes of tubing, using zero-dead-volume fittings on each end. For 1/8" to 1/16" OD tubing. Stainless steel ferrules included.

| Description | Union Bore | Valco # | qty. | cat.# | price |
|---|---|---|---|---|---|
| Internal Reducing Union | 0.25mm | ZRU21C | ea. | 20151 | |
| Internal Reducing Union | 0.75mm | ZRU21 | ea. | 20152 | |
| Internal Reducing Union | 1/16" | ZRU21T | ea. | 20153 | |

20154

## Zero-Dead-Volume Valco® Internal Tee

Connect three lines. 300 series stainless steel; stainless steel ferrules included. For 1/16" OD tubing.

| Description | Union Bore | Valco # | qty. | cat.# | price |
|---|---|---|---|---|---|
| Internal Tee | 0.25mm | ZT1C | ea. | 20154 | |
| Internal Tee | 0.75mm | ZT1 | ea. | 20155 | |

20156

## Zero-Dead-Volume Valco® Internal Cross

Connect four lines. 300 series stainless steel; stainless steel ferrules included. For 1/16" OD tubing.

| Description | Union Bore | Valco # | qty. | cat.# | price |
|---|---|---|---|---|---|
| Internal Cross | 0.25mm | ZX1C | ea. | 20156 | |
| Internal Cross | 0.75mm | ZX1 | ea. | 20157 | |

20159
20158

## Male Pipe to Valco® Internal Adapter

Makes a minimum volume connection from a female pipe fitting on a pressure gauge or regulator to a Valco® zero-dead-volume fitting. 300 series stainless steel; stainless steel ferrules included.

| Description | Fitting Size | Bore | Valco # | qty. | cat.# | price |
|---|---|---|---|---|---|---|
| 1/8" NPT Male Internal Adapter | 1/16" ZDV | 1.0mm | PZA21 | ea. | 20158 | |
| 1/4" NPT Male Internal Adapter | 1/16" ZDV | 1.0mm | PZA41 | ea. | 20159 | |

20286 20287

## Nuts & Ferrules for Valco® Connectors

| Description | Valco # | qty. | cat.# | price |
|---|---|---|---|---|
| 1/16" Stainless Steel Ferrules | ZF1-10 | 10-pk. | 20286 | |
| 1/16" Stainless Steel Nuts | ZN1-10 | 10-pk. | 20287 | |

## 1/16-Inch Valco® Adaptor Ferrules

| | | | Valcon Polyimide | | | Polyimide | | |
|---|---|---|---|---|---|---|---|---|
| Tubing OD | Tubing ID | Valco # | qty. | cat.# | price | qty. | cat.# | price |
| 0.25–0.4mm | 0.1-0.25mm | FS1.4-5 | 5-pk. | 20142 | | 2-pk. | 21015 | |
| 0.4–0.5mm | 0.32mm | FS1.5-5 | 5-pk. | 20143 | | 2-pk. | 21016 | |
| 0.5–0.8mm | 0.53mm | FS1.8-5 | 5-pk. | 20144 | | — | — | — |
| 0.8mm (1/32") | — | FS1.9-5 | 5-pk. | 20145 | | — | — | — |

## also available

**Treated Fittings!**

See pages 237-241 for our Siltek®/Sulfinert® treated and Silcosteel®-CR treated fittings, as well as many more brass and stainless steel fittings from Swagelok® and Parker.

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## MXT™-Union Connector Kits for Fused Silica Columns

- Low-dead-volume, leak-tight connection.
- Reusable.
- Siltek® treatment ensures maximum inertness.
- Ideal for connecting a guard column or transfer line to an analytical column.
- Use to oven temperatures of 360°C.
- Available in union and "Y" configurations.
- Can also be used for fused silica to metal connections.

These MXT™ connectors can be used with fused silica tubing, because of a Valcon polyimide 1/32-inch one-piece fused silica adaptor. This unique graphite-reinforced composite allows a capillary column to slide into the adaptor and be locked in place simply by loosening and tightening the fitting.

### MXT™-Union Connector Kits for Fused Silica Columns

Each kit contains the MXT™ union, two 1/32-inch nuts and two one-piece fused silica adaptors.

| Description | qty. | cat.# | price |
|---|---|---|---|
| For 0.25mm ID Fused Silica Columns | kit | 21386 | |
| For 0.32mm ID Fused Silica Columns | kit | 21385 | |
| For 0.53mm ID Fused Silica Columns | kit | 21384 | |

### MXT™ "Y"-Union Connector Kits for Fused Silica Columns

Each kit contains the MXT™ union, three 1/32-inch nuts and three one-piece fused silica adaptors.

| Description | qty. | cat.# | price |
|---|---|---|---|
| For 0.25mm ID Fused Silica Columns | kit | 21389 | |
| For 0.32mm ID Fused Silica Columns | kit | 21388 | |
| For 0.53mm ID Fused Silica Columns | kit | 21387 | |

Adaptor Ferrules

20389

## Valco™ Connectors—One-Piece Valcon Polyimide Adaptor Ferrule for Fused Silica

Fused silica adaptor ferrules are Valcon polyimide, a unique graphite-reinforced composite, specially prepared to maximize mechanical stability at temperatures to 350°C. The determining factor for selecting adaptor ferrule size is the fused silica tubing OD.

### 1/32-Inch Adaptor Ferrule (Valcon Polyimide)

| Tubing OD | Tubing ID | Valco # | qty. | cat.# | price |
|---|---|---|---|---|---|
| 0.25 ≤ 0.40mm | 0.25mm | FS.4-5 | 5-pk. | 20137 | |
| 0.40 ≤ 0.50mm | 0.32mm | FS.5-5 | 5-pk. | 20140 | |
| 0.50 ≤ 0.80mm | 0.53mm | ZF.5V-5 | 5-pk. | 20141 | |
| 1/32" Replacement Nut | | | 5-pk. | 20389 | |

## MXT™ Low-Dead-Volume Connector Kits for Metal Columns

These low-dead-volume connectors are Siltek® treated to make them inert to active compounds, just like our MXT® columns. They can be used at temperatures up to 430°C without degrading the deactivated layer. Purchase the appropriate ferrules for connecting 0.28, 0.32 or 0.53mm ID tubing.

### MXT™ Low-Dead-Volume Connector Kits for Metal Columns

- Connect a guard column/transfer line to an MXT® stainless steel column.
- Low thermal mass tracks rapid oven temperature programming.
- Stainless steel ferrules and nuts.
- Available in "Y" and union configurations.
- Siltek® treatment ensures ultimate inertness.

Each kit contains the MXT™ union, two 1/32-inch ferrules and nuts.

| Description | | qty. | cat.# | price |
|---|---|---|---|---|
| For 0.28mm ID MXT Columns | NEW! | kit | 20397 | |
| For 0.32mm ID MXT Columns | | kit | 20536 | |
| For 0.53mm ID MXT Columns | | kit | 20394 | |

### MXT™ Low-Dead-Volume "Y" Connector Kits for Metal Columns

- Connect two MXT® columns to one inlet or one MXT® column to two detectors.

Each kit contains the MXT™ union, three 1/32-inch ferrules and nuts.

| Description | | qty. | cat.# | price |
|---|---|---|---|---|
| For 0.28mm ID MXT Columns | NEW! | kit | 20396 | |
| For 0.32mm ID MXT Columns | | kit | 20537 | |
| For 0.53mm ID MXT Columns | | kit | 20395 | |

### 1/32-Inch Stainless Steel Replacement Ferrules for MXT™ Connectors

| Ferrule ID | | Fits Column ID | qty. | cat.# | price |
|---|---|---|---|---|---|
| 0.59mm | NEW! | 0.28mm | 10-pk. | 20398 | |
| 0.53mm | | 0.32mm | 10-pk. | 20535 | |
| 0.79mm | | 0.53mm | 10-pk. | 20399 | |



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# We provide every part of your fluidic system

# BIOTECH – WORLDWIDE

Degassers & Debubblers

Customized Fittings

Tubing

Analytical Injectors

Frits & Filters

Column Hardware

OEM Column Packing

Automatic Valve Solutions

## The company

We are supplying innovative laboratory products to instrument manufacturers and distributors around the world. Our mission is to empower you to design a unique product in the field of liquid handling and fluid transfer components for analytical, biotech and life science users.

- The complete solution for degassing and fluidic handling
- From idea to finished product

Biotech is involved in a variety of research projects with renowned European and US companies and institutes. We are an innovative company, benefitting from the synergy of scientific research and applied technology. Ownership and close liaison with network partners results in future opportunities for new exciting products in fluidic handling and chromatography.

## Visit our headquarter

You have a standing invitation to visit us at the Onsala peninsula on the Swedish Westcoast in close proximity to the Gothenburg City and Landvetter International Airport.

Today we are selling our products in more than 30 countries around the world. We have subsidiaries in US and India to give you the best service and support. At our facilities in India we provide OEM packing of HPLC columns.

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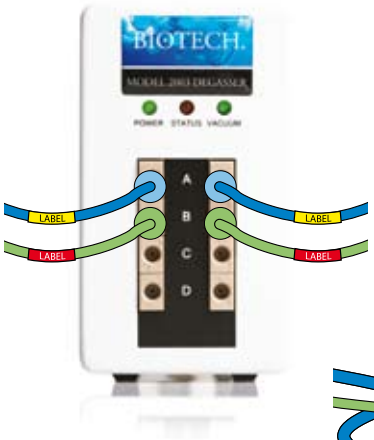
## You require – we deliver

# OEM TUBING KITS FROM BIOTECH

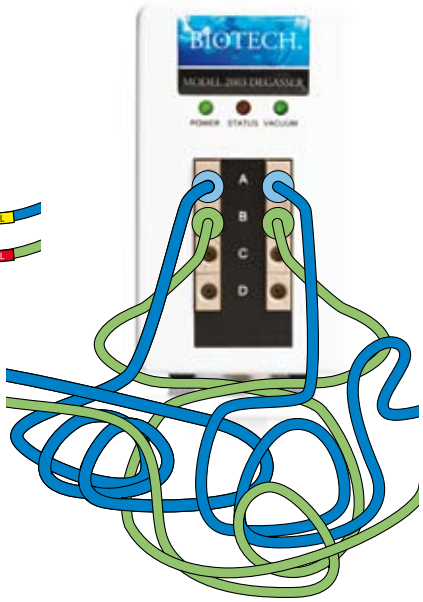
## Customization – trouble free usage

**Save time and avoid confusion**
Avoid delay and confusion when installing a new system for your customer. Let us help you to configure a ready-to-use tubing and fittings kit! We have a very wide range of products and long experience in the field.

**Precut and assembled**




**Without our customization**




## Starter-Kit with common parts

**Why not?**
Give away a starter kit labelled with your logo and contact details to every instrument customer or sell the starter-kit to them. Contact us and we will make a suggestion for a suitable starter kit for your needs at an attractive price.

## Pick the best combination

- Tubing length
- Desired fittings (size, color, label)
- Your P/N and private labelling
- Filters, tools, tubing markers and accessories
- Labelled with your logo and company details
- Sorted set packed in boxes or plastic bags
- Make a drawing or explain your needs and we present the solution

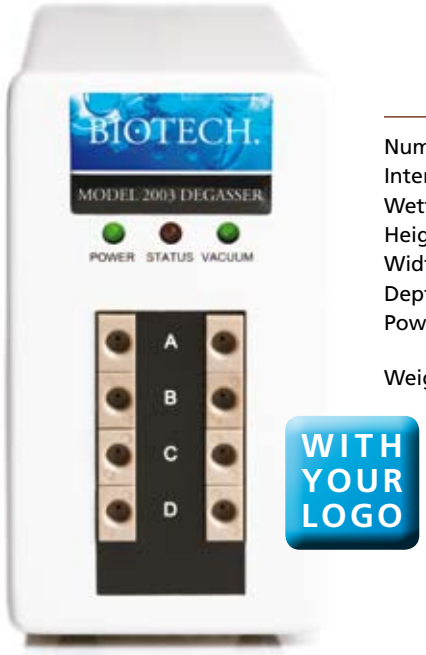
# Customized OEM modules, parts or stand alone units

# DEGASSERS & DEBUBBLERS

## Biotech on-line degasser

**Secure your analysis with our on-line degasser**

- Extremely quiet
- Long life expectancy – 5 years continuous running capacity
- Pump head purge eliminates need for purging valve
- Eliminate baseline fluctuations due to the ZHCR® (Zero Hysterisis Constant Run) stepper motor driven vacuum pump
- Short time vacuum pull-down, normally less than 3 minutes
- Closed loop vacuum control means constant vacuum (variable RPM)
- Advanced error and leak checking functions




### General specifications

| | |
|---|---|
| Number of channels: | 2, 3, 4, 5 or 8 |
| Internal Channel Volume: | 480 microliter |
| Wetted Parts: | Peek and Systec AF |
| Height: | 5.0 in. (127 mm) |
| Width: | 2.87 in. (73 mm) |
| Depth: | 9.81 in. (249 mm) |
| Power: | 15 to 24 VDC @ 0.85 A max. (0.5 A typical) |
| Weight: | 6 lb (2.7 kg) |

## Debubblers

**Trouble with visible bubbles in your system?**

**Are you working at high flow-rates and highly aqueous systems?**

**Then, have a look at our new series of debubblers!**

The main advantage of the debubbler compared with our degassers, is that the debubbler has much higher capacity to remove visible bubbles. The debubbler is incredibly efficient in removing bubbles from the liquid.

The in-line debubbler is used in highly aqueous systems where bubbles and dissolved gas must be removed. Aqueous systems may have some alcohol content, and small amounts of surfactant.

**Choose from different configurations**

- Low volume chambers (Mini chamber design)
- High flow rate configurations (250ml/min)
- With or without bubble trap
- New 100rpm continuously running vacuum pump

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# Degassing modules

**Horizontal, vertical or Z-shaped?**
Choose the bracket wanted and configure it with:

- Up to 5 mini degassing chambers (100-925µl)
- ZHCR® control P.C.-board
- ZHCR® vacuum pump

**Features with the Systec AF / ZHCR® degassing technology:**

- 50 times the degassing efficiency over PTFE design, gives drastically reduced internal volume and faster start-up
- Constant vacuum with closed loop control
- Perfectly clean detector base line due to ZHCR® vacuum pump
- Continuously vented vacuum system

# Vacuum degassing chambers and ZHCR vacuum pumps

**Choose from several configurations**

- Different flow path I.D.
- Standard or GPC compatible
- 100µl – 13.8ml chambers
- Capillary-, analytical- or preparative scale

## General specifications

| | |
|---|---|
| Degassing Channel Tubing: | Systec® AF |
| Degassing Channel Pressure Rating (priming pressure): | 70 PSI |
| Wetted Materials: | Systec AF, PEEK and Tefzel |
| Vacuum Housing Materials: | PEEK / PPS and Stainless Steel |

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## Almost every color, material and dimension

# TUBING, ADAPTERS & VALVES

### Colors

- Natural
- Black
- Red
- Violet
- Yellow
- Blue
- Orange
- Green
- More available upon request

### Materials

- Dupont Teflon® Brand Resin FEP, PFA, PFA High Purity, PFA High Purity Plus
- Tefzel (ETFE)
- PEEK
- Stainless Steel
- Custom material/blending upon request

### Shapes and custom cut

- Customized thermoformed polymer tubing available for all extruded materials and dimensions
- Endless possibilities for customization

### Dimensions

| | |
|---|---|
| Outer diameter range: | 360µm-7.9mm |
| Inner diameter range: | 20µm-6.4mm |
| Typical ID / OD tolerances for 1.6mm OD tubing: | ±25µm |
| Typical for 3.2mm OD tubing: | ±75-100µm |

Available custom cut (length range depends on material) with tight tolerances on length

## Automatic valve solutions

### Choose from several configurations

- Low pressure up to 1000 bar ultra-high pressure
- 2-position or multi-position
- Standard or nano configuration
- Stand alone units
- OEM units
- Now a

## Valves

### Control your flow stream with ease

- Shut-Off Valves
- Micro-Splitter Valves
- Micro-Metering Valves Prime/Purge Valves
- Pressure Relief Valves
- Inline Check Valves
- Maximum Pressure 0.3 - 276 Bar

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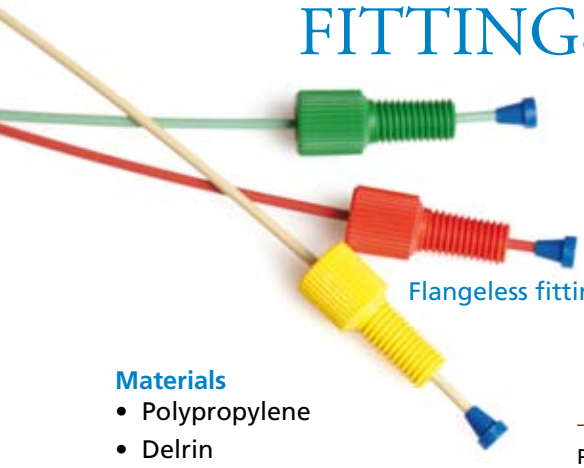
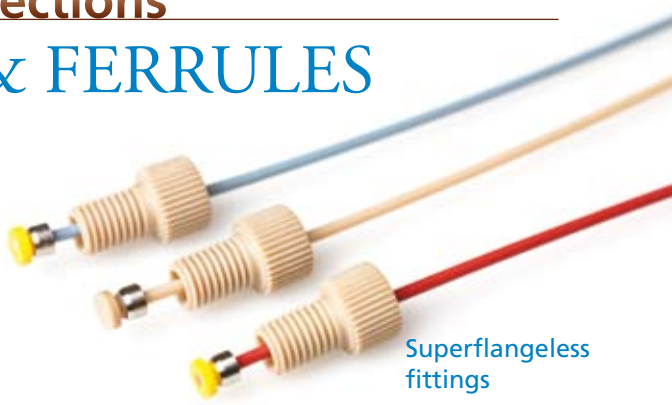
## Secure your connections

# FITTINGS – NUTS & FERRULES



Flangeless fittings



Superflangeless fittings

### Materials

- Polypropylene
- Delrin
- PEEK
- Tefzel (EFTE)
- Teflon (PFA)
- PPS
- Stainless steel
- Polyketone
- KEL-F

### Colors

- Natural
- Black
- Red
- Violet
- Yellow
- Blue
- Orange
- Green
- White
- Cream

### Dimensions

Standard US and Metric thread specifications for Metric and Imperial tubing diameters: 1/4-28, M6, 10-32, M8, 6-32

## Superflangeless fittings

PROS

- Tubing twist is eliminated
- Higher pressure in a flat bottom port configuration
- Ferule stays on the tubing, great for premade assemblies

CONS

- Three components in the assembly makes initial assembly process less user-friendly

## Flangeless fittings

PROS

- The ferrule is easy to replace when necessary to fix problematic connections
- Higher pressure holding ability than flanged tubing
- Inexpensive

CONS

- Difficult to use in pre-made assemblies because ferrule is not pre-swaged on the tubing
- Tubing can twist during installation due to the method of compression

## Coned fittings

## Ultra high performance fittings

**Line includes nuts, ferrules, unions, tees, and crosses**

### High temperature versions

Withstand temperatures up to 200°C

### Ultra high pressure versions

Rated to 15,000 psi and 28,800 psi

- Fittings for coned and flat-bottom ports
- For 1/16", 1/32", and 360 µm OD tubing connections
- SealTight™, LiteTouch® and Super Flangeless available

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# New on market

# SAPPHIRE ENGINEERING

## PVM – Pump & valve module

The PVM can be operated as a stand-alone module or in automated instruments controlled by an external computer or microprocessor.

**Protocol features:**

- Programmable ramps, cut-offs, backlash compensation, plunger speeds, delays and loops
- Select piston / syringe speed
- Absolute and relative positioning of pistons / syringes
- Start and terminate piston / syringe movement
- Check pump with self-test
- Selective work with up to 15 PVM's

**IPV – Integrated Piston/Valve**

- 5 – 20 times longer life than typical Glass Barrel/ Teflon® syringes with Kel-F®/Teflon plug valves
- Use with Sapphire Engineering™'s PVM Pump
- Also use for direct, plug-in replacement for existing syringes and valves on Cavro™ XP-3000 and Hamilton PSD4 Syringe Pumps
- Accuracy and precision identical to typical syringes and valves
- Significant lifetime cost savings
- No routine maintenance required
- Optional seal-wash versions available to help extend life with difficult fluids
- Made of durable, chemically resistant materials
- Available valve configurations: 3-way "Y" valve, 3-way "T" valve,
- 3-port distribution valve, 4-way valve
- Optional wetted materials available upon request

## VFP17 – Precision Dispense Pump

**Value - Flexibility - Performance**

With its Zirconia ceramic displacement piston technology, the VFP17 precision displacement and syringe pumps, including:

- High precision and low cost of ownership at a value price to meet the cost constraints of lab automation and diagnostic applications
- Guaranteed pump life of millions of cycles
- Available with total dispense volumes of 25µL to 5mL
- Flexibility to customize for your application

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# Just hardware or OEM packing

# COLUMNS & FRITS

## Stainless Steel Columns

**Choose amongst different hardware configurations**

- Compression, Modular, Quick Seal
- Special Hardware for Ultra-High Pressure or LC/MS

## PEEK Columns

Bio-Safe™ columns are biocompatible and precision-machined from virgin PEEK (polyetheretherketone), a strong, inert polymer material.

**Why PEEK?**

PEEK columns are used when analytes are sensitive to the metals in stainless steel hardware.

### Bio-Safe column dimensions

- Internal diameter (mm): 2.1, 4.6
- Length (mm): 33, 50, 75, 100, 150, 250, 300
- Stable to 8 000 psi

**Top-of-the-line column hardware manufactured by Isolation Technologies**

## OEM Column packing

Use our economic packing possibilities in India. Fully equipped laboratory facilities and a well educated staff ensure you packed columns of highest quality.

## Frits

**PEEK, titanium or stainless steel?**

Biotech produces a variety of dimensions of Polyethylene Hydrophilic frits primarily intended for SPE (Solid Phase Extration) applications. Details upon request.

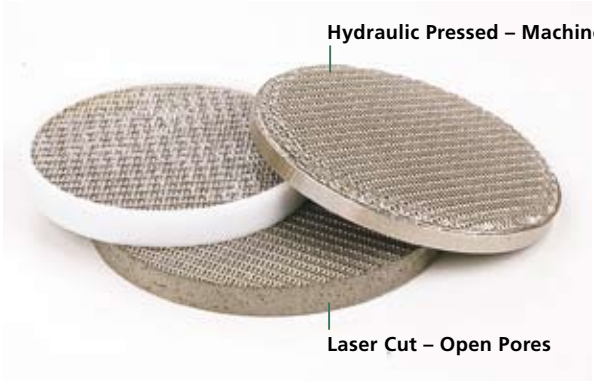
**Special Design**

Frits can be modified; rings – no rings, PEEK rings – PCTFE rings etc.

**Choose from several configurations**

- Disc Diameter
- Disc Thickness
- Ring OD

## Poro-Frit




**Poro-frit™ for prep chromatography**

Poro-Frit™ is a woven wire cloth laminate with the different wire cloth layers closely bounded together by a unique sintering process, resulting in a predetermined precise characteristics with regard to pore-size, number of layers, strength, pore distribution and permeability.

### Tecnical data

- defined pore size range of 2 microns and upwards
- no “blind holes”
- range from 20 mm - 1 200 mm without welding
- 5-10 layers, including a strong support screen, and a thickness of either 1.7 – 3.0 – 5.0 mm

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## Biotech provides every part of your fluidic system

# PLACE YOUR ORDER TODAY

**NAME**

**COMPANY / INSTITUTE**

**ADDRESS**

**ZIP CODE**

**COUNTRY**

**TELEPHONE**

**E-MAIL**

**MESSAGE** (Please, describe your application and needs briefly)

**Copy this page and fill it out**
E-mail or fax your copy of this page to Biotech and explain your interest.

**I'M INTERESTED IN:**

- ☐ OEM Degassers
- ☐ Stand Alone Degassers
- ☐ Debubblers
- ☐ Tubing- and fittings kits
- ☐ Column hardware
- ☐ Frits & filters
- ☐ OEM column packing
- ☐ HPLC columns
- ☐ Valve solutions
- ☐ Pumps
- ☐ Other

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# FLUIDIC PRODUCTS & INFORMATION for LABORATORY APPLICATIONS

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View from our office windows

# BIOTECH

Biotech Sweden is a company highly specialized in chromatography accessories and consumables. Biotech is located on the Swedish Westcoast – south of Gothenburg – at the beautiful Onsala peninsula, covering 15.000 sq.m. land and 700 sq.m. production and office area.

# A SIMPLE PHILOSOPHY...

We at Biotech believe that value is not "the lowest price" – our customers are the reason we exist – our customers always come first. We have not lost sight where we come from and therefore we try harder to be your partner, we're not satisfied unless you are satisfied.

Thank you for your business. I know we'll continue to grow and prosper together.

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BIOTECH

# SEE WHAT'S NEW!

**NEW!** Biocompatible

Biocompatible Tubing for UHPLC
PEEK-Lined Stainless Steel (PLS)

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**NEW!** Biocompatible

Four Independent Channels!
Reglo ICC Peristaltic Pump

Page 92

**NEW!** Biocompatible

High Pressure Manual Injection Valve
Active Flow-Splitter for LC/MS

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Biocompatible

**Our Biocompatible logo indicates the use of materials anticipated to maintain the integrity and improve the analysis of biological samples in their intended application.**

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SEE STARRED PRODUCTS FOR **TOP SELLERS!**

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# Fittings Chapter

In this catalog, we've taken a new approach to presenting our extensive line of fittings. In one comprehensive chapter, you will find fittings for several applications — very high pressure (> 15,000 psi/1,034 bar), high pressure (> 1,000 psi/69 bar), and low pressure (< 1,000 psi/69 bar). There is also a separate section for micro and nano-scale applications.

You'll also find information on:

**THREADS (10-32, 6-32, M6, etc.)**

**TUBING SIZE (1/16", 1/32", 360 µm, etc.)**

**PORT GEOMETRY (Coned, Flat-bottom)**

Specification tables at the bottom of each page include:

- Part numbers
- Part description
- Materials of construction
- Standard size packages
- Pressure ratings
- Available colors

Additionally, you will find fitting-related application notes and, if available, special ordering options throughout the chapter.

*Please Note: in the product descriptions, a "Fitting" refers to a complete product ready to assemble and connect tubing into a part. This could be a one-piece connector or a nut and ferrule packaged together. A "Nut" indicates the male or female threaded product sold separately, and a "Ferrule" is sold separately when indicated in the description. For your convenience we ship most Upchurch Scientific® Fittings and Ferrules in 10-packs, however, you may order individual pieces (an "x" in the product part number designates "10-pk").*

You may notice a change in some of our pressure ratings — be assured that the IDEX Health & Science team is dedicated to providing the most reliable, proven products on the market. We have implemented more stringent testing protocols and a generous safety margin to our ratings to ensure your safety.

*Please Note: all testing is performed with water at room temperature unless otherwise specified. Results may vary depending on the material of the receiving port and tubing, actual tubing diameters (with stated tolerances), temperature and solvents used. If a pressure range is listed for a product's specification, the pressure rating depends on the tubing material used. The lower end of the range will represent testing performed on softer tubing such as FEP, and the higher end of the range will represent testing performed on harder tubing such as Stainless Steel. For more detail, please see the product specification sheets on our website, www.idex-hs.com, or contact us directly.*

**FINGERTIGHT FITTINGS**
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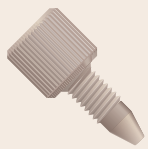

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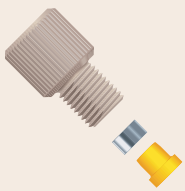

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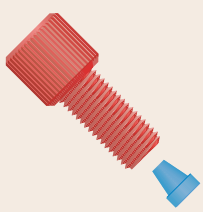

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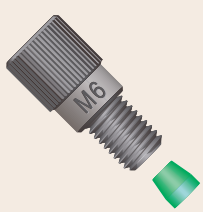


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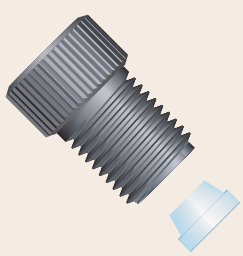

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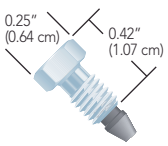
# Reusable Very High Pressure (VHP) Fittings

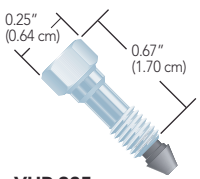
- Pressure rated up to 25,000 psi (1,720 bar)
- Patent pending innovative design
- Capable of up to ten repeat assembly cycles with no impact on pressure holding ability or carry-over
- Available in 10-32 threads for 1/16" OD tubing and M4 threads for 1/32" OD tubing
- Materials of construction: stainless steel and proprietary PEEK polymer blend (PK)

IDEX Health & Science introduces an innovative line of Upchurch Scientific® Very High Pressure (VHP) fittings, designed to withstand extreme pressures. This patent-pending line of ground-breaking fitting systems is perfect for use within the increasingly demanding requirements of today's high performance analytical systems.

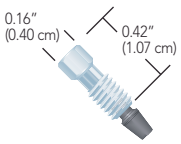
The Reusable VHP fittings can be reused when following the tightening torque specification listed below. With a polymer front ferrule, there is no damage to the tubing or receiving port, also increasing the life of these components.



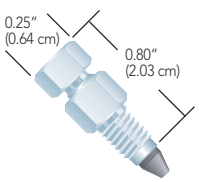

**VHP-320**
10-32 VHP Fitting
for 1/16" OD tubing



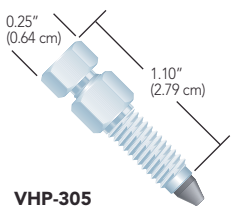

**VHP-325**
10-32 VHP Fitting, Long
for 1/16" OD tubing



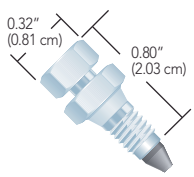

**VHP-920**
M4 VHP Fitting
for 1/32" OD tubing



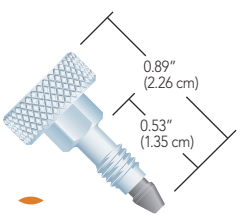

**VHP-300**
10-32 VHP Fitting
for 1/16" OD tubing




**VHP-305**
10-32 VHP Fitting, Long
for 1/16" OD tubing




**VHP-310**
10-32 VHP Fitting
for 1/16" OD tubing




**VHP-3200**
10-32 VHP Fitting
for 1/16" OD tubing

**VHP-1001**
VHP Fingertight
1/4" Hex Tool

## APPLICATION NOTE

### Reusability

- Using a reusable fitting eliminates the problems described on stainless steel fitting interchangeability on page 185 of the Technical Resources section. A reusable fitting will allow for quick column, sample loop, inline filter or tubing changes with minimal downtime.
- The VHP-300, VHP-305, and VHP-310 fittings can be used up to 30,000 psi (2,070 bar) if tightened to 14 in-lbs (1.6 N·m). This limits the reusability to 5 cycles. The stacked design of these fittings allows the user to lightly assemble the fitting before tightening into the port. Leaving the tubing extended at least half an inch beyond the end of the ferrule will ensure that the tubing is bottomed out in the port before the fitting is tightened down, avoiding any potential dead volume that could be introduced during fitting installation.

## RELATED PRODUCTS

- Find tightening tools on page 8 designed to deliver the torque necessary for these fittings.

| | Part No. | Description | Port | Pressure Rating | Required Torque | Head Style | Material | Qty. |
|---|---|---|---|---|---|---|---|---|
| | **REUSABLE VHP FITTINGS** | | | | | | | |
| | **VHP-300x** | VHP Fitting for 1/16" OD | 10-32 Coned | 20,000 psi (1,380 bar) | 10 in-lbs (1.10 N·m) | 1/4" Hex | SST/PK | 10-pk |
| | **VHP-305x** | VHP Fitting for 1/16" OD, Long | 10-32 Coned | 20,000 psi (1,380 bar) | 10 in-lbs (1.10 N·m) | 1/4" Hex | SST/PK | 10-pk |
| | **VHP-310x** | VHP Fitting for 1/16" OD | 10-32 Coned | 20,000 psi (1,380 bar) | 10 in-lbs (1.10 N·m) | 8 mm Hex | SST/PK | 10-pk |
| | **VHP-320x** | VHP Fitting for 1/16" OD | 10-32 Coned | 25,000 psi (1,720 bar) | 10 in-lbs (1.10 N·m) | 1/4" Hex | SST/PK | 10-pk |
| | **VHP-325x** | VHP Fitting for 1/16" OD, Long | 10-32 Coned | 25,000 psi (1,720 bar) | 10 in-lbs (1.10 N·m) | 1/4" Hex | SST/PK | 10-pk |
| | **VHP-920x** | VHP Fitting for 1/32" OD | M4 Coned | 25,000 psi (1,720 bar) | 8 in-lbs (0.90 N·m) | 4 mm Hex | SST/PK | 10-pk |
| NEW! | **VHP-3200** | VHP Fitting for 1/16" OD | 10-32 Coned | 11,000 psi (760 bar) | 3.5 in-lbs (0.40 N·m) | 1/2" Knurl | SST/PK | 10-pk |
| NEW! | **VHP-1001** | VHP Fingertight 1/4" Hex Tool | — | — | — | — | PPS | ea. |

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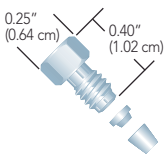
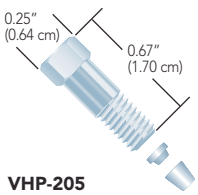
# Stainless Steel VHP Fittings

- Pressure rated to 30,000 psi (2,070 bar)
- Double compression ferrule design
- Available with 10-32 threads for 1/16" OD tubing and M4 threads for 1/32" OD tubing

The all Stainless-Steel VHP Fittings include a unique ferrule system with two compression points to provide twice the grip of a standard ferrule. This design also allows the bite on the tubing to be less concentrated and does not restrict the inner diameter, as discussed in the Application Note. The ferrules for 1/16" OD tubing and 10-32 coned ports are two pieces, while the grooved ferrule for 1/32" OD tubing and M4 coned ports is a one-piece design for easier handling, but it will act as two pieces with double compression on the tubing as it is tightened down.

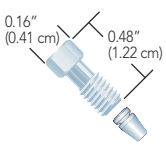



**VHP-200**
VHP 10-32 Fitting
for 1/16" OD tubing




**VHP-205**
VHP 10-32 Fitting, Long
for 1/16" OD tubing

**VHP-700**
VHP 6-40 Fitting
for 1/32" OD tubing

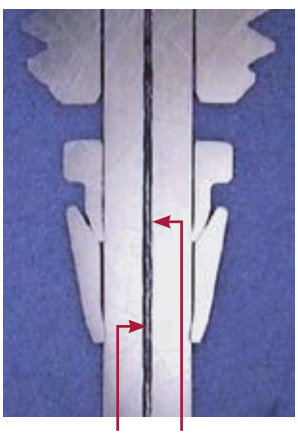



**VHP-900**
VHP M4 Fitting
for 1/32" OD tubing

## APPLICATION NOTE

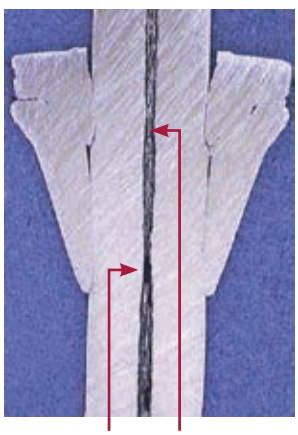
In order to seal up to the stated pressure rating, the VHP-200-01 ferrule requires 20 in-lbs (2.25 N·m) of torque. Similar ferrules on the market require tightening torque of at least 30 in-lbs (3.3 N·m), which can result in a restricted tubing passage, as shown in the picture below. This restriction can increase turbulence and add a 'throttling' effect to the fluid pathway, resulting in mixing and other potential chromatographic problems.

**IDEX Health & Science VHP-200**



Uniform Tubing Passage

**Conventional Two Piece Ferrule Design**



Constricted Tubing Passage

| Part No. | Description | Port | Pressure Rating | Required Torque | Head Style | Material | Qty. |
|---|---|---|---|---|---|---|---|
| **STAINLESS STEEL VHP FITTINGS (INCLUDES NUT AND FERRULE)** | | | | | | | |
| **VHP-200x** | VHP Fitting for 1/16" OD | 10-32 Coned | 30,000 psi (2,070 bar) | 20 in-lbs (2.25 N·m) | 1/4" Hex | SST | 10-pk |
| **VHP-205x** | VHP Fitting for 1/16" OD, Long | 10-32 Coned | 30,000 psi (2,070 bar) | 20 in-lbs (2.25 N·m) | 1/4" Hex | SST | 10-pk |
| **VHP-900x** | VHP Fitting for 1/32" OD | M4 Coned | 30,000 psi (2,070 bar) | 20 in-lbs (2.25 N·m) | 4 mm Hex | SST | 10-pk |
| NEW! **VHP-700x** | VHP Fitting for 1/32" OD | 6-40 Coned | 30,000 psi (2,070 bar) | 20 in-lbs (2.25 N·m) | 4 mm Hex | SST | 10-pk |
| **STAINLESS STEEL VHP FERRULES** | | | | | | | |
| **VHP-200-01x** | VHP Ferrule for 1/16" OD | 10-32 Coned | 30,000 psi (2,070 bar) | 20 in-lbs (2.25 N·m) | — | SST | 10-pk |
| **VHP-900-01x** | VHP Ferrule for 1/32" OD | M4 Coned | 30,000 psi (2,070 bar) | 20 in-lbs (2.25 N·m) | — | SST | 10-pk |

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# Tightening Tools for VHP Fittings

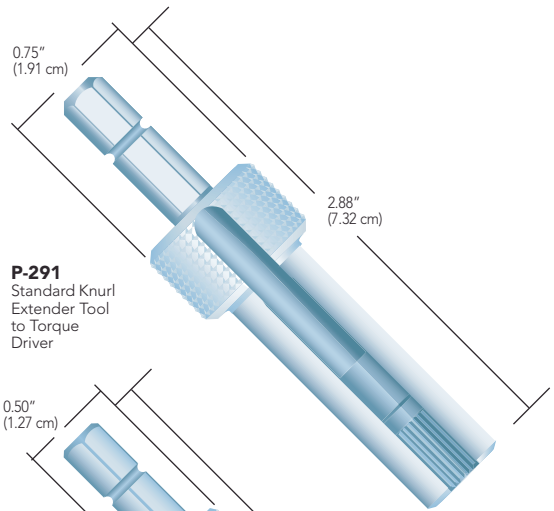
- Configured for the optimum torque to provide assurance of a strong connection
- Prolongs the lifetime of reusable fittings by not overtightening
- Available for multiple fitting head styles

This new line of tightening tools is designed for the VHP fittings and can also be used with any fitting in this chapter described to have a corresponding head style to the tool listed below. There are three styles of tightening tools available for various applications. The Torque Tools (VHP-1000, VHP-2000, and VHP-3000) are breakaway torque wrenches designed to deliver a precise amount of torque to the fitting system. These torque wrenches come calibrated according to ISO 6789:2003 (± 6% of setting) and have been tested extensively with the reusable VHP fittings on page 6. Choose the appropriate torque delivered and the proper head style to work with the VHP fittings, increasing the ease of use with these fittings.

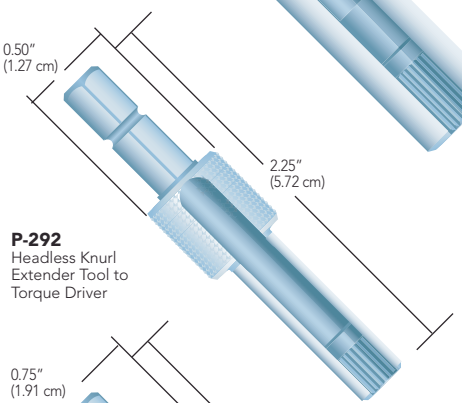
The VHP-4000 Torque Driver couples with the specially designed Extender Tools listed below and provides an externally adjustable torque setting. This tool along with the appropriate Extender Tools will tighten any Upchurch Scientific® knurled polymer fitting in your system. Reference the head style found in the tables at the bottom of each page for information on the proper Extender Tool to select.

Because of the small hex-head on the M4 fittings (VHP-900 and VHP-920), a custom wrench, the VHP-9000, is available below.

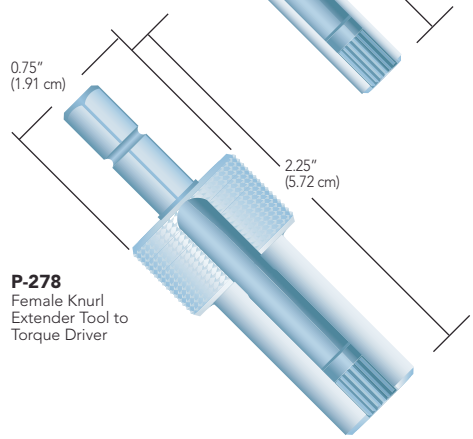
**VHP-1000**
VHP Wrench
1/4 in Hex
10 in-lbs (1.13 N·m)




**P-291**
Standard Knurl Extender Tool to Torque Driver




**P-292**
Headless Knurl Extender Tool to Torque Driver




**P-278**
Female Knurl Extender Tool to Torque Driver

| | Part No. | Description | Use With Head Style | Torque Delivered | Qty. |
|---|---|---|---|---|---|
| | VHP TIGHTENING TOOLS | | | | |
| NEW! | F-347 | Extender Tool to Torque Driver | FlushNut (1/4-28) | — | ea. |
| NEW! | N-291 | Extender Tool to Torque Driver | Micro Headless | — | ea. |
| NEW! | P-268 | Extender Tool to Torque Driver | 1/4" Hex | — | ea. |
| | P-278 | Extender Tool to Torque Driver | Female Nut Knurl | — | ea. |
| | P-279 | Extender Tool to Torque Driver | Micro Nut Knurl | — | ea. |
| | P-291 | Extender Tool to Torque Driver | Standard Nut Knurl | — | ea. |
| | P-292 | Extender Tool to Torque Driver | Headless Nut Knurl | — | ea. |
| | P-1000 | Standard Knurl Torque Tool | Standard Knurl | 4 in-lbs (0.45 N·m) | ea. |
| | VHP-1000 | VHP Torque Tool | 1/4" Hex | 10 in-lbs (1.13 N·m) | ea. |
| | VHP-2000 | VHP Torque Tool | 1/4" Hex | 14 in-lbs (1.58 N·m) | ea. |
| | VHP-3000 | VHP Torque Tool | 8 mm Hex | 10 in-lbs (1.13 N·m) | ea. |
| | VHP-4000 | VHP Torque Driver | Extender Tool 1/4" Drive | Adjustable between 2–12 in-lbs (0.23–1.35 N·m) | ea. |
| | VHP-9000 | 4 mm Wrench | 4 mm Hex | — | ea. |

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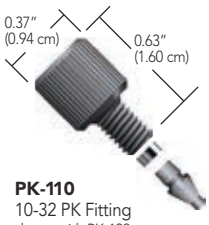
# Very High Pressure PK Fittings

Upchurch Scientific® Ultra High Performance fittings are manufactured from a proprietary PEEK blend (PK) which allow them to be used at higher temperatures (up to 200 °C) and higher pressures.

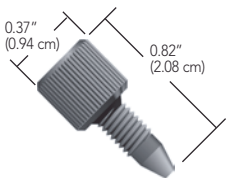
The VHP PK One-Piece fittings are available for 10-32 coned, 6-32 coned, or M4 coned ports, and Two-Piece fittings are available to connect either 1/16" or 1/32" OD tubing into 10-32 coned ports in multiple styles.

**PK-110**
10-32 PK Fitting
shown with PK-100
for 1/16" OD tubing

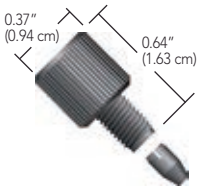



**PK-110**
10-32 PK Fitting
shown with PK-132
for 1/32" OD tubing

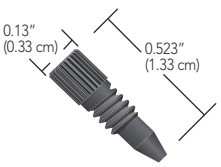
**PK-126**
6-32 PK MicroTight® Fitting
for 1/32" OD tubing



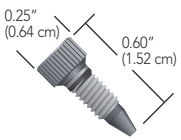

**PK-120BLK**
10-32 PK Fitting
for 1/16" OD tubing



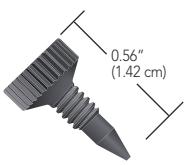

**PK-195**
10-32 PK Fitting
with PK 192
for 1/16" OD tubing




**PK-126H**
6-32 PK MicroTight® Fitting
for 1/32" OD tubing



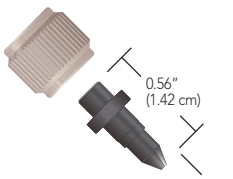

**UH-904**
M4, 1/32" Fitting
for Rheodyne® MX valves



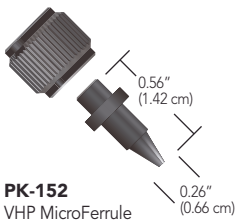

**PK-124**
6-32 PK MicroTight® Fitting
for 1/32" OD tubing

# VHP MicroFerrules

VHP MicroFerrules are made from a proprietary high performance PEEK polymer blend, a material which is unique in its ability to enable the use of capillary tubing in UHPLC environments. The new high pressure MicroFerrules are available for use with 1/32" or 360 µm OD tubing, and they are incorporated into several of our VHP products for capillary tubing.




**PK-112**
VHP MicroFerrule
shown with P-416
for 1/32" OD tubing




**PK-152**
VHP MicroFerrule
shown with P-416BLK
for 360 µm OD tubing

## APPLICATION NOTE

CAUTION: While the proprietary blend of the PK fittings will allow a fitting to attain a higher pressure and minimal cold flow properties relative to pure PEEK, some fittings molded of PK are known to be conductive. Use caution when employing PK fittings in high voltage applications.

## NOTE

### MicroTight fittings and MicroFerrules

While the MicroTight Female Nuts may be used with any of the separate MicroFerrules, the MicroFerrules themselves are port-specific and are thus not interchangeable. Additionally, the one-piece MicroTight fittings are also port-specific and should not be exchanged.

## RELATED PRODUCTS

▶ Find unions, tees and crosses for VHP applications on pages 36, 37, and 42.

| | Part No. | Description | Port | Pressure Rating | Required Torque | Head Style | Material | Qty. |
|---|---|---|---|---|---|---|---|---|
| | **PK VHP ONE-PIECE FITTINGS** | | | | | | | |
| ★ | **PK-120BLKx** | PK One-Piece Fitting for 1/16" OD Tubing | 10-32 Coned | 12,000 psi (827 bar) | 8.0 in-lbs (0.90 N·m) | Standard Knurl | PK | 10-pk |
| NEW! | **PK-124x** | PK One-Piece Fitting for 360 µm OD Tubing | 6-32 Coned | 15,000 psi (1,035 bar) | 3.0 in-lbs (0.34 N·m) | Standard Micro Knurl | PK | 10-pk |
| NEW! | **PK-126Hx** | PK One-Piece Headless Fitting for 1/32" OD Tubing | 6-32 Coned | 15,000 psi (1,035 bar) | 3.0 in-lbs (0.34 N·m) | Headless Micro Knurl | PK | 10-pk |
| | **PK-126x** | PK One-Piece Fitting for 1/32" OD Tubing | 6-32 Coned | 15,000 psi (1,035 bar) | 3.0 in-lbs (0.34 N·m) | Standard Micro Knurl | PK | 10-pk |
| | **UH-904x** | PK One-Piece Fitting for 1/32" OD Tubing | M4 Coned | 15,000 psi (1,035 bar) | 4.0 in-lbs (0.45 N·m) | Headless Knurl | PK | 10-pk |
| | **PK VHP FITTINGS (SEALTIGHT™ STYLE, FITTINGS INCLUDE PK-192X)** | | | | | | | |
| | **PK-192x** | PK Ferrule for 1/16" OD Tubing | 10-32 Coned | 11,000 psi (760 bar) | — | — | PK | 10-pk |
| | **PK-195x** | PK Fitting for 1/16" OD Tubing | 10-32 Coned | 11,000 psi (760 bar) | 8.0 in-lbs (0.90 N·m) | Standard Knurl | PK | 10-pk |
| | **PK VHP FITTINGS (LITETOUCH® STYLE, NUTS AND FERRULES SOLD SEPARATELY)** | | | | | | | |
| ★ | **PK-100x** | PK Ferrule for 1/16" OD Tubing | 10-32 Coned | 16,500 psi (1,140 bar) | — | — | PK | 10-pk |
| | **PK-110x** | PK Nut for 1/16" OD Tubing | 10-32 Coned | 16,500 psi (1,140 bar) | 8.0 in-lbs (0.90 N·m) | Standard Knurl | PK | 10-pk |
| | **PK-132x** | PK Ferrule for 1/32" OD Tubing | 10-32 Coned | 16,500 psi (1,140 bar) | — | — | PK | 10-pk |
| | **PK MICRO FERRULES AND FEMALE NUTS** | | | | | | | |
| | **P-416** | Female Nut for Microferrule | 5/16-24 Coned | 15,000 psi (1,035 bar) | 4.0 in-lbs (0.45 N·m) | Female Knurl | PEEK, Natural | ea. |
| | **P-416BLK** | Female Nut for Microferrule | 5/16-24 Coned | 15,000 psi (1,035 bar) | 4.0 in-lbs (0.45 N·m) | Female Knurl | PEEK, Black | ea. |
| ★ | **PK-112** | VHP MicroFerrule for 1/32" OD Tubing | 5/16-24 Coned | 15,000 psi (1,035 bar) | — | — | PK | ea. |
| | **PK-152** | VHP MicroFerrule for 360 µm OD Tubing | 5/16-24 Coned | 15,000 psi (1,035 bar) | — | — | PK | ea. |

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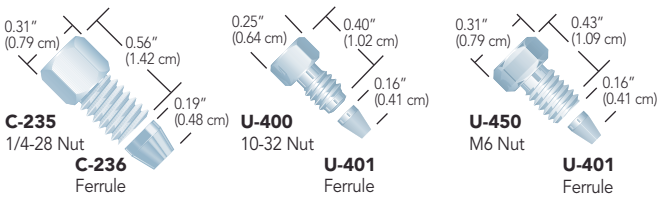
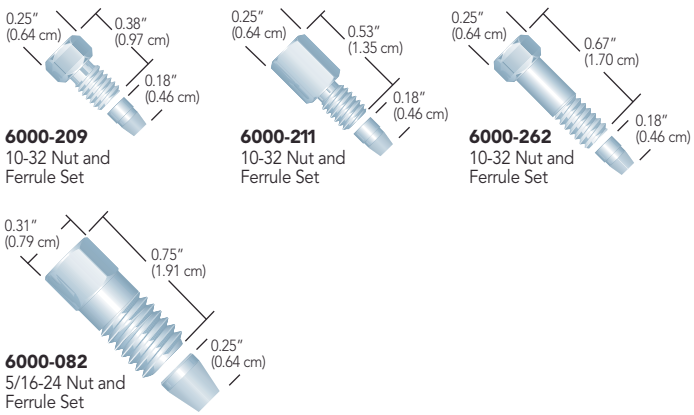
# Stainless Steel Fittings

These 316 Stainless Steel Fittings are rated to 20,000 psi (1,380 bar) when wrench tightened. Choose Upchurch Scientific® Standard Fittings, or select from the Rheodyne® or other manufacturer-compatible offerings.

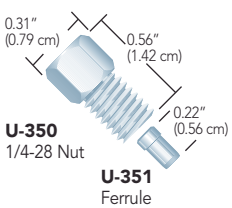
## Standard Stainless Steel Fittings



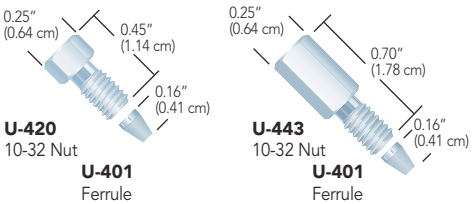

## Rheodyne Fittings



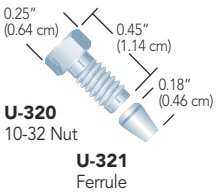

## SSI Compatible Fittings



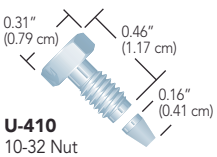

## Beckman® Compatible Fittings




## VICI® (Valco) Compatible Fittings




## Waters® Compatible Fittings




## NOTE

- Do not use metal fittings in plastic ports, as this can damage the port. Please see the "Material Structural Compatibility" chart on page 184 for more information about fittings compatibility with tubing and port materials.
- The recommended torque to tighten these fittings is 20 in-lbs (2.25 N·m).

| Part No. | Description | Port | Pressure Rating | Head Style | Material | Qty. |
|---|---|---|---|---|---|---|
| **STANDARD STAINLESS STEEL FITTINGS** | | | | | | |
| **C-235x** | Nut for 1/8" OD Tubing | 1/4-28 Coned | 20,000 psi (1,380 bar) | 5/16" Hex | SST | 10-pk |
| **C-236x** | Ferrule for 1/8" OD Tubing | 1/4-28 Coned | 20,000 psi (1,380 bar) | — | SST | 10-pk |
| ★ **U-400x** | Nut for 1/16" OD Tubing | 10-32 Coned | 20,000 psi (1,380 bar) | 1/4" Hex | SST | 10-pk |
| ★ **U-401x** | Ferrule for 1/16" OD Tubing | 10-32 or M6 Coned | 20,000 psi (1,380 bar) | — | SST | 10-pk |
| **U-450x** | Nut for 1/16" OD Tubing | M6 Coned | 20,000 psi (1,380 bar) | 5/16" Hex | SST | 10-pk |
| **RHEODYNE FITTINGS** | | | | | | |
| **6000-082** | Fitting for 1/8" OD Tubing | 5/16-24 Coned | 20,000 psi (1,380 bar) | 5/16" Hex | SST | ea. |
| **6000-083** | Ferrule for 1/8" OD Tubing | 5/16-24 Coned | 20,000 psi (1,380 bar) | — | SST | 5-pk |
| **6000-209** | Fitting for 1/16" OD Tubing | 10-32 Coned | 20,000 psi (1,380 bar) | 1/4" Hex | SST | 10-pk |
| **6000-210** | Ferrule for 1/16" OD Tubing | 10-32 Coned | 20,000 psi (1,380 bar) | — | SST | 10-pk |
| **6000-211** | Fitting for 1/16" OD Tubing, Long | 10-32 Coned | 20,000 psi (1,380 bar) | 1/4" Hex | SST | 10-pk |
| **6000-262** | Fitting for 1/16" OD Tubing, Extra Long | 10-32 Coned | 20,000 psi (1,380 bar) | 1/4" Hex | SST | 10-pk |
| **MANUFACTURER COMPATIBLE FITTINGS** | | | | | | |
| ★ **U-320x** | Nuts for 1/16" OD Tubing, Valco/VICI Compatible | 10-32 Coned | 20,000 psi (1,380 bar) | 1/4" Hex | SST | 10-pk |
| ★ **U-321x** | Ferrule for 1/16" OD Tubing, Valco/VICI Compatible | 10-32 Coned | 20,000 psi (1,380 bar) | — | SST | 10-pk |
| **U-350x** | Nuts for 1/16" OD Tubing, SSI Compatible | 10-32 Coned | 20,000 psi (1,380 bar) | 5/16" Hex | SST | 10-pk |
| **U-351x** | Ferrule for 1/16" OD Tubing, SSI Compatible | 10-32 Coned | 20,000 psi (1,380 bar) | — | SST | 10-pk |
| ★ **U-410x** | Nuts for 1/16" OD Tubing, Waters Compatible | 10-32 Coned | 20,000 psi (1,380 bar) | 5/16" Hex | SST | 10-pk |
| **U-420x** | Nuts for 1/16" OD Tubing, Beckman Compatible | 10-32 Coned | 20,000 psi (1,380 bar) | 1/4" Hex | SST | 10-pk |
| **U-443x** | Nuts for 1/16" OD Tubing, Beckman Compatible, Long | 10-32 Coned | 20,000 psi (1,380 bar) | 1/4" Hex | SST | 10-pk |

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# One-Piece Fingertight Fittings

- The original One-Piece Fingertight Fitting
- All polymer construction
- Versions available for 1/16", 1/32" or 1/8" OD tubing

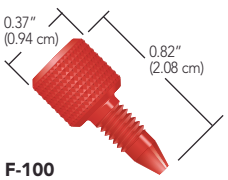
The Upchurch Scientific® One-Piece Fingertight Fittings provide convenience and ease of use because the ferrule will not stick in a receiving port and the fitting is more easily found if dropped. The fittings for 1/16" OD tubing and 10-32 coned ports are available in a variety of colors, materials and lengths to suit virtually every application.

Beyond the standard 10-32 fittings, also featured in this product family are specialty fittings for specific applications. Our M-645 Fitting is a direct replacement for the 6-40 threaded VICI® (Valco) fitting. The P-100 can be used in 1/4-28 coned ports for 1/8" OD tubing including some of the inlet filters starting on page 157.

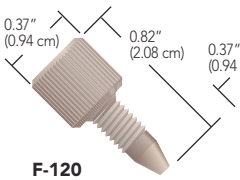
RheFlex® One-Piece Fittings are included in many of the Rheodyne® manual valves, starting on page 132. The One-Piece RheFlex M4 Fittings, for use with Rheodyne MX Nano-Scale Modules, are listed on page 12.

## NOTE

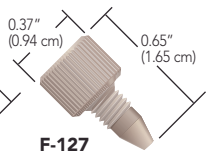
- For your convenience we ship most Upchurch Scientific Fingertight Fittings in 10-packs. However, you may order individual pieces (the letter "x" in the product part number simply designates "10-pk").
- Some of the Upchurch Scientific fittings on this page are available in additional colors. Please contact your distributor or us for more information.
- The F-120FUN PACK includes six F-120 Fittings in the following colors: natural, blue, black, green, red, and yellow.
- Fingertight is generally equal to 3–4 in-lbs (0.34–0.45 N·m).



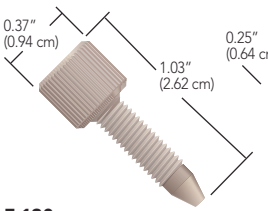

**F-100**
10-32 PCTFE Fitting



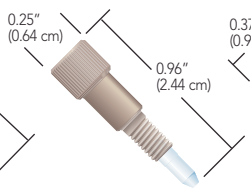

**F-120**
10-32 PEEK Fitting



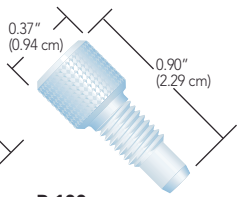

**F-127**
10-32 PEEK Fitting



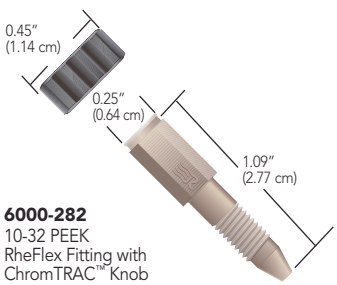

**F-130**
10-32 PEEK Fitting




**M-645**
6-40 PEEK/PCTFE Fitting
for 1/32" OD tubing




**P-100**
1/4-28 PCTFE Fitting
for 1/8" OD tubing




**6000-282**
10-32 PEEK
RheFlex Fitting with
ChromTRAC™ Knob

| Part No. | Description | Port | Pressure Rating | Head Style | Material | Qty. |
|---|---|---|---|---|---|---|
| **ONE-PIECE FINGERTIGHT FITTINGS** | | | | | | |
| **6000-282** | Fingertight Fitting for 1/16" OD Tubing | 10-32 Coned | 5,000 psi (345 bar) | ChromTRAC knob | PEEK, Natural | 10-pk |
| **F-100x** | Fingertight Fitting for 1/16" OD Tubing | 10-32 Coned | 4,000 psi (276 bar) | Diamond Knurl | PCTFE, Red | 10-pk |
| **F-100Nx** | Fingertight Fitting for 1/16" OD Tubing | 10-32 Coned | 4,000 psi (276 bar) | Diamond Knurl | PCTFE, Natural | 10-pk |
| ★ **F-120x** | Fingertight Fitting for 1/16" OD Tubing | 10-32 Coned | 5,000 psi (345 bar) | Standard Knurl | PEEK, Natural | 10-pk |
| **F-120FUN PACK** | Fingertight Fitting for 1/16" OD Tubing | 10-32 Coned | 5,000 psi (345 bar) | Standard Knurl | PEEK, Natural, Blue, Black, Green, Red, Yellow (one each color) | 6-pk |
| **F-127x** | Fingertight Fitting for 1/16" OD Tubing, Short | 10-32 Coned | 5,000 psi (345 bar) | Standard Knurl | PEEK, Natural | 10-pk |
| ★ **F-130x** | Fingertight Fitting for 1/16" OD Tubing, Long | 10-32 Coned | 5,000 psi (345 bar) | Standard Knurl | PEEK, Natural | 10-pk |
| **M-645x** | Fingertight Fitting for 1/32" OD Tubing | 6-40 Coned | 1,750–3,250 psi (121–224 bar) | Headless Knurl | PEEK, Natural/PCTFE, Natural | 10-pk |
| **P-100** | Fingertight Fitting for 1/8" OD Tubing | 1/4-28 Coned | 1,000 psi (69 bar) | Diamond Knurl | PCTFE, Natural | ea. |

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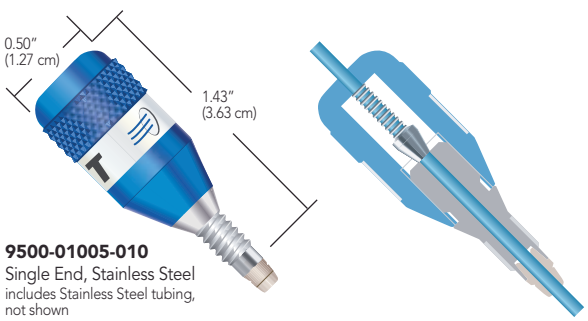
## Sure-Fit™ Connector

- Self-adjusting to any port depth regardless of column manufacturer
- Fingertight to 6,000 psi (414 bar)
- Available in PEEK or stainless steel

Eliminating leaks and dead volume is critical to achieving good chromatographic results. The Sure-Fit connector gives you a perfect fit in nearly every 10-32 coned receiving port — every connection, every time. Typically leaks and dead volume are caused by an improperly plumbed system and can occur for many reasons, including switching columns. The problem occurs not only when switching from one manufacturer to another, it can also occur when changing columns from the same manufacturer. This is because internal port depths vary, even within the same manufacturing lot. Unless the connector is universal, eliminating leaks and dead volume cannot be guaranteed. The Sure-Fit connector has a unique internal spring-tensioned mechanism that automatically self-adjusts to virtually any port depth while maintaining constant pressure on the 1/16" OD tubing.

Sure-Fit connectors come with either PEEK tubing or stainless steel tubing, in varying lengths and internal diameters, pre-assembled for ease of use. Choose the 9502-01007-HP — a U-shaped Sure-Fit connector — for use in Agilent® 1100 systems, or select the 9504-01005-050 for micro-scale applications where biocompatibility is desired.



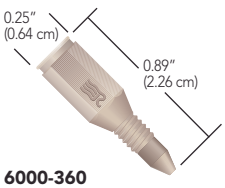

**9500-01005-010**
Single End, Stainless Steel
includes Stainless Steel tubing, not shown

## RheFlex® M4 Fittings

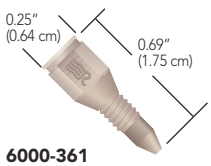
- Incorporates M4 coned threads for 1/32" OD tubing
- Pressure rated to 5,000 psi (345 bar)

The Rheodyne® RheFlex M4 Fitting is designed to connect 1/32" OD tubing in MX Series II™ valves (see Actuated Valves, starting on page 130). This PEEK fitting has a one piece design, which eliminates the need for a separate nut and ferrule. The M4 Fitting design provides dependable zero dead volume connections for micro and nano applications. Due to the unique RheFlex gripping design, the M4 Fitting will hold to 5,000 psi (345 bar) on PEEK or with a PEEK tubing sleeve on fused silica tubing. A PEEK M4 Plug is also available.

Use Rheodyne ChromTRAC™ knobs with the RheFlex M4 Fitting for fingertight convenience and to color-code connections.




**6000-360**
M4 Fitting
M4 threads
for 1/32" OD tubing




**6000-361**
M4 Plug
M4 threads

| Part No. | Description | Port | Pressure Rating | Head Style | Material | Qty. |
|---|---|---|---|---|---|---|
| **SURE-FIT FITTINGS** | | | | | | |
| **9500-01005-010** | Single End Fitting, 1/16" x 0.005" x 10 cm | 10-32 Coned | 6,000 psi (414 bar) | Diamond Knurl | SST | ea. |
| **9500-01007-010** | Single End Fitting, 1/16" x 0.007" x 10 cm | 10-32 Coned | 6,000 psi (414 bar) | Diamond Knurl | SST | ea. |
| **9500-01010-010** | Single End Fitting, 1/16" x 0.010" x 10 cm | 10-32 Coned | 6,000 psi (414 bar) | Diamond Knurl | SST | ea. |
| **9500-01020-030** | Single End Fitting, 1/16" x 0.020" x 30 cm | 10-32 Coned | 6,000 psi (414 bar) | Diamond Knurl | SST | ea. |
| **9502-01007-HP** | Single End Fitting, 1/16" x 0.007", U-Shape for Agilent 1100 System | 10-32 Coned | 6,000 psi (414 bar) | Diamond Knurl | SST | ea. |
| **9504-01005-050** | Single End Fitting, 1/16" x 0.005" x 50 cm | 10-32 Coned | 6,000 psi (414 bar) | Diamond Knurl | PEEK, Natural | ea. |
| **9504-01007-050** | Single End Fitting, 1/16" x 0.007" x 50 cm | 10-32 Coned | 6,000 psi (414 bar) | Diamond Knurl | PEEK, Natural | ea. |
| **9504-01010-050** | Single End Fitting, 1/16" x 0.010" x 50 cm | 10-32 Coned | 6,000 psi (414 bar) | Diamond Knurl | PEEK, Natural | ea. |
| **SURE-FIT FITTINGS REPLACEMENT PARTS** | | | | | | |
| **9500-FP** | Replacement Ferrule | 10-32 Coned | 6,000 psi (414 bar) | — | PEEK, Natural | ea.* |
| **RHEFLEX ONE-PIECE FITTINGS** | | | | | | |
| **6000-360** | RheFlex Fitting for 1/32" OD Tubing | M4 Coned | 5,000 (345 bar) | 1/4" Hex | PEEK, Natural | 10-pk |
| **6000-361** | RheFlex Plug | M4 Coned | 5,000 (345 bar) | 1/4" Hex | PEEK, Natural | 10-pk |

** Minimum order quantity of 100.*

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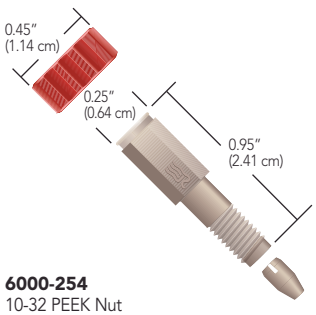
# Two-Piece RheFlex® Fingertight Fittings

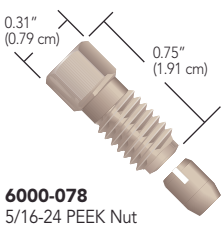
The Rheodyne® RheFlex Precision Two-Piece PEEK Fittings sets provide inert, biocompatible connections for instrumentation. These fittings have a reliable, time-tested design. Each 1/16" fittings set contains a 10-32 threaded nut and a specially-designed PEEK ferrule. Three lengths of the 1/16" nut are available: Standard, Short, and Extra Long. RheFlex Fingertight Fittings are rated for use up to 7,000 psi (483 bar). Also offered in this product line is the 6000-078 fitting, designed to connect 1/8" OD tubing into our manual preparative-scale injection valves. (See pages 128–134 for more information on these valves.)

*View the online product bulletin at: www.idex-hs.com.*




**6000-254**
10-32 PEEK Nut
with 6000-251 PEEK Ferrule
(RD ChromTRAC suffix)

**6000-255**
10-32 PEEK Nut
with 6000-251 PEEK Ferrule




**6000-078**
5/16-24 PEEK Nut
with 6000-079 PEEK Ferrule

Biocompatible

# ChromTRAC™

- Brightly colored knobs to easily track inlets and outlets of valves, columns, and detectors

All ChromTRAC-compatible RheFlex fittings offer the ChromTRAC knob option. Specify the ChromTRAC two letter suffix for the color choice when ordering. Please see the ChromTRAC Suffix Codes table below. For example, to order red ChromTRAC knobs with the RheFlex One-Piece Fitting on this page, specify 6000-282RD. No suffix indicates black knobs.

*View the online product bulletin for RheFlex fittings at: www.idex-hs.com.*

## CHROMTRAC SUFFIX CODES

| CODE | COLOR |
|---|---|
| BL | Blue |
| GN | Green |
| GY | Gray |
| RD | Red |
| WH | White |
| YL | Yellow |
| MC | Multi-color (two each of blue, green, gray, red, and yellow) |

*Add these letter suffixes to the end of the seven-digit part numbers of the 10-32 and M4 threaded RheFlex Fittings on pages 11, 12, and 13.*

## RELATED PRODUCTS

- For PEEK tubing sleeves that can be used with these M4 RheFlex fittings, see page 20.
- For reusable fittings that both work in UHPLC applications and can help ensure the tubing is fully inserted into the receiving port, see the VHP-300 fitting shown earlier in this chapter on page 6.

| Part No. | Description | Port | Pressure Rating | Head Style | Material | Qty. |
|---|---|---|---|---|---|---|
| **RHEFLEX TWO-PIECE FITTINGS (INCLUDES FERRULES)** | | | | | | |
| **6000-078** | RheFlex Fitting for 1/8" OD Tubing | 5/16-24 Coned | 5,000 psi (345 bar) | 5/16" Hex | PEEK, Natural | ea. |
| **6000-254** | RheFlex Fitting for 1/16" OD Tubing | 10-32 Coned | 7,000 psi (483 bar) | ChromTRAC knob | PEEK, Natural | 10-pk |
| **6000-255** | RheFlex Fitting for 1/16" OD Tubing, Short | 10-32 Coned | 7,000 psi (483 bar) | 1/4" Hex | PEEK, Natural | 10-pk |
| **REPLACEMENT FERRULES** | | | | | | |
| **6000-079** | RheFlex Ferrule for 1/8" OD Tubing | 5/16-24 Coned | 7,000 psi (483 bar) | ChromTRAC knob | PEEK, Natural | 5-pk |
| **6000-251** | RheFlex Ferrule for 1/16" OD Tubing | 10-32 Coned | 7,000 psi (483 bar) | ChromTRAC knob | PEEK, Natural | 10-pk |

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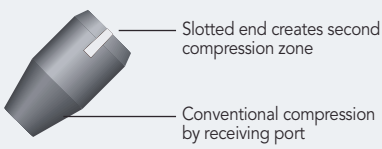
# Two-Piece SealTight™ Fingertight Fittings

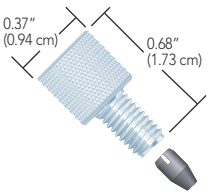
- Several nut lengths and head styles to fit into a variety of applications
- Designed to connect 1/16" OD tubing to 10-32 coned ports
- Hold up to 9,000 psi (620 bar)

The dual compression created by the specially designed nut and ferrule enables the Upchurch Scientific® SealTight Fittings system to outperform standard finger tightened fittings. The forward cone of the SealTight Ferrule provides gripping power and a leak-free seal via conventional compression by the receiving port. The slotted end creates the second compression zone in conjunction with a SealTight Nut. All SealTight Nuts are for use with 1/16" OD tubing and are designed to be used with the F-192 Ferrule. A wide variety of fitting head styles are available for various space constraints. This fittings system is also interchangeable with the Two-Piece RheFlex® Fittings System for 1/16" OD tubing, shown on the previous page.

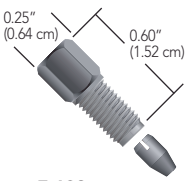



## NOTE

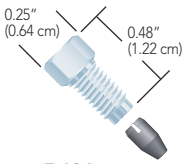
Overtightening these fittings on fluoropolymer (e.g., FEP, PFA, and ETFE) tubing can cause the ID of your tubing to collapse.



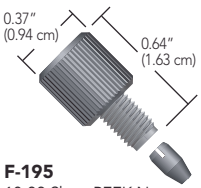

**F-190**
10-32 Standard Stainless Steel Nut, with F-192 Ferrule



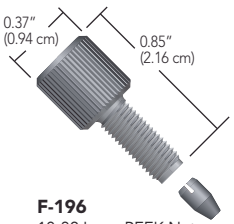

**F-193**
10-32 Short PEEK Hex Head Nut, with F-192 Ferrule



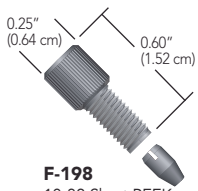

**F-194**
10-32 Short Stainless Steel Hex Head Nut, with F-192 Ferrule



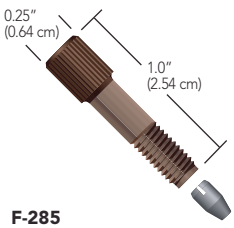

**F-195**
10-32 Short PEEK Nut, with F-192 Ferrule



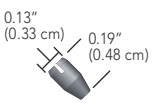

**F-196**
10-32 Long PEEK Nut, with F-192 Ferrule



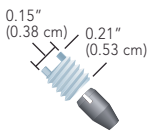

**F-198**
10-32 Short PEEK Headless Nut, with F-192 Ferrule




**F-285**
10-32 Long PPS Headless Nut, with F-192 Ferrule




**F-192**
SealTight Ferrule, for 1/16" OD tubing




**F-350**
10-32 Stainless Steel FlushNut, with F-192 Ferrule

## RELATED PRODUCTS

- Find tightening tools for these fittings on page 33.
- Try the F-350 FlushNut™ for the ultimate streamline design. For more information on these innovative products, please see page 31.

| | Part No. | Description | Port | Pressure Rating | Head Style | Material | Qty. |
|---|---|---|---|---|---|---|---|
| | **SEALTIGHT TWO-PIECE FITTINGS (INCLUDES F-192 FERRULES)** | | | | | | |
| | **F-190x** | SealTight Fitting for 1/16" OD Tubing | 10-32 Coned | 7,000–9,000 psi (483–620 bar) | Standard Knurl | SST | 10-pk |
| ★ | **F-193x** | SealTight Fitting for 1/16" OD Tubing, Short | 10-32 Coned | 7,000–9,000 psi (483–620 bar) | 1/4" Hex | PEEK Black | 10-pk |
| | **F-194x** | SealTight Fitting for 1/16" OD Tubing, Short | 10-32 Coned | 7,000–9,000 psi (483–620 bar) | 1/4" Hex | SST | 10-pk |
| | **F-195x** | SealTight Fitting for 1/16" OD Tubing, Short | 10-32 Coned | 7,000–9,000 psi (483–620 bar) | Standard Knurl | PEEK Black | 10-pk |
| ★ | **F-196x** | SealTight Fitting for 1/16" OD Tubing, Long | 10-32 Coned | 7,000–9,000 psi (483–620 bar) | Standard Knurl | PEEK Black | 10-pk |
| | **F-198x** | SealTight Fitting for 1/16" OD Tubing, Short | 10-32 Coned | 3,000–9,000 psi (207–620 bar) | Headless Knurl | PEEK Black | 10-pk |
| | **F-284x** | SealTight Fitting for 1/16" OD Tubing, Long | 10-32 Coned | 3,000–9,000 psi (207–620 bar) | Headless Knurl | PEEK Black | 10-pk |
| | **F-285x** | SealTight Fitting for 1/16" OD Tubing, Long | 10-32 Coned | 3,000–9,000 psi (207–620 bar) | Headless Knurl | PPS Brown | 10-pk |
| | **F-287x** | SealTight Fitting for 1/16" OD Tubing, Long | 10-32 Coned | 7,000–9,000 psi (483–620 bar) | Knurl-1/4" Hex | PEEK Black | 10-pk |
| | **F-350x** | SealTight Fitting for 1/16" OD Tubing, FlushNut | 10-32 Coned | 7,000–9,000 psi (483–620 bar) | FlushNut | SST | 10-pk |
| | **REPLACEMENT FERRULES** | | | | | | |
| ★ | **F-192x** | SealTight Ferrule for 1/16" OD Tubing | 10-32 or M6 Coned | 7,000–9,000 (483–620 bar) | — | PEEK/Black | 10-pk |

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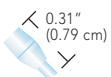
# Two-Piece Fingertight Fittings

- Designed to connect tubing to 10-32 coned ports
- Ferrules available for directly connecting 1/16", 1/32", 360 µm, or 190 µm OD tubing

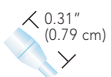
Two-Piece Fingertight Fittings feature a separate ferrule. With a two-piece design, you can replace just the ferrule instead of the entire unit, making these Fingertights more economical than the one-piece version. Use a standard knurled head fitting for traditional fingertight applications, or use a fitting with wings built into the head for extra tightening leverage. A stainless steel hex headed fitting can be used for applications where a wrench may be needed for added tightening torque.

To order the fittings as shown to the right, simply reference the part numbers as indicated. To exchange the ferrule typically packaged with our fittings with one of our specialty ferrules shown below, simply replace the letter "x" in the part number with a "-01", and then specify the ferrule needed on a separate line. For example, to order the F-140 fitting with the M-215 ferrule, specify F-140-01 and M-215 separately. *Please note: all "-01" fittings are packaged individually, not in 10-packs.*

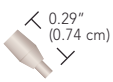
The M-215 Conductive Perfluoroelastomer Ferrule is designed for mass spectrometer electrospray applications. Unlike most graphite ferrules, the elastomeric properties of this ferrule let you use it through many tightening/retightening cycles. It also eliminates any possibility of graphite contamination in your system. Like graphite ferrules, you can apply voltage through a metallic port block or metallic nut, allowing voltage to translate to the flow path through the ferrule.



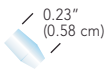

**F-148**
PCTFE Ferrule
for 190 µm OD tubing



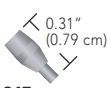

**F-151**
PCTFE Ferrule
for 360 µm OD tubing



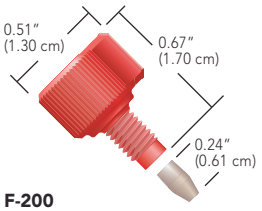

**F-113**
PEEK Ferrule
for 1/32" OD tubing



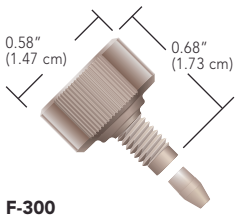

**F-142N**
ETFE Ferrule
for 1/16" OD tubing



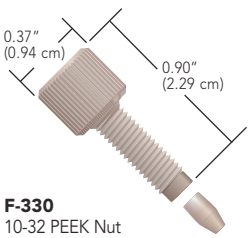

**M-215**
Conductive Perfluoroelastometer Ferrule
for 360 µm OD tubing



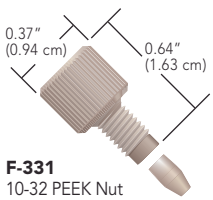

**F-200**
10-32 Delrin® Winged Nut
with F-142 PEEK Ferrule



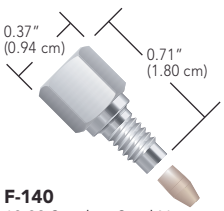

**F-300**
10-32 PEEK Double-Winged Nut
with F-142 PEEK Ferrule




**F-330**
10-32 PEEK Nut
with F-142 PEEK Ferrule




**F-331**
10-32 PEEK Nut
with F-142 PEEK Ferrule




**F-140**
10-32 Stainless Steel Nut
with F-142 PEEK Ferrule

## APPLICATION NOTE

Some Upchurch Scientific® Fingertight Nuts feature wings in addition to a knurled head, which provide more leverage when tightening the fitting into a receiving port. Choose our single or double-winged design.

*Please Note: customers can use the standard knurl head fittings with our tightening tools found on page 33.*

| | Part No. | Description | Port | Pressure Rating | Head Style | Material | Qty. |
|---|---|---|---|---|---|---|---|
| | **TWO-PIECE FINGERTIGHT FITTINGS (INCLUDES F-142 FERRULES)** | | | | | | |
| | **F-140x** | Fitting for 1/16" OD Tubing | 10-32 Coned | 6,000 psi (414 bar) | 5/16" Hex | SST/PEEK Natural | 10-pk |
| | **F-200x** | Fingertight Fitting for 1/16" OD Tubing | 10-32 Coned | 6,000 psi (414 bar) | Single Wing | Delrin Red/PEEK Natural | 10-pk |
| ★ | **F-300x** | Fingertight Fitting for 1/16" OD Tubing | 10-32 Coned | 6,000 psi (414 bar) | Double Wing | PEEK Natural | 10-pk |
| ★ | **F-330x** | Fingertight Fitting for 1/16" OD Tubing, Long | 10-32 Coned | 6,000 psi (414 bar) | Standard Knurl | PEEK Natural | 10-pk |
| | **F-331x** | Fingertight Fitting for 1/16" OD Tubing | 10-32 Coned | 6,000 psi (414 bar) | Standard Knurl | PEEK Natural | 10-pk |
| | **REPLACEMENT FERRULES** | | | | | | |
| ★ | **F-113** | Ferrule for 1/32" OD Tubing | 10-32 Coned | 6,000 psi (414 bar) | — | PEEK Natural | ea. |
| | **F-142x** | Ferrule for 1/16" OD Tubing | 10-32 Coned | 6,000 psi (414 bar) | — | PEEK Natural | 10-pk |
| | **F-142Nx** | Ferrule for 1/16" OD Tubing | 10-32 Coned | 4,000 psi (276 bar) | — | ETFE Natural | 10-pk |
| | **F-148** | Ferrule for 190 µm OD tubing | 10-32 Coned | 6,000 psi (414 bar) | — | PCTFE Natural | ea. |
| | **F-151** | Ferrule for 360 µm OD Tubing | 10-32 Coned | 6,000 psi (414 bar) | — | PCTFE Natural | ea. |
| | | | | | | | |
| ★ | **M-215** | Conductive Ferrule for 360 µm OD tubing | 10-32 Coned | 1,500 psi (103 bar) | — | Conductive Perfluoroelastomer | ea. |

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# LiteTouch® Fittings

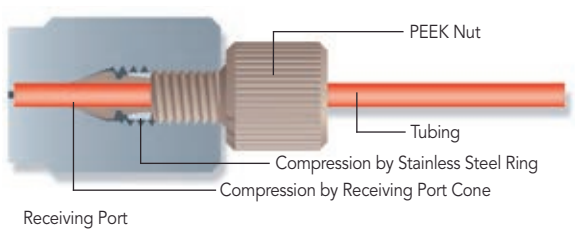
- Helps prevent twisting of polymer tubing
- High pressure with fingertight convenience
- Options available for 1/32", 1/16", or 1/8" OD tubing

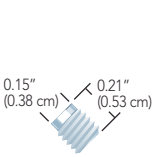
The LiteTouch Fittings System grips tubing at two compression points (see diagram), holding to high pressures with Fingertight convenience. It also prevents polymer tubing from twisting, a potential problem when using standard Fingertight fittings. LiteTouch Fittings are available for use with 1/32", 1/16", or 1/8" OD tubing sizes, and for 10-32 or 1/4-28 coned ports.

For those space-limited applications where nut heads interfere with each other, try the FlushNut™ Fittings. (FlushNut Fittings require a tightening tool. Please see page 31 for more information about these products.)

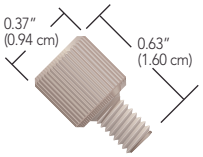
To avoid collapsing the ID of your tubing, the LiteTouch system can be used on hard tubing only, such as stainless steel and PEEK polymer tubing. The LiteTouch Ferrule System is not recommended for repeated use in plastic ports.

## LiteTouch Fittings Systems

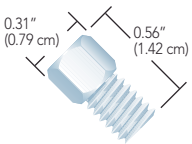


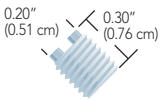

**F-354**
10-32 Stainless Steel FlushNut
for 1/32" and 1/16" OD tubing



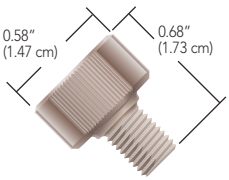

**LT-110**
10-32 PEEK Nut
for 1/32" and 1/16" OD tubing



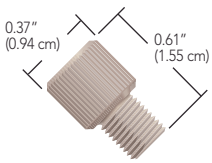

**C-235**
1/4-28 Stainless Steel Nut
for 1/8" OD tubing



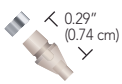

**F-364**
1/4-28 Stainless Steel FlushNut
for 1/8" OD tubing



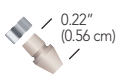

**LT-210**
1/4-28 PEEK Double-Winged Nut
for 1/8" OD tubing



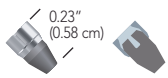

**LT-215**
1/4-28 PEEK Nut
for 1/8" OD tubing



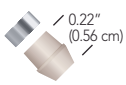

**LT-132**
PEEK Ferrule with Stainless Steel Lock Ring
for 1/32" OD tubing




**LT-100**
PEEK Ferrule with Stainless Steel Lock Ring
for 1/16" OD tubing




**LT-135**
One-Piece LiteTouch SealTight™ Ferrule with Stainless Steel Lock Ring
for 1/16" OD tubing




**LT-200**
PEEK Ferrule with Stainless Steel Lock Ring
for 1/8" OD tubing

## RELATED PRODUCTS

- The stainless steel nuts on page 10 can also be used with the LiteTouch ferrules on this page.

| Part No. | Description | Port | Pressure Rating | Head Style | Material | Qty. |
|---|---|---|---|---|---|---|
| **LITETOUCH NUTS** | | | | | | |
| **C-235x** | LiteTouch Nut for 1/8" OD Tubing | 1/4-28 Coned | 4,500 psi (310 bar) | 5/16" Hex | SST | 10-pk |
| **F-354x** | LiteTouch Nut for 1/16" or 1/32" OD Tubing, FlushNut | 10-32 Coned | 5,000 psi (345 bar) | FlushNut | SST | 10-pk |
| **F-364x** | LiteTouch Nut for 1/8" OD Tubing, FlushNut | 1/4-28 Coned | 4,500 psi (310 bar) | FlushNut | SST | 10-pk |
| **LT-110x** | LiteTouch Nut for 1/16" or 1/32" OD Tubing | 10-32 Coned | 5,000 psi (345 bar) | Standard Knurl | PEEK Natural | 10-pk |
| **LT-210x** | LiteTouch Nut for 1/8" OD Tubing | 1/4-28 Coned | 4,500 psi (310 bar) | Double Wing | PEEK Natural | 10-pk |
| **LT-215x** | LiteTouch Nut for 1/8" OD Tubing, Short | 1/4-28 Coned | 4,500 psi (310 bar) | Standard Knurl | PEEK Natural | 10-pk |
| **LITETOUCH FERRULES** | | | | | | |
| ★ **LT-100x** | LiteTouch Ferrule for 1/16" OD Tubing | 10-32 Coned | 5,000 psi (345 bar) | — | PEEK Natural/SST | 10-pk |
| ★ **LT-132x** | LiteTouch Ferrule for 1/32" OD Tubing | 10-32 Coned | 5,000 psi (345 bar) | — | PEEK Natural/SST | 10-pk |
| ★ **LT-135x** | LiteTouch Ferrule for 1/16" OD Tubing | 10-32 Coned | 10,000 psi (690 bar)* | — | PEEK Black/SST | 10-pk |
| **LT-200x** | LiteTouch Ferrule for 1/8" OD Tubing | 1/4-28 Coned | 4,500 psi (310 bar) | — | PEEK Natural/SST | 10-pk |

** When used with a stainless steel 10-32 nut from page 10.*

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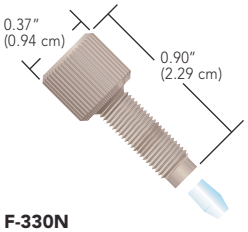
# NanoTight™ Fittings & Sleeves

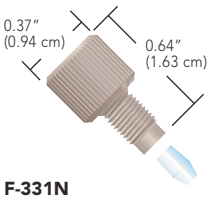
- For connecting 1/16" OD or capillary tubing using tubing sleeves to standard 10-32 coned ports
- Multiple nut styles available
- Nuts manufactured from PEEK polymer, ferrules manufactured from ETFE

Upchurch Scientific® NanoTight Fittings and Sleeves are designed to connect 70 µm–1 mm OD capillary tubing to any standard 10-32 coned port normally intended for 1/16" OD tubing using the NanoTight Tubing Sleeves on page 19. The fittings can also be used to connect any 1/16" OD tubing. The ETFE ferrule material is softer than PEEK, making it a good candidate for connecting thin walled semi-rigid tubing such as FEP and ETFE into 10-32 ports with minimal constricting to the inner diameter.

Select from our expansive line of PEEK NanoTight Fittings, featuring several head style and length options. Each 10-pack of nuts includes ten ETFE F-142N ferrules.




**F-330N**
Long Standard Head Nut
with F-142N Ferrule




**F-331N**
Short Standard Head Nut
with F-142N Ferrule

**F-333N**
Short Headless Nut
with F-142N Ferrule

## RELATED PRODUCTS

- Find tightening tools for these head styles on page 33.
- NanoTight Tubing sleeves start on page 19.

| | Part No. | Description | Port | Pressure Rating | Head Style | Material (Nut/Ferrule) | Qty. |
|---|---|---|---|---|---|---|---|
| | NANOTIGHT FITTINGS (INCLUDES F-142N FERRULES) | | | | | | |
| ★ | **F-330Nx** | NanoTight Fitting for 1/16" OD Tubing and NanoTight Sleeves | 10-32 Coned | 4,000 psi (276 bar) | Standard Knurl | PEEK Natural/ETFE Natural | 10-pk |
| | **F-331Nx** | NanoTight Fitting for 1/16" OD Tubing and NanoTight Sleeves, Short | 10-32 Coned | 4,000 psi (276 bar) | Standard Knurl | PEEK Natural/ETFE Natural | 10-pk |
| ★ | **F-333Nx** | NanoTight Fitting for 1/16" OD Tubing and NanoTight Sleeves, Short | 10-32 Coned | 4,000 psi (276 bar) | Headless Knurl | PEEK Natural/ETFE Natural | 10-pk |
| | REPLACEMENT FERRULES | | | | | | |
| | **F-142Nx** | NanoTight Ferrule for 1/16" OD Tubing and NanoTight Sleeves | 10-32 Coned | 4,000 psi (276 bar) | — | ETFE Natural | 10-pk |

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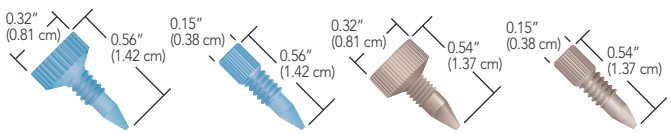
# MicroTight® Fittings

- Comprehensive Fitting System for Connecting Capillary Tubing
- Made from PEEK Polymer

Upchurch Scientific® MicroTight One-Piece Fittings are designed for use with the NanoPort™ and MicroTight Unions, Adapters and Inline MicroFilters. Specifically made for 360 µm OD tubing, 1/32" OD tubing, or our MicroTight Tubing Sleeves (see page19), these fittings make superior fingertight connections with capillary tubing. MicroTight Fittings withstand temperatures up to 125 °C.

The MicroTight family also includes a female nut matched with one of five dedicated ferrules for connecting specific tubing ODs.

Use the P-277 Extender Tool to tighten standard micro knurl 6-32 fittings in hard-to-reach places. Tighten micro headless 6-32 fittings with our N-290 Tool. See page 33 for more information.

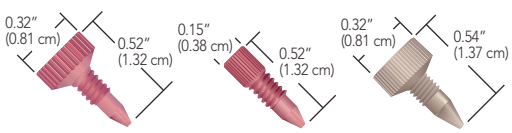



**F-124S**
Standard Head Fitting
for use with
360 µm OD tubing

**F-124H**
Headless Fitting
for use with
360 µm OD tubing

**F-125**
Standard Head Fitting
for use with
MicroTight Sleeves

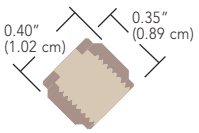
**F-125H**
Headless Fitting
for use with
MicroTight Sleeves



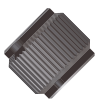

**F-126S**
Standard Head Fitting
for use with
1/32" OD tubing

**F-126H**
Headless Fitting
for use with
1/32" OD tubing

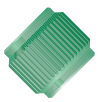
**P-555**
Standard Head Plug



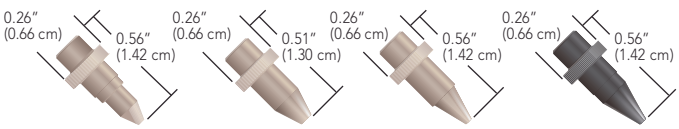

**P-416**
Female Nut
5/16-24
internal threads



**P-416BLK**
Female Nut
5/16-24
internal threads



**P-416G**
Female Nut
5/16-24
internal threads

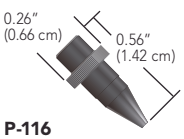



**F-112**
MicroFerrule
for 1/32" OD tubing

**F-132**
MicroFerrule
for 1/16" OD tubing

**F-152**
MicroFerrule
for 360 µm OD tubing

**F-172**
MicroFerrule
for 0.025" OD tubing




**P-116**
MicroFerrule Plug

## RELATED PRODUCTS

- Connectors for Capillary Tubing can be found on pages 37–45.
- Very High Pressure fittings for capillary tubing can be found on page 9.
- Capillary tubing is featured on pages 67.

## NOTE

### MicroTight fittings and MicroFerrules

While the MicroTight Female Nuts may be used with any of the separate MicroFerrules, the MicroFerrules themselves are port-specific and are thus not interchangeable. Additionally, the one-piece MicroTight fittings are also port-specific and should not be exchanged.

| | Part No. | Description | Port | Pressure Rating | Head Style | Material | Qty. |
|---|---|---|---|---|---|---|---|
| | **MICROTIGHT FITTINGS** | | | | | | |
| | **F-124Hx** | MicroTight Fitting for 360 µm OD Tubing | 6-32 Coned | 5,000 psi (345 bar) | Micro Headless Knurl | PEEK Blue | 10-pk |
| | **F-124Sx** | MicroTight Fitting for 360 µm OD Tubing | 6-32 Coned | 5,000 psi (345 bar) | Standard Micro Knurl | PEEK Blue | 10-pk |
| | **F-125Hx** | MicroTight Fitting for MicroTight Tubing Sleeves | 6-32 Coned | 4,000 psi (276 bar) | Micro Headless Knurl | PEEK Natural | 10-pk |
| | **F-125x** | MicroTight Fitting for MicroTight Tubing Sleeves | 6-32 Coned | 4,000 psi (276 bar) | Standard Micro Knurl | PEEK Natural | 10-pk |
| ★ | **F-126Hx** | MicroTight Fitting for 1/32" OD Tubing | 6-32 Coned | 5,000 psi (345 bar) | Micro Headless Knurl | PEEK Red | 10-pk |
| | **F-126Sx** | MicroTight Fitting for 1/32" OD Tubing | 6-32 Coned | 5,000 psi (345 bar) | Standard Micro Knurl | PEEK Red | 10-pk |
| | **P-555** | MicroTight Plug | 6-32 Coned | 5,000 psi (345 bar) | Standard Micro Knurl | PEEK Natural | ea. |
| | **MICROFERRULES AND FEMALE NUTS** | | | | | | |
| | **F-112** | MicroFerrule for 1/32" OD Tubing | 5/16-24 Coned | 5,000 psi (345 bar) | — | PEEK Natural | ea. |
| | **F-132** | MicroFerrule for 1/16" OD Tubing | 5/16-24 Coned | 5,000 psi (345 bar) | — | PEEK Natural | ea. |
| ★ | **F-152** | MicroFerrule for 360 µm OD Tubing | 5/16-24 Coned | 5,000 psi (345 bar) | — | PEEK Natural | ea. |
| | **F-152BLK** | MicroFerrule for 360 µm OD Tubing | 5/16-24 Coned | 5,000 psi (345 bar) | — | PEEK Black | ea. |
| ★ | **F-172** | MicroFerrule for MicroTight Tubing Sleeves | 5/16-24 Coned | 4,000 psi (276 bar) | — | PEEK Black | ea. |
| | **P-116** | MicroFerrule Plug | 5/16-24 Coned | 5,000 psi (345 bar) | — | PEEK Black | ea. |
| ★ | **P-416** | MicroTight Female Nut | 5/16-24 Coned | 4,000–5,000 psi (276–345 bar) | Female Knurl | PEEK Natural | ea. |
| | **P-416BLK** | MicroTight Female Nut | 5/16-24 Coned | 4,000–5,000 psi (276–345 bar) | Female Knurl | PEEK Black | ea. |
| | **P-416G** | MicroTight Female Nut | 5/16-24 Coned | 4,000–5,000 psi (276–345 bar) | Female Knurl | PEEK Green | ea. |

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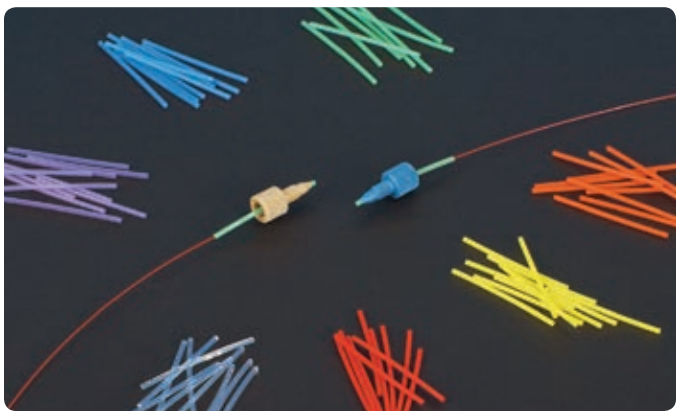
# MicroTight® Tubing Sleeves

- Manufactured from PEEK polymer
- Pressure rated to 4,000 psi (276 bar)
- Color-coded for easy inner diameter identification

Upchurch Scientific® MicroTight Tubing Sleeves feature an outer diameter of 0.025" and offer a wide assortment of inner diameters to help facilitate capillary tubing connections with our MicroTight accessories. Because the sleeves are manufactured from PEEK polymer, they carry an upper temperature threshold of 125 °C.

To use these sleeves properly, choose a sleeve with an inner diameter 0.001"–0.002" (25–50 µm) larger than the outer diameter of your capillary tubing. Then, slip the sleeve over your flow path tubing, such that your tubing extends all the way through the sleeve, but not beyond the end of the sleeve. Choose the correct fitting that corresponds with your receiving port, slide it over the sleeved flow path tubing and connect as normal.



# NanoTight™ Tubing Sleeves

- Manufactured from FEP fluoropolymer
- Pressure rated to 4,000 psi (276 bar)
- Outer diameter of 1/16" — the most popular size used on most instrumentation

Upchurch Scientific NanoTight Tubing Sleeves are manufactured using FEP fluoropolymer and precisely cut to a 1.6" length. A wide assortment of sleeves is available, ensuring the availability of a NanoTight sleeve for most applications. Many of the sleeves feature a light color tint that can help more easily identify the inner diameter for future orders. Because FEP is the base polymer for these sleeves, there is a maximum recommended continuous operating temperature of 50 °C.

Upchurch Scientific NanoTight sleeves were designed primarily for use with the NanoTight fittings, found on page 17 and also work well with the Super Flangeless™ fittings for 1/16" OD tubing on pages 21. For tubing sleeves that can be used effectively with stainless steel fittings and at higher temperatures, consider using the Upchurch Scientific PEEK Tubing Sleeves, found on the next page.

## APPLICATION NOTE

### Why use Sleeves?

Because most capillary tubing connections are made into coned receiving ports, where the port is not designed to be used with capillary tubing directly, special care must be used to ensure a good connection. While custom ferrules can help make these connections, they only offer a fixed-length nose — and because most tubing pockets will vary slightly in length, this can lead to leaking or dead volume.

To help save overall expense while maintaining a concentric connection with minimal dead volume, IDEX Health & Science recommends the use of sleeves. Because sleeves are not permanently attached to a ferrule, they can easily adapt to varying tubing pocket depths. Additionally, because they are manufactured using Upchurch Scientific extruded polymer tubing, you are assured of the concentricity of the resultant connection.

| | Part No. | ID | For Tubing OD Size | Color | Qty. |
|---|---|---|---|---|---|
| **MICROTIGHT PEEK TUBING SLEEVES AND KITS, 0.025" OD** | | | | | |
| | F-180x | 125 µm (0.005") | 70–110 µm | Red | 10-pk |
| | F-181x | 180 µm (0.007") | 125–165 µm | Yellow | 10-pk |
| | F-182x | 230 µm (0.009") | 175–215 µm | Natural | 10-pk |
| | F-183x | 280 µm (0.011") | 225–265 µm | Blue | 10-pk |
| | F-184x | 330 µm (0.013") | 275–315 µm | Orange | 10-pk |
| ★ | F-185x | 395 µm (0.0155") | 340–380 µm | Green | 10-pk |
| | F-186x | 455 µm (0.018") | 400–440 µm | Black | 10-pk |
| | F-187x | 535 µm (0.021") | 480–520 µm | Natural | 10-pk |
| | F-188x | 152 µm (0.006") | 95–135 µm | Purple | 10-pk |
| | 1328 | MicroTight Tubing Sleeve Kit contains (6) each of the sleeve sizes listed above | | | |
| | 1356 | MicroTight Connector Kit Kit contains: a 10-pack of each MicroTight Tubing Sleeve (F-180–F-187); (2) P-770 MicroTight Adapters; and (2) MicroTight P-720 Unions | | | |
| **NANOTIGHT FEP TUBING SLEEVES, 1/16" OD** | | | | | |
| | F-237x | 125 µm (0.005") | 70–110 µm | Red | 10-pk |
| | F-238x | 180 µm (0.007") | 125–165 µm | Yellow | 10-pk |
| | F-239x | 215 µm (0.0085") | 160–200 µm | Natural | 10-pk |
| | F-240x | 280 µm (0.011") | 225–265 µm | Blue | 10-pk |
| | F-241x | 330 µm (0.013") | 275–315 µm | Orange | 10-pk |
| ★ | F-242x | 395 µm (0.0155") | 340–380 µm | Green | 10-pk |
| | F-243x | 455 µm (0.018") | 400–440 µm | Black | 10-pk |
| | F-244x | 535 µm (0.021") | 480–520 µm | Natural | 10-pk |
| | F-245x | 610 µm (0.024") | 555–595 µm | Red | 10-pk |
| | F-246x | 685 µm (0.027") | 630–670 µm | Yellow | 10-pk |
| | F-247x | 840 µm (0.033") | 785–825 µm | Green | 10-pk |
| | F-252x | 1.07 mm (0.042") | 1 mm | Purple | 10-pk |

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## 1/16" OD PEEK Tubing Sleeves

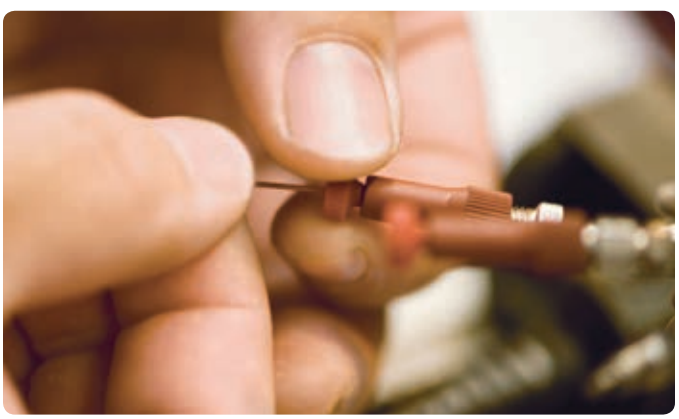
- For connecting capillary tubing to standard 10-32 ports
- Require the use of wrench tightened stainless steel nuts
- Pressure rated to 6,000 psi (414 bar)

Like the NanoTight™ FEP Sleeves on the previous page, these PEEK Tubing Sleeves are designed to be used with 1/16" OD, 10-32 threaded fittings to adapt capillary tubing to standard coned ports. Made of PEEK polymer, these 1.3" long sleeves can be used up to 125 °C.

These sleeves require a wrench tightened nut to achieve proper sealing. We recommend the F-140 Two-Piece Fingertight Fitting (page 15), which includes a PEEK ferrule or the hex-head SealTight™ fittings on page 14. Many researchers also use a stainless steel nut and ferrule with these sleeves, such as our U-400 and U-401 (page 10).

## 1/32" OD PEEK Tubing Sleeves

These 1.6" long Upchurch Scientific® 1/32" OD PEEK Tubing Sleeves can be used with any fitting designed for 1/32" OD tubing when smaller tubing must be connected. Select the appropriate sleeve from the product listing for your capillary tubing OD size. The 1/32" OD PEEK Tubing Sleeves have a maximum recommended temperature of 125 °C and have a pressure rating of 5,000 psi (345 bar).



## 1/32" OD FEP Tubing Sleeves

These 1.6" long sleeves facilitate connecting capillary tubing into ports designed for 1/32" OD tubing. Please refer to the product listing below to select the appropriate sleeve for your capillary OD size. These sleeves can be used at up to 50 °C and have a pressure rating of 1,750 psi (121 bar).

Clockwise, starting at top:

- 1/16" OD PEEK Tubing Sleeves, shown with F-140 Fitting
- 1/32" OD PEEK Tubing Sleeves, shown with F-126H Fitting
- 1/32" OD FEP Tubing Sleeves, shown with F-126S Fitting
- Fittings and tubing only shown to highlight how sleeves are designed to be used; they are not included with the sleeves

### RELATED PRODUCTS

1/32" OD PEEK or FEP Sleeves to connect capillary tubing with the following:

- The F-113 Ferrule and Two-Piece Fingertight Fittings for 10-32 ports (page 15).
- The F-112 and P-416BLK MicroTight (page 18) — 1/32" OD PEEK Tubing Sleeves only.
- The 1/32" OD MicroTight Fittings on ® Fittings
- The Rheodyne® RheFlex M4 Fitting ( page 18.
- MX Module applications; the M-645 Valve page 12) for ®-Compatible
- Fitting (page 11) for Valco Nanovolume ® valve applications.

| Part No. | ID | For Tubing OD Size | Color | Qty. |
|---|---|---|---|---|
| **PEEK TUBING SLEEVES FOR 1/16" OD FITTINGS** | | | | |
| | | 70–110 µm | | |
| | 125 µm (0.005") | 125–165 µm | Red | |
| | 180 µm (0.007") | 175–215 µm | Yellow | |
| **F-225** | 230 µm (0.009") | 225–265 µm | Yellow | ea. |
| **F-226** | 250 µm (0.011") | 275–315 µm | Blue | ea. |
| **F-227** | 330 µm (0.013") | 350–390 µm | Natural | ea. |
| **F-228** | 405 µm (0.016") | 505–545 µm | Orange | ea. |
| **F-229** | 560 µm (0.022") | 730–770 µm | Natural | ea. |
| ★ **F-230** | 785 µm (0.031") | 785–825 µm | Natural | ea. |
| **F-231** | 865 µm (0.034") | 630–670 µm | Blue | ea. |
| **F-232** | 965 µm (0.037") | | Yellow | ea. |
| **F-233** | | 125–165 µm | | ea. |
| **F-234** | 180 µm (0.007") | 150–190 µm | Yellow | ea. |
| | 205 µm (0.008") | | Natural | |
| **F-381x** | 255 µm (0.010") | 200–240 µm | Blue | 10-pk |
| **F-382x** | 380 µm (0.015") | 325–365 µm | Natural | 10-pk |
| **F-384x** | 510 µm (0.020") | 455–495 µm | Orange | 10-pk |
| ★ **F-385x** | 250 µm (0.011") | 225–265 µm | Red | 10-pk |
| **F-386x** | 330 µm (0.013") | 275–315 µm | Black | 10-pk |
| **F-387x** | | | | 10-pk |
| **F-388x** | 280 µm (0.011") | 225–265 µm | Blue | 10-pk |
| | 330 µm (0.013") | 275–315 µm | Orange | |
| **F-374x** | 395 µm (0.0155") | 340–380 µm | Green | 10-pk |
| **F-375x** | | | | 10-pk |
| ★ **F-376x** | | | | 10-pk |

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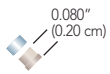
# Super Flangeless™ Fittings

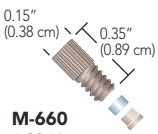
- Highest pressure holding flat-bottom fitting system we offer
- Eliminates loosening of fittings due to tubing twist
- Excellent for Tubing Assemblies
- Holds tight even through vibration

## 6-40 and 6-32 Options (for 1/16" OD Tubing)



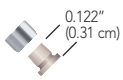

**M-650**
Super Flangeless Ferrule
for 1/16" OD tubing

**M-644-03**
6-40 Nut
shown with M-650 Ferrule
(not included)

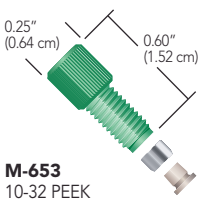



**M-660**
6-32 Nut
shown with M-650 Ferrule
(not included)

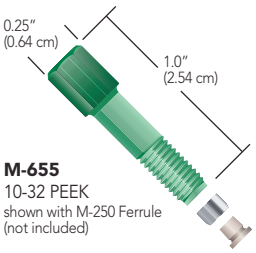
## 10-32 Options (for 1/16" OD Tubing)



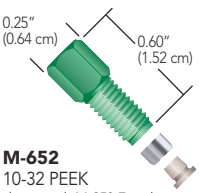

**M-250**
Super Flangeless Ferrule
for 1/16" OD tubing




**M-653**
10-32 PEEK
shown with M-250 Ferrule
(not included)

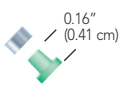



**M-655**
10-32 PEEK
shown with M-250 Ferrule
(not included)

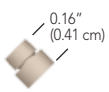



**M-652**
10-32 PEEK
shown with M-250 Ferrule
(not included)

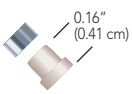
## Ferrules for M6x1, 1/4-28, 5/16-24



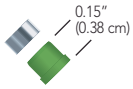

**P-248** for 1/32" OD tubing
**P-250** for 1/16" OD tubing
**P-259** for 1/16" OD tubing



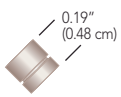

**P-260**
for 1/16" OD tubing



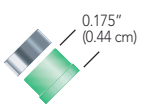

**P-350, P-359**
for 1/8" OD tubing




**P-355** for 1.8 mm OD tubing
**P-366** for 2.5 mm OD tubing
**P-352** for 1/8" OD tubing

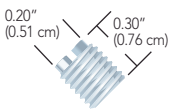



**P-360**
for 1/8" OD tubing

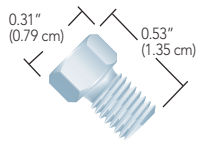



**P-140**
for 3/16" OD tubing

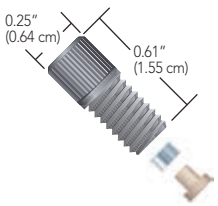
## M6x1, 1/4-28, 5/16-24 Options for 1/32"–3/16" OD Tubing



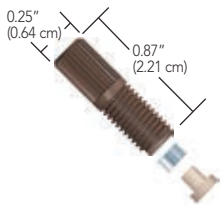

**F-356** (1/4-28, ≤ 1/16" OD Tubing)
**F-364** (1/4-28, > 1/16" OD Tubing)



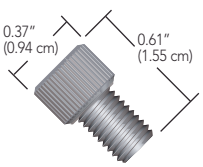

**LT-105** (1/4-28, ≤ 1/16" OD Tubing)
**C-235** (1/4-28, > 1/16" OD Tubing)



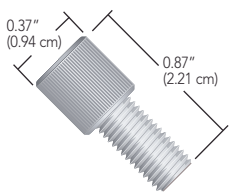

**P-213** (M6X1, ≤ 1/16" OD Tubing)
**P-337** (M6X1, > 1/16" OD Tubing)
**P-232** (1/4-28, ≤ 1/16" OD Tubing)
**P-336** (1/4-28, > 1/16" OD Tubing)



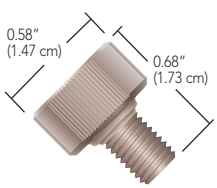

**P-287** (1/4-28, ≤ 1/16" OD Tubing)
**P-387** (1/4-28, > 1/16" OD Tubing)



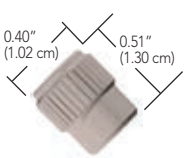

**P-219** (M6X1, ≤ 1/16" OD Tubing)
**P-319** (M6X1, > 1/16" OD Tubing)
**LT-115** (1/4-28, ≤ 1/16" OD Tubing)
**LT-215** (1/4-28, > 1/16" OD Tubing)



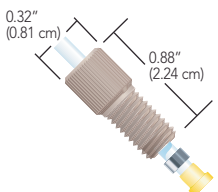

**P-217** (M6X1, ≤ 1/16" OD Tubing)
**P-317** (M6X1, > 1/16" OD Tubing)
**P-246, P-252, P-255, P-281**
(1/4-28, ≤ 1/16" OD Tubing)
**P-331, P-332, P-381**
(1/4-28, > 1/16" OD Tubing)




**LT-210** (1/4-28, > 1/16" OD Tubing)




**P-420** (1/4-28, ≤ 1/16" OD Tubing)
**F-156** (1/4-28, > 1/16" OD Tubing)




**P-141** (5/16-24, ≤ 1/16" OD Tubing)
**P-131** (5/16-24, >1/16"– ≤ 1/8" OD Tubing)
**P-137** (5/16-24, 3/16" OD Tubing)

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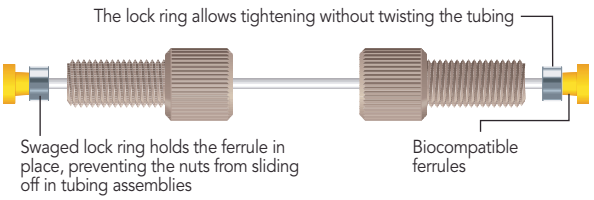
# Super Flangeless™ Tubing OD / Thread Comparison

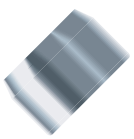
| | 1/32" | 1/16" | 1.8 mm | 2.5 mm | 1/8" | 3/16" |
|---|---|---|---|---|---|---|
| 6-40 | | • | | | | |
| 6-32 | | • | | | | |
| 10-32 | | • | | | | |
| M6x1 | • | • | • | • | • | |
| 1/4-28 | • | • | • | • | • | |
| 5/16-24 | | | | | | • |

## SUPER FLANGELESS FITTINGS SYSTEM




## TIP ASSEMBLY HINT

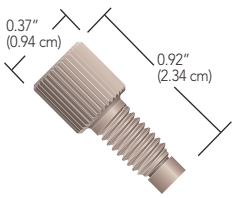
Make sure the locking ring is oriented correctly! The flattened end of the ring should face towards the nut with the narrow end of the ferrule towards the ring.



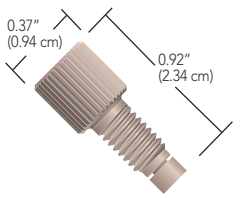
**LT-100-02**
Enlarged to show detail

# New One-Piece Super Flangeless Fittings

- All-PEEK construction
- For 1/16" OD and 1/8" OD tubing
- M6x1 and 1/4-28 options
- Finger tight (2–3 in-lbs / 0.23–0.34 N·m)
- Extremely easy to use
- Reusable one piece design that requires no swaging




**P-329** M6X1, for 1/8" OD Tubing
**P-249** 1/4-28, for 1/16" OD Tubing
**P-349** 1/4-28, for 1/8" OD Tubing




**P-229** M6X1, for 1/16" OD Tubing

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| | Part No. | Description | Port | Pressure Rating | Head Style | Material | Qty. |
|---|---|---|---|---|---|---|---|
| | **SUPER FLANGELESS™ FERRULES FOR 1/32", 1/16", 1/8", 3/16", 1.8MM, 2.0MM, 2.5MM** | | | | | | |
| | **M-250x** | Super Flangeless Ferrule for 1/16" OD Tubing | 10-32 Flat-Bottom | 1,000–5,000 psi (69–345 bar) | — | PEEK Natural/SST | 10-pk |
| ★ | **M-650x** | Super Flangeless Ferrule for 1/16" OD Tubing | 6-32 or 6-40 Flat Bottom | 750–3,750 psi (52–259 bar) | — | PEEK Natural/SST | 10-pk |
| | **P-248x** | Super Flangeless Ferrule for 1/32" OD Tubing | 10-32 Flat-Bottom | 2,500 psi (172 bar) | — | ETFE Green/SST | 10-pk |
| ★ | **P-250x** | Super Flangeless Ferrule for 1/16" OD Tubing | 1/4-28 or M6 Flat Bottom | 2,500 psi (172 bar) | — | PEEK Natural/SST | 10-pk |
| ★ | **P-259x** | Super Flangeless Ferrule for 1/16" OD Tubing | 1/4-28 or M6 Flat Bottom | 1,350 psi (93 bar) | — | ETFE Yellow/SST | 10-pk |
| | **P-260x** | Super Flangeless Ferrule for 1/16" OD Tubing | 1/4-28 or M6 Flat Bottom | 1,850 psi (128 bar) | — | PEEK Natural/SST | 10-pk |
| ★ | **P-350x** | Super Flangeless Ferrule for 1/8" OD Tubing | 1/4-28 Flat Bottom | 2,500 psi (172 bar) | — | PEEK Natural/SST | 10-pk |
| | **P-352x** | Super Flangeless Ferrule for 1/16" OD Tubing | 1/4-28 or M6 Flat Bottom | 2,500 psi (172 bar) | — | PEEK Black/SST | 10-pk |
| | **P-355x** | Super Flangeless Ferrule for 1.8 mm OD Tubing | 1/4-28 or M6 Flat Bottom | 2,500 psi (172 bar) | — | PCTFE Green/SST | 10-pk |
| | **P-357-2x** | Super Flangeless Ferrule for 2.0 mm OD Tubing | M6 Flat Bottom | 5,000 psi (345 bar) | — | PEEK Natural/SST | 10-pk |
| ★ | **P-359x** | Super Flangeless Ferrule for 1/8" OD Tubing | 1/4-28 Flat Bottom | 1,000 psi (69 bar) | — | ETFE Yellow/SST | 10-pk |
| | **P-360x** | Super Flangeless Ferrule for 1/8" OD Tubing | 1/4-28 Flat Bottom | 1,500 psi (102 bar) | — | PEEK Natural/SST | 10-pk |
| NEW! | **P-366x** | Super Flangeless Ferrule for 2.5" OD Tubing | 1/4-28 Flat Bottom | 1,000 psi (69 bar) | — | PEEK Natural/SST | 10-pk |
| | **P-140x** | Super Flangeless Ferrule for 3/16" OD Tubing | 5/16-24 Flat Bottom | 500 psi (34 bar) | — | ETFE Green/SST | 10-pk |
| | **6-40 AND 6-32 FITTINGS FOR 1/16" OD TUBING** | | | | | | |
| | **M-660x** | Super Flangeless Nut for 1/16" OD Tubing | 6-32 Flat Bottom | 750–3,750 psi (52–259 bar) | Micro Headless | PEEK Natural | 10-pk |
| ★ | **M-644-03x** | Super Flangeless Nut for 1/16" OD Tubing | 6-40 Flat Bottom | 750–3,750 psi (52–259 bar) | Micro Headless | PEEK Green | 10-pk |
| | **10-32 FITTINGS FOR 1/16" OD TUBING** | | | | | | |
| | **M-652x** | Super Flangeless Nut for 1/16" OD Tubing | 10-32 Flat Bottom | 1,000–5,000 psi (69–345 bar) | 1/4" Hex | PEEK Green | 10-pk |
| | **M-653x** | Super Flangeless Nut for 1/16" OD Tubing | 10-32 Flat Bottom | 1,000–5,000 psi (69–345 bar) | Headless Knurl | PEEK Green | 10-pk |
| | **M-655x** | Super Flangeless Nut for 1/16" OD Tubing, Long | 10-32 Flat Bottom | 1,000–5,000 psi (69–345 bar) | 1/4" Hex | PEEK Green | 10-pk |
| | **M6X1 FITTINGS FOR 1/16" AND 1/32" OD TUBING** | | | | | | |
| | **P-213** | Super Flangeless Nut for 1/16" or 1/32" OD Tubing, Short | M6 Flat Bottom | * | Headless Knurl | PEEK Black | ea. |
| | **P-217** | Super Flangeless Nut for 1/16" or 1/32" OD Tubing | M6 Flat Bottom | * | Standard Knurl | PPS Black | ea. |
| | **P-219** | Super Flangeless Nut for 1/16" or 1/32" OD Tubing, Short | M6 Flat Bottom | * | Standard Knurl | PEEK Black | ea. |
| | **M6X1 FITTINGS FOR 1.8 MM, 20. MM, 2.5 MM, 1/8" OD TUBING** | | | | | | |
| | **P-317** | Super Flangeless For >1/16"–≤ 1/8" OD Tubing | M6 Flat Bottom | * | Standard Knurl | PPS Black | ea |
| | **P-319** | Super Flangeless Nut for 1/8" OD Tubing, Short | M6 Flat Bottom | * | Standard Knurl | PEEK Black | ea. |
| | **P-337x** | Super Flangeless For >1/16"–≤ 1/8" OD Tubing, Short | M6 Flat Bottom | * | Headless Knurl | PEEK Black | 10-pk |
| | **P-357x** | Super Flangeless Fitting for 2.0 mm OD Tubing | M6 Flat Bottom | * | Standard Knurl | PEEK Black, Natural/SST | 10-pk |
| | **1/4-28 FITTINGS FOR 1/16" AND 1/32" OD TUBING** | | | | | | |
| | **F-356x** | Super Flangeless Nut for 1/16" or 1/32" OD Tubing, FlushNut | 1/4-28 Flat Bottom | * | FlushNut | SST | 10-pk |
| | **LT-105x** | Super Flangeless Nut for 1/16" or 1/32" OD Tubing, Short | 1/4-28 Flat Bottom | * | 1/4" Hex | SST | 10-pk |
| ★ | **LT-115x** | Super Flangeless Nut for 1/16" or 1/32" OD Tubing, Short | 1/4-28 Flat Bottom | * | Standard Knurl | PEEK Natural | 10-pk |
| ★ | **P-232** | Super Flangeless Nut for 1/16" or 1/32" OD Tubing, Short | 1/4-28 Flat Bottom | * | Headless Knurl | PEEK Natural | ea. |
| | **P-246x** | Super Flangeless Nut for 1/16" or 1/32" OD Tubing | 1/4-28 Flat Bottom | * | Standard Knurl | PFA Natural | 10-pk |
| | **P-252x** | Super Flangeless Nut for 1/16" or 1/32" OD Tubing | 1/4-28 Flat Bottom | * | Standard Knurl | Delrin® Gray | 10-pk |
| ★ | **P-255x** | Super Flangeless Nut for 1/16" or 1/32" OD Tubing | 1/4-28 Flat Bottom | * | Standard Knurl | PEEK Natural | 10-pk |
| | **P-281** | Super Flangeless Nut for 1/16" or 1/32" OD Tubing | 1/4-28 Flat Bottom | * | Standard Knurl | PPS Natural | ea. |
| | **P-287** | Super Flangeless Nut for 1/16" or 1/32" OD Tubing | 1/4-28 Flat Bottom | * | Headless Knurl | PPS Natural | ea. |
| | **P-420** | Super Flangeless Nut for 1/16" or 1/32" OD Tubing, Female | 1/4-28 Flat Bottom | * | Female Knurl | PEEK Natural | ea. |
| | **1/4-28 FITTINGS FOR 1.8MM, 2.5 MM, 1/8" OD TUBING** | | | | | | |
| | **C-235x** | Super Flangeless Nut for 1/8" OD Tubing | 1/4-28 Flat Bottom | * | 1/4" Hex | SST | 10-pk |
| | **F-156** | Super Flangeless Nut for 1/8" OD Tubing, Female | 1/4-28 Flat Bottom | * | Female Knurl | PEEK Black | ea. |
| | **F-364x** | Super Flangeless Nut for 1/8" OD Tubing, FlushNut™ | 1/4-28 Flat Bottom | * | FlushNut | SST | 10-pk |
| | **LT-210x** | Super Flangeless Nut for 1/8" OD Tubing | 1/4-28 Flat Bottom | * | Double Wings | PEEK Natural | 10-pk |
| | **LT-215x** | Super Flangeless Nut for 1/8" OD Tubing, Short | 1/4-28 Flat Bottom | * | Standard Knurl | PEEK Natural | 10-pk |
| ★ | **P-331** | Super Flangeless Nut for 1/8" OD Tubing | 1/4-28 Flat Bottom | * | Standard Knurl | PEEK Natural | ea. |
| | **P-332x** | Super Flangeless Nut for 1/8" OD Tubing | 1/4-28 Flat Bottom | * | Standard Knurl | Delrin Black | 10-pk |
| ★ | **P-336** | Super Flangeless Nut for 1/8" OD Tubing, Short | 1/4-28 Flat Bottom | * | Headless Knurl | PEEK Natural | ea. |
| ★ | **P-381** | Super Flangeless Nut for 1/8" OD Tubing | 1/4-28 Flat Bottom | * | Standard Knurl | PPS Natural | ea. |
| | **P-387** | Super Flangeless Nut for 1/8" OD Tubing | 1/4-28 Flat Bottom | * | Standard Knurl | PPS Natural | ea. |
| | **5/16-24 FITTINGS FOR 1/16", 1/8", 3/16" OD TUBING** | | | | | | |
| NEW! | **P-131x** | Super Flangeless Fitting for 1/8" OD Tubing | 5/16-24 Flat Bottom | * | Standard Knurl | PEEK Natural | 10-pk |
| NEW! | **P-137x** | Super Flangeless Fitting for 3/16" OD Tubing | 5/16-24 Flat Bottom | * | Standard Knurl | PEEK Black | 10-pk |
| NEW! | **P-141x** | Super Flangeless Fitting for 1/16" OD Tubing | 5/16-24 Flat Bottom | * | Standard Knurl | PEEK Natural | 10-pk |
| | **ONE-PIECE SUPER FLANGELESS FITTINGS FOR 1/16" AND 1/8" OD TUBING** | | | | | | |
| NEW! | **P-229x** | One Piece Super Flangeless Fitting for 1/16" OD Tubing | M6 Flat Bottom | 1,000 psi (69 bar) | Standard Knurl | PEEK | 10-pk |
| NEW! | **P-249x** | One Piece Super Flangeless Fitting for 1/16" OD Tubing | 1/4-28 Flat Bottom | 1,000 psi (69 bar) | Standard Knurl | PEEK | 10-pk |
| NEW! | **P-329x** | One Piece Super Flangeless Fitting for 1/16" OD Tubing | M6 Flat Bottom | 1,000 psi (69 bar) | Standard Knurl | PEEK | 10-pk |
| NEW! | **P-349x** | One Piece Super Flangeless Fitting for 1/16" OD Tubing | 1/4-28 Flat Bottom | 1,000 psi (69 bar) | Standard Knurl | PEEK | 10-pk |

** Pressure rating of nut depends on the ferrule used.*

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# Flangeless Fittings

Upchurch Scientific® Flangeless Fittings eliminate the need to flange tubing. This removable and reusable system provides several benefits:

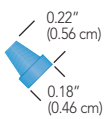
**Convenience:** Flangeless Fittings are easy to use. Just slip the nut and ferrule over the tubing and finger tighten the assembly into your receiving port. In tests, it is shown that the ideal amount of torque to achieve expected part performance should be approximately 3–4 in-lbs (0.34–0.45 N·m). Check out the line of special tightening tools designed to adapt to many standard torque wrenches, on page 33 and the adjustable torque driver, VHP-4000 on page 8.

**Minimal Down-Time:** Component replacement is quick, taking only a few seconds — unlike the significant time required to flange tubing.

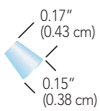
**Cost-Effectiveness:** Repairing a flanged tubing assembly requires a costly flanging tool or the purchase of a complete replacement assembly, including a new length of tubing and a set of fittings. The Flangeless Fittings system typically requires only one new ferrule at minimal cost when repairing a connection.

The 1/4-28 and M6 Flangeless Fittings for 1/16", 1/8", and metric sized OD tubing are summarized on the following page and listed on pages 25–27.

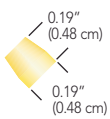
### Ferrules



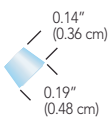

**Standard 1/16"**
P-200 P-200N



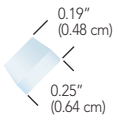

**Small Valve 1/16"**
P-240




**Standard 1/8" and Metric Ferrules**
P-300 P-300N P-342
P-353 P-363R P-343



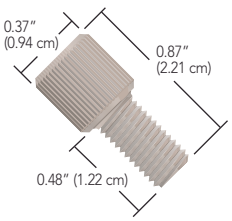

**Small Valve 1/8"**
P-340



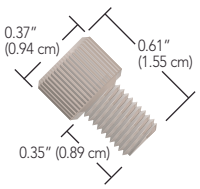

**Standard 4.0 mm**
P-344

## Dimensions for 1/4-28 Flangeless Fittings (pages 24–27)

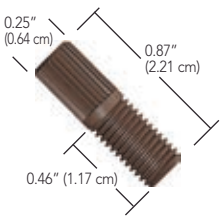
### Nuts



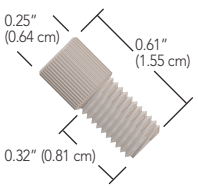

**Standard**
XP-201 XP-301–XP-305
XP-202 XP-330
XP-220
XP-230
XP-238
XP-245



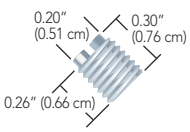

**Short**
XP-218 P-207S
XP-235 P-247
XP-308 P-307S
XP-335 P-347



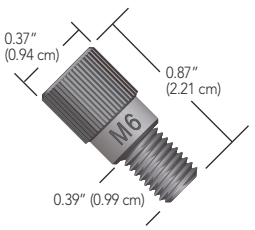

**Headless**
XP-286 XP-386




**Short Headless**
XP-283




**FlushNut™**
XF-358 XF-368

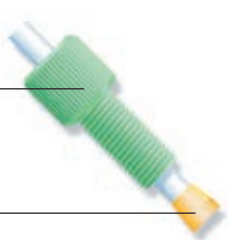



**Standard Metric**
P-207 P-307

## TIP THE CONVENIENCE OF FLANGELESS FITTINGS

Our Flangeless Nuts provide fingertight convenience — no wrenches required.

Our Flangeless Ferrules provide a leak-proof seal. There is no need to spend time flanging tubing.



## RELATED PRODUCTS

- For the Large Bore Flangeless Fittings, please refer to page 30.

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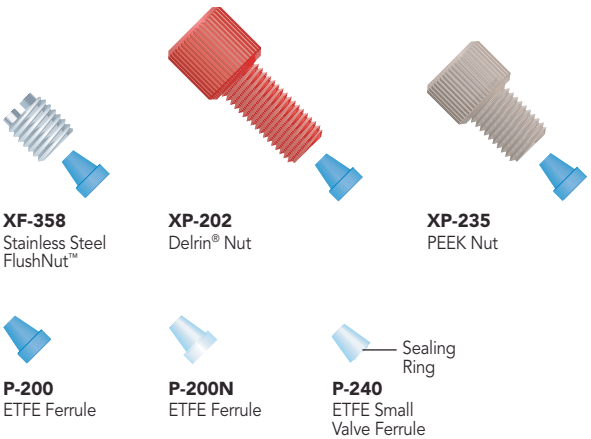
# Flangeless Fittings for 1/16" OD Tubing

- Wide variety of materials and geometries to fit most applications
- Fittings and ferrules packaged together for easy ordering convenience

The Upchurch Scientific® Flangeless Fittings are excellent replacements for flanged fittings. Flangeless Fittings are dependable, easy to use and easy to replace.

Additionally, all fittings on this page come pre-packaged with appropriate ferrules (1/4-28 threaded fittings are packaged with P-200 ferrules; however, the XLT-111 — a 10-32 threaded fitting — is packaged with P-240 ferrules). Nuts are available in a wide variety of materials, and replacement ferrules are available in ETFE and polypropylene. The designs of many small, low pressure valves incorporate many shallow ports. The P-240 ferrule is designed to seal tightly in such ports and the special sealing rign on this ferrule helps ensure a minimum dead-volume seal between the tubing, ferrule, and port. (Please refer to our website, www.idex-hs.com for polymer chemical compatibility information.)

For higher pressure and temperature applications where a Flangeless connection is desired, consider the Flangeless SealTight™ Fitting System. Both fitting and ferrule are manufactured from PEEK polymer; additionally, the ferrule has been specially engineered to incorporate the dual-compression mechanism of the F-192 SealTight ferrule in a design that allows its use in a 1/4-28 flat-bottom port.




Please see page 24 for the dimensions of the products on this page.

*Please Note: The nuts can be ordered separately — simply remove the preceding "X" from the part number to reference the nut separate from the pre-packaged ferrules.*

| | Part No. | Description | Port | Pressure Rating | Head Style | Material | Qty. |
|---|---|---|---|---|---|---|---|
| | **FLANGELESS FITTINGS (INCLUDES P-200 FERRULES)** | | | | | | |
| | **XF-358x** | Flangeless Fitting for 1/16" OD Tubing, FlushNut | 1/4-28 Flat-Bottom | 2,000 psi (138 bar) | FlushNut | SST/ETFE Blue | 10-pk |
| | **XLT-111x** | Flangeless Fitting for 1/16" OD Tubing | 10-32 Flat-Bottom | 2,500 psi (172 bar) | Standard Knurl | PEEK Natural/ETFE Natural | 10-pk |
| ★ | **XP-201x** | Flangeless Fitting for 1/16" OD Tubing | 1/4-28 Flat-Bottom | 2,000 psi (138 bar) | Standard Knurl | Delrin Black/ETFE Blue | 10-pk |
| | **XP-202x** | Flangeless Fitting for 1/16" OD Tubing | 1/4-28 Flat-Bottom | 2,000 psi (138 bar) | Standard Knurl | Delrin Red/ETFE Blue | 10-pk |
| ★ | **XP-218x** | Flangeless Fitting for 1/16" OD Tubing | 1/4-28 Flat-Bottom | 2,000 psi (138 bar) | Standard Knurl | ETFE Natural/ETFE Blue | 10-pk |
| | **XP-230x** | Flangeless Fitting for 1/16" OD Tubing | 1/4-28 Flat-Bottom | 2,000 psi (138 bar) | Standard Knurl | PEEK Natural/ETFE Blue | 10-pk |
| ★ | **XP-235x** | Flangeless Fitting for 1/16" OD Tubing, Short | 1/4-28 Flat-Bottom | 2,000 psi (138 bar) | Standard Knurl | PEEK Natural/ETFE Blue | 10-pk |
| | **XP-238x** | Flangeless Fitting for 1/16" OD Tubing | 1/4-28 Flat-Bottom | 2,000 psi (138 bar) | Standard Knurl | Delrin Purple/ETFE Blue | 10-pk |
| | **XP-245x** | Flangeless Fitting for 1/16" OD Tubing | 1/4-28 Flat-Bottom | 2,000 psi (138 bar) | Standard Knurl | PFA Natural/ETFE Blue | 10-pk |
| ★ | **XP-286x** | Flangeless Fitting for 1/16" OD Tubing | 1/4-28 Flat-Bottom | 2,000 psi (138 bar) | Headless Knurl | PPS Natural/ETFE Blue | 10-pk |
| | **REPLACEMENT FERRULES** | | | | | | |
| ★ | **P-200x** | Flangeless Ferrule for 1/16" OD Tubing | 1/4-28 Flat-Bottom | 2,000 psi (138 bar) | — | ETFE Blue | 10-pk |
| ★ | **P-200Nx** | Flangeless Ferrule for 1/16" OD Tubing | 1/4-28 Flat-Bottom | 2,000 psi (138 bar) | — | ETFE Natural | 10-pk |
| | **P-240x** | Flangeless Ferrule for 1/16" OD Tubing, Small Valve | 1/4-28 or 10-32 Flat-Bottom | 2,500 psi (172 bar) | — | ETFE Natural | 10-pk |

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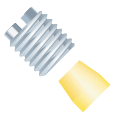
# Flangeless Fittings for 1/8" OD Tubing

- Wide variety of materials and geometries to fit most applications
- Fittings and ferrules packaged together for easy ordering convenience

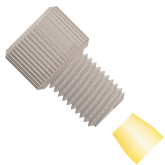
Upchurch Scientific® Flangeless Fittings for 1/8" OD tubing feature a wide assortment of nut geometries and materials from which to choose. Fittings shown on this page come in convenient 10-packs and also include P-300 Flangeless Ferrules. (The nuts can be ordered separately — simply remove the preceding "X" from the part number to reference the nut separate from the pre-packaged ferrules.)

All nuts on this page have 1/4-28 threads.



**XF-368**
Stainless Steel FlushNut™

**XP-305**
Delrin® Nut



**XP-335**
PEEK Nut

**XP-386**
PPS Nut

**P-312**
Lock Nut White Delrin



**P-300**
ETFE Ferrule

**P-300N**
ETFE Ferrule

**P-340**
ETFE Small Valve Ferrule

## Lock Nut

The P-312 Lock Nut is for use with any 1/4-28 male Flangeless Fitting. Use this product in applications where vibrations can loosen fittings.

**To Use:** Thread the lock nut onto the male fitting. When the male fitting is firmly seated into the receiving port, tighten the lock nut down against the receiving port to securely hold the male fitting in place.

## NOTE

- The P-340 ferrule is designed for use with shallow receiving ports, such as those used on some low pressure valves.
- The XF-368 FlushNut is an excellent choice for applications where port-to-port spacing is limited; see page 31 for more information on this innovative product line. As an alternative, consider one of the "headless" fittings shown on this page.

Please see page 24 for the dimensions of the products on this page.

## RELATED PRODUCTS

- Nuts for M6 threaded ports are on page 27; nuts for 5/16-24 threaded ports are on page 30.

| | Part No. | Description | Port | Pressure Rating | Head Style | Material | Qty. |
|---|---|---|---|---|---|---|---|
| | **FLANGELESS FITTINGS (INCLUDES P-300 FERRULES)** | | | | | | |
| | **XF-368x** | Flangeless Fitting for 1/8" OD Tubing, FlushNut | 1/4-28 Flat-Bottom | 500 psi (34 bar) | FlushNut | SST/ETFE Yellow | 10-pk |
| ★ | **XP-301x** | Flangeless Fitting for 1/8" OD Tubing | 1/4-28 Flat-Bottom | 500 psi (34 bar) | Standard Knurl | Delrin Black/ETFE Yellow | 10-pk |
| | **XP-302x** | Flangeless Fitting for 1/8" OD Tubing | 1/4-28 Flat-Bottom | 500 psi (34 bar) | Standard Knurl | Delrin Red/ETFE Yellow | 10-pk |
| | **XP-305x** | Flangeless Fitting for 1/8" OD Tubing | 1/4-28 Flat-Bottom | 500 psi (34 bar) | Standard Knurl | Delrin Green/ETFE Yellow | 10-pk |
| ★ | **XP-308x** | Flangeless Fitting for 1/8" OD Tubing, Short | 1/4-28 Flat-Bottom | 500 psi (34 bar) | Standard Knurl | Delrin Black/ETFE Yellow | 10-pk |
| | **XP-315x** | Flangeless Fitting for 1/8" OD Tubing | 1/4-28 Flat-Bottom | 500 psi (34 bar) | Standard Knurl | ETFE Natural/ETFE Yellow | 10-pk |
| ★ | **XP-330x** | Flangeless Fitting for 1/8" OD Tubing | 1/4-28 Flat-Bottom | 500 psi (34 bar) | Standard Knurl | PEEK Natural/ETFE Yellow | 10-pk |
| ★ | **XP-335x** | Flangeless Fitting for 1/8" OD Tubing, Short | 1/4-28 Flat-Bottom | 500 psi (34 bar) | Standard Knurl | PEEK Natural/ETFE Yellow | 10-pk |
| ★ | **XP-386x** | Flangeless Fitting for 1/8" OD Tubing | 1/4-28 Flat-Bottom | 500 psi (34 bar) | Headless Knurl | PPS Natural/ETFE Yellow | 10-pk |
| | **REPLACEMENT FERRULES** | | | | | | |
| ★ | **P-300x** | Flangeless Ferrule for 1/8" OD Tubing | 1/4-28 Flat-Bottom | 500 psi (34 bar) | — | ETFE Yellow | 10-pk |
| ★ | **P-300Nx** | Flangeless Ferrule for 1/8" OD Tubing | 1/4-28 Flat-Bottom | 500 psi (34 bar) | — | ETFE Natural | 10-pk |
| ★ | **P-340x** | Flangeless Ferrule for 1/8" OD Tubing, Small Valve | 1/4-28 Flat-Bottom | 500 psi (34 bar) | — | ETFE Natural | 10-pk |
| | **P-312x** | Lock Nut for Flangeless Nuts | 1/4-28 Flat-Bottom | — | — | Delrin White | 10-pk |

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# Metric Flangeless Fittings

- For 1/16", 1.8 mm, 2.0 mm, 2.5 mm, 3.0 mm, 4.0 mm, or 1/8" OD tubing
- Convenience of flangeless fittings for metric tubing sizes and M6 flat-bottom ports

Upchurch Scientific® Metric Flangeless Ferrules are designed to connect 1.8, 2.0, 2.5, 3.0, or 4.0 mm OD tubing to flat-bottom ports when paired with the appropriate M6, 1/4-28, or 5/16-24 Flangeless Nuts. We also offer M6-threaded nuts to connect 1/16" or 1/8" OD tubing, plus a tubing sleeve to facilitate 1.0 mm OD tubing connections. Please refer to the "Metric Connections" chart on this page for information regarding which nuts and ferrules to use with your tubing.

**P-342**
ETFE Ferrule
for 1.8 OD tubing

**P-363R**
ETFE Ferrule
for 2.0 mm OD tubing

**P-353**
ETFE Ferrule
for 2.5 mm OD tubing

**P-343**
ETFE Ferrule
for 3.0 mm OD tubing



**P-344**
ETFE Ferrule
for 4.0 mm OD tubing

**P-207**
Delrin® Nut
for 1/16" OD tubing

**P-347**
PEEK Nut
for 1.8, 2.0, 3.0 mm or 1/8" OD tubing

Please see page 24 for the dimensions of the products on this page.

## TIP METRIC CONNECTIONS

Use this chart to determine the low pressure fittings needed to connect metric and English-sized tubing into the indicated ports.

| Tubing Size | Port | Ferrules | Nuts |
|---|---|---|---|
| **1.0 mm** | M6<br>1/4-28 | P-200 (w/F-252 sleeve, not included)<br>P-200 (w/F-252 sleeve, not included) | P-207, P-207S, P-247<br>Any 1/4-28 nut from page 25[1] |
| **1.8 mm** | M6<br>1/4-28 | P-342<br>P-342 | P-307, P-307S, P-347<br>Any nut from page 26[1] |
| **2.0 mm** | M6<br>1/4-28 | P-363R<br>P-363R | P-307, P-307S, P-347<br>Any nut from page 26 |
| **2.5 mm** | M6<br>1/4-28 | P-353<br>P-353 | P-307, P-307S, P-347<br>Any nut from page 26[1] |
| **3.0 mm** | M6<br>1/4-28 | P-343<br>P-343 | P-307, P-307S, P-347<br>Any nut from page 26[1] |
| **4.0 mm** | 5/16-24 | P-344 | XP-132x from page 30 |
| **1/16"** | M6<br>M6 | P-200<br>P-840 | P-207, P-207S, P-247, P-931, page 28 |
| **1/8"** | M6<br>M6 | P-300<br>P-940 | P-307, P-307S, P-347, P-945, page 28 |

[1] *To order 1/4-28 threaded Flangeless Nuts separately from the Flangeless Ferrules, simply remove the preceding "X" from the appropriate part number — for example, order P-301x instead of XP-301x.*

## RELATED PRODUCTS

### More Metric–Sized Products

| | Page |
|---|---|
| **High Pressure Polymer Fittings** | 9, 12 |
| **High Pressure Stainless Steel Fittings** | 10 |
| **Luer Adapters** | 56 |
| **Metric Threaded Adapters** | 51 |
| **External NPT Adapters** | 52 |
| **VacuTight™ Fittings** | 28 |
| **Plugs and Caps** | 172 |
| **Low Pressure Unions** | 40 |
| **Bulkhead Unions** | 41 |
| **PEEK (1.8 mm OD and Capillary) and Fused Silica Tubing** | 65 |
| **PEEKsil™ Tubing** | 66 |
| **FEP Tubing (1.0–4.0 mm OD) and PFA Capillary Tubing** | 71 |
| **Frit-In-A-Ferrule™** | 166 |

*In addition, many of our 1/4-28 threaded Filters, Valves and Flow Control Accessories can be converted to accept 1.8, 2.0, 2.5 and 3.0 mm tubing, using the ferrules listed for 1/4-28 ports in the "Metric Connections" table, this page.*

| | Part No. | Description | Port | Pressure Rating | Head Style | Material | Qty. |
|---|---|---|---|---|---|---|---|
| | **METRIC FLANGELESS NUTS** | | | | | | |
| | **P-207x** | Flangeless Nut for 1/16" OD Tubing | M6 Flat-Bottom | 2,000 psi (138 bar) | Standard Knurl | Delrin Black | 10-pk |
| | **P-207Sx** | Flangeless Nut for 1/16" OD Tubing, Short | M6 Flat-Bottom | 2,000 psi (138 bar) | Standard Knurl | Delrin Black | 10-pk |
| | **P-247x** | Flangeless Nut for 1/16" OD Tubing, Short | M6 Flat-Bottom | 2,000 psi (138 bar) | Standard Knurl | PEEK Black | 10-pk |
| | **P-307x** | Flangeless Nut for 1.8 mm, 2.0 mm, 3.0 mm, 1/8" OD Tubing | M6 Flat-Bottom | 500 psi (34 bar) | Standard Knurl | Delrin Black | 10-pk |
| | **P-307Sx** | Flangeless Nut for 1.8 mm, 2.0 mm, 3.0 mm, 1/8" OD Tubing | M6 Flat-Bottom | 500 psi (34 bar) | Standard Knurl | Delrin Black | 10-pk |
| | **P-347x** | Flangeless Nut for 1.8 mm, 2.0 mm, 3.0 mm, 1/8" OD Tubing | M6 Flat-Bottom | 500 psi (34 bar) | Standard Knurl | PEEK Black | 10-pk |
| | **FLANGELESS FERRULES** | | | | | | |
| | **F-252x** | 1/16" OD Tubing Sleeve for 1.0 mm ID Tubing | M6 or 1/4-28 Flat-Bottom | 500 psi (34 bar) | — | FEP Purple | 10-pk |
| ★ | **P-200x** | Flangeless Ferrule for 1/16" OD Tubing | M6 or 1/4-28 Flat-Bottom | 2,000 psi (138 bar) | — | ETFE Blue | 10-pk |
| ★ | **P-300x** | Flangeless Ferrule for 1/8" OD Tubing | M6 or 1/4-28 Flat-Bottom | 500 psi (34 bar) | — | ETFE Yellow | 10-pk |
| ★ | **P-342x** | Flangeless Ferrule for 1.8 mm OD Tubing | M6 or 1/4-28 Flat-Bottom | 500 psi (34 bar) | — | ETFE Green | 10-pk |
| | **P-343x** | Flangeless Ferrule for 3.0 mm OD Tubing | M6 or 1/4-28 Flat-Bottom | 500 psi (34 bar) | — | ETFE Orange | 10-pk |
| NEW! | **P-344x** | Flangeless Ferrule for 4.0 mm OD Tubing | 5/16-24 | 250 psi (17 bar) | — | ETFE Natural | 10-pk |
| | **P-353x** | Flangeless Ferrule for 2.5 mm OD Tubing | M6 or 1/4-28 Flat-Bottom | 500 psi (34 bar) | — | ETFE Natural | 10-pk |
| | **P-363Rx** | Flangeless Ferrule for 2.0 mm OD Tubing | M6 or 1/4-28 Flat-Bottom | 500 psi (34 bar) | — | ETFE Red | 10-pk |

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# VacuTight™ Fittings

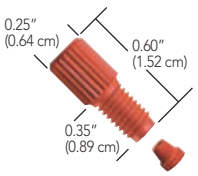
- For 1/16" or 1/8" OD tubing connections into 10-32, 1/4-28, or M6 flat-bottom ports
- Vacuum Rated to 25 in-Hg (84 kPa)
- Improve transfer volume consistency

Upchurch Scientific® VacuTight Fittings are designed to provide airtight, dependable connections under vacuum and low pressure conditions. Many of the VacuTight Nuts have streamlined profiles for use in systems requiring a large number of connections in a small area. Furthermore, the VacuTight Ferrule's small size ensures sufficient nut/thread engagement, even in shallow ports. These features make VacuTight Fittings ideal for "combichem" high throughput screening, clinical diagnostic, and other automated liquid handling applications.

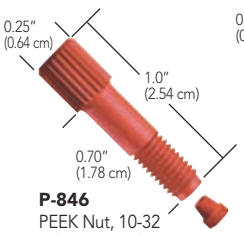
The configuration of the VacuTight flat-bottom ferrules prevents overcompression and tubing ID reduction that can occur with many coned fittings. The result is more consistent aspirating and dispensing volumes across all system connections.

The VacuTight fittings can also work well in some positive pressure applications. The pressure range for each fitting is listed below and depends upon the tubing used for the connection. Please contact your distributor or IDEX Health & Science for more information. Additionally, please note that some of the VacuTight fittings have changed in color from red to black; however, this color change does not affect product performance.

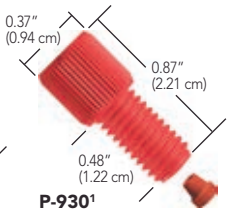
All VacuTight Nuts must be used exclusively with VacuTight Ferrules.



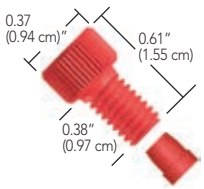

**P-844**
PEEK Nut, 10-32
with P-840 Ferrule



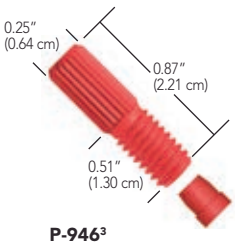

**P-846**
PEEK Nut, 10-32
with P-840 Ferrule




**P-930**[1]
Delrin® Nut, 1/4-28
with P-840 Ferrule




**P-945**[2]
Delrin Nut, M6
with P-940 Ferrule




**P-946**[3]
Delrin Nut, 1/4-28
with P-940 Ferrule

[1] *The dimensions shown apply to P-930, P-931, P-938, P-942, and P-948.*
[2] *The dimensions shown apply to P-945.*
[3] *The dimensions shown apply to P-946.*

| | Part No. | Description | Port | Pressure Rating | Head Style | Material | Qty. |
|---|---|---|---|---|---|---|---|
| | **VACUTIGHT FITTINGS (INCLUDES P-840 OR P-940 FERRULES)** | | | | | | |
| ★ | **P-842x** | VacuTight Fitting for 1/16" OD Tubing, Short | 10-32 Flat-Bottom | 400–800 psi (27–55 bar) | 1/4" Hex | PEEK Red | 10-pk |
| ★ | **P-844x** | VacuTight Fitting for 1/16" OD Tubing, Short | 10-32 Flat-Bottom | 400–800 psi (27–55 bar) | Headless Knurl | PEEK Red | 10-pk |
| | **P-846x** | VacuTight Fitting for 1/16" OD Tubing, Long | 10-32 Flat-Bottom | 400–800 psi (27–55 bar) | Headless Knurl | PEEK Red | 10-pk |
| | **P-930x** | VacuTight Fitting for 1/16" OD Tubing | 1/4-28 Flat-Bottom | 400–800 psi (27–55 bar) | Standard Knurl | Delrin Red | 10-pk |
| | **P-931x** | VacuTight Fitting for 1/16" OD Tubing | M6 Flat-Bottom | 400–800 psi (27–55 bar) | Standard Knurl | Delrin Red | 10-pk |
| | **P-938x** | VacuTight Fitting for 1/16" OD Tubing | 1/4-28 Flat-Bottom | 400–800 psi (27–55 bar) | Standard Knurl | PEEK Natural | 10-pk |
| | **P-942x** | VacuTight Fitting for 1/8" OD Tubing | 1/4-28 Flat-Bottom | 500–1,000 psi (34–69 bar) | Standard Knurl | Delrin Red | 10-pk |
| | **P-945x** | VacuTight Fitting for 1/8" OD Tubing, Short | M6 Flat-Bottom | 500–1,000 psi (34–69 bar) | Standard Knurl | Delrin Red | 10-pk |
| | **P-946x** | VacuTight Fitting for 1/8" OD Tubing | 1/4-28 Flat-Bottom | 500–1,000 psi (34–69 bar) | Headless Knurl | Delrin Red | 10-pk |
| | **P-948x** | VacuTight Fitting for 1/8" OD Tubing | 1/4-28 Flat-Bottom | 500–1,000 psi (34–69 bar) | Standard Knurl | PEEK Natural | 10-pk |
| | **REPLACEMENT FERRULES** | | | | | | |
| | **P-840x** | VacuTight Ferrule for 1/16" OD Tubing | M6 or 1/4-28 Flat-Bottom | 400–800 psi (27–55 bar) | — | ETFE Red | 10-pk |
| ★ | **P-940x** | VacuTight Ferrule for 1/8" OD Tubing | M6 or 1/4-28 Flat-Bottom | 500–1,000 psi (34–69 bar) | — | ETFE Red | 10-pk |

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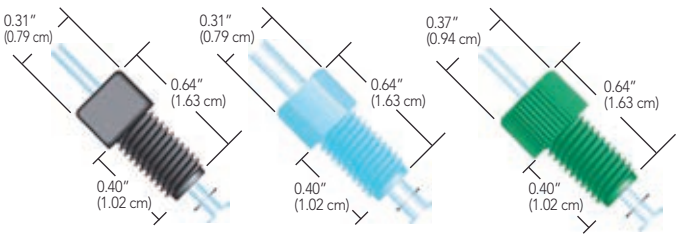
# Flanged Fittings

- Fittings for 1/16" or 1/8" OD tubing, supplied with nut and 316 stainless steel washer
- Multiple head styles and materials available
- For 1/4-28 and M6 flat-bottom ports
- All head styles, square, hex, and knurl are available in the following colors: black, red, white, green, and blue

Upchurch Scientific® Flanged Fittings are compatible with most standard 1/4-28 or M6 Flat-Bottom flanged fittings. The hard, inert Delrin® (acetal resin) nut resists cross threading or loosening during use, while the ETFE nuts work well in chemically aggressive environments.




**P-401**[1]
Flanged Fitting
for 1/16" OD tubing*

**P-580B**[2]
Flanged Fitting
for 1/8" OD tubing*

**P-482G**[3]
Flanged Fitting
for 1/16" OD tubing*

*1 The dimensions shown apply to all square-head Flanged Fittings*
*2 The dimensions shown apply to all hex-head Flanged Fittings*
*3 The dimensions shown apply to all knurled-head Flanged Fittings*
** Flanged tubing not included*

## RELATED PRODUCTS

- For an alternative to flanging tubing, we highly recommend the Flangeless Fittings found on pages 24–27, the Super Flangeless™ Fittings found on pages 21–23, or the VacuTight™ Fittings on page 28.

| Part No. | Description | Port Geometry | Head Style | Material (Nut/Washer) | Qty. |
|---|---|---|---|---|---|
| **FLANGED FITTINGS (INCLUDES STAINLESS STEEL WASHERS)** | | | | | |
| **P-401x** | Flanged Fitting for 1/16" OD Tubing | 1/4-28 Flat-Bottom | 5/16" Square | Delrin Black/SST | 10-pk |
| ★ **P-480BLK** | Flanged Fitting for 1/16" OD Tubing | 1/4-28 Flat-Bottom | 5/16" Hex | Delrin Black/SST | ea. |
| **P-482BLK** | Flanged Fitting for 1/16" OD Tubing | 1/4-28 Flat-Bottom | Standard Knurl | Delrin Black/SST | ea. |
| **P-501x** | Flanged Fitting for 1/8" OD Tubing | 1/4-28 Flat-Bottom | 5/16" Square | Delrin Black/SST | 10-pk |
| **P-580BLK** | Flanged Fitting for 1/8" OD Tubing | 1/4-28 Flat-Bottom | 5/16" Hex | Delrin Black/SST | ea. |
| **P-582BLK** | Flanged Fitting for 1/8" OD Tubing | 1/4-28 Flat-Bottom | Standard Knurl | Delrin Black/SST | ea. |
| **P-982BLKx** | Flanged Fitting for 1/16" OD Tubing | M6 Flat-Bottom | Standard Knurl | Delrin Black/SST | 10-pk |
| **P-1082BLKx** | Flanged Fitting for 1/8" OD Tubing | M6 Flat-Bottom | Standard Knurl | Delrin Black/SST | 10-pk |
| **REPLACEMENT WASHERS** | | | | | |
| **P-407x** | Washer for 1/16" OD Tubing | 1/4-28 Flat-Bottom | — | SST | 10-pk |
| **P-507x** | Washer for 1/8" OD Tubing | 1/4-28 Flat-Bottom | — | SST | 10-pk |
| **P-987x** | Washer for 1/16" OD Tubing | M6 Flat-Bottom | — | SST | 10-pk |
| **P-1087x** | Washer for 1/8" OD Tubing | M6 Flat-Bottom | — | SST | 10-pk |

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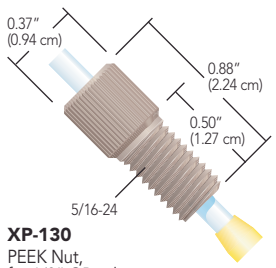
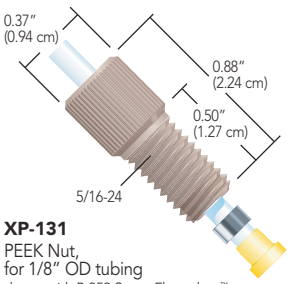
# Large Bore Fittings

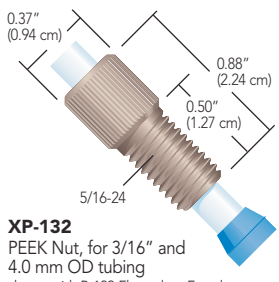
- 5/16-24 or 1/2-20 threads
- For use with 1/16", 1/8", 3/16", 1/4", 5/16", 3.0 mm, or 4.0 mm OD tubing



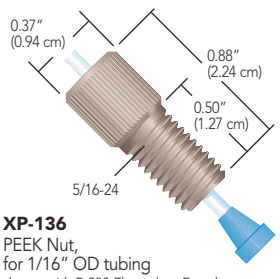

**XP-130**
PEEK Nut,
for 1/8" OD tubing
shown with P-300 Flangeless Ferrule
(page 26)



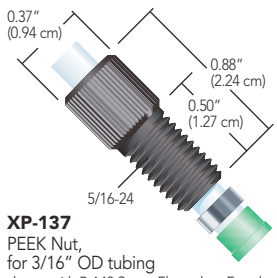

**XP-131**
PEEK Nut,
for 1/8" OD tubing
shown with P-359 Super Flangeless™
Ferrule (included and found on page 23)



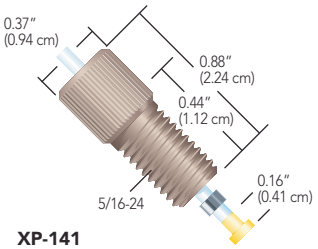

**XP-132**
PEEK Nut, for 3/16" and
4.0 mm OD tubing
shown with P-133 Flangeless Ferrule
(included and found on this page)



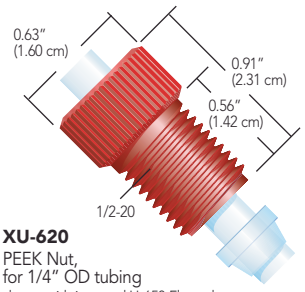

**XP-136**
PEEK Nut,
for 1/16" OD tubing
shown with P-200 Flangeless Ferrule
(included and found on page 25)



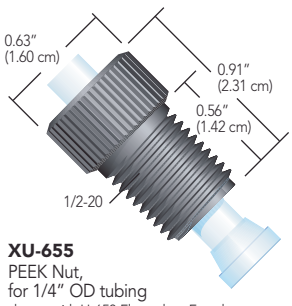

**XP-137**
PEEK Nut,
for 3/16" OD tubing
shown with P-140 Super Flangeless Ferrule
(included and found on this page)



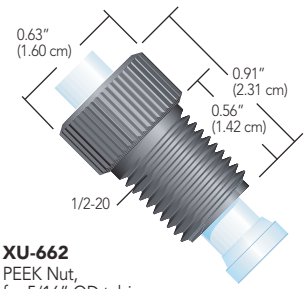

**XP-141**
PEEK Nut,
for 1/16" OD tubing
shown with P-259 Super Flangeless Ferrule
(included and found on page 23)




**XU-620**
PEEK Nut,
for 1/4" OD tubing
shown with inverted U-650 Flangeless
Ferrule for coned ports
(included and found on this page)




**XU-655**
PEEK Nut,
for 1/4" OD tubing
shown with U-650 Flangeless Ferrule
(included and found on this page)




**XU-662**
PEEK Nut,
for 5/16" OD tubing
shown with U-660 Flangeless Ferrule
(included and found on this page)

*Please Note: Each of the Large Bore Fittings shown on this page comes in a convenient 10-pack and is packaged with the most popularly chosen Ferrule option. The Fittings can be ordered separately by removing the preceding letter "X" from the part number. Additionally, to connect metric-sized tubing with outer diameters less than 4.0 mm to 5/16-24 threaded ports, reference the chart on page 27 to choose the correct nut/ferrule combination.*

## RELATED PRODUCTS

### More Large Bore Products

| | Page |
|---|---|
| **5/16-24 Coned Fittings** | 18 |
| **Barbed Adapters** | 58 |
| **Threaded Adapters** | 48 |
| **Plugs** | 32, 159 |
| **Y Connector** | 47 |
| **ETFE Tubing** | 73 |

| | Page |
|---|---|
| **FEP, PFA Tubing** | 71, 72 |
| **Tubing Cutter** | 74 |
| **Pressure Relief Valve** | 154 |
| **Solvent Inlet Filters** | 157 |
| **Bottle Caps** | 159 |
| **Semi-Prep Inline Filters** | 161 |

| Part No. | Description | Port | Pressure Rating | Head Style | Material (Nut/Washer) | Qty. |
|---|---|---|---|---|---|---|
| **LARGE BORE FITTINGS** | | | | | | |
| **XP-130x** | Flangeless Fitting for 1/8" OD tubing | 5/16-24 Flat-Bottom | 500 psi (34 bar) | Standard Knurl | PEEK Natural/ETFE Yellow | 10-pk |
| **XP-131x** | Super Flangeless Fitting for 1/8" OD tubing | 5/16-24 Flat-Bottom | 1,000 psi (69 bar) | Standard Knurl | PEEK Natural/ETFE Yellow/SST | 10-pk |
| ★ **XP-132x** | Flangeless Fitting for 3/16" OD tubing | 5/16-24 Flat-Bottom | 500 psi (34 bar) | Standard Knurl | PEEK Natural/ETFE Blue | 10-pk |
| **XP-136x** | Flangeless Fitting for 1/16" OD tubing | 5/16-24 Flat-Bottom | 2,000 psi (138 bar) | Standard Knurl | PEEK Natural/ETFE Blue | 10-pk |
| **XP-137x** | Super Flangeless Fitting for 3/16" OD tubing | 5/16-24 Flat-Bottom | 500 psi (34 bar) | Standard Knurl | PEEK Black/ETFE Green/SST | 10-pk |
| **XP-141x** | Super Flangeless Fitting for 1/16" OD tubing | 5/16-24 Flat-Bottom | 1,350 psi (93 bar) | Standard Knurl | PEEK Natural/ETFE Yellow/SST | 10-pk |
| **XP-143x** | Flangeless Fitting for 3.0 mm OD tubing | 5/16-24 Flat-Bottom | 500 psi (34 bar) | Standard Knurl | PEEK Natural/ETFE Orange | 10-pk |
| **XU-620x** | Flangeless Fitting for 1/4" OD tubing | 1/2-20 Coned | 250 psi (17 bar) | Large Knurl | PEEK Red/ETFE Natural | 10-pk |
| **XU-655x** | Flangeless Fitting for 1/4" OD tubing | 1/2-20 Flat-Bottom | 250 psi (17 bar) | Large Knurl | PEEK Black/ETFE Natural | 10-pk |
| **XU-662x** | Flangeless Fitting for 5/16" OD tubing | 1/2-20 Flat-Bottom | 250 psi (17 bar) | Large Knurl | PEEK Black/ETFE Natural | 10-pk |
| **REPLACEMENT FERRULES** | | | | | | |
| ★ **P-133x** | Flangeless Ferrule for 3/16" OD tubing | 5/16-24 Flat-Bottom | 500 psi (34 bar) | — | ETFE Blue | 10-pk |
| **P-133Nx** | Flangeless Ferrule for 3/16" OD tubing | 5/16-24 Flat-Bottom | 500 psi (34 bar) | — | ETFE Natural | 10-pk |
| **P-140x** | Super Flangeless Ferrule for 3/16" OD tubing | 5/16-24 Flat-Bottom | 500 psi (34 bar) | — | ETFE Green | 10-pk |
| **U-650x** | Flangeless Ferrule for 1/4" OD tubing | 1/2-20 Flat-Bottom | 250 psi (17 bar) | — | ETFE Natural | 10-pk |
| **U-660x** | Flangeless Ferrule for 5/16" OD tubing | 1/2-20 Flat-Bottom | 250 psi (17 bar) | — | ETFE Natural | 10-pk |

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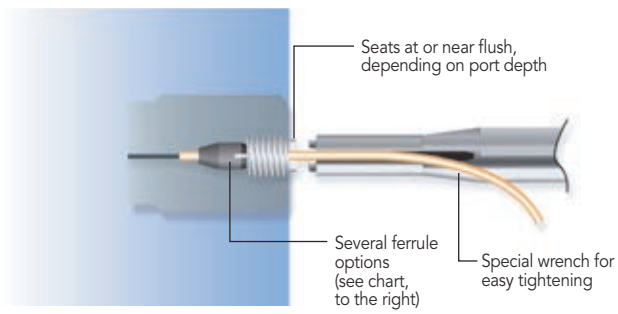
# FlushNut™ Fittings

- Tightens flush with the top of the receiving port
- Several ferrule options

Upchurch Scientific® FlushNut Fittings are designed for those tight-space applications where nut heads often interfere with each other. When coupled with an appropriate ferrule and tightened into a receiving port, the FlushNut's slotted head seats at or near flush with the top of the port. This feature allows FlushNut Fittings to reside in closer proximity than any other option on the market. All FlushNut Fittings are manufactured from 316 stainless steel, except the P-321 Plug, which is made of PEEK polymer.

Tighten or remove FlushNut Fittings with our specially designed FlushNut Wrenches, available in 10-32 or 1/4-28 versions. For more information on the FlushNut wrenches, see page 33.

## FlushNut Fittings System

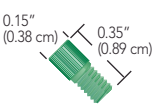


# Lee Company "MINSTAC®" Compatible Fittings

- Super Flangeless™ style ferrules designed specifically to work with 6-40 nuts in Lee MINSTAC valve ports
- For 1/16" OD tubing

Upchurch Scientific TinyTight™ Fittings are easy-to-use alternatives for Lee Company 062 MINSTAC fittings systems. These fittings consist of a TinyTight Ferrule which works with the 6-40 threaded nut on this page, M-644-03. Choose from two ferrule options, with 0.020" (0.50 mm) or 0.030" (0.75 mm) thru-holes. To use, simply slide a fitting head-first onto your tubing, followed by the ring and ferrule, and thread this assembly into the solenoid valve receiving port, while making sure the tubing is bottomed out. No collets, colleting tools, or chamfering tools required; however, if needed for easier assembly of the TinyTight fittings, the M-150 tool is available. To use, first place the tool in a vise, then tighten tubing, fitting, and ferrule into the tool as you would into any port. Once removed, the swaged ferrule will be held in place on the tubing.

The TinyTight fittings have a pressure range that depends upon the tubing used for the connection. Please contact your distributor or IDEX Health & Science for more information.




**M-644-03**
Headless Nut
6-40 threads

**M-647**
TinyTight Ferrule
for 1/16" OD tubing
0.020" thru-hole

**M-657**
TinyTight Ferrule
for 1/16" OD tubing
0.030" thru-hole

## RELATED PRODUCTS

### FlushNut Ferrule Options

| FlushNut | Threads/ Port* | For Tubing OD | Ferrule Options | Page |
|---|---|---|---|---|
| **F-350** | 10-32 C | 1/16" | SealTight™ F-192 | 14 |
| **F-354** | 10-32 C | 1/32" | LiteTouch® LT-132 | 16 |
| | 10-32 C | 1/16" | LiteTouch LT-100 | 16 |
| | 10-32 C | 1/16" | LiteTouch SealTight LT-135 | 16 |
| **F-364** | 1/4-28 C | 1/8" | LiteTouch LT-200 | 16 |
| | 1/4-28 FB | 1/8" | Super Flangeless P-350, P-352, P-359, P-360 | 23 |
| | 1/4-28 FB | 2.0 mm | Super Flangeless P-355 | 23 |
| **F-356** | 1/4-28 FB | 1/32" | Super Flangeless P-248 | 23 |
| | 1/4-28 FB | 1/16" | Super Flangeless P-250, P-259, P-260 | 23 |
| **XF-358** | 1/4-28 FB | 1/16" | Flangeless P-200, P-200N, P-240 | 24 |
| **XF-368** | 1/4-28 FB | 1/8" | Flangeless P-300, P-300N, P-340 | 24 |
| | 1/4-28 FB | 1.8 mm | Flangeless P-342 | 24 |
| | 1/4-28 FB | 2.0 mm | Flangeless P-363R | 24 |
| | 1/4-28 FB | 2.5 mm | Flangeless P-353 | 24 |
| | 1/4-28 FB | 3.0 mm | Flangeless P-343 | 24 |
| **P-321** | 1/4-28 FB | N/A | Plug — No ferrule required | 32 |

** C=Coned; FB=Flat-bottom*
*To order FlushNuts separately from the included ferrules, simply remove the preceding "X" from the appropriate part number — for example, order F-358 instead of XF-358.*

| Part No. | Description | Port | Pressure Rating | Head Style | Material | Qty. |
|---|---|---|---|---|---|---|
| TINYTIGHT FITTINGS | | | | | | |
| **M-150** | Swaging Tool for TinyTight Fittings | 6-40 MINSTAC | — | — | SST | ea. |
| **M-644-03x** | Super Flangeless Nut for 1/16" OD Tubing | 6-40 Flat Bottom or MINSTAC | 750–3,750 psi (52–259 bar) | Micro Headless | PEEK Green | 10-pk |
| **M-647x** | TinyTight Ferrule for 1/16" OD Tubing, 0.020" Thru-Hole | 6-40 MINSTAC | 750–3,750 psi (52–259 bar) | — | PEEK Natural/SST | 10-pk |
| ★ **M-657x** | TinyTight Ferrule for 1/16" OD Tubing, 0.030" Thru-Hole | 6-40 MINSTAC | 750–3,750 psi (52–259 bar) | — | PEEK Natural/SST | 10-pk |

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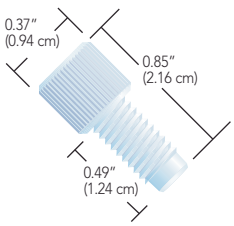
# Plugs & Caps

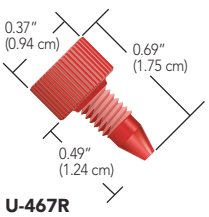
- Seal 6-32, 6-40, 10-32, 1/4-28, M6, or 5/16-24 threaded ports or fittings

Use Upchurch Scientific® plugs to close off unused ports in valves and multi-port connectors. Our color-coded 10-32 threaded plugs are perfect for identifying stored columns that have different packing materials, or in which different mobile phases have been utilized. Cap off tubing with one of the PEEK or ETFE caps presented on this page and the appropriate fittings from this chapter.

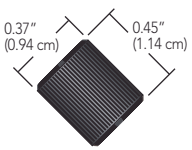
To help determine which plug or cap is best suited for your application, please visit www.idex-hs.com for detailed chemical compatibility data.



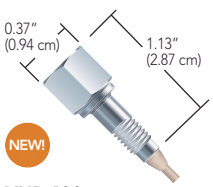

**P-316**
PFA Plug
for 1/4-28 flat-bottom ports




**U-467R**
Delrin® Column Plug
for 10-32 coned ports




**P-755**
ETFE Cap
for 1/4-28 flat-bottom fittings




**VHP-600**
VHP Plug
for 10-32 coned ports

| | Part No. | Description | Head Style | Material | Qty. |
|---|---|---|---|---|---|
| | **PLUGS** | | | | |
| | **P-120** | Plug for 1/4-28 Coned Ports for 1/8″ OD Tubing | Standard Knurl | PCTFE Natural | ea. |
| | **P-123** | Plug for 1/4-28 Flat-Bottom Ports | 5/16″ Hex | ETFE Natural | ea. |
| ★ | **P-309x** | Plug for 1/4-28 Flat-Bottom Ports | Standard Knurl | Delrin Black | 10-pk |
| ★ | **P-311** | Plug for 1/4-28 Flat-Bottom Ports | Standard Knurl | ETFE Natural | ea. |
| | **P-314** | Plug for M6 Flat-Bottom Ports | Standard Knurl | ETFE Black | ea. |
| ★ | **P-316** | Plug for 1/4-28 Flat-Bottom Ports | Standard Knurl | PFA Natural | ea. |
| | **P-321** | Plug for 1/4-28 Flat-Bottom Ports, FlushNut™ | FlushNut | PEEK Natural | ea. |
| | **P-520** | Plug for 10-32 Coned Ports | 5/16″ Hex | SST | ea. |
| | **P-550** | Plug for 10-32 Coned Ports, Extra Long | Standard Knurl | PEEK Natural | ea. |
| ★ | **P-551** | Plug for 10-32 Coned Ports | Standard Knurl | PEEK Natural | ea. |
| | **P-552** | Plug for 6-40 Coned Ports | Headless Knurl | PEEK Natural/PCTFE | ea. |
| | **P-555** | Plug for 6-32 Coned Ports | Standard Micro Knurl | PEEK Natural | ea. |
| | **P-556** | Plug for 5/16-24 Flat-Bottom Ports | Standard Knurl | PEEK Natural | ea. |
| | **P-558** | Plug for 6-40 Flat-Botton Ports | Micro Headless Knurl | PEEK Green | ea. |
| | **P-559** | Plug for 6-32 Flat-Bottom Ports | Micro Headless Knurl | PEEK Natural | ea. |
| | **P-849** | Plug for 10-32 Flat-Bottom Ports | Standard Knurl | Delrin Black | ea. |
| | **U-467Rx** | Plug for 10-32 Coned Ports | Standard Knurl | Delrin Red | 10-pk |
| NEW! | **VHP-600** | VHP Plug for 10-32 Coned Ports | 3/8″ Hex | PK-SST | ea. |
| | **CAPS** | | | | |
| | **P-754** | Cap for 10-32 Coned Ports | Standard Knurl | ETFE Yellow | ea. |
| ★ | **P-755** | Cap for 1/4-28 Flat-Bottom Ports | Standard Knurl | ETFE Black | ea. |
| | **P-756** | Cap for M6 Flat-Bottom Ports | Standard Knurl | ETFE Blue | ea. |

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# Extender Tools

These tools can be used to tighten most of our knurled nuts in hard to reach places. See the application note on this page for knurl size and corresponding extender tool.

For precise tightening, the extender tools listed with 1/4" hex drives are designed to adapt to any torque wrench with a female 1/4" socket, such as the VHP-4000 Torque Driver on page 8. The tools featured on this page also include the FlushNut™ wrenches, used to tighten the FlushNuts found throughout this chapter and described in detail on page 31.

# Removal Tool

Use the LT-300 Removal Tool to detach LiteTouch® and Super Flangeless™ Ferrules from tubing. Simply slide the appropriate tool blade slot between the lock ring and the ferrule body. With a slight twist, the ring will pop off, releasing the ferrule from the tubing. *Please Note: This Removal Tool will not work with the LT-135 Ferrule System.*

# Wrenches

For your convenience, we offer wrenches in three standard sizes. You will need two A-304 wrenches to tighten most nuts into unions found on page 36 (for union 1593, you need one A-304 and one A-320 wrench).

The IDEX Wrench is slotted to fit over 1/16" and 1/8" OD tubing, and has 1/4" and 5/16" internal hex ends, to engage with the heads of the hex-head fittings most commonly used with Rheodyne® valves and the stainless steel fittings listed on page 10.

## APPLICATION NOTE

The drawings represent actual size of the various knurled head designs of the Upchurch Scientific® nuts featured in this chapter. Select the appropriate extender tool for the knurl pattern of the nut you've selected.

| Female Knurl | Standard Knurl | Headless Knurl |
|---|---|---|
| | | |

| Standard Micro Knurl | Micro Headless Knurl |
|---|---|
| | |

| Part No. | Description | Material | Qty. |
|---|---|---|---|
| **EXTENDER TOOLS** | | | |
| **P-291** | Extender Tool for Standard Head Nuts, with 1/4" Hex Drive | Aluminum | ea. |
| **P-298** | Extender Tool for Standard Head Nuts | Delrin® | ea. |
| **P-299** | Extender Tool for Standard Head Nuts | Aluminum | ea. |
| **P-399** | Extender Tool for Standard Head Nuts, Short | Aluminum | ea. |
| **P-297** | Extender Tool for Headless Nuts | Aluminum | ea. |
| **P-292** | Extender Tool for Headless Nuts, with 1/4" Hex Drive | Aluminum | ea. |
| **P-277** | Extender Tool for Standard Micro Nuts | Aluminum | ea. |
| **N-290** | Extender Tool for Micro Headless Nuts | Aluminum | ea. |
| **P-278** | Extender Tool for Female Nuts, with 1/4" Hex Drive | Aluminum | ea. |
| **MISCELLANEOUS TOOLS** | | | |
| **A-304** | Wrench, 1/4" x 5/16" | Steel | ea. |
| **A-305** | Wrench, 1/2" x 9/16" | Steel | ea. |
| **A-320** | Wrench, 3/8" x 7/16" | Steel | ea. |
| **6810** | IDEX Wrench, 1/4" x 5/16" | Steel | ea. |
| **F-345** | FlushNut Wrench for 10-32 Threaded Fittings | Steel/Plastic Handle | ea. |
| **F-346** | FlushNut Wrench for 1/4-28 Threaded Fittings | Steel/Plastic Handle | ea. |
| **LT-300** | Removal Tool for LiteTouch and Super Flangeless Ferrules | Steel/Plastic Handle | ea. |

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# CONNECTORS

**VHP UNIONS**
PAGE 36

**LOW PRESSURE UNIONS**
PAGE 40

**THREADED ADAPTERS**
PAGE 48

**BARBED ADAPTERS**
PAGE 58

SEE STARRED PRODUCTS FOR **TOP SELLERS!**

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# Connectors Reference Chart

This chart offers suggestions for connecting two pieces of inline tubing. The required product numbers are listed, with the appropriate page numbers listed below them in respective order. In most cases other options exist. For more information, please contact IDEX Health & Science or your local distributor.

| TUBING SIZE (OD) | CAPILLARY (<1/32" OD) | 1/32" | 1 mm | 1/16" | 1.8–3 mm | 1/8" | 4 mm, 3/16" | 1/4" | 5/16" |
|---|---|---|---|---|---|---|---|---|---|
| **CAPILLARY (<1/32" OD)** | P-720 + MTSlv or P-882 or P-772 or P-779 + (2) NTSlv<br>Pages: 39, 19, 52, 39, 38, 19 | P-779 + NTSlv + F-247<br>Pages: 38, 19 | P-779 + NTSlv + F-252<br>Pages: 38, 19 | P-770 + MTSlv<br>Pages: 38, 19 | P-627 + NTSys + MFF + XP-335<br>Pages: 48, 19, 27, 26 | P-627 + NTSys + XP-335<br>Pages: 49, 19, 26 | P-135 + P-259 + NTSys + LT-115 + LBFF + XP-132<br>Pages: 48, 23, 19, 23, 30 | U-665 + P-259 + NTSlv + LT-115<br>Pages: 48, 23, 19, 23 | U-665 + XU-662 + P-259 + NTSlv + LT-115<br>Pages: 48, 30, 60, 19, 23 |
| **1/32"** | P-779 + NTSlv + F-247<br>Pages: 38, 19 | P-771<br>Page: 39 | P-779 + F-247 + F-252<br>Pages: 38, 19, 19 | P-881<br>Page: 52 | P-702 + P-248 + LT-115 + MFF + XP-335<br>Pages: 40, 23, 23, 27, 26 | P-702 + P-248 + LT-115 + XP-335<br>Pages: 40, 23, 23, 26 | P-135 + P-248 + LT-115 + LBFF + XP-132<br>Pages: 48, 23, 23, 30, 30 | U-665 + P-248 + LT-115<br>Pages: 48, 23, 23 | U-665 + XU-662 + P-248 + LT-115<br>Pages: 48, 30, 23, 23 |
| **1 mm** | P-779 + NTSlv + F-252<br>Pages: 38, 19 | P-779 + F-247 + F-252<br>Pages: 38, 19, 19 | P-779+ (2) F-252<br>Pages: 38, 19 | P-779 + F-252<br>Pages: 38, 19 | P-702 + F-252 + MFF + XP-335<br>Pages: 40, 19, 27, 26 | P-702 + F-252 + XP-335<br>Pages: 40, 19, 26 | P-135 + XP-235 + F-252 + LBFF + XP-132<br>Pages: 48, 25, 19, 27, 30 | U-665 + XP-235 + F-252<br>Pages: 48, 25, 19 | U-665 + XU-662 + XP-235 + F-252<br>Pages: 48, 30, 25, 19 |
| **1/16"** | P-770 + MTSlv<br>Pages: 38, 19 | P-881<br>Page: 52 | P-779+ F-252<br>Pages: 38, 19 | P-742 or P-702<br>Pages: 38, 40 | P-702 + MFF + XP-335<br>Pages: 40, 27, 26 | P-703 + XP-235<br>Pages: 40, 25 | P-135 + XP-235 + LBFF + XP-132<br>Pages: 48, 25, 30, 30 | U-665 + XP-235<br>Pages: 49, 25 | U-665 + XU-662 + XP-235<br>Pages: 48, 30, 25 |
| **1.8–3 mm** | P-627 + NTSys + MFF + XP-335<br>Pages: 48, 19, 27, 26 | P-702 + P-248 + LT-115 + MFF + XP-335<br>Pages: 40, 23, 23, 27, 26 | P-702 + F-252 + MFF + XP-335<br>Pages: 40, 19, 27, 26 | P-702 + MFF + XP-335<br>Pages: 40, 27, 26 | P-703 + (2) MFF<br>Pages: 40, 27 | P-703 + MFF<br>Pages: 40, 27 | P-135 + XP-335 + LBFF + XP-132<br>Pages: 48, 27, 26, 30 | U-665 + MFF + XP-335<br>Pages: 48, 27, 26 | U-665 + XU-662 + MFF + XP-335<br>Pages: 48, 30, 27, 26 |
| **1/8"** | P-627 + NTSys + XP-335<br>Pages: 48, 19, 26 | P-702 + P-248 + LT-115 + XP-335<br>Pages: 40, 23, 23, 26 | P-702 + F-252 + XP-335<br>Pages: 40, 19, 26 | P-703 + XP-235<br>Pages: 40, 25 | P-703 + MFF<br>Pages: 40, 27 | P-703<br>Page: 40 | P-135 + XP-335 + LBFF + XP-132<br>Pages: 48, 26, 30, 30 | U-665 + XP-335<br>Pages: 48, 26 | U-665 + XU-662 + X P-335<br>Pages: 48, 30, 26 |
| **4 mm, 3/16"** | P-135 + P-259 + NTSys + LT-115 + LBFF + XP-132<br>Pages: 48, 23, 19, 23, 30 | P-135 + P-248 + LT-115 + LBFF + XP-132<br>Pages: 48, 23, 23, 30, 30 | P-135 + XP-235 + F-252 + LBFF + XP-132<br>Pages: 48, 25, 19, 27, 30 | P-135 + XP-235 + LBFF + XP-132<br>Pages: 48, 25, 30, 30 | P-135 + XP-335 + LBFF + XP-132<br>Pages: 48, 27, 26, 30 | P-135 + XP-335 + LBFF + XP-132<br>Pages: 48, 26, 30, 30 | P-134 + (2) LBFF + (2) XP-132<br>Pages: 41, 27, 30, 30 | U-659 + LBFF + XP-132<br>Pages: 48, 30, 30 | U-659 + XU-662 + LBFF + XP-132<br>Pages: 48, 30, 27, 30, 30 |
| **1/4"** | U-665 + P-259 + NTSlv + LT-115<br>Pages: 48, 23, 19, 23 | U-665 + P-248 + LT-115<br>Pages: 48, 23, 23 | U-665 + XP-235 + F-252<br>Pages: 48, 25, 19 | U-665 + XP-235<br>Pages: 48, 25 | U-665 + MFF + XP-335<br>Pages: 48, 27, 26 | U-665 + XP-335<br>Pages: 48, 26 | U-659 + LBFF + XP-132<br>Pages: 48, 30, 30 | Contact Us | U-665 + P-684 + XU-662<br>Pages: 48, 48, 30 |
| **5/16"** | U-665 + XU-662 + P-259 + NTSlv + LT-115<br>Pages: 48, 30, 60, 19, 23 | U-665 + XU-662 + P-248 + LT-115<br>Pages: 48, 30, 23, 23 | U-665 + XU-662 + XP-235 + F-252<br>Pages: 48, 30, 25, 19 | U-665 + XU-662 + XP-235<br>Pages: 48, 30, 25 | U-665 + XU-662 + MFF + XP-335<br>Pages: 48, 30, 27, 26 | U-665 + XU-662 + XP-335<br>Pages: 48, 30, 26 | U-659 + XU-662 + LBFF + XP-132<br>Pages: 48, 30, 27, 30, 30 | U-665 + P-684 + XU-662<br>Pages: 48, 48, 30 | Contact Us |

*MTSlv* *MicroTight® Sleeves. Select the appropriate MicroTight Sleeve(s) for your tubing OD size.*
*NTSys* *NanoTight™ System. Select the appropriate NanoTight Sleeve(s) for your tubing OD size, and NanoTight fitting(s).*
*NTSlv* *Select the appropriate NanoTight Sleeves for your tubing OD size.*
*MFF* *Select the appropriate Metric Flangeless Ferrule(s) for your tubing OD size. Choose from P-342, P-343, P-353, and P-363R.*
*LBFF* *Select from the following Large-Bore Flangeless Ferrules: P-133 (3/16" OD) or P-139 (4.0 mm OD).*

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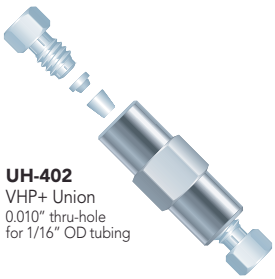
# VHP Stainless Steel ZDV Unions

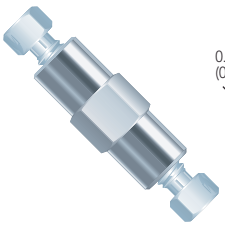
- Supplied with fittings for 1/16" OD or 1/8" OD tubing
- Manufactured from 316 stainless steel
- All union assemblies rated to 20,000 psi (1,380 bar) or higher

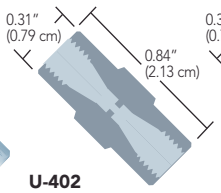
These Upchurch Scientific®, high pressure, zero-dead-volume (ZDV) unions, manufactured by IDEX Health & Science, are precision machined from 316 stainless steel, carefully passivated, then thoroughly rinsed. Each comes complete with stainless steel nuts and ferrules.

**U-411**
NanoTight™ Union
0.007" thru-hole
for 1/16" OD tubing

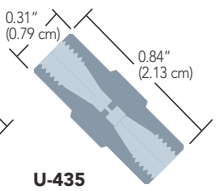


**UH-402**
VHP+ Union
0.010" thru-hole
for 1/16" OD tubing



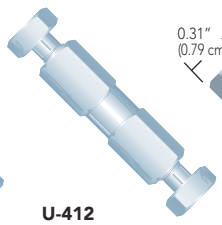



**U-402**
ZDV Union
0.020" thru-hole
for 1/16" OD tubing

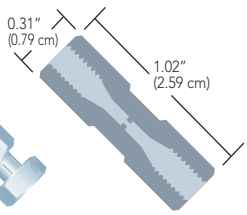


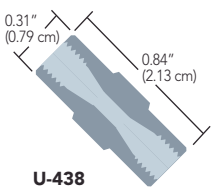

**U-435**
ZDV Union
0.010" thru-hole
for 1/16" OD tubing

**U-322**
VICI® (Valco) Compatible
ZDV Union
0.020" thru-hole
for 1/16" OD tubing

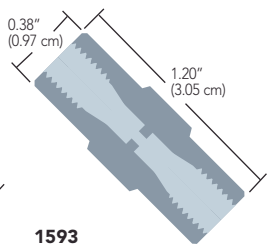


**U-412**
Waters Compatible
ZDV Union
0.020" thru-hole
for 1/16" OD tubing




**U-438**
True ZDV Union
0.067" thru-hole
for 1/16" OD tubing




**1593**
ZDV Union
0.050" thru-hole
for 1/8" OD tubing

## NOTE

It is possible to order the products on this page without the fittings. Simply use a -01 at the end of the product number to order the union body without fittings.

| | Part No. | Description | Threads | Includes | Thru-hole | Swept Volume | Pressure Rating |
|---|---|---|---|---|---|---|---|
| | **VHP STAINLESS STEEL ZDV UNIONS** | | | | | | |
| | **1593** | Stainless Steel Union for 1/8" OD Tubing | 1/4-28 Coned | (2) C-235/C-236 | 0.050" (1.25 mm) | 1.48 µL | 20,000 psi (1,380 bar) |
| ★ | **U-402** | Stainless Steel Union for 1/16" OD Tubing | 10-32 Coned | (2) U-400/U-401 | 0.020" (0.50 mm) | 0.13 µL | 20,000 psi (1,380 bar) |
| ★ | **U-411** | Stainless Steel Union for 1/16" OD Tubing | 10-32 Coned | (2) U-400/U-401 | 0.007" (178 µm) | 13 nL | 20,000 psi (1,380 bar) |
| ★ | **U-435** | Stainless Steel Union for 1/16" OD Tubing | 10-32 Coned | (2) U-400/U-401 | 0.010" (0.25 mm) | 20 nL | 20,000 psi (1,380 bar) |
| | **U-438** | Stainless Steel Union for 1/16" OD Tubing | 10-32 Coned | (2) U-400/U-401, (1) P-554 Gauge Plug | 0.067" (1.70 mm) | Near 0 µL | 20,000 psi (1,380 bar) |
| | **UH-402** | VHP+ Stainless Steel Union for 1/16" OD Tubing | 10-32 Coned | (2) VHP-200 | 0.010" (0.25 mm) | 20 nL | 30,000 psi (2,070 bar) |
| | **VICI (VALCO) COMPATIBLE ZDV UNION** | | | | | | |
| ★ | **U-322** | Stainless Steel Union for 1/16" OD Tubing | 10-32 Coned | (2) U-320/U-321 | 0.020" (0.50 mm) | 0.15 µL | 20,000 psi (1,380 bar) |
| | **WATERS® COMPATIBLE ZDV UNION** | | | | | | |
| | **U-412** | Stainless Steel Union for 1/16" OD Tubing | 10-32 Coned | (2) U-410/U-401 | 0.020" (0.50 mm) | 0.10 µL | 20,000 psi (1,380 bar) |

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# VHP Unions for Capillary Tubing

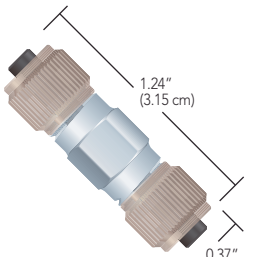
- Featuring stainless steel bodies and PK/PEEK fittings
- Pressure rated up to 15,000 psi (1,034 bar)
- Options to direct-connect both 1/32" OD tubing and 360 µm OD tubing

Upchurch Scientific® has expanded its line of specialized fittings and connectors for UHPLC applications to include several innovative unions and adapters.

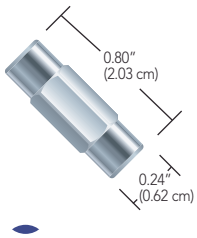
Two of these products — the UH-432 and UH-436 — follow the design of our popular Mini MicroFilters (see page 162) and allow a convenient union between either 1/32" OD tubing or 360 µm OD tubing. Each features a stainless steel union body and a unique stainless steel union capsule, enabling both excellent chemical compatibility as well as conductivity, making these a great choice for electrical interfacing in certain LC-MS applications. Each is also coupled with direct-connect ferrules made from our proprietary PEEK polymer blend (PK), allowing tubing connections up to 15,000 psi (1,034 bar). *(Please Note: While these connectors can be used at elevated pressures, they are not recommended for applications above 100 °C.)*

The UH-632 is a more traditionally designed connector, incorporating internally threaded ports. The union (UH-632) features a true ZDV (zero dead volume) connection between both tubes. This unique product is coupled with our one-piece Ultra-High Performance Fingertight fittings manufactured from our proprietary PEEK polymer blend, allowing them to be used in high temperature applications (up to 200 °C) at pressures up to 6,000 psi (414 bar) — or use these connectors at room temperature up to 15,000 psi (1,034 bar)!

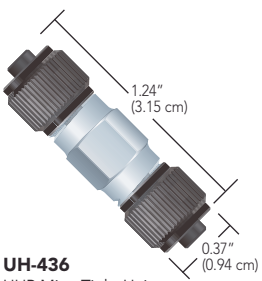
The 1959-01 is a new VHP union designed to accept the popular M4x0.7 threaded fittings for 1/32" OD tubing, made popular by Rheodyne®. These unions will work nicely with both the VHP-900 fittings (found on page 7) as well as the reusable VHP-920 (found on page 6).



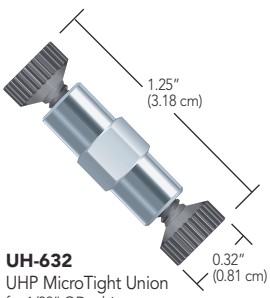

**UH-432**
UHP MicroTight® Union
for 1/32" OD tubing
with fittings and capsule union included




**1959-01**
UHP MicroTight® Union
for 1/32" OD tubing




**UH-436**
UHP MicroTight Union
for 360 µm OD tubing
with fittings and capsule union included

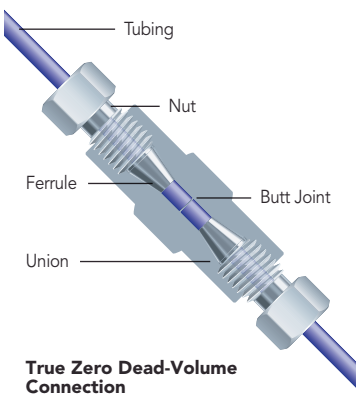



**UH-632**
UHP MicroTight Union
for 1/32" OD tubing
with fittings included

## APPLICATION NOTE

### What is a True ZDV Union?

True zero dead volume (ZDV) unions are designed so that the two joined pieces of tubing butt perfectly together as shown in the image to the right. These products have no swept volume contained within the union body. The fluid moves directly from one tube into another in this type of connector.




**True Zero Dead-Volume Connection**

When using true ZDV unions, it is important to take care to ensure connecting tubing has burr-free 90 degree ends. Find tubing cutters on page 74 to assist with cleanly cutting polymer and fused silica tubing. Gauge plugs are supplied with True ZDV Unions to assist with assembly. With the gauge plug inserted into one side of the union, a hard stop is created for the tubing to bottom out against as it is connected to the opposite port. The gauge plug is removed and then the second piece of tubing is connected, using the first piece of tubing to bottom out against resulting in the two tubes joined together in the center of the union.

## ORDER ONLINE

## RELATED PRODUCTS

- Find replacement VHP fittings on page 9.
- Find Fused Silica tubing on page 67.
- Find 1/32" OD Stainless Steel tubing on page 64–65.
- To achieve 15,000 psi (1,034 bar) with the female threaded fittings used with some of these products, use the P-278 extender tool found on page 8.

| | Part No. | Description | Threads | Includes | Thru-hole | Swept Volume | Pressure Rating |
|---|---|---|---|---|---|---|---|
| | VHP UNIONS FOR CAPILLARY TUBING | | | | | | |
| ★ | **UH-432** | VHP Union for 1/32" OD Tubing, PEEK/SST | 5/16-24 Coned | (2) PK-112, (2) P-416 | 0.006" (0.150 mm) | 5 nL | 15,000 psi (1,034 bar) |
| | **UH-436** | VHP Union for 360 µm OD Tubing, PEEK/SST | 5/16-24 Coned | (2) PK-152, (2) P-416BLK | 0.006" (0.150 mm) | 5 nL | 15,000 psi (1,034 bar) |
| | **UH-632** | VHP True ZDV Union for 1/32" OD Tubing, PEEK/SST | 6-32 Coned | (2) PK-126, (1) P-553 Gauge Plug | N/A | N/A | 15,000 psi (1,034 bar) |
| NEW! | **1959-01** | VHP Union for 1/32" OD Tubing, SST | M4x0.7 | N/A (Fittings must be ordered separately) | 0.007" (178 µm) | 16 nL | 30,000 psi (2,070 bar) |

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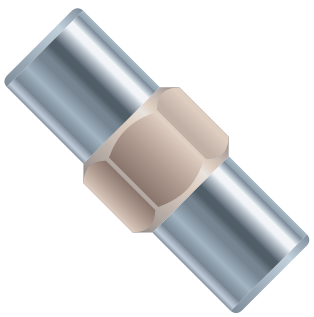
# New Bio-Inert UHPLC Unions

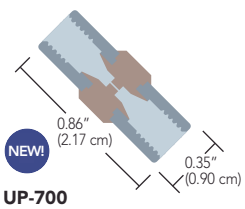
- Unique, Patent-Pending Process allows a fully-PEEK fluid contact area combined with the strength of stainless steel
- Pressure rated to 1,200 bar (17,400 psi)
- Two inner diameters available: 0.008" and 0.016"

Upchurch Scientific® introduces two new unions specifically engineered for Bio-Inert UHPLC applications. Combining the physical strength of 316 stainless steel with the inertness and biocompatibility of an all-PEEK fluid pathway, these unions will work well in applications where pressures reach up to 17,400 psi (1,200 bar) — without allowing metal contact by the fluid.

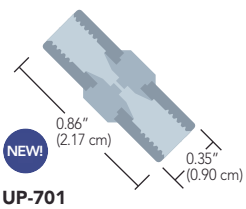
Neither union comes with fittings, but can be paired successfully with any 10-32 coned fitting that uses a polymer nose or ferrule.

*Note: All-stainless steel fittings should NOT be used with these unions, as they will damage the internal conical seat.*






**UP-700**
Bio-Inert UHPLC Union
0.008" thru-hole
for 1/16" OD tubing

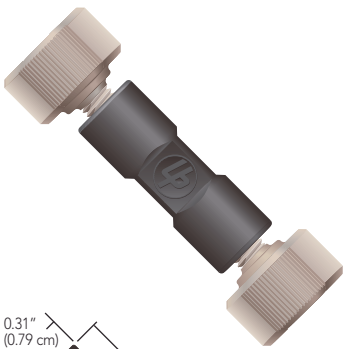


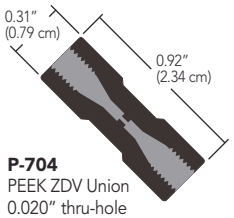

**UP-701**
Bio-Inert UHPLC Union
0.016" thru-hole
for 1/16" OD tubing

Biocompatible

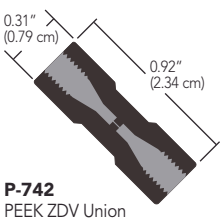
# PEEK ZDV Unions

Upchurch Scientific PEEK zero-dead-volume (ZDV) Unions come complete with two F-300 Fingertight Fittings for 1/16" OD tubing and are pressure rated to 5,000 psi (344 bar).

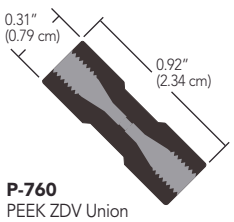





**P-704**
PEEK ZDV Union
0.020" thru-hole
with F-300 Fittings



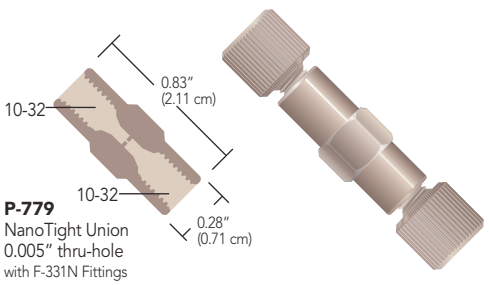

**P-742**
PEEK ZDV Union
0.010" thru-hole
with F-300 Fittings




**P-760**
PEEK ZDV Union
0.050" thru-hole
with F-300 Fittings

# NanoTight™ Union

This Upchurch Scientific NanoTight Union improves capillary tubing connections in several ways. The internal design of the union greatly reduces the incidence of tubing misalignment. When using 1/16" OD tubing sleeves (found on page 19) to connect capillary tubing, the webbed thru-hole minimizes breaking of fused silica while adding only miniscule swept volume. The results are fewer blockages, fewer flow rate reductions and fewer back pressure problems.




**P-779**
NanoTight Union
0.005" thru-hole
with F-331N Fittings

| | Part No. | Description | Threads | Includes | Thru-hole | Swept Volume | Pressure Rating |
|---|---|---|---|---|---|---|---|
| | **BIO-INERT UHPLC UNIONS** | | | | | | |
| NEW! | **UP-700** | Bio-Inert UHPLC Union for 1/16" OD Tubing, Natural (Tan) | 10-32 Coned | N/A | 0.008" (0.20 mm) | 0.05 µL | 17,400 psi (1,200 bar) |
| NEW! | **UP-701** | Bio-Inert UHPLC Union for 1/16" OD Tubing, Gray | 10-32 Coned | N/A | 0.016" (0.40 mm) | 0.20 µL | 17,400 psi (1,200 bar) |
| | **PEEK ZDV UNIONS** | | | | | | |
| ★ | **P-704** | PEEK Union for 1/16" OD Tubing | 10-32 Coned | (2) F-300 | 0.020" (0.50 mm) | 0.28 µL | 5,000 psi (344 bar) |
| ★ | **P-742** | PEEK Union for 1/16" OD Tubing | 10-32 Coned | (2) F-300 | 0.010" (0.25 mm) | 0.07 µL | 5,000 psi (344 bar) |
| ★ | **P-760** | PEEK Union for 1/16" OD Tubing | 10-32 Coned | (2) F-300 | 0.050" (1.25 mm) | 1.2 µL | 5,000 psi (344 bar) |
| | **NANOTIGHT UNION** | | | | | | |
| ★ | **P-779** | PEEK NanoTight Union for 1/16" OD Tubing and Tubing Sleeves | 10-32 Coned | (2) F-331N | 0.005" (125 µm) | 8 nl | 5,000 psi (344 bar) |

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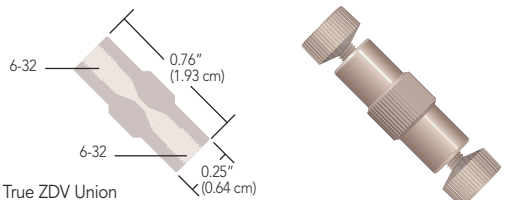
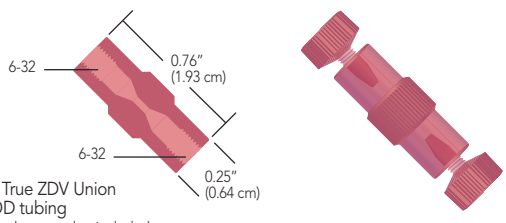
# MicroTight® Connectors for Capillary Tubing

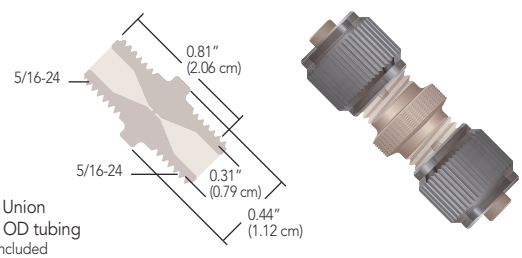
Connect two pieces of capillary tubing with these Upchurch Scientific® PEEK MicroTight Connectors. The True ZDV Unions allow two pieces of tubing to connect directly to each other — using the included gauge plug to ensure proper alignment. The standard union and elbow both feature a 0.006" (0.150 mm) thru-hole, adding only a small amount of additional flow-path volume to help ensure proper chromatographic results. For MicroTight unions designed for UHPLC applications, see page 37.



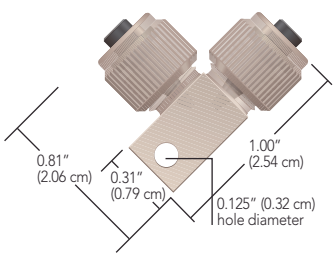

**P-720**
MicroTight True ZDV Union
for use with MicroTight Sleeves
with fittings and gauge plug included




**P-771**
MicroTight True ZDV Union
for 1/32" OD tubing
with fittings and gauge plug included



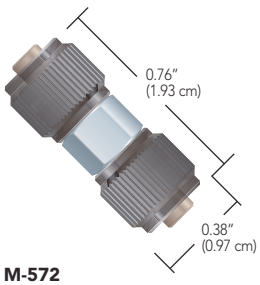

**P-772**
MicroTight Union
for 360 µm OD tubing
with fittings included




**P-874**
MicroElbow for
MicroTight Tubing Sleeves
with fittings included

# Conductive MicroTight Union

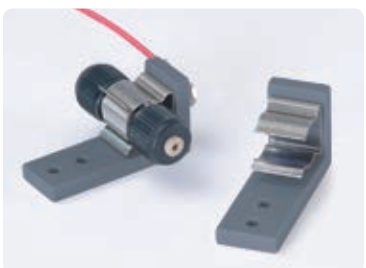
The Upchurch Scientific Conductive MicroTight Union manufactured by IDEX Health & Science provide an excellent opportunity to introduce voltage into an electrospray or capillary electrophoresis system. With an extremely low internal volume of 16 nL, this union can be placed inline with 360 µm OD capillary tubing. Mount and apply voltage to these unions using our Insulating Mounting Bracket below.




**M-572**
Conductive MicroTight Union
for 360 µm OD tubing
with fittings and Capsule Union included

# Insulating Mounting Bracket

Use our Insulating Mounting Bracket to easily integrate the Conductive MicroTight Union (shown above) or our Conductive Mini MicroFilters (on page 162) into your system or lab.



*Insulating Mounting Bracket, shown with lead wire and Conductive MicroTight Union, not included.*

The product snaps into place. Voltage from your lead wire is conducted through the attaching stainless steel nut and screw (included), then onto the mounted product via the stainless steel clip.

The bracket's base includes two holes (#2 screw clearance) for easy mounting onto any lab surface. Dimensions are 1.25" L x 0.45" W x 0.63" H.

## APPLICATION NOTE

For an example of using a Conductive MicroTight Union in a pressure driven ion preconcentration application see: "Self-Sealed Vertical Polymeric Nanoporous Junctions for High Throughput Nanofluidic Applications."

*Sun Jae Kim and Jong Yoon Han. Analytical Chem. 2008, 80: 3507-3511.*

| | Part No. | Description | Threads | Includes | Thru-hole | Swept Volume | Pressure Rating |
|---|---|---|---|---|---|---|---|
| | **MICROTIGHT UNIONS** | | | | | | |
| ★ | **P-720** | PEEK True ZDV Union for MicroTight Sleeves | 6-32 Coned | (2) F-125, (1) P-553 | N/A | N/A | 4,000 psi (276 bar) |
| ★ | **P-771** | PEEK True ZDV Union for 1/32" OD Tubing | 6-32 Coned | (2) F-126S, (1) P-553 | N/A | N/A | 5,000 psi (345 bar) |
| ★ | **P-772** | PEEK Union for 360 µm OD Tubing | 5/16-24 Coned | (2) F-152, (2) P-416BLK | 0.006" (0.150 mm) | 5 nL | 5,000 psi (345 bar) |
| | **P-874** | PEEK MicroElbow for MicroTight Sleeves | 5/16-24 Coned | (2) F-172, (2) P-416 | 0.006" (0.150 mm) | 20 nL | 4,000 psi (276 bar) |
| | **REPLACEMENT GAUGE PLUGS (TO ACHIEVE TRUE ZDV CONNECTIONS WITH OUR P-720 AND P-771 UNIONS)** | | | | | | |
| | **P-553** | Gauge Plug, Delrin® | 6-32 Coned | N/A | N/A | N/A | N/A |
| | **CONDUCTIVE MICROTIGHT UNIONS** | | | | | | |
| | **M-572** | Conductive Union for 360 µm OD Tubing, PEEK/SST | 5/16-24 Coned | (2) F-152, (2) P-416BLK, (1) M-128NF | 0.011" (0.279 mm) | 16 nL | 5,000 psi (345 bar) |
| | **INSULATING MOUNTING BRACKET** | | | | | | |
| | **M-447** | Insulating Mounting Bracket | N/A | N/A | N/A | N/A | N/A |

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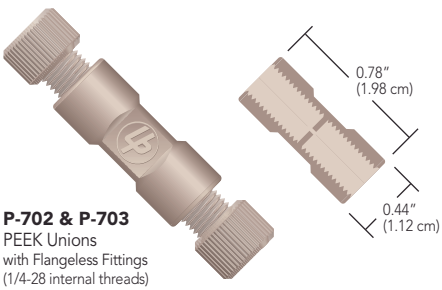
# Low Pressure Unions

- Manufactured from PEEK, ETFE, Delrin®, polypropylene, or PCTFE
- Available with 1/4-28, M6, or 10-32 flat-bottom threads

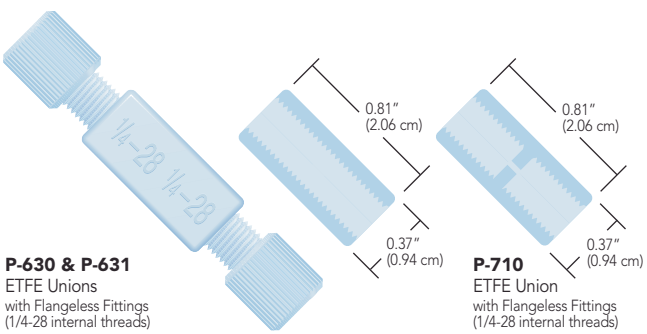
Upchurch Scientific® Low Pressure Unions are available in a variety of polymers, providing several low-cost and chemically-resistant options. The union assemblies below include fittings as shown in the table. The unions in the right column do not include fittings, allowing for customizing the fitting selection. In some cases, a union can be configured to connect two different tubing sizes—for example, if 1/4-28 Flangeless fittings for 1/16" and 1/8" OD tubing were selected from pages 25 and 26 they can be used with the P-603 union to connect the two different tubing sizes.

## Low Pressure PEEK Union Assemblies




**P-702 & P-703**
PEEK Unions
with Flangeless Fittings
(1/4-28 internal threads)

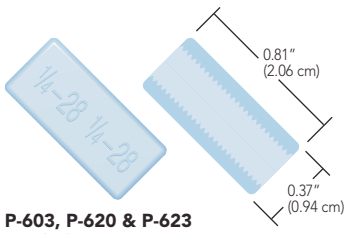
## Low Pressure ETFE Union Assemblies




**P-630 & P-631**
ETFE Unions
with Flangeless Fittings
(1/4-28 internal threads)

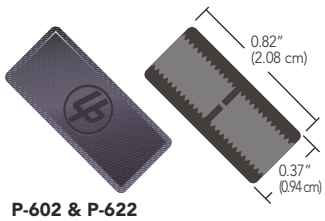
**P-710**
ETFE Union
with Flangeless Fittings
(1/4-28 internal threads)

## Low Pressure Standard Unions



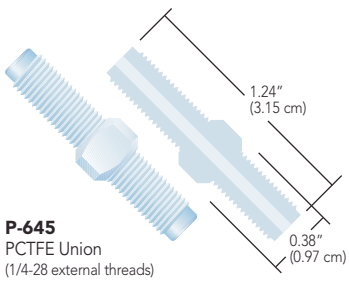

**P-603, P-620 & P-623**
Standard Unions
(1/4-28 internal threads)

## Low Pressure Metric Unions



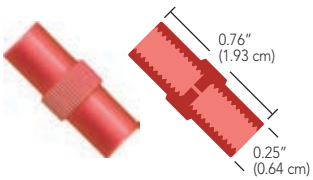

**P-602 & P-622**
Metric Unions
(M6 internal threads)

## Low Pressure Male Union




**P-645**
PCTFE Union
(1/4-28 external threads)

## VacuTight™ Union




**P-845-01**
PEEK Union
(10-32 internal threads)

Biocompatible

## RELATED PRODUCTS

- To use connectors in higher pressure applications, simply replace the provided fittings with Super Flangeless™ Nuts and Ferrules, found on pages 21–23.
- Use any of the 10-32 flat-bottom fittings on page 21 and 28 to make an inline connection with our VacuTight Union. This product is designed for use with 1/16" OD tubing.

| | Part No. | Description | Color | Threads | Includes | Thru-hole | Swept Volume | Pressure Rating |
|---|---|---|---|---|---|---|---|---|
| | **PEEK UNION ASSEMBLIES** | | | | | | | |
| ★ | **P-702** | PEEK Union for 1/16" OD Tubing | Natural | 1/4-28 FB | (2) XP-235 | 0.020" (0.50 mm) | 0.41 µL | 1,000 psi (69 bar) |
| ★ | **P-703** | PEEK Union for 1/8" OD Tubing | Natural | 1/4-28 FB | (2) XP-335 | 0.050" (1.25 mm) | 2.57 µL | 1,000 psi (69 bar) |
| | **ETFE UNION ASSEMBLIES** | | | | | | | |
| | **P-630** | ETFE True ZDV Union for 1/16" OD Tubing | Natural | 1/4-28 FB | (2) P-200N/P-245 | N/A | N/A | 1,000 psi (69 bar) |
| | **P-631** | ETFE True ZDV Union for 1/8" OD Tubing | Natural | 1/4-28 FB | (2) P-300N/P-345 | N/A | N/A | 1,000 psi (69 bar) |
| | **P-710** | ETFE Union for 1/16" OD Tubing | Natural | 1/4-28 FB | (2) XP-245 | 0.030" (0.75 mm) | 0.93 µL | 1,000 psi (69 bar) |
| | **STANDARD UNIONS** | | | | | | | |
| ★ | **P-603** | Delrin True ZDV Standard Union | Natural | 1/4-28 FB | N/A | N/A | N/A | N/A* |
| ★ | **P-620** | Polypropylene True ZDV Standard Union | Natural | 1/4-28 FB | N/A | N/A | N/A | N/A* |
| ★ | **P-623** | ETFE True ZDV Standard Union | Natural | 1/4-28 FB | N/A | N/A | N/A | N/A* |
| | **METRIC UNIONS** | | | | | | | |
| | **P-602** | Delrin Metric Union | Black | M6 FB | N/A | 0.020" (0.50 mm) | 0.41 µL | N/A* |
| | **P-622** | ETFE Metric Union | Blue | M6 FB | N/A | 0.020" (0.50 mm) | 0.41 µL | N/A* |
| | **MALE UNION** | | | | | | | |
| ★ | **P-645** | PCTFE Male Union | Natural | 1/4-28 FB | N/A | 0.062" (1.60 mm) | 61.3 µL | 500 psi (34 bar) |
| | **VACUTIGHT UNION** | | | | | | | |
| | **P-845-01** | PEEK Union for 1/16" OD Tubing | Red | 10-32 FB | N/A | 0.020" (0.50 mm) | 0.20 µL | N/A* |

** Pressure Rating depends on Fittings selected. See pressure rating for fittings on appropriate page.*
*FB = Flat-Bottom*

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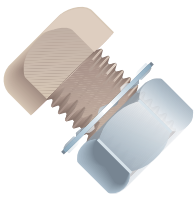
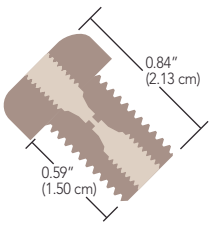
# Bulkhead Unions

- Designed for plumbing tubing through equipment housing
- For use with standard 10-32 coned or 1/4-28 flat-bottom threaded fittings

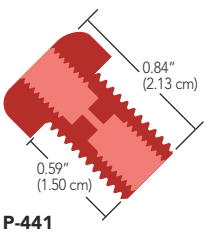
Thread Upchurch Scientific® PEEK Bulkhead Unions directly through your equipment housing to connect internal tubing to the outside. Each union has unique 3/8-24 external threads and comes complete with a stainless steel nut and lock washer to hold it in place. Requires a 3/8" hole to mount. The recommended torque limit for these unions is 15 in.– lbs (1.7 N·m).



**Bulkhead Union**
includes stainless steel nut/lock washer



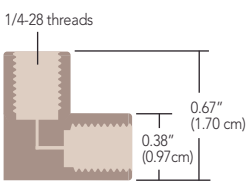

**P-440**
10-32 internal threads




**P-441**
1/4-28 internal threads

## Elbow Connectors

Use these Elbow Connectors to easily navigate tight corners. One Elbow is designed for use with 1/16" OD tubing and has a 0.020" (0.50 mm) thru-hole. Use 1/8" OD tubing with the other Elbow, which has a 0.062" (1.6 mm) thru-hole. Both come complete with 1/4-28 PEEK nuts and ETFE ferrules, and are pressure rated to 1,000 psi (69 bar).

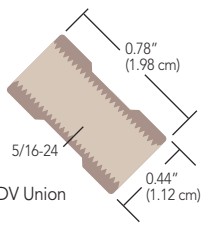



**P-430**
PEEK Elbow
comes with Flangeless Fittings

## Large Bore Union

- 5/16-24 flat-bottom threads

Use any of the 5/16-24 fittings on page 55 and the appropriate ferrule to create a true zero dead volume (ZDV) connection with the P-134 Union.




**P-134**
PEEK ZDV Union

## RELATED PRODUCTS

- Stainless Steel Bulkhead Unions are also available. Please contact us for more information.
- To use Elbows in higher pressure applications, simply replace the provided fittings with Super Flangeless™ Nuts and Ferrules, found on pages 21–23.

| | Part No. | Description | Threads | Color | Includes | Thru-hole | Swept Volume |
|---|---|---|---|---|---|---|---|
| | **BULKHEAD UNIONS** | | | | | | |
| ★ | **P-440** | PEEK Bulkhead Union | 10-32 Coned | Natural | (1) SST Nut/Washer | 0.020" (0.50 mm) | 1.9 µL |
| ★ | **P-441** | PEEK Bulkhead Union | 1/4-28 Flat-Bottom | Red | (1) SST Nut/Washer | 0.040" (1.00 mm) | 2.9 µL |
| ★ | **P-441N** | PEEK Bulkhead Union | 1/4-28 Flat-Bottom | Natural | (1) SST Nut/Washer | 0.040" (1.00 mm) | 2.9 µL |
| | **ELBOW CONNECTORS** | | | | | | |
| | **P-430** | PEEK Elbow for 1/16" OD Tubing | 1/4-28 Flat-Bottom | Natural | (2) XP-235 | 0.020" (0.50 mm) | 1.4 µL |
| | **P-432** | PEEK Elbow for 1/8" OD Tubing | 1/4-28 Flat-Bottom | Natural | (2) XP-335 | 0.062" (1.60 mm) | 13.6 µL |
| | **LARGE BORE UNION** | | | | | | |
| | **P-134** | PEEK True ZDV Union | 5/16-24 Flat-Bottom | Natural | N/A | N/A | N/A |

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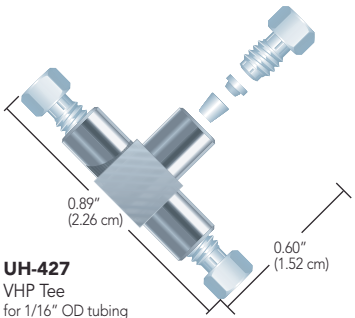
# VHP Tee for 1/16" OD Tubing

IDEX Health & Science offers this Very High Pressure (VHP) Tee Connector, designed to bring three pieces of tubing together. The all-316 stainless steel connector is designed for 1/16" OD tubing and is pressure rated to 30,000 psi (2,070 bar).



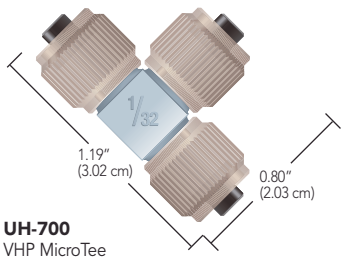

**UH-427**
VHP Tee
for 1/16" OD tubing
with fittings included

# VHP Tees & Crosses for Capillary Tubing

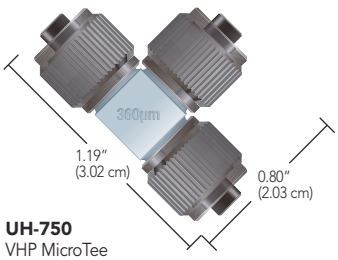
- Direct-connect either 360 µm or 1/32" OD tubing — no sleeves required!
- Available in both tee and cross configurations
- Pressure rated to 15,000 psi (1,034 bar)

To help facilitate multi-port connections in UHPLC applications, Upchurch Scientific® has developed a line of MicroTees and MicroCrosses, manufactured from stainless steel and featuring small thru-holes and very low internal volume. Additionally, the stainless steel construction allows these products to be used in applications where electrical conductivity is desired.

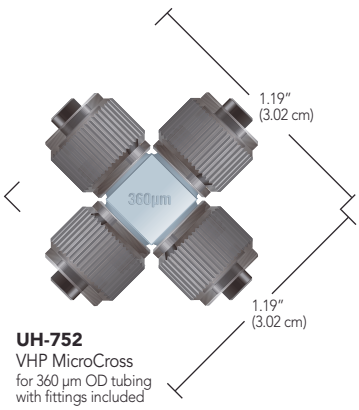
Included with the MicroTees and MicroCrosses are the VHP MicroFerrules found on page 9. The P-278 Extender Tool on page 33 can be used to tighten the female nuts that are included with these connectors.




**UH-700**
VHP MicroTee
for 1/32" OD tubing
with fittings included




**UH-750**
VHP MicroTee
for 360 µm OD tubing
with fittings included




**UH-752**
VHP MicroCross
for 360 µm OD tubing
with fittings included

## APPLICATION NOTE

### Why 1/32" OD Tubing and 360 µm OD Tubing?

IDEX Health & Science has focused strongly on the development of a variety of connectors and accessories for 1/32" OD tubing and 360 µm OD tubing. We have focused on these specific sizes due to their overwhelming popularity in analytical instruments, especially where micro and nano-scale analyses are being performed. By creating products designed for these popular sizes, the overall connection is easier to make and generally holds to increased pressures over connections where tubing sleeves are involved.

| Part No. | Description | Threads | Includes | Thru-hole | Swept Volume | Pressure Rating |
|---|---|---|---|---|---|---|
| **VHP TEE FOR 1/16" OD TUBING** | | | | | | |
| **UH-427** | VHP Tee for 1/16" OD Tubing, SST | 10-32 Coned | (3) VHP-200 | 0.020" (0.50 mm) | 0.57 µL | 30,000 psi (2,070 bar) |
| **VHP TEES & CROSSES FOR CAPILLARY TUBING** | | | | | | |
| ★ **UH-700** | VHP MicroTee for 1/32" OD Tubing, PEEK/SST | 5/16-24 Coned | (3) PK-112, (3) P-416 | 0.010" (0.25 mm) | 84 nL | 15,000 psi (1,034 bar) |
| **UH-750** | VHP MicroTee for 360 µm OD Tubing, PEEK/SST | 5/16-24 Coned | (3) PK-152, (3) P-416BLK | 0.010" (0.25 mm) | 84 nL | 15,000 psi (1,034 bar) |
| **UH-752** | VHP MicroCross for 360 µm OD Tubing, PEEK/SST | 5/16-24 Coned | (4) PK-152, (4) P-416BLK | 0.010" (0.25 mm) | 101 nL | 15,000 psi (1,034 bar) |

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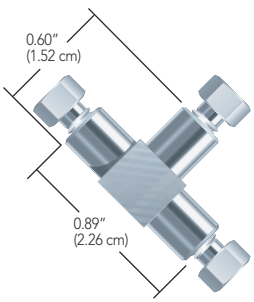
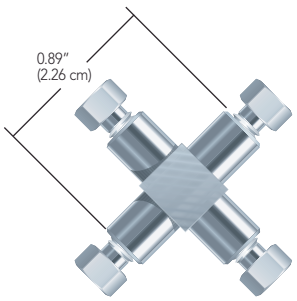
## Stainless Steel Tees & Crosses

These 316 stainless steel connectors come complete with 10-32 stainless steel fittings for use with 1/16" OD tubing and are rated to 20,000 psi (1,380 bar). They are compatible with any 10-32 coned threaded fittings.



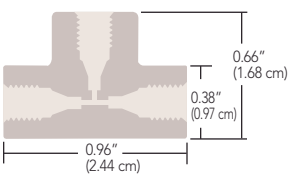

**U-428 Stainless Steel Tee**
0.020" thru-hole
with U-400 and U-401 Fittings



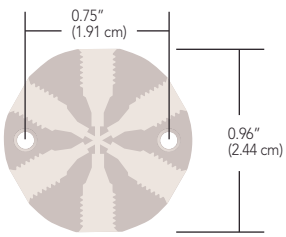

**U-430 Stainless Steel Cross**
0.020" thru-hole
with U-400 and U-401 Fittings

## PEEK 7-Port Manifold

Combine several streams into one or split one fluid stream into several. This PEEK 7-Port Manifold comes complete with F-331 Fingertight Fittings for 1/16" OD tubing and offers a pressure rating of 5,000 psi (345 bar). Seal unused ports with any of our polymer 10-32 coned plugs on page 32.




**Side View**

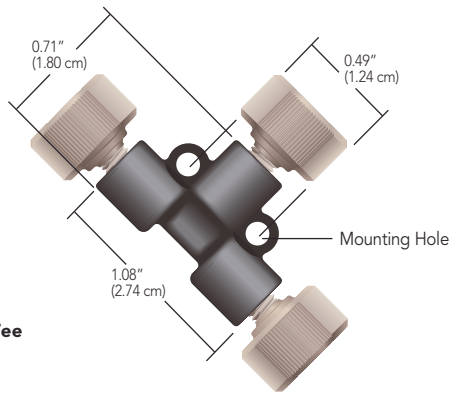



**Top View**

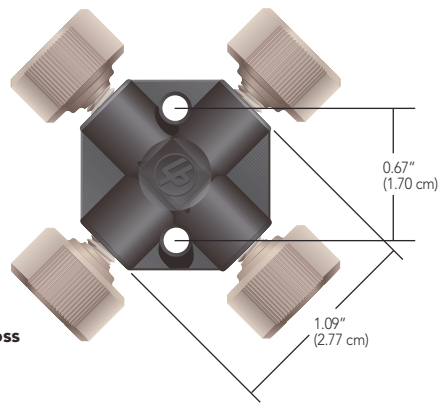
**P-170**
PEEK 7-Port Manifold
0.020" thru-holes
with F-331 Fittings

## PEEK Tees & Crosses

Our PEEK Tees and Crosses include high pressure F-300 PEEK Fingertight Fittings — allowing maximum operating pressures to 3,500 psi (241 bar) when used with 1/16" OD PEEK or stainless steel tubing.




**P-727 PEEK Tee**
0.020" thru-hole
with F-300 Fittings




**P-729 PEEK Cross**
0.020" thru-hole
with F-300 Fittings

Biocompatible

| | Part No. | Description | Threads | Includes | Thru-hole | Swept Volume | Pressure Rating |
|---|---|---|---|---|---|---|---|
| | **VHP TEE FOR 1/16" OD TUBING** | | | | | | |
| ★ | **U-428** | Stainless Steel Tee for 1/16" OD Tubing | 10-32 Coned | (3) U-400, (3) U-401 | 0.020" (0.50 mm) | 0.57 µL | 20,000 psi (1,380 bar) |
| ★ | **U-429** | Stainless Steel Tee for 1/16" OD Tubing | 10-32 Coned | (3) U-400, (3) U-401 | 0.040" (1.00 mm) | 2.1 µL | 20,000 psi (1,380 bar) |
| | **U-430** | Stainless Steel Cross for 1/16" OD Tubing | 10-32 Coned | (4) U-400, (4) U-401 | 0.020" (0.50 mm) | 0.72 µL | 20,000 psi (1,380 bar) |
| ★ | **U-431** | Stainless Steel Cross for 1/16" OD tubing | 10-32 Coned | (4) U-400, (4) U-401 | 0.040" (1.00 mm) | 2.5 µL | 20,000 psi (1,380 bar) |
| | **PEEK MANIFOLD** | | | | | | |
| | **P-170** | PEEK 7-Port Manifold for 1/16" OD Tubing | 10-32 Coned | (7) F-331 | 0.020" (0.50 mm) | 2.2 µL | 5,000 psi (345 bar) |
| | **PEEK TEES AND CROSSES** | | | | | | |
| ★ | **P-727** | PEEK Tee for 1/16" OD Tubing | 10-32 Coned | (3) F-300 | 0.020" (0.50 mm) | 0.57 µL | 3,500 psi (241 bar) |
| | **P-728** | PEEK Tee for 1/16" OD Tubing | 10-32 Coned | (3) F-300 | 0.050" (1.25 mm) | 3.0 µL | 3,500 psi (241 bar) |
| | **P-729** | PEEK Cross for 1/16" OD Tubing | 10-32 Coned | (4) F-300 | 0.020" (0.50 mm) | 0.72 µL | 3,500 psi (241 bar) |

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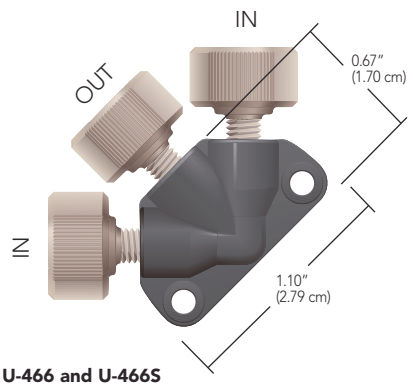
## Static Mixing Tees

- PEEK body with two-piece fingertight fittings
- Low swept volume

Upchurch Scientific® Static Mixing Tees are ideal for microbore or analytical gradient HPLC. They have a low swept volume of 2.2 µL (includes frit volume) and are designed for flow rates of 0.5 to 3 mL/min and a maximum pressure of 5,000 psi (345 bar). The back pressure caused by the tee is typically only 10 to 20 psi (0.7 to 1.4 bar) at these flow rates. The thru-holes are 0.020" (0.50 mm) and the center port features a 10 µm UHMWPE or stainless steel frit that aids mixing.

### NOTE

- Turbulent mixing of solvents often increases outgassing. To maintain a bubble-free fluid pathway, we recommend solvent degassing when using this product.
- The frit incorporated into our U-466 and U-466S Static Mixing Tees is not replaceable. If it becomes clogged, the Mixing Tee must be replaced.

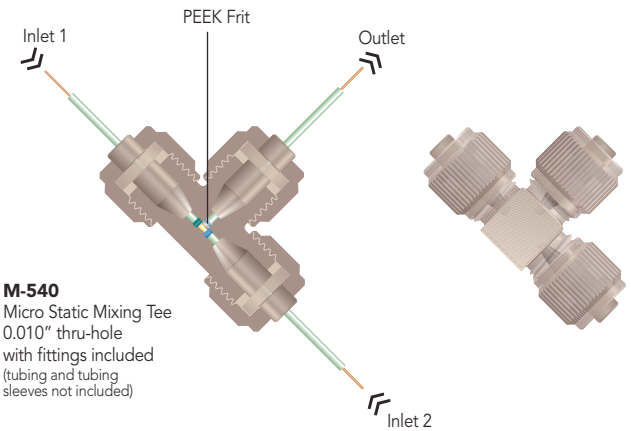



**U-466 and U-466S Static Mixing Tees**
with F-300 Fingertight Fittings for 1/16" OD tubing

## Micro Static Mixing Tee

- Constructed of inert PEEK and PCTFE
- Low swept volume of 0.95 µL
- Designed for flow rates of 20–250 µL/min

The Upchurch Scientific® Micro Static Mixing Tee utilizes a specifically engineered internal geometry to efficiently mix two fluid streams into one combined stream. The center port also features a 0.5 µm porosity PEEK polymer frit to aid in mixing. This frit adds a maximum of 20 psi (1.4 bar) back pressure to most systems (within the stated flow rate range). The Mixing Tee handles a maximum pressure of 5,000 psi (345 bar) when directly connecting 1/16" OD tubing, or up to 4,000 psi (276 bar) with capillary tubing when using our NanoTight™ Fittings and Tubing Sleeves (pages 17 and 19).




**M-540**
Micro Static Mixing Tee
0.010" thru-hole
with fittings included
(tubing and tubing sleeves not included)

### RELATED PRODUCTS

- See the Systec® Vacuum Degassing Systems on pages 178.
- Our standard Static Mixing Tees are designed for flow rates from 0.5 mL/min to 3 mL/min.

| | Part No. | Description | Threads | Includes | Thru-hole | Swept Volume | Pressure Rating |
|---|---|---|---|---|---|---|---|
| | **STATIC MIXING TEE** | | | | | | |
| | **U-466** | PEEK Static Mixing Tee for 1/16" OD Tubing, 10 µm UHMWPE Frit | 10-32 Coned | (3) F-300 | 0.020" (0.50 mm) | 2.2 µL | 5,000 psi (345 bar) |
| ★ | **U-466S** | PEEK Static Mixing Tee for 1/16" OD Tubing, 10 µm SST Frit | 10-32 Coned | (3) F-300 | 0.020" (0.50 mm) | 2.2 µL | 5,000 psi (345 bar) |
| | **MICRO STATIC MIXING TEE** | | | | | | |
| ★ | **M-540** | PEEK Micro Static Mixing Tee, for 1/16" OD Tubing | 5/16-24 Coned | (3) F-132/P-416 | 0.010" (0.250 mm) | 0.95 µL | 5,000 psi (345 bar) |

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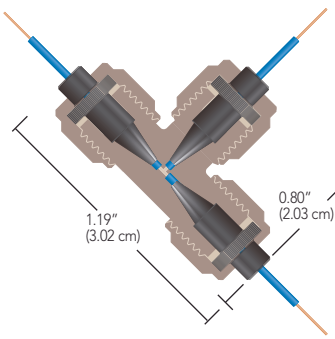
# MicroTee & Cross for Capillary Tubing

- Direct connect 1/16", 1/32", 360 µm OD tubing, plus other capillary tubing
- Low swept volume

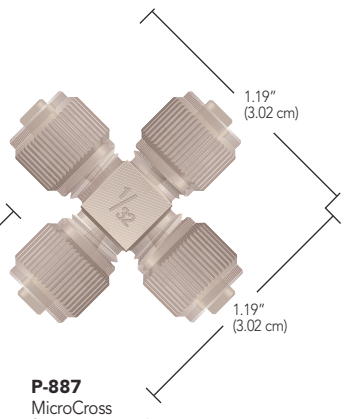
Use Upchurch Scientific® MicroTees and MicroCrosses to join capillary tubing. All of these products are made entirely of PEEK and have 0.006" (0.150 mm) thru-holes, with resulting swept volumes ranging from 29 to 81 nL.

## NOTE

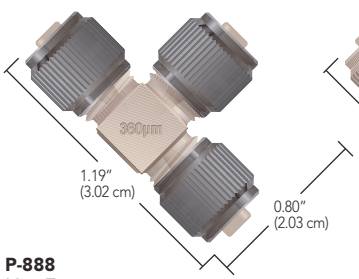
- Use only the ferrules supplied with each connector — they are not interchangeable. Replacement ferrules and female nuts are available on page 18. For MicroUnions, MicroTees, and MicroCrosses for UHPLC applications, see page 42.



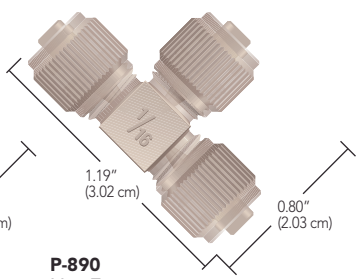

**P-775**
MicroTee for MicroTight® Tubing Sleeves
0.006" thru-holes
with fittings included
(tubing sleeves not included)




**P-887**
MicroCross
for 1/32" OD tubing
0.006" thru-holes
with fittings included




**P-888**
MicroTee
for 360 µm OD tubing
0.006" thru-holes
with fittings included




**P-890**
MicroTee
for 1/16" OD tubing
0.006" thru-holes
with fittings included

Biocompatible

## APPLICATION NOTE

Several researchers use our PEEK MicroTee to introduce ionizing voltage to their fluid stream just prior to a Mass Spectrometer[1]. MicroTees are well suited for this application due to advantageous internal geometry and PEEK polymer's electrical resistance. The materials required for this setup are as follows: one gold or platinum conducting wire, one P-775 or P-875 MicroTee (this page), one MicroTight Tubing Sleeve (page 19) for the conducting wire (as needed to accommodate wire diameter), and at least two more MicroTight Tubing Sleeves (page 19) to connect your capillary tubing.

To set up a similar connection, first thread your wire through the appropriate tubing sleeve, if necessary, with the wire extending beyond both ends of the sleeve. Slip the female nut included with the MicroTee over the wire or sleeved wire, followed by the ferrule — ensuring the wire (and its sleeve) extends well past the end of the ferrule tip. Align the tip of the wire with the thru-hole of the MicroTee and gently insert the wire until it bottoms out. Now finger tighten the female nut into place. Attach your flow path tubing to the MicroTee's two other available ports, following the instructions provided with the MicroTee.

Begin fluid flow through the tee and apply voltage to the conducting wire lead. This setup typically provides effective electrospray ionization in applications having a flow rate of 100 µL/min or greater.

[1] *One such paper describing pioneering electrospray work:* ***Protein Identification at the Low Femtomole Level from Silver-Stained Gels Using a New Fritless Electrospray Interface for Liquid Chromatography-Microspray and Nanospray Mass Spectrometry.*** *Christine L. Gatlin, Gerd R. Kleemann, Lara G. Hays, Andrew J. Link, John R. Yates III (1998) Analytical Biochemistry 263, 93-101.*

| | Part No. | Description | Threads | Includes | Thru-hole | Swept Volume | Pressure Rating |
|---|---|---|---|---|---|---|---|
| | MICROTEE, MICROCROSS AND MICROELBOW | | | | | | |
| ★ | P-775 | PEEK MicroTee for MicroTight Sleeves | 5/16-24 Coned | (3) F-172, (3) P-416 | 0.006" (0.150 mm) | 29 nL | 4,000 psi (276 bar) |
| ★ | P-777 | PEEK MicroCross for MicroTight Sleeves | 5/16-24 Coned | (4) F-172, (4) P-416 | 0.006" (0.150 mm) | 38 nL | 4,000 psi (276 bar) |
| | P-875 | PEEK MicroTee with Mounting Hole, for MicroTight Sleeves | 5/16-24 Coned | (3) F-172, (3) P-416 | 0.006" (0.150 mm) | 29 nL | 4,000 psi (276 bar) |
| ★ | P-885 | PEEK MicroTee for 1/32" OD Tubing | 5/16-24 Coned | (3) F-112, (3) P-416 | 0.006" (0.150 mm) | 29 nL | 5,000 psi (345 bar) |
| | P-887 | PEEK MicroCross for 1/32" OD Tubing | 5/16-24 Coned | (4) F-112, (4) P-416 | 0.006" (0.150 mm) | 38 nL | 5,000 psi (345 bar) |
| ★ | P-888 | PEEK MicroTee for 360 µm OD Tubing | 5/16-24 Coned | (3) F-152, (3) P-416BLK | 0.006" (0.150 mm) | 29 nL | 5,000 psi (345 bar) |
| | P-889 | PEEK MicroCross for 360 µm OD Tubing | 5/16-24 Coned | (4) F-152, (4) P-416BLK | 0.006" (0.150 mm) | 38 nL | 5,000 psi (345 bar) |
| ★ | P-890 | PEEK MicroTee for 1/16" OD Tubing | 5/16-24 Coned | (3) F-132, (3) P-416 | 0.006" (0.150 mm) | 58 nL | 5,000 psi (345 bar) |
| | P-891 | PEEK MicroCross for 1/16" OD Tubing | 5/16-24 Coned | (4) F-132, (4) P-416 | 0.006" (0.150 mm) | 81 nL | 5,000 psi (345 bar) |

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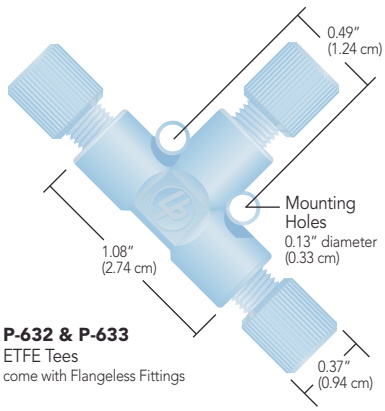
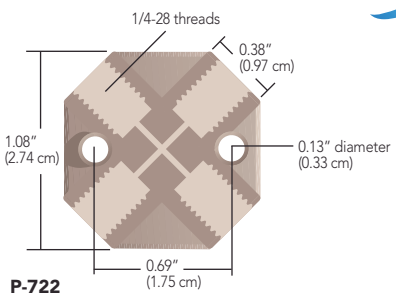
# Low Pressure Tees & Crosses

Upchurch Scientific® Low Pressure Tees and Crosses manufactured by IDEX Health & Science are available in two inert polymers and can handle pressures to 500 psi (34 bar) or 1,000 psi (69 bar), depending upon the configuration of the products. Each is designed with handy mounting holes. All ETFE Tees and Crosses ship complete with 1/4-28 PFA Flangeless nuts and ETFE ferrules, while their PEEK polymer counterparts ship with 1/4-28 PEEK nuts and ETFE ferrules. Replacement fittings are located on pages 25 and 26.




**P-632 & P-633**
ETFE Tees
come with Flangeless Fittings

Biocompatible




**P-722**
PEEK Cross
comes with Flangeless Fittings

## NOTE

- To order just the body of one of our tees and crosses without fittings, simply add a '-01' to the part number — e.g., P-632-01.

## RELATED PRODUCTS

- Seal off unused ports with any of our 1/4–28 flat-bottom plugs found on page 32.
- To use the PEEK polymer versions of our Tees and Crosses in higher pressure applications, simply replace the provided fittings with Super Flangeless™ Nuts and Ferrules, found on pages 21–23.
- High Pressure Tees, Crosses, and a 7-Port Manifold (all with 10-32 threaded ports) are on page 43.

| | Part No. | Description | Threads | Includes | Thru-hole | Swept Volume | Pressure Rating |
|---|---|---|---|---|---|---|---|
| ★ | **P-632** | ETFE Tee for 1/16" OD Tubing | 1/4-28 Flat-Bottom | (3) P-245, (3) P-200N | 0.020" (0.50 mm) | 2.9 µL | 1,000 psi (69 bar) |
| ★ | **P-633** | ETFE Tee for 1/8" OD Tubing | 1/4-28 Flat-Bottom | (3) P-345, (3) P-300N | 0.050" (1.25 mm) | 17.5 µL | 500 psi (34 bar) |
| | **P-634** | ETFE Cross for 1/16" OD Tubing | 1/4-28 Flat-Bottom | (4) P-245, (4) P-200N | 0.020" (0.50 mm) | 3.8 µL | 1,000 psi (69 bar) |
| | **P-635** | ETFE Cross for 1/8" OD Tubing | 1/4-28 Flat-Bottom | (4) P-345, (4) P-300N | 0.050" (1.25 mm) | 22.8 µL | 500 psi (34 bar) |
| ★ | **P-712** | PEEK Tee for 1/16" OD Tubing | 1/4-28 Flat-Bottom | (3) XP-235 | 0.020" (0.50 mm) | 2.9 µL | 1,000 psi (69 bar) |
| ★ | **P-713** | PEEK Tee for 1/8" OD Tubing | 1/4-28 Flat-Bottom | (3) XP-335 | 0.050" (1.25 mm) | 17.5 µL | 500 psi (34 bar) |
| ★ | **P-714** | PEEK Tee for 1/16" OD Tubing | 1/4-28 Flat-Bottom | (3) XP-235 | 0.040" (1.00 mm) | 11.4 µL | 1,000 psi (69 bar) |
| | **P-722** | PEEK Cross for 1/16" OD Tubing | 1/4-28 Flat-Bottom | (4) XP-235 | 0.020" (0.50 mm) | 3.8 µL | 1,000 psi (69 bar) |
| | **P-723** | PEEK Cross for 1/8" OD Tubing | 1/4-28 Flat-Bottom | (4) XP-335 | 0.050" (1.25 mm) | 22.8 µL | 500 psi (34 bar) |

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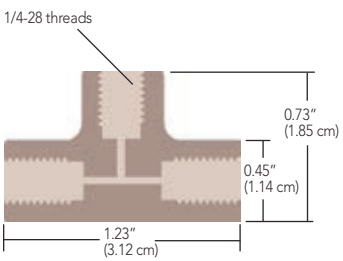
# Manifolds

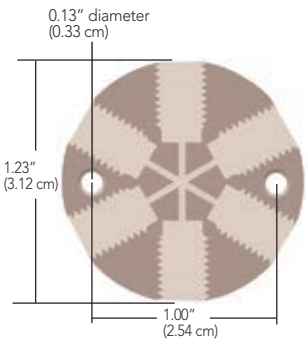
Choose a 5, 7, or 9 Port Manifold to combine several streams into one, or split one fluid stream into several. Each PEEK manifold comes complete with 1/4-28 Super Flangeless™ Fittings for either 1/16" or 1/8" OD tubing, with pressure ratings of 2,000 psi (138 bar) and 500 psi (34 bar), respectively.

A few useful applications include:

- Multiport mixing chamber
- Gas sparging splitting union
- Sample injection onto multi-well plates or a multiple direction flow path union




**Side View**



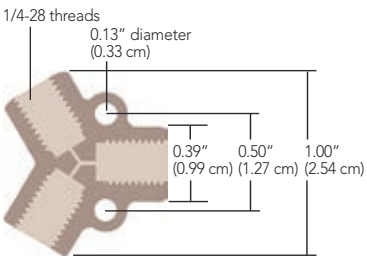

**Top View**

**P-150**
PEEK 7-Port Manifold
comes with Super Flangeless Fittings

# Y Connectors

Upchurch Scientific® PEEK Y Connectors are designed to split a stream or join two streams together, just like a tee. However, the configuration of a tee can lead to turbulent flow and solvent outgassing, which increases baseline noise and reduces sensitivity. The geometry of a Y connector creates less turbulence and thus can improve analytical results.

All of these Y Connectors use 1/4-28 Flangeless fittings, except P-515 which uses 5/16-24 fittings (to accommodate larger tubing).




**P-512**
PEEK Y
comes with Flangeless Fittings

Biocompatible

| | Part No. | Description | Threads | Includes | Thru-hole | Swept Volume | Pressure Rating |
|---|---|---|---|---|---|---|---|
| | **MANIFOLDS** | | | | | | |
| | **Standard** | | | | | | |
| ★ | **P-150** | PEEK 7-Port Manifold for 1/16" OD Tubing | 1/4-28 FB | (7) P-255, (7) P-250 | 0.040" (1.00 mm) | 42.0 µL | 1,000 psi (69 bar) |
| | **P-154** | PEEK 5-Port Manifold for 1/16" OD Tubing | 1/4-28 FB | (5) P-255, (5) P-250 | 0.040" (1.00 mm) | 22.3 µL | 1,000 psi (69 bar) |
| | **P-155** | PEEK 5-Port Manifold for 1/8" OD Tubing | 1/4-28 FB | (5) P-331, (5) P-359 | 0.062" (1.60 mm) | 53.8 µL | 500 psi (34 bar) |
| ★ | **P-190** | PEEK 9-Port Manifold for 1/8" OD Tubing | 1/4-28 FB | (9) P-331, (9) P-359 | 0.062" (1.60 mm) | 160 µL | 500 psi (34 bar) |
| | **P-191** | PEEK 9-Port Manifold for 1/16" OD Tubing | 1/4-28 FB | (9) P-255, (9) P-250 | 0.040" (1.00 mm) | 139 µL | 1,000 psi (69 bar) |
| | **Y CONNECTORS** | | | | | | |
| ★ | **P-512** | PEEK Y for 1/16" OD Tubing | 1/4-28 FB | (3) XP-235 | 0.020" (0.50 mm) | 1.7 µL | 1,000 psi (69 bar) |
| | **P-513** | PEEK Y for 1/8" OD Tubing | 1/4-28 FB | (3) XP-335 | 0.040" (1.00 mm) | 6.0 µL | 500 psi (34 bar) |
| ★ | **P-514** | PEEK Y for 1/8" OD Tubing | 1/4-28 FB | (3) XP-335 | 0.060" (1.50 mm) | 13.6 µL | 500 psi (34 bar) |
| | **P-515** | PEEK Y for 3/16" OD Tubing | 5/16-24 FB | (3) XP-132 | 0.125" (3.20 mm) | 47.7 µL | 500 psi (34 bar) |

*FB = Flat-Bottom*

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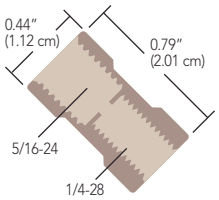
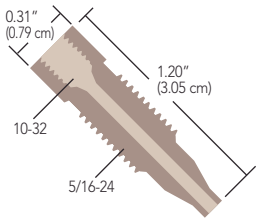
# Threaded Adapters

- Threaded adapters in a variety of configurations
- Both English and Metric threaded adapters offered
- Bring together connectors with different threads
- Manufactured from inert polymers — PEEK, PCTFE, ETFE, and PTFE

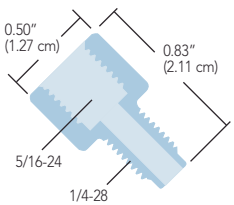
## English Threaded Adapters



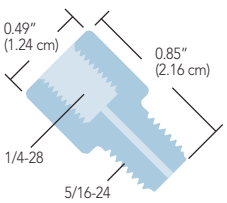

**P-135**
0.080" (2.05 mm) thru-hole



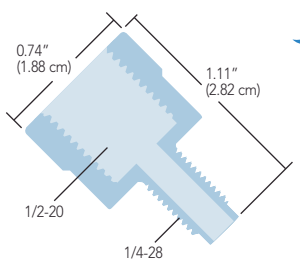

**6000-076**
0.066" (1.70 mm) thru-hole




**P-681**
0.125" (3.20 mm) thru-hole

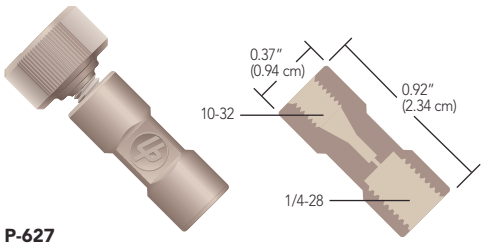



**P-718**
0.040" (1.00 mm) thru-hole

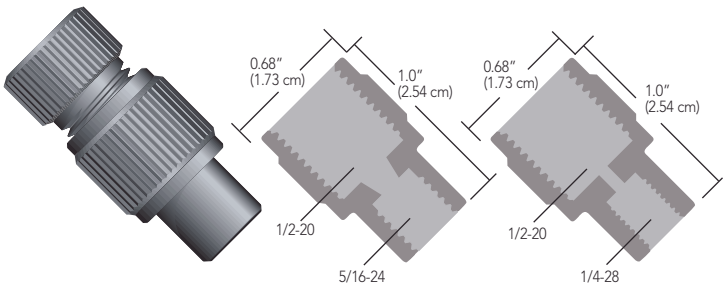



**P-684**
0.130" (3.30 mm) thru-hole

Biocompatible




**P-627**
0.020" (0.50 mm) thru-hole
Includes (1) F-300 for 1/16" OD tubing




**U-659**
Tapered thru-hole
Includes (1) U-650/U-655 for 1/4" OD tubing

**U-665**
0.063" (1.60 mm) thru-hole
Includes (1) U-650/U-655 for 1/4" OD tubing

## RELATED PRODUCTS

- Please refer to our Connections Reference Chart on page 35 for assistance with choosing the right product for your needs.
- Use the Rheodyne® 6000-076 Adapter to connect 1/16" OD tubing to the Rheodyne Preparative-Scale Injector Valve (page 132).

| Part No. | Description | Includes | Thru-hole | Swept Volume | Pressure Rating |
|---|---|---|---|---|---|
| **ENGLISH THREADED ADAPTERS** | | | | | |
| **6000-076** | PEEK Adapter, 5/16-24 C, M to 10-32 C, F | N/A | 0.066" (1.70 mm) | 49.8 µL | 3,000 psi (207 bar) |
| **P-135** | PEEK Adapter, 5/16-24 FB, F to 1/4-28 F | N/A | 0.080" (2.05 mm) | 4.1 µL | 1,000 psi (69 bar) |
| ★ **P-627** | PEEK Adapter, 10-32 C, F to 1/4-28 FB, F | (1) F-300 | 0.020" (0.50 mm) | 0.30 µL | 1,000 psi (69 bar) |
| ★ **P-681** | PCTFE Adapter, 5/16-24 FB, F to 1/4-28 FB, M | N/A | 0.125" (3.20 mm) | 96.6 µL | 1,000 psi (69 bar) |
| **P-684** | PCTFE Adapter, 1/2-20 FB, F to 1/4-28 FB, M | N/A | 0.130" (3.30 mm) | 121.7 µL | 250 psi (17 bar) |
| **P-718** | PCTFE Adapter, 5/16-24 FB, M to 1/4-28 FB, F | N/A | 0.040" (1.00 mm) | 10.3 µL | 1,000 psi (69 bar) |
| **U-659** | PEEK Adapter, 5/16-24 FB, F to 1/2-20 FB, F | (1) XU-655 | Tapered* | 42.0 µL | 250 psi (17 bar) |
| **U-665** | PEEK Adapter, 1/2-20 FB, F to 1/4-28 FB, F | (1) XU-655 | 0.063" (1.60 mm) | 6.6 µL | 250 psi (17 bar) |

*F = Female (internal) threads; M = Male (external) threads; C = Coned; FB = Flat-Bottom*
** Thru-hole tapers from 0.188" (4.80 mm) to 0.125" (3.20 mm).*

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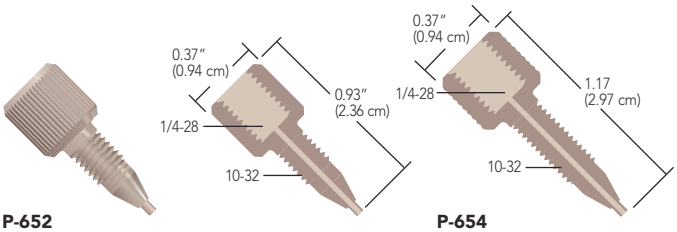
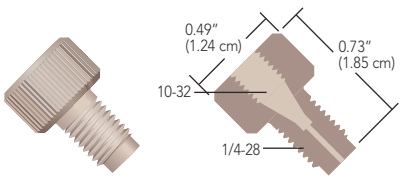
## English Threaded Adapters, cont.

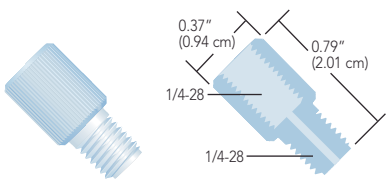



**P-652**
0.030" (0.75 mm) thru-hole
Note the new knurled design

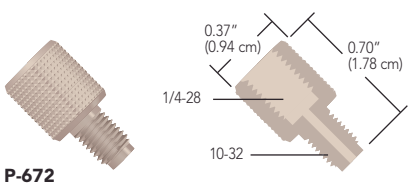
**P-654**
Extra Long, 0.030"
(0.76 mm) thru-hole




**P-669-01**
0.040" (1.00 mm) thru-hole




**P-671**
0.040" (1.00 mm) thru-hole




**P-672**
0.050" (1.25 mm) thru-hole

Biocompatible

## APPLICATION NOTE

### Here are application ideas using two of our popular adapters:

- Many injection valves used in HPLC systems have 10-32 coned ports designed to accept 1/16" OD tubing. However, this may be a problem if large injection volumes are required (in excess of 10 mL). The most popular loops for large volume samples are made from 1/8" OD tubing, making it impossible to connect these larger volume loops to your injection valve. The solution: use our P-654 Adapter and the appropriate fittings for your sample loop. This set-up allows connection of 1/8" OD sample loop leads to your injection valve.
- Another potential application is connecting tubing to low-pressure solenoid valves with 1/4-28 flat-bottom ports. Most low-pressure valves of this type have very shallow threaded ports, which typically preclude the use of our Flangeless Fittings. However, by first threading our P-671 Adapter into the valve port(s), you can effectively use standard 1/4-28 fittings to connect your tubing into the backside of the adapter body. This also saves "wear and tear" on the threads in the valve ports.

## NOTE

- When using an adapter with male (external) threads, we recommend you first attach the adapter body into the receiving port, and then connect your tubing and fitting into the head of the adapter body.

## RELATED PRODUCTS

- You may not need an adapter to connect 1/16" OD tubing into your flat-bottom port. A less expensive alternative is to use a Flangeless Nut and Ferrule starting on page 24 or a Super Flangeless™ Nut and Ferrule starting on page 21. Our Connections Reference chart on page 35 is also a good resource to consult when making connections.

| | Part No. | Description | Includes | Thru-hole | Swept Volume | Pressure Rating |
|---|---|---|---|---|---|---|
| | ENGLISH THREADED ADAPTERS | | | | | |
| ★ | **P-652** | PEEK Adapter, 1/4-28 FB, F to 10-32 C, M | N/A | 0.030" (0.75 mm) | 6.7 µL | 1,000 psi (69 bar) |
| ★ | **P-654** | PEEK Adapter, 1/4-28 FB, F to 10-32 C, M, Extra Long | N/A | 0.030" (0.75 mm) | 9.5 µL | 1,000 psi (69 bar) |
| ★ | **P-669-01** | PEEK Adapter, 10-32 C, F to 1/4-28 FB, M | N/A | 0.040" (1.00 mm) | 6.6 µL | 1,000 psi (69 bar) |
| | **P-671** | PTFE Adapter, 1/4-28 FB, F to 1/4-28 FB, M | N/A | 0.040" (1.00 mm) | 8.0 µL | 1,000 psi (69 bar) |
| | **P-672** | PEEK Adapter, 1/4-28 FB, F to 10-32 FB, M | N/A | 0.050" (1.25 mm) | 11.4 µL | 1,000 psi (69 bar) |

*F = Female (internal) threads; M = Male (external) threads; XL = extra long; C = Coned; FB = Flat-Bottom*
** The pressure ratings of these adapters exceed the pressure holding ability of the fittings and tubing used with them.*

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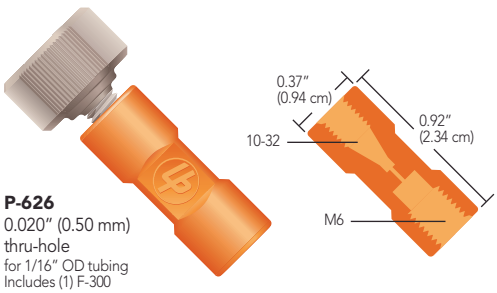
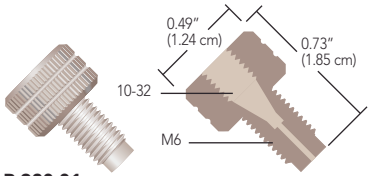
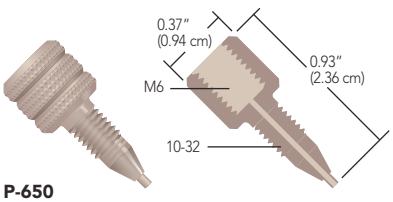
## Metric Threaded Adapters



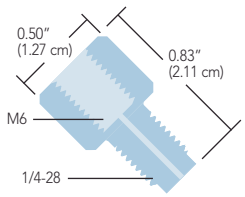

**P-626**
0.020" (0.50 mm) thru-hole
for 1/16" OD tubing
Includes (1) F-300



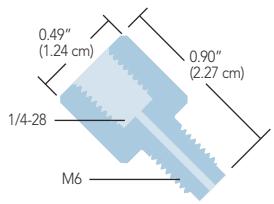

**P-920-01**
0.040" (1.00 mm) thru-hole



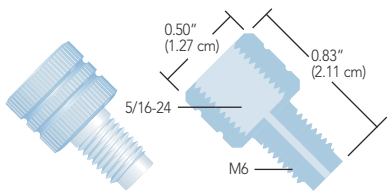

**P-650**
0.030" (0.75 mm) thru-hole




**P-670**
0.030" (0.75 mm) thru-hole




**P-694**
0.040" (1.00 mm) thru-hole




**P-673**
0.040" (1.00 mm) thru-hole

## RELATED PRODUCTS

- For an alternative to the Female M6 Adapters presented in the left column of this page, try a P-602 or P-622 Low Pressure Metric Union from page 40, along with the appropriate Metric Flangeless Fittings on page 27.
- To direct connect your tubing into a flat-bottom port, find the appropriate Flangeless or Super Flangeless™ Fittings on pages 24–27 and 21–23 respectively.
- Need metric fittings for your connections? See page 27.

| Part No. | Description | Includes | Thru-hole | Swept Volume | Pressure Rating |
|---|---|---|---|---|---|
| **METRIC M6 THREADED ADAPTERS** | | | | | |
| **P-626** | PEEK Adapter, 10-32 C, F to M6 FB, F | (1) F-300 | 0.020" (0.50 mm) | 0.3 µL | 1,000 psi (69 bar) |
| ★ **P-650** | PEEK Adapter, M6 FB, F to 10-32 C, M Standard | N/A | 0.030" (0.75 mm) | 6.7 µL | 1,000 psi (69 bar) |
| **P-670** | PCTFE Adapter, M6 FB, F to 1/4-28 FB, M | N/A | 0.030" (0.75 mm) | 2.6 µL | 1,000 psi (69 bar) |
| **P-673** | PCTFE Adapter, 5/16-24 FB, F to M6 FB, M | N/A | 0.040" (1.00 mm) | 9.9 µL | 1,000 psi (69 bar) |
| **P-694** | PCTFE Adapter, 1/4-28 FB, F to M6 FB, M | N/A | 0.040" (1.00 mm) | 11.3 µL | 1,000 psi (69 bar) |
| **P-920-01** | PEEK Adapter, 10-32 C, F to M6 FB, M | N/A | 0.040" (1.00 mm) | 8.0 µL | 1,000 psi (69 bar) |

*F = Female (internal) threads; M = Male (external) threads; C = Coned; FB = Flat-Bottom*
** The pressure rating of this adapter exceeds the pressure holding ability of the fittings and tubing used with it.*

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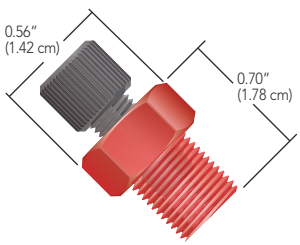
# External National Pipe Thread Adapters

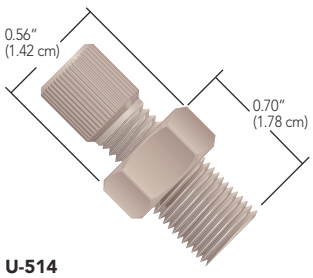
These adapters make connections to female 1/8" and 1/4" National Pipe Thread (NPT) ports.

Manufactured from PEEK polymer by IDEX Health & Science, Upchurch Scientific® NPT Adapters are durable and chemically resistant. We provide versions with either 1/4-28 or 5/16-24 flat-bottom threads, suitable for most low pressure applications.

*Please Note: Wrap the threads on the NPT side of these adapters with thread seal tape (plumber's tape) to ensure a leak-free seal.*




**U-510**
1/8" NPT to 1/4-28 Flat-Bottom Female Adapter
for 1/8" OD tubing
Includes (1) XP-308 Fitting




**U-514**
1/8" NPT to 5/16-24 Flat-Bottom Female Adapter
for 3/16" OD tubing
Includes (1) XP-132 Fitting

Biocompatible

## APPLICATION NOTE

Our U-500 and U-510 NPT Adapters are great for attaching 1/8" OD fluoropolymer sparging lines to sparging gas tank regulating valves. Simply thread the appropriately-sized NPT Adapter into the valve's receiving port and then attach your sparging tubing to the adapter body using the fittings provided.

## RELATED PRODUCTS

Replacement fittings for these adapters are located on the pages indicated below:

| | Page(s) |
|---|---|
| 1/4-28 for 1/8" OD tubing | 26 |
| 5/16-24 for 1/8" OD tubing | 23, 30 |
| 5/16-24 for 3/16" OD tubing | 30 |

Other tubing/fitting combinations are available. For more information, please contact your local Distributor or IDEX Health & Science directly.

| Part No. | Description | Color | Tubing OD | Includes | Thru-hole | Swept Volume | Pressure Rating |
|---|---|---|---|---|---|---|---|
| **1/8" MALE NPT ADAPTERS** | | | | | | | |
| ★ **U-510** | PEEK 1/8" NPT, M to 1/4-28 FB, F Adapter | Red | 1/8" | (1) XP-308 | 0.062" (1.60 mm) | 17.3 µL | 500 psi (34 bar) |
| **U-514** | PEEK 1/8" NPT, M to 5/16-24 FB, F Adapter | Natural | 3/16" | (1) XP-132 | 0.125" (3.2 mm) | 70.4 µL | 500 psi (34 bar) |
| **1/4" MALE NPT ADAPTERS** | | | | | | | |
| **U-500** | PEEK 1/4" NPT, M to 1/4-28 FB, F Adapter | Red | 1/8" | (1) XP-308 | 0.062" (1.60 mm) | 17.3 µL | 500 psi (34 bar) |
| **U-504** | PEEK 1/4" NPT, M to 5/16-24 FB, F Adapter | Natural | 3/16" | (1) XP-132 | 0.125" (3.2 mm) | 70.4 µL | 500 psi (34 bar) |

*F = Female (internal) threads; M = Male (external) threads; FB = Flat-Bottom*

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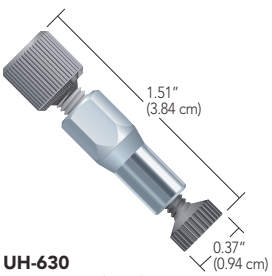
# MicroTight Adapters

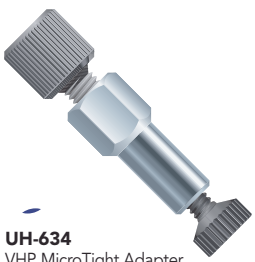
- Convenient adapters for common 1/16" OD to capillary tubing
- Direct connect to 1/32" OD or 360 µm OD tubing options available
- VHP adapters pressure rated to 12,000 psi (828 bar)

Create a true zero dead volume (ZDV) connection between 1/16" OD tubing and capillary tubing with these Upchurch Scientific® MicroTight Adapters.

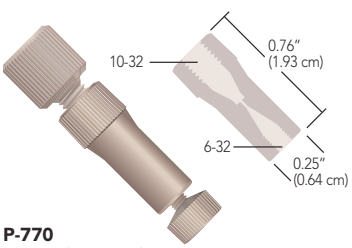
For Very High Pressure applications the UH-630 will connect 1/16" OD to 1/32" OD tubing in an inline true ZDV connection with the ability to withstand 12,000 psi (828 bar)! The materials of construction also allow this product to be used up to 200 °C, which reduces the pressure rating to 8,000 psi (552 bar). For more information on the fittings used with the VHP adapter, please see page 9.




**UH-630**
VHP MicroTight Adapter
for 1/16" and 1/32" OD tubing with fittings included

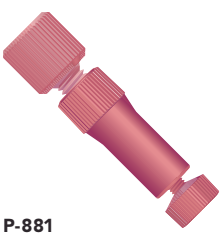


**UH-634**
VHP MicroTight Adapter
for 1/16" and 360 µm OD tubing with fittings included

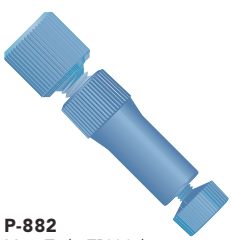



**P-770**
MicroTight ZDV Adapter
for 1/16" OD to MicroTight Sleeves with fittings included

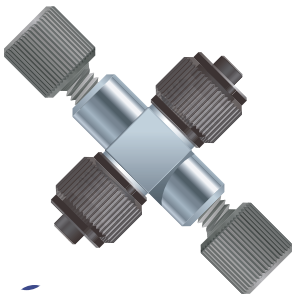
**1958-01**
VHP MicroTight Adapter
10-32 Coned for 1/16" OD tubing and M4x0.7 for 1/32" OD tubing



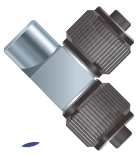
**P-881**
MicroTight ZDV Adapter
for 1/16" to 1/32" OD tubing with fittings included



**P-882**
MicroTight ZDV Adapter
for 1/16" to 360 µm OD tubing with fittings included



**UH-906**
VHP MicroTight Adapting Cross
10-32 Coned for 1/16" OD tubing and 5/16-24 Coned for 360 µm OD tubing



**UH-753**
VHP MicroTight Adapting Tee
360 µm (2 ports) to 10-32 C for 1/16" OD tubing (1 port)

**UH-631-01**
VHP MicroTight Adapter
10-32 Coned for 1/16" OD tubing and 6-40 Coned for 1/32" OD tubing fittings not included

## NOTE

While many 10-32 coned fittings are interchangeable, coned fittings using different threads are generally not interchangeable. As such, IDEX Health & Science recommends that only the style of coned fittings that accompanies these connectors be used for replacements.

## RELATED PRODUCTS

- Replacement 6-32 fittings are on page 54.
- Replacement F-120 style nuts are on page 11 (when ordering, replace the "x" with an "R" or "B" to order either red or blue fittings).
- Use this list to find micro flow products outside this chapter.


| | Page |
|---|---|
| 360 µm, 510 µm (0.020"), and 1/32" OD PEEK Tubing | 67 |
| 360 µm OD Fused Silica Tubing | 67 |
| 1/16" and 1/32" OD PEEKsil™ Tubing | 68 |
| 1/32" OD FEP Tubing | 71 |
| 360 µm OD High Purity PFA Tubing | 72 |
| 510 µm (0.020") and 1/32" OD Stainless Steel Tubing | 64 |
| Polymer Capillary and Fused Silica Tubing Cutters | 74 |
| Rheodyne® MX Series II™ Injection and Switching Valves | 130 |
| Rheodyne Manual Injection Valves | 132 |
| Micro Injection Port Adapters | 143 |
| Micro-Splitter Valves | 146 |
| Micro-Metering Valves | 147 |
| Microbore Guard Column | 172 |
| Ultra-Low Volume Back-Pressure Regulators | 154 |
| Nonmetallic 10-32 Micro-Volume Inline Check Valve | 149 |
| Ismatec® Peristaltic Tubing Pumps | 92 |


| | Part No. | Description | Threads | Includes | Color | Swept Volume | Pressure Rating |
|---|---|---|---|---|---|---|---|
| | **MICROTIGHT ADAPTERS** | | | | | | |
| ★ | **P-770** | PEEK Micro Adapter, True ZDV, for 1/16" OD Tubing to MicroTight Tubing Sleeve | 10-32 C to 6-32 C | (1) F-120, (1) F-125, (1) P-554 | Natural | N/A | 4,000 psi (276 bar) |
| | **P-881** | PEEK Micro Adapter, True ZDV, for 1/16" to 1/32" OD Tubing | 10-32 C to 6-32 C | (1) F-120R, (1) F-126S, (1) P-554 | Red | N/A | 5,000 psi (345 bar) |
| ★ | **P-882** | PEEK Micro Adapter, True ZDV, for 1/16" to 360 µm OD Tubing | 10-32 C to 6-32 C | (1) F-120B, (1) F-124S, (1) P-554 | Blue | N/A | 5,000 psi (345 bar) |
| | **UH-630** | Stainless Steel VHP Micro Adapter, for 1/16" to 1/32" OD Tubing | 10-32 C to 6-32 C | (1) PK-120BLK, (1) PK-126, (1) P-554 | SST/Black | N/A | 12,000 psi (827 bar) |
| NEW! | **UH-634** | Stainless Steel VHP Micro Adapter, for 1/16" to 360 µm OD Tubing | 10-32 C to 6-32 C | (1) PK-120BLK, (1) PK-124, (1) P-554 | SST/Black | N/A | 12,000 psi (827 bar) |
| NEW! | **UH-753** | Stainless Steel VHP Micro Adapting Tee, for 1/16" to 360 µm OD Tubing | 10-32 C to 5/16-24 C | (2) P-416BLK, (2) PK-152 | SST/Black | 152 nL | 15,000 psi (1,035 bar)* |
| NEW! | **1958-01** | Stainless Steel VHP Micro Adapter, for 1/16" to 1/32" OD Tubing | 10-32 C to M4x0.7 C | N/A | SST | 16 nL | 30,000 psi (2,070 bar)* |
| NEW! | **UH-631-01** | Stainless Steel VHP Micro Adapter, for 1/16" to 1/32" OD Tubing | 10-32 C to 6-40 C | N/A | SST | 13 nL | 30,000 psi (2,070 bar)* |
| NEW! | **UH-906** | Stainless Steel VHP Micro Adapting Cross, for 1/16" to 360 µm OD Tubing | 10-32 C to 5/16-24 C | (2) PK-120BLK, (2) P-416BLK, (2) PK-152 | SST/Black | 0.11 µL | 15,000 psi (1,035 bar)* |
| | **REPLACEMENT GAUGE PLUGS (TO ACHIEVE TRUE ZDV CONNECTIONS WITH THE ABOVE ADAPTERS)** | | | | | | |
| | **P-554** | Delrin® Gauge Plug | 10-32 C | | White | N/A | N/A |

*C = Coned*
** Pressure rating depends upon the fitting used.*

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# NanoPort Assemblies

- For lab-on-a-chip applications
- Options to connect 360 µm, MicroTight® tubing sleeves, 1/32" OD or 1/16" OD tubing
- Wetted materials: PEEK and perfluoroelastomer

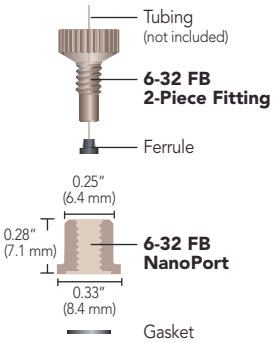
Upchurch Scientific® NanoPort Assemblies provide consistent fluid connections for chip-based analyses. Once attached, NanoPort connections can withstand pressures to 1,000 psi (69 bar).* NanoPorts will adhere to silicon, quartz, glass and some polymers.

All NanoPort components are made of inert, biocompatible PEEK polymer (nuts and ports) and Perlast® perfluoroelastomer (ferrules and gaskets). These products bond easily to chip surfaces with the provided Preformed Adhesive Rings (see Application Note below). Their unique design also prevents adhesive contamination of the fluid path. And NanoPort connections add no additional volume to the fluid path, virtually eliminating dead volume traditionally associated with chip-based fluid connections.

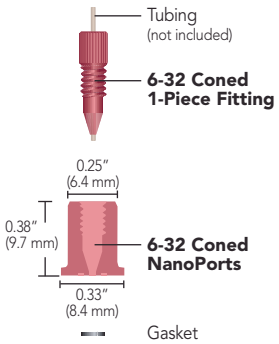
Our NanoPort Reservoir Assembly is designed for open well applications, such as CE.

**Except the N-333 NanoPort Assembly, which is rated to 500 psi (34 bar).*

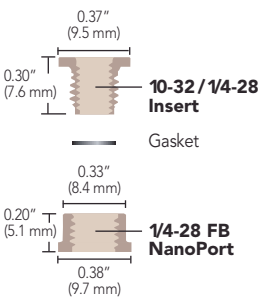
## 6-32 Flat-Bottom Assemblies



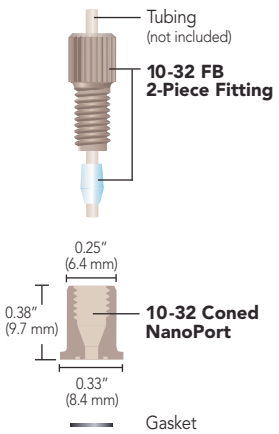

## 6-32 Coned Assemblies




## Reservoir Assembly




## 10-32 Coned Assembly




## APPLICATION NOTE

### NanoPort Adhesive Cure Requirements

- Preformed Adhesive Rings (included with each order).

| Cure Temperature | Cure Time |
|---|---|
| 165–177 °C (330–350 °F) | 1 hour |

- Place clamped Ports in oven at a temperature of 165–177 °C (330–350 °F) for one hour to develop a complete bond between the Port and the substrate.
- Due to differences in thermal expansion rates, IDEX Health & Science does not recommend the use of the Preformed Adhesive Rings when connecting NanoPorts to metal substrates. For information on this, for information regarding the adherence of NanoPorts to other polymer substrates, or for information on other adhesive options, please contact us or your authorized Distributor directly.

### NanoPort Reservoir Applications

- Sample reservoir.
- Open wells for capillary electrophoresis.
- Syringe injection or flushing/priming, using our P-604 Luer Adapter, page 55, and luer syringe (such as our B-310) on page 55.

See following page for replacement parts

| Part No. | Nut | Ferrule | For Chip Hole (dia. x depth) | For Tubing OD | Qty. |
|---|---|---|---|---|---|
| NANOPORT ASSEMBLIES | | | | | |
| **6-32 Flat-Bottom NanoPort Assemblies** | | | | | |
| **N-121S** | F-123S | N-123-04 | 0.04" x 0.04" (1.0 mm x 1.0 mm) | 360 µm | ea. |
| **N-123H** | F-123H | N-123-03 | 0.04" (1.0 mm) dia. or less | 360 µm | ea. |
| **N-123S** | F-123S | N-123-03 | 0.04" (1.0 mm) dia. or less | 360 µm | ea. |
| **6-32 Coned NanoPort Assemblies** | | | | | |
| **N-124S** | F-124S | None | Up to 0.063" (1.6 mm) | 360 µm | ea. |
| **N-125S** | F-125 | None | Up to 0.063" (1.6 mm) | 70–520 µm[1] | ea. |
| **N-126H** | F-126H | None | Up to 0.063" (1.6 mm) | 1/32" | ea. |
| **N-126S** | F-126S | None | Up to 0.063" (1.6 mm) | 1/32" | ea. |
| **10-32 Coned NanoPort Assembly** | | | | | |
| ★ **N-333** | F-333N | F-142N | Up to 0.063" (1.6 mm) | 1/16" | ea. |
| **NanoPort Reservoir Assembly** | | | | | |
| **N-131** | 80 µL Reservoir with Insert | | | | ea. |

*[1] Designed to use our MicroTight® Tubing Sleeves (page 19) to connect tubing OD sizes from 70–520 µm.*

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# NanoPort Assemblies (cont.)

## NOTE

To select the appropriate NanoPort assembly you will need to consider:

- Size of tubing you are connecting
- Dimensions of the chip hole
- Fitting style (one-piece or two-piece fittings)
- Nut head style (standard or headless nut)

*Please Note: Each NanoPort Assembly includes a fitting (one- or two-piece), a NanoPort, gasket, a 2-pack of preformed adhesive rings, and a clamp for holding the port in place while the adhesive cures.*

Full NanoPort Assemblies can be found on the previous page

| | Part No. | Description | Threads | For Chip Hole | Tubing OD | Qty. |
|---|---|---|---|---|---|---|
| | **NANOPORT REPLACEMENT PARTS** | | | | | |
| | **Fittings** | | | | | |
| | **F-123Hx** | Headless Nuts | 6-32 FB | N/A | 360 µm | 10-pk |
| | **F-123Sx** | Standard Head Nuts | 6-32 FB | N/A | 360 µm | 10-pk |
| | **F-124Sx** | Standard Head Fittings | 6-32 C | N/A | 360 µm | 10-pk |
| ★ | **F-125x** | Standard Head Fittings | 6-32 C | N/A | 70–520 µm[1] | 10-pk |
| | **F-126Hx** | Headless Fittings | 6-32 C | N/A | 1/32" | 10-pk |
| | **F-126Sx** | Standard Head Fittings | 6-32 C | N/A | 1/32" | 10-pk |
| | **F-333Nx** | Headless Fittings | 10-32 C | Up to 0.063" (1.6 mm) | 1/16" | 10-pk |
| | **F-142Nx** | Ferrules | 10-32 C | Up to 0.063" (1.6 mm) | 1/16" | 10-pk |
| ★ | **N-123-03x** | Ferrules | 6-32 FB | 0.04" (1.0 mm) dia. or less | 360 µm | 10-pk |
| ★ | **N-123-04x** | Ferrules | 6-32 FB | 0.04" x 0.04" (1.0 mm x 1.0 mm) | 360 µm | 10-pk |
| | **N-123-05x** | Ferrules | 6-32 FB | 0.04" x 0.06" (1.0 mm x 1.5 mm) | 360 µm | 10-pk |
| | **Gaskets** | | | | | |
| | **N-123-02** | Gasket, For all assemblies *except* 6-32 Coned Assemblies | | N/A | N/A | ea. |
| | **N-124-02** | Gasket, For 6-32 Coned Assemblies | | N/A | N/A | ea. |
| | **Adhesives and Clamp** | | | | | |
| | **N-006** | Clamp | | N/A | N/A | ea. |
| ★ | **N-100-01** | Preformed Adhesive Rings | | N/A | N/A | 2-pk |

[1] *Designed to use our MicroTight® Tubing Sleeves (page 19) to connect tubing OD sizes from 70–520 µm.*
*Abbreviation Definitions: FB = Flat-Bottom; C = Coned; N/A = Not Applicable*

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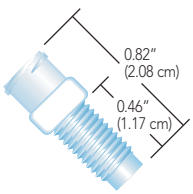
# Quick Connect Luer Adapters

- Delrin®, polypropylene, ETFE, or PEEK Versions
- Adapts luers to 1/4-28, 10-32, 5/16-24, or M6 threaded ports

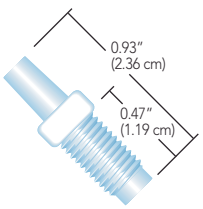
These luer adapters were designed to work in a variety of applications. By connecting any male luer to any female luer, you can create your own quick connect union or adapter. Each Upchurch Scientific® Quick Connect Luer Adapter conforms to ISO requirements for medical luer taper configuration and performance (45 psi/3.1 bar).

Find fittings to connect tubing to the threaded ports of these adapters in the Fittings chapter, starting on page 4.

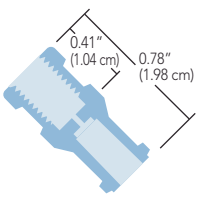
*Please Note: Our Female Quick Connect Luer Adapters can be used with any of the Male Luers on this page, i.e., those with and without lock hubs.*



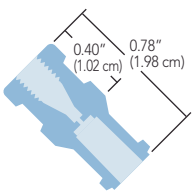

**P-604, P-618, P-624**
Female Luer to 1/4-28 Male
(luer end of P-604 different than shown)



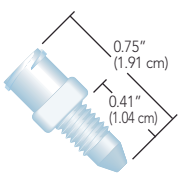

**P-619, P-625**
Male Luer to 1/4-28 Male



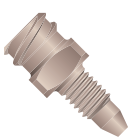

**P-628**
Female Luer to 1/4-28 Female



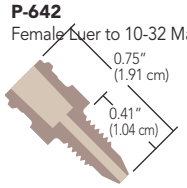

**P-629**
Female Luer to 10-32 Female

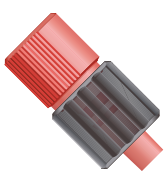



**P-642**
Female Luer to 10-32 Male

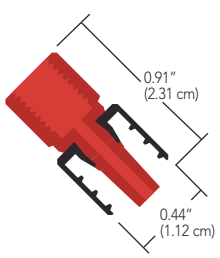


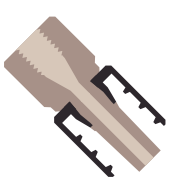
**P-719**
Female Luer to 10-32 Male



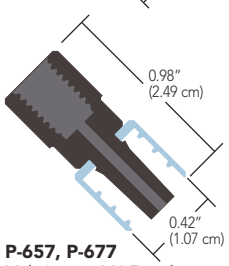



**P-655, P-675**
Male Luer to 1/4-28 Female

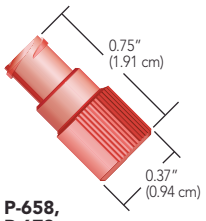


**P-656**
Male Luer to 10-32 Female

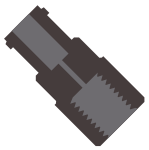



**P-657, P-677**
Male Luer to M6 Female

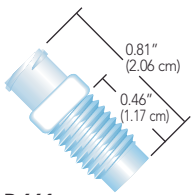



**P-658, P-678**
Female Luer to 1/4-28 Female

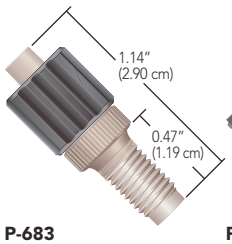
**P-659**
Female Luer to 10-32 Female



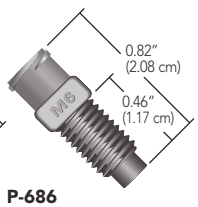
**P-660, P-680**
Female Luer to M6 Female




**P-661**
Female Luer to 5/16-24 Male




**P-683**
Male Luer to 1/4-28 Male




**P-686**
Female Luer to M6 Male

## APPLICATION NOTE

- Our A-626 Bottle Cap Plug (page 159) can be used to plug any of the female luer adapters on this page.
- To prevent a chemical spill when disconnecting your solvent reservoir tubing from the pump, try our Quick-Stop Luer Check Valve on page 151.
- To economically prime an HPLC pump, simply remove the 10-32 fitting on the outlet check valve (standard on most models), insert a P-642 luer adapter, attach a syringe (such as our B-310) and draw the mobile phase through the pump head.

| | Part No. | Description | Body Material | Lock Hub Material | Thru-hole |
|---|---|---|---|---|---|
| | **QUICK CONNECT LUER ADAPTERS** | | | | |
| | **P-604** | F Luer to 1/4-28 FB, M | Nat. Delrin | N/A | 0.05" (1.3 mm) |
| | **P-618** | F Luer to 1/4-28 FB, M | Nat. PP | N/A | 0.05" (1.3 mm) |
| | **P-619** | M Luer to 1/4-28 FB, M | Nat. PP | None * | 0.05" (1.3 mm) |
| ★ | **P-624** | F Luer to 1/4-28 FB, M | Nat. ETFE | N/A | 0.05" (1.3 mm) |
| ★ | **P-625** | M Luer to 1/4-28 FB, M | Nat. ETFE | None * | 0.04" (1.0 mm) |
| ★ | **P-628** | F Luer to 1/4-28 FB, F | Nat. ETFE | N/A | 0.04" (1.0 mm) |
| | **P-629** | F Luer to 10-32 C, F | Nat. ETFE | N/A | 0.04" (1.0 mm) |
| ★ | **P-642** | F Luer to 10-32 C, M | Nat. ETFE | N/A | 0.05" (1.3 mm) |
| ★ | **P-655** | M Luer to 1/4-28 FB, F | Red PEEK | Black PEEK | 0.04" (1.3 mm) |
| ★ | **P-656** | M Luer to 10-32 C, F | Nat. PEEK | Black PEEK | 0.05" (1.3 mm) |
| | **P-657** | M Luer to M6 FB, F | Black PEEK | Black PEEK | 0.05" (1.3 mm) |
| ★ | **P-658** | F Luer to 1/4-28 FB, F | Red PEEK | N/A | 0.05" (1.3 mm) |
| ★ | **P-659** | F Luer to 10-32 C, F | Nat. PEEK | N/A | 0.05" (1.3 mm) |
| | **P-660** | F Luer to M6 FB, F | Black PEEK | N/A | 0.05" (1.3 mm) |
| | **P-661** | F Luer to 5/16-24 FB, M | Nat. ETFE | N/A | 0.05" (1.3 mm) |
| ★ | **P-675** | M Luer to 1/4-28 FB, F | Red ETFE | Natural PP | 0.05" (1.3 mm) |
| | **P-677** | M Luer to M6 FB, F | Black ETFE | Natural PP | 0.05" (1.3 mm) |
| ★ | **P-678** | F Luer to 1/4-28 FB, F | Red ETFE | N/A | 0.05" (1.3 mm) |
| | **P-680** | F Luer to M6 FB, F | Black ETFE | N/A | 0.05" (1.3 mm) |
| ★ | **P-683** | M Luer to 1/4-28 FB, M | Nat. PEEK | Black PEEK | 0.04" (1.0 mm) |
| ★ | **P-686** | F Luer to M6 FB, M | Black ETFE | N/A | 0.05" (1.3 mm) |
| NEW! | **P-719** | F Luer to 10-32 C, M | Nat. PEEK | N/A | 0.05" (1.3 mm) |
| | **SYRINGE WITH MALE LUER LOCK** | | | | |
| | **B-310** | 10 cc Disposable Luer-Lock Syringe For use with any Female Luer Adapter | | | 0.05" (1.3 mm) |

*F = Female (internal) threads; M = Male (external) threads; Nat. = Natural; N/A = Not Applicable; PP = Polypropylene; FB = Flat-Bottom; C = Coned*
** Slip-type male luer.*

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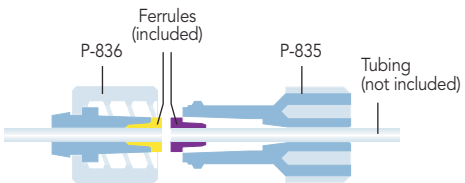
# LuerTight™ Fittings

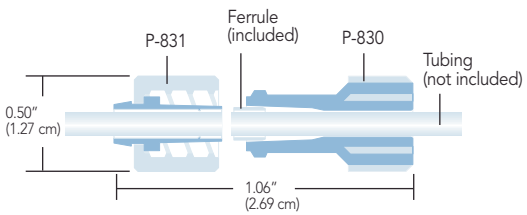
- Luer fittings for fluoropolymer tubing
- Quick disconnect and barbless
- For 1/16" and 1/8" OD tubing

Upchurch Scientific® LuerTight fittings are specifically designed to connect fluoropolymer tubing without barbs or nuts! By integrating ferrules into the luer bodies, LuerTights will reliably hold your tubing in place while giving you the convenience of a luer connection. An inline set of LuerTight fittings provides a quick and easy disconnection option. LuerTight connections are also less bulky and more economical than nut-to-luer style fittings.

The bodies of these products are manufactured from polypropylene and the ferrules, where used, are made of ETFE.




**P-837**
LuerTight Fittings System
for 1/16" OD tubing



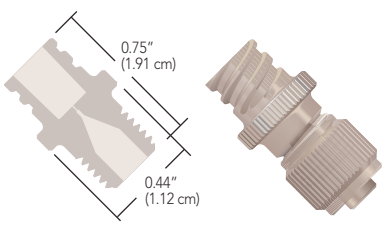

**P-838**
LuerTight Fittings System
for 1/8" OD tubing

# Luer-To-MicroTight® Adapter

- Easily connect 360 µm OD tubing to a syringe

The Upchurch Scientific Luer-to-MicroTight Adapter is ideal for infusing sample into lab-on-a-chip devices. This product is made entirely of biocompatible PEEK polymer and introduces only 14 nL of additional volume to the flow path. Use it to directly connect a luer-tip syringe or other product that terminates with a standard male luer to 360 µm OD capillary tubing without tubing sleeves (see photo). MicroTight Fittings are included.

*P-662 Luer-to-MicroTight Adapter, shown with a B-310 Syringe (page 55) and PEEK capillary tubing (page 67), not included.*




**P-662**
Luer-To-MicroTight Adapter
for Luer to 360 µm OD tubing
with fittings included

Biocompatible

## NOTE

LuerTight fittings are designed to be used exclusively within the LuerTight family. Combining LuerTight fittings with non-LuerTight luer products may result in a poor connection.

## ORDER ONLINE

| Part No. | Description | Includes | Thru-hole | Pressure Rating |
|---|---|---|---|---|
| **LUERTIGHT FITTINGS SYSTEMS** | | | | |
| ★ **P-837** | LuerTight System for 1/16" OD Tubing | (1) P-835, (1) P-836, (1) P-830T | N/A | 100 psi (7 bar) |
| **P-838** | LuerTight System for 1/8" OD Tubing | (1) P-830, (1) P-831, (1) P-830T | N/A | 100 psi (7 bar) |
| **LUERTIGHT FITTING COMPONENTS** | | | | |
| **P-830** | Female Fitting for 1/8" OD Tubing | (1) Ferrule | N/A | N/A |
| **P-830T** | Set Plug to swage Ferrules into P-835 and P-830 | N/A | N/A | N/A |
| **P-831** | Male Fitting for 1/8" OD Tubing | No Ferrule Required | N/A | N/A |
| **P-835** | Female Fitting for 1/16" OD Tubing | (1) Ferrule | N/A | N/A |
| **P-836** | Male Fitting for 1/16" OD Tubing | (1) Ferrule | N/A | N/A |
| **LUER-TO-MICROTIGHT ADAPTER** | | | | |
| ★ **P-662** | Luer-to-MicroTight Adapter | (1) F-152, (1) P-416 | 0.006" (0.150 mm) | 45 psi (2.4 bar) |

*Female = internal receiving luer pocket; Male = external luer nose (surrounded by internally-threaded locking ring)*

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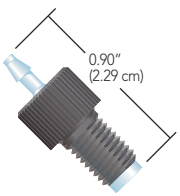
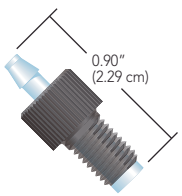
# Swivel Barb Adapters

- Barb connection spins freely from the nut to prevent twist during installation
- Manufactured from polypropylene

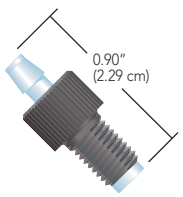
The new Swivel Barb Adapters from Upchurch Scientific® are made up of two captive pieces acting as a one-piece fitting for ease of use. Manufactured from polypropylene and available in three barb sizes, the Swivel Barb will facilitate connection between flexible tubing to a 1/4-28 flat-bottom port. The barbed insert spins freely from the threaded nut in order to prevent the tubing from twisting during installation.




**D-646**
1/4-28 to 1/16" ID tubing




**D-647**
1/4-28 to 3/32" ID tubing



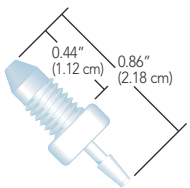

**D-648**
1/4-28 to 1/8" ID tubing

Biocompatible

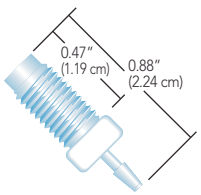
# Thread to Barbed Adapters

- Three barb sizes, for 1/16", 1/8", and 3/16" ID flexible tubing
- Adapt to 1/4-28 flat-bottom, 5/16-24 flat-bottom, or 10-32 coned receiving ports

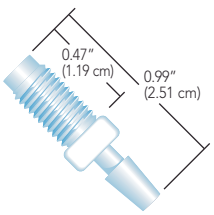
These Upchurch Scientific adapters make it easy to connect flexible tubing to any standard 1/4-28 flat-bottom or 10-32 coned receiving port. Simply thread the adapter into a receiving port and slip tubing over the barbed stem to create a reliable low pressure connection.



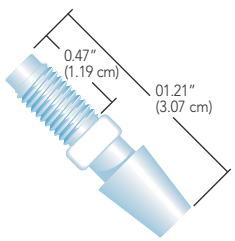

**P-663**
10-32 to 1/16" ID tubing



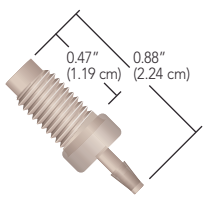

**P-646**
1/4-28 to 1/16" ID tubing



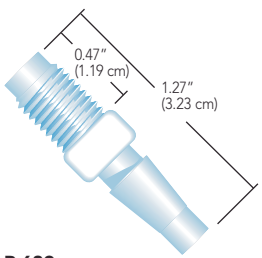

**P-647**
1/4-28 to 1/8" ID tubing



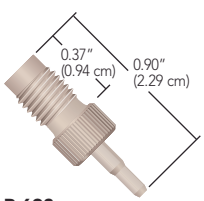

**P-648**
1/4-28 to 3/16" ID tubing




**P-668**
1/4-28 to 1/16" ID tubing




**P-689**
5/16-24 to 3/16" ID tubing




**P-692**
1/4-28 to 0.020"–1/32"ID tubing

## RELATED PRODUCTS

- To connect low pressure fluoropolymer tubing, try the LuerTight™ Adapters on page 56.
- To connect peristaltic tubing to low pressure fluoropolymer tubing, see page 60.
- For peristaltic tubing, see pages 75–89.

| Part No. | Description | Material | Threads | Thru-hole |
|---|---|---|---|---|
| **SWIVEL BARB ADAPTERS** | | | | |
| **D-646** | Swivel Barb Adapter, 1/16" (1.55 mm) ID Tubing | Polypropylene | 1/4-28 Flat-Bottom | 0.03" (0.75 mm) |
| **D-647** | Swivel Barb Adapter, 3/32" (2.40 mm) ID Tubing | Polypropylene | 1/4-28 Flat-Bottom | 0.056" (1.5 mm) |
| **D-648** | Swivel Barb Adapter, 1/8" (3.20 mm) ID Tubing | Polypropylene | 1/4-28 Flat-Bottom | 0.08" (2.0 mm) |
| **THREAD TO BARBED ADAPTERS** | | | | |
| ★ **P-663** | Barb Adapter, 1/16" (1.55 mm) ID Tubing | ETFE | 10-32 Coned | 0.04" (1.0 mm) |
| ★ **P-646** | Barb Adapter, 1/16" (1.55 mm) ID Tubing | ETFE | 1/4-28 Flat-Bottom | 0.04" (1.0 mm) |
| ★ **P-647** | Barb Adapter, 1/8" (3.20 mm) ID Tubing | ETFE | 1/4-28 Flat-Bottom | 0.08" (2.0 mm) |
| **P-648** | Barb Adapter, 3/16" (4.75 mm) ID Tubing | ETFE | 1/4-28 Flat-Bottom | 0.10" (2.5 mm) |
| ★ **P-668** | Barb Adapter, 1/16" (1.55 mm) ID Tubing | PEEK | 1/4-28 Flat-Bottom | 0.04" (1.0 mm) |
| **P-689** | Barb Adapter, 3/16" (4.75 mm) ID Tubing | ETFE | 5/16-24 Flat-Bottom | 0.10" (2.5 mm) |
| **P-692** | Barb Adapter, 0.020" to 1/32" (0.50 to 0.80 mm) ID Tubing | PEEK | 1/4-28 Flat-Bottom | 0.02" (0.5 mm) |

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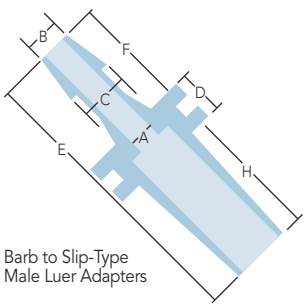
# Barbed Adapters

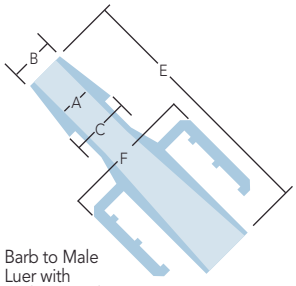
- Adapters on this page feature various luer to barb adaptations
- Adapters on the next page feature a variety of barb-to-barb connectors

Use these barbed adapters to connect peristaltic-type flexible tubing for general, low pressure applications, such as plumbing Ismatec® Peristaltic Pumps (listed on pages 92–108).

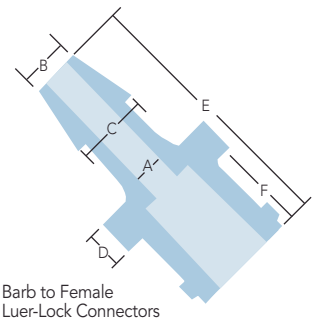
The polypropylene used to manufacture the majority of these products is a Class VI material. Due to the low melt point of polypropylene (PP), these adapters are not autoclavable, however, they can be sterilized via gamma radiation. There are also Barb to Female Luer-Lock connectors available from ETFE, which has superior solvent resistance and a higher temperature rating (80 °C).



Barb to Slip-Type
Male Luer Adapters



Barb to Male
Luer with
Lock Ring Adapters



Barb to Female
Luer-Lock Connectors

| Part No. | Description | Material |
|---|---|---|
| **BARB TO SLIP-TYPE MALE LUER ADAPTERS (10-PK)** | | |
| **P-854x** | Male Luers (Slip-type) for use with 1/16" ID (1.55 mm) Tubing<br>A=0.046" B=0.064" C=0.090" D=0.129" E=0.711" F=0.198" H=0.384" | PP |
| *These slip-type male luer fittings are for use in systems for which luer lock rings are not desired.* | | |
| **BARB TO MALE LUER WITH LOCK RING ADAPTERS (10-PK)** | | |
| **P-850x** | Male Luers with Lock Ring for use with 1/16" ID (1.55 mm) Tubing<br>A=0.049" B=0.065" C=0.090" E=0.583" F=0.434" | PP |
| **P-851x** | Male Luers with Lock Ring for use with 3/32" ID (2.40 mm) Tubing<br>A=0.071" B=0.100" C=0.139" E=0.681" F=0.436" | PP |
| **P-852x** | Male Luers with Lock Ring for use with 1/8" ID (3.20 mm) Tubing<br>A=0.099" B=0.132" C=0.184" E=0.777" F=0.436" | PP |
| **BARB TO FEMALE LUER-LOCK CONNECTORS (10-PK)** | | |
| ★ **P-857x** | Female Luer Connectors for use with 1/16" ID (1.55 mm) Tubing<br>A=0.030" B=0.063" C=0.106" D=0.100" E=0.598" F=0.253" | PP |
| **P-858x** | Female Luer Connectors for use with 3/32" ID (2.40 mm) Tubing<br>A=0.056" B=0.102" C=0.145" D=0.100" E=0.648" F=0.253" | PP |
| **P-859x** | Female Luer Connectors for use with 1/8" ID (3.20 mm) Tubing<br>A=0.080" B=0.135" C=0.187" D=0.100" E=0.733" F=0.253" | PP |
| **P-870** | For use with 1/16" (1.55 mm) ID Tubing<br>A=0.030" B=0.063" C=0.106" D=0.100" E=0.598" F=0.253" | ETFE |
| **P-872** | For use with 1/8" (3.20 mm) ID Tubing<br>A=0.080" B=0.137" C=0.187" D=0.100" E=0.733" F=0.253" | ETFE |
| *An "x" in the product part number designates "10-pk."* | | |

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# Barbed Connectors

- Specifically designed for Ismatec® pump tubing
- Wide variety of unions, adapters and multi-port connectors in multiple material choices

There are several Ismatec connectors for connecting multiple pieces of peristaltic tubing. Reference the tubing size of the barb in the tables below to select from unions (to connect same tubing size), reducers (to connect two different tubing sizes) in both straight, tee, Y, elbow and cross configurations.

For very small peristaltic tubing, steel connectors are available to couple two pieces of the same size tubing together. Match the OD of the steel tubing connector to be slightly larger than the ID of the peristaltic tubing.

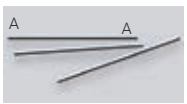
**Standard Tube Connectors in Plastic**

Type 1 Type 2 Type 3

**Reducer Tube Connectors in Plastic**

Type 6 Type 7 Type 8

**Steel 18/8 Standard Tube Connectors**




| Part No. | Tubing ID | Material | Qty. |
|---|---|---|---|
| **STANDARD TUBE CONNECTORS IN PLASTIC** | | | |
| **Type 1** | | | |
| **P-801x** | 0.06″ (1.5 mm) | Polypropylene | 10-pk |
| **ISM557A** | 0.10″ (2.5 mm) | Polypropylene | 10-pk |
| **P-802x** | 0.12″ (3.0 mm) | Polypropylene | 10-pk |
| **ISM559** | 0.16″ (4.0 mm) | Nylon | 10-pk |
| **ISM560** | 0.20″ (5.0 mm) | Nylon | 10-pk |
| **ISM561** | 0.24″ (6.0 mm) | Nylon | 10-pk |
| **ISM562** | 0.31″ (8.0 mm) | Nylon | 10-pk |
| **ISM563** | 0.40″ (10.0 mm) | Nylon | 10-pk |
| **ISM564** | 0.47″ (12.0 mm) | Nylon | 10-pk |
| **ISM565** | 0.51″ (13.0 mm) | Nylon | 10-pk |
| **ISM566** | 0.55″ (14.0 mm) | Nylon | 10-pk |
| **ISM567** | 0.63″ (16.0 mm) | Nylon | 10-pk |
| **Type 2** | | | |
| **ISM693A** | 0.06″ (1.5 mm) | Polypropylene | 10-pk |
| **ISM694** | 0.10″ (2.5 mm) | Polypropylene | 10-pk |
| **ISM510** | 0.12″ (3.0 mm) | Polypropylene | 10-pk |
| **ISM511** | 0.16″ (4.0 mm) | Nylon | 10-pk |
| **ISM512** | 0.20″ (5.0 mm) | Nylon | 10-pk |
| **ISM513** | 0.24″ (6.0 mm) | Nylon | 10-pk |
| **ISM514** | 0.28″ (7.0 mm) | Nylon | 10-pk |
| **ISM515** | 0.31″ (8.0 mm) | Nylon | 10-pk |
| **ISM516** | 0.40″ (10.0 mm) | Nylon | 10-pk |
| **Type 3** | | | |
| **P-860x** | 0.06″ (1.5 mm) | Polypropylene | 10-pk |
| **P-861x** | 0.10″ (2.5 mm) | Polypropylene | 10-pk |
| **ISM524** | 0.12″ (3.0 mm) | Polypropylene | 10-pk |
| **ISM525** | 0.16″ (4.0 mm) | Polypropylene | 10-pk |
| **ISM526** | 0.20″ (5.0 mm) | Polypropylene | 10-pk |
| **ISM527** | 0.24″ (6.0 mm) | Polypropylene | 10-pk |
| **P-862x** | 0.12″ (3.0 mm) | Polypropylene | 10-pk |
| **P-863x** | 0.18″ (4.8 mm) | Polypropylene | 10-pk |
| **P-864x** | 0.25″ (6.4 mm) | Polypropylene | 10-pk |
| **ISM528** | 0.31″ (8.0 mm) | Polypropylene | 10-pk |
| **ISM529** | 0.40″ (10.0 mm) | Polypropylene | 10-pk |
| **ISM530** | 0.47″ (12.0 mm) | Polypropylene | 10-pk |

| Part No. | Tubing ID | | Material | Qty. |
|---|---|---|---|---|
| **REDUCER TUBE CONNECTORS IN PLASTIC** | | | | |
| **Type 6** | **A** | **B** | | |
| **ISM569A** | 0.06″ (1.5 mm) | 0.10″ (2.5 mm) | Polypropylene | 10-pk |
| **ISM570A** | 0.06″ (1.5 mm) | 0.12″ (3.0 mm) | Polypropylene | 10-pk |
| **ISM571A** | 0.10″ (2.5 mm) | 0.12″ (3.0 mm) | Polypropylene | 10-pk |
| **ISM572** | 0.12″ (3.0 mm) | 0.16″ (4.0 mm) | Nylon | 10-pk |
| **ISM573A** | 0.16″ (4.0 mm) | 0.24″ (6.0 mm) | Nylon | 10-pk |
| **ISM574** | 0.16″ (4.0 mm) | 0.31″ (8.0 mm) | Nylon | 10-pk |
| **ISM575** | 0.24″ (6.0 mm) | 0.31″ (8.0 mm) | Nylon | 10-pk |
| **ISM576** | 0.24″ (6.0 mm) | 0.40″ (10.0 mm) | Nylon | 10-pk |
| **ISM577** | 0.31″ (8.0 mm) | 0.40″ (10.0 mm) | Nylon | 10-pk |
| **ISM578** | 0.31″ (8.0 mm) | 0.47″ (12.0 mm) | Nylon | 10-pk |
| **ISM579** | 0.40″ (10.0 mm) | 0.47″ (12.0 mm) | Nylon | 10-pk |
| **Type 7** | **A** | **B** | | |
| **ISM538** | 0.12″ (3.0 mm) | 0.16″ (4.0 mm) | Polypropylene | 10-pk |
| **ISM539** | 0.16″ (4.0 mm) | 0.24″ (6.0 mm) | Polypropylene | 10-pk |
| **ISM540** | 0.24″ (6.0 mm) | 0.16″ (4.0 mm) | Polypropylene | 10-pk |
| **ISM541** | 0.31″ (8.0 mm) | 0.16″ (4.0 mm) | Polypropylene | 10-pk |
| **ISM542** | 0.31″ (8.0 mm) | 0.24″ (6.0 mm) | Polypropylene | 10-pk |
| **ISM544** | 0.40″ (10.0 mm) | 0.24″ (6.0 mm) | Polypropylene | 10-pk |
| **ISM545** | 0.40″ (10.0 mm) | 0.31″ (8.0 mm) | Polypropylene | 10-pk |
| **ISM546** | 0.40″ (10.0 mm) | 0.51″ (13.0 mm) | Polypropylene | 10-pk |
| **ISM547** | 0.47″ (12.0 mm) | 0.31″ (8.0 mm) | Polypropylene | 10-pk |
| **Type 8** | **A** | **B** | | |
| **ISM553** | 0.16″ (4.0 mm) | 0.24″ (6.0 mm) | Polypropylene | 10-pk |
| **ISM554** | 0.24″ (6.0 mm) | 0.31″ (8.0 mm) | Polypropylene | 10-pk |

| Part No. | Tubing ID | Tubing OD | Connector Length | Material | Qty. |
|---|---|---|---|---|---|
| **STEEL 18/8 STANDARD TUBE CONNECTORS** | | | | | |
| **ISM580** | 0.01″ (0.30 mm) | 0.02″ (0.63 mm) | 0.59″ (15.0 mm) | SST | 6-pk |
| **ISM581** | 0.02″ (0.58 mm) | 0.04″ (0.90 mm) | 0.59″ (15.0 mm) | SST | 6-pk |
| **ISM582** | 0.02″ (0.58 mm) | 0.04″ (0.90 mm) | 0.43″ (11 mm) | SST | 6-pk |
| **ISM583** | 0.03″ (0.84 mm) | 0.05″ (1.27 mm) | 0.43″ (11 mm) | SST | 6-pk |
| **ISM584** | 0.03″ (0.84 mm) | 0.05″ (1.27 mm) | 0.63″ (16.0 mm) | SST | 6-pk |
| **ISM585A** | 0.01″ (0.30 mm) | 0.02″ (0.63 mm) | 0.98″ (25 mm) | SST | 6-pk |
| **ISM586A** | 0.02″ (0.58 mm) | 0.04″ (0.90 mm) | 0.98″ (25 mm) | SST | 6-pk |
| **ISM587** | 0.02″ (0.58 mm) | 0.04″ (0.90 mm) | 0.75″ (19.0 mm) | SST | 6-pk |

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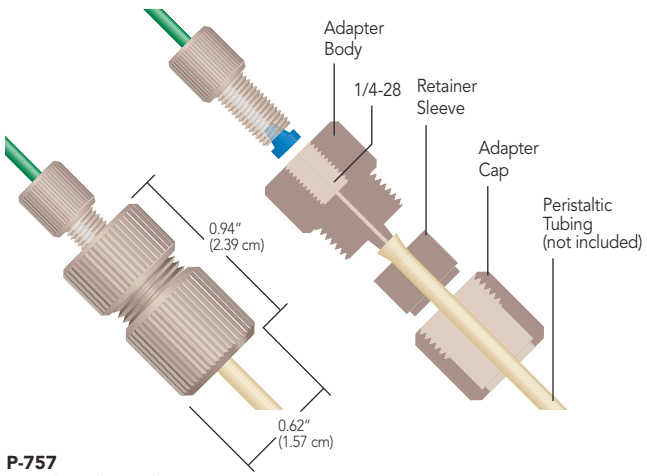
# Peristaltic Tubing Adapters

These unique adapters connect peristaltic tubing to standard 1/16" or 1/8" OD tubing. A specially-designed nose allows the peristaltic tubing to simply press fit over the nose and then be held tightly in place by the retainer sleeve. Your 1/16" OD tubing may then be connected with the Flangeless Fittings supplied with the adapter. To connect your peristaltic tubing to tubing with a different OD, simply replace the supplied fittings with your choice of Flangeless Fittings from page 24.

One popular application for these adapters is to use them as "stops" for your peristaltic pump. By doing so, you can reduce the amount of peristaltic tubing required for your flow path, thus reducing cost.

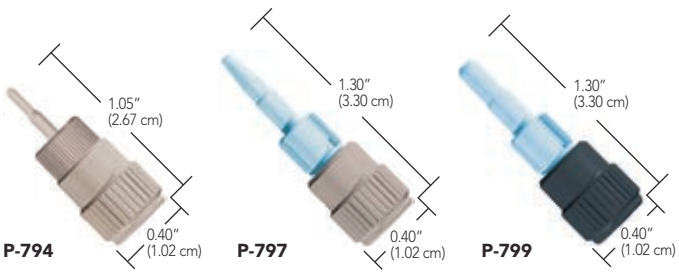


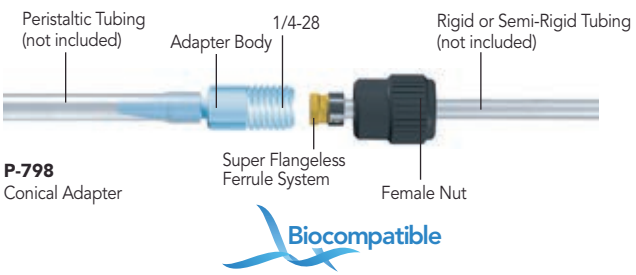

**P-757**
Peristaltic Tubing Adapter
includes P-200/P-235 Flangeless Fittings, and 3 sizes of retainer sleeves

# Conical Adapters

- Direct connect 1/16" and 1/8" OD rigid and semi-rigid tubing to peristaltic tubing
- Accept 0.020"–1/8" (0.50–3.2 mm) ID peristaltic tubing
- Biocompatible flow path with excellent chemical compatibility

Upchurch Scientific® Conical Adapters manufactured by IDEX Health & Science provide a reliable connection between rigid/semi-rigid tubing and peristaltic-type flexible tubing, such as Tygon® and PharMed®. These adapters are composed of a PEEK polymer female nut, our Super Flangeless™ ferrule system and an ETFE or PEEK conical adapter body. The narrow coned end of the adapter body allows peristaltic tubing to slide on more easily than it does onto conventional barbed adapters. Peristaltic tubing is also easier to remove from our Conical Adapters, since no cutting or excessive pulling is required.




**P-798**
Conical Adapter

## RELATED PRODUCTS

- Use the adapters on this page to connect rigid and semi-rigid tubing (pages 63–69 and 70–73) to the peristaltic tubing on pages 75–89.

## APPLICATION NOTE

To help secure peristaltic tubing more firmly to the Upchurch Scientific Conical Adapters, simply attach a cable tie to the outside of the peristaltic tubing once it has been placed onto the Adapter body.

| | Part No. | Description | Peristaltic Tubing OD | Peristaltic Tubing ID | Thru-Hole |
|---|---|---|---|---|---|
| | **PERISTALTIC TUBING ADAPTERS** | | | | |
| ★ | **P-757** | Standard Adapter | up to 0.180" (4.55 mm) | 0.048"–0.110" (1.20–2.80 mm) | 0.030" (0.75 mm) |
| | **P-767** | Large Bore Adapter | up to 0.250" (6.35 mm) | 0.100"–0.150" (2.55–3.80 mm) | 0.070" (1.78 mm) |
| | **CONICAL ADAPTER ASSEMBLIES** | | | | |
| | **Part No.** | **Description** | **Rigid or Semi-Rigid Tubing OD** | **Peristaltic Tubing ID** | **Thru-Hole** |
| ★ | **P-794** | Conical Adapter | 1/16" | 0.020"–0.030" (0.50 mm–0.75 mm) | 0.020" (0.50 mm) |
| | **P-797** | Conical Adapter | 1/16" | 1/16"–3/32" (1.55 mm–2.40 mm) | 0.040" (1.0 mm) |
| | **P-798** | Conical Adapter | 1/8" | 1/16"–3/32" (1.55 mm–2.40 mm) | 0.040" (1.0 mm) |
| | **P-799** | Conical Adapter | 1/8" | 3/32"–1/8" (2.40 mm–3.20 mm) | 0.060" (1.5 mm) |
| | **CONICAL ADAPTER REPLACEMENT PARTS** | | | | |
| | **Part No.** | **Description** | **Material** | **For Use With** | |
| | **F-156** | Female Nut, 1/8", 1/4-28 | Black PEEK | P-798, P-799 | |
| | **P-420** | Female Nut, 1/16", 1/4-28 | Natural PEEK | P-794, P-797 | |
| | **P-259** | Super Flangeless Ferrule, 1/16" | Yellow ETFE/SST | P-794, P-797 | |
| | **P-359** | Super Flangeless Ferrule, 1/8" | Yellow ETFE/SST | P-798, P-799 | |
| | **P-691** | Conical Adapter Body | Natural ETFE | P-799 | |
| | **P-692** | Conical Adapter Body | Natural PEEK | P-794 | |

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# TUBING

**NEW! PEEK-LINED STAINLESS STEEL (PLS) TUBING**
PAGE 63

**HIGH PRESSURE TUBING**
PAGE 63

**FLUOROPOLYMER TUBING**
PAGE 71

**TUBING CUTTERS**
PAGE 74

**PERISTALTIC TUBING**
PAGE 75

SEE STARRED PRODUCTS FOR **TOP SELLERS!**

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| TUBING | PEEK-LINED STAINLESS STEEL (PLS) | STAINLESS STEEL | PEEK | CAPILLARY PEEK | FUSED SILICA | PEEKsil™ | SPIRAL-LINK™ | RADEL® |
|---|---|---|---|---|---|---|---|---|
| **Page** | 63 | 64 | 66 | 67 | 67 | 68 | 69 | 69 |
| **Description** | Biocompatible, chemically inert to most commonly-used solvents, PLS tubing offers a PEEK inner layer which serves as the fluid pathway, jacketed by stainless steel.<br>• Ideal for bio-inert UHPLC applications<br>• Can be bent into various shapes without affecting performance | Seamless, pre-cut 316 stainless steel tubing meets the exacting requirements of today's analyses. Thorough preparation guarantees that the tubing is truly ready-to-use, with flat-burr-free ends and a clean finish.<br>• Wide selection of outside and inside diameters and lengths<br>• Pre-cut to ensure burr-free, flat connections<br>• Many sizes feature a color-coded band for easy ID identification | Biocompatible, chemically inert to most commonly used solvents, PEEK tubing is flexible, offers a very smooth internal surface, and can be easily cut to desired lengths.<br>• Great alternative for stainless steel tubing in high pressure applications<br>• Many sizes available in color scheme to help identify ID | All the benefits of larger sized PEEK tubing, while serving as an excellent alternative to more traditional fused silica and stainless steel capillary tubing. Capillary PEEK tubing is available in a wide range of micro and nano-scale inner diameters.<br>• Available in common capillary tubing sizes with tight tolerances on OD and ID<br>• Tubing sleeves available for capillary tubing connections | Because of the tight tolerances of fused silica's inner diameters, this tubing is used for micro-scale analyses such as micro and nano-HPLC and capillary electrophoresis.<br>• Most commonly used OD and ID sizes available<br>• High quality, polyimide-clad fused silica<br>• Offered in convenient, two meter lengths | PEEKsil is mechanically strong and has ideal characteristics for sealing with metal or polymer fittings.<br>• Comprised of high quality fused silica sheathed by PEEK tubing<br>• Excellent chemical compatibility<br>• Very tight manufacturing tolerances<br>• Good replacement for stainless steel, PEEK, or standard fused silica | The PEEK Spiral Link coils expand and contract, allowing you to easily move your system components or even make equipment repairs whenever needed, without the hassle of breaking connections.<br>• Available in several specific volumes<br>• Includes two SealTight™ fittings | A mechanically strong and chemically resistant material, much like PEEK polymer, Radel is frequently used in medical applications where repeated autoclave sterilization is performed (tests show product stability after 1,000 cycles). Radel tubing is also transparent, allowing technicians to visually monitor flow through their instrument. Readily wetted surfaces help keep air bubbles from accumulating on inner surfaces as well.<br>• Withstands up to 12,500 psi (862 bar)<br>• Transparent and autoclavable |
| **Specifications** | | | | | | | | |
| **OD (outside diameter)** | 1/16" (1.6 mm) | 0.020" (510 µm), 1/32" (785 µm), 1/16" (1.55 mm), 1/8" (3.2 mm) | 1/16" (1.55 mm), 0.071" (1.8 mm), 0.079" (2.0 mm), 1/8" (3.2 mm) | 0.0145" (360 µm), 1/32" (785 µm), 0.020" (0.5 mm) | 0.0145" (360 µm) | 0.0145" (360 µm), 1/32" (785 µm), 1/16" (1.55 mm) | 1/16" (1.55 mm) | 1/16" (1.55 mm), 1/8" (3.2 mm) |
| **ID (inside diameter)** | 0.001" (25 µm)–0.010" (254 µm) | 0.004" (100 µm)–0.080" (2.0 mm) | 0.001" (25 µm)–0.080" (2.0 mm) | 0.001" (25 µm)–0.020" (0.50 mm) | 0.0008" (20 µm)–0.006" (150 µm) | 0.001" (25 µm)–0.012" (300 µm) | 0.005" (125 µm)–0.030" (0.75 mm) | 0.010" (0.25 mm)–0.062" (1.55 mm) |
| **Operating Temp** | -51 to 100 °C | -51 to 289 °C | -51 to 100 °C | -51 to 100 °C | -51 to 100 °C | -51 to 100 °C | -51 to 100 °C | -51 to 100 °C |
| **Pressure Rating** | 17,400 psi (1,200 bar) | N/A* | 500–10,000 psi (34–690 bar) | 2,000–5,000 psi (138–345 bar) | N/A* | 10,000 psi (690 bar) | 7,000 psi (484 bar) | 5,500–12,500 psi (379–862 bar) |
| **Typical Tolerances** | ±5 to 15 µm | ±0.001" (25 µm) for 1/16" OD tubing, ±0.003" (75 µm) for 1/8" OD tubing | ±0.001" (25 µm) for 1/16" OD tubing, ±0.003" (75 µm) for 1/8" OD tubing | ±0.0005" (12.5 µm) | ±0.0004" (10 µm) | ±0.0004" (10 µm) | ±0.001" (25 µm) for 1/16" OD tubing | ±0.001" (25 µm) for 1/16" OD tubing, ±0.003" (75 µm) for 1/8" OD tubing |
| **Refractive Index (Clarity)** | Opaque | Opaque | Opaque | Opaque | 1.78 | Opaque | Opaque | 1.672 |
| **pH Range** | 0–14 | 1–14 | 0–14 | 0–14 | 0–10 | 0–10 | 0–14 | 1–14 |
| **Sterilization Techniques** | Gamma irradiation; ethylene oxide; thermal | Gamma irradiation; ethylene oxide; thermal | Gamma irradiation; ethylene oxide; thermal | Gamma irradiation; ethylene oxide; thermal | Ethylene oxide; thermal | Ethylene oxide; thermal | Gamma irradiation; ethylene oxide; thermal | Thermal, gamma irradiation |
| **Autoclavable?** | Y | Y | Y | Y | Y | Y | Y | Y |

**The manufacturer of this tubing or material does not publish this specification.*

## Upchurch Scientific® Tubing OD Sizes

Please use this table as a reference tool to help quickly locate within this chapter the appropriate OD size tubing for your application.

| Size | Tubing OD | Page(s) |
|---|---|---|
| . | 360 µm | 67, 68, 72 |
| . | 510 µm | 65, 67 |
| • | 1/32" | 65, 67, 68, 71 |
| ● | 1/16" | 63, 65, 66, 68, 69, 71, 72, 73, 77 |
| ● | 1/8" | 65, 66, 69, 71, 72, 73 |
| ● | 3/16" | 71, 72 |
| ● | 1/4" | 71, 72, 73 |

| Size | Tubing OD | Page(s) |
|---|---|---|
| ● | 5/16" | 71 |
| • | 1 mm | 71 |
| ● | 1.8 mm | 66 |
| ● | 2 mm | 66, 71 |
| ● | 3 mm | 71 |
| ● | 4 mm | 71 |

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# Biocompatible UHPLC Tubing

- PEEK-Lined Stainless Steel (PLS)
- Pressures to 17,400 psi (1,200 bar)
- Bends with no loss of performance
- 6 different inner diameters in 4 pre-cut lengths available
- Pre-assembled with VHP-325 fittings

IDEX Health & Science introduces NEW PEEK-Lined Stainless Steel (PLS) Tubing for biocompatible UHPLC applications. The tubing combines the strength of industry-standard 316 Stainless Steel with the chemical inertness of PEEK polymer to enable more efficient bio-separations at pressures up to 17,400 psi (1,200 bar).

The unique design features of PLS Tubing allow it to be bent into shapes that may be required by the system equipment — including angled bends and even sample loops for the injection valve — all with no loss of performance. Even in a bent shape, the PEEK lining maintains its integrity along the entire length.

PLS Tubing achieves its maximum performance of 17,400 psi (1,200 bar) when used with Upchurch Scientific® VHP Fittings. The standard configuration of this tubing automatically pairs a length of tubing with two VHP-325 fittings, which allow repeat connections at UHPLC pressures.

**PLS Tubing**

| Part No. | ID | Length | Includes |
|---|---|---|---|
| **PEEK-LINED STAINLESS STEEL (PLS) TUBING, 1/16" OD** | | | |
| **UP-6025100** | 25 µm (0.001") | 100 mm (4") | (2) VHP-325 |
| **UP-6025200** | 25 µm (0.001") | 200 mm (8") | (2) VHP-325 |
| **UP-6025300** | 25 µm (0.001") | 300 mm (12") | (2) VHP-325 |
| **UP-6025500** | 25 µm (0.001") | 500 mm (1.6') | (2) VHP-325 |
| **UP-6050100** | 50 µm (0.002") | 100 mm (4") | (2) VHP-325 |
| **UP-6050200** | 50 µm (0.002") | 200 mm (8") | (2) VHP-325 |
| **UP-6050300** | 50 µm (0.002") | 300 mm (12") | (2) VHP-325 |
| **UP-6050500** | 50 µm (0.002") | 500 mm (1.6') | (2) VHP-325 |
| **UP-6075100** | 75 µm (0.003") | 100 mm (4") | (2) VHP-325 |
| **UP-6075200** | 75 µm (0.003") | 200 mm (8") | (2) VHP-325 |
| **UP-6075300** | 75 µm (0.003") | 300 mm (12") | (2) VHP-325 |
| **UP-6075500** | 75 µm (0.003") | 500 mm (1.6') | (2) VHP-325 |
| **UP-6100100** | 100 µm (0.004") | 100 mm (4") | (2) VHP-325 |
| **UP-6100200** | 100 µm (0.004") | 200 mm (8") | (2) VHP-325 |
| **UP-6100300** | 100 µm (0.004") | 300 mm (12") | (2) VHP-325 |
| **UP-6100500** | 100 µm (0.004") | 500 mm (1.6') | (2) VHP-325 |
| **UP-6125100** | 125 µm (0.005") | 100 mm (4") | (2) VHP-325 |
| **UP-6125200** | 125 µm (0.005") | 200 mm (8") | (2) VHP-325 |
| **UP-6125300** | 125 µm (0.005") | 300 mm (12") | (2) VHP-325 |
| **UP-6125500** | 125 µm (0.005") | 500 mm (1.6') | (2) VHP-325 |
| **UP-6175100** | 175 µm (0.007") | 100 mm (4") | (2) VHP-325 |
| **UP-6175200** | 175 µm (0.007") | 200 mm (8") | (2) VHP-325 |
| **UP-6175300** | 175 µm (0.007") | 300 mm (12") | (2) VHP-325 |
| **UP-6175500** | 175 µm (0.007") | 500 mm (1.6') | (2) VHP-325 |
| **UP-6254100** | 254 µm (0.010") | 100 mm (4") | (2) VHP-325 |
| **UP-6254200** | 254 µm (0.010") | 200 mm (8") | (2) VHP-325 |
| **UP-6254300** | 254 µm (0.010") | 300 mm (12") | (2) VHP-325 |
| **UP-6254500** | 254 µm (0.010") | 500 mm (1.6') | (2) VHP-325 |

*Custom lengths of tubing are available. Contact us for more information.*

## SPECIFICATIONS & DETAILS

PEEK-lined Stainless Steel (PLS) tubing carries a maximum pressure rating of 17,400 psi (1,200 bar). Additionally, inner diameter tolerances range from ±5–15 µm, depending upon the nominal inner diameter of the tubing.

### Peek-lined Stainless Steel (PLS) Tubing "Smart" Numbering System

**UP-{OD}{ID}{Length}**

| {OD} | {ID} | {Length} |
|---|---|---|
| 6 (for 1/16") | 025 (for 25 µm) | 050 (for 50 mm) |
| | 050 (for 50 µm) | 100 (for 100 mm) |
| | 075 (for 75 µm) | 200 (for 200 mm) |
| | 100 (for 100 µm) | 300 (for 300 mm) |
| | 125 (for 125 µm) | |
| | 175 (for 175 µm) | |
| | 254 (for 254 µm) | |

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# Stainless Steel Tubing

- Precut 316 stainless steel*
- Available ODs include 0.020", 1/32", 1/16", and 1/8"
- Color-coded banding for easy identification of the inner diameter

IDEX Health & Science seamless, precut stainless steel tubing is designed to meet the exacting requirements of today's analyses. We machine cut and polish each end, deburr the inside and outside edges, and passivate the tubing (please see the passivation information on this page). Finally, we flush reagent-grade isopropanol through each piece.

Our thorough preparation and cleaning procedure guarantees tubing that is truly ready-to-use, with flat, burr-free ends and a clean finish. This care is important in achieving zero-dead-volume connections and good chromatographic results.

We offer a variety of precut lengths as well as longer lengths (5' and 25') of some sizes. Cutting the tubing disturbs and roughens the tubing's end surface, so we recommend using our precut tubing whenever possible. If you need to cut tubing to custom lengths, we suggest you then passivate the tubing. For a description of a cold passivation process, please contact IDEX Health & Science or visit our website at www.idex-hs.com and search for "stainless steel tubing."

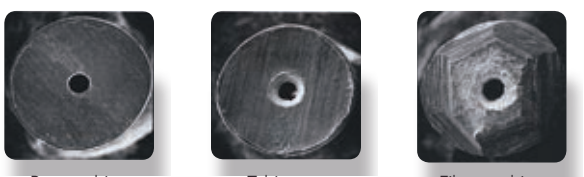
** Except our 0.020" OD Stainless Steel Tubing, which is manufactured from 304 series stainless steel.*

## NOTE

PEEK polymer tubing can be used to replace stainless steel tubing in most liquid analytical systems. Unlike stainless steel tubing, PEEK tubing is biocompatible, flexible, and can easily be cut to desired lengths. See pages 66–68.

All Stainless Steel tubing longer than 1 m is coiled.

### The Beauty of Precut Tubing



Precut tubing

Tubing cut by a commercially available tubing cutter

File cut tubing

## APPLICATION NOTE

- Our 1/32" OD tubing is designed for enhanced flexibility in high pressure applications.
- Standard 1/16" and 1/8" OD stainless steel tubing is suited for most analytical applications.

## SPECIFICATIONS & DETAILS

- Maximum Recommended Operating Temperature: 750 °F (399 °C).
- Rockwell Hardness (B): Maximum of 95.
- Meets ASTM A269 and A213.

| Tubing OD | OD Tolerance | Tubing ID | ID Tolerance |
|---|---|---|---|
| 0.020" | ±0.0005" (12.5 µm) | All | ±0.0005" (12.5 µm) |
| 1/32" | +0.002"/-0.000" (+50 µm/-0 µm) | All, except 0.004" (0.10 mm) | +0.000"/-0.002" (+0 µm/-50 µm) |
| 1/32" | +0.002"/-0.000" (+50 µm/-0 µm) | 0.004" (0.10 mm) | +0.002"/-0.000" (+50 µm/-0 µm) |
| 1/16" | +0.002"/-0.000" (+50 µm/-0 µm) | All | ±0.001" (25 µm) |
| 1/8" | ±0.003" (75 µm) | All | ±0.003" (75 µm) |

## RELATED PRODUCTS

- Our 0.020" OD tubing is the size of choice for the Rheodyne® Model 8125 Micro-Scale Injector Valve (page 132).
- PEEK polymer tubing is available in all of these sizes, listed on pages 66–67.

### Stainless Steel Tubing Passivation

Stainless steel is naturally self-passivating, forming an oxidized layer on newly created surfaces. IDEX Health & Science takes extra steps to ensure the chemical resistance of our stainless steel tubing by manually passivating before and after the tubing is cut into specified lengths (except in a few cases where size is prohibitive). In the precut stage, the internal wall is acid passivated and flushed. After the tubing is cut, deburred and polished, it is completely submerged in an acid passivation bath and again flushed clean. The table below summarizes the manual passivation steps performed for each size of our stainless steel tubing:

| Tubing OD | Precut Passivation | Postcut Passivation |
|---|---|---|
| 0.020" | All | All |
| 1/32" | All | All |
| 1/16" | All | All, ex. 25' lengths |
| 1/8" | None | All, ex. 3 & 5 m lengths |

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NOTE

## Understanding the Maximum Pressure Value of Stainless Steel Tubing

Stainless steel is unique as a material. The Maximum Pressure value listed for each part number is the safe, continuous working pressure limit that IDEX Health & Science has assigned for the tubing. It reflects a safety margin before the tubing begins to "yield" — which is well below the tubing's "burst" pressure. For more information, contact IDEX Health & Science or your authorized Distributor.

| Part No. | ID | Length | Color | Maximum Pressure |
|---|---|---|---|---|
| **STAINLESS STEEL, 0.020" OD** | | | | |
| U-119 | 0.005" (0.125 mm) | 5 cm (2") | N/A | 17,200 psi (1,186 bar) |
| U-120 | 0.005" (0.125 mm) | 10 cm (4") | N/A | 17,200 psi (1,186 bar) |
| U-121 | 0.005" (0.125 mm) | 20 cm (8") | N/A | 17,200 psi (1,186 bar) |
| U-122 | 0.005" (0.125 mm) | 30 cm (12") | N/A | 17,200 psi (1,186 bar) |
| U-123 | 0.005" (0.125 mm) | 50 cm (1.6') | N/A | 17,200 psi (1,186 bar) |
| U-124 | 0.005" (0.125 mm) | 1 m (3.2') | N/A | 17,200 psi (1,186 bar) |
| U-125 | 0.005" (0.125 mm) | 1.5 m (5') | N/A | 17,200 psi (1,186 bar) |
| **STAINLESS STEEL, 1/32" OD** | | | | |
| U-1114 | 0.004" (0.10 mm) | 5 cm (2") | Red | 19,300 psi (1,331 bar) |
| U-1115 | 0.004" (0.10 mm) | 10 cm (4") | Red | 19,300 psi (1,331 bar) |
| U-1116 | 0.004" (0.10 mm) | 20 cm (8") | Red | 19,300 psi (1,331 bar) |
| U-1117 | 0.004" (0.10 mm) | 30 cm (12") | Red | 19,300 psi (1,331 bar) |
| U-1120 | 0.006" (0.15 mm) | 5 cm (2") | Yellow | 19,300 psi (1,331 bar) |
| U-1121 | 0.006" (0.15 mm) | 10 cm (4") | Yellow | 19,300 psi (1,331 bar) |
| U-1122 | 0.006" (0.15 mm) | 20 cm (8") | Yellow | 19,300 psi (1,331 bar) |
| U-1123 | 0.006" (0.15 mm) | 30 cm (12") | Yellow | 19,300 psi (1,331 bar) |
| U-1125 | 0.008" (0.20 mm) | 5 cm (2") | Clear | 17,800 psi (1,227 bar) |
| U-1126 | 0.008" (0.20 mm) | 10 cm (4") | Clear | 17,800 psi (1,227 bar) |
| U-1127 | 0.008" (0.20 mm) | 20 cm (8") | Clear | 17,800 psi (1,227 bar) |
| ★ U-1128 | 0.008" (0.20 mm) | 30 cm (12") | Clear | 17,800 psi (1,227 bar) |
| U-1130 | 0.010" (0.25 mm) | 5 cm (2") | Blue | 16,200 psi (1,117 bar) |
| U-1131 | 0.010" (0.25 mm) | 10 cm (4") | Blue | 16,200 psi (1,117 bar) |
| U-1132 | 0.010" (0.25 mm) | 20 cm (8") | Blue | 16,200 psi (1,117 bar) |
| U-1133 | 0.010" (0.25 mm) | 30 cm (12") | Blue | 16,200 psi (1,117 bar) |
| U-1140 | 0.015" (0.40 mm) | 5 cm (2") | Green | 12,300 psi (848 bar) |
| U-1141 | 0.015" (0.40 mm) | 10 cm (4") | Green | 12,300 psi (848 bar) |
| U-1142 | 0.015" (0.40 mm) | 20 cm (8") | Green | 12,300 psi (848 bar) |
| U-1143 | 0.015" (0.40 mm) | 30 cm (12") | Green | 12,300 psi (848 bar) |
| U-1145 | 0.018" (0.45 mm) | 5 cm (2") | Black | 10,000 psi (689 bar) |
| U-1146 | 0.018" (0.45 mm) | 10 cm (4") | Black | 10,000 psi (689 bar) |
| U-1147 | 0.018" (0.45 mm) | 20 cm (8") | Black | 10,000 psi (689 bar) |
| U-1148 | 0.018" (0.45 mm) | 30 cm (12") | Black | 10,000 psi (689 bar) |

| Part No. | ID | Length | Color | Maximum Pressure |
|---|---|---|---|---|
| **STAINLESS STEEL, 1/16" OD** | | | | |
| U-220 | 0.004" (0.100 mm) | 5 cm (2") | N/A | 22,100 psi (1,523 bar) |
| U-221 | 0.004" (0.100 mm) | 10 cm (4") | N/A | 22,100 psi (1,523 bar) |
| U-222 | 0.004" (0.100 mm) | 20 cm (8") | N/A | 22,100 psi (1,523 bar) |
| U-223 | 0.004" (0.100 mm) | 30 cm (12") | N/A | 22,100 psi (1,523 bar) |
| U-224 | 0.004" (0.100 mm) | 0.5 m (1.6') | N/A | 22,100 psi (1,523 bar) |
| U-225 | 0.004" (0.100 mm) | 1 m (3.2') | N/A | 22,100 psi (1,523 bar) |
| U-152 | 0.005" (0.125 mm) | 5 cm (2") | Red | 21,600 psi (1,489 bar) |
| U-153 | 0.005" (0.125 mm) | 10 cm (4") | Red | 21,600 psi (1,489 bar) |
| U-154 | 0.005" (0.125 mm) | 20 cm (8") | Red | 21,600 psi (1,489 bar) |
| U-155 | 0.005" (0.125 mm) | 30 cm (12") | Red | 21,600 psi (1,489 bar) |
| U-156 | 0.005" (0.125 mm) | 0.5 m (1.6') | Red | 21,600 psi (1,489 bar) |
| U-157 | 0.005" (0.125 mm) | 1 m (3.2') | Red | 21,600 psi (1,489 bar) |
| U-158 | 0.005" (0.125 mm) | 1.5 m (5') | Red | 21,600 psi (1,489 bar) |
| U-160 | 0.005" (0.125 mm) | 7.6 m (25') | Red | 21,600 psi (1,489 bar) |
| U-126 | 0.007" (0.175 mm) | 5 cm (2") | Black | 20,900 psi (1,441 bar) |
| U-127 | 0.007" (0.175 mm) | 10 cm (4") | Black | 20,900 psi (1,441 bar) |
| U-128 | 0.007" (0.175 mm) | 20 cm (8") | Black | 20,900 psi (1,441 bar) |
| U-129 | 0.007" (0.175 mm) | 30 cm (12") | Black | 20,900 psi (1,441 bar) |
| U-130 | 0.007" (0.175 mm) | 0.5 m (1.6') | Black | 20,900 psi (1,441 bar) |
| U-131 | 0.007" (0.175 mm) | 1 m (3.2') | Black | 20,900 psi (1,441 bar) |
| U-108 | 0.007" (0.175 mm) | 1.5 m (5') | Black | 20,900 psi (1,441 bar) |
| U-161 | 0.007" (0.175 mm) | 7.6 m (25') | Black | 20,900 psi (1,441 bar) |
| ★ U-111 | 0.010" (0.25 mm) | 5 cm (2") | Blue | 19,700 psi (1,358 bar) |
| ★ U-112 | 0.010" (0.25 mm) | 10 cm (4") | Blue | 19,700 psi (1,358 bar) |
| U-113 | 0.010" (0.25 mm) | 20 cm (8") | Blue | 19,700 psi (1,358 bar) |
| ★ U-114 | 0.010" (0.25 mm) | 30 cm (12") | Blue | 19,700 psi (1,358 bar) |
| U-132 | 0.010" (0.25 mm) | 0.5 m (1.6') | Blue | 19,700 psi (1,358 bar) |
| U-133 | 0.010" (0.25 mm) | 1 m (3.2') | Blue | 19,700 psi (1,358 bar) |
| U-106 | 0.010" (0.25 mm) | 1.5 m (5') | Blue | 19,700 psi (1,358 bar) |
| U-162 | 0.010" (0.25 mm) | 7.6 m (25') | Blue | 19,700 psi (1,358 bar) |
| U-101 | 0.020" (0.5 mm) | 5 cm (2") | Yellow | 15,800 psi (1,089 bar) |
| U-102 | 0.020" (0.5 mm) | 10 cm (4") | Yellow | 15,800 psi (1,089 bar) |
| U-103 | 0.020" (0.5 mm) | 20 cm (8") | Yellow | 15,800 psi (1,089 bar) |
| U-104 | 0.020" (0.5 mm) | 30 cm (12") | Yellow | 15,800 psi (1,089 bar) |
| U-134 | 0.020" (0.5 mm) | 0.5 m (1.6') | Yellow | 15,800 psi (1,089 bar) |
| U-135 | 0.020" (0.5 mm) | 1 m (3.2') | Yellow | 15,800 psi (1,089 bar) |
| ★ U-105 | 0.020" (0.5 mm) | 1.5 m (5') | Yellow | 15,800 psi (1,089 bar) |
| U-163 | 0.020" (0.5 mm) | 7.6 m (25') | Yellow | 15,800 psi (1,089 bar) |
| U-115 | 0.030" (0.75 mm) | 5 cm (2") | White | 12,000 psi (827 bar) |
| U-116 | 0.030" (0.75 mm) | 10 cm (4") | White | 12,000 psi (827 bar) |
| U-117 | 0.030" (0.75 mm) | 20 cm (8") | White | 12,000 psi (827 bar) |
| U-118 | 0.030" (0.75 mm) | 30 cm (12") | White | 12,000 psi (827 bar) |
| U-136 | 0.030" (0.75 mm) | 0.5 m (1.6') | White | 12,000 psi (827 bar) |
| U-137 | 0.030" (0.75 mm) | 1 m (3.2') | White | 12,000 psi (827 bar) |
| ★ U-107 | 0.030" (0.75 mm) | 1.5 m (5') | White | 12,000 psi (827 bar) |
| ★ U-164 | 0.030" (0.75 mm) | 7.6 m (25') | White | 12,000 psi (827 bar) |
| U-138 | 0.040" (1.0 mm) | 5 cm (2") | N/A | 8,100 psi (558 bar) |
| U-139 | 0.040" (1.0 mm) | 10 cm (4") | N/A | 8,100 psi (558 bar) |
| U-140 | 0.040" (1.0 mm) | 20 cm (8") | N/A | 8,100 psi (558 bar) |
| U-141 | 0.040" (1.0 mm) | 30 cm (12") | N/A | 8,100 psi (558 bar) |
| U-142 | 0.040" (1.0 mm) | 0.5 m (1.6') | N/A | 8,100 psi (558 bar) |
| U-143 | 0.040" (1.0 mm) | 1 m (3.2') | N/A | 8,100 psi (558 bar) |
| U-144 | 0.040" (1.0 mm) | 1.5 m (5') | N/A | 8,100 psi (558 bar) |
| ★ U-165 | 0.040" (1.0 mm) | 7.6 m (25') | N/A | 8,100 psi (558 bar) |
| U-145 | 0.046" (1.15 mm) | 5 cm (2") | N/A | 5,800 psi (400 bar) |
| U-146 | 0.046" (1.15 mm) | 10 cm (4") | N/A | 5,800 psi (400 bar) |
| U-147 | 0.046" (1.15 mm) | 20 cm (8") | N/A | 5,800 psi (400 bar) |
| U-148 | 0.046" (1.15 mm) | 30 cm (12") | N/A | 5,800 psi (400 bar) |
| U-149 | 0.046" (1.15 mm) | 0.5 m (1.6') | N/A | 5,800 psi (400 bar) |
| U-150 | 0.046" (1.15 mm) | 1 m (3.2') | N/A | 5,800 psi (400 bar) |
| U-151 | 0.046" (1.15 mm) | 1.5 m (5') | N/A | 5,800 psi (400 bar) |
| **STAINLESS STEEL, 1/8" OD** | | | | |
| U-815 | 0.080" (2.0 mm) | 15 cm (6") | N/A | 7,600 psi (524 bar) |
| U-825 | 0.080" (2.0 mm) | 25 cm (10") | N/A | 7,600 psi (524 bar) |
| U-800 | 0.080" (2.0 mm) | 1 m (3.2') | N/A | 7,600 psi (524 bar) |
| U-803 | 0.080" (2.0 mm) | 3 m (9.8') | N/A | 7,600 psi (524 bar) |
| U-805 | 0.080" (2.0 mm) | 5 m (16') | N/A | 7,600 psi (524 bar) |

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# PEEK Tubing

- 1/16", 1/8", 1.8 mm, or 2.0 mm outside diameter available
- Biocompatible, inert, and easily cut
- Great for high pressure applications
- Maximum continuous use temperature: 100 °C

Upchurch Scientific® PEEK (polyetheretherketone) polymer tubing is biocompatible, chemically inert to most solvents, and can be used to replace stainless steel tubing in most liquid analytical systems. Unlike stainless steel tubing, PEEK tubing is flexible and can be easily cut to desired lengths.

PEEK tubing has a very smooth internal surface, which causes less turbulence than similarly sized metal tubing, contributing to improved resolution of sample bands. Of all our polymer tubing materials, PEEK is the least permeable to gas (see material properties on our website: www.idex-hs.com).

In addition, much of our 1/16" OD tubing is color-coded so different IDs are easily identified. Our proprietary extrusion process ensures color permanence in our tubing.

Our 5' length tubing is rough cut to approximately 5'1". A trim cut should be made before use, especially for smaller ID tubing. PEEK tubing can be cut easily with a razor blade. However for an improved cut, try our Tubing Cutters on page 74.

| | Part No. | ID | Color | Max. Pressure |
|---|---|---|---|---|
| | **PEEK TUBING, 1/16" OD X 5' (1.5 M)** | | | |
| | **1559** | 0.001" (25 µm) ID | Natural | 10,000 psi (690 bar) |
| | **1560** | 0.0025" (65 µm) ID | Natural | 7,000 psi (483 bar) |
| ★ | **1561** | 0.004" (0.10 mm) ID | Black | 7,000 psi (483 bar) |
| ★ | **1535** | 0.005" (0.125 mm) ID | Red | 7,000 psi (483 bar) |
| ★ | **1562** | 0.006" (0.15 mm) ID | Purple | 7,000 psi (483 bar) |
| | **1536** | 0.007" (0.175 mm) ID | Yellow | 7,000 psi (483 bar) |
| ★ | **1531** | 0.010" (0.25 mm) ID | Natural | 7,000 psi (483 bar) |
| ★ | **1531B** | 0.010" (0.25 mm) ID | Blue | 7,000 psi (483 bar) |
| ★ | **1565** | 0.015" (0.40 mm) ID | Gray | 7,000 psi (483 bar) |
| | **1532** | 0.020" (0.50 mm) ID | Orange | 7,000 psi (483 bar) |
| ★ | **1533** | 0.030" (0.75 mm) ID | Green | 7,000 psi (483 bar) |
| ★ | **1538** | 0.040" (1.00 mm) ID | Natural | 5,000 psi (345 bar) |
| ★ | **1537** | 0.055" (1.40 mm) ID | Natural | 500 psi (34 bar) |
| | **PEEK TUBING, 1/8" OD X 5' (1.5 M)** | | | |
| | **1534** | 0.062" (1.55 mm) ID | Natural | 4,000 psi (276 bar) |
| ★ | **1544** | 0.080" (2.00 mm) ID | Natural | 3,000 psi (207 bar) |
| | **PEEK TUBING, 1.8 MM OD X 5' (1.5 M)** | | | |
| | **1539** | 0.055" (1.40 mm) ID | Natural | 500 psi (34 bar) |
| | **PEEK TUBING, 2.0 MM OD X 5' (1.5 M)** | | | |
| | **1590** | 0.042" (1.05 mm) ID | Natural | 5,000 psi (345 bar) |

## APPLICATION NOTE

### What Size PEEK Tubing Should I Use?

- It is usually safe to use 1/16" OD x 0.010" ID tubing throughout an analytical HPLC system. With a 0.010" ID, the pressure drop across most tubing lengths is negligible, and the ID is small enough to minimize band broadening.
- High pressure semi-prep LC systems will most likely use 1/8" OD tubing.
- Use 1.8 mm OD tubing to replace fluoropolymer tubing used in some Pharmacia®/GE Healthcare systems.
- Use our 1/32" OD tubing for the high pressure flow path of some microbore HPLC systems.
- Choose 360 µm OD tubing for most capillary systems.
- PEEK tubing is available in additional sizes and in 50' and 100' lengths. Contact your local Distributor or IDEX Health & Science directly for pricing information.

## SPECIFICATIONS & DETAILS

| Tubing OD | OD Tolerance |
|---|---|
| 1/16" | ±0.001" (25 µm) |
| 1.8 mm | ±0.002" (50 µm) |
| 2.0 mm | ±0.002" (50 µm) |
| 1/8" | ±0.003" (75 µm) |

| Tubing ID | ID Tolerance |
|---|---|
| 25 µm | ±0.0005" (12.5 µm) |
| All | ±0.001" (25 µm) |
| All | ±0.001" (25 µm) |
| All | ±0.003" (75 µm) |

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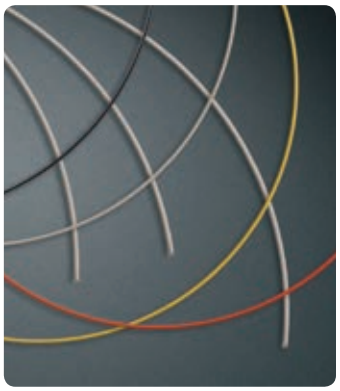
# Capillary PEEK Tubing

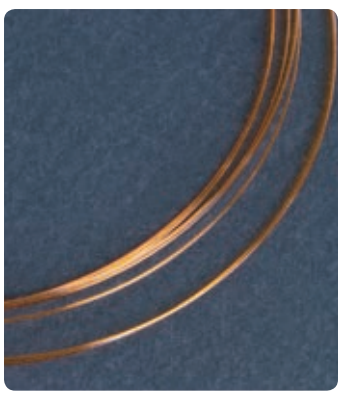
- 360 µm, 510 µm, or 1/32" outside diameter available
- IDs as small as 25 µm (0.001")



Capillary PEEK tubing offers all the benefits of larger sized PEEK tubing, while serving as an excellent alternative to more traditional fused silica and stainless steel capillary tubing (see Application Note, right). The capillary tubing can be coupled to many of the products in the Connectors chapter (starting on page 34) and to some of the valves in the Valves chapter (starting on page 124).

# Fused Silica Tubing

- Five inner diameters with most common capillary outside diameter, 360 µm
- Cut in convenient lengths, up to 2 m



These products are manufactured from synthetic fused silica with a polyimide coating.

| | Part No. | ID | Color | Max. Pressure | Qty. |
|---|---|---|---|---|---|
| | **CAPILLARY PEEK TUBING, 360 µm OD** | | | | |
| | **1574** | 25 µm (0.001") ID x 5' (1.5 m) | Natural | 5,000 psi (345 bar) | ea. |
| | **1570** | 50 µm (0.002") ID x 5' (1.5 m) | Natural | 2,000 psi (138 bar) | ea. |
| | **1573** | 75 µm (0.003") ID x 5' (1.5 m) | Black | 2,000 psi (138 bar) | ea. |
| | **1571** | 100 µm (0.004") ID x 5' (1.5 m) | Red | 2,000 psi (138 bar) | ea. |
| | **1572** | 150 µm (0.006") ID x 5' (1.5 m) | Yellow | 2,000 psi (138 bar) | ea. |
| | **CAPILLARY PEEK TUBING, 510 µm (0.020") OD** | | | | |
| | **1543** | 0.0025" (65 µm) ID x 5' (1.5 m) | Natural | 2,000 psi (138 bar) | ea. |
| ★ | **1541** | 0.005" (0.125 mm) ID x 5' (1.5 m) | Natural | 2,000 psi (138 bar) | ea. |
| | **1542** | 0.010" (0.254 mm) ID x 5' (1.5 m) | Natural | 2,000 psi (138 bar) | ea. |
| | **CAPILLARY PEEK TUBING, 1/32" OD** | | | | |
| | **1567** | 0.001" (25 µm) ID x 5' (1.5 m) | Natural | 5,000 psi (345 bar) | ea. |
| | **1579** | 0.0025" (65 µm) ID x 5' (1.5 m) | Natural | 5,000 psi (345 bar) | ea. |
| | **1578** | 0.0035" (90 µm) ID x 5' (1.5 m) | Black | 5,000 psi (345 bar) | ea. |
| | **1576** | 0.005" (0.125 mm) ID x 5' (1.5 m) | Red | 5,000 psi (345 bar) | ea. |
| | **1577** | 0.007" (0.175 mm) ID x 5' (1.5 m) | Yellow | 5,000 psi (345 bar) | ea. |
| | **1575** | 0.008" (0.20 mm) ID x 5' (1.5 m) | Natural | 5,000 psi (345 bar) | ea. |
| | **1580** | 0.009" (0.23 mm) ID x 5' (1.5 m) | Gray | 5,000 psi (345 bar) | ea. |
| | **1581** | 0.010" (0.25 mm) ID x 5' (1.5 m) | Blue | 5,000 psi (345 bar) | ea. |
| | **1568** | 0.015" (0.40 mm) ID x 5' (1.5 m) | Natural | 5,000 psi (345 bar) | ea. |
| ★ | **1569** | 0.020" (0.50 mm) ID x 5' (1.5 m) | Orange | 3,000 psi (207 bar) | ea. |
| | **787-KIT** | 1/32" OD x 12" Kit<br>Kit contains (1) 10-pack of each 1/32" OD x 12" size listed above. | | | Kit |
| | **FUSED SILICA TUBING, 360 µm OD** | | | | |
| ★ | **FS-120** | 20 µm (0.0008") ID x 2 m (6.4') | Natural | 10,000 psi (690 bar) | ea. |
| ★ | **FS-150** | 50 µm (0.002") ID x 2 m (6.4') | Natural | 10,000 psi (690 bar) | ea. |
| | **FS-175** | 75 µm (0.003") ID x 2 m (6.4') | Natural | 10,000 psi (690 bar) | ea. |
| | **FS-110** | 100 µm (0.004") ID x 2 m (6.4') | Natural | 10,000 psi (690 bar) | ea. |
| | **FS-115** | 150 µm (0.006") ID x 2 m (6.4') | Natural | 10,000 psi (690 bar) | ea. |

## APPLICATION NOTE

- An independent study conducted by a major pharmaceutical company indicated LC-MS chromatographic performance could be improved in some cases by switching the post-column transfer line from fused silica to PEEK polymer tubing. The switch dramatically reduced peak tailing and eliminated the degradation of peak symmetry as injection volume was reduced. For more information, please contact us or order the "Improved LC-MS Results Study" from the "Request Literature" section of our website at www.idex-hs.com.
- To straighten PEEK polymer tubing, first choose a piece of stainless steel tubing with an inner diameter slightly larger than the OD of your tubing and with an appropriate length for the PEEK tubing you wish to straighten. For instance, for 1/16" OD PEEK tubing with a length of 10", choose our U-825 tubing (stainless steel, 1/8" OD x 0.080" ID x 25 cm long, page 64). Slip your PEEK tubing into the stainless steel tubing. Place this "sleeved" tubing into an oven and bake at 425 °F (218 °C) for 30 minutes or 350 °F (177 °C) for 60 minutes. Allow the sleeved tubing to return to room temperature naturally (i.e., do not quench it with water). Once cooled, remove the PEEK tubing from the stainless steel sleeve and inspect it for straightness. If needed, repeat the process until the desired straightness is achieved.

## NOTE

Because the thru-hole of our 25 µm ID PEEK tubing is very small, it is possible for some fittings to cause the ID to become occluded. Please use caution, especially with wrench-tightened fittings. For more information, please contact IDEX Health & Science or your local Distributor directly.

## SPECIFICATIONS & DETAILS

### Capillary PEEK Tubing Specifications

| Tubing OD | Tubing ID | OD/ID Tolerances |
|---|---|---|
| 360 µm | All | ±0.0005" (12.5 µm) |
| 510 µm | All | ±0.001" (25 µm) |
| 1/32" | All | ±0.0005" (12.5 µm) |

### Fused Silica Tubing Specifications

| Tubing OD | Tubing ID | OD Tolerance | ID Tolerance |
|---|---|---|---|
| 360 µm | 20 µm (0.0008") | ±0.0004" (10 µm) | ±0.00008" (2 µm) |
| 360 µm | 50 µm (0.002") and 75 µm (0.003") | ±0.0004" (10 µm) | ±0.00012" (3 µm) |
| 360 µm | 100 µm (0.004") and 150 µm (0.006") | ±0.0004" (10 µm) | ±0.00016" (4 µm) |

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# PEEKsil™ Tubing

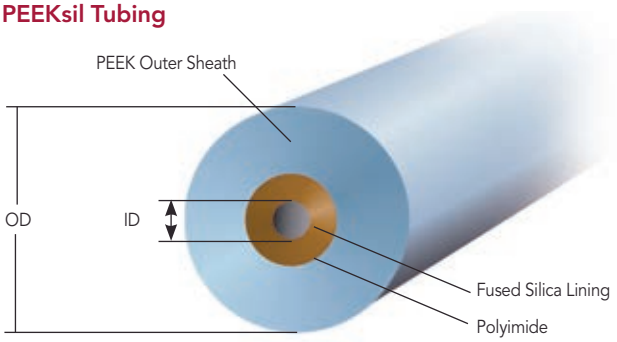
- PEEK covered fused silica
- 360 µm, 1/32", and 1/16" outside diameters with a wide variety of inside diameters
- Precut to numerous standard lengths

PEEKsil's sheathing is mechanically strong and has ideal characteristics for sealing with many styles of fittings. The fused silica core provides a consistent and rigid fluid pathway with very tight tolerances and industry-accepted chemical properties. Together, this makes PEEKsil tubing ideal for numerous applications. In fact, PEEKsil can be used as a direct replacement for conventional stainless steel or PEEK tubing in many analytical systems.

Like traditional fused silica tubing, PEEKsil has excellent chemical compatibility and extremely low adsorption characteristics, especially when compared with stainless steel.

*Please Note:* ***Do not cut this tubing.*** *It should be used at its precut lengths because of permanent damage caused by conventional cutters.*

## PEEKsil Tubing




## SPECIFICATIONS & DETAILS

| Tubing OD | OD Tolerance |
|---|---|
| 360 µm | ±0.0004" (10 µm) |
| 1/32" | ±0.0008" (20 µm) |
| 1/16" | ±0.0012" (30 µm) |

| Tubing ID | ID Tolerance |
|---|---|
| 25 µm | ±0.00004" (1 µm) |
| 50–100 µm | ±0.00012" (3 µm) |
| 0.15–0.30 mm | ±0.0002" (5 µm) |

| Part No. | ID | Length | Color | Qty. |
|---|---|---|---|---|
| **PEEKSIL TUBING, 360 µm OD** | | | | |
| **360255** | 25 µm (0.001") | 5 cm (2") | Orange | 2-pk |
| **3602510** | 25 µm (0.001") | 10 cm (4") | Orange | 2-pk |
| **3602515** | 25 µm (0.001") | 15 cm (6") | Orange | 2-pk |
| **3602525** | 25 µm (0.001") | 25 cm (10") | Orange | 2-pk |
| **3602550** | 25 µm (0.001") | 50 cm (1.6') | Orange | 2-pk |
| **360505** | 50 µm (0.002") | 5 cm (2") | Natural | 2-pk |
| **3605010** | 50 µm (0.002") | 10 cm (4") | Natural | 2-pk |
| **3605015** | 50 µm (0.002") | 15 cm (6") | Natural | 2-pk |
| **3605025** | 50 µm (0.002") | 25 cm (10") | Natural | 2-pk |
| **3605050** | 50 µm (0.002") | 50 cm (1.6') | Natural | 2-pk |
| **PEEKSIL TUBING, 1/32" OD** | | | | |
| **3255** | 25 µm (0.001") | 5 cm (2") | Orange | 2-pk |
| **32510** | 25 µm (0.001") | 10 cm (4") | Orange | 2-pk |
| **32515** | 25 µm (0.001") | 15 cm (6") | Orange | 2-pk |
| **32520** | 25 µm (0.001") | 20 cm (8") | Orange | 2-pk |
| **32550** | 25 µm (0.001") | 50 cm (1.6') | Orange | 2-pk |
| **3505** | 50 µm (0.002") | 5 cm (2") | Natural | 2-pk |
| **35010** | 50 µm (0.002") | 10 cm (4") | Natural | 2-pk |
| **35015** | 50 µm (0.002") | 15 cm (6") | Natural | 2-pk |
| **35020** | 50 µm (0.002") | 20 cm (8") | Natural | 2-pk |

## SPECIFICATIONS & DETAILS

Because PEEKsil tubing has fused silica tubing at its core, the pressure rating for this tubing is determined by the inner diameter of the tubing. The following chart highlights the Maximum Pressure values for this tubing, as determined by SGE International Pty., Ltd., the manufacturer of this tubing:

| Tubing ID | Maximum Pressure |
|---|---|
| 25 µm | 25,000 psi (1,723 bar) |
| 50 µm | 20,000 psi (1,379 bar) |
| 75–100 µm | 15,000 psi (1,034 bar) |

| Tubing ID | Maximum Pressure |
|---|---|
| 150–175 µm | 8,500 psi (586 bar) |
| 200–300 µm | 6,000 psi (414 bar) |

*The pressure ratings provided are indicative of the performance capabilities of the tubing. The actual pressure limits achievable will depend upon the fittings used, the quality of the receiving port, and other factors. Contact IDEX Health & Science or your authorized Distributor for more information.*

| Part No. | ID | Length | Color | Qty. |
|---|---|---|---|---|
| **PEEKSIL TUBING, 1/32" OD** | | | | |
| ★ **35050** | 50 µm (0.002") | 50 cm (1.6') | Natural | 2-pk |
| **3755** | 75 µm (0.003") | 5 cm (2") | Black | 2-pk |
| **37510** | 75 µm (0.003") | 10 cm (4") | Black | 2-pk |
| **37515** | 75 µm (0.003") | 15 cm (6") | Black | 2-pk |
| **37520** | 75 µm (0.003") | 20 cm (8") | Black | 2-pk |
| **37550** | 75 µm (0.003") | 50 cm (1.6') | Black | 2-pk |
| **31005** | 100 µm (0.004") | 5 cm (2") | Red | 2-pk |
| **310010** | 100 µm (0.004") | 10 cm (4") | Red | 2-pk |
| **310015** | 100 µm (0.004") | 15 cm (6") | Red | 2-pk |
| **310020** | 100 µm (0.004") | 20 cm (8") | Red | 2-pk |
| **310050** | 100 µm (0.004") | 50 cm (1.6') | Red | 2-pk |
| **31505** | 150 µm (0.006") | 5 cm (2") | Purple | 2-pk |
| **315010** | 150 µm (0.006") | 10 cm (4") | Purple | 2-pk |
| **315015** | 150 µm (0.006") | 15 cm (6") | Purple | 2-pk |
| **315020** | 150 µm (0.006") | 20 cm (8") | Purple | 2-pk |
| ★ **315050** | 150 µm (0.006") | 50 cm (1.6') | Purple | 2-pk |
| **PEEKSIL TUBING, 1/16" OD** | | | | |
| **6255** | 25 µm (0.001") | 5 cm (2") | Orange | 5-pk |
| **62510** | 25 µm (0.001") | 10 cm (4") | Orange | 5-pk |
| **62515** | 25 µm (0.001") | 15 cm (6") | Orange | 5-pk |
| **62520** | 25 µm (0.001") | 20 cm (8") | Orange | 5-pk |
| **62550** | 25 µm (0.001") | 50 cm (1.6') | Orange | 2-pk |
| **6505** | 50 µm (0.002") | 5 cm (2") | Natural | 5-pk |
| **65010** | 50 µm (0.002") | 10 cm (4") | Natural | 5-pk |
| **65015** | 50 µm (0.002") | 15 cm (6") | Natural | 5-pk |
| ★ **65020** | 50 µm (0.002") | 20 cm (8") | Natural | 5-pk |
| **65050** | 50 µm (0.002") | 50 cm (1.6') | Natural | 2-pk |
| **6755** | 75 µm (0.003") | 5 cm (2") | Black | 5-pk |
| **67510** | 75 µm (0.003") | 10 cm (4") | Black | 5-pk |
| **67515** | 75 µm (0.003") | 15 cm (6") | Black | 5-pk |
| **67520** | 75 µm (0.003") | 20 cm (8") | Black | 5-pk |
| **67550** | 75 µm (0.003") | 50 cm (1.6') | Black | 2-pk |
| **61005** | 100 µm (0.004") | 5 cm (2") | Red | 5-pk |
| **610010** | 100 µm (0.004") | 10 cm (4") | Red | 5-pk |
| **610015** | 100 µm (0.004") | 15 cm (6") | Red | 5-pk |
| **610020** | 100 µm (0.004") | 20 cm (8") | Red | 5-pk |
| **610050** | 100 µm (0.004") | 50 cm (1.6') | Red | 2-pk |
| **61505** | 150 µm (0.006") | 5 cm (2") | Purple | 5-pk |
| **615010** | 150 µm (0.006") | 10 cm (4") | Purple | 5-pk |
| **615015** | 150 µm (0.006") | 15 cm (6") | Purple | 5-pk |
| **615020** | 150 µm (0.006") | 20 cm (8") | Purple | 5-pk |
| **615050** | 150 µm (0.006") | 50 cm (1.6') | Purple | 2-pk |
| **61755** | 175 µm (0.007") | 5 cm (2") | Yellow | 5-pk |
| **617510** | 175 µm (0.007") | 10 cm (4") | Yellow | 5-pk |
| **617515** | 175 µm (0.007") | 15 cm (6") | Yellow | 5-pk |
| **617520** | 175 µm (0.007") | 20 cm (8") | Yellow | 5-pk |
| **617550** | 175 µm (0.007") | 50 cm (1.6') | Yellow | 2-pk |
| **62005** | 200 µm (0.008") | 5 cm (2") | Blue | 5-pk |
| **620010** | 200 µm (0.008") | 10 cm (4") | Blue | 5-pk |
| **620015** | 200 µm (0.008") | 15 cm (6") | Blue | 5-pk |
| **620020** | 200 µm (0.008") | 20 cm (8") | Blue | 5-pk |
| **620050** | 200 µm (0.008") | 50 cm (1.6') | Blue | 2-pk |
| **63005** | 300 µm (0.012") | 5 cm (2") | Gray | 5-pk |
| **630010** | 300 µm (0.012") | 10 cm (4") | Gray | 5-pk |
| **630015** | 300 µm (0.012") | 15 cm (6") | Gray | 5-pk |
| **630020** | 300 µm (0.012") | 20 cm (8") | Gray | 5-pk |
| **630050** | 300 µm (0.012") | 50 cm (1.6') | Gray | 2-pk |

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# Spiral-Link™ Tubing

- Preformed PEEK tubing into a convenient spiral for a sample loop or to facilitate tubing movement
- Many volumes available

The coils of our 1/16" OD Spiral-Link tubing expand and contract, allowing you to more easily move your system components or even make equipment repairs whenever needed, without the hassle of breaking connections.

Upchurch Scientific® Spiral-Link tubing is made of PEEK polymer, a biocompatible, chemically inert material. Spiral-Links come in six different lengths. Our proprietary extrusion process ensures color permanence.

Each Spiral-Link ships with two F-287 SealTight™ Fittings.

## NOTE

In addition to 0.010" ID shown in the price block below, Spiral-Link tubing is also available with the following IDs: 0.005" (125 µm), 0.020" (0.50 mm), and 0.030" (0.75 mm), all with 1/16" OD. Please contact us or an IDEX Health & Science Distributor for more information, or find these products at www.idex-hs.com.

## RELATED PRODUCTS

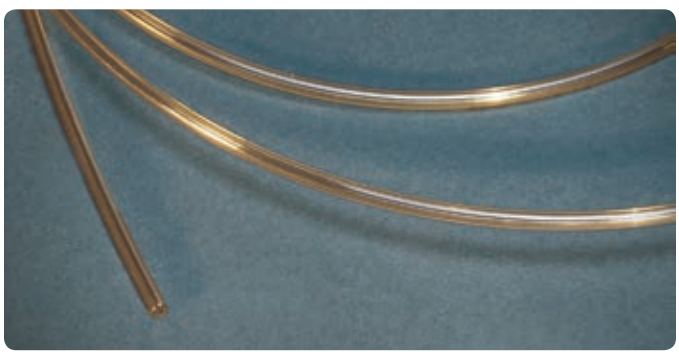
- Some customers report using longer lengths of polymer tubing to add a little back pressure to their system. A more precise way to achieve this objective is to use one of our Back Pressure Regulators, found on page 152.

# Radel® Tubing

- Withstands up to 12,500 psi (862 bar)
- Transparent and autoclavable
- 1/16" and 1/8" outside diameters available
- Maximum continuous use temperature: 100 °C

Radel (polyphenylsulfone) is a mechanically strong and chemically resistant material, much like PEEK. Radel is frequently used in medical applications where repeated autoclave sterilization is performed (tests show product stability even after 1,000 cycles). Radel tubing is also transparent, allowing technicians to visually monitor flow through their instrument. Readily wetted surfaces help keep air bubbles from accumulating on inner surfaces.

Please visit our website, www.idex-hs.com, for more information regarding chemical compatibility of Radel.



## SPECIFICATIONS & DETAILS

| Tubing OD | OD Tolerance |
|---|---|
| 1/16" | ±0.001" (25 µm) |
| 1/8" | ±0.003" (75 µm) |

| Tubing ID | ID Tolerance |
|---|---|
| All | ±0.001" (25 µm) |
| All | ±0.003" (75 µm) |

| Part No. | ID | Length (Prior to Coiling) | | Max coil span | Volume |
|---|---|---|---|---|---|
| **SPIRAL LINK TUBING, 1/16" OD** | | | | | |
| **17202** | 0.25 mm (0.010") | 20 cm (8") | | 1.3 cm (0.5") | 10 µL |
| **17204** | 0.25 mm (0.010") | 40 cm (15.75") | | 6.1 cm (2.4") | 20 µL |
| **17205** | 0.25 mm (0.010") | 50 cm (19.69") | | 7.6 cm (3.0") | 25 µL |
| **17210** | 0.25 mm (0.010") | 100 cm (39.37") | | 17.8 cm (7.0") | 51 µL |
| **17220** | 0.25 mm (0.010") | 200 cm (78.74") | | 33 cm (13.0") | 101 µL |
| **RADEL TUBING, 1/16" OD** | | | | | |
| **Part No.** | **ID** | **Length** | **Color** | **Max Pressure** | **Volume** |
| **1210** | 0.25 mm (0.010") | 1.5 m (5') | Natural | 12,500 psi (862 bar) | N/A |
| **1210L** | 0.25 mm (0.010") | 15 m (50') | Natural | 12,500 psi (862 bar) | N/A |
| **1210XL** | 0.25 mm (0.010") | 30 m (100') | Natural | 12,500 psi (862 bar) | N/A |
| **1220** | 0.50 mm (0.020") | 1.5 m (5') | Natural | 7,500 psi (518 bar) | N/A |
| **1220L** | 0.50 mm (0.020") | 15 m (50') | Natural | 7,500 psi (518 bar) | N/A |
| **1220XL** | 0.50 mm (0.020") | 30 m (100') | Natural | 7,500 psi (518 bar) | N/A |
| **1230** | 0.75 mm (0.030") | 1.5 m (5') | Natural | 5,500 psi (379 bar) | N/A |
| **1230L** | 0.75 mm (0.030") | 15 m (50') | Natural | 5,500 psi (379 bar) | N/A |
| **1230XL** | 0.75 mm (0.030") | 30 m (100') | Natural | 5,500 psi (379 bar) | N/A |
| **RADEL TUBING, 1/8" OD** | | | | | |
| **1235** | 1.55 mm (0.062") | 1.5 m (5') | Natural | 4,500 psi (310 bar) | N/A |
| **1235L** | 1.55 mm (0.062") | 15 m (50') | Natural | 4,500 psi (310 bar) | N/A |
| ★ **1235XL** | 1.55 mm (0.062") | 30 m (100') | Natural | 4,500 psi (310 bar) | N/A |

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| TUBING | DuPont® FEP | DuPont PFA | DuPont HIGH PURITY PFA | 360 µm DuPont HIGH PURITY PFA | ETFE |
|---|---|---|---|---|---|
| **Page** | **71** | **72** | **72** | **72** | **73** |
| **Description** | FEP tubing is a great alternative to traditional PTFE tubing, desirable for use because it is chemically inert to most solvents, easy to cut, and translucent for easy monitoring of solutions passing through.<br>• Great for general, low pressure applications<br>• Many sizes available in multiple colors for easy identification<br>• Tight manufacturing tolerances to ensure product consistency | Offers excellent chemical compatibility, plus due to its inner surface smoothness, PFA tubing tends to be more translucent than PTFE tubing.<br>• Offers higher purity and enhanced translucence when compared with other fluoropolymer tubes<br>• Great for more critical, low pressure applications | This polymer tubing is manufactured from a premium grade of PFA — one of the most contaminant-free polymers on the market.<br>• Offers chemical stability, mechanical strength, and purity for applications such as medical, diagnostic, pharmaceutical, biotechnology, and semiconductor<br>• Excellent replacement for PTFE where gas permeability and surface texture are issues<br>• Clarity of tubing makes PFA an excellent choice for monitoring fluid movement | This tubing offers excellent chemical compatibility, transparency, very low contaminant levels and is available in the most commonly-used outside diameter for capillary tubing applications.<br>• Replacement for capillary tubing in low pressure applications where excellent chemical compatibility is required<br>• Tubing sleeves available for capillary tubing connections | ETFE is chemically inert and more suitable for higher pressure applications (when using aqueous mobile phases) than PTFE, FEP, and PFA. Additionally, because ETFE is more rigid than PTFE, FEP, and PFA, this tubing better resists inner diameter collapse.<br>• Excellent solvent resistance<br>• More durable and less gas permeable than PTFE, FEP, and PFA<br>• Operating temperatures up to 80 °C |
| **Specifications** | | | | | |
| **OD (outside diameter)** | 1/32" (785 µm), 0.040" (1.0 mm), 1/16" (1.55 mm), 0.080" (2.0 mm), 0.118"(3.0 mm), 1/8" (3.2 mm), 0.157"(4.0 mm), 3/16" (4.8 mm), 1/4" (6.35 mm), 5/16" (7.94 mm) | 1/16" (1.55 mm), 1/8" (3.2 mm) | 1/16" (1.55 mm), 1/8" (3.2 mm), 3/16" (4.8 mm), 1/4" (6.35 mm) | 0.0145" (360 µm) | 1/16" (1.6 mm), 1/8" (3.2 mm), 1/4" (6.35 mm) |
| **ID (inside diameter)** | 0.003" (0.075 mm) – 0.250" (6.35 mm) | 0.020" (0.50 mm)– 0.062" (1.55 mm) | 0.020" (0.50 mm)– 0.188" (4.80 mm) | 0.002" (50 µm)– 0.006" (150 µm) | 0.010" (0.25 mm)– 0.188" (4.80 mm) |
| **Operating Temp** | -51 to 50 °C | -51 to 80 °C | -51 to 80 °C | -51 to 80 °C | -51 to 80 °C |
| **Pressure Rating** | 2,500–4,000 psi (172 - 276 bar) | 500–2,000 psi (34–138 bar) | 250–2,000 psi (17–138 bar) | 1,750–3,500 psi (121–241 bar) | 250–4,000 psi (17–276 bar) |
| **Typical Tolerances** | ±0.001" (25 µm) for 1/16" OD tubing, ±0.003" (75 µm) for 1/8" OD tubing | ±0.001" (25 µm) for 1/16" OD tubing, ±0.003" (75 µm) for 1/8" OD tubing | ±0.001" (25 µm) for 1/16" OD tubing | ±0.0005" (12.5 µm) | ±0.001" (25 µm) for 1/16" OD tubing, ±0.003" (75 µm) for 1/8" OD tubing |
| **Refractive Index (Clarity)** | 1.338 | 1.34 | 1.34 | 1.34 | 1.4 |
| **pH Range** | 0–14 | 0–14 | 0–14 | 0–14 | 0–14 |
| **Sterilization Techniques** | Ethylene oxide; thermal | Ethylene oxide; thermal | Gamma irradiation; ethylene oxide; thermal | Gamma irradiation; ethylene oxide; thermal | Ethylene oxide |
| **Autoclavable?** | Y | Y | Y | Y | Y |

## Upchurch Scientific® Tubing OD Sizes

Please use this table as a reference tool to help quickly locate within this chapter the appropriate OD size tubing for your application.

| Size | Tubing OD | Page(s) |
|---|---|---|
| . | 360 µm | 67, 68, 72 |
| . | 510 µm | 65, 67 |
| • | 1/32" | 65, 67, 68, 71 |
| • | 1/16" | 63, 65, 66, 68, 69, 71, 72, 73, 77 |
| • | 1/8" | 65, 66, 69, 71, 72, 73 |
| • | 3/16" | 71, 72 |
| • | 1/4" | 71, 72, 73 |

| Size | Tubing OD | Page(s) |
|---|---|---|
| • | 5/16" | 71 |
| • | 1 mm | 71 |
| • | 1.8 mm | 66 |
| • | 2 mm | 66, 71 |
| • | 3 mm | 71 |
| • | 4 mm | 71 |

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# DuPont® FEP Fluoropolymer Tubing

- Great for moderate-to-low pressure applications
- 1/32", 1/16", 1/8", 3/16", 1/4", or 5/16" outside diameter available
- 1 mm, 2 mm, 3 mm, or 4 mm outside diameter available
- Maximum continuous use temperature: 50 °C

With virtually identical chemical resistance to PFA at a lower price, FEP tubing is great for general, low pressure applications. Compared to PTFE, FEP (fluorinated ethylene propylene) tubing is held to tighter tolerances and has lower gas permeability (see material properties on our website: www.idex-hs.com).

Much of our FEP Tubing — even the color-tinted options — is translucent, making it possible to watch fluid flow. Using different colored tubing can help identify transfer lines in multisolvent systems. Color coding also allows easy identification of the tubing thru-hole size. Black FEP tubing is available for light-sensitive applications (such as enzymatic and chemiluminescent reactions) and entering/exiting flow cells.

## SPECIFICATIONS & DETAILS

| Tubing Size | OD Tolerances | ID Tolerances |
|---|---|---|
| 1/32" OD | ±0.0005" (12.5 µm) | ±0.0005" (12.5 µm) |
| 1/16" OD | ±0.001" (25 µm) | ±0.001" (25 µm) |
| 1/8" OD | ±0.003" (75 µm) | ±0.003" (75 µm) |
| 3/16" OD | ±0.004" (0.10 mm) | ±0.004" (0.10 mm) |
| 5/16" OD | ±0.004" (0.10 mm) | ±0.004" (0.10 mm) |
| 1 mm OD | ±0.001" (25 µm) | ±0.001" (25 µm) |
| 2 mm OD | ±0.003" (75 µm) | ±0.003" (75 µm) |
| 3 mm OD | ±0.003" (75 µm) | ±0.003" (75 µm) |
| 4 mm OD | ±0.004" (0.10 mm) | ±0.004" (0.10 mm) |

| Part No. | ID | Length | Color | Max. Pressure |
|---|---|---|---|---|
| **FEP TUBING, 1/32" OD** | | | | |
| **1683** | 0.003" (75 µm) | 5' (1.5 m) | Natural | 4,000 psi (276 bar) |
| **1684** | 0.004" (0.10 mm) | 5' (1.5 m) | Black | 3,000 psi (207 bar) |
| **1685** | 0.005" (0.125 mm) | 5' (1.5 m) | Red | 3,000 psi (207 bar) |
| **1686** | 0.006" (0.15 mm) | 5' (1.5 m) | Violet | 3,000 psi (207 bar) |
| **1687** | 0.007" (0.175 mm) | 5' (1.5 m) | Yellow | 3,000 psi (207 bar) |
| **1688** | 0.008" (0.20 mm) | 5' (1.5 m) | Natural | 2,500 psi (172 bar) |
| **1689** | 0.009" (0.23 mm) | 5' (1.5 m) | Blue | 2,500 psi (172 bar) |
| **1692** | 0.016" (0.405 mm) | 5' (1.5 m) | Natural | 1,500 psi (104 bar) |
| **FEP TUBING, 1/16" OD** | | | | |
| **1474** | 0.004" (0.10 mm) | 10' (3 m) | Black | 4,000 psi (276 bar) |
| **1475** | 0.005" (0.125 mm) | 10' (3 m) | Red | 4,000 psi (276 bar) |
| **1476** | 0.006" (0.150 mm) | 10' (3 m) | Violet | 4,00t0 psi (276 bar) |
| **1477** | 0.007" (0.175 mm) | 10' (3 m) | Yellow | 4,000 psi (276 bar) |
| **1478** | 0.008" (0.20 mm) | 10' (3 m) | Natural | 4,000 psi (276 bar) |
| **1479** | 0.009" (0.23 mm) | 10' (3 m) | Blue | 4,000 psi (276 bar) |
| **1526** | 0.010" (0.25 mm) | 10' (3 m) | Natural | 3,000 psi (207 bar) |
| **1526B** | 0.010" (0.25 mm) | 10' (3 m) | Blue | 3,000 psi (207 bar) |
| **1527** | 0.010" (0.25 mm) | 20' (6 m) | Natural | 3,000 psi (207 bar) |
| **1527B** | 0.010" (0.25 mm) | 20' (6 m) | Blue | 3,000 psi (207 bar) |
| **1518** | 0.020" (0.50 mm) | 10' (3 m) | Black | 2,000 psi (138 bar) |
| **1549** | 0.020" (0.50 mm) | 10' (3 m) | Natural | 2,000 psi (138 bar) |
| **1549OR** | 0.020" (0.50 mm) | 10' (3 m) | Orange | 2,000 psi (138 bar) |
| **1519** | 0.020" (0.50 mm) | 20' (6 m) | Black | 2,000 psi (138 bar) |
| ★ **1548** | 0.020" (0.50 mm) | 20' (6 m) | Natural | 2,000 psi (138 bar) |
| **1548OR** | 0.020" (0.50 mm) | 20' (6 m) | Orange | 2,000 psi (138 bar) |
| **1522** | 0.030" (0.75 mm) | 10' (3 m) | Natural | 1,000 psi (69 bar) |
| **1522G** | 0.030" (0.75 mm) | 10' (3 m) | Green | 1,000 psi (69 bar) |
| ★ **1520** | 0.030" (0.75 mm) | 20' (6 m) | Natural | 1,000 psi (69 bar) |
| **1520G** | 0.030" (0.75 mm) | 20' (6 m) | Green | 1,000 psi (69 bar) |

| Part No. | ID | Length | Color | Max. Pressure |
|---|---|---|---|---|
| **FEP TUBING, 1/8" OD** | | | | |
| ★ **1521** | 0.062" (1.55 mm) | 20' (6 m) | Natural | 500 psi (34 bar) |
| **1521BL** | 0.062" (1.55 mm) | 50' (15 m) | Blue | 500 psi (34 bar) |
| **1521GL** | 0.062" (1.55 mm) | 50' (15 m) | Green | 500 psi (34 bar) |
| **1521ORL** | 0.062" (1.55 mm) | 50' (15 m) | Orange | 500 psi (34 bar) |
| **1521RL** | 0.062" (1.55 mm) | 50' (15 m) | Red | 500 psi (34 bar) |
| **1521YL** | 0.062" (1.55 mm) | 50' (15 m) | Yellow | 500 psi (34 bar) |
| **1523** | 0.062" (1.55 mm) | 10' (3 m) | Natural | 500 psi (34 bar) |
| **FEP TUBING, 3/16" OD** | | | | |
| **1524** | 0.125" (3.20 mm) | 20' (6 m) | Natural | 500 psi (34 bar) |
| **1524L** | 0.125" (3.20 mm) | 50' (15 m) | Natural | 500 psi (34 bar) |
| ★ **1524XL** | 0.125" (3.20 mm) | 100' (30 m) | Natural | 500 psi (34 bar) |
| **1525** | 0.125" (3.20 mm) | 10' (3 m) | Natural | 500 psi (34 bar) |
| **FEP TUBING, 1/4" OD** | | | | |
| **1651** | 0.156" (4.0 mm) | 10' (3 m) | Natural | 250 psi (17 bar) |
| **1651L** | 0.156" (4.0 mm) | 50' (15 m) | Natural | 250 psi (17 bar) |
| **1651XL** | 0.156" (4.0 mm) | 100' (30 m) | Natural | 250 psi (17 bar) |
| **1650** | 0.188" (4.80 mm) | 10' (3 m) | Natural | 250 psi (17 bar) |
| **1650L** | 0.188" (4.80 mm) | 50' (15 m) | Natural | 250 psi (17 bar) |
| **1650XL** | 0.188" (4.80 mm) | 100' (30 m) | Natural | 250 psi (17 bar) |
| **FEP TUBING, 5/16" OD** | | | | |
| **1652** | 0.250" (6.35 mm) | 10' (3 m) | Natural | 250 psi (17 bar) |
| **1652L** | 0.250" (6.35 mm) | 50' (15 m) | Natural | 250 psi (17 bar) |
| **1652XL** | 0.250" (6.35 mm) | 100' (30 m) | Natural | 250 psi (17 bar) |
| **FEP TUBING, 1.0 mm OD** | | | | |
| **1671** | 0.020" (0.50 mm) | 10' (3 m) | Natural | 500 psi (34 bar) |
| **1671L** | 0.020" (0.50 mm) | 50' (15 m) | Natural | 500 psi (34 bar) |
| **1671XL** | 0.020" (0.50 mm) | 100' (30 m) | Natural | 500 psi (34 bar) |
| **FEP TUBING, 2.0 mm OD** | | | | |
| **1673** | 0.040" (1.0 mm) | 10' (3 m) | Natural | 500 psi (34 bar) |
| **1673L** | 0.040" (1.0 mm) | 50' (15 m) | Natural | 500 psi (34 bar) |
| **1673XL** | 0.040" (1.0 mm) | 100' (30 m) | Natural | 500 psi (34 bar) |
| **FEP TUBING, 3.0 mm OD** | | | | |
| **1675** | 0.040" (1.0 mm) | 10' (3 m) | Natural | 500 psi (34 bar) |
| **1675L** | 0.040" (1.0 mm) | 50' (15 m) | Natural | 500 psi (34 bar) |
| **1675XL** | 0.040" (1.0 mm) | 100' (30 m) | Natural | 500 psi (34 bar) |
| **1677** | 0.080" (2.0 mm) | 10' (3 m) | Natural | 500 psi (34 bar) |
| **1677L** | 0.080" (2.0 mm) | 50' (15 m) | Natural | 500 psi (34 bar) |
| **1677XL** | 0.080" (2.0 mm) | 100' (30 m) | Natural | 500 psi (34 bar) |
| **FEP TUBING, 4.0 mm OD** | | | | |
| **1679** | 0.120" (3.0 mm) | 10' (3 m) | Natural | 500 psi (34 bar) |
| **1679L** | 0.120" (3.0 mm) | 50' (15 m) | Natural | 500 psi (34 bar) |
| **1679XL** | 0.120" (3.0 mm) | 100' (30 m) | Natural | 500 psi (34 bar) |

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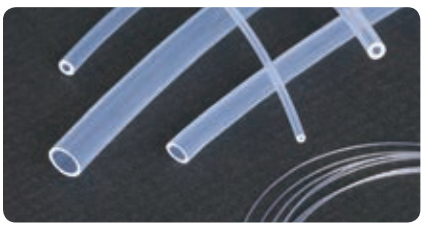
# DuPont® PFA Tubing

- 1/16" and 1/8" ODs available
- Excellent solvent resistance and low gas permeability

PFA (perfluoroalkoxyalkane) tubing offers excellent solvent resistance (virtually identical to FEP and PTFE) while adding several advantages. These include smoother surface texture, higher continuous service temperature and superior polymer purity. The recommended maximum operating temperature for our PFA tubing is 80 °C.



# DuPont High Purity PFA Tubing

- 360 µm, 1/16", 1/8", 3/16", and 1/4" outside diameters available
- PFA HP and PFA HP Plus Grades available
- Virtually contaminant free

PFA High Purity (HP) tubing offers all of the benefits of standard PFA tubing, with the additional benefit of being manufactured from a premium grade of PFA that is one of the most contaminant-free polymers available. In PFA HP, we offer tubing with the following outer diameters: 1/16", 1/8", 3/16", and 1/4".

PFA High Purity (HP) Plus tubing carries all of the benefits of PFA HP tubing, with the additional benefits of increased ability to withstand repeated flexing; improved resistance to stress cracking when exposed to aggressive fluorosurfactants; and smoother, clearer walls. In PFA HP Plus, we offer tubing with the following outer diameters: 360 µm, 1/16", and 1/8".

*(Please Note: Due to the physical nature of the 360 µm OD tubing, we recommend using our A-350 Polymer Tubing Cutter from page 74 when cutting this tubing to length. Additionally, extra care should be taken to ensure fittings are not overtightened and to ensure the tubing is not stretched once secured in place, to ensure the dimensional stability of the tubing.)*

| Part No. | ID | Length | Color | Max. Pressure |
|---|---|---|---|---|
| **PFA TUBING, 1/16" OD** | | | | |
| **1500** | 0.020" (0.50 mm) | 5' (1.5 m) | Natural | 2,000 psi (138 bar) |
| **1511** | 0.020" (0.50 mm) | 10' (3 m) | Natural | 2,000 psi (138 bar) |
| **1512** | 0.020" (0.50 mm) | 20' (6 m) | Natural | 2,000 psi (138 bar) |
| **1512L** | 0.020" (0.50 mm) | 50' (15 m) | Natural | 2,000 psi (138 bar) |
| **1502** | 0.030" (0.75 mm) | 5' (1.5 m) | Natural | 1,000 psi (69 bar) |
| **1513** | 0.030" (0.75 mm) | 10' (3 m) | Natural | 1,000 psi (69 bar) |
| **1514** | 0.030" (0.75 mm) | 20' (6 m) | Natural | 1,000 psi (69 bar) |
| ★ **1514L** | 0.030" (0.75 mm) | 50' (15 m) | Natural | 1,000 psi (69 bar) |
| **1503** | 0.040" (1.0 mm) | 5' (1.5 m) | Natural | 500 psi (34 bar) |
| **1504** | 0.040" (1.0 mm) | 10' (3 m) | Natural | 500 psi (34 bar) |
| **1507** | 0.040" (1.0 mm) | 20' (6 m) | Natural | 500 psi (34 bar) |
| **1507L** | 0.040" (1.0 mm) | 50' (15 m) | Natural | 500 psi (34 bar) |
| **PFA TUBING, 1/8" OD** | | | | |
| **1508** | 0.062" (1.55 mm) | 10' (3 m) | Natural | 500 psi (34 bar) |
| ★ **1509** | 0.062" (1.55 mm) | 20' (6 m) | Natural | 500 psi (34 bar) |
| **1509L** | 0.062" (1.55 mm) | 50' (15 m) | Natural | 500 psi (34 bar) |
| **PFA TUBING, 1/4" OD** | | | | |
| **1649** | 0.156" (4.0 mm) | 10' (3 m) | Natural | 250 psi (17 bar) |
| **1649L** | 0.156" (4.0 mm) | 50' (15 m) | Natural | 250 psi (17 bar) |
| **1649XL** | 0.156" (4.0 mm) | 100' (30 m) | Natural | 250 psi (17 bar) |
| **PFA HP TUBING, 1/16" OD** | | | | |
| **1620** | 0.020" (0.50 mm) | 5' (1.5 m) | Natural | 2,000 psi (138 bar) |
| **1621** | 0.020" (0.50 mm) | 10' (3 m) | Natural | 2,000 psi (138 bar) |
| **1622** | 0.020" (0.50 mm) | 20' (6 m) | Natural | 2,000 psi (138 bar) |
| **1622L** | 0.020" (0.50 mm) | 50' (15 m) | Natural | 2,000 psi (138 bar) |
| **1630** | 0.030" (0.75 mm) | 5' (1.5 m) | Natural | 1,000 psi (69 bar) |
| **1631** | 0.030" (0.75 mm) | 10' (3 m) | Natural | 1,000 psi (69 bar) |
| **1632** | 0.030" (0.75 mm) | 20' (6 m) | Natural | 1,000 psi (69 bar) |
| **1632L** | 0.030" (0.75 mm) | 50' (15 m) | Natural | 1,000 psi (69 bar) |
| **PFA HP TUBING, 1/8" OD** | | | | |
| **1640** | 0.062" (1.55 mm) | 10' (3 m) | Natural | 500 psi (34 bar) |
| **1641** | 0.062" (1.55 mm) | 20' (6 m) | Natural | 500 psi (34 bar) |
| ★ **1641L** | 0.062" (1.55 mm) | 50' (15 m) | Natural | 500 psi (34 bar) |
| **PFA HP TUBING, 3/16" OD** | | | | |
| **1642** | 0.125" (3.20 mm) | 10' (3 m) | Natural | 250 psi (17 bar) |
| **1642L** | 0.125" (3.20 mm) | 50' (15 m) | Natural | 250 psi (17 bar) |
| **1642XL** | 0.125" (3.20 mm) | 100' (30 m) | Natural | 250 psi (17 bar) |
| **PFA HP TUBING, 1/4" OD** | | | | |
| **1645** | 0.188" (4.80 mm) | 10' (3 m) | Natural | 250 psi (17 bar) |
| **1645L** | 0.188" (4.80 mm) | 50' (15 m) | Natural | 250 psi (17 bar) |
| **1645XL** | 0.188" (4.80 mm) | 100' (30 m) | Natural | 250 psi (17 bar) |
| **PFA HP PLUS TUBING, 1/16" OD** | | | | |
| **1900** | 0.010" (0.25 mm) | 5' (1.5 m) | Natural | 3,000 psi (207 bar) |
| **1901** | 0.010" (0.25 mm) | 10' (3 m) | Natural | 3,000 psi (207 bar) |
| **1902** | 0.010" (0.25 mm) | 20' (6 m) | Natural | 3,000 psi (207 bar) |
| **1902L** | 0.010" (0.25 mm) | 50' (15 m) | Natural | 3,000 psi (207 bar) |
| **1905** | 0.020" (0.50 mm) | 5' (1.5 m) | Natural | 2,000 psi (138 bar) |
| **1906** | 0.020" (0.50 mm) | 10' (3 m) | Natural | 2,000 psi (138 bar) |
| **1907** | 0.020" (0.50 mm) | 20' (6 m) | Natural | 2,000 psi (138 bar) |
| **1907L** | 0.020" (0.50 mm) | 50' (15 m) | Natural | 2,000 psi (138 bar) |
| **1910** | 0.030" (0.75 mm) | 5' (1.5 m) | Natural | 1,000 psi (69 bar) |
| **1911** | 0.030" (0.75 mm) | 10' (3 m) | Natural | 1,000 psi (69 bar) |
| **1912** | 0.030" (0.75 mm) | 20' (6 m) | Natural | 1,000 psi (69 bar) |
| **1912L** | 0.030" (0.75 mm) | 50' (15 m) | Natural | 1,000 psi (69 bar) |
| **PFA HP PLUS TUBING, 1/8" OD** | | | | |
| **1920** | 0.062" (1.55 mm) | 10' (3 m) | Natural | 500 psi (34 bar) |
| **1921** | 0.062" (1.55 mm) | 20' (6 m) | Natural | 500 psi (34 bar) |
| **1921L** | 0.062" (1.55 mm) | 50' (15 m) | Natural | 500 psi (34 bar) |
| **PFA HP PLUS TUBING, 360 µm OD** | | | | |
| **1930** | 50 µm (0.002") | 5' (1.5 m) | Natural | 3,500 psi (241 bar) |
| **1931** | 75 µm (0.003") | 5' (1.5 m) | Natural | 3,000 psi (207 bar) |
| **1932** | 100 µm (0.004") | 5' (1.5 m) | Natural | 2,500 psi (172 bar) |
| **1933** | 150 µm (0.006") | 5' (1.5 m) | Natural | 1,750 psi (121 bar) |

## SPECIFICATIONS & DETAILS

### PFA Tubing Specifications

| Tubing OD | OD Tolerances | Tubing ID | ID Tolerance |
|---|---|---|---|
| 1/16" | ±0.001" (25 µm) | All | ±0.001" (25 µm) |
| 1/8" | ±0.003" (75 µm) | All | ±0.003" (75 µm) |

### High Purity PFA Tubing Specifications

| Tubing OD | OD Tolerances | Tubing ID | ID Tolerance |
|---|---|---|---|
| 1/16" | ±0.001" (25 µm) | All | ±0.001" (25 µm) |
| 1/8" | ±0.003" (75 µm) | All | ±0.003" (75 µm) |
| 3/16" | ±0.003" (75 µm) | All | ±0.003" (75 µm) |
| 1/4" | ±0.004" (100 µm) | All | ±0.004" (100 µm) |

### 360 µm OD PFA HP Tubing Specifications

| Tubing OD | OD Tolerance | Tubing ID | ID Tolerance |
|---|---|---|---|
| 360 µm | ±0.0005" (12.5 µm) | All | ±0.0005" (12.5 µm) |

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# ETFE Tubing

- Excellent chemical resistance
- Holds pressure up to 4,000 psi (276 bar)
- 1/16", 1/8", or 1/4" outside diameter available
- Maximum continuous operating temperature: 80 °C

Upchurch Scientific® ETFE (ethylene-tetrafluoroethylene) tubing is an excellent fluoropolymer product that offers several benefits over tubing manufactured from PTFE, FEP, or PFA. These benefits include enhanced pressure holding capabilities, increased mechanical stability and lower gas permeability.

Other tubing materials and dimensions may be available. Please contact IDEX Health & Science or your local representative directly.

## APPLICATION NOTE

ETFE tubing is an ideal choice for the fluid pathway between the vacuum degasser and the system's pump. Its low gas permeability will help ensure the mobile phase solvents do not regas while in transit.

## SPECIFICATIONS & DETAILS

### ETFE Tubing Specifications

| Tubing OD | Tubing ID | OD/ID Tolerances |
|---|---|---|
| 1/16" OD | 0.010" (0.25 mm), 0.020" (0.50 mm), 0.030" (0.75 mm) | ±0.001" (25 µm) |
| 1/16" OD | 0.040" (1.0 mm) | ±0.002" (50 µm) |
| 1/8" OD | All | ±0.003" (75 µm) |
| 1/4" OD | All | ±0.004" (100 µm) |

| | Part No. | ID | Length | Color | Max. Pressure |
|---|---|---|---|---|---|
| | **ETFE TUBING, 1/16" OD** | | | | |
| | **1529** | 0.010" (0.25 mm) | 5' (1.5 m) | Natural | 4,000 psi (276 bar) |
| | **1529L** | 0.010" (0.25 mm) | 50' (15 m) | Natural | 4,000 psi (276 bar) |
| | **1529XL** | 0.010" (0.25 mm) | 100' (30 m) | Natural | 4,000 psi (276 bar) |
| | **1516** | 0.020" (0.50 mm) | 5' (1.5 m) | Natural | 3,000 psi (207 bar) |
| | **1516L** | 0.020" (0.50 mm) | 50' (15 m) | Natural | 3,000 psi (207 bar) |
| ★ | **1516XL** | 0.020" (0.50 mm) | 100' (30 m) | Natural | 3,000 psi (207 bar) |
| | **1528** | 0.030" (0.75 mm) | 5' (1.5 m) | Natural | 2,000 psi (138 bar) |
| | **1528L** | 0.030" (0.75 mm) | 50' (15 m) | Natural | 2,000 psi (138 bar) |
| ★ | **1528XL** | 0.030" (0.75 mm) | 100' (30 m) | Natural | 2,000 psi (138 bar) |
| | **1517** | 0.040" (1.00 mm) | 5' (1.5 m) | Natural | 500 psi (34 bar) |
| | **1517L** | 0.040" (1.00 mm) | 50' (15 m) | Natural | 500 psi (34 bar) |
| | **1517XL** | 0.040" (1.00 mm) | 100' (30 m) | Natural | 500 psi (34 bar) |
| | **ETFE TUBING, 1/8" OD** | | | | |
| | **1515** | 0.062" (1.55 mm) | 5' (1.5 m) | Black | 1,000 psi (69 bar) |
| | **1515L** | 0.062" (1.55 mm) | 50' (15 m) | Black | 1,000 psi (69 bar) |
| | **1515XL** | 0.062" (1.55 mm) | 100' (30 m) | Black | 1,000 psi (69 bar) |
| ★ | **1530** | 0.062" (1.55 mm) | 5' (1.5 m) | Natural | 1,000 psi (69 bar) |
| | **1530L** | 0.062" (1.55 mm) | 50' (15 m) | Natural | 1,000 psi (69 bar) |
| ★ | **1530XL** | 0.062" (1.55 mm) | 100' (30 m) | Natural | 1,000 psi (69 bar) |
| | **1648** | 0.093" (2.40 mm) | 5' (1.5 m) | Natural | 500 psi (34 bar) |
| | **1648L** | 0.093" (2.40 mm) | 50' (15 m) | Natural | 500 psi (34 bar) |
| ★ | **1648XL** | 0.093" (2.40 mm) | 100' (30 m) | Natural | 500 psi (34 bar) |
| | **ETFE TUBING, 1/4" OD** | | | | |
| | **1647** | 0.188" (4.80 mm) | 5' (1.5 m) | Natural | 250 psi (17 bar) |
| | **1647L** | 0.188" (4.80 mm) | 50' (15 m) | Natural | 250 psi (17 bar) |
| | **1647XL** | 0.188" (4.80 mm) | 100' (30 m) | Natural | 250 psi (17 bar) |

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## Fused Silica Tubing Cutters

We offer a precision cutter for fused silica tubing — SGT's Shortix™ Cutter (FS-315). This cutter ensures clean, trouble-free cutting of fused silica tubing, providing better cuts than any other product on the market. It also includes a built-in magnifying glass to examine the cut tubing ends. Order the FS-315-02 Maintenance Kit, as needed, to replace a worn or damaged cutting wheel.

**FS-315**
for fused silica tubing

When using traditional fused silica tubing cutters, only a small part of the tubing wall is scratched, then the tubing is snapped or pulled in two, often resulting in a jagged, uneven cut. With a Shortix Cutter, a clean cut is made every time, regardless of skill or experience, as the cut is made by rotating a diamond blade around the entire circumference of the tubing.

*Please Note: The FS-315 Fused Silica Tubing Cutters are designed to cut only tubing with ODs of 350 µm–780 µm and IDs of 100 µm–350 µm.*

## Polymer Tubing Cutters

- For 1/16", 1/8", 3/16", 1/4", and 5/16" OD tubing

A flat, 90˚, burr-free cut is difficult to obtain with most commercial polymer tubing cutters. Upchurch Scientific® has designed several tubing cutters specifically to cut polymer tubing. This line of tubing cutters includes a standard cutter for 1/16" and 1/8" OD tubing (A-327), and another for large bore tubing (A-329). Each has guide holes to ensure precise cutting. These cutters are durable, reliable, and easy to operate. Five replacement blades are included with each tool.

**A-329**
for 3/16" - 5/16" OD tubing

**A-327**
for 1/16" and 1/8" OD tubing

### NOTE

- The A-350 Capillary Polymer Tubing Cutter can be used to cut tubing OD sizes other than 360 µm, 510 µm, and 1/32". Simply use the proper NanoTight™ Tubing Sleeve found on page 17. Please note, however, that these sleeves are shorter than those listed on this page, and therefore will last through fewer cuts.
- Our tubing cutters are material specific: the A-327, A-329, A-350, and A-370 should only be used to cut polymer tubing, where as the FS-315 should only be used to cut fused silica tubing.

## Capillary Polymer Tubing Cutters

The Upchurch Scientific A-350 Cutter is designed to cut capillary-sized polymer tubing. The cutter makes clean, perpendicular cuts without collapsing thin capillary walls. A set of ten tubing sleeves, required for cutting, are included with each cutter, along with five replacement blades. The included tubing sleeves are for cutting 360 µm OD polymer capillary tubing. Alternative sleeves are available for cutting 510 µm and 1/32" OD tubing. All tubing sleeves are 2" long and are made of DuPont® FEP.

Upchurch Scientific introduces a new tubing cutter specifically for cutting 2.0 mm OD polymer tubing. The A-370 tubing cutter is designed to cut in a similar method to the A-350 capillary polymer tubing cutter. The tubing slides through the cutter and the knob is rotated to spin the tubing as the razor blade circumscribes the tubing, providing a very clean, perpendicular cut.

**A-350**
for capillary polymer tubing

| | Part No. | Description | Qty. |
|---|---|---|---|
| | **FS-315** | Shortix Fused Silica Tubing Cutter | ea. |
| | | **CAPILLARY POLYMER TUBING CUTTER** | |
| ★ | **A-350** | Capillary Polymer Tubing Cutter* for 360 µm–1/32" OD tubing Includes (1) F-262x 10-pack of sleeves and (1) M-438-03 wrench | ea. |
| | **F-262x** | Replacement Sleeves for A-350, 0.0155" ID, Green, for cutting 360 µm OD tubing | 10-pk |
| | **F-264x** | Alternative Sleeves for A-350, 0.021" ID, Natural, for cutting 510 µm OD tubing | 10-pk |
| | **F-267Bx** | Alternative Sleeves for A-350, 0.033" ID, Blue, for cutting 1/32" OD tubing | 10-pk |
| ★ | **A-327** | Standard Polymer Tubing Cutter* for 1/16" and 1/8" OD tubing | ea. |
| | **A-329** | Large Bore Polymer Tubing Cutter* for 3/16"– 5/16" OD tubing | ea. |
| | **A-328** | Replacement Blades for A-350, A-370, A-327 and A-329 | 5-pk |
| NEW! | **A-370** | Polymer Tubing Cutter* for 2.0 mm OD tubing | ea. |

** Includes (1) A-328 5-pack of replacement blades.*

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| TUBING | TYGON® LMT-55 | TYGON E-LFL | ISMAPRENE (PHARMED®) | TYGON 3350 SI | SILICONE PEROXIDE |
|---|---|---|---|---|---|
| **Page** | 78 | 78 | 79 | 79 | 80 |
| **Description** | The inexpensive all-round tubing for general laboratory applications.<br>• Transparent<br>• Resistant to almost all inorganic chemicals<br>• Smooth polished inner wall<br>• Low gas permeability<br>• Non-aging and non-oxidizing | The tubing with the longest service-life of any clear Tygon tubing.<br>• Transparent<br>• Broad chemical resistance<br>• Tasteless<br>• Extremely low particulate spallation<br>• Meets USP Class VI and FDA criteria<br>• Non-aging | The ideal tubing for pharmaceutical and medical applications, and for foodstuffs.<br>• Recommended for cell cultures and tissue<br>• Ideal for production filtration, fermentation, and bioreactor process lines<br>• Very long service-life<br>• Non-toxic and non-hemolytic<br>• Impermeable to normal light and UV-radiation<br>• Appropriate for medical products and foodstuffs<br>• Low particulate spallation<br>• Can be autoclaved repeatedly<br>• Withstands repeated CIP and SIP cleaning and sterilization<br>• Meets USP class VI, FDA, and NSF criteria | The platinum-cured silicone tubing with an ultra-smooth inner surface for sanitary transfer of sensitive fluids.<br>• Can be autoclaved with steam<br>• Excellent biological compatibility<br>• Ultra-smooth inner-bore reduces potential for particle entrapment<br>• Lower level of protein binding<br>• Entirely non-toxic, non-hemolytic and non-pyrogenic<br>• Weather, ozone, sunlight, and radiation resistant<br>• Resistant to fungus<br>• Odorless | Silicone tubing blended with organic peroxide for biological applications.<br>• Can be autoclaved with steam<br>• Excellent biological compatibility<br>• Greater physical compression capability<br>• Not prone to mold<br>• Non-toxic<br>• Waterproof and resistant to ozone, radiation, and sunlight<br>• Resistant to fungus<br>• Odorless |
| **Specifications** | | | | | |
| **OD (outside diameter)** | 0.16–0.88" (4.0–22.3 mm) | 0.19–0.75" (4.8–19.1 mm) | 0.16–1.3" (4.0–33.4 mm) | 0.16–1.3" (4.0–33.4 mm) | 0.16–1.3" (4.0–33.4 mm) |
| **ID (inside diameter)** | 0.03–0.61" (0.8–15.9 mm) | 0.06–0.5" (1.6–12.7 mm) | 0.03–1" (0.8–25.4 mm) | 0.03–1" (0.8–25.4 mm) | 0.03–1" (0.8–25.4 mm) |
| **Operating Temp** | -50 to 74 °C | -50 to 74 °C | -60 to 135 °C | -60 to +200 °C | -51 to 238 °C |
| **Certification(s)** | | FDA 21 CFR 175.300; US Pharmacopoeia Class VI | FDA 21 CFR 177.2600; US Pharmacopoea Class VI, NSF listed (Standard 51) | FDA 21 CFR, 177.2600, Also exceeds 3A sanitary standards; US Pharmacopoea XXIII Cl.VI; | FDA 21 CFR 177.2600; US Pharmacopoea XXIII Cl.VI |
| **Chemical Resistance** | | | | | |
| **Acids** | Good | Fair | Good | Limited | Limited |
| **Alkaline Solutions** | Good | Fair | Good | Limited | Good |
| **Solvents** | Not Recommended | Not Recommended | Not Recommended | Limited | Not Recommended |
| **Pressure** | Fair | Good | Not Recommended | Not Recommended | Not Recommended |
| **Vacuum** | Good | Good | Excellent | Good | Good |
| **Viscous Media** | Excellent | Excellent | Good | Fair | Fair |
| **Sterile Media** | Limited | Limited | Excellent | Excellent | Excellent |
| **Gas Permeability (at 25 °C)*** | | | | | |
| **$CO_2$** | 360 | 720 | 1200 | 25147 | 25147 |
| **$H_2$** | — | — | — | — | — |
| **$0_2$** | 80 | 160 | 200 | 4715 | 4715 |
| **$N_2$** | 40 | 80 | 80 | 2284 | 2284 |

** Permeability Coefficient =* $\frac{\text{Amount of Gas } (cm^3) \times \text{tubing wall thickness } (cm)}{\text{Surface Area of tubing ID } (cm^2) \times \text{time (sec)} \times \text{pressure drop across tubing wall (cm Hg)}} \times 10^{-10}$

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| TUBING | TYGON 2001 | TYGON MHLL | TYGON HC F-4040-A | NORPRENE® A-60-G | FLURAN® F-5500-A |
|---|---|---|---|---|---|
| **Page** | 80 | 81 | 81 | 82 | 82 |
| **Description** | The transparent, plasticizer-free tubing with superior pump-life. Especially designed for MEK and other aggressive solvents.<br>• Plasticizer and oil-free<br>• Smooth inner-bore<br>• Low sorption maintains fluid and tube integrity<br>• Does not impart anything into the pumping medium<br>• No release of hazardous materials when properly incinerated | Chemically resistant to Acetone, MEK and other aggressive solvents. Long life tubing.<br>• Plasticizer-free<br>• Smooth inner-bore<br>• Low sorption maintains fluid integrity<br>• Minimal adhesion and diffusion<br>• Suitable for MEK, Acetone and other corrosive solvents<br>• Long life tubing | The special tubing for hydrocarbons, petroleum products and distillates.<br>• Specially formulated to transport hydrocarbons, petroleum products and distillates<br>• Ideal for gasoline, kerosene, heating oils, cutting liquids and coolants based on glycols<br>• Low gas permeability | The high performance tubing for industrial use.<br>• Offers longest service-life with good flow consistency<br>• Good resistance to acids and alkaline chemicals<br>• Superior weathering<br>• Abrasion resistant<br>• Non-aging and non-oxidizing<br>• Outstanding flexural fatigue resistance<br>• Low gas permeability versus rubber tubing<br>• Ozone (300 pphm) and UV light resistant<br>• Ideal for use in vacuum system | The special tubing for concentrated acids and corrosive solvents.<br>• High chemical resistance<br>• Low gas permeability<br>• Wide temperature range |
| **Specifications** | | | | | |
| **OD (outside diameter)** | 0.19–0.88" (4.8–22.3 mm) | 0.09–0.18" (2.22–4.63 mm) | 0.19–0.75" (4.8–19.1 mm) | 0.16–0.9" (4.0–22.3 mm) | 0.16–0.6" (4.0–15.9 mm) |
| **ID (inside diameter)** | 0.06–0.61" (1.6–15.9 mm) | 0.01–0.1" (0.38–2.79 mm) | 0.06–0.5" (1.6–12.7 mm) | 0.03–0.6" (0.8–15.9 mm) | 0.03–0.4" (0.8–9.5 mm) |
| **Operating Temp** | -73 to 57 °C | -70 to 74 °C | -37 to 74 °C | -60 to 135 °C | -32 to 204 °C |
| **Certification(s)** | FDA 21 CFR 177.2600; FDA Approved for contact with foods | FDA 21 CFR 177.2600; US Pharmacopoea Class VI | None | None | GMP |
| **Chemical Resistance** | | | | | |
| **Acids** | Excellent | Excellent | Limited | Excellent | Excellent |
| **Alkaline Solutions** | Excellent | Excellent | Not Recommended | Excellent | Excellent |
| **Solvents** | Good | Excellent | Not Recommended | Not Recommended | Limited |
| **Pressure** | Good | Not Recommended | Good | Not Recommended | Not Recommended |
| **Vacuum** | Good | Good | Good | Good | Good |
| **Viscous Media** | Excellent | Good | Excellent | Excellent | Good |
| **Sterile Media** | Good | Good | Limited | Not Recommended | Fair |
| **Permeability (at 25 °C)** | | | | | |
| **$CO_2$** | 1140 | 3800 | 100 | 1200 | 38 |
| **$H_2$** | — | — | — | — | — |
| **$0_2$** | 76 | 800 | 22 | 200 | 14 |
| **$N_2$** | 190 | 320 | 12 | 80 | 5 |

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# Peristaltic Pumps & Tubing

The pumps presented on pages 92–108 require peristaltic tubing to operate. Flow rate of a given fluid through a peristaltic tubing pump depends on two variables:

1. The speed of the pump, measured in revolutions per minute (rpm)
2. The volume held with the internal diameter (ID) of the selected tubing

### Variable Speed Pump Flow Rates

For a variable speed pump, such as the products on pages 92, 93, and 95–104, the flow rate of a channel can be changed by varying the pump rpm, or by using tubing with different IDs, or a combination of both.

# Ordering your Pump & Tubing

Follow these steps to complete your Ismatec® peristaltic tubing pump order:

1. Select the pump for your application from pages 92–104, determined by the requirements of your fluid delivery task(s):
    a. Level of accuracy
    b. Fluid streams (# of channels)
    c. Flow rate range(s)
    d. Need for constant flow, discrete dispensing, or both
    e. Need for variable speed
    f. Need for automation/programmability
2. Note whether the selected pump requires 2-stop, 3-stop, or standard tubing.
3. Review the tubing properties tables on pages 62, 70, 75, and 76 and select the tubing material best suited for your application.
4. Review the page that contains information and options for the tubing material you have selected.
5. Identify the correct part number for the tubing you need, based upon two factors: a) if your pump requires tubing with stops or not, and if so how many; and b) the correct inner diameter and wall thickness for the model pump you are using.
6. If required, order extension tubing that corresponds as closely as possible to the tubing material and ID of your 2-stop or 3-stop tubing.

## RELATED PRODUCTS

- Connectors and adapters for peristaltic tubing are on pages 58, 59, and 60.

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# Tygon® LMT-55 Tubing

- DEHP Free
- The Tygon blend of choice for general laboratory applications

Tygon LMT-55 offers an all-around, inexpensive option for general laboratory applications. Featuring transparent walls and low gas permeability — and with many different sizes from which to choose — this tubing material option is the option of choice for many less-critical applications. To determine the expected flow rates related to the tubing inner diameters, see the technical specifications for your pump model, listed here in this catalog or in your pump's operating manual.

*Please Note: The low overall lifetime of this material will require tubing to replaced more frequently. For a longer life version of Tygon LMT-55, consider Tygon S3 E-LFL.*

## SPECIFICATIONS & DETAILS

| | | |
|---|---|---|
| **Special Properties** | The inexpensive all-round tubing for general laboratory applications | |
| **Advantages** | • Transparent<br>• Resistant to almost all inorganic chemicals<br>• Tasteless<br>• Smooth polished inner wall | • Low gas permeability<br>• Non-aging and non-oxidizing<br>• High dielectric constant<br>• LMT-55 will outlast R-3603 in most applications by 3 to 1 |
| **Limitations** | • Potential leaching of plasticizers | • Short service-life |
| **Physical Properties** | • Thermoplastic<br>• PVC-based material with phthalate-free plasticizer | • Flexible, firm, transparent |
| **Service Temperature Range** | -50 °C to +74 °C (-58 °F to + 165 °F) | |
| **Applications** | | |
| Acids | Good | |
| Alkaline solutions | Good | |
| Solvents | Not recommended | |
| Pressure | Fair | |
| Vacuum | Good | |
| Viscous media | Excellent | |
| Sterile media | Limited | |
| **Complies with the Following Standards** | | |
| **Sterilization** | Autoclavable with steam, 30 minutes at 1 bar (15 psi) and 121 °C (250 °F); tubing will appear milky. Gas sterilization with Ethylene oxide. **Not recommended for sterilization with radiation.** | |
| **Permeability** | | |
| $CO_2$ | 360 | $\frac{\text{Volume of gas [cm3] x wall thickness [mm]}}{\text{Area of tubing ID [cm2] x time [sec] x pressure drop across tubing wall [cm Hg]}} \times 10^{-10}$ |
| $O_2$ | 80 | |
| $N_2$ | 40 | |
| **Odor and taste** | None | |
| **Toxicity** | Non-toxic | |
| **Tubing life** at 0 bar | 35 hrs | |
| at 0.7 bar | 30 hrs | |

# Tygon E-LFL Tubing

- DEHP Free
- Longest service life of any clear Tygon tubing material
- Excellent choice where transparency and good chemical resistance is needed

Tygon S3 E-LFL tubing is available in a broad range of sizes for use throughout our pump product line. Its good chemical resistance coupled with its durability makes it an excellent choice in those applications where longer-life tubing is desired (i.e., where tubes are not disposed of frequently).

In many cases, this tubing can withstand system pressures that are in excess of most peristaltic pumps' abilities, providing built-in safety precautions for your system flow path.

Choose tubing without stops for use with most single-channel pumps. *(Note: Ensure the wall thickness of the tubing you have selected matches the requirements for the pump you are using.)* Choose the 2-stop or 3-stop tubing for use with the versions of our pumps that incorporate cassettes into the pumphead design.

## SPECIFICATIONS & DETAILS

| | | |
|---|---|---|
| **Special Properties** | The tubing with the longest service-life of any clear Tygon tubing | |
| **Advantages** | • Transparent<br>• Broad chemical resistance<br>• Tasteless<br>• Extremely low particulate spallation<br>• Meets USP Class VI and FDA criteria<br>• Non-aging | |
| **Limitations** | • Potential leaching of plasticizers | |
| **Physical Properties** | • Thermoplastic<br>• PVC-based material with phthalate-free plasticizer<br>• Flexible, firm, transparent | |
| **Service Temperature Range** | -50 °C to +74 °C (-58 °F to + 165 °F) | |
| **Applications** | | |
| Acids | Fair | |
| Alkaline solutions | Fair | |
| Solvents | Not recommended | |
| Pressure | Good | |
| Vacuum | Good | |
| Viscous media | Excellent | |
| Sterile media | Limited | |
| **Complies with the Following Standards** | FDA 21 CFR 175.300; US Pharmacopoea Class VI | |
| **Sterilization** | Autoclavable with steam, 30 minutes at 1 bar (15 psi) and 121 °C (250 °F); tubing will appear milky. Gas sterilization with Ethylene oxide. **Not recommended for sterilization with radiation.** | |
| **Permeability** | | |
| $CO_2$ | 720 | $\frac{\text{Volume of gas [cm3] x wall thickness [mm]}}{\text{Area of tubing ID [cm2] x time [sec] x pressure drop across tubing wall [cm Hg]}} \times 10^{-10}$ |
| $O_2$ | 160 | |
| $N_2$ | 80 | |
| **Odor and taste** | None | |
| **Toxicity** | Non-toxic | |
| **Tubing life** at 0 bar | 800 hrs | |
| at 0.7 bar | 700 hrs | |

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# Ismaprene Tubing (PharMed®)

- Excellent chemical resistance for traditional peristaltic pump tubing
- Offers FDA and USP Class VI certification

PharMed Ismaprene tubing has long been the tubing of choice for many demanding applications where other polymer blends have been unsuitable for use.

With strong chemical resistance, excellent lifetime, and low gas permeability — coupled with industry-standard certifications — PharMed tubing is offered in options for standard pumps as well as for pumps requiring 2-stop and 3-stop tubing. Special versions are available with welded stops for applications where repeated autoclaving must take place.

## SPECIFICATIONS & DETAILS

| | |
|---|---|
| **Special Properties** | The ideal tubing for pharmaceutical and medical applications, and for foodstuffs |
| **Advantages** | • Recommended for cell cultures and tissue<br>• Ideal for production filtration, fermentation, and bioreactor process lines<br>• Very long service-life<br>• Non-toxic and non-hemolytic<br>• Impermeable to normal light and UV-radiation<br>• Appropriate for medical products and foodstuffs<br>• Low particulate spallation<br>• Can be autoclaved repeatedly<br>• Withstands repeated CIP and SIP cleaning and sterilization<br>• Meets USP Class VI, FDA, and NSF criteria |
| **Limitations** | • Potential leaching of additives (lubricants) |
| **Physical Properties** | • Thermoplastic elastomer based on polypropylene<br>• Firm, opaque, beige color |
| **Service Temperature Range** | -60 °C to +135 °C (-75 °F to +275 °F) |
| **Applications** | |
| Acids | Good |
| Alkaline solutions | Good |
| Solvents | Not recommended |
| Pressure | Not recommended |
| Vacuum | Excellent |
| Viscous media | Good |
| Sterile media | Excellent |
| **Complies with the Following Standards** | FDA 21 CFR Part 177.2600; US Pharmacopoea Class VI, NSF listed (Standard 51) |
| **Sterilization** | Autoclavable with steam, 30 minutes at 1 bar (15 psi) and 141 °C (250 °F) Gas sterilization with Ethylene oxide. Sterilization with radiation up to 2.5 mrad. **Caution: Use special tubing version (welded stoppers) when autoclaving 2 or 3-stop color-coded tubing.** |
| **Permeability** | |
| $CO_2$ | 1200 |
| $O_2$ | 200 |
| $N_2$ | 80 |

$$\frac{\text{Volume of gas [cm3] x wall thickness [mm]}}{\text{Area of tubing ID [cm2] x time [sec] x pressure drop across tubing wall [cm Hg]}} \times 10^{-10}$$

| | |
|---|---|
| **Odor and taste** | Low |
| **Toxicity** | Non-toxic and non-hemolytic |
| **Tubing life** at 0 bar | 1000+ hrs |
| at 0.7 bar | 1000 hrs |

# Tygon® 3350 SI Tubing

- Platinum-cured silicone tubing
- Features ultra-smooth inner-bore
- Biocompatible for life science applications

Tygon 3350 SI tubing is a special silicone-based tubing that undergoes a special treatment with platinum to ensure a very smooth internal surface. This surface feature helps improve the material's use with biological applications where solid material may be present. Additionally, the material exhibits a low-level of protein-binding as well as being non-toxic, helping to make this material the top choice for many life science applications.

## SPECIFICATIONS & DETAILS

| | |
|---|---|
| **Special Properties** | The platinum-cured silicone tubing with an ultra-smooth inner surface for sanitary transfer of sensitive fluids |
| **Advantages** | • Steam autoclavability<br>• Excellent biological compatibility<br>• Ultra-smooth inner-bore reduces potential for particle entrapment<br>• Lower level of protein binding<br>• Entirely non-toxic, non-hemolytic, and non-pyrogenic<br>• Weather, ozone, sunlight, and radiation resistant<br>• Resistant to fungus<br>• Odorless |
| **Limitations** | • Not suitable for concentrated solvents, oils, acids, or diluted sodium hydroxide<br>• Relatively high gas permeability |
| **Physical Properties** | • Thermal set rubber<br>• Siloxane polymers and amorphous silica<br>• Soft, translucent, clear to light amber<br>• Excellent compression strength |
| **Service Temperature Range** | -60 °C to +200 °C (-75 °F to +392 °F) |
| **Applications** | |
| Acids | Limited |
| Alkaline solutions | Limited |
| Solvents | Limited |
| Pressure | Not recommended |
| Vacuum | Good |
| Viscous media | Fair |
| Sterile media | Excellent |
| **Complies with the Following Standards** | US Pharmacopoea XXIII Cl.VI, FDA 21 CFR, Part 177.2600. Also exceeds 3A sanitary standards. |
| **Sterilization** | Autoclavable with steam, 30 minutes at 1 bar (15 psi) and 121 °C (250 °F) Gas sterilization with Ethylene oxide Sterilization with radiation up to 2.5 mrad. |
| **Permeability** | |
| $CO_2$ | 25147 |
| $O_2$ | 4715 |
| $N_2$ | 2284 |

$$\frac{\text{Volume of gas [cm3] x wall thickness [mm]}}{\text{Area of tubing ID [cm2] x time [sec] x pressure drop across tubing wall [cm Hg]}} \times 10^{-10}$$

| | |
|---|---|
| **Odor and taste** | None |
| **Toxicity** | Non-toxic |
| **Tubing life** at 0 bar | 200 hrs |
| at 0.7 bar | 100 hrs |

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# Silicone Peroxide Tubing

- Non-toxic material great for biological applications
- Soft and translucent for applications requiring visual checks

## SPECIFICATIONS & DETAILS

| | | |
|---|---|---|
| **Special Properties** | | Silicone tubing blended with organic peroxide for biological applications |
| **Advantages** | | • Steam autoclavability<br>• Excellent biological compatibility<br>• Greater physical compression capability<br>• Not prone to mold<br>• Non-toxic<br>• Waterproof and resistant to ozone, radiation, and sunlight<br>• Resistant to fungus<br>• Odorless |
| **Limitations** | | • Not recommended for concentrated solvents, oils, acids, or diluted sodium hydroxide<br>• Relatively high gas permeability |
| **Physical Properties** | | • Polydimethylsiloxane with silica filter and silicone oil<br>• Excellent resistance to compression<br>• Soft, translucent, clear to light amber |
| **Service Temperature Range** | | -51 °C to +238 °C (-60 °F to +460 °F) |
| **Applications** | | |
| | Acids | Limited |
| | Alkaline solutions | Good |
| | Solvents | Not recommended |
| | Pressure | Not recommended |
| | Vacuum | Good |
| | Viscous media | Fair |
| | Sterile media | Excellent |
| **Complies with the Following Standards** | | FDA 21 CFR 177.2600; US Pharmacopoea XXIII Cl.VI |
| **Sterilization** | | Autoclavable with steam, 30 minutes at 1 bar (15 psi) and 121 °C (250 °C) Radiation: Irradiate at up to 2.5 mrad<br>**Gas: Not recommended to sterilize with ethylene oxide** |
| **Permeability** | | Volume of gas [cm3] x wall thickness [mm] / Area of tubing ID [cm2] x time [sec] x pressure drop across tubing wall [cm Hg] **x $10^{-10}$** |
| | $CO_2$ | 25147 |
| | $O_2$ | 4715 |
| | $N_2$ | 2284 |
| **Odor and taste** | | — |
| **Toxicity** | | — |
| **Tubing life** | at 0 bar | — |
| | at 0.7 bar | — |

# Tygon® 2001 Tubing for Aggressive Media

- High chemical resistance for broad application use
- Options available for single and multi-channel pump systems
- Ultra-pure tubing for peristaltic pumps

Tygon 2001 tubing features all of the benefits of most Tygon blends — including wall transparency and FDA approval. Added to this is strong chemical resistance for many solutions (excluding hydrocarbons), making Tygon 2001 a material of choice for many demanding applications where other blends may not be suitable.

Options are available in both Standard Tubing, up to 0.626" (15.9 mm) and Stopper Tubing up to 0.109" (2.79 mm).

## SPECIFICATIONS & DETAILS

| | | |
|---|---|---|
| **Special Properties** | | The transparent, plasticizer-free tubing with superior pump-life; especially designed for MEK and other aggressive solvents |
| **Advantages** | | • Plasticizer and oil-free<br>• Smooth inner-bore<br>• Low sorption maintains fluid and tube integrity<br>• Does not impart anything into the pumping medium<br>• No release of hazardous materials when properly incinerated |
| **Limitations** | | None |
| **Physical Properties** | | Polyolefin |
| **Service Temperature Range** | | -73 °C to +57 °C (-100 °F to +135 °F) |
| **Applications** | | |
| | Acids | Excellent |
| | Alkaline solutions | Excellent |
| | Solvents | Good / Excellent |
| **Complies with the Following Standards** | | FDA certification for food contact |
| **Sterilization** | | Autoclavable with steam, 30 minutes at 1 bar (15 psi) and 141 °C (250 °F). Gas sterilization with Ethylene oxide. Sterilization with radiation up to 2.5 mrad. |
| **Permeability** | | Volume of gas [cm3] x wall thickness [mm] / Area of tubing ID [cm2] x time [sec] x pressure drop across tubing wall [cm Hg] **x $10^{-10}$** |
| | $CO_2$ | 1140 |
| | $O_2$ | 76 |
| | $N_2$ | 190 |
| **Odor and taste** | | No odor or taste |
| **Toxicity** | | – |
| **Tubing life** | at 0 bar | 75 hrs |
| | at 0.7 bar | – |

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# Tygon® MHLL Tubing

- Dual-layered tubing material
- Pairs chemical resistance and long-life

Tygon MHLL is a unique tubing material, comprised of an inner layer of Tygon MH and an outer layer of PharMed®. This combination helps ensure excellent chemical resistance (except for hydrocarbons and strong ketones) as well as long service life. Available as Stopper Tubing for use with MS/CA cassettes.

Additionally, this material offers both FDA approval as well as USP Class VI approval, making it a material of choice for more demanding life-science applications.

## SPECIFICATIONS & DETAILS

| | | |
|---|---|---|
| **Special Properties** | | • The tubing can be used with acetone and MEK<br>• Long life tubing |
| **Advantages** | | • Plasticizer-free<br>• Smooth inner-bore<br>• Low sorption maintains fluid integrity<br>• Minimal adhesion and diffusion<br>• Suitable for MEK, Acetone and other corrosive solvents<br>• Long life tubing |
| **Limitations** | | • Cannot be repeatedly sterilized<br>• Only available as stopper tubing |
| **Physical Properties** | | • Special thermoplastic of high purity<br>• Without additives<br>• Without plasticizer<br>• Environmental-friendly disposal<br>• Flexible, firm, opaque |
| **Service Temperature Range** | | -70 °C to +74 °C (-94 °F to + 165 °F) |
| **Applications** | | |
| | Acids | Excellent |
| | Alkaline solutions | Excellent |
| | Solvents | Excellent |
| | Pressure | Not recommended |
| | Vacuum | Good |
| | Viscous media | Good |
| | Sterile media | Good |
| **Complies with the Following Standards** | | FDA 21 CFR, Part 177.2600; USP Pharmacopoea Class VI<br>FDA certification for food contact |
| **Sterilization** | | Autoclavable with steam, 30 minutes at 1 bar (15 psi) and 121 °C (250 °F). Gas sterilization with Ethylene oxide. Sterilization with radiation up to 2.5 mrad **Caution: Can not be repeatedly sterilized.** |
| **Permeability** | | $\frac{\text{Volume of gas [cm3] x wall thickness [mm]}}{\text{Area of tubing ID [cm2] x time [sec] x pressure drop across tubing wall [cm Hg]}} \times 10^{-10}$ |
| | $CO_2$ | — |
| | $O_2$ | — |
| | $N_2$ | — |
| **Odor and taste** | | No odor or taste |
| **Toxicity** | | — |
| **Tubing life** | at 0 bar | 800+ hrs |
| | at 0.7 bar | 800+ hrs |

# Tygon HC F-4040-A Tubing

- Specially formulated for hydrocarbon-based applications
- Features low gas permeability and good pressure resistance

Tygon F-4040-A tubing has been specially-formulated for use in petroleum (and similar) applications where other Tygon blends cannot be used successfully. The material offers some of the lowest gas permeability rates for atmospheric gases of all the Tygon blends, making it ideal for use in those applications where sensitivity to gas permeation is high or where vacuum may be applied.

In addition to being suitable for hydrocarbon-based applications, this material can also be used successfully with low-concentration acidic solutions as well as mineral salt solutions.

Yellow-tinted, the material offers some degree of translucency, however, it is not as transparent as many other Tygon blends.

## SPECIFICATIONS & DETAILS

| | | |
|---|---|---|
| **Special Properties** | | The special tubing for hydrocarbons, petroleum products and distillates |
| **Advantages** | | • Specially formulated to transport hydrocarbons, petroleum products, and distillates<br>• Ideal for gasoline, kerosene, heating oils, cutting liquids, and coolants based on glycols<br>• High dielectric constant<br>• Low gas permeability |
| **Limitations** | | • Not recommended for strong acids and alkalies, foodstuffs, beverages, and medicines<br>• Potential leaching of plasticizers |
| **Physical Properties** | | • Thermoplastic<br>• PVC-based material with plasticizer<br>• Flexible, firm, translucent, yellow |
| **Service Temperature Range** | | -37 °C to +74 °C (-35 °F to +165 °F) |
| **Applications** | | |
| Acids | | Limited |
| Alkaline solutions | | Not recommended |
| Solvents | | Not recommended |
| Pressure | | Good |
| Vacuum | | Good |
| Viscous media | | Excellent |
| Sterile media | | Limited |
| **Complies with the Following Standards** | | None |
| **Sterilization** | | Not recommended |
| **Permeability** | | $\frac{\text{Volume of gas [cm3] x wall thickness [mm]}}{\text{Area of tubing ID [cm2] x time [sec] x pressure drop across tubing wall [cm Hg]}} \times 10^{-10}$ |
| $CO_2$ | | 100 |
| $O_2$ | | 22 |
| $N_2$ | | 12 |
| **Odor and taste** | | Must not be used for foodstuffs, beverages, and drugs |
| **Toxicity** | | Must not be used for foodstuffs, beverages, and drugs |
| **Tubing life** | at 0 bar | 60 hrs |
| | at 0.7 bar | 60 hrs |

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# Norprene® A-60-G Tubing

- Long-life tubing with strong chemical resistance
- Excellent option for industrial applications

Norprene tubing is an excellent alternative to traditional rubber tubing in industrial applications where good chemical resistance is paired with a desire for longer service life.

This tubing material offers additional benefits, including low gas permeability and broad temperature range compatibility. Combined, this material's features help make this tubing the tubing of choice in many applications.

## SPECIFICATIONS & DETAILS

| | | |
|---|---|---|
| **Special Properties** | | The high performance tubing for industrial use |
| **Advantages** | | • Offers longest service-life with good flow consistency<br>• Good resistance to acids and alkaline chemicals<br>• Superior weathering<br>• Abrasion resistant<br>• Non-aging and non-oxidizing<br>• Outstanding flexural fatigue resistance<br>• Low gas permeability versus rubber tubing<br>• Ozone (300 pphm) and UV light resistant<br>• Ideal for use in vacuum system |
| **Limitations** | | • Potential leaching of blend material |
| **Physical Properties** | | • Thermoplastic elastomer based on polypropylene<br>• Excellent tensile strength<br>• Firm, opaque, black |
| **Service Temperature Range** | | -60 °C to +135 °C (-75 °F to +275 °F) |
| **Applications** | | |
| Acids | | Excellent |
| Alkaline solutions | | Excellent |
| Solvents | | Not recommended |
| Pressure | | Not recommended |
| Vacuum | | Good |
| Viscous media | | Excellent |
| Sterile media | | Not recommended |
| **Complies with the Following Standards** | | None |
| **Sterilization** | | Not recommended |
| **Permeability** | | Volume of gas [cm3] x wall thickness [mm] / Area of tubing ID [cm2] x time [sec] x pressure drop across tubing wall [cm Hg] x $10^{-10}$ |
| | $CO_2$ | 1200 |
| | $O_2$ | 200 |
| | $N_2$ | 80 |
| **Odor and taste** | | Must not be used for foodstuffs, beverages and drugs |
| **Toxicity** | | Must not be used for foodstuffs, beverages and drugs |
| **Tubing life** | at 0 bar | 1000+ hrs |
| | at 0.7 bar | 1000 hrs |

# Fluran® F-5500-A Tubing

- Specially-formulated elastomer for use with strong acidic and basic solutions
- Very low gas permeability

Fluran tubing has been specially formulated for use in applications where strong acidic solutions or strong basic solutions are being used.

The material's very low gas permeability also makes this the choice material for applications where fluids can be transferred without being contaminated by atmospheric gases. Additionally, the low gas permeability and relative strength of this material make it a material of choice in vacuum based applications.

## SPECIFICATIONS & DETAILS

| | | |
|---|---|---|
| **Special Properties** | | The special tubing for concentrated acids and corrosive solvents |
| **Advantages** | | • High chemical resistance<br>• Low gas permeability<br>• Wide temperature range |
| **Limitations** | | • Limited service-life |
| **Physical Properties** | | • Fluoroelastomer<br>• Firm, opaque, black |
| **Service Temperature Range** | | -31 °C to +204 °C (-25 °F to + 400 °F) |
| **Applications** | | |
| Acids | | Excellent |
| Alkaline solutions | | Excellent |
| Solvents | | Limited |
| Pressure | | Not recommended |
| Vacuum | | Good |
| Viscous media | | Good |
| Sterile media | | Fair |
| **Complies with the Following Standards** | | None |
| **Sterilization** | | Not recommended |
| **Permeability** | | Volume of gas [cm3] x wall thickness [mm] / Area of tubing ID [cm2] x time [sec] x pressure drop across tubing wall [cm Hg] x $10^{-10}$ |
| | $CO_2$ | 38 |
| | $O_2$ | 14 |
| | $N_2$ | 5 |
| **Odor and taste** | | — |
| **Toxicity** | | — |
| **Tubing life** | at 0 bar | 150 |
| | at 0.7 bar | 90 |

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*The next seven pages contain product numbers for ordering Standard, 2-Stop, 3-Stop, and Extension tubing in each material offered.*

## Extension Tubing

| ID (mm) | TYGON® LMT-55 | TYGON R3603/ R3607* | ISMAPRENE (PHARMED®) | SILICONE PEROXIDE | TYGON 2001 | TYGON HC F-4040-A | FLURAN® F-5500-A |
|---|---|---|---|---|---|---|---|
| | **Part No.** | **Part No.** | **Part No.** | **Part No.** | **Part No.** | **Part No.** | **Part No.** |
| 0.13 | SC0226T | SC0226* | | | | | |
| 0.19 | SC0025T | SC0025* | | | | | |
| 0.25 | SC0026T | SC0026* | SC0337 | | | SC0173 | |
| 0.38 | SC0027T | SC0027* | SC0338 | | SC0854 | SC0174 | |
| 0.44 | SC0028T | SC0028* | | | | | |
| 0.51 | SC0029T | SC0029* | SC0339 | | | SC0175 | SC0550 |
| 0.57 | SC0030T | SC0030* | | | | | |
| 0.64 | SC0031T | SC0031* | SC0340 | SC0448 | SC0856 | SC0176 | SC0551 |
| 0.76 | SC0032T | SC0032* | SC0341 | SC0449 | | SC0177 | SC0552 |
| 0.89 | SC0033T | SC0033* | SC0342 | SC0450 | | SC0120 | SC0553 |
| 0.95 | SC0034T | SC0034* | | | | | |
| 1.02 | SC0035T | SC0035* | SC0343 | SC0451 | SC0858 | SC0121 | SC0554 |
| 1.09 | SC0036T | SC0036* | | | | | |
| 1.14 | SC0037T | SC0037* | SC0344 | SC0452 | | SC0122 | SC0555 |
| 1.22 | SC0038T | SC0038* | | | | | |
| 1.30 | SC0039T | SC0039* | SC0345 | SC0453 | | SC0123 | SC0556 |
| 1.42 | SC0040T | SC0040* | SC0346 | SC0454 | | SC0124 | SC0557 |
| 1.52 | SC0041T | SC0041* | SC0347 | SC0455 | SC0860 | SC0125 | SC0558 |
| 1.65 | SC0042T | SC0042* | SC0348 | SC0456 | | SC0126 | SC0559 |
| 1.75 | SC0043T | SC0043* | | | | | |
| 1.85 | SC0044T | SC0044* | SC0349 | SC0457 | | SC0127 | SC0560 |
| 2.06 | SC0045T | SC0045* | SC0350 | SC0458 | SC0862 | SC0128 | SC0561 |
| 2.29 | SC0046T | SC0046* | SC0351 | SC0459 | | SC0129 | SC0562 |
| 2.54 | SC0047T | SC0047* | SC0352 | SC0460 | | SC0130 | SC0563 |
| 2.79 | SC0048T | SC0048* | SC0353 | SC0461 | SC0864 | SC0131 | SC0564 |
| 3.17 | SC0223T | SC0223* | | | | | |
| **Roll Length** | 10 m | 10 m | 3 m | 15 m | 10 m | 3 m | 10 m |

** The Tygon R3603/R3607 formulation is being phased out. Substituting Tygon LMT-55 is highly recommended.*

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# 2-Stop Tubing

| ID (mm) | COLOR CODES | TYGON® LMT-55 | TYGON R3603/ R3607 * | TYGON E-LFL | ISMAPRENE (PHARMED®) | PHARMED BPT ** | TYGON 3350 SI |
|---|---|---|---|---|---|---|---|
| | | **Part No.** | **Part No.** | **Part No.** | **Part No.** | **Part No.** | **Part No.** |
| 0.13 | Orange-black | SC0188T | SC0188* | | | | |
| 0.19 | Orange-red | SC0001T | SC0001* | | | | |
| 0.25 | Orange-blue | SC0002T | SC0002* | | SC0320 | SC0740** | |
| 0.27 | Orange-blue | | | SCE0414 | | | |
| 0.38 | Orange-green | SC0003T | SC0003* | SCE0415 | SC0321 | | |
| 0.44 | Green-yellow | SC0004T | SC0004* | | | | |
| 0.48 | Orange-yellow | | | SCE0416 | | | |
| 0.51 | Orange-yellow | SC0005T | SC0005* | | SC0322 | SC0741** | SC0620 |
| 0.57 | White-yellow | SC0006T | SC0006* | | | | |
| 0.64 | Orange-white | SC0007T | SC0007* | SCE0417 | SC0323 | | SC0621 |
| 0.76 | Black-black | SC0008T | SC0008* | SCE0418 | SC0324 | | SC0622 |
| 0.89 | Orange-orange | SC0009T | SC0009* | SCE0419 | SC0325 | SC0742** | SC0623 |
| 0.95 | White-black | SC0010T | SC0010* | | | | |
| 1.02 | White-white | SC0011T | SC0011* | SCE0420 | SC0326 | SC0747** | SC0624 |
| 1.09 | White-red | SC0012T | SC0012* | | | | |
| 1.14 | Red-red | SC0013T | SC0013* | SCE0421 | SC0327 | | SC0625 |
| 1.22 | Red-grey | SC0014T | SC0014* | | | | |
| 1.25 | Grey-grey | | | SCE0422 | | | |
| 1.30 | Grey-grey | SC0015T | SC0015* | | SC0328 | SC0743** | SC0626 |
| 1.37 | Yellow-yellow | | | SCE0423 | | | |
| 1.42 | Yellow-yellow | SC0016T | SC0016* | | SC0329 | | SC0627 |
| 1.52 | Yellow-blue | SC0017T | SC0017* | SCE0424 | SC0330 | SC0744** | SC0628 |
| 1.53 | Yellow-blue | | | | | | |
| 1.60 | Blue-blue | | | SCE0425 | | | |
| 1.65 | Blue-blue | SC0018T | SC0018* | | SC0331 | | SC0629 |
| 1.75 | Blue-green | SC0019T | SC0019* | | | | |
| 1.85 | Green-green | SC0020T | SC0020* | SCE0426 | SC0332 | | SC0630 |
| 2.06 | Purple-purple | SC0021T | SC0021* | SCE0427 | SC0333 | SC0745** | SC0631 |
| 2.20 | Purple-black | | | SCE0428 | | | |
| 2.29 | Purple-black | SC0022T | SC0022* | | SC0334 | | SC0632 |
| 2.54 | Purple-orange | SC0023T | SC0023* | | SC0335 | | SC0633 |
| 2.62 | Purple-orange | | | SCE0429 | | | |
| 2.79 | Purple-white | SC0024T | SC0024* | SCE0430 | SC0336 | SC0746** | SC0634 |
| 3.17 | Black-white | SC0222T | SC0222* | | | | |
| **Tube Length** | | 400 mm | 400 mm | 400 mm | 400 mm | 400 mm | 400 mm |
| **Pack Size** | | 12 pieces | 12 pieces | 12 pieces | 6 pieces | 6 pieces | 6 pieces |

** The Tygon R3603/R3607 formulation is being phased out. Substituting Tygon LMT-55 is highly recommended.*
*** Welded stoppers for use in an autoclave.*

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| SILICONE PEROXIDE | TYGON® 2001 | TYGON MHLL | TYGON HC F-4040-A | FLURAN F-5500-A | COLOR CODES | ID (mm) |
|---|---|---|---|---|---|---|
| **Part No.** | **Part No.** | **Part No.** | **Part No.** | **Part No.** | | |
| | | | | | Orange-black | 0.13 |
| | | | | | Orange-red | 0.19 |
| | | | SC0156 | | Orange-blue | 0.25 |
| | | | | | Orange-blue | 0.27 |
| | SC0814 | SC0716 | SC0157 | | Orange-green | 0.38 |
| | | | | | Green-yellow | 0.44 |
| | | | | | Orange-yellow | 0.48 |
| | | | SC0158 | SC0132 | Orange-yellow | 0.51 |
| | | | | | White-yellow | 0.57 |
| SC0092 | SC0816 | | SC0159 | SC0133 | Orange-white | 0.64 |
| SC0093 | | SC0717 | SC0160 | SC0134 | Black-black | 0.76 |
| SC0094 | | | SC0161 | SC0135 | Orange-orange | 0.89 |
| | | | | | White-black | 0.95 |
| SC0095 | SC0818 | | SC0162 | SC0136 | White-white | 1.02 |
| | | | | | White-red | 1.09 |
| SC0096 | | SC0718 | SC0163 | SC0137 | Red-red | 1.14 |
| | | | | | Red-grey | 1.22 |
| | | | | | Grey-grey | 1.25 |
| SC0097 | | | SC0164 | SC0138 | Grey-grey | 1.30 |
| | | | | | Yellow-yellow | 1.37 |
| SC0098 | | | SC0165 | SC0139 | Yellow-yellow | 1.42 |
| SC0099 | SC0820 | SC0719 | SC0166 | SC0140 | Yellow-blue | 1.52 |
| | | | | | Yellow-blue | 1.53 |
| | | | | | Blue-blue | 1.60 |
| SC0100 | | | SC0167 | SC0141 | Blue-blue | 1.65 |
| | | | | | Blue-green | 1.75 |
| SC0101 | | | SC0168 | SC0142 | Green-green | 1.85 |
| SC0102 | SC0822 | SC0720 | SC0169 | SC0143 | Purple-purple | 2.06 |
| | | | | | Purple-black | 2.20 |
| SC0103 | | | SC0170 | SC0144 | Purple-black | 2.29 |
| SC0104 | | | SC0171 | SC0145 | Purple-orange | 2.54 |
| | | | | | Purple-orange | 2.62 |
| SC0105 | SC0824 | SC0721 | SC0172 | SC0146 | Purple-white | 2.79 |
| | | | | | Black-white | 3.17 |
| 400 mm | 381 mm | 381 mm | 400 mm | 180 mm | | **Tube Length** |
| 6 pieces | 6 pieces | 6 pieces | 12 pieces | 12 pieces | | **Pack Size** |

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# 3-Stop Tubing

| ID (mm) | COLOR CODES | TYGON® LMT-55 | TYGON R3603/ R3607 * | TYGON E-LFL | ISMAPRENE (PHARMED®) | PHARMED BPT ** | TYGON 3350 SI |
|---|---|---|---|---|---|---|---|
| | | **Part No.** | **Part No.** | **Part No.** | **Part No.** | **Part No.** | **Part No.** |
| 0.13 | Orange-black | SC0189T | SC0189* | | | | |
| 0.19 | Orange-red | SC0049T | SC0049* | | | | |
| 0.25 | Orange-blue | SC0050T | SC0050* | | SC0303 | SC0730** | |
| 0.27 | Orange-blue | | | SCE0397 | | | |
| 0.38 | Orange-green | SC0051T | SC0051* | SCE0398 | SC0304 | | |
| 0.44 | Green-yellow | SC0052T | SC0052* | | | | |
| 0.48 | Orange-yellow | | | SCE0399 | | | |
| 0.51 | Orange-yellow | SC0053T | SC0053* | | SC0305 | SC0731** | SC0600 |
| 0.57 | White-yellow | SC0054T | SC0054* | | | | |
| 0.64 | Orange-white | SC0055T | SC0055* | SCE0400 | SC0306 | | SC0601 |
| 0.76 | Black-black | SC0056T | SC0056* | SCE0401 | SC0307 | | SC0602 |
| 0.89 | Orange-orange | SC0057T | SC0057* | SCE0402 | SC0308 | SC0732** | SC0603 |
| 0.95 | White-black | SC0058T | SC0058* | | | | |
| 1.02 | White-white | SC0059T | SC0059* | SCE0403 | SC0309 | SC0737** | SC0604 |
| 1.09 | White-red | SC0060T | SC0060* | | | | |
| 1.14 | Red-red | SC0061T | SC0061* | SCE0404 | SC0310 | | SC0605 |
| 1.22 | Red-grey | SC0062T | SC0062* | | | | |
| 1.25 | Grey-grey | | | SCE0405 | | | |
| 1.30 | Grey-grey | SC0063T | SC0063* | | SC0311 | SC0733** | SC0606 |
| 1.37 | Yellow-yellow | | | SCE0406 | | | |
| 1.42 | Yellow-yellow | SC0064T | SC0064* | | SC0312 | | SC0607 |
| 1.52 | Yellow-blue | SC0065T | SC0065* | SCE0407 | SC0313 | SC0734** | SC0608 |
| 1.53 | Yellow-blue | | | | | | |
| 1.60 | Blue-blue | | | SCE0408 | | | |
| 1.65 | Blue-blue | SC0066T | SC0066* | | SC0314 | | SC0609 |
| 1.75 | Blue-green | SC0067T | SC0067* | | | | |
| 1.85 | Green-green | SC0068T | SC0068* | SCE0409 | SC0315 | | SC0610 |
| 2.06 | Purple-purple | SC0069T | SC0069* | | SC0316 | SC0735** | SC0611 |
| 2.20 | Purple-black | | | SCE0411 | | | |
| 2.29 | Purple-black | SC0070T | SC0070* | | SC0317 | | SC0612 |
| 2.54 | Purple-orange | SC0071T | SC0071* | | SC0318 | | SC0613 |
| 2.62 | Purple-orange | | | SCE0412 | | | |
| 2.79 | Purple-white | SC0072T | SC0072* | SCE0413 | SC0319 | SC0736** | SC0614 |
| 3.17 | Black-white | SC0224T | SC0224* | | | | |
| **Tube Length** | | 400 mm | 400 mm | 400 mm | 400 mm | 400 mm | 400 mm |
| **Pack Size** | | 12 pieces | 12 pieces | 12 pieces | 6 pieces | 6 pieces | 6 pieces |

** The Tygon R3603/R3607 formulation is being phased out. Substituting Tygon LMT-55 is highly recommended.*
*** Welded stoppers for use in an autoclave.*
**** These tubes are equipped with only 2 stoppers for use with MS/CA cassettes.*

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| SILICONE PEROXIDE | TYGON® 2001*** | TYGON MHLL*** | TYGON HC F-4040-A | FLURAN F-5500-A | COLOR CODES | ID (mm) | |
|---|---|---|---|---|---|---|---|
| **Part No.** | **Part No.** | **Part No.** | **Part No.** | **Part No.** | | | |
| | | | | | Orange-black | 0.13 | |
| | | | | | Orange-red | 0.19 | |
| | | | SC0286 | | Orange-blue | 0.25 | |
| | | | | | Orange-blue | 0.27 | |
| | SC0802*** | SC0710*** | SC0287 | | Orange-green | 0.38 | |
| | | | | | Green-yellow | 0.44 | |
| | | | | | Orange-yellow | 0.48 | |
| | | | SC0288 | SC0255 | Orange-yellow | 0.51 | |
| | | | | | White-yellow | 0.57 | |
| SC0106 | SC0804*** | | SC0289 | SC0256 | Orange-white | 0.64 | |
| SC0107 | | SC0711*** | SC0290 | SC0257 | Black-black | 0.76 | |
| SC0108 | | | SC0291 | SC0258 | Orange-orange | 0.89 | |
| | | | | | White-black | 0.95 | |
| SC0109 | SC0806*** | | SC0292 | SC0259 | White-white | 1.02 | |
| | | | | | White-red | 1.09 | |
| SC0110 | | SC0712*** | SC0293 | SC0260 | Red-red | 1.14 | |
| | | | | | Red-grey | 1.22 | |
| | | | | | Grey-grey | 1.25 | |
| SC0111 | | | SC0294 | SC0261 | Grey-grey | 1.30 | |
| | | | | | Yellow-yellow | 1.37 | |
| SC0112 | | | SC0295 | SC0262 | Yellow-yellow | 1.42 | |
| SC0113 | SC0808*** | SC0713*** | SC0296 | SC0263 | Yellow-blue | 1.52 | |
| | | | | | Yellow-blue | 1.53 | |
| | | | | | Blue-blue | 1.60 | |
| SC0114 | | | SC0297 | SC0264 | Blue-blue | 1.65 | |
| | | | | | Blue-green | 1.75 | |
| SC0115 | | | SC0298 | SC0265 | Green-green | 1.85 | |
| SC0116 | SC0810*** | SC0714*** | SC0299 | SC0266 | Purple-purple | 2.06 | |
| | | | | | Purple-black | 2.20 | |
| SC0117 | | | SC0300 | SC0267 | Purple-black | 2.29 | |
| SC0118 | | | SC0301 | SC0268 | Purple-orange | 2.54 | |
| | | | | | Purple-orange | 2.62 | |
| SC0119 | SC0812*** | SC0715*** | SC0302 | SC0269 | Purple-white | 2.79 | |
| | | | | | Black-white | 3.17 | |
| | 300 mm | 300 mm | 400 mm | 400 mm | | | **Tube Length** |
| | 6 pieces | 6 pieces | 12 pieces | 12 pieces | | | **Pack Size** |

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# Standard Tubing

| ID (mm) | OD (mm) | TYGON® LMT-55 | TYGON R3603/ R3607 * | TYGON E-LFL | ISMAPRENE (PHARMED®) | TYGON 3350 SI | SILICONE PEROXIDE |
|---|---|---|---|---|---|---|---|
| **1.6 mm wall thickness (1/16") Standard Tubing** | | **Part No.** | **Part No.** | **Part No.** | **Part No.** | **Part No.** | **Part No.** |
| 0.8 | 4.0 | SC0355T | MF0001* | | MF0009 | MF0291 | MF0044 |
| 1.6 | 3.2 | | | | | | |
| 1.6 | 4.8 | SC0373T | MF0028* | SCE0389 | MF0010 | SC0580B | MF0035 |
| 2.4 | 5.6 | SC0691T | SC0691* | | SC1006 | SC0590B | |
| 3.2 | 6.4 | SC0374T | MF0030* | SCE0390 | MF0012 | SC0581B | MF0037 |
| 4.0 | 7.2 | SC0462T | SC0462* | | | | |
| 4.8 | 8.0 | SC0379T | SC0379* | SCE0391 | MF0011 | SC0582B | MF0045 |
| 6.4 | 9.6 | SC0375T | MF0031* | SC0E392 | MF0013 | SC0584B | MF0046 |
| 8.0 | 11.2 | SC0376T | MF0032* | SC0E394 | MF0014 | SC0587B | MF0047 |
| 9.5 | 12.7 | SC0383T | SC0383* | | | SC0387B | |
| 11.1 | 14.3 | SC0384T | SC0384* | | | SC0697B | |
| **Roll Length** | | 15 m | 15 m | 7.5 m | 7.5 m | 15 m | 7.5 m |
| **2.4 mm wall thickness (3/32")** | | | | | | | |
| 4.8 | 9.6 | SC0500T | MF0029* | | MF0448 | SC0583B | MF0288 |
| 6.4 | 11.2 | SC0501T | MF0033* | | | SC0585B | MF0040 |
| 8.0 | 12.8 | SC0502T | SC0502* | | | SC0515B | |
| 9.5 | 14.3 | SC0503T | SC0503* | | | SC0516B | |
| 11.1 | 15.9 | SC0504T | SC0504* | | | SC0517B | |
| 12.7 | 17.5 | SC0505T | SC0505* | | | SC0518B | |
| 15.9 | 20.7 | SC0506T | SC0506* | | | SC0519B | |
| **Roll Length** | | 15 m | 15 m | 7.5 m | 7.5 m | 15 m | 7.5 m |
| **3.2 mm wall thickness (1/8")** | | | | | | | |
| 4.8 | 11.2 | SC0694T | SC0694* | | | | |
| 6.4 | 12.8 | SC0380T | SC0380* | SCE0393 | MF0015 | SC0586B | MF0314 |
| 8.0 | 14.4 | SC0535T | SC0535* | | | | |
| 9.5 | 15.9 | SC0381T | SC0381* | SCE0395 | MF0016 | SC0588B | MF0041 |
| 11.1 | 17.5 | SC0534T | SC0534* | | | | |
| 12.7 | 19.1 | SC0382T | SC0382* | SCE0396 | MF0034 | SC0589B | MF0315 |
| 15.9 | 22.3 | SC0695T | SC0695* | | SC0696 | SC0532B | |
| **Roll Length** | | 15 m | 15 m | 7.5 m | 7.5 m | 15 m | 7.5 m |

** The Tygon R3603/R3607 formulation is being phased out. Substituting Tygon LMT-55 is highly recommended.*

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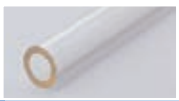

| TYGON® 2001 | TYGON HC F-4040-A | NORPRENE A-60-G | NORPRENE CHEMICAL | VITON® | OD (mm) | ID (mm) |
|---|---|---|---|---|---|---|
| **Part No.** | **Part No.** | **Part No.** | **Part No.** | **Part No.** | **1.6 mm wall thickness (1/16") Standard Tubing** | |
| | | MF0017 | | MF0048 | 4.0 | 0.8 |
| | | | | | 3.2 | 1.6 |
| SC0830 | MF0002 | SC0357 | | MF0049 | 4.8 | 1.6 |
| | | | | | 5.6 | 2.4 |
| SC0831 | MF0004 | SC0358 | SC1022 | MF0051 | 6.4 | 3.2 |
| | | | | | 7.2 | 4.0 |
| SC0832 | MF0003 | SC0359 | SC1023 | MF0322 | 8.0 | 4.8 |
| SC0833 | MF0005 | SC0360 | SC1024 | MF0052 | 9.6 | 6.4 |
| SC0834 | MF0006 | SC0361 | | MF0053 | 11.2 | 8.0 |
| SC0835 | | SC0385 | SC1025 | | 12.7 | 9.5 |
| | | SC0386 | | | 14.3 | 11.1 |
| 15 m | 15 m | 15 m | 15 m | 7.5 m | | **Roll Length** |
| | | | | | | **2.4 mm wall thickness (3/32")** |
| | MF0476 | SC0362 | | MF0050 | 9.6 | 4.8 |
| | MF0007 | SC0363 | | MF0054 | 11.2 | 6.4 |
| | | SC0511 | | | 12.8 | 8.0 |
| | | SC0512 | | | 14.3 | 9.5 |
| | | | | | 15.9 | 11.1 |
| | | | | | 17.5 | 12.7 |
| | | | | | 20.7 | 15.9 |
| | 15 m | 15 m | | 7.5 m | | **Roll Length** |
| | | | | | | **3.2 mm wall thickness (1/8")** |
| | | | | | 11.2 | 4.8 |
| | | SC0364 | | MF0323 | 12.8 | 6.4 |
| | | | | | 14.4 | 8.0 |
| | MF0008 | SC0365 | | MF0055 | 15.9 | 9.5 |
| | | | | | 17.5 | 11.1 |
| SC0845 | SC0725 | SC0366 | SC1026 | | 19.1 | 12.7 |
| SC0846 | | SC0698 | | | 22.3 | 15.9 |
| 15 m | 15 m | 15 m | 15 m | 7.5 m | | **Roll Length** |

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# LABORATORY PUMPS

**ALL-NEW REGLO ICC**
PAGE 92

**PERISTALTIC PUMPS**
PAGE 93

**GEAR PUMPS**
PAGE 110

**ROTARY PISTON PUMPS**
PAGE 116

SEE STARRED PRODUCTS FOR **TOP SELLERS!**

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IDEX Health & Science's Ismatec® pump drives are available with three pump types — peristaltic, gear, and piston — to make a complete pumping system. The chart below will help you choose the right pump technology. Once you find the desired pumping technology, proceed to the section pages listed and choose the pump/drive combination best suited for your application.

| SELECTION CRITERIA | | PERISTALTIC PUMPS | GEAR PUMPS | ROTARY PISTON PUMPS |
|---|---|---|---|---|
| **Pages** | | **92** | **110** | **116** |
| **Flow Rate Min. to Max.** | | < 0.001 mL/min to 13 L/min | 1 mL/min to 7 L/min | 0.025 mL/min–2.3 L/min |
| **Number of Channels** | | 1–24 | 1 | 1 |
| **Differential Pressure** | | Max. 2.5 bar (36 psi) | Max. 5.6 bar (81 psi) | Max. 6.9 bar (100 psi) |
| **Suction Lift (water)** | | 7–8 m | < 1 m | ~5 m |
| **Dead Volume** | | Practically None | 5–45 mL | Very Small |
| **Chemical Resistance** | | Depends on Tubing Material | High | Very High |
| **Accuracy and Repeatability** | | High | High [1] | Very High |
| **Self-Priming** | | Yes | Possible [4] | Possible |
| **Sensitive to Dry-Running** | | No | Yes | Yes |
| **Syphoning Effect** | | No | Yes | No |
| **Pumping** | Gently = Low Shearing Forces | Yes | No | No |
| | Under Sterile Conditions | Yes | No | No |
| | In Both Directions | Yes | Yes [4] | Yes |
| | Pulse-Free | [2] | Yes | [2] |
| | Contamination-Free | Yes | No | No |
| **Media** | Containing Particles | Very Good | No | Max. 0.8 mm Ø |
| | Viscous | Very Good | Possible | Good |
| | Containing Living Cells | Very Good | No | No |
| | Foaming | Very Good | No | No |
| | Corrosive/Aggressive | [3] | Good | Very Good |
| | Gas | [3] | No | [4] |

*[1] Requires non-return valve.*
*[2] Pumping with low pulsation possible; depends on the pump head.*
*[3] Depends on the tubing material.*
*[4] Depends on the pump head.*

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# Reglo ICC Independent-Channel Control Peristaltic Pump

- Continuous pumping or precision dispensing
- Flexibility of bi-directional flow in each channel
- Easy-to-use tubing cassettes allow quick changeovers
- Independent channel calibration minimizes the tube to tube differences resulting in the best calibration accuracy possible in a multichannel peristaltic pump
- New easy-to-use USB interface makes connections quickly
- Windows® software is included. Control up to eight Reglo ICC pumps. Time based routines allow for complex experiment development.

Expand the power of your peristaltic pumping application! By providing individually addressable control of each fluidic channel, the new Ismatec® Reglo ICC eliminates the clutter of multiple pumps on the bench top as well as allowing you, the scientist, to solve your application complexity in a single pump.

Long hailed in Europe as the gold standard of Swiss precision, Ismatec drives will now power up to four channels — flowing, dispensing, starting, stopping, reversing, aspirating, and calibrating — all working independently at the command of your PC or keypad. Plus the precision and accuracy of Ismatec's traditional peristaltic pumps for low-volume applications. For the first time, you'll be able to perform multiple precision fluidic tasks — at multiple flow rates — all from a single space-saving pump.

**ISM4408**
Reglo ICC
4-Channel Pump

**ISM4308**
Reglo ICC
3-Channel Pump

## SPECIFICATIONS & DETAILS

### Reglo ICC

| | |
|---|---|
| **Motor Type** | Stepper Motor (1/channel) |
| **Speed Range** | 0.1–100 rpm |
| **Speed Setting** | rpm (Resolution = 0.01 rpm) |
| **Flow Rate Range** | 0.0002–35 mL/min/channel (tubing dependent) |
| **Number of Channels** | 2-4 |
| **Number of Rollers** | 8 Ertalyte® rollers standard; 6 and 12-roller options also available |
| **Cassettes** | MS/CA Click'n'Go (POM-C; alternatives available) |
| **Dimensions (HxWxD)** | 6.7" (170 mm) x 5" (125 mm) x 8.1" (205 mm)* (*=for 3-channel model) |
| **Weight** | 6 lbs. (2.7 kg) |
| **Power Consumption** | 30 W (Max.) Main Voltage: 100–264 V AC/50/60 Hz (Requires use of included power supply, cables) |
| **Protection Rating** | IP 30 |
| **Differential Pressure** | 1.0 bar/14.5 psi (Max.) |

## FLOW RATES & TUBING

| Tubing ID (mm) | Flow Rate (mL/min per channel) | |
|---|---|---|
| | **0.1 rpm** | **100 rpm** |
| | **Min.** | **Max.** |
| 0.13 | 0.0002 | 0.11 |
| 0.25 | 0.0005 | 0.41 |
| 0.51 | 0.0017 | 1.7 |
| 0.76 | 0.0036 | 3.6 |
| 1.02 | 0.0063 | 6.3 |
| 1.22 | 0.0088 | 8.8 |
| 1.52 | 0.013 | 13 |
| 1.85 | 0.017 | 17 |
| 2.54 | 0.027 | 27 |
| 3.17 | 0.035 | 35 |

| Part No. | Description | Flow rates mL/min | Channels | Rollers | Speed rpm |
|---|---|---|---|---|---|
| REGLO ICC | | | | | |
| **ISM4308** | Reglo ICC | 0.0002–35 | 3 | 8 | 100 |
| **ISM4408** | Reglo ICC | 0.0002–35 | 4 | 8 | 100 |

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# Peristaltic Pumps & Tubing

The pumps presented on pages 94–108 require peristaltic tubing to operate. Flow rate of a given fluid through a peristaltic tubing pump depends on two variables:

1. The speed of the pump, measured in revolutions per minute (rpm)

2. The volume held within the internal diameter (ID) of the selected tubing

## Variable Speed Pump Flow Rates

For a variable speed pump, such as the products on pages 93–103, 112–115, and 117–118, the flow rate of a channel can be changed by varying the pump rpm, or by using tubing with different IDs, or a combination of both.

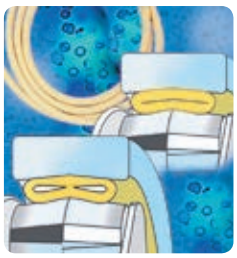
## Fixed Speed Pump Flow Rates

Single-channel and multichannel peristaltic tubing pumps are available in this catalog. The number of channels refers to how many pieces of tubing that can be used simultaneously. Tubing with different IDs can be used in each channel to deliver varying flow rates at any given pump speed.

## Convex Rollers and Concave Tube-Bed

- Treat the liquid gently (e.g. living cells)
- Improve the delivery stability
- Increase the repeatability
- Guarantee optimum tube centering

The tube is progressively closed, starting from the center outwards.



CELL SENSITIVE PUMPING

Pump heads with this sign are ideal for cell and media sensitive pumping.

## RELATED PRODUCTS

| | |
|---|---|
| **Accessories** | Page 109 |
| **Tubing** | Pages 75–89 |

## NOTE

All microprocessor controlled drives are LabVIEW™ compatible and can easily be integrated into process control systems. The LabVIEW drivers can be downloaded from the website: www.idex-hs.com/ismatec

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| PUMP SERIES | | CHANNELS | FLOW RANGE | DRIVE OPTIONS | INTERFACE | PAGE |
|---|---|---|---|---|---|---|
| REGLO | | 1–4 | 0.001–230 mL/min | Variable | Digital = RS-232 only interface<br>Analog = Analog only | **95** |
| FLOWMASTER® | | Single channel only | 37–13,000 mL/min | Variable | Analog | **98** |
| ECOLINE | | 1–8 | 0.005–5,400 mL/min | Variable | Analog | **99** |
| IP / IPC | | 4–24 | 0.001–44 mL/min | Variable | RS-232, Analog | **101** |
| BVP/MCP | | 1–24 | 0.001–3,700 mL/min | Variable | RS-232, Analog | **103** |

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# Reglo Analog/Digital

## The Smallest Dispensing Pump with Calibration Features

**Reglo Analog**
without dispensing functions
0.002–68 mL/min (per channel)
Variable speed drive

DISPENSING & CALIBRATING

**Reglo Digital**
with dispensing functions
0.001–68 mL/min (per channel)
Microprocessor controlled

## SPECIFICATIONS & DETAILS

### Reglo Analog

| | | |
|---|---|---|
| **Motor Type** | DC motor | |
| **Speed** | 2-channel | 3.2–160 rpm |
| | 4-channel | 2.0–100 rpm |
| **Speed Setting** | 2–99%, resolution 1% | |
| | 2-digit potentiometer | |
| **Power Consumption** | 20 W | |
| **Mains Connection** | 230 V AC/50 Hz,115 V AC/60 Hz, selectable | |
| **Protection Rating** | IP 30 | |
| **Depth/Width/Height** | 2-channel 178 x 100 x 143 mm | |
| | 4-channel 190 x 100 x 143 mm | |
| **Weight** | 2-channel 2.0 kg | |
| | 4-channel 2.1 kg | |

### Reglo Digital

| | | |
|---|---|---|
| **Motor Type** | DC motor | |
| **Speed** | 2-channel | 1.6–160 rpm |
| | 4-channel | 1.0–100 rpm |
| **Speed Setting** | rpm, resolution 0.1 rpm | |
| **Flow Rate Setting** | µL/min or mL/min | |
| **Power Consumption** | 75 W | |
| **Mains Connection** | 100–230 V AC/50–60 Hz, selectable | |
| **Protection Rating** | IP 30 | |
| **Depth/Width/Height** | 2-channel 178 x 100 x 135 mm | |
| | 4-channel 190 x 100 x 135 mm | |
| **Weight** | 2-channel 2.0 kg | |
| | 4-channel 2.1 kg | |

### Interfaces

RPM ANALOG

**Reglo Analog**
- Speed control (0–5 or 0–10 V, 0–20 or 4–20 mA)
- Speed output 2-channel: 0–8 kHz 4-channel: 0–5 kHz
- Start/Stop
- Rotation direction

**Reglo Analog**
2-digit potentiometer
2–99%, resolution 1% (for speed setting)

RS232
RPM ANALOG

**Reglo Digital**
- PC-controllable
- Digital is RS-232 only

**Reglo Digital**
6-button membrane key-pad, LED-display
Flow rate setting in µL/min and mL/min

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## FLOW RATES & TUBING

| | Model | Reglo Analog+Digital | | Reglo Analog+Digital | | Reglo Analog+Digital | | Reglo Analog+Digital | | Reglo Analog+Digital | | Reglo Analog+Digital | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Channels | 2 | | 2 | | 2 | | 4 | | 4 | | 4 | |
| | Rollers | 6 | | 8 | | 12 | | 6 | | 8 | | 12 | |
| | Speed rpm | 1.61 | 160 | 1.61 | 160 | 1.61 | 160 | 1.0[1] | 100 | 1.0[1] | 100 | 1.0[1] | 100 |
| Tygon® ST R-3603/R-3607 Part No. | Tubing ID mm | mL/min per channel | | mL/min per channel | | mL/min per channel | | mL/min per channel | | mL/min per channel | | mL/min per channel | |
| | | min.[1] | max.[2] | min.[1] | max.[2] | min.[1] | max.[2] | min.[1] | max.[2] | min.[1] | max.[2] | min.[1] | max.[2] |
| SC0189 | 0.13 | 0.003 | 0.22 | 0.002 | 0.17 | 0.002 | 0.15 | 0.002 | 0.14 | 0.002 | 0.11 | 0.001 | 0.093 |
| SC0050 | 0.25 | 0.008 | 0.76 | 0.007 | 0.65 | 0.007 | 0.61 | 0.005 | 0.48 | 0.005 | 0.41 | 0.004 | 0.38 |
| SC0053 | 0.51 | 0.031 | 3.1 | 0.027 | 2.7 | 0.025 | 2.5 | 0.019 | 1.9 | 0.017 | 1.7 | 0.016 | 1.6 |
| SC0056 | 0.76 | 0.067 | 6.7 | 0.058 | 5.8 | 0.053 | 5.3 | 0.042 | 4.2 | 0.036 | 3.6 | 0.033 | 3.3 |
| SC0059 | 1.02 | 0.12 | 12 | 0.10 | 10 | 0.090 | 9.0 | 0.073 | 7.3 | 0.063 | 6.3 | 0.056 | 5.6 |
| SC0062 | 1.22 | 0.16 | 16 | 0.14 | 14 | 0.12 | 12 | 0.10 | 10 | 0.088 | 8.8 | 0.075 | 7.5 |
| SC0065 | 1.52 | 0.24 | 24 | 0.20 | 20 | 0.17 | 17 | 0.15 | 15 | 0.13 | 13 | 0.10 | 10 |
| SC0068 | 1.85 | 0.34 | 34 | 0.28 | 28 | 0.21 | 21 | 0.21 | 21 | 0.17 | 17 | 0.13 | 13 |
| SC0071 | 2.54 | 0.53 | 53 | 0.44 | 44 | 0.31 | 31 | 0.33 | 33 | 0.27 | 27 | 0.19 | 19 |
| SC0224 | 3.17 | 0.68 | 68 | 0.57 | 57 | 0.38 | 38 | 0.43 | 43 | 0.35 | 35 | 0.24 | 24 |

*Approx. values: determined with water, at 22 °C, no differential pressure, Tygon tubing.*
*[1] Min. flow rates shown are for the Reglo Digital. Min. flow rate for Reglo Analog =2% of max. flow rate.*
*[2] Max. flow rates shown are for both the Reglo Analog and Digital pumps.*

## APPLICATION NOTE

- Addition of a reagent to a reactor and simultaneous removal of the reaction product from the upper fraction. Ramp control combined with a thermostat to maintain the ΔT during the reaction.
- Simultaneous addition of both components of a 2-component adhesive in ratio 1:10 with two different tubing sizes.

| Part No. | Model | Flow rates mL/min per channel | Channels | Rollers | Speed rpm |
|---|---|---|---|---|---|
| **REGLO ANALOG** | | | | | |
| **ISM830** | MS-2/06 | 0.005–68 | 2 | 6 | 1.6–160 |
| **ISM829** | MS-2/08 | 0.004–57 | 2 | 8 | 1.6–160 |
| **ISM795** | MS-2/12 | 0.003–38 | 2 | 12 | 1.6–160 |
| **ISM828** | MS-4/06 | 0.003–43 | 4 | 6 | 1.0–100 |
| **ISM827** | MS-4/08 | 0.003–35 | 4 | 8 | 1.0–100 |
| **ISM796** | MS-4/12 | 0.002–24 | 4 | 12 | 1.0–100 |
| **REGLO DIGITAL** | | | | | |
| **ISM831** | MS-2/06 | 0.003–68 | 2 | 6 | 3.2–160 |
| **ISM832** | MS-2/08 | 0.002–57 | 2 | 8 | 3.2–160 |
| **ISM596** | MS-2/12 | 0.002–38 | 2 | 12 | 3.2–160 |
| **ISM833** | MS-4/06 | 0.002–43 | 4 | 6 | 2.0–100 |
| **ISM834** | MS-4/08 | 0.002–35 | 4 | 8 | 2.0–100 |
| **ISM597** | MS-4/12 | 0.001–24 | 4 | 12 | 2.0–100 |
| **ACCESSORIES** | | | | | |
| **Part No.** | **Description** | | | | |
| **ISM891** | Reglo Analog Foot switch, see page 109 | | | | |
| **ISM894** | Reglo Digital Foot switch, see page 109 | | | | |
| *LabVIEW™ driver for Reglo Digital download for free: www.idex-hs.com/ismatec* | | | | | |

## RELATED PRODUCTS


| | |
|---|---|
| **Accessories** | Page 109 |
| **Tubing** | Pages 75–89 |


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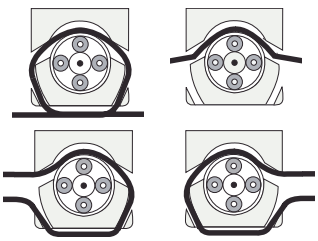
# Reglo Quick™

## Very Fast Tubing Change-Over

**Reglo** *Quick*
2.1–230 mL/min
Easily accessible tube-bed thanks to wide opening angle.



TIP **Flexible layout for tubing appropriate to your application**

## APPLICATION NOTE

Single-channel delivery processes with variable flow rates where frequent tubing change-over is required e.g.:

- Addition of dye stuffs with tubing exchange after each dispensing process.
- Flushing cylinder heads of HPLC pumps.

## SPECIFICATIONS & DETAILS

### Reglo *Quick*

| | |
|---|---|
| **Motor Type** | DC motor |
| **Speed** | 3.2–160 rpm |
| **Speed Setting** | 1–99 %, resolution 1%<br>2-digit potentiometer |
| **Power Consumption** | 30 W |
| **Mains Connection** | 230 V AC /50 Hz,115 V AC /60 Hz, selectable |
| **Protection Rating** | IP 30 |
| **Depth/Width/Height** | 178 x 100 x 143 mm (pump head closed) |
| **Weight** | 2.2 kg |

### Interfaces

RPM ANALOG

- Speed control (0–5 or 0–10 V, 0–20 or 4–20 mA)
- Speed output (0–8 kHz)
- Start/stop
- Rotation direction

**Reglo *Quick***
2-digit potentiometer
1–99%, resolution 1% (for speed setting)

## FLOW RATES & TUBING

| | | Model/Type | Reglo *Quick* | |
|---|---|---|---|---|
| | | Channels | 1 | |
| | | Rollers | 4 | |
| | | Speed rpm | 3.2 | 160 |
| **Tygon® ST R-3603/R-3607 Part No.** | **Wall (mm)** | **Tubing ID (mm)** | **mL/min minimum** | **mL/min maximum** |
| MF0030 | 1.6 | 3.2 | 2.1 | 103 |
| SC0379 | 1.6 | 4.8 | 4.6 | 230 |

Approx. values: determined with water, at 22°C, no differential pressure, Tygon tubing.

| Part No. | Flow rates mL/min per channel | Channels max. | Rollers | Speed rpm |
|---|---|---|---|---|
| REGLO QUICK | | | | |
| **ISM897** | 2.1–230 | 1 | 4 | 3.2–160 |

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# Flowmaster®

## Ideal for Heavy-Duty Processes

- Ideal for dispensing and filling applications in a dusty, humid or corrosive environment and in clean room areas
- Protection rating of IP 65

## Optimized for Increased Hygienic Requirements

- Stainless steel housing
- Tube-loading under sterile conditions without aspirating air
- Easy disassembly of the pump head
- Thorough cleaning thanks to easy disassembly and reassembly of the pump head

## Safety

- Pump Stops When Opening the Tube-Bed
- Multiple Overload Protection

# Flowmaster FMT300

## 37 mL/min–13 L/min

- 1 channel
- 3 convex stainless steel rollers
- Automatic tube retention
- Standard tubing 6.4–15.9 mm ID, wall thickness 3.2 mm, differential pressure max. 2 bar (30 psi) — depends on tubing material used

## TIP TUBE EXCHANGE IN 5 SECONDS!!

- Insert the Tube (Easily and Fast)
- Press Down the Lever (Automatically Correct Pressure Setting of the Tube)
- Start the Pump!

## SPECIFICATIONS & DETAILS

| | |
|---|---|
| **Motor type** | DC motor |
| **Speed** | 5 to 500 rpm |
| **Speed setting** | Resolution 0.1 rpm membrane key-pad, LED display |
| **Power consumption** | 500 W |
| **Mains connection** | 230 V AC/50 Hz,115 V AC/60 Hz, selectable |
| **Protection rating** | IP 65 |
| **Depth/Width/Height** | 500 x 220 x 262 mm |
| **Weight** | 26 kg |

### Interfaces

PLC compatible interface with status information for process control systems (the level of the inputs can be configured: 5, 12, or 24 V).

RPM ANALOG

- Speed control (0–5 or 0–10 V, 0–20 or 4–20 mA)
- Start/stop, rotation direction
- Autostart
- Speed output
- Digital output (potential free) (error, okay, busy)

**Settings menu**

- Configuration of analog interface
- Entry of basic settings, e.g. rpm, time, etc.
- Foot switch control
- Rotation speed (% or rpm)
- Service life of tubing
- Timer function, etc.

## RELATED PRODUCTS


| | |
|---|---|
| **Accessories** | Page 109 |
| **Tubing** | Pages 75–89 |


| Part No. | Description | Flow rates mL/min | Channels | Rollers | Speed rpm |
|---|---|---|---|---|---|
| **FLOWMASTER** | | | | | |
| **ISM1020A** | Flowmaster FMT300 230 V 50 Hz | 37–13,000 | 1 | 3 | 5–500 |
| **ISM1022A** | Flowmaster FMT300 115 V 60 Hz | 37–13,000 | 1 | 3 | 5–500 |
| **ACCESSORIES** | | | | | |
| **IS10279** | Foot switch, see page 109 | | | | |

## FLOW RATES & TUBING

| Tubing Information | | | | Flow Rates in L/min | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Tygon® E-LFL Part No. | PharMed® Part No. | Wall (mm) | Tubing ID (mm) | rpm 5 | rpm 10 | rpm 50 | rpm 100 | rpm 200 | rpm 300 | rpm 400 | rpm 500 |
| SCE0393 | MF0015 | 3.2 | 6.4 | 0.037 | 0.074 | 0.37 | 0.74 | 1.5 | 2.2 | 3.1 | 3.7 |
| SCE0395 | MF0016 | 3.2 | 9.5 | 0.08 | 0.16 | 0.80 | 1.6 | 3.2 | 4.8 | 6.4 | 8.0 |
| SCE0396 | MF0034 | 3.2 | 12.7 | 0.10 | 0.20 | 1.0 | 2.0 | 4.0 | 6.0 | 8.0 | 10.0 |
| | SC0696 | 3.2 | 15.9 | 0.13 | 0.26 | 1.3 | 2.6 | 5.2 | 7.8 | 10.4 | 13.0 |

*Approx. values: determined with water, at 22 °C, no differential pressure, PharMed tubing.*

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## Ecoline VC-MS/CA8-6

**0.005–150 mL/min**

- 8 channels
- 6 rollers
- 3-stop tubing
- Differential pressure 1.0 bar[1] (15 psi)

## Ecoline VC-MS/CA4–12

**0.003–83 mL/min**

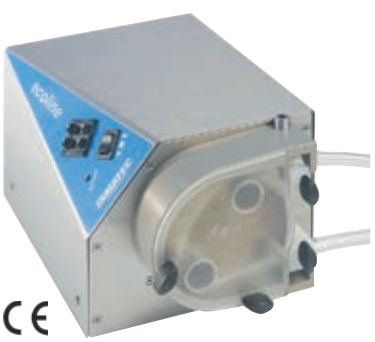
- 4 channels
- 12 rollers (low pulsation)
- Click'n'Go cassettes with automatic pressure setting
- 3-stop tubing
- Differential pressure 1.0 bar[1] (15 psi)

*[1] Possible with appropriate tubing material; tubing with small ID's and/or cassettes with the pressure lever (see page 109) may enable higher pressures.*

## Ecoline VC-280 (1.7–5,400 mL/min) and Ecoline VC-380 (1.6–5,000 mL/min)

- 1 channel
- 2 or 3 convex rollers treat the liquid and tubing gently
- With exchangeable rotor e.g. for lower pulsation, higher flow rates, or elevated differential pressures
- Standard tubing 1.6 mm wall thickness (WT)
- Differential pressure 1.5 bar[1] (22 psi)

*[1] Differential pressure depends on tubing material; tubing with small ID's may enable higher pressures.*



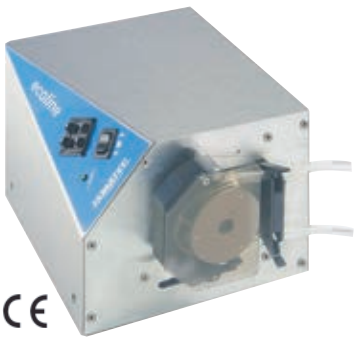
CELL SENSITIVE PUMPING

## Ecoline VC-360

**0.25–1,300 mL/min**

- 1 channel
- 3 convex rollers treat the liquid and tubing gently
- Hinged tube-bed for easy and rapid tube change-over
- Standard tubing 1.6 mm WT
- Differential pressure 1.5 bar[1] (22 psi)

*[1] Differential pressure depends on tubing material; tubing with small ID's may enable higher pressures.*



CELL SENSITIVE PUMPING

## APPLICATION NOTE

- **Ecoline VC-280**
  To apply protective lacquer to cartons
- **Ecoline VC-380**
  As recirculating pump for coolant in thermostat bath
- **Ecoline VC-360**
  Externally controlled spectrophotometer cuvette filling
- **Ecoline VC-MS/CA8-6**
  8-channel flushing of the tubing system of a digital fabric printing machine

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## SPECIFICATIONS & DETAILS

| | |
|---|---|
| **Motor Type** | DC motor |
| **Speed** | 3.5–350 rpm |
| **Speed Setting** | 1–99%, resolution 1%<br>2-digit potentiometer |
| **Power Consumption** | 100 W |
| **Mains Connection** | 230 V AC/50 Hz,115 V AC/60 Hz, selectable |
| **Protection Rating** | IP 30 |

### Size and Weight

| Model | Depth x Width x Height | Weight |
|---|---|---|
| **Ecoline VC-280** | 256 x 169 x 138 mm | 5.2 kg |
| **Ecoline VC-380** | 256 x 169 x 138 mm | 5.3 kg |
| **Ecoline VC-360** | 238 x 169 x 138 mm | 4.9 kg |
| **Ecoline VC-Easy-Load™** | 285 x 169 x 138 mm | 5.2 kg |
| **Ecoline VC-MS/CA8-6** | 313 x 169 x 138 mm | 5.5 kg |
| **Ecoline VC-MS/CA4-12** | 281 x 169 x 138 mm | 5.4 kg |

### Interfaces

RPM ANALOG

- Speed control (0–5 or 0–10 V, 0–20 or 4–20 mA)
- Start/stop, rotation direction

## FLOW RATES & TUBING

### 3-Stop Tubing

| | Model Type | Ecoline VC-MS / CA8-6 | | Ecoline VC-MS / CA4-12 | |
|---|---|---|---|---|---|
| | Channels | 8 | | 4 | |
| | Rollers | 6 | | 12 | |
| | Speed rpm | 3.5 | 350 | 3.5 | 350 |
| Tygon® ST R-3603/R-3607 Part No. | Tubing ID (mm) | mL/min per channel min. | mL/min per channel max. | mL/min per channel min. | mL/min per channel max. |
| SC0189 | 0.13 | 0.005 | 0.49 | 0.003 | 0.32 |
| SC0050 | 0.25 | 0.017 | 1.7 | 0.013 | 1.3 |
| SC0053 | 0.51 | 0.067 | 6.7 | 0.055 | 5.5 |
| SC0056 | 0.76 | 0.15 | 15 | 0.12 | 12 |
| SC0059 | 1.02 | 0.26 | 26 | 0.20 | 20 |
| SC0062 | 1.22 | 0.36 | 36 | 0.26 | 26 |
| SC0065 | 1.52 | 0.53 | 53 | 0.36 | 36 |
| SC0068 | 1.85 | 0.73 | 73 | 0.47 | 47 |
| SC0071 | 2.54 | 1.2 | 120 | 0.68 | 68 |
| SC0224 | 3.17 | 1.5 | 150 | 0.83 | 83 |

*Approx. values: determined with water at 22 °C, no differential pressure, Tygon ST tubing.*

### Standard Tubing



| | Model Type | Ecoline VC-280 | | Ecoline VC-380 | | Ecoline VC-260 | |
|---|---|---|---|---|---|---|---|
| | Channels | 1 | | 1 | | 1 | |
| | Rollers | 2 | | 3 | | 3 | |
| | Speed rpm | 3.5 | 350 | 3.5 | 350 | 3.5 | 350 |
| Tygon ST R-3603/R-3607 Part No. | WT (mm) | Tubing ID (mm) | mL/min per channel min. | mL/min per channel max. | mL/min per channel min. | mL/min per channel max. | mL/min per channel min. | mL/min per channel max. |
| MF0001 | 1.6 | 0.8 | | | | | 0.25 | 25 |
| MF0028 | 1.6 | 1.6 | 1.7 | 170 | 1.6 | 160 | 0.9 | 90 |
| MF0030 | 1.6 | 3.2 | 6.6 | 660 | 5.9 | 590 | 3.5 | 350 |
| SC0379 | 1.6 | 4.8 | 5.1 | 1,500 | 13 | 1,300 | 7.7 | 770 |
| MF0031 | 1.6 | 6.4 | 25 | 2,500 | 23 | 2,300 | 13 | 1,300 |
| MF0032 | 1.6 | 8.0 | 37 | 3,700 | 34 | 3,400 | | |
| SC0383 | 1.6 | 9.5 | 48 | 4,800 | 44 | 4,400 | | |
| SC0384 | 1.6 | 11.1 | 54 | 5,400 | 50 | 5,000 | | |

*Approx. values: determined with water at 22 °C, no differential pressure, Tygon ST tubing.*

| Part No. | Model | Flow rates mL/min per channel | Channels max. | Rollers |
|---|---|---|---|---|
| **COMPLETE ECOLINE PUMPS** | | | | |
| **ISM1063** | Ecoline VC-MS/CA8-6 | 0.005-150 | 8 | 6 |
| **ISM1076A** | Ecoline VC-360 | 0.25–1,300 | 1 | 3 |
| **ISM1078B** | Ecoline VC-280 WT 1.6 | 1.7–5,400 | 1 | 2 |
| **ISM1079B** | Ecoline VC-380 WT 1.6 | 1.6–5,000 | 1 | 3 |
| **ISM1090** | Ecoline VC-MS/CA4-12 | 0.003–82 | 4 | 12 |
| **ISM1091** | Ecoline EasyLoad I | 0.23–1,600 | 1 | 3 |
| **ISM1091B** | Ecoline EasyLoad II | 0.24–1,000 | 1 | 4 |

**For standard tubing 2.4 mm wall thickness 4.8–9.5 mm (3/16–3/8") inner diameter.*

## RELATED PRODUCTS


| | |
|---|---|
| **Accessories** | Page 109 |
| **Tubing** | Pages 75–89 |


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# IPC/IP & IPC-N/IP-N

## IPC (and IP)

- 0.002–44 mL/min (Per Channel)

## IPC-N (and IP-N)

- 0.4 µL/min–11 mL/min (Per Channel)

DISPENSING & CALIBRATING

## SPECIFICATIONS & DETAILS

### Specifications IPC and IPC-N

| | |
|---|---|
| **Motor Type** | DC motor |
| **Speed** | IPC 0.4–44 rpm<br>IPC-N 0.11–11.25 rpm |
| **Speed Setting** | 1–100 %, resolution 0.1% |
| **Flow Rate Setting** | µL/min or mL/min |
| **Power Consumption** | 30 W |
| **Mains Connection** | 230 V AC/50 Hz,115 V AC/60 Hz, selectable |
| **Protection Rating** | IP 30 |

### Specifications IP and IP-N

| | |
|---|---|
| **Motor Type** | DC motor |
| **Speed** | IP 0.4–44 rpm<br>IP-N 0.11–11.25 rpm |
| **Speed Setting** | 1–100 %, resolution 0.1%<br>IP rpm, resolution 0.1 rpm<br>IP-N rpm, resolution 0.03 rpm |
| **Power Consumption** | 30 W |
| **Mains Connection** | 230 V AC/50 Hz,115 V AC/60 Hz, selectable |
| **Protection Rating** | IP 30 |

### Dimensions/Weight

| | |
|---|---|
| **4 Channels** | |
| Depth/Width/Height | 180 x 175 x 130 mm |
| Weight | 4.6 kg |
| **8 Channels** | |
| Depth/Width/Height | 220 x 175 x 130 mm |
| Weight | 5.1 kg |
| **12 Channels** | |
| Depth/Width/Height | 260 x 175 x 130 mm |
| Weight | 5.8 kg |
| **16 Channels** | |
| Depth/Width/Height | 300 x 175 x 130 mm |
| Weight | 6.5 kg |
| **24 Channels** | |
| Depth/Width/Height | 380 x 175 x 130 mm |
| Weight | 7.9 kg |

### Interfaces

RS232

RPM ANALOG

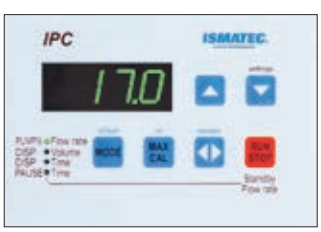
**IPC, IPC-N**

- PC-controllable
- Analog: same as IP, IP-N

RPM ANALOG

**IP, IP-N**

- Speed control (0–5 or 0–10 V, 0–20 or 4–20 mA)
- Speed output (0–10 V or 0–11 kHz)
- Start/stop
- Rotation direction
- Autostart




**Standard Speed (IPC)**

## FLOW RATES & TUBING

| | Model | IPC / IP | | IPC-N / IP-N | |
|---|---|---|---|---|---|
| | Channels | 4 / 8 / 12 / 16 / 24 | | 4 / 8 / 12 / 16 / 24 | |
| | Rollers | 8 | | 8 | |
| | Speed rpm | 0.4 | 44.0 | 0.11 | 11.25 |
| **Tygon® ST R-3603/R-3607 Part No.** | **Tubing ID (mm)** | **mL/min per channel min.** | **mL/min per channel max.** | **mL/min per channel min.** | **mL/min per channel max.** |
| SC0188 | 0.13 | 0.002 | 0.15 | 0.0004 | 0.039 |
| SC0002 | 0.25 | 0.005 | 0.41 | 0.001 | 0.10 |
| SC0005 | 0.51 | 0.015 | 1.5 | 0.004 | 0.38 |
| SC0008 | 0.76 | 0.032 | 3.2 | 0.009 | 0.81 |
| SC0011 | 1.02 | 0.057 | 5.7 | 0.041 | 1.4 |
| SC0014 | 1.22 | 0.079 | 7.9 | 0.020 | 2.0 |
| SC0017 | 1.52 | 0.12 | 12 | 0.030 | 3.0 |
| SC0020 | 1.85 | 0.17 | 17 | 0.043 | 4.3 |
| SC0023 | 2.54 | 0.30 | 30 | 0.075 | 7.5 |
| SC0222 | 3.17 | 0.44 | 44 | 0.11 | 11 |

*Approx. values: determined with water, at 22 °C, no differential pressure, Tygon tubing.*

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4 channels | 8 channels | 12 channels | 16 channels | 24 channels

## Planetary Drive System

With the planetary drive system each roller is directly driven by the sun wheel. This prevents axial push-pull friction on the tubing.

Result: increased service-life of the tubing, lower pulsation, high repeatability.

## APPLICATION NOTE

- Toxicological in-vitro use.
- Perfusion of animal tissue samples.
- Sampling from tablet dissolution systems.
- Environmental applications.

| Part No. | Model | Flow rates mL/min per channel | Channels | Speed rpm |
|---|---|---|---|---|
| **IPC AND IPC-N** | | | | |
| **ISM930** | IPC 4 | 0.002–44 | 4 | 0.4–45 |
| **ISM931** | IPC 8 | 0.002–44 | 8 | 0.4–45 |
| **ISM932** | IPC 12 | 0.002–44 | 12 | 0.4–45 |
| **ISM933** | IPC 16 | 0.002–44 | 16 | 0.4–45 |
| **ISM934** | IPC 24 | 0.002–44 | 24 | 0.4–45 |
| **ISM935** | IPC-N 4 | 0.0004–11 | 4 | 0.11–11.25 |
| **ISM936** | IPC-N 8 | 0.0004–11 | 8 | 0.11–11.25 |
| **ISM937** | IPC-N 12 | 0.0004–11 | 12 | 0.11–11.25 |
| **ISM938** | IPC-N 16 | 0.0004–11 | 16 | 0.11–11.25 |
| **ISM939** | IPC-N 24 | 0.0004–11 | 24 | 0.11–11.25 |
| **IP AND IP-N** | | | | |
| **ISM940** | IP 4 | 0.002–44 | 4 | 0.4–45 |
| **ISM941** | IP 8 | 0.002–44 | 8 | 0.4–45 |
| **ISM942** | IP 12 | 0.002–44 | 12 | 0.4–45 |
| **ISM943** | IP 16 | 0.002–44 | 16 | 0.4–45 |
| **ISM944** | IP 24 | 0.002–44 | 24 | 0.4–45 |
| **ISM945** | IP-N 4 | 0.0004–11 | 4 | 0.11–11.25 |
| **ISM946** | IP-N 8 | 0.0004–11 | 8 | 0.11–11.25 |
| **ISM947** | IP-N 12 | 0.0004–11 | 12 | 0.11–11.25 |
| **ISM948** | IP-N 16 | 0.0004–11 | 16 | 0.11–11.25 |
| **ISM949** | IP-N 24 | 0.0004–11 | 24 | 0.11–11.25 |

*LabVIEW™ driver, download for free www.idex-hs.com/ismatec*

## RELATED PRODUCTS


| | |
|---|---|
| **Accessories** | Page 109 |
| **Tubing** | Pages 75–89 |


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# BVP *Standard*

## Economical

- Robust, powerful drive
- Variable speed

## Without Dispensing Functions

- 3-digit potentiometer for speed setting
- 20 pump head configurations available
- Bayonet coupling system enables a system change without tools
- Flow rates, channels, rollers and differential pressure depend on the mounted pump head (see pages 105 to 108)

**BVP *Standard* Drive**
(pump heads on pages 105 to 108)

# BVP *Process*

## Washdown

- Protection rating of IP 65
- Extremely robust drive
- Microprocessor controlled
- Ideal for applications in a dusty, humid or corrosive environment and in clean room areas (IP 65, dust-tight and protected against water jets)

## Without Dispensing Functions

Flow rates, channels, rollers and differential pressure depend on the mounted pump head (see pages 105 to 108)

- Membrane key-pad for speed setting, LED display
- Stainless steel housing
- More than 20 pump heads available
- Bayonet coupling system enables a system change without tools

**BVP *Process* drive**
(pump heads on pages 105 to 108)

## SPECIFICATIONS & DETAILS

| | BVP *Standard* | BVP *Process* |
|---|---|---|
| **Motor Type** | DC motor | DC motor |
| **Speed** | 2.4–240 rpm | 1–240 rpm |
| **Speed Setting** | 1–99.9%, resolution 0.1% 3-digit potentiometer | rpm, resolution 0.1 rpm |
| **Power Consumption** | 100 W | 120 W |
| **Mains Connection** | 230 V AC/50 Hz,115 V AC/60 Hz, selectable | 230 V AC/50 Hz,115 V AC/60 Hz, selectable |
| **Protection Rating** | IP 30 | IP 65 |
| **Depth/Width/Height** | 220 x 155 x 260 mm (without pump head) | 220 x 155 x 260 mm (without pump head) |
| **Weight** | 5.7 kg (without pump head) | 6.9 kg (without pump head) |

## Interfaces

RPM ANALOG

### BVP *Standard*

- Speed control (0–5 or 0–10 V, 0–20 or 4–20 mA)
- Speed output (0–10 V DC or 0–12 kHz)
- Start/stop, rotation direction

RPM ANALOG

### BVP *Process*

- Speed control (0–5 or 0–10 V, 0–20 or 4–20 mA)
- Speed output (0–10 V DC or 0–7.2 kHz)
- Start/stop, rotation direction, autostart

## RELATED PRODUCTS

| | |
|---|---|
| **Accessories** | Page 109 |
| **Tubing** | Pages 75–89 |

| Part No. | Includes |
|---|---|
| THE COMPLETE PUMP SYSTEM BVP ***PROCESS*** CONSISTS OF: | |
| **ISM920A** | Drive, page 103 |
| **Order the Following to Complete the BVP *Process* Pump System** | |
| | Pump head, pages 105–108 |
| | Tubing, pages 61–89 |
| | Accessories, page 109 |
| **IS10039** | Foot switch, page 109 |
| THE COMPLETE PUMP SYSTEM BVP ***STANDARD*** CONSISTS OF: | |
| **ISM444B** | Drive, page 103 |
| **Order the Following to Complete the BVP *Standard* Pump System** | |
| | Pump head, pages 105–108 |
| | Tubing, pages 61–89 |
| | Accessories, page 109 |
| **IS10039** | Foot switch, page 109 |

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# MCP *Standard*

## Multi-Purpose

- Saves individual application parameters
- Robust, powerful drive
- Ideal for dispensing and filling
- Pre-programmed tube sizes and pump heads allow you to work with flow rates
- Membrane key-pad, LED display
- 4 program memories for saving individual application parameters
- More than 20 pump heads available
- Bayonet coupling system enables a system change without tools
- Flow rates, channels, rollers and differential pressure depend on the pump head mounted (see pages 105 to 108)

**MCP *Standard* Drive**
(pump heads on pages 104–107)

DISPENSING & CALIBRATING

# MCP *Process*

## Programmable

- Programs can be carried out on the spot independently of a PC
- Protection rating of IP 65
- Extremely robust drive, suitable for industries
- Ideal for dispensing and filling applications in a dusty, humid or corrosive environment, and in clean room areas
- Pre-programmed tube sizes and pump heads allow you to work with flow rates
- Stainless steel housing, membrane key-pad, LED display
- 4 program memories for saving individual application parameters or PC programmed command sequences
- More than 20 pump heads available
- Bayonet coupling system enables a system change without tools
- Flow rates, channels, rollers and differential pressure depend on the pump head mounted (see pages 105 to 108)

**MCP *Process* Drive**
(pump heads on pages 105 to 108)

DISPENSING & CALIBRATING

## SPECIFICATIONS & DETAILS

| | MCP *Process* | MCP *Standard* |
|---|---|---|
| **Motor Type** | DC motor | DC motor |
| **Speed** | 1–240 rpm | 1–240 rpm |
| **Speed Setting** | rpm, resolution 0.1 rpm | rpm, resolution 0.1 rpm |
| **Flow Rate Settings** | µL/min, mL/min, L/min | µL/min, mL/min, L/min |
| **Power Consumption** | 100 W | 100 W |
| **Mains Connection** | 100–230 V AC/50–60 Hz, selectable | 230 V AC/50 Hz, 115 V AC/60 Hz, selectable |
| **Protection Rating** | IP 65 | IP 30 |
| **Depth/Width/Height** | 220 x 155 x 260 mm (without pump head) | 220 x 155 x 260 mm (without pump head) |
| **Weight** | 6.9 kg (without pump head) | 6.4 kg (without pump head) |

## Interfaces

RS232
RPM
ANALOG

### MCP *Standard*

- PC controllable
- RS-232
- Speed control (0–5 or 0–10 V, 0–20 or 4–20 mA)
- Speed output (0–10 V DC or 0–12 kHz)
- Start/stop, rotation direction, autostart

### MCP *Process*

- PC controllable
- RS-232
- Speed control (0–5 or 0–10 V, 0–20 or 4–20 mA)
- Speed output (0–10 V DC or 0–7.2 kHz)
- Start/stop, rotation direction, autostart
- 2 universal inputs

| Part No. | Includes |
|---|---|
| THE COMPLETE PUMP SYSTEM MCP ***PROCESS*** CONSISTS OF: | |
| **ISM915A** | Drive, page 104 |
| **Order the Following to Complete the MCP *Process* Pump System** | |
| | Pump head, pages 105 to 108 |
| | Tubing, pages 61–89 |
| | Accessories, page 109 |
| **IS10039** | Foot switch, page 109 |
| THE COMPLETE PUMP SYSTEM MCP ***STANDARD*** CONSISTS OF: | |
| **ISM404B** | Drive, page 104 |
| **Order the Following to Complete the MCP *Standard* Pump System** | |
| | Pump head, pages 105 to 108 |
| | Tubing, pages 62–89 |
| | Accessories, page 109 |

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# Drive (MCP or BVP) + Pump Head + Tubing = Complete Pump System

## BVP/MCP — an Investment for the Future

### Instantly Interchangeable Pump Systems

**BVP *Standard***
ISM444

**MCP *Standard***
ISM404B

**BVP *Process***
ISM920A
IP 65

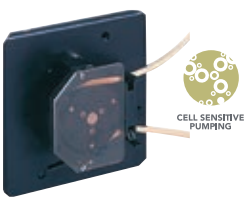
**MCP *Process***
ISM915A
IP 65

## Easy Interchangeable Pump Heads

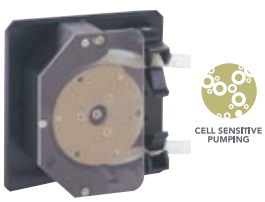
- Mount the pump head without using a tool

The MCP and BVP drives enable the user to choose individually from a large variety of different pump heads. These heads are interchangeable and can be mounted or exchanged within seconds.

### Single-Channel




**ISM719A**
0.072–530 mL/min
Type 360




**ISM718A**
0.44–2,800 mL/min
Type 380

**ISM785A**
0.49–3,700 mL/min
Type Pro-280
For 1.6 mm Wall Thickness

**ISM793A**
3.6–3,100 mL/min
Type Pro-281
For 2.4 mm Wall Thickness

**ISM791A**
0.45–3,400 mL/min
Type Pro-380
For 1.6 mm Wall Thickness

**ISM797A**
3.3–2,900 mL/min
Type Pro-381
For 2.4 mm Wall Thickness

**MF0313**
0.07–1,100 mL/min
Type MF Easy-Load®

**MF0446**
0.24–1,000 mL/min
Type MF Easy-Load II
(with adjustable pressure setting)

### Multi-Channel

**SB 2V (2 channel)**
**ISM734B + ISM010A**
1.1–1,100 mL/min

**SB 3V (3 channel)**
**ISM734B + ISM011A**
0.09–530 mL/min

**ISM721A (4 channel)**
**ISM732B (8 channel)**
**ISM733A (12 channel)**
0.002–230 mL/min
4–12 channels
Type CA 4, CA 8, and CA 12

**ISM735A (4 channel)**
**(ISM737A 4 channel extension block)**
0.001–57 mL/min
Type MS/CA 4–12
(Combine up to 3 extension blocks of 4 channels each)

**ISM724B (8 channel)**
**(ISM185A 8 channel extension block)**
0.002–100 mL/min
Type MS/CA 8-6
(Combine up to 2 extension blocks of 8 channels each)

### Single-Channel for Corrosive Media

**Rigid PTFE Tubing Pump Head**

**MF0330**
0.07–15 mL/min
PTFE tubing 2 mm ID

0.19–45 mL/min
PTFE tubing 4 mm ID

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# BVP/MCP Pump Heads

## Pro-280

**ISM785A**

CELL SENSITIVE PUMPING

### 0.49–3,700 mL/min

- Coated aluminum pump head
- Can be dismantled for cleaning
- Self-centering tube-track thanks to concave tube-bed and convex rollers, which lengthens the tube-life
- 2 stainless steel rollers (higher max. flow rate but more pulsation than with 3 rollers)
- For tubing with 1.6 mm wall thickness
- 1.5 bar (22 psi) differential pressure[1]

## Pro-281

**ISM793A**

### 3.6–3,100 mL/min

*Same pump head as Pro-280, but*

- For tubing with 2.4 mm wall thickness
- 2.5 bar (36 psi) differential pressure[1]

## Pro-380

**ISM791A**

CELL SENSITIVE PUMPING

### 0.45–3,400 mL/min

*Same pump head as Pro-280, but*

- 3 stainless steel rollers (less pulsation but lower max. flow rate than with 2 rollers)

## Pro-381

**ISM797A**

### 3.3–2,900 mL/min

*Same pump head design as Pro-280, but*

- 3 stainless steel rollers (less pulsation but lower max. flow rate than with 2 rollers)
- For tubing with 2.4 mm wall thickness
- 2.5 bar (36 psi) differential pressure[1]

*[1] Differential pressure depends on tubing material; tubing with small ID's enable higher pressures.*

*The flow rates are based on a drive speed of 1 (or 2.4) to 240 rpm. For the BVP Standard drive the indicated min. flow rates must be multiplied by factor 2.4.*

*Approx. values: determined with water, at 22 °C, no differential pressure, Tygon tubing.*

## APPLICATION NOTE

- Chemical, biotechnological, and pharmaceutical applications.
- Food industry.
- Elevated differential pressures (Pro-281 and Pro-381).
- Viscous fluids.
- Fluids containing a high content of sensitive solids.
- Applications requiring hygienic conditions, durability, and reliability.
- Comparisons to gear, piston and centrifugal pumps proved that peristaltic pumps are the only suitable and sterilizable pump system for gently pumping media containing living cells.

## RELATED PRODUCTS


| | |
|---|---|
| **Accessories** | Page 109 |
| **Tubing** | Pages 75–89 |


## FLOW RATES & TUBING

| Tygon® ST R-3603/R-3607 Part No. | Wall (mm) | Tubing ID (mm) | mL/min min. | mL/min max. |
|---|---|---|---|---|
| **MODEL PRO-280** | | | | |
| MF0028 | 1.6 | 1.6 | 0.49 | 120 |
| MF0030 | 1.6 | 3.2 | 1.9 | 450 |
| SC0379 | 1.6 | 4.8 | 4.2 | 1,000 |
| MF0031 | 1.6 | 6.4 | 7.2 | 1,700 |
| MF0032 | 1.6 | 8.0 | 11 | 2,600 |
| SC0383 | 1.6 | 9.5 | 14 | 3,300 |
| SC0384 | 1.6 | 11.1 | 16 | 3,700 |
| **MODEL PRO-281** | | | | |
| MF0029 | 2.4 | 4.8 | 3.6 | 870 |
| MF0033 | 2.4 | 6.4 | 6.5 | 1,600 |
| SC0502 | 2.4 | 8.0 | 9.9 | 2,400 |
| SC0503 | 2.4 | 9.5 | 13 | 3,100 |
| **MODEL PRO-380** | | | | |
| MF0028 | 1.6 | 1.6 | 0.45 | 110 |
| MF0030 | 1.6 | 3.2 | 1.7 | 400 |
| SC0379 | 1.6 | 4.8 | 3.7 | 890 |
| MF0031 | 1.6 | 6.4 | 6.5 | 1,600 |
| MF0032 | 1.6 | 8.0 | 9.7 | 2,300 |
| SC0383 | 1.6 | 9.5 | 13 | 3,000 |
| SC0384 | 1.6 | 11.1 | 14 | 3,400 |
| **MODEL PRO-381** | | | | |
| MF0029 | 2.4 | 4.8 | 3.3 | 800 |
| MF0033 | 2.4 | 6.4 | 5.8 | 1,400 |
| SC0502 | 2.4 | 8.0 | 8.8 | 2,100 |
| SC0503 | 2.4 | 9.5 | 12 | 2,900 |

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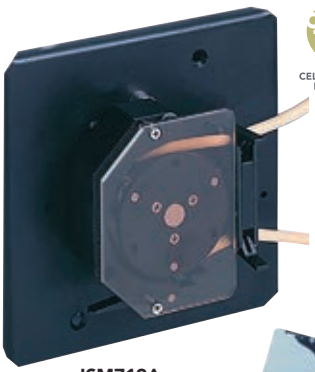
# BVP/MCP Pump Heads

## 360[1]

**0.072–530 mL/min**

- Easily accessible flip-up tube-bed guarantees easy and rapid tube change-over
- Transparent protection cover allows monitoring the tube and the revolving rotor
- Self-centering tube-track design thanks to the concave tube-bed and convex rollers (lengthens tube-life)
- Rotor accepts tubing ID from 0.8 to 6.4 mm with 1.6 mm wall thickness
- 3 stainless steel rollers
- 1.5 bar (22 psi) differential pressure[2]




**ISM719A**

## 380[1]

**0.44–2,800 mL/min**

*Same design as pump head 360, but larger size*

- For tubing ID from 1.6 to 9.5 mm with 1.6 mm wall thickness
- 1.5 bar (22 psi) differential pressure[2]
- Ideal for sterile media

**ISM791A**

[1] *An OEM version of this pump head is also available. Ask for the detailed data sheet.*

[2] *Differential pressure depends on tubing material; tubing with small ID's may enable higher pressures.*

## NOTE

The flow rates are based on a drive speed of 1 (or 2.4) to 240 rpm. For the BVP Standard drive the indicated min. flow rates must be multiplied by factor 2.4. Approx. values: determined with water, at 22 °C, no differential pressure, and Tygon® tubing.

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# BVP/MCP Pump Heads

## Easy-Load®[1]

### 0.07–1,100 mL/min

- Easily accessible pump head
- Allows rapid tube change-over
- PSF housing (polysulfone)
- Rotor designed for tubing with 1.6 mm wall thickness
- Rotor with 3 stainless steel rollers
- 0.7 bar (10 psi) differential pressure[2]

**MF0313**

## Easy-Load II[1]

### 0.24–1,000 mL/min

*Same specifications as Easy-Load, but*

- Adjustable pressure setting
- Improved, automatic tubing retention
- PPS housing (polyphenylene sulfide)
- Rotor with 4 stainless steel rollers
- 0.7 bar (10 psi) differential pressure[2]

**MF0446**

*[1] Two pump heads can be mounted on one drive. (Special mounting sets must be ordered separately).*

*[2] Differential pressure depends on tubing material; tubing with small ID's may enable higher pressures.*

## FLOW RATES & TUBING

| Tygon® ST R-3603/R-3607 Part No. | Wall (mm) | Tubing ID (mm) | mL/min min. | mL/min max. |
|---|---|---|---|---|
| **MODEL 360** | | | | |
| MF0001 | 1.6 | 0.8 | 0.072 | 17 |
| MF0028 | 1.6 | 1.6 | 0.26 | 62 |
| MF0030 | 1.6 | 3.2 | 1.0 | 240 |
| SC0379 | 1.6 | 4.8 | 2.0 | 530 |
| **MODEL 380** | | | | |
| MF0028 | 1.6 | 1.6 | 0.44 | 100 |
| MF0030 | 1.6 | 3.2 | 1.7 | 400 |
| SC0379 | 1.6 | 4.8 | 3.6 | 860 |
| MF0031 | 1.6 | 6.4 | 6.0 | 1,400 |
| MF0032 | 1.6 | 8.0 | 8.8 | 2,100 |
| SC0383 | 1.6 | 9.5 | 12 | 2,800 |
| **MODEL 380AD** | | | | |
| MF0028 | 1.6 | 1.6 | 0.4 | 99 |
| MF0030 | 1.6 | 3.2 | 1.5 | 370 |
| SC0379 | 1.6 | 4.8 | 3.4 | 830 |
| MF0031 | 1.6 | 6.4 | 6.2 | 1,500 |
| MF0032 | 1.6 | 8.0 | 9.5 | 2,300 |
| SC0383 | 1.6 | 9.5 | 13.0 | 3,000 |
| SC0384 | 1.6 | 11.1 | 15.0 | 3,600 |
| MF0029 | 2.4 | 4.8 | 3.4 | 830 |
| MF0033 | 2.4 | 6.4 | 6.2 | 1,500 |
| **MODEL EASY-LOAD** | | | | |
| MF0001 | 1.6 | 0.8 | 0.066 | 16 |
| MF0028 | 1.6 | 1.6 | 0.25 | 59 |
| MF0030 | 1.6 | 3.2 | 0.91 | 220 |
| SC0379 | 1.6 | 4.8 | 1.9 | 450 |
| MF0031 | 1.6 | 6.4 | 3.1 | 730 |
| MF0032 | 1.6 | 8.0 | 4.7 | 1,100 |
| **MODEL EASY-LOAD II** | | | | |
| MF0028 | 1.6 | 1.6 | 0.24 | 58 |
| MF0030 | 1.6 | 3.2 | 0.92 | 220 |
| SC0379 | 1.6 | 4.8 | 1.9 | 460 |
| MF0031 | 1.6 | 6.4 | 3.0 | 730 |
| MF0032 | 1.6 | 8.0 | 4.2 | 1,000 |

## RELATED PRODUCTS


| | |
|---|---|
| **Accessories** | Page 109 |
| **Tubing** | Pages 75–89 |


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# Tubing Cassettes

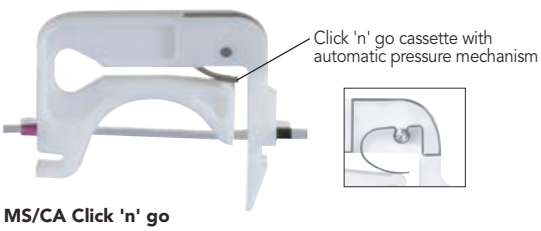
- Developed and consistently improved by Ismatec®

## Click 'n' go Cassettes (Standard)[1]

**Advantages:**

- Automatic tubing pressure; no readjustment necessary
- Ideal for non-monitored, long-time use

*Please Note: Click 'n' go cassettes are not suitable for differential pressure greater than 1 bar (15 psi). For these conditions you should choose the pressure lever cassettes.*

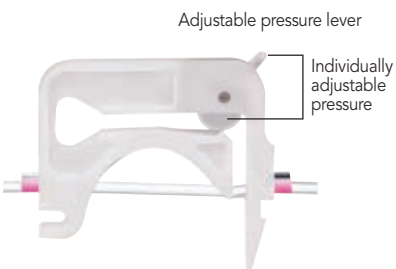



**MS/CA Click 'n' go**

**CA Click 'n' go**

## Pressure Lever Cassettes (Optional)

The optional pressure lever allows you to set a different tubing pressure for each channel. Depending on the application, tubing material and diameter, an optimally adjusted tubing pressure can be set. To maintain constant flow rates it may be necessary to periodically adjust the tubing pressure.




**MS/CA Pressure Lever (Optional)**

**CA Pressure Lever (Optional)**

# Foot Switch

The Ismatec foot switch for start/stop is very practical for use with pumps as dispensing systems, e.g. for filling tubes, bottles etc. A foot switch provides the start/stop signal required, allowing hands-free activation of the filling system. The switch's protection rating is IP21. A 6-foot (1.8 m) cable is included.

| Part No. | Model | Material | Adapters Required? | Qty. |
|---|---|---|---|---|
| **TUBING CASSETTES AND ADAPTERS** | | | | |
| **Click'n'go Spare Cassettes[1]** | | | | |
| **IS3510A** | MS/CA Click 'n' go | POM-C[4] | No | 1 |
| **IS3710A** | CA Click 'n' go | POM-C[4] | Yes[2] | 1 |
| **Pressure Lever Optional Cassettes** | | | | |
| **IS0649A** | MS/CA Pressure Lever | POM-C[4] | No | 1 |
| **IS3629A** | MS/CA Pressure Lever | PVDF[3,4] | No | 1 |
| **IS0122A** | CA Pressure Lever | POM-C[4] | Yes[2] | 1 |
| **IS3820A** | CA Pressure Lever | PVDF[3,4] | Yes[2] | 1 |
| **Replacement Adapters for CA Cassettes[2]** | | | | |
| **IS0123A** | Adapter for CA Cassettes | POM-C[4] | | 1 |
| **IS0123A-4** | Insert Adapter Packs | POM-C[4] | | 4-pk |
| **IS0123A-8** | Insert Adapter Packs | POM-C[4] | | 8-pk |
| **IS0123A-12** | Insert Adapter Packs | POM-C[4] | | 12-pk |
| **IS3861A** | Adapter for CA Cassettes | PVDF[3,4] | | |
| **FOOT SWITCH** | | | | |
| **Part No.** | **Foot switch suitable for pump models:** | | | |
| **ISM016** | IPC and IPC-N (firmware version older than 4.00) | | | |
| **IS10039** | IPC and IPC-N (from firmware version 4.00) | | | |
| **ISM891** | Reglo Analog, Reglo *Quick*™ | | | |
| **ISM894** | Reglo Digital | | | |

[1] *One set is included with all Ismatec cassette-style pumps.*
[2] *When ordering replacement CA Cassettes, two Adapters per cassette must also be ordered.*
[3] *PVDF offers higher chemical resistance.*
[4] *POM-C = Polyoxymethylene Copolymer, PVDF = Polyvinylidene Fluoride*

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# Gear Pumps

## Pulsefree Pumping

- Gear pumps allow differential pressures up to max. 5.6 bar (81 psi)

## Low Operation Costs

- Interchangeable, magnetically coupled pump heads
- Maintenance-free drives
- Only few wearing parts (gears, seals)
- Service kits allow the user to exchange worn parts
- High quality and precision for an optimum performance even after many years of intensive use

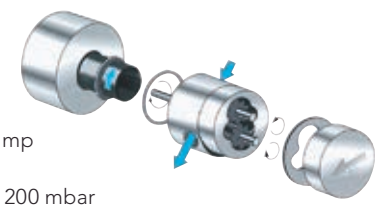
CLOCKWISE

Ismatec® gear pumps run only in the clockwise direction (Exception Reglo Z Digital).

CONTINUOUS DUTY

## Cavity Style

### Series GJ

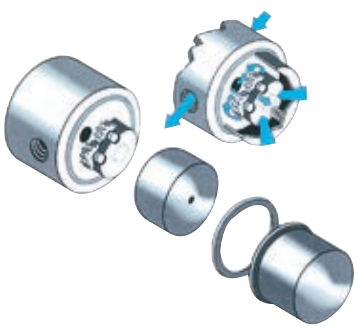


- Max. suction height with water and flooded pump head: 8 m, depending on pump head and tubing
- Pumping out of a vacuum of 200 mbar
- Based on the traditional gear pump technology
- For application with moderate differential pressure

In comparison to the Suction Shoe pump heads, the Cavity style pump heads can be used for viscous media and applications with a certain suction height.

## Suction Shoe Style

### Series GA and GB



- An exclusive Micropump® product featuring a patented technology
- Modified pump chamber compared to the conventional gear pump technique

This type of pump head design has a seal plate mounted with a deliberate play in the suction part of the pump chamber (hence the expression Suction Shoe). Discharge pressure keeps the Suction Shoe seated tightly on top of the gears which prevents flow from decreasing in high-pressure applications.

REVERSIBLE

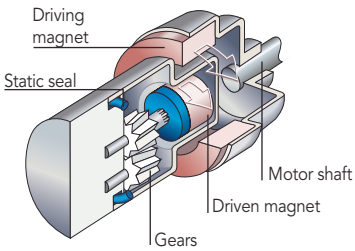
With Cavity Style pump head, rotation direction is reversible

CLOCKWISE

With Suction shoe pump head, run only in the clockwise direction

NOTE

## The Magnetically Coupled Drive Principle




Consists of two magnets, a driving magnet that attaches to the motor shaft and a driven magnet that is completely sealed within the pump head and is connected to the driving gear. The driven magnet is a non-wetted component and is totally encapsulated.

The two magnets couple automatically such that the driving magnet turns the driven magnet and gears without physical contact.

Decoupling occurs when the pump load exceeds the coupling torque between the two magnets. This feature can act as a safety device to prevent damage to the pump and motor as well as associated piping. The magnets can be recoupled by bringing the motor to a complete stop, eliminating the cause of the decoupling and restarting.

## Application Range of Gear Pumps

| Industries | Applications | Special Media |
|---|---|---|
| Biotechnological | Sampling | Biozides |
| Chemical | Refrigeration Technology | Dye Stuffs |
| Food | Water Treatment | Thixotropic Products |
| Mining | Liquid Chromatography | Liquid Waxes |
| Power | Surface Treatment | Hydrogen Peroxide |
| Pulp and Paper | Distillation Systems | Flux |
| Semiconductor | | Not suited for media containing particulates |
| Textile | | |

## Pump Head Material Options

| Enhance the chemical compatibility and application potential | | |
|---|---|---|
| **Base material** | Standard: | Stainless Steel 316 |
| | Options: | e.g., Hastelloy® B2,Hastelloy C-276, Alloy 20, and Titanium |
| **Gears** | Standard: | PPS, Graphite, PTFE (depends on pump head) |
| | Options: | e.g., PEEK, PPSKV |
| **Static seals** | Standard: | Viton®, PTFE (depends on pump head) |
| | Options: | EP, Buna N, Kalrez® |
| **Magnets** | Standard: | Ferrite |
| | Options: | e.g., SmCo, NdFeB |
| **Further pump head options** | | |
| Integral Drive | | |
| High System Pressure | | |
| Deck Ports | | |
| 1/4-18 NPT Ports | | |
| Tri-clamp Fittings | | |

*PTFE = Polytetrafluoroethylene, PPS = Polyphenylenesulphide, PEEK = Polyetheretherketone*

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| PUMP SERIES | | PUMP STYLE | FLOW RANGE* | GEAR MATERIALS | DRIVE OPTIONS | INTERFACE | PAGE |
|---|---|---|---|---|---|---|---|
| REGLO Z | | Suction Shoe | 1–466 mL/min | PEEK, PPS, Graphite | Digital and Analog | RS-232, Analog | **112** |
| | | Cavity Style | 33–3,290 mL/min | PEEK, PTFE, PPS | | | |
| REGLO ZS | | Suction Shoe | 1–466 mL/min | PEEK, PPS, Graphite | Digital and Analog | RS-232, Analog | **112** |
| | | Cavity Style | 33–3,290 mL/min | PEEK, PTFE, PPS | | | |
| BVP-Z | | Suction Shoe | 1–7,271 mL/min | PEEK, PPS, Graphite | Analog | Analog | **113** |
| | | Cavity Style | 40–5,480 mL/min | PEEK, PTFE, PPS | | | |
| MCP-Z STANDARD | | Suction Shoe | 1–7,271 mL/min | PEEK, PPS, Graphite | Digital and Analog | RS-232, Analog | **113** |
| | | Cavity Style | 40–5,480 mL/min | PEEK, PTFE, PPS | | | |
| MCP-Z PROCESS | | Suction Shoe | 1–7,271 mL/min | PEEK, PPS, Graphite | Digital and Analog | RS-232, Analog | **114** |
| | | Cavity Style | 40–5,480 mL/min | PEEK, PTFE, PPS | | | |

**Depending on pump head.*

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# Reglo Z, Reglo ZS

## Reglo Z Analog

### 1–3,290 mL/min

- Variable speed
- Differential pressure of pump drive max. 3.0 bar (43.5 psi)

ISM895E

## Reglo ZS Analog

### 1–3,290 mL/min

- Drive and pump head are separated by a 2 m long cable

ISM896B

## Reglo Z Digital

### 1–3,290 mL/min with dispensing functions

- Membrane key-pad
- LED display with setting menu
- Differential pressure of pump drive max. 3.0 bar (43.5 psi)

ISM901B

## Reglo ZS Digital

### 1–3,290 mL/min with dispensing functions

- Drive and pump head are separated by a 2 m long cable

ISM1143A

## SPECIFICATIONS & DETAILS

| | Reglo Z/ZS Analog | Reglo Z/ZS Digital |
|---|---|---|
| **Motor Type** | DC motor | DC motor |
| **Speed** | 50–5,000 rpm | 50–5,000 rpm |
| **Speed Setting** | 1–99%, resolution 1%<br>2-digit potentiometer | For flow setting (mL/min)<br>For dispensing volume (mL) |
| **Flow Rate Setting** | | mL/min, L/min |
| **Power Consumption** | 50 W | 75 W |
| **Mains Connection** | 230 V AC/50 Hz,115 V AC/60 Hz, selectable | 100–230 V AC/50–60 Hz |
| **Protection Rating** | IP 30 | IP 30 |
| **Depth/Width/Height** | | |
| **Drive Reglo Z** | 178 x 100 x 143 mm | 178 x 100 x 135 mm |
| **Drive Reglo ZS** | 175 x 65 x 80 mm | 175 x 65 x 80 mm |
| **External Control Unit** | 178 x 100 x 143 mm | 178 x 100 x 135 mm |
| **Weight** | | |
| **Drive Reglo Z** | 2.1 kg (without pump head) | 1.7 kg (without pump head) |
| **Drive Reglo ZS** | 0.7 kg (without pump head) | 0.7 kg (without pump head) |
| **External Control Unit** | 1.7 kg | 1.2 kg |

REVERSIBLE

With Cavity Style pump head, rotation direction is reversible

CLOCKWISE

With Suction shoe pump head, run only in the clockwise direction

## Interfaces

RPM ANALOG

### Reglo Z/ZS Analog

- Speed control (0–5 or 0–10 V, 0–20 or 4–20 mA)
- Speed output 0–10 KHz, start/stop
- Rotation direction

RS232

RPM ANALOG

### Reglo Z Digital

- RS-232 PC-controllable
- Speed output 0–12 KHz, start/stop and autostart

## RELATED PRODUCTS

| | |
|---|---|
| **Accessories** | Page 109 |
| **Tubing** | Pages 75–89 |

| Part No. | Description |
|---|---|
| REGLO Z AND REGLO ZS | |
| **ISM895E** | Reglo Z Analog |
| **ISM896B** | Reglo ZS Analog |
| **ISM901B** | Reglo Z Digital |
| **ISM1143A** | Reglo ZS Digital |
| **ISM891** | Footswitch |
| | Pump Head, page 115 |
| | 2 Nozzles, page 115 |

*LabVIEW™ drivers for Reglo Z Digital download for free: www.idex-hs.com/ismatec*
*Never use a gear pump for media containing particulates.*
*Max. differential pressure limited by pump drive, pump head capable of max. 5.2 bar (75 psi).*

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# BVP-Z *Standard*

## BVP-Z *Standard* without Dispensing Functions

- 3-digit potentiometer (for speed setting)
- Over 20 interchangeable Micropump® pump heads
- Flow rates and differential pressure depend on the pump head mounted

**BVP-Z *Standard***
with interchangeable gear pump heads (see page 115)
(material options, see page 110)

**ISM446B**

# MCP-Z *Standard*

## MCP-Z *Standard* with Dispensing Functions

- Membrane key-pad, LED display
- 4 program memories for saving individual application parameters
- Over 20 interchangeable Micropump pump heads (pre-programmed)
- Flow rates and differential pressure depend on the pump head mounted

**MCP-Z *Standard***
with interchangeable gear pump head (see page 115)
(material options, see page 110)

DISPENSING & CALIBRATING

**ISM405A**

## SPECIFICATIONS & DETAILS

| | BVP-Z *Standard* | MCP-Z *Standard* |
|---|---|---|
| **Motor Type** | DC motor | DC motor |
| **Speed** | 60–6,000 rpm | 60–6,000 rpm |
| **Speed Setting** | 1–99.9%, resolution 0.1% 3-digit potentiometer | rpm, resolution 1 rpm |
| **Flow Rate Setting** | | µL/min, mL/min, L/min |
| **Power Consumption** | 150 W | 150 W |
| **Mains Connection** | 230 V AC/50 Hz, 115 V AC/60 Hz selectable | 230 V AC/50 Hz, 115 V AC/60 Hz selectable |
| **Protection Rating** | IP 30 | IP 30 |
| **Depth/Width/Height** | 220 x 155 x 260 mm (without pump head) | 220 x 155 x 260 mm (without pump head) |
| **Weight** | 5.7 kg (without pump head) | 6.4 kg (without pump head) |

### Interfaces

**BVP-Z *Standard***

RPM ANALOG

- Speed control (0–5 or 0–10 V, 0–20 or 4–20 mA)
- Speed output (0–10 V DC or 0–12 kHZ)
- Start/stop

**MCP-Z *Standard***

RS232

RPM ANALOG

- PC-controllable
- RS-232
- Speed control (0–5 or 0–10 V, 0–20 or 4–20 mA)
- Speed output (0–10 V DC or 0–12 kHZ)
- Start/stop

## APPLICATION NOTE

### BVP-Z *Standard*

- Single-channel delivery processes under pressure for particulate-free fluids, e.g.: addition of reagents/solvents in organic synthesis at laboratory scale.
- Pumping propylene oxide into a laboratory reactor with a dispensing precision of +/–1% and a differential pressure of up to max. 3 bar.

### MCP-Z *Standard*

- Single-channel delivery and dispensing processes of particulate-free fluids under pressure.
- With pump heads GJ-N23 and GA-X21: Pulseless dispensing under pressure of different reagents with 2 pumps in different quantity ratios via a mixing valve into a reactor.

| Part No. | Includes |
|---|---|
| **THE COMPLETE PUMP SYSTEM BVP-Z *STANDARD* CONSISTS OF:** | |
| **ISM446B** | Drive (magnet included), page 113 |
| **Order the Following to Complete the BVP-Z Standard Pump System** | |
| | Pump head, page 115 |
| | 2 Nozzles, page 115 |
| | Accessories, page 109 |
| **ISM891** | Foot switch, page 109 |
| **THE COMPLETE PUMP SYSTEM MCP-Z *STANDARD* CONSISTS OF:** | |
| **ISM405A** | Drive (magnet included), page 113 |
| **Order the Following to Complete the MCP-Z Standard Pump System** | |
| | Pump head, page 115 |
| | 2 Nozzles, page 115 |

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# MCP-Z Process

## Programmable

- Programs can be entered on the spot independently of a PC
- Protection rating of IP 65
- Suitable for industries, extremely robust gear pump drive
- For pulseless pumping up to 5.2 bar (75 psi)
- Stainless steel housing
- Membrane key-pad with LED display
- 4 program memories for saving individual application parameters or PC programmed command sequences
- Pre-programmed pump heads
- Over 20 interchangeable Micropump® pump heads
- Flow rates and differential pressure depend on the pump head mounted

**ISM918A**
MCP-Z Process
with interchangeable gear pump heads
(material options, see page 110)

DISPENSING & CALIBRATING

## APPLICATION NOTE

- Single-channel delivery and dispensing processes under pressure, for particulate-free solutions.
- Addition of various reagents in different quantity ratios via mixing valve into reactor.
- Ideal for dispensing and filling applications in a dusty, humid or corrosive environment, and in clean room areas (IP 65, dust-tight and protected against water jets).

## SPECIFICATIONS & DETAILS

| | |
|---|---|
| **Motor Type** | DC motor |
| **Speed** | 60–6,000 rpm |
| **Speed Setting** | rpm, resolution 1 rpm |
| **Flow Rate Setting** | µL/min, mL/min, L/min |
| **Power Consumption** | 200 W |
| **Mains Connection** | 100–230 V AC/50–60 Hz, selectable |
| **Protection Rating** | IP 65 |
| **Depth/Width/Height** | 260 x 160 x 262 mm (without pump head) |
| **Weight** | 6.9 kg (without pump head) |

### Interfaces

RS232
- PC-controllable
- Speed control (0–5 or 0–10 V, 0–20 or 4–20 mA)

RPM ANALOG
- Speed output (0–10 V DC or 0–12 kHZ)

- Start/stop
- Autostart
- 2 universal inputs
- 2 universal outputs

## RELATED PRODUCTS

| | |
|---|---|
| **Accessories** | Page 109 |
| **Tubing** | Pages 75–89 |

| Part No. | Includes |
|---|---|
| THE COMPLETE PUMP SYSTEM MCP-Z *PROCESS* CONSISTS OF: | |
| **ISM918A** | MCP-Z Process Pump System |
| **Order the Following to Complete the MCP-Z Process Pump System** | |
| | Drive (magnet included), page 114 |
| | Pump head, page 115 |
| | 2 Nozzles, page 115 |
| | Accessories, page 109 |
| **IS10039** | Foot Switch, page 109 |
| *LabVIEW™ driver download for free: www.idex-hs.com/ismatec* | |

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# Ordering Information Pump Heads for BVP-Z/ MCP-Z/Reglo Z/Reglo ZS

## Suction Shoe Pump Heads

- Enhanced pumping performance at elevated differential pressures
- Suited for higher temperature ranges
- Not recommended for applications requiring suction lift

**Ismatec® gear pumps run only in the clockwise direction**
Never use a gear pump for media containing particulates

| SUCTION SHOE | Part No. | Pump Head No. | Flow rate (mL/min) min. | Flow rate (mL/min) max. | Differential pressure max. bar | Gear material | Seals | Stainless steel housing | System pressure, max. (bar) | Temperature range °C | Internal Bypass |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **MI0006** | GA-X21.CFS.B | 1 | 99 | 1.4 (20 psi) | Graphite | PTFE | SS316 | 21 | -46–+177 | – |
| | **MI0007** | GA-V21.CFS.B | 3 | 252 | 2.8 (40 psi) | Graphite | PTFE | SS316 | 21 | -46–+177 | – |
| | **MI0008** | GA-V23.CFS.B | 5 | 504 | 2.8 (40 psi) | Graphite | PTFE | SS316 | 21 | -46–+177 | – |
| | **MI0131** | GA-T23.PFS.B | 6 | 560 | 5.2 (75 psi) | PPS | PTFE | SS316 | 21 | -46–+177 | – |
| | **MI0280** | GA-V23.JFS.B | 6 | 560 | 5.2 (75 psi) | PEEK | PTFE | SS316 | 21 | -46–+177 | – |
| | **MI0022** | GB-P25.PVS.A.B | 35 | 3,509 | 3.5 (51 psi) | PPS | Viton® | SS316 | 21 | -29–+177 | ✓ |
| | **MI0306** | GB-P25.JVS.A | 35 | 3,480 | 3.5 (51 psi) | PEEK | Viton | SS316 | 21 | -29–+177 | – |
| | **MI0023** | GB-P35.PVS.A.B | 70 | 7,020 | 3.5 (51 psi) | PPS | Viton | SS316 | 21 | -29–+177 | ✓ |
| **Organic solvents** | **MI0378** | GB-P35.JKS.B | 73 | 7,241 | 3.5 (51 psi) | PEEK | Kalrez® | SS316 | 21 | -29–+177 | ✓ |
| **For corrosive media** | **MI0309** | GA-X21.CFC.B | 1 | 99 | 1.4 (20 psi) | Graphite | PTFE | Hastelloy®-C276 | 21 | -46–+177 | – |
| | **MI0310** | GA-V23.CFC.B | 5 | 504 | 2.8 (40 psi) | Graphite | PTFE | Hastelloy-C276 | 21 | -46–+177 | – |

*Ports (internal thread) 1/8"-27NPT.*
*Flow rates without differential pressure.*
*Operating temperature: with other seals up to 99 °C possible.*

## Cavity Style Pump Heads

- Excellent chemical resistance
- Smooth and precise flow
- Recommended for applications requiring a modest suction lift

| CAVITY STYLE | Part No. | Pump Head No. | Flow rate (mL/min) min. | Flow rate (mL/min) max. | Differential pressure max. bar | Gear material | Seals | Stainless steel housing | System pressure, max. (bar) | Temperature range °C | Internal Bypass |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **MI0013** | GJ-N23.FFS.B.B1 | 40 | 3,950 | 3.5 (51 psi) | PTFE | PTFE | SS316 | 21 | -46–+54 | ✓ |
| | **MI0016** | GJ-N23.FFS.B | 40 | 3,950 | 3.5 (51 psi) | PTFE | PTFE | SS316 | 21 | -46–+54 | – |
| | **MI0313** | GJ-N23.JFS.B | 40 | 3,950 | 5.6 (81 psi) | PEEK | PTFE | SS316 | 21 | -46–+54 | – |
| | **MI0018** | GJ-N25.FFS.B | 55 | 5,460 | 3.5 (51 psi) | PTFE | PTFE | SS316 | 21 | -46–+54 | – |
| | **MI0019** | GJ-N23.JFS.B.B1 | 40 | 3,950 | 5.2 (75 psi) | PPS | PTFE | SS316 | 21 | -46–+54 | ✓ |
| | **MI0020** | GJ-N23.JFS.B | 40 | 3,950 | 5.2 (75 psi) | PPS | PTFE | SS316 | 22 | -46–+54 | – |
| **For corrosive media** | **MI0284** | GJ-N23.FFC.B | 40 | 3,950 | 3.5 (51 psi) | PTFE | PTFE | Hastelloy-C276 | 21 | -46–+54 | – |
| | **MI0311** | GJ-N25.FFC.B | 55 | 5,480 | 3.5 (51 psi) | PTFE | PTFE | Hastelloy-C276 | 21 | -46–+54 | – |

*Ports (internal thread) 1/8"-27NPT.*
*Flow rates without differential pressure.*
*Operating temperature: with other seals up to 99 °C possible.*

**Service Kits Available for all Micropump® Gear Pumps**
Service Kits contain the wearing parts (brushings, seals, gears). For ordering information, contact your local distributor or IDEX Health & Science.

| Part No. | External Thread | Tubing Adaptor | Tubing ID mm |
|---|---|---|---|
| **TUBING ADAPTERS FOR GEAR PUMP HEADS** | | | |
| **Threaded stainless steel connectors** | | | |
| **AR0002** | 1/8" NPT | Tube nozzle | 3 |
| **AR0004** | 3/8" NPT | Tube nozzle | 12 |
| **AR0008** | 1/8" NPT | Tube nozzle | 8 |
| **AR0009** | 1/8" NPT | Tube nozzle | 9.5 |
| **AR0024** | 1/8" NPT | Pipe connection | 6 (outside) |
| **Threaded connectors in Hastelloy-C** | | | |
| **AR0001-HC** | 1/8" NPT | Tube nozzle | 6 |

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# Rotary Piston Pumps Introduction

## For Corrosive Media and Very Accurate Dispensing

The pump heads are available with ceramic pistons and ceramic cylinder liners, which makes these components very resistant even to highly aggressive chemicals.

## Inexpensive to Maintain

- Interchangeable pump heads
- No valves
- Only one moving part — the piston
- High quality and precision guarantee an optimum performance even after many years of intensive use

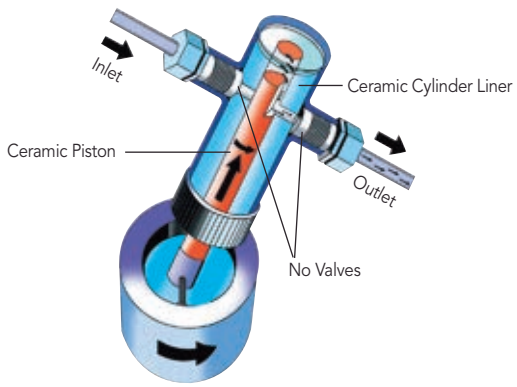
REVERSIBLE

CONTINUOUS DUTY

# Valveless Pumping

The valveless pumping function is accomplished by the synchronous rotation and reciprocation of the ceramic piston in the precisely mated ceramic cylinder liner. One complete piston revolution is required for each suction/discharge cycle.

The piston always bottoms for maximum fluid and bubble clearing. Together with the drive speed the stroke volume, which can be pre-set by the adjustment of the pump head angle, determines the actual flow rate.




## Only the Ismatec® Rotary Piston Pump MCP-CPF Process Features:

### Carrying out programs independently of a PC

- Download the file data into the pump memory
- Disconnect the pump from the PC
- Carry out your application on the spot, using the pump as a stand-alone unit

## APPLICATION NOTE

### Application Range of Piston Pumps

| Industries | Applications | Special Media |
|---|---|---|
| Biotechnology | Accurate dispensing e.g. into bioreactors | Biozides |
| Chemistry | Emulsion and slurry dosing | Dyes |
| Medical | Medical diagnostics production | Flux compound |
| Electronic | Milk and beverage enrichment | Hydrogen peroxide |
| Food and Diary | Plating bath replenishment | Liquid wax |
| Perfume/Cosmetics | Titration equipment | Thixotropic products |
| Rubber/Plastics | | |
| Glass/Ceramic | | Not suited for media containing particles larger than 0.8 mm |
| Pulp and Paper | | |

## RELATED PRODUCTS


| | |
|---|---|
| **Accessories** | Page 109 |
| **Tubing** | Pages 75–89 |


## NOTE

All microprocessor controlled drives are LabVIEW™ compatible and can easily be integrated into process control systems.

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| PUMP SERIES | | FLOW RANGE | PISTON MATERIAL | DRIVE OPTIONS | INTERFACE | PAGE |
|---|---|---|---|---|---|---|
| RH 00 | | 0.025–45 mL/min | 316 SST, Ceramic | Analog or Digital | RS-232 or Analog | **118** |
| RH 00 | | 0.045–45 mL/min | 316 SST, Ceramic | Digital | RS-232 and Analog | **118** |
| RH 0 | | 0.09–90 mL/min | Ceramic | Analog or Digital | RS-232 or Analog | **118** |
| RH 0 | | 0.05–90 mL/min | Ceramic | Digital | RS-232 and Analog | **118** |
| RH 1 | | 0.1–180 mL/min | Ceramic | Analog or Digital | RS-232 and Analog | **119** |
| RH 1 & Q-SERIES | | 0.18–180 mL/min | Ceramic | Digital | RS-232 or Analog | **120** |
| | | 0.4–144 mL/min | 316 SST | Digital | RS-232 or Analog | **122** |
| | | 0.13–576 mL/min | 316 SST, Ceramic | Digital | RS-232 or Analog | **121** |
| | | 0.29–1,300 mL/min | 316 SST, Ceramic | Digital | RS-232 or Analog | **121** |
| | | 0.51–2,300 mL/min | Ceramic | Digital | RS-232 or Analog | **121** |

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# RH Pump Heads

## Pump Head RH 00

### Stroke volumes 2.5–25 µL

Drives and flow rates:

- Reglo CPF Analog 0.045–45 mL/min
- Reglo CPF Digital 0.1–45 mL/min
- MCP-CPF *Process* 0.025–45 mL/min

| Part No. | FMI009 | FMI010A |
|---|---|---|
| TYPE | RH00.CKC-LF | RH00.SKY-LF |
| Piston | Ceramic | 316 Stainless Steel |
| Cylinder Case | Kynar® (Fluorocarbon {PVDF}) | Kynar (Fluorocarbon {PVDF}) |
| Cylinder Liner | Ceramic | Carbon |
| Lip Seals | Rulon® AR | Rulon J |
| Gland Washers | PTFE | PTFE |
| Max. Temperature | 100 °C | 60 °C |
| Max. Differential Pressure | 6.9 bar (100 psi) | 6.9 bar (100 psi) |
| Flow Ports | Kynar UNF 1/4"–28 (female) | Kynar UNF 1/4"–28 (female) |

**PTFE TUBING FOR PUMP HEADS MENTIONED ABOVE (MUST BE ORDERED SEPARATELY)**

**1.6 mm ID, 3.2 mm OD with 2 fittings UNF 1/4"–28 male**

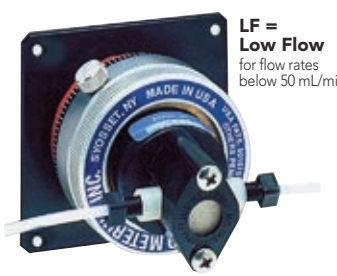
| Part No. | Length | Part No. | Length |
|---|---|---|---|
| IC0053 | 0.25 m | IC0061 | 0.75 m |

## Pump Head RH 0

### Stroke volumes 5–50 µL

Drives and flow rates:

- Reglo CPF Analog 0.09–90 mL/min
- Reglo CPF Digital 0.2–90 mL/min
- MCP-CPF *Process* 0.050–90 mL/min



**LF = Low Flow**
for flow rates below 50 mL/min

| Part No. | FMI005A | FMI013 |
|---|---|---|
| TYPE | RH0.CKC | RH0.CKC-LF |
| Piston | Ceramic | Ceramic |
| Cylinder Case | Kynar (Fluorocarbon {PVDF}) | Kynar (Fluorocarbon {PVDF}) |
| Cylinder Liner | Ceramic | Ceramic |
| Lip Seals | Rulon AR | Rulon AR |
| Gland Washers | PTFE | PTFE |
| Max. Temperature | 100 °C | 100 °C |
| Max. Differential Pressure | 6.9 bar (100 psi) | 6.9 bar (100 psi) |
| Flow Ports | 2 fixed tube fittings for PTFE tubing 6 mm OD | Kynar UNF 1/4"–28 (female) |

**TUBING (MUST BE ORDERED SEPARATELY)**

**PTFE tubing 4 mm ID, 6 mm OD**

| Part No. MF0336 |
|---|
| (For other tubing material; use tubing adapters, see page 123) |

**PTFE tubing 1.6 mm ID, 3.2 mm OD with 2 fittings UNF 1/4"–28 male**

| Part No. | Length |
|---|---|
| IC0053 | 0.25 m |
| IC0057 | 0.50 m |
| IC0061 | 0.75 m |
| IC0065A | 1.00 m |

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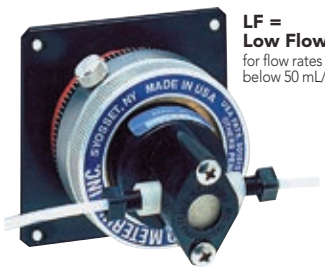
## Pump Head RH 1

### Stroke volumes 10–100 µL

Drives and flow rates:

- Reglo CPF Analog 0.18–180 mL/min
- Reglo CPF Digital 0.4–180 mL/min
- MCP-CPF Process 0.1–180 mL/min



**LF = Low Flow**
for flow rates below 50 mL/min

| Part No. | FMI007 | FMI015 | FMI008A |
|---|---|---|---|
| **TYPE** | **RH1.CKC** | **RH1.CKC-LF** | **RH1.CTC** |
| **Piston** | Ceramic | Ceramic | Ceramic |
| **Cylinder Case** | Kynar® (Fluorocarbon {PVDF}) | Kynar (Fluorocarbon {PVDF}) | ETFE |
| **Cylinder Liner** | Ceramic | Ceramic | Ceramic |
| **Lip Seals** | Rulon® AR | Rulon AR | Rulon AR |
| **Gland Washers** | PTFE | PTFE | PTFE |
| **Max. Temperature** | 100 °C | 100 °C | 100 °C |
| **Max. Differential Pressure** | 6.9 bar (100 psi) | 6.9 bar (100 psi) | 6.9 bar (100 psi) |
| **Flow Ports** | 2 fixed tube fittings for PTFE tubing 6 mm OD | Kynar UNF 1/4"–28 (female) | 2 fixed tube fittings for PTFE tubing 6 mm OD |

**TUBING (MUST BE ORDERED SEPARATELY)**

| PTFE tubing 4 mm ID, 6 mm OD | PTFE tubing 1.6 mm ID, 3.2 mm OD with 2 fittings UNF 1/4"–28 male | | PTFE tubing 4 mm ID, 6 mm OD |
|---|---|---|---|
| **Part No. SC1016B0** | **Part No.** | **Length** | **Part No. SC1016B0** |
| (For other tubing material; use tubing adapters, see page 123) | **IC0053** | 0.25 m | (For other tubing material; use tubing adapters, see page 123) |
| | **IC0057** | 0.50 m | |
| | **IC0061** | 0.75 m | |
| | **IC0065A** | 1.00 m | |

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# Reglo CPF Analog

REVERSIBLE

**Reglo CPF Analog**
without dispensing functions
0.045–180 mL/min
Variable speed

**Reglo CPF Analog**
**ISM1014B**
with piston pump head RH 00.CKC-LF

Overview of piston pump heads on pages 118 to 119

# Reglo CPF Digital

REVERSIBLE

**Reglo CPF Digital**
with dispensing functions
0.1–180 mL/min
Microprocessor controlled

DISPENSING & CALIBRATING

**Reglo CPF Digital**
**ISM321C**
with piston pump head RH 00.CKC-LF

## Dispensing Pumps — Ideal for Corrosive Media

- Easy to calibrate
- High repeatability
- Differential pressure up to 6.9 bar (100 psi)
- 10 cm wide, 13.5 cm high
- Wide selection of ceramic piston pumps

**Reglo CPF Analog**
2-digit potentiometer
1–99%, resolution 1% (for speed)

**Reglo CPF Digital**
6-button membrane key-pad, LED display
Flow rate setting in µL/min and mL/min

## SPECIFICATIONS & DETAILS

| | Reglo CPF Analog | Reglo CPF Digital |
|---|---|---|
| **Motor Type** | DC motor | DC motor |
| **Speed** | 18–1,800 rpm | 40–1,800 rpm |
| **Speed Setting** | 1–99%, resolution 1%<br>2-digit potentiometer | rpm, resolution 0.1 rpm |
| **Flow Rate Setting** | | µL/min and mL/min |
| **Power Consumption** | 50 W | 75 W |
| **Mains Connection** | 230 V AC/50 Hz,<br>115 V AC/60 Hz, selectable | 100–230 V AC/50–60 Hz,<br>selectable |
| **Protection Rating** | IP 30 | IP 30 |
| **Depth/Width/Height** | 250 x 100 x 143 mm | 250 x 100 x 135 mm |
| **Weight** | 2.5 kg | 2.1 kg |

### Interfaces

RPM
ANALOG

**Reglo CPF Analog**

- Speed control (0–5 or 0–10 V, 0–20 or 4–20 mA)
- Speed output 0–9 kHz
- Start/stop
- Rotation direction

RS232

**Reglo CPF Digital**

- RS-232
- Speed output 0–9 kHz, Start/stop, autostart

## APPLICATION NOTE

- Highly reproducible, single-channel dispensing processes of organic solvents or acids/bases.
- Dispensing of hydrogen fluoride and other highly corrosive acids with an X-Y-Z dispenser.
- Remotely controlling the pump in hazardous environments.

## RELATED PRODUCTS

| | |
|---|---|
| **Accessories** | Page 109 |
| **Tubing** | Pages 75–89 |

| Part No. (Drive Only) | Model (Drive Only) | Flow rates | Channels | Speed |
|---|---|---|---|---|
| **REGLO CPF** | | | | |
| **ISM1014B** | Reglo CPF Analog | 0.045–180 | 1 | 18–1,800 |
| **ISM321C** | Reglo CPF Digital | 0.1–180 | 1 | 40–1,800 |
| **FOOT SWITCH** | | | | |
| **ISM891** | Reglo CPF Analog, page 109 | | | |
| **ISM894** | Reglo CPF Digital, page 109 | | | |
| **THE COMPLETE PUMP SYSTEM REGLO CPF CONSISTS OF:** | | | | |
| Select Drive, page 120 | | | | |
| Select Piston pump head, pages 118–119 | | | | |

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# MCP-CPF *Process*

DISPENSING & CALIBRATING

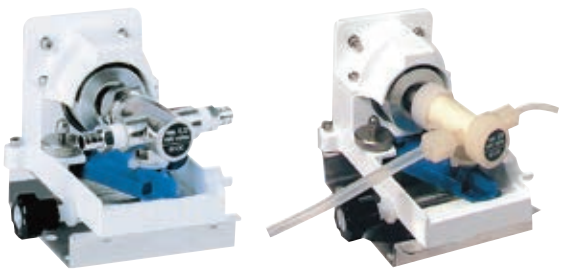
REVERSIBLE

Rotation direction reversible

**MCP-CPF *Process***
**ISM919A**
with rotary piston pump head QP Q0.SSY-LF

**'RH' pump heads (description see pages 118 to 119)**

| Type | Flow rates mL/min | Stroke volumes µL |
|---|---|---|
| RH 00 | 0.025–45 | 2.5–25 |
| RH 0 | 0.050–90 | 5.0–50 |
| RH 1 | 0.10–180 | 10.0–100 |



**'Q' pump heads (description see pages 122 to 123)**

| Type | Flow rates mL/min | Stroke volumes µL |
|---|---|---|
| QP Q0 | 0.04–144 | 3.2–80 |
| QP Q1 | 0.13–576 | 12.8–320 |
| QP Q2 | 0.29–1,300 | 28.8–720 |
| QP Q3 | 0.51–2,300 | 51.2–1,280 |

## SPECIFICATIONS & DETAILS

| | |
|---|---|
| **Motor Type** | DC motor |
| **Speed** | 10.0–1,800 rpm |
| **Speed Setting** | rpm, resolution 0.1 rpm |
| **Flow Rate Setting** | µL/min, mL/min, L/min |
| **Power Consumption** | 100 W |
| **Mains Connection** | 100–230 V AC/50–60 Hz |
| **Protection Rating** | IP 65 |
| **Depth/Width/Height** | 220 x 155 x 260 mm (without pump head) |
| **Weight** | 6.9 kg (without pump head) |

### Interfaces

RS232

- PC-controllable
- RS-232

RPM ANALOG

- Speed control (0–5 or 0–10 V, 0–20 or 4–20 mA)
- Speed output (0–10 V DC or 0–7.2 kHZ)
- Start/stop
- Rotation direction
- Autostart
- 2 universal inputs
- 2 universal outputs

## APPLICATION NOTE

- Single-channel sterile delivery and dispensing processes under pressure for particulate-free solvents.
- Addition of various reagents in different volume ratios through mixing valve into reactor.

## RELATED PRODUCTS

| | |
|---|---|
| **Accessories** | Page 109 |
| **Tubing** | Pages 75–89 |

| Part No. | Description |
|---|---|
| **THE COMPLETE PUMP SYSTEM MCP-CPF *PROCESS* CONSISTS OF:** | |
| **ISM919A** | MCP-CPF Process Pump System |
| **Order the Following to Complete the MCP-CPF Process Pump System** | |
| | Drive, page 121 |
| | Pump head and tubing, pages 122–123 |
| **IS10039** | Foot switch, page 109 |
| *LabVIEW™ driver download for free: www.idex-hs.com/ismatec* | |

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# Q-Type Pump Heads

## Pump Head Q0 and Q3

- Q0 = stroke vol. 3.2–80 µL
- Q3 = stroke vol. 51.2–1,280 µL
- Q0 = flow rate 0.04–144 mL/min
- Q3 = flow rate 0.51–2,300 mL/min

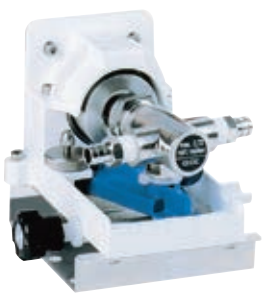
| Part No. | FMI202 | FMI217 |
|---|---|---|
| TYPE QP | Q0.SSY | Q3.CKC |
| Piston | 316 Stainless Steel | Ceramic |
| Cylinder Case | 316 Stainless Steel | Kynar (Fluorocarbon {PVDF}) |
| Cylinder Liner | Carbon | Ceramic |
| Lip Seals | Rulon® J | Rulon AR |
| Gland Washers | PTFE | PTFE |
| Cylinder Head Seal | PTFE | None |
| Max. Temperature | 60 °C | 100 °C |
| Max. Differential Pressure | 6.9 bar | 1.7 bar (to 1,600 rpm) 0.5 bar (from 1,600 rpm) |
| Flow Ports | 1/4 NPT (female) Includes: 2 stainless steel adapters with thread 1/4 NPT (male) and fitting for tubing with 6.4 mm ID | For tubing up to 12.7 mm ID or PTFE tubing 6 mm OD Includes: 2 Kynar (PVDF) adapters for tubing with 6 mm OD |

**TUBING (MUST BE ORDERED SEPARATELY)**

| Part No. | Tubing ID | Part No. | Tubing ID |
|---|---|---|---|
| Tygon® ST R-3603 | | Tygon ST R-3603 | |
| MF0031 | 6.4 mm | SC0382 | 12.7 mm |
| Accessories | | PTFE Tubing | |
| FMI056A | Low Flow Kit R 479 (see below) | MF0336 | 4 mm/6 mm, 3.6 m long |

## Pump Heads Q1 and Q2

- Q1 = stroke vol. 12.8–320 µL
- Q2 = stroke vol. 28.8–720 µL
- Q1 = flow rates 0.13–576 mL/min
- Q2 = flow rates 0.29–1,300 mL/min



| Part No. | FMI205 | FMI212 | FMI352 |
|---|---|---|---|
| TYPE QP | Q1.CSC | Q2.CSC | Q1.CKC |
| Piston | Ceramic | | Ceramic |
| Cylinder Case | 316 Stainless Steel | | Kynar®2 |
| Cylinder Liner | Ceramic | | Ceramic |
| Lip Seals | Rulon AR | | Rulon AR |
| Gland Washers | PTFE | | PTFE |
| Cylinder Head Seal | PTFE | | none |
| Max. Temperature | 177 °C | | 100 °C |
| Max. Differential Pressure | 6.9 bar (100 psi) | | 4.1 bar (60 psi) |
| Main Flow Ports | 1/4 NPT (female) Includes: 2 stainless steel adapters with thread 1/4 NPT (male) and fitting for tubing with 9.5 mm ID | | For tubing up to 9.5 mm ID |

**TUBING (MUST BE ORDERED SEPARATELY)**

| Part No. | Tubing ID |
|---|---|
| Tygon ST R-3603 | |
| SC0383A | 9.5 mm |
| Accessories | |
| FMI056A | Low Flow Kit R 479 |

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## Other Materials for Wetted Parts for:

**Pump Heads Q1 and Q2 (see table below)**

- Q1 = stroke vol. 12.8–320 µL
- Q2 = stroke vol. 28.8–720 µL
- Q1 = flow rates 0.13–576 mL/min
- Q2 = flow rates 0.29–1,300 mL/min

| Part No. | FMI355 | FMI356 | FMI357 | FMI358 | FMI353 | FMI359 | FMI360 | FMI361 | FMI362 | FMI363 | FMI364 | FMI365 | FMI366 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| QP TYPE PUMP HEADS | Q2.CKC | Q1.CKC-W | Q2.CKC-W | Q1.CKY | Q2.CKY | Q1.CSY | Q2.CSY | Q1.SKY | Q2.SKY | Q1.SSY | Q2.SSY | Q1.SAN[1] | Q2.SAN[1] |
| **Piston** | Ceramic | Ceramic | | Ceramic | | Ceramic | | 316 Stainless Steel | | 316 Stainless Steel | | Ceramic | |
| **Cylinder Case** | Kynar®[2] | Kynar[2] | | Kynar[2] | | 316 Stainless Steel | | Kynar[2] | | 316 Stainless Steel | | 316 Stainless Steel | |
| **Cylinder Liner** | Ceramic | Ceramic | | Carbon | | Carbon | | Carbon | | Carbon | | 316 Stainless Steel | |
| **Lip Seals** | Rulon® AR | Rulon AR | | Rulon AR | | Rulon AR | | Rulon J | | Rulon J | | PTFE | |
| **Gland Washers** | PTFE | PTFE | | PTFE | | PTFE | | PTFE | | PTFE | | PTFE | |
| **Cylinder Head Seal** | None | None | | None | | PTFE | | None | | PTFE | | PTFE | |
| **Max. Temperature** | 100 °C | 100 °C | | 100 °C | | 177 °C | | 60 °C | | 60 °C | | 177 °C | |
| **Max. Diff. Pressure** | 4.1 bar (60 psi) | 4.1 bar (60 psi) | | 4.1 bar (60 psi) | | 6.9 bar (100 psi) | | 4.1 bar (60 psi) | | 6.9 bar (100 psi) | | 6.9 bar (100 psi) | |
| **Main Flow Ports** | For tubing up to 9.5 mm ID | For tubing up to 9.5 mm ID With isolation gland Fittings for tubing with 3.2 mm ID | | For tubing up to 9.5 mm ID | | 1/4 NPT (female) | | For tubing up to 9.5 mm ID | | 1/4 NPT (female) | | PTFE tubing adaptor | |

*[1] Designed for sanitary applications.*
*[2] Kynar = Fluorocarbon (PVDF).*

## Low Flow Kit R 479

**Part No. FMI056**

Suitable for the following pump heads:

- QP Q0.SSY
- QP Q1.SSY
- QP Q2.CSY
- QP Q1.CSC
- QP Q2.CSC
- QP Q2.SSY
- QP Q1.CSY

This Low Flow adaptor Kit enables the use of the above mentioned pump heads for flow rates below 50 mL/min or in case that a minimum dead volume or a maximum of chemical compatibility are required. The adaptor features a 1/4-28 inner thread. These threads are used with low flow tube fittings for small bore tubing of 3.2 mm OD or less. Hence, this Low Flow Kit is also very useful for chromatography applications.

| Part No. | Length |
|---|---|
| PTFE TUBING FOR LOW FLOW KIT R 479 | |
| **1.6 mm ID/3.2 mm OD, with 2 fittings 1/4-28 (male)** | |
| **IC0053** | 0.25 m long |
| **IC0057** | 0.50 m long |
| **IC0061** | 0.75 m long |
| **IC0065A** | 1.00 m long |

## Tubing Adapters for Pump Heads with a Kynar Cylinder Case:

- Q0.SKY
- Q1.CKC
- Q1.CKY
- Q1.SKY
- Q2.CKC
- Q2.CKY
- Q2.SKY
- Q3.CKC

In addition to the tubing mentioned above, these adapters enable the use of other tubing.

| Part No. | Description | |
|---|---|---|
| TUBING ADAPTERS | | |
| **FMI050** | R412-0K | For tubing with 3.2 mm ID |
| **FMI051** | R412-1K | For tubing with 6.4 mm ID |
| **FMI052** | R412-2K | For tubing with 9.5 mm ID |
| **FMI053** | R412-5K | For tubing with 1/4–28 ferrule fittings |
| **FMI054** | H476K | For tubing with 3.2 mm OD |

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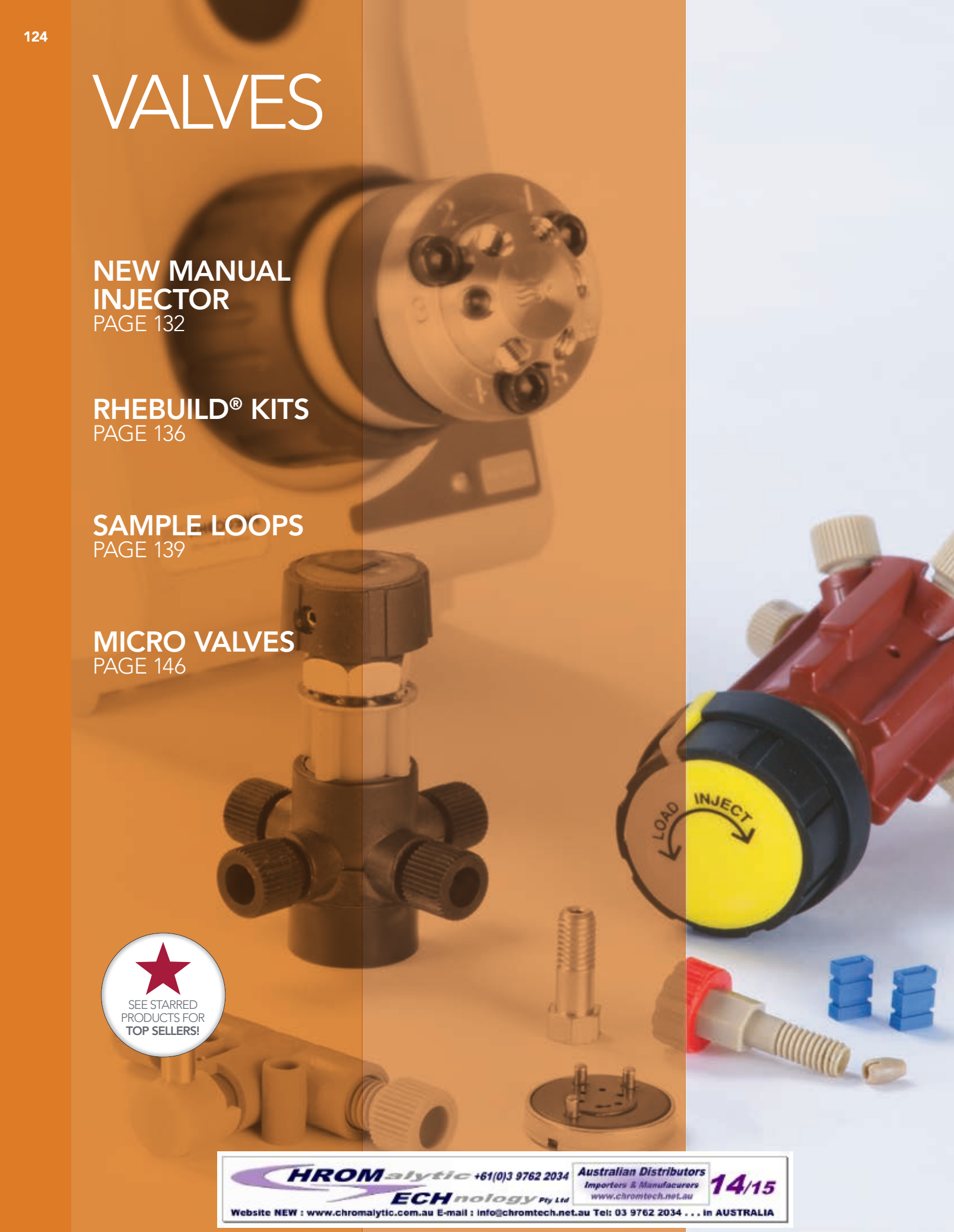
# VALVES


**NEW MANUAL INJECTOR**
PAGE 132

**RHEBUILD® KITS**
PAGE 136

**SAMPLE LOOPS**
PAGE 139

**MICRO VALVES**
PAGE 146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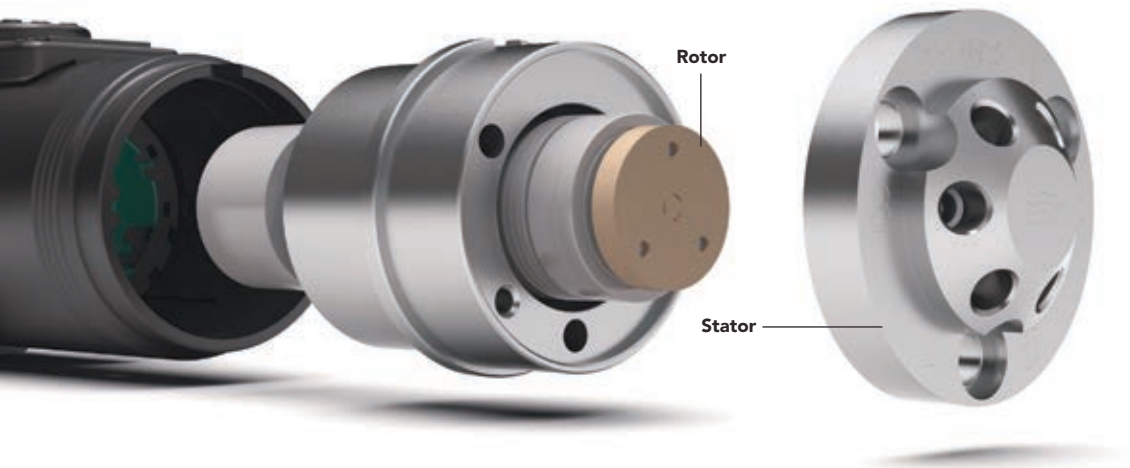
# Rotary Shear Valves

Rheodyne® Rotary Shear Valves were developed in tandem with the evolution of liquid chromatography, where combinations of elevated system pressures, aggressive chemicals, and ever-diminishing fluid volumes continually challenged system manufacturers who required highly precise fluid control and delivery. Today, many other disciplines utilize Rotary Shear Valves for their versatility, reliability, repeatability, long system uptime, and easy preventive maintenance.




# Valve Overview

| Valve Module | Flow Configurations | Page |
|---|---|---|
| **ACTUATED VALVES** | | |
| **UP TO 15,000 PSI** | | |
| **Switching** | • 2-Position, 6-Port<br>• 2-Position, 10-Port | 130 |
| **Injection** | • For Injection, add the appropriately sized Sample Loop to the Switching valves above | 130 |
| **Selection** | • 6-Position, 7-Port | 130 |
| **UP TO 6,000 PSI** | | |
| **Switching** | • 2-Position, 6-Port (Analytical and Nano Scale)<br>• 2-Position, 10-Port (Analytical and Nano Scale) | 130 |
| **Injection** | • For Injection, add the appropriately sized Sample Loop to the Switching valves above<br>• 2-Position, 6-Port (vertical port) | 130 |
| **Selection** | • 6-Position, 7-Port | 130 |
| **UP TO 125 PSI** | | |
| **Switching** | • 2-Position, 6-Port<br>• 2-Position, 6-Port (Double 3-Way) | 130 |
| **Selection** | • 6-Position, 7-Port<br>• 10-Position, 11-Port | 130 |

| Valve Module | Flow Configurations | Page |
|---|---|---|
| **MANUAL VALVES** | | |
| **UP TO 15,000 PSI** | | |
| NEW! **Injection** | • 2-Position, 6-Port (Front-Loading, 9,000 psi) | 132 |
| **UP TO 6,000 PSI** | | |
| **Switching** | • 2-Position, 6-Port (Analytical and Micro Scale) | 132 |
| **Injection** | • 2-Position, 6-Port | 132 |
| **Selection** | • 6-Position, 7-Port | |
| **UP TO 1,000 PSI** | | |
| **Switching** | • 2-Way, Right Angle 4-Position, 4-Port<br>• 3-Way, T-Shape 4-Position, 4-Port<br>• 4-Way, Diagonal Flow 4-Position, 4 Port | 133 |
| **Injection** | • 2-Position, 6-Port | 133 |
| **Selection** | • 6-Position, 7-Port | 133 |

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# Choosing a Rotary Shear Valve

Evaluating some simple variables will assist you in choosing the best valve for your needs.

## Identify the Operating Pressure of Your Instrument or Application

Valves are designed to repeatedly deliver specific fluids to different locations in a fluidic circuit. Achieving fluidic precision at 15,000 psi requires different valve-design features than what's required to achieve fluidic precision at 100 psi. A wide variety of variables such as valve architectures, metals, polymers, coatings, actuation speeds, and manufacturing techniques have been tested to achieve the fluidic accuracy and precision required for the full array of pressure conditions in life science applications. In this catalog, we define four separate pressure groupings:

| | |
|---|---|
| **Up to 15,000 psi (1,035 bar)** | UHPLC/Fast Chromatography |
| **Up to 6,000 psi (410 bar)** | HPLC |
| **Up to 1,000 psi (69 bar)** | Upchurch Scientific® |
| **Up to 125 psi (8.5 bar)** | Low Pressure/Atmospheric Pressure |

## Identify the Range of Flow Rates in Your System

Because Rotary Shear Valves have been used most often in chromatography systems, certain flow rate ranges have evolved functionally. However, these ranges can apply to any system, not just chromatography:

- Micro/Nano Scale — flow rates less than 100 µL per minute
- Analytical Scale — flow rates from 100 µL to 10 mL per minute
- Prep (or Semi-Prep) Scale — flow rates greater than 10 mL per minute

## Decide What You Want the Valve to Do

In this chapter Rotary Shear Valves perform three functions:

- Switching one or more flow paths to a different destination under pressure
- Injection into a flowing stream under pressure
- Selection/distribution of a variety of system liquids by means of a common port
- Read more about valve functions on pages 128–129

## Identify Whether You Want Automated or Manual Control

An automated valve offers more sophisticated functionality. Choose an automated valve if the application requires fast, consistent flow-stream switching. Some other advantages of automated valves include control options (PC- or instrument-triggered), higher torque operation, valve-position feedback, or very small flow paths.

Choose a manual valve if your application involves low frequency of use, demands operator control, or involves injection of smaller sample volumes. (See page 129 for more on Single Mode vs. Dual Mode operation.)

## Identify the Chemical Compatibility Requirements Related to Your Fluids

Consulting the chemical compatibility chart in the Technical Resources section at the back of The IDEX Health & Science Laboratory Products catalog helps identify what valve materials to use—and avoid—in your application. You can also find Chemical Compatibility information at www.idex-hs.com under Materials and Tools.

## Identify Fluidic Connection Requirements in Your System

The rotary shear valves in this catalog accommodate one or more of the following tubing outer diameters: 1/8", 1/16", or 1/32".

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# Effects of Valves and Tubing on Resolution

The effect of tubing on analytical and microscale analyses can be significant. Since dispersion caused by tubing is proportional to the fourth power of diameter, large bore tubing should be avoided when performing analytical scale or microscale analyses. Tubing ID size ≤ 0.25 mm (0.010") is recommended.

Consider a system with injection and column switching valves and analytical columns with small-bore connecting tubing. The chromatograms below, made using a typical analytical chromatograph, show these effects. Scheme A is the control (injection valve ➔ column ➔ detector) with no valve in the system. In Schemes B and C, two model 7060 Six-Position Switching Valves were placed side by side (injection valve ➔ valve #1 ➔ column ➔ valve #2 ➔ detector).

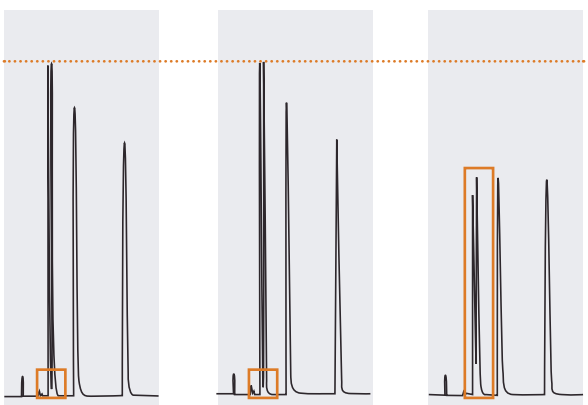
The injection valve and detector were connected to these valves by the same tubing used in the control. The extra tubing pieces required to connect the valves to the column were a 10 cm length for valve #1-to-column, and a 35 cm length for column-to-valve #2. The diameters of these tubes are indicated in the experimental details, below.

## Comparison of Observed Column Plates of Rheodyne® Analytical and MicroScale Injection Valves

| | 7725 | 8125 | Δ |
|---|---|---|---|
| **k' = 0.6** | 2930 | 5054 | 72% |
| **k' = 1.5** | 4653 | 6904 | 48% |
| **k' = 7.9** | 7875 | 8305 | 5.0% |

*UV detector: 1 µL volume, 4 mm path. Sample volume: 2 µL, partial-filling method. Column: 2 mm ID x 100 mm long, 4 µm C-18. True plates of column = 11,570.*

## Effects of Valves and Tubing on Resolution



**A** Column Only

**B** Valve w/ 0.007" Tubing

**C** Valve w/ 0.020" Tubing

Conclusion: These sequential chromatograms show the effect of adding volume to the flow path through the addition of components.

(A) Establishes a baseline quality of separation with the minimum volume of liquid in the flow path.

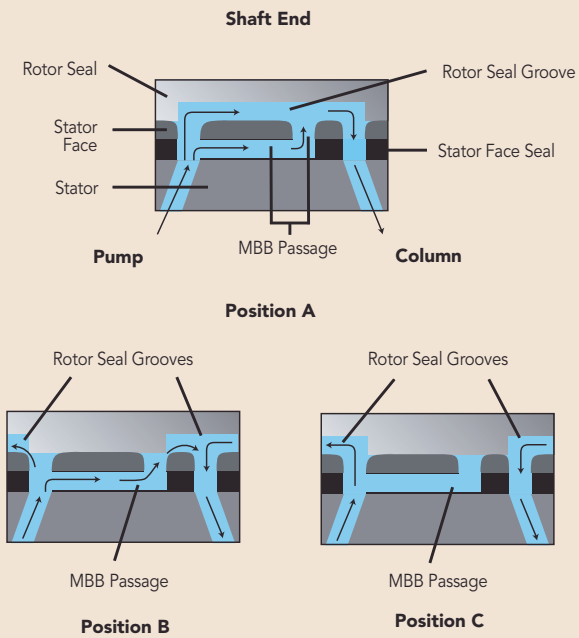
(B) Adding a valve plus smaller-ID tubing, and thereby increasing the liquid volume only marginally, barely affects the separation. However in

(C) Adding a valve plus larger-ID tubing, thereby increasing the liquid volume in the flow path to a greater degree, distinctly impairs the quality of the separation and the detectable sample.

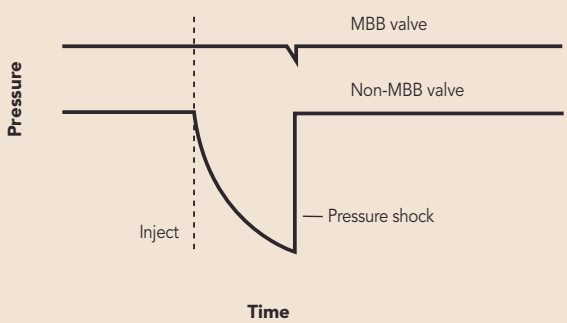
# What is Make-Before-Break™, and When Does it Matter?

Make-Before-Break is a unique design feature of certain dual-mode manual injection valves.

**Flow paths of model 7725(i) and 9725(i) with MBB design**




To maintain a constant, desired high-pressure flow, Rheodyne's Make-Before-Break (MBB®) design creates continuous flow between the LOAD and INJECT positions that virtually eliminates pressure transient shock to the system. A passage in the stator face makes a new connection before old connections break. The MBB design — an improvement over bypass-style injectors — does not dilute the sample and is easy to maintain and troubleshoot.

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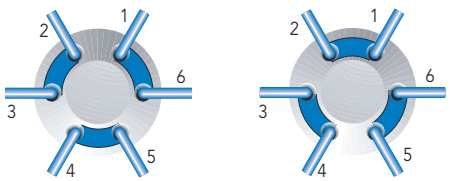
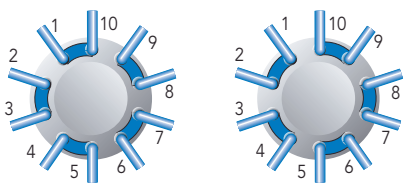
## Switching Valves

Switching valves dynamically alternate between two fluid paths without manually disconnecting plumbing. In Chromatography, these valves can be used for column switching, backflushing, sample enrichment, and other techniques. In Diagnostic or Sequencing applications, the switching valve may alternate flow paths to enable back flushing or other fluidic tasks within the instrument.




**Flow path of Two-Position, Six-Port Switching Valve**

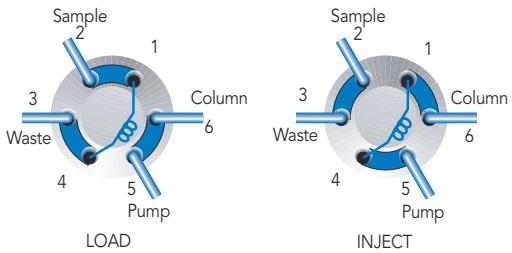



**Flow path of Two-Position, Ten-Port Switching Valve**

Rheodyne® switching valves operate between two positions, and may have 6 or 10 ports on the face of the stator (2/6 or 2/10). The flow paths connect ports around the circumference of the stator. The Upchurch Scientific® manual switching valves (to 1,000 psi) described on page 133 have different flow path geometry as noted.

## Injection Valves

Rheodyne injection valves are a form of switching valve. Injection valves can be automated or manual, and they are generally utilized in the two-position, six-port (2/6) configuration and have a sample loop attached.




**Flow path of Two-Position, Six-Port Injection Valve**

The purpose of an Injection valve is to introduce a sample of a solution into a flowing stream of liquid. Some Switching valves become Injection valves by the addition of a Sample Loop (a defined length of tubing and fittings configured to match the angle of the valve ports). Sample is loaded and held in the loop until injection is triggered, either manually or mechanically.

Rheodyne injection valves are classified as either Single or Dual Mode, and either Front or Rear-loading, based on how the Sample Loop can be filled. A Single Mode Injection valve requires complete filling of the sample loop and is configured for Rear loading, generally in an auto-sample configuration. A Dual Mode Injection valve allows either partial or complete filling of the loop, and introduces sample by syringe through the needle port built into the valve shaft. Complete filling of the sample loop in both the Dual and Single Mode Injection valves provides greater repeatability injection to injection. (See the Application Note, page 129 for greater detail on partial vs. complete loop filling.)

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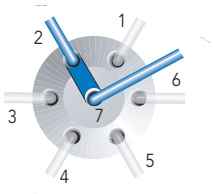
# Selection Valves

Selection valves enable discrete connections among multiple system liquids (mobile phase, reagents, buffers) by means of a common port (inlet or outlet) connected to a number of different reciprocal ports. In Diagnostic or Sequencing applications, the selection valve alternates between different reagents or sample streams. Selection valves also enable fractionation for multiple sample analyses.

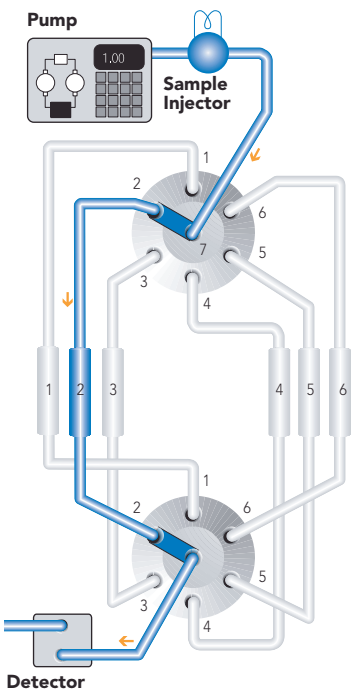



**Flow path of Six-Position, Seven-Port Selector Valve**

Numerous configurations exist among selection valves (e.g., 6-position 7-port, or 10-position 11-port), but these valves always operate between more than two positions. The ports are usually spaced radially, or outward in some manner around the center port of the stator.

## APPLICATION NOTE

Six column selection using two selection valves.




## APPLICATION NOTE

### Dual Mode Sample Loop Loading: Partial-Filling vs. Complete-Filling

**Partial-Filling**

Use the partial-filling method if you need to conserve sample, or if you want to vary sample volume frequently.

In partial-filling, the syringe sets the volume injected onto the column. There is no sample waste, and the volume injected onto the column is equal to that dispensed from the syringe. Reproducibility is 1.0% relative standard deviation (RSD). The volume of the sample loaded is limited to half the sample loop volume. For example, the most you can load into a 200 µL sample loop is 100 µL.

**Complete-Filling**

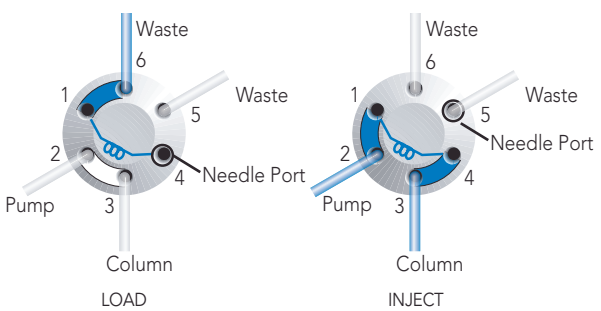
Use the complete-filling method if you have plenty of sample, if you do not vary sample volume, or if you need high reproducibility.

In complete-filling, the loop sets the volume loaded onto the column. Use excess sample (two to five loop volumes) to replace all the mobile phase in the loop. See Figure 2. Change the loop to vary the sample volume. Reproducibility is typically 0.1% RSD for loop sizes ≥ 5 µL. Accuracy is limited as loop volumes are nominal.

**Q:** "Which method should I use and which Rheodyne® sample injection valves use this method?"

**A:** There are two types of injection valves available: dual mode and single mode. Dual mode injection valves allow both partial- and complete-filling whereas single mode injection valves allow only complete-filling. See manual injection valves, page 132.

If you are collecting experimental data, sample is scarce, and/or you want to use different sample volumes, a dual mode injector with a large volume sample loop is appropriate. Only dual mode injection valves allow the partial-filling method for easily varying your volumes (up to half your sample loop volume) by setting the syringe volume. Once you begin routine analysis, and/or you have an abundance of sample, either a dual mode or single mode injector is appropriate. Both types of injection valves allow the complete-filling method in which you overfill the sample loop. Complete-filling maximizes the reproducibility of your results.




**Flow path for the typical dual mode injector**

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# Actuated Valves

An automated valve offers more sophisticated functionality. Choose an automated valve if the application requires fast, consistent flow-stream switching. Some other advantages of automated valves include control options (PC- or instrument-triggered), higher torque operation, valve-position feedback, or very small flow paths.

## Actuated Valves up to 15,000 psi

| Part No. | Description | Ports, Connections | Wetted Material | Rapid Replacement Pod |
|---|---|---|---|---|
| UP TO 15,000 PSI (1,035 BAR) | | | | |
| **SWITCHING** | | | | |
| **MXT715-000** | 2-Position, 6-Port | 10-32 Ports for 1/16" OD Tubing | UltraLife | PD715-000 |
| **MXT715-102** | 2-Position, 10-Port | 10-32 Ports for 1/16" OD Tubing | UltraLife | PD715-102 |
| **INJECTION** | **For Injection, add the appropriately sized Sample Loop to the Switching valves above** | | | |
| **SELECTION** | | | | |
| **MXT715-105** | 6-Position, 7-Port | 10-32 Ports for 1/16" OD Tubing | UltraLife | PD715-105 |

*All of these MXX valves include a set of 1/16" and 1/8" ferrules. Replacement Fittings for MXX valves can be located on page 144.*

## Actuated Valves up to 6,000 psi

| Part No. | Description | Ports, Connections | Wetted Material | Rapid Replacement Pod |
|---|---|---|---|---|
| UP TO 6,000 PSI (410 BAR) | | | | |
| **SWITCHING** | | | | |
| **MXP7900-000** | 2-Position, 6-Port | 10-32 Ports for 1/16" OD Tubing | DuraLife®* | PD7900 |
| **MXP7960-000** | 2-Position, 10-Port | 10-32 Ports for 1/16" OD Tubing | DuraLife | PD7960 |
| **MXP7980-000** | 2-Position, 6-Port, Nano, 5,000 psi (345 bar) | M4 Ports for 1/32" OD Tubing | DuraLife II | PD7980 |
| **MXP7986-000** | 2-Position, 10-Port, Nano, 5,000 psi (345 bar) | M4 Ports for 1/32" OD Tubing | DuraLife II | PD7986 |
| **MXP9900-000** | 2-Position, 6-Port, Biocompatible, 5,000 psi (345 bar) | 10-32 Ports for 1/16" OD Tubing | PEEK | PD9900 |
| **MXP9960-000** | 2-Position, 10-Port, Biocompatible, 5,000 psi (345 bar) | 10-32 Ports for 1/16" OD Tubing | PEEK | PD9960 |
| **INJECTION** | **For Injection, add the appropriately sized Sample Loop to the Switching valves above** | | | |
| **MXP7920-000** | 2-Position, 6-Port, Vertical Port | 10-32 Ports for 1/16" OD Tubing | DuraLife | PD7920 |
| **SELECTION** | | | | |
| **MXP7970-000** | 6-Position, 7-Port | 10-32 Ports for 1/16" OD Tubing | DuraLife II** | PD7970 |

** DuraLife is a proprietary material combination of SST and an advanced polymer.*
*** DuraLife II is a proprietary material combination consisting of Titanium and an advanced polymer.*
*All of these MXX valves include a set of 1/16" and 1/8" ferrules. Replacement Fittings for MXX valves can be located on page 144.*

## Actuated Valves to 125 psi

| Part No. | Description | Ports, Connections | Wetted Material | Ferrule Size |
|---|---|---|---|---|
| UP TO 125 PSI (8.5 BAR) | | | | |
| **SWITCHING** | | | | |
| **MXX777-601** | 2-Position, 6-Port | Accepts Either 1/16" or 1/8" Tubing | RPC-7* | 1/16" and 1/8" |
| **MXX777-603** | 2-Position, Double Three Way | Accepts Either 1/16" or 1/8" Tubing | RPC-7 | 1/16" and 1/8" |
| **MXX777-612** | 2-Position, 6-Port, Large Bore | Accepts Either 1/16" or 1/8" Tubing | RPC-7 | 1/16" and 1/8" |
| **SELECTION** | | | | |
| **MXX777-605** | 6-Position, 7-Port | Accepts Either 1/16" or 1/8" Tubing | RPC-7 | 1/16" and 1/8" |
| **MXX777-616** | 6-Position, 7-Port, Large Bore | Accepts Either 1/16" or 1/8" Tubing | RPC-7 | 1/16" and 1/8" |
| **MXX778-605** | 10-Position, 11-Port | Accepts Either 1/16" or 1/8" Tubing | RPC-7 | 1/16" and 1/8" |

** RPC-7 Proprietary Polymer Combination.*
*All of these MXX valves include a set of 1/16" and 1/8" ferrules. Replacement Fittings for MXX valves can be located on page 144.*

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# MX Series II

## Actuated Valves

- **MXT** to 15,000 psi (1,035 bar)
- **MXP** to 6,000 psi (410) bar)
- **MXX** to 125 psi (8.5 bar)

Add Rheodyne® MX Series II™ actuated valves to your existing instrument or use in stand-alone lab configurations. MX valves can be controlled remotely or operated manually using the push-button front panel with LED position indicator. MX valves connect to your instrument or PC through contact closure, BCD, serial port, or USB. Commands can be sent to the MX valves using your chromatography software or the included proprietary software for timed-events programmability.

Available flow rates include options for Analytical, Micro/Nano, or Semi-Prep in a range of pressure capabilities. Valve liquid ends are available in materials chosen to be chemically inert and biocompatible. Routine maintenance using authorized RheBuild® kits (page 136) or — for the higher-pressure MXP and MXP valves — the Rapid Replacement Pods™ (page 135) assures optimal performance.

**MXX**
Up to 125 psi
(9 bar)

**MXT**
Up to 15,000 psi
(1,034 bar)

**MXP**
Up to 6,000 psi
(414 bar)

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# Manual Valves

Choose a manual valve if your application involves low frequency of use, demands operator control, or involves injection of smaller sample volumes.

NEW!

**7725i-188**
Manual Injection Valve
Up to 9,000 psi (600 bar)

**7060**
Manual Switching Valve
Up to 7,000 psi (483 bar)

## SPECIFICATIONS & DETAILS

| Part No. | Stator Passage Diameter | Factory Set Pressure | Maximum Field Set Pressure | Maximum Temperature (°C) |
|---|---|---|---|---|
| 3000, 3030 (PEEK) | 1.0 mm (0.040") | 3,000 psi (207 bar) | 4,000 psi (276 bar) | 50° |
| 3000-038 (SST) | 1.0 mm (0.040") | 4,000 psi (276 bar) | 5,000 psi (340 bar) | 50° |
| 7000, 7010 (SST) | 0.6 mm (0.024") | 5,000 psi (340 bar) | 7,000 psi (483 bar) | 150° |
| 7000L (SST) | 1.0 mm (0.040") | 3,000 psi (207 bar) | 5,000 psi (340 bar) | 150° |
| 7030 (SST) | 0.6 mm (0.024") | 5,000 psi (340 bar) | 7,000 psi (483 bar) | 150° |
| 7030L (SST) | 1.0 mm (0.040") | 3,000 psi (207 bar) | 5,000 psi (340 bar) | 150° |
| 7060 (SST) | 0.4 mm (0.016") | 5,000 psi (340 bar) | 7,000 psi (483 bar) | 80° |
| 7060L (SST) | 1.0 mm (0.040") | 3,000 psi (207 bar) | 5,000 psi (340 bar) | 80° |

*SST = Stainless Steel*

### Manual Valves up to 15,000 psi

| | Part No. | Description | Tubing/Fitting Size | Wetted Material | Configuration |
|---|---|---|---|---|---|
| | **UP TO 15,000 PSI (1,035 BAR)** | | | | |
| | **INJECTION** | | | | |
| NEW! | **7725i-188** | 2-Position, 6-Port, 9,000 psi (600 bar) | 10-32 Ports for 1/16" OD Tubing | Stainless Steel, PEEK, Ceramic | Front loading |

### Manual Valves up to 6,000 psi

| | Part No. | Description | Tubing/Fitting Size | Wetted Material | Configuration |
|---|---|---|---|---|---|
| | **UP TO 6,000 PSI (410 BAR)** | | | | |
| | **SWITCHING** | | | | |
| | **3000** | 2-Position, 6-Port, Prep Scale | 5/16-24 Ports for 1/8" Tubing | PEEK | — |
| | **3000-038** | 2-Position, 6-Port, Prep Scale | 5/16-24 Ports for 1/8" Tubing | Stainless Steel & PEEK | — |
| | **3030** | 2-Position, 6-Port, Prep Scale | 5/16-24 Ports for 1/8" OD Tubing | PEEK | Double 3-Way |
| | **7000** | 2-Position, 6-Port, Large Bore | 10-32 Ports for 1/16" OD Tubing | Stainless Steel & Vespel® | — |
| | **7000L** | 2-Position, 6-Port, Large Bore | 10-32 Ports for 1/16" OD Tubing | Stainless Steel & Vespel | — |
| | **7030** | 2-Position, 6-Port | 10-32 Ports for 1/16" OD Tubing | Stainless Steel & Vespel | Double 3-Way |
| | **7030L** | 2-Position, 6-Port, Large Bore | 10-32 Ports for 1/16" OD Tubing | Stainless Steel & Vespel | Double 3-Way |
| | **INJECTION*** | | | | |
| | **Part No.** | **Description** | **Tubing/Fitting Size** | **Wetted Material** | **Sample Loop Volume** |
| | **7010** | 2-Position, 6-Port Single Mode | 10-32 Ports for 1/16" OD Tubing | Stainless Steel & Vespel | 20 µL* |
| | **9010** | 2-Position, 6-Port Single Mode (Switching, Injection) | 10-32 Ports for 1/16" OD Tubing | PEEK, ETFE, Ceramic | 20 µL* |
| | **3725-038** | 2-Position, 6-Port, Prep Scale Dual Mode | 5/16-24 Ports for 1/8" Tubing | Stainless Steel & PEEK | 10 mL* |
| | **3725i** | 2-Position, 6-Port, Prep Scale Dual Mode with Switch | 5/16-24 Ports for 1/8" Tubing | PEEK | 10 mL* |
| | **3725i-038** | 2-Position, 6-Port, Prep Scale Dual Mode with Switch | 5/16-24 Ports for 1/8" Tubing | Stainless Steel & PEEK | 10 mL* |
| ★ | **7725** | 2-Position, 6-Port, Analytical Scale Dual Mode | 10-32 Ports for 1/16" OD Tubing | Stainless Steel, Ceramic, Vespel | 20 µL* |
| ★ | **7725i** | 2-Position, 6-Port, Analytical Scale Dual Mode with Switch | 10-32 Ports for 1/16" OD Tubing | Stainless Steel, Ceramic, Vespel | 20 µL* |
| | **8125**** | 2-Position, 6-Port, Micro Scale Dual Mode with Switch | 10-32 Ports for 0.020" (0.5 mm) or 1/16" Tubing | Stainless Steel, Ceramic, Vespel | 5 µL* |
| | **9725** | 2-Position, 6-Port, Analytical Scale Dual Mode | 10-32 Ports for 1/16" OD Tubing | PEEK, ETFE, Ceramic | 20 µL* |
| ★ | **9725i** | 2-Position, 6-Port, Analytical Scale Dual Mode with Switch | 10-32 Ports for 1/16" OD Tubing | PEEK, ETFE, Ceramic | 20 µL* |
| | **SELECTION** | | | | |
| | **7060** | 6-Position, 7-Port | 10-32 Ports for 1/16" OD Tubing | Stainless Steel & Vespel | 6-Way |
| | **7060L** | 6-Position, 7-Port, Large Bore | 10-32 Ports for 1/16" OD Tubing | Stainless Steel & Vespel | 6-Way |

** Ships with a sample loop attached to ports 1 and 4.*
*** The 8125 requires special ferrules for 0.020" (0.5 mm) tubing. 8125-084–0.5 mm ferrule for 8125; 8125-086–0.5 mm ferrule for 8125 — 4-pk.*

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# SPECIFICATIONS & DETAILS

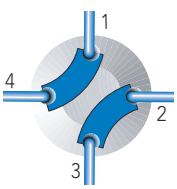
## Characteristics of Rheodyne® Manual Sample Injection Valves

| Type & Capabilities | Scale | Partial Filling Volumes (Range) | Sample Loop Sizes (Range) | Wetted Materials | Max. psi (bar)[1] | Max. T (°C) | MBB[2] | Model[3] |
|---|---|---|---|---|---|---|---|---|
| Dual Mode<br>Can load the loop by two methods:<br>1) Partial filling–syringe determines volume without wasting sample<br>2) Complete filling–loop determines volume by over filling loop | Analytical | 1 µL–2.5 mL<br>1 µL–5.0 mL | 2 µL–5.0 mL<br>2 µL–10 mL | 316 SST, Vespel®<br>PEEK, ETFE, ceramic | 7,000 (483)<br>5,000 (340) | 80°<br>50° | Yes<br>Yes | 7725, 7725i<br>9725, 9725i |
| | Micro | 0.1 µL–500 µL | 5 µL–1.0 mL | 316 SST, PEEK, Vespel, ceramic | 7,000 (483) | 80° | No | 8125 |
| | Preparative | 100 µL–10 mL | 2.0 mL–20 mL | 316 SST, PEEK<br>PEEK | 5,000 (340)<br>4,000 (276) | 50°<br>50° | Yes<br>Yes | 3725(i)-038,<br>3725i |
| Single Mode<br>Can load the loop by one method:<br>Complete filling — loop determines volume by over filling loop | Analytical | Not Applicable | 5 µL–5.0 mL<br>5 µL–10 mL | 316 SST, Vespel<br>PEEK, ETFE, Ceramic | 7,000 (483)<br>5,000 (340) | 150°<br>50° | No<br>No | 7010<br>9010 |

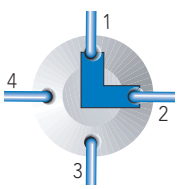
*SST = Stainless Steel*
*[1] This is the maximum pressure to which the valve can be adjusted. Some models are shipped from the factory set for lower pressures.*
*[2] MBB (Make-Before-Break™) is a design that provides uninterrupted flow when switching between LOAD and INJECT. MBB also greatly reduces transient pressure shocks.*
*[3] Models with an "i" suffix have a built-in position sensing switch. Models 8125 and 9010 also have a built-in switch.*

# NOTE

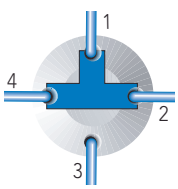
## Upchurch Scientific® Switching Valve Options




4-Way Diagonal Flow Switching Valves
(V-100D, V-101D)

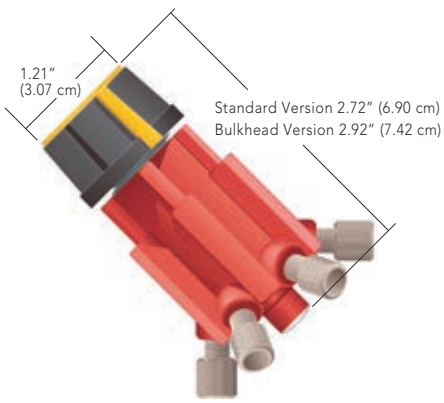



Right Angle Flow Switching Valves
(V-100L, V-101L)




3-Way Flow Switching Valves
(V-100T, V-101T)

**V-101L**
Manual Switching Valve
Up to 1,000 psi (69 bar)




**V-540**
Manual Injection Valve
Up to 1,000 psi (69 bar)

## Manual Valves up to 1,000 psi

| | Part No. | Description | Tubing/Fitting Size | Wetted Material | Configuration | Includes |
|---|---|---|---|---|---|---|
| | **UP TO 1,000 PSI (69 BAR) UPCHURCH SCIENTIFIC** | | | | | |
| | **SWITCHING** | | | | | |
| | **V-100D** | 4-Position, 4-Port, 500 psi (34 bar) | 1/4-28 Ports for 1/16" OD Tubing | PEEK, PTFE | Double Diagonal | * |
| ★ | **V-101D** | 4-Position, 4-Port, Bulkhead, 500 psi (34 bar) | 1/4-28 Ports for 1/16" OD Tubing | PEEK, PTFE | Double Diagonal | * |
| ★ | **V-100L** | 4-Position, 4-Port, 500 psi (34 bar) | 1/4-28 Ports for 1/16" OD Tubing | PEEK, PTFE | Right-Angle "L" | ** |
| ★ | **V-101L** | 4-Position, 4-Port, Bulkhead, 500 psi (34 bar) | 1/4-28 Ports for 1/16" OD Tubing | PEEK, PTFE | Right-Angle "L" | ** |
| | **V-100T** | 4-Position, 4-Port, 500 psi (34 bar) | 1/4-28 Ports for 1/16" OD Tubing | PEEK, PTFE | Single "T" | *** |
| | **V-101T** | 4-Position, 4-Port, Bulkhead, 500 psi (34 bar) | 1/4-28 Ports for 1/16" OD Tubing | PEEK, PTFE | Single "T" | *** |
| | **INJECTION** | **For Injection, add the appropriately sized Sample Loop to the Switching valves above** | | | | |
| | **V-450** | 2-Position, 6-Port, 1,000 psi (69 bar) | 1/4-28 Ports for 1/16" OD Tubing | Polyimide, PTFE | Injection | (6) XP-235 |
| ★ | **V-451** | 2-Position, 6-Port, Bulkhead Version, 1,000 psi (69 bar) | 1/4-28 Ports for 1/16" OD Tubing | Polyimide, PTFE | Injection | (6) XP-235 |
| | **V-540** | 2-Position, 6-Port, 1,000 psi (69 bar) | 1/4-28 Ports for 1/8" OD Tubing | Polyimide, PTFE | Injection | (6) XP-335 |
| ★ | **V-541** | 2-Position, 6-Port, Bulkhead Version, 1,000 psi (69 bar) | 1/4-28 Ports for 1/8" OD Tubing | Polyimide, PTFE | Injection | (6) XP-335 |
| | **SELECTION** | | | | | |
| | **V-240** | 6-Position, 7-Port, 1,000 psi (69 bar) | 1/4-28 Ports for 1/16" OD Tubing | Polyimide, PTFE | Multi-port Selection | (6) XP-235 |
| ★ | **V-241** | 6-Position, 7-Port, Bulkhead Version, 1,000 psi (69 bar) | 1/4-28 Ports for 1/16" OD Tubing | Polyimide, PTFE | Multi-port Selection | (6) XP-235 |
| | **V-340** | 6-Position, 7-Port, 1,000 psi (69 bar) | 1/4-28 Ports for 1/8" OD Tubing | Polyimide, PTFE | Multi-port Selection | (6) XP-335 |
| ★ | **V-341** | 6-Position, 7-Port, Bulkhead Version, 1,000 psi (69 bar) | 1/4-28 Ports for 1/8" OD Tubing | Polyimide, PTFE | Multi-port Selection | (6) XP-335 |

** (4) P-218BLK, (4) P-240.*
*** (4) P-218BLK, (4) P-240, (1) P-309.*
**** (4) P-218BLK, (4) P-240, (1) P-309.*

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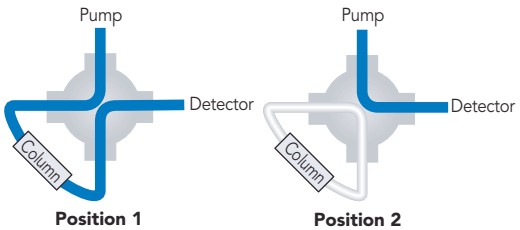
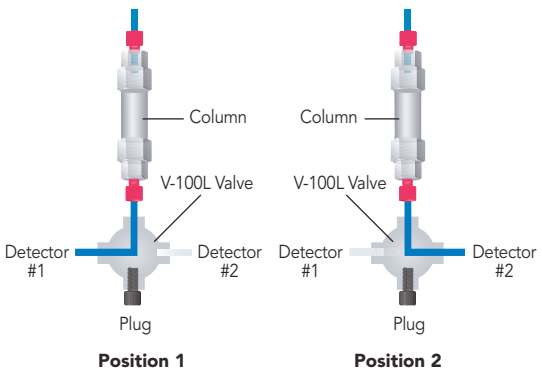
## APPLICATION NOTE

### Upchurch Scientific® Switching Valve Applications

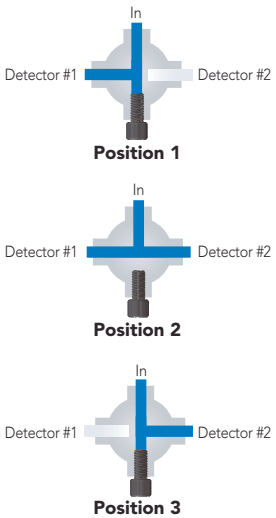
Protect sensitive system components (such as a column) during a cleaning cycle with our Diagonal Flow Switching Valve ("D"). This valve eliminates the need to remove, plug and reconnect a low pressure column (see below).




- A typical application for a Right Angle Flow Switching Valve ("L") is column switching, allowing two columns to use one detector. Detector switching is another common application for this valve (see below). Plug off the extra port with the included plug.




- Your detector switching application may require the flexibility of routing the column effluent to both detectors simultaneously while retaining the ability to isolate each detector. Use our 3-Way Flow Switching Valve ("T"), plugging off the fourth port with the included plug (see right).

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# Rapid Replacement Pods™

## For Rheodyne® Valves

- Zero downtime maintenance
- Improves lab throughput

To help keep your instrument online and performing at maximum precision, select the exact Rapid Replacement Pod for your higher pressure MX Series II valves. Replacement pods are easily exchanged as part of scheduled preventive maintenance, or in an emergency, a pod can be substituted quickly while the original is examined and cleaned at your convenience. The pod kit contains complete instructions for removal and replacement.

| Part No. | Description | For Valve Part No. |
|---|---|---|
| **TO 15,000 PSI (1,035 BAR)** | | |
| **SWITCHING** | | |
| **PD715-000** | Rapid Replacement Pod | MXT715-000 |
| **PD715-102** | Rapid Replacement Pod | MXT715-102 |
| **SELECTION** | | |
| **PD715-105** | Rapid Replacement Pod | MXT715-105 |
| **UP TO 6,000 PSI (410 BAR)** | | |
| **SWITCHING** | | |
| **PD7900** | Rapid Replacement Pod | MXP7900-000 |
| **PD7960** | Rapid Replacement Pod | MXP7960-000 |
| **PD7980** | Rapid Replacement Pod | MXP7980-000 |
| **PD7986** | Rapid Replacement Pod | MXP7986-000 |
| **PD9900** | Rapid Replacement Pod | MXP9900-000 |
| **PD9960** | Rapid Replacement Pod | MXP9960-000 |
| **INJECTION** | | |
| **PD7920** | Rapid Replacement Pod | MXP7920-000 |
| **SELECTION** | | |
| **PD7970** | Rapid Replacement Pod | MXP7970-000 |

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# RheBuild® Kits

RheBuild Kits are available for all Rheodyne® brand products. Included in each individualized RheBuild Kit are all parts, tools, and instructions to maintain precision performance of your particular product. RheBuild Kits eliminate individual part ordering.

## APPLICATION NOTE

### How to Avoid Pressure Transients

Air in the sample loop can cause an instantaneous system pressure drop that eventually returns to a normal level. Air causes the pressure to drop when the injector moves from the LOAD to the INJECT position. When large sample loops (≥ 100 µL) are partially loaded, air present in the needle port tube is pushed into the sample loop (see Figure 1). Air can also enter the sample loop from siphoning which occurs when the vent line is higher than the injection port. In either case, upon injection, the system pressure collapses the air bubble, causing pressure to drop momentarily.

A pressure drop in the system caused by air results in changes in retention time, artifact peaks, and affects column performance.

Avoid pressure drops by removing the air in the needle port tube. Do this by flushing about 1 mL of mobile phase with a luer syringe with needle port cleaner. Keep the needle port tube filled with mobile phase by occasional flushing. Adjust the vent line(s) so the outlet is at the same horizontal level as the needle port (see Figure 2). For additional injection troubleshooting, refer to the Rheodyne Troubleshooting Guide for HPLC Injection Problems. You may download the Guide from the IDEX Health & Science web site: www.idex-hs.com under Support.

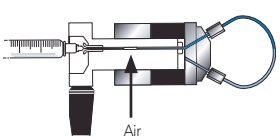


**Figure 1** Air present in the needle port tube is pushed by the syringe during loading into the sample loop

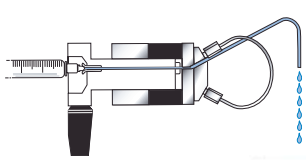

**Figure 2** Pathway of the flushing mobile phase using the Needle Port Cleaner, Part # 7125-054 (see page 143) when the injector is in INJECT

| Part No. | Description |
|---|---|
| **RHEBUILD KITS FOR MX SERIES II™ VALVES** | |
| **7150-999** | RheBuild Kit for MXT715-000 (includes 2 rotor seals) |
| **7152-999** | RheBuild Kit for MXT715-102 (includes 2 rotor seals) |
| **7155-999** | RheBuild Kit for MXT715-105 (includes 2 rotor seals) |
| **7920-999** | RheBuild Kit for MXP7920-000 and MXP7900-000 |
| **7960-999** | RheBuild Kit for MXP9960-000 (includes rotor seal and stator face seal) |
| **7961-999** | RheBuild Kit for MXP7960-000 |
| **7970-999** | RheBuild Kit for MXP7970-000 |
| **79801-999** | RheBuild Kit for MXP7980-000 |
| **79861-999** | RheBuild Kit for MXP7986-000 |
| **7900-999** | RheBuild Kit for MXP9900-000 (includes rotor seal and stator face seal) |
| **RHEBUILD KITS FOR MANUAL VALVES** | |
| **3725-999** | RheBuild Kit for models 3725, 3725i, 3725-038, 3735i-038 |
| **7010-996** | Conversion Kit including Stator Face Assembly for model 7010 |
| **7010-997** | RheBuild Kit including Stator for model 7010 |
| **7010-998** | RheBuild Kit, pH Upgrade Kit for model 7000 |
| **7010-999** | RheBuild Kit for model 7010 and 7010-type Valves |
| **7125-999** | RheBuild Kit for models 7125 and 7126 |
| **7125Ti-999** | RheBuild Kit for model 7125-081 |
| **7410-999** | RheBuild Kit for model 7410 |
| **7520-999** | RheBuild Kit for models 7520 and 7526 (includes inlet stator and seal) |
| **7725-999** | RheBuild Kit for models 7725 and 7725i |
| **7788-999** | RheBuild Kit for model 7725i-188 |
| **8125-999** | RheBuild Kit for models 8125 and 8126 |
| **9010-999** | RheBuild Kit for model 9010 |
| **9125-999** | RheBuild Kit for models 9125 and 9126 |
| **9725-999** | RheBuild Kit for models 9725 and 9725i; 7725(i) pH upgrade kit |
| **RHEBUILD KITS FOR MX SERIES I™ VALVES** | |
| **7900-999** | RheBuild Kit for models MX7900-000, MX7925-000, MX9900-000, MX9925-000 |
| **7960-999** | RheBuild Kit for model MX7960-000 |
| **7980-999** | RheBuild Kit for model MX7980-000 |
| **7984-999** | RheBuild Kit for model MX7984-000 |
| **7986-999** | RheBuild Kit for model MX7986-000 |
| **RHEBUILD KITS FOR LABPRO™ & EV AUTOMATED FLUIDIC INSTRUMENTS** | |
| **1006-999** | RheBuild Kit for model PR/EV100-106 |
| **5001-999** | RheBuild Kit for models PR/EV500-101 and PR/EV550-101 |
| **5100-999** | RheBuild Kit for models PR/EV500-100 and PR/EV550-100 |
| **5104-999** | RheBuild Kit for models PR/EV500-104 and PR/EV550-104 |
| **7004-999** | RheBuild Kit for models PR/EV700-104 and PR/EV750-104 |
| **7112-999** | RheBuild Kit for models PR/EV700-112 and PR/EV750-112 |
| **7501-999** | RheBuild Kit for models PR/EV700-100 and PR/EV750-100 |
| **7502-999** | RheBuild Kit for models PR/EV700-102 and PR/EV750-102 |
| **7507-999** | RheBuild Kit for models PR/EV700-107 and PR/EV750-107 |
| **7531-999** | RheBuild Kit for models PR703-100 and PR753-100 |

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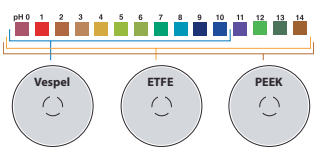
# Rotor Seals & Stators

The rotor seal is the polymeric disc that makes a high pressure seal against the stator or stator face seal. The seal wears with use and is one of the only parts that may need routine replacement.

Stators are available in 316 stainless steel, PEEK and proprietary materials. Stators need replacement only if the ports or sealing surfaces become damaged. Avoid damage from use of improper injection needles by referring to the "Using Proper Syringe Needles" Application Note on page 142.

*Please Note: Rotor seals for MX Series II™ Modules are available in RheBuild® Kits on page 136. Stators for MX Series II Modules are available on this page. MX (Series I) Module rotor seals are available in RheBuild Kits on page 136.*

## APPLICATION NOTE




### How to Select the Right Rotor Seal

The standard rotor seal in many Rheodyne® manual valves is made from a Vespel® blend. This polyimide has low wear and high chemical resistance. Vespel tolerates a pH range of 0 to 10. Solutions more basic than pH 10 dissolve Vespel which damages the rotor seal. If you use any solutions above pH 10, Rheodyne recommends a PEEK blend rotor seal. PEEK offers a high chemical resistance and versatility, and will tolerate the entire pH range from 0 to 14. ETFE blend rotor seals are appropriate for use in applications where PEEK is not generally acceptable, such as when methylene chloride or DMSO in higher concentrations is being used.

| Part No. | For Valve Model No. | Description |
|---|---|---|
| **VESPEL BLEND ROTOR SEALS** | | |
| **7000-016** | 7000L, 7040L | Vespel Rotor Seal |
| **7010-039** | 7010, 7000, 7040 | Vespel Rotor Seal |
| ★ **7030-003** | 7030, 9030 | Vespel Rotor Seal |
| **7030-014** | 7030L | Vespel Rotor Seal |
| **7060-070** | 7060, 7066 | Vespel Rotor Seal |
| **7060-064** | 7060L | Vespel Rotor Seal |
| **7125-047** | 7125, 7725, 9725 | Vespel Rotor Seal |
| **7410-038** | 7410 | Vespel Rotor Seal |
| **7413-013** | 7413 | Vespel Rotor Seal |
| **8125-038** | 8125 | Vespel Rotor Seal |

| Part No. | For Valve Model No. | Description |
|---|---|---|
| **ETFE BLEND ROTOR SEALS** | | |
| **7000-017** | 7000L, 7040L | ETFE Rotor Seal |
| **7010-071** | 7010, 7010-087, 7000, 7040 | ETFE Rotor Seal |
| **7030-015** | 7030, 9030 | ETFE Rotor Seal |
| **7060-074** | 7060, 7066, 9060 | ETFE Rotor Seal |
| **7060-067** | 7060L | ETFE Rotor Seal |
| **7125-079** | 7125, 7125-081, 7725 | ETFE Rotor Seal |
| **7410-075** | 7410 | ETFE Rotor Seal |
| **8125-097** | 8125 | ETFE Rotor Seal |
| **9010-051** | 9010 | ETFE Rotor Seal |
| **9125-082** | 9125, 9725 | ETFE Rotor Seal |
| **PEEK BLEND ROTOR SEALS** | | |
| **3030-005** | 3030, 3030-038 | PEEK Rotor Seal |
| **3710-008** | 3000, 3000-038, 3710, 3710-038 | PEEK Rotor Seal |
| **3725-018** | 3725, 3725-038 | PEEK Rotor Seal |
| **9010-065** | 7000, 7010, 9010 | PEEK Rotor Seal |
| **8125-119** | 8125 | PEEK Rotor Seal |
| **9125-095** | 7125, 7725, 9125, 9725 | PEEK Rotor Seal |
| **STATORS FOR MX SERIES II MODULES** | | |
| **7123-548** | MXT715-000 | Stator |
| **7123-550** | MXT715-105 | Stator |
| **7123-568** | MXT715-102 | Stator |
| **7770-229** | MXP7920-000 | Stator |
| **7980-004** | MXP7980-000 | Stator |
| **7986-004** | MXP7986-000 | Stator |
| **7900-146** | MXP9900-000 | Stator |
| **7900-179** | MXP7900-000 | Stator |
| **7900-183** | MXP7970-000 | Stator |
| **7960-014** | MXP7960-000 | Stator |
| **9960-002** | MXP9960-000 | Stator |
| **STATORS FOR OTHER RHEODYNE VALVES** | | |
| **3725-006** | 3725, 3710-038, 3000-038 and 3030-038 | Stator |
| **3725-085** | 3725-038, 3710-038, 3000-038 and 3030-038 | Stator |
| **7010-069** | 7000L, 7030L, 7040L | Stator |
| **7010-040** | 7010, 7125, 7000, 7030 and 7040 | Stator |
| **7010-066** | 7125-081 and 7010-087 | Stator |
| **7060-039** | 7060 and 7066 | Stator |
| **7060-065** | 7060L, EV501-100 | Stator |
| **7123-047** | PR/EV500-100 | Stator |
| **7123-127** | PR/EV750-107 | Stator |
| **7123-128** | PR/EV700-107 | Stator |
| **7123-142** | PR/EV500-104, EV501-104 | Stator |
| **7123-145** | PR/EV550-104, EV551-104 | Stator |
| **7123-147** | PR/EV550-100 | Stator |
| **7123-148** | PR/EV500-101 | Stator |
| **7123-149** | PR/EV550-101 | Stator |
| **7123-180** | PR703-100 and EV700-105 | Stator |
| **7123-221** | PR753-100 and EV750-105 | Stator |
| **7123-223** | PR/EV700-112 | Stator |
| **7123-390** | EV200-102 | Stator |
| **7410-041** | 7410 and 7413 | Stator |
| **7520-030 (inlet)** | 7520 | Stator |
| **7520-035 (outlet)** | 7520 | Stator |
| **7650-002** | PR/EV700-102 | Stator |
| **7725-010** | 7725(i) | Stator |
| **7750-070** | 7750 | Stator |
| **7750-038** | PR/EV700-100 | Stator |
| **8125-098** | 8125 | Stator |
| **9060-016** | 9060 | Stator |
| **9125-043** | 9125, 9010, 9030 and 9725(i) | Stator |
| **9650-009** | PR/EV750-102 | Stator |
| **9750-021** | PR/EV750-100 | Stator |

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# Stainless Steel Sample Loops

These high quality stainless steel sample loops have burr-free, square-cut ends to ensure a flush connection to valve ports. The size designations of loops are nominal. The actual volumes can differ from the theoretical designations because of the 0.001" (± 0.025 mm) tolerance of the metal tubing bore.

Accuracy of large metal loops (1.0 mm, 0.040" bore) is about ±5%, intermediate loops (0.5 mm, 0.020" bore) ±10%, and small loops (0.2 mm, 0.007" bore) ±30%.

Since both standards and unknowns are usually analyzed using the same sample loop, knowledge of the actual, accurate volume is rarely needed. If the sample loop volume must be known, it is best to calibrate the loop in place on the valve so the flow passages in the valve are also taken into account. An alternative to calibration is to use a dual mode injector and partial-filling method of loading. See the "Sample Loop Loading" Application Note on page 129.

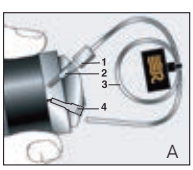
Model 7725 Injector loops are not interchangeable with loops for the model 7125. The port angle for the 7725 is 30° whereas the port angle for the 7125 is 20° requiring the loops to have a different shape.

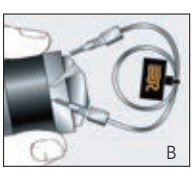
Model 8125 Micro-Scale Sample Injector requires special loops in the 5.0 µL to 50 µL range. The 8125 sample loops are made with 0.5 mm (0.020") OD tubing.

## APPLICATION NOTE

### How to Properly Install Sample Loops: Stainless Steel

Stainless steel sample loops are supplied with fittings that are not swaged onto the tube. It is important that the loop be completely bottomed in the injector port before the ferrule is swaged onto the tube. The depth of the tubing holes may vary slightly from port to port and from valve to valve. A fitting made up in one port may leave a small cavity in another port. The cavity causes high dispersion and peak distortion such as fronting, tailing, or broadening. It is good practice to label loop ends so they will be replaced in the same, respective ports that were used in swaging the ferrules. Hint: swaging ferrules separately on each side, into each respective valve port makes loop installation easier.



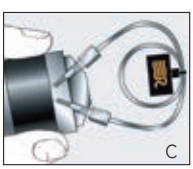




**Figure 1** Cut-away view of stainless steel sample loop installation

**To install the sample loop:**

a) Take one end of the loop and place the nut (1) and ferrule (2) onto the tubing (3) with the threaded portion of the nut and tapered portion of the ferrule toward the end. See Figure A.

b) Insert the tubing into port (4). Confirm that the tubing is bottomed in the valve port as shown in Figure A.

c) While firmly pressing down on the tubing, hand-tighten the nut as tight as possible.

d) With the IDEX Wrench (see pages 33 and 144), designed especially for fittings, tighten one quarter turn past finger tight. Remove the loop to confirm the ferrule is swaged onto the tube.

e) Repeat steps a-d with the other end of the loop while the swaged end remains outside the valve port. See Figure B.

f) Reinstall each end of the loop to their respective ports. See Figure C.

| Part No. | Volume | Tubing |
|---|---|---|
| **RHEODYNE® STAINLESS STEEL LOOPS FOR MXT715-000** | | |
| **7755-300** | 5 µL Sample Loop | 0.18 mm (0.007") ID x 1/16" OD |
| **7755-301** | 10 µL Sample Loop | 0.30 mm (0.012") ID x 1/16" OD |
| **7755-302** | 20 µL Sample Loop | 0.30 mm (0.012") ID x 1/16" OD |
| **7755-303** | 50 µL Sample Loop | 0.51 mm (0.021") ID x 1/16" OD |
| **7755-304** | 100 µL Sample Loop | 0.51 mm (0.021") ID x 1/16" OD |
| **RHEODYNE STAINLESS STEEL LOOPS FOR 7125, 7010 INJECTION VALVES (DO NOT USE FOR 7725)** | | |
| **7020** | 5 µL Sample Loop | 0.18 mm (0.007") ID x 1/16" OD |
| **7021** | 10 µL Sample Loop | 0.30 mm (0.012") ID x 1/16" OD |
| **7022** | 20 µL Sample Loop | 0.51 mm (0.020") ID x 1/16" OD |
| **7023** | 50 µL Sample Loop | 0.51 mm (0.020") ID x 1/16" OD |
| **7024** | 100 µL Sample Loop | 0.51 mm (0.020") ID x 1/16" OD |
| **7025** | 200 µL Sample Loop | 0.76 mm (0.030") ID x 1/16" OD |
| **7026** | 500 µL Sample Loop | 0.76 mm (0.030") ID x 1/16" OD |
| **7027** | 1.0 mL Sample Loop | 0.76 mm (0.030") ID x 1/16" OD |
| **7028** | 2.0 mL Sample Loop | 1.0 mm (0.040") ID x 1/16" OD |
| **7029** | 5.0 mL Sample Loop | 1.0 mm (0.040") ID x 1/16" OD |
| **1876** | 10 mL Sample Loop | 2.0 mm (0.080") ID x 1/8" OD |
| **1877** | 20 mL Sample Loop | 2.0 mm (0.080") ID x 1/8" OD |
| **RHEODYNE STAINLESS STEEL LOOPS FOR 3725-038, 3725I-038 INJECTION VALVES** | | |
| **3065-018** | 2.0 mL Sample Loop | 2.0 mm (0.080") ID x 1/8" OD |
| **3065-019** | 5.0 mL Sample Loop | 2.0 mm (0.080") ID x 1/8" OD |
| **3065-023** | 10 mL Sample Loop | 2.0 mm (0.080") ID x 1/8" OD |
| **3065-025** | 20 mL Sample Loop | 2.0 mm (0.080") ID x 1/8" OD |
| **RHEODYNE STAINLESS STEEL LOOPS FOR 7725, 7725I, PR/EV700-100, PR/EV703-100, MX MODULE INJECTION VALVES (DO NOT USE FOR 7125)** | | |
| **7755-020** | 5 µL Sample Loop | 0.18 mm (0.007") ID x 1/16" OD |
| **7755-021** | 10 µL Sample Loop | 0.30 mm (0.012") ID x 1/16" OD |
| **7755-022** | 20 µL Sample Loop | 0.30 mm (0.012") ID x 1/16" OD |
| **7755-023** | 50 µL Sample Loop | 0.51 mm (0.020") ID x 1/16" OD |
| **7755-024** | 100 µL Sample Loop | 0.51 mm (0.020") ID x 1/16" OD |
| **7755-025** | 200 µL Sample Loop | 0.76 mm (0.030") ID x 1/16" OD |
| **7755-026** | 500 µL Sample Loop | 0.76 mm (0.030") ID x 1/16" OD |
| **7755-027** | 1.0 mL Sample Loop | 0.76 mm (0.030") ID x 1/16" OD |
| **7755-028** | 2.0 mL Sample Loop | 1.0 mm (0.040") ID x 1/16" OD |
| **7755-029** | 5.0 mL Sample Loop | 1.0 mm (0.040") ID x 1/16" OD |
| **1876** | 10 mL Sample Loop | 2.0 mm (0.080") ID x 1/8" OD |
| **1877** | 20 mL Sample Loop | 2.0 mm (0.080") ID x 1/8" OD |
| **RHEODYNE STAINLESS STEEL LOOPS FOR 8125 INJECTOR (USE 7755-024 TO 7755-029 FOR VOLUMES > 50 µL)** | | |
| **8020** | 5 µL Sample Loop | 0.20 mm (0.008") ID x 0.020" OD |
| **8021** | 10 µL Sample Loop | 0.20 mm (0.008") ID x 0.020" OD |
| **8022** | 20 µL Sample Loop | 0.25 mm (0.010") ID x 0.020" OD |
| **8023** | 50 µL Sample Loop | 0.30 mm (0.012") ID x 0.020" OD |
| **8125-084** | Ferrules for 0.020" (0.5 mm) Tubing | |
| **8125-086** | Ferrules for 0.020" (0.5 mm) Tubing, 4 pk. | |

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# PEEK Sample Loops

Flexible PEEK sample loops are alternatives to stainless steel loops. PEEK loop ends are provided with clean, straight cuts for easy valve installation.

PEEK polymer is inert to almost all organic solvents and is biocompatible, giving PEEK loops added versatility. Natural PEEK is used for these sample loops. Like metal loops, the size designations of PEEK loops are nominal. The actual volumes can differ from the theoretical designations because of the ±0.05 mm (0.002") tolerance of the tubing bore. Accuracy of large PEEK loops (0.8 mm, 0.030" bore) is about ±14%, intermediate loops (0.5 mm, 0.020") ±21%, and small loops (0.2 mm, 0.007") ±65%.

PEEK loops are also supplied with unswaged RheFlex® fittings but do not require the same swaging precaution. The fittings can reposition along the loop tubing when the fitting reinserts in the ports for correct loop installation.

*Please Note: Several of our PEEK Sample Loops can also be used with Valco/VICI® sample injection valves. Please refer to the product listing on this page to aid selection.*

## APPLICATION NOTE

### PEEK Physical Strength Characteristics

Although PEEK material is compatible with virtually all solvents, there are many factors that affect burst pressure of PEEK tubing. Factors such as increases in inner diameter, temperature, exposure time, and concentration of organic solvents affect the degradation of PEEK. Other solvents such a THF, methylene chloride and DMSO cause PEEK tubing to swell while concentrated nitric acid and sulfuric acid weaken the tubing.

| Part No. | Volume | Tubing | Valco No. |
|---|---|---|---|
| **PEEK LOOPS FOR 3725, 3725I INJECTION VALVES** | | | |
| **3055-018** | 2.0 mL Sample Loop | 1.6 mm (0.062") ID x 1/8" OD | N/A |
| **3055-019** | 5.0 mL Sample Loop | 1.6 mm (0.062") ID x 1/8" OD | N/A |
| **3055-023** | 10 mL Sample Loop | 2.0 mm (0.080") ID x 1/8" OD | N/A |
| **3055-025** | 20 mL Sample Loop | 2.0 mm (0.080") ID x 1/8" OD | N/A |
| **PEEK LOOPS FOR 9725, 9010, PR/EV750-100, PR/EV753-100 INJECTION VALVES** | | | |
| **Part No.** | **Volume** | **Bore / Tubing** | **Valco No.** |
| **9055-020** | 5.0 µL Sample Loop | 0.18 mm (0.007") ID x 1/16" OD | SL5CWPK |
| **9055-021** | 10 µL Sample Loop | 0.25 mm (0.010") ID x 1/16" OD | SL10WPK |
| **9055-022** | 20 µL Sample Loop | 0.25 mm (0.010") ID x 1/16" OD | SL20WPK |
| **9055-023** | 50 µL Sample Loop | 0.51 mm (0.020") ID x 1/16" OD | SL50WPK |
| **9055-024** | 100 µL Sample Loop | 0.51 mm (0.020") ID x 1/16" OD | SL100WPK |
| **9055-025** | 200 µL Sample Loop | 0.51 mm (0.020") ID x 1/16" OD | N/A |
| **9055-026** | 500 µL Sample Loop | 0.76 mm (0.030") ID x 1/16" OD | SL500WPK |
| **9055-027** | 1.0 mL Sample Loop | 0.76 mm (0.030") ID x 1/16" OD | SL1KCWPK |
| **9055-028** | 2.0 mL Sample Loop | 0.76 mm (0.030") ID x 1/16" OD | SL2KCWPK |
| **9055-029** | 5.0 mL Sample Loop | 0.76 mm (0.030") ID x 1/16" OD | N/A |
| **9055-033** | 10 mL Sample Loop | 0.76 mm (0.030") ID x 1/16" OD | N/A |
| **PEEK LOOPS FOR 7725, 7725I, PR/EV700-100** | | | |
| **7123-227** | 1 µL Sample Loop (models PR/EV700-100 and EV750-100 only) | Internal groove | N/A |
| **7755-015** | 2 µL Sample Loop (models 7725, 7725i, and 9725(i) only) | Internal groove | N/A |
| **REPLACEMENT RHEFLEX FITTINGS FOR PEEK LOOPS** | | | |
| **Part No.** | **Description** | | **Qty.** |
| **6000-078** | Nut/Ferrule Set, Natural PEEK, 5/16-24, for 1/8" OD loops | | ea. |
| **6000-079** | Ferrules, Natural PEEK, for 1/8" OD loops | | 5-pk |
| **6000-251** | Ferrules, Natural PEEK, for 1/16" OD loops | | 10-pk |
| **6000-254** | Nut/Ferrule Sets, Natural PEEK, 10-32, for 1/16" OD loops | | 10-pk |

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# Valco/VICI-Compatible Stainless Steel Sample Loops

Valco-Compatible Stainless Steel Loops are manufactured by IDEX Health & Science. These loops are designed for use with Valco valve models CW6 and EC6W. Each loop has burr-free, polished ends and is passivated and flushed with reagent-grade methanol to ensure cleanliness.

Loops made with 1/16" OD tubing come complete with F-287 SealTight™ Fittings, which are pressure rated to 9,000 psi (620 bar)[1]. The fittings and adapters that accompany the 1/8" OD sample loops are rated to 1,000 psi (69 bar)[1]. Volumes are stated at ±10%.

*[1] These pressure ratings reflect the performance of the fittings, not the port or valve in which they are used. IDEX Health & Science manufactures many products designed as direct replacements for OEM components. Reference to these manufacturers does not imply their endorsement of our products.*

| Part No. | Volume | Tubing | Valco No. |
|---|---|---|---|
| **VALCO/VICI-COMPATIBLE STAINLESS STEEL LOOPS FOR C6W, EC6W INJECTION VALVES** | | | |
| **1750** | 5 µL Sample Loop | 0.18 mm (0.007") ID x 1/16" OD | SL5CW |
| **1751** | 10 µL Sample Loop | 0.25 mm (0.010") ID x 1/16" OD | SL10CW |
| **1752** | 15 µL Sample Loop | 0.25 mm (0.010") ID x 1/16" OD | SL15CW |
| **1755** | 20 µL Sample Loop | 0.51 mm (0.010") ID x 1/16" OD | SL20CW |
| **1758** | 25 µL Sample Loop | 0.51 mm (0.010") ID x 1/16" OD | SL25CW |
| **1759** | 50 µL Sample Loop | 0.51 mm (0.020") ID x 1/16" OD | SL50CW |
| **1762** | 100 µL Sample Loop | 0.51 mm (0.020") ID x 1/16" OD | SL100CW |
| **1778** | 200 µL Sample Loop | 0.76 mm (0.030") ID x 1/16" OD | N/A |
| **1763** | 250 µL Sample Loop | 0.76 mm (0.030") ID x 1/16" OD | SL250CW |
| **1764** | 500 µL Sample Loop | 0.76 mm (0.030") ID x 1/16" OD | SL500CW |
| **1770** | 1 mL Sample Loop | 0.76 mm (0.030") ID x 1/16" OD | SL1KCW |
| **1772** | 2 mL Sample Loop | 1.02 mm (0.040") ID x 1/16" OD | SL2KCW |
| **1775** | 5 mL Sample Loop | 2.03 mm (0.080") ID x 1/8" OD | SL5KCW |
| **1776** | 10 mL Sample Loop | 2.03 mm (0.080") ID x 1/8" OD | SL10KCW |

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## APPLICATION NOTE

### Fluidic Movement in Tubes

**Q:** "Why can I load only up to half of the volume of the loop in partial-filling method?"

**A:** Sample occupies 2 µL of loop for every 1 µL loaded from the syringe. For example, 10 µL of sample spreads out over the entire length of a 20 µL loop. Any additional sample loaded will overflow the end of the loop and exit out to waste. Reproducibility is poor because the volume of sample in the loop is different from the known volume originally loaded by your syringe.

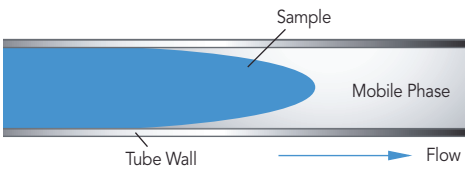


**Figure 1** Schematic of sample flow through mobile phase between tubing walls

Fluid spreads in a parabolic shape through a tube instead of moving in one plug because the velocity is different at the center of the tube than at the walls. The velocity at the center of the tube is twice the average velocity, and near the wall the velocity is almost zero, creating a parabolic shape. This fluidic movement is called laminar flow. See Figure 1.

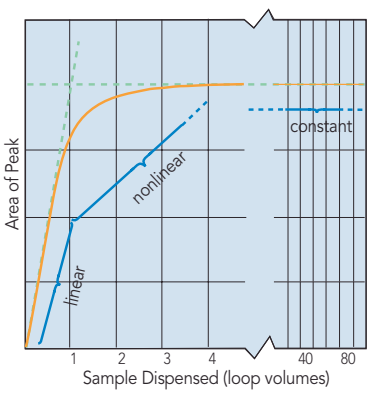


**Figure 2** Sample mass (observed peak area) vs. volume of sample dispensed from the syringe, in units of loop volumes, injected onto the column from a Rheodyne® dual mode injector such as model 7725

In dual mode injection valves (see "Sample Loop Loading" Application Note on page 129) the sample from the syringe needle loads directly into the sample loop. The sample volume is known since there is no sample waste. The laminar flow phenomenon accounts for the shape of the plot as shown in Figure 2. Note that the plot has three regions:

a) Partial-Filling Region. When the volume dispensed is less than half the loop volume, the curve is linear. Sample has not reached the end of the loop. Within this region, performance depends on the syringe and operator.

b) Nonlinear Region. When the volume dispensed is between half the loop volume and about two loop volumes, the curve is nonlinear. Sample is lost from the loop, so reproducibility is poor. If you dispense a volume equal to the loop size, you are in this region of poor performance.

c) Complete-Filling Region. When the volume of sample dispensed is several loop volumes, the loop contains only pure sample, undiluted by residual mobile phase. Within this region, reproducibility is highest.

In the single mode injection valves the sample must pass through a connecting passage before it reaches the sample loop. Since some of the sample dispensed from the syringe remains in the connecting passageway, an unknown amount enters the sample loop. Therefore, single mode injection valves achieve high reproducibility only by using the complete-filling method.

## APPLICATION NOTE

### How to Find and Fix Common Sample Injector Leaks

Leaks cause valuable sample loss. Nobody wants that. The key to the valve holding pressure is the integrity of the sealing surfaces. If there is a scratch on the sealing surface, or the needle seal in the rotor seal is damaged, a leak may appear. It is also important to realize what appears to be a leak can instead be a result of siphoning. The following are the three most common situations in which fluid leaks occur.

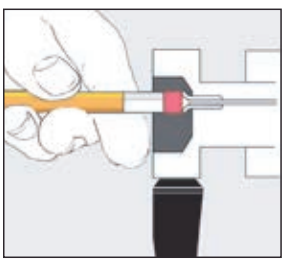

**Figure 1** To reform the needle seal, push the eraser end of a pencil against the needle port

1. If fluid leaks out of the needle port only while loading the loop (i.e., while pushing down on the plunger of the syringe), the problem is most likely that the needle seal or the needle port fitting in the loop filler port is not gripping the syringe needle tightly enough. Tighten the needle seal grip by pushing with the eraser end of the pencil on the needle port (See Figure 1). The tightening reduces the hole diameter of the needle seal and port fitting.

2. If fluid leaks continuously from the needle port or vent lines and/or from the stator-to-stator ring interface, replace the rotor seal and/or stator face assembly. Scratches on the rotor seal or cracks in the stator face assembly allow mobile phase to escape and cause cross port leakage. Genuine Rheodyne replacement rotor seals are listed on page 137.

3. If fluid leaks from the needle port and/or vent lines but eventually stops, the cause is most likely siphoning and not a leak. Siphoning occurs if the vent lines are lower or higher than the needle port. Adjust the vent line(s) so that the outlet is at the same horizontal level as the needle port to prevent siphoning. (See Figure 2).

For other leakage or injection troubleshooting, refer to the Rheodyne Troubleshooting Guide for HPLC Injection Problems. You may download the Guide from the Rheodyne web site: www.idex-hs.com under Support.

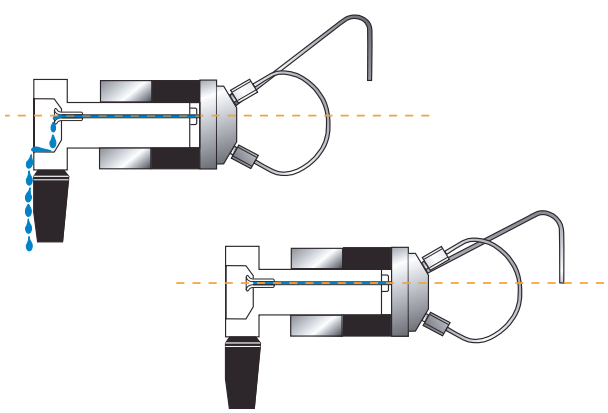

**Figure 2** Needle port level compared to the level of vent line outlet:
(A) siphoning occurs when the vent line outlet is above the needle port level
(B) siphoning does not occur if the vent line outlet is the same horizontal level as the needle port

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## APPLICATION NOTE

### Using Proper Syringe Needles

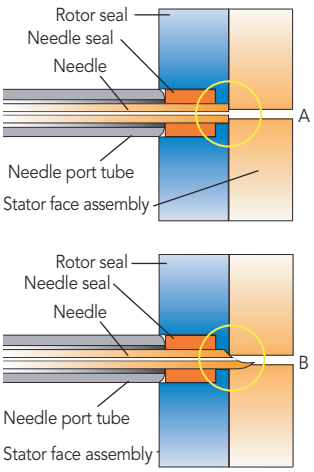


**Figure 1** A square cut needle: (A) stops against the stator face assembly; The tip of a pointed needle (B) slips into the stator face and the tip breaks off as the valve rotates

With front-loading injection valves it is important to use the correct needle when loading the sample loop. An incorrect needle will damage the valve and can cause poor reproducibility. When the needle is too short the tip will not reach the needle seal. When the needle is too small in diameter the seal will not grip tightly enough. Needles with a beveled tip can damage the rotor seal and stator face assembly (see Figure 1). The needle should be #22 gauge (0.028"–0.0285"/ 0.72 mm), and 90° point style (square cut end). Model 3725 requires a #16 gauge (0.0645"–0.0655"/ 1.65 mm) needle. Never use a beveled, pointed, or tapered needle.

Needle specifications are not critical when using a Loop Filler Port to load the sample loop. However, it is important to tighten the needle port fitting around the needle if using a syringe needle with a slightly smaller diameter than 0.7 mm (0.028").

If the loading method used is complete-filling, a syringe without a needle can be used. A syringe fitted with a Needle Port Cleaner can be used with a front-loading valve (Figure 2A) or with a Loop Filler Port (Figure 2B).

Needle port accessories are listed on this page.

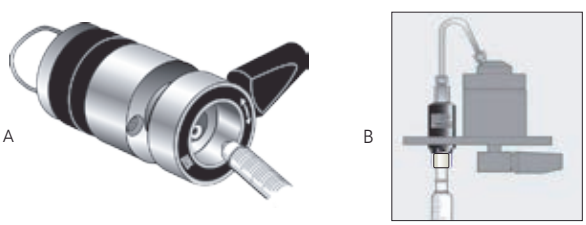


**Figure 2**
(A) Syringe fitted with Needle Port Cleaner (Part # 7125-054) loading a front-loading valve (model 7725); (B) loading a Loop Filler Port (Part # 7012)

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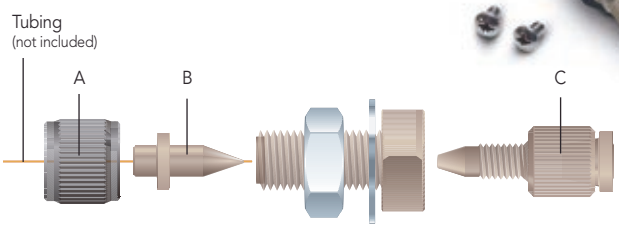
# Injection Port Adapters

- For 360 µm OD tubing
- Mount on bracket or bulkhead

To introduce sample, connect 360 µm OD capillary tubing to an Upchurch Scientific® Injection Port Adapter Assembly. This adapter accepts standard 22 gauge Hamilton-style injection syringe needles. No additional swept volume is added to the fluid pathway by this adapter, as the needle butts directly against the connecting tubing during injections. The adapter can be bulkhead mounted or mounted with the V-447 Kits.

To introduce a sample directly into a 10-32 port, purchase a M-432-03 separately.



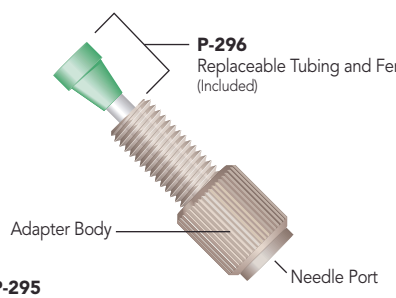

**M-432**
Micro Injection Port Adapter Assembly

## RELATED PRODUCTS

| | A | B | C |
|---|---|---|---|
| **For 360 µm OD Tubing** | | | |
| M-432 and V-447 | P-416BLK | F-152 | M-432-03 |

- For use with Upchurch Scientific Injection Valves on page 133

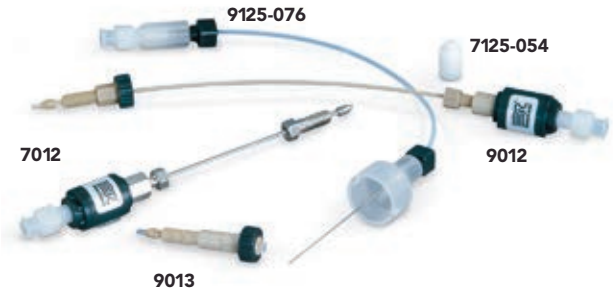
This simple, biocompatible adapter is designed specifically for the Upchurch Scientific Injection Valves on page 133 and can also convert any 1/4-28 flat-bottom port into a port that can accept a standard 22 gauge HPLC injection needle. This injection port adapter is adjustable, so you can create a snug fit around the needle to prevent any leaking of the analyte. In addition, this product features an internal stop that prevents you from inserting the needle too far, eliminating the possibility of damaging the valve with the needle tip.




**P-295**
1/4-28 Flat-Bottom Injection Port Adapter

# Needle Port Accessories

The Rheodyne® adaptable Loop Filler Ports (Part #7012 and 9012) are used to load sample from syringe needles or luer tips. The Needle Port (Part #9013) conserves sample by minimizing the volume between the needle and the valve.




| Part No. | Description |
|---|---|
| **MICRO INJECTION PORT ADAPTER** | |
| **For 360 µm OD Tubing** | |
| **F-152** | Replacement MicroFerrule for M-432, Natural PEEK |
| **M-432** | Micro Injection Port Adapter Assembly |
| **M-432-03** | Replacement Tubing/Fitting Assembly for M-432 & M-433 |
| **P-416BLK** | Replacement Female Nut for M-432, Black PEEK |
| **V-447** | Micro Injection Port Adapter Assembly Actuator Mounting Kit<br>Includes (1) M-432 with mini-actuator bracket and (2) mounting screws |
| **1/4-28 FLAT-BOTTOM INJECTION PORT ADAPTER** | |
| **P-295** | Adjustable Injection Port Adapter |
| **P-296** | Replacement Tubing/Ferrule Assembly |
| **NEEDLE PORT ACCESSORIES** | |
| **7012** | Stainless Steel Loop Filler Port |
| **7125-054** | Needle Port Cleaner |
| **9012** | PEEK Loop Filler Port |

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## Valve Wrenches

- For convenient wrench-tightening of fittings on high pressure rotary shear valves
- For removal of knobs on Upchurch Scientific® Manual Valves

The smartly designed IDEX Wrench is a double-ended slotted socket wrench that fits over 1/16" and 1/8" OD tubing. It easily loosens and tightens 1/4" and 5/16" hex head stainless steel or PEEK fittings. The "Z" shape of the IDEX Wrench provides ideal leverage for changing sample loops and fittings, and keeps one end from restricting the use of the other.

The V-103 is an Allen (hex-key) wrench designed to remove the knob from Upchurch Scientific V-101 valves (page 133). The V-104 is an Allen wrench that can be used to remove the knob from Upchurch Scientific Medium Pressure Selection and Injection Valves (also found on page 133).

## MXX Replacement Fittings

Use these replacement Ferrules and O-rings for 1/8" and 1/16" tubing with the MXX Series II valves shown on page 133. Please see the part number chart below for a list of individual part numbers.

Biocompatible

## Mounting Brackets

Rheodyne® mounting brackets and panels of different shapes and sizes organize and provide a sturdy support for Rheodyne valves. The Ring Stand Mounting Bracket now allows the valves to mount onto common laboratory equipment.

| Part No. | Description |
|---|---|
| **VALVE WRENCHES** | |
| **6810** | IDEX Wrench |
| **V-103** | 0.050" Allen Wrench (replacement) |
| **V-104** | 5/64" Allen Wrench (replacement) |
| **MOUNTING BRACKET ACCESSORIES** | |
| **7160** | Mounting Panel |
| **7160-010** | Valve Angle Bracket |
| **7160-029** | Ring Stand Mounting Bracket |
| **VALVE BRACKET** | |
| **M-615-1** | Mounting Bracket for Upchurch Scientific® Switching Valves |
| **M-615-2** | Mounting Bracket for Upchurch Scientific Injection and Selection Valves |

| REPLACEMENT FITTINGS | | |
|---|---|---|
| **Part No.** | **Description** | **Qty.** |
| **7770-039** | Ferrules for 1/8" OD Tubing | 25-pk |
| **7770-040** | Ferrules for 1/8" Tubing | 50-pk |
| **7770-041** | Ferrules for 1/8" Tubing | 100-pk |
| **7770-044** | Ferrules for 1/16" OD Tubing | 25-pk |
| **7770-045** | Ferrules for 1/16" Tubing | 50-pk |
| **7770-046** | Ferrules for 1/16" Tubing | 100-pk |
| **7770-124** | O-rings for 1/16" OD Tubing | 25-pk |

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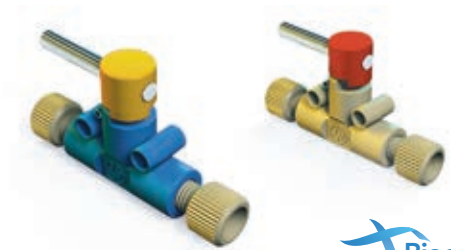
# Shut-Off Valves

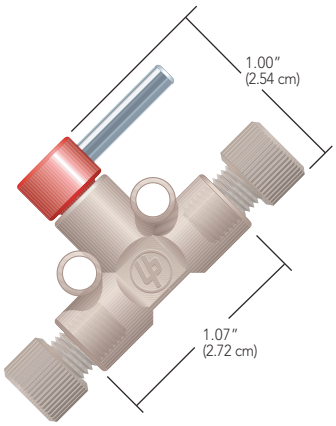
- Biocompatible, all-polymer flow path
- Available for 1/16" and 1/8" OD tubing
- Pressure rated to 500 psi (34 bar)

Stop a flow stream quickly with Upchurch Scientific® biocompatible Shut-Off Valves. The bodies are manufactured from either PEEK or ETFE, and both versions feature a PCTFE rotor, making them highly resistant to chemical attack. The blue colorant used in some valve configurations has proven not to leach out with common HPLC solvents.

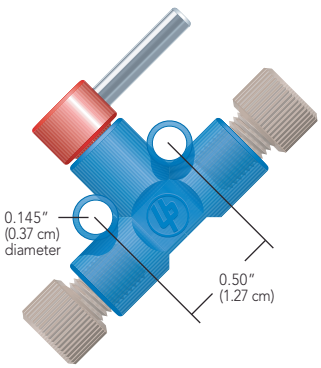
Connect semi-rigid or rigid tubing, such as PEEK, stainless steel or fluoropolymer, with the 1/4-28 Flangeless Fittings provided. Soft tubing, such as PharMed® or Tygon® (see pages 75–89), may be connected to these valves using our 1/4-28 barbed adapters, found on page 58.



Biocompatible




**P-733**
PEEK Shut-Off Valve




**P-783**
ETFE Shut-Off Valve

| | Part No. | Material | OD Tubing | Thru-hole | Internal Volume* | Includes |
|---|---|---|---|---|---|---|
| | **SHUT-OFF VALVES** | | | | | |
| | **P-721** | ETFE, Natural | 1/8" | 0.040" (1.0 mm) | 10.0 µL | (2) P-335, (2) P-300N |
| ★ | **P-732** | PEEK, Natural | 1/16" | 0.020" (0.5 mm) | 2.5 µL | (2) XP-235 |
| ★ | **P-733** | PEEK, Natural | 1/8" | 0.040" (1.0 mm) | 10.0 µL | (2) XP-335 |
| ★ | **P-782** | ETFE, Blue | 1/16" | 0.020" (0.5 mm) | 2.5 µL | (2) XP-235 |
| ★ | **P-783** | ETFE, Blue | 1/8" | 0.040" (1.0 mm) | 10.0 µL | (2) XP-335 |

** Maximum internal volume, with valve fully open.*

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# Micro-Splitter Valves

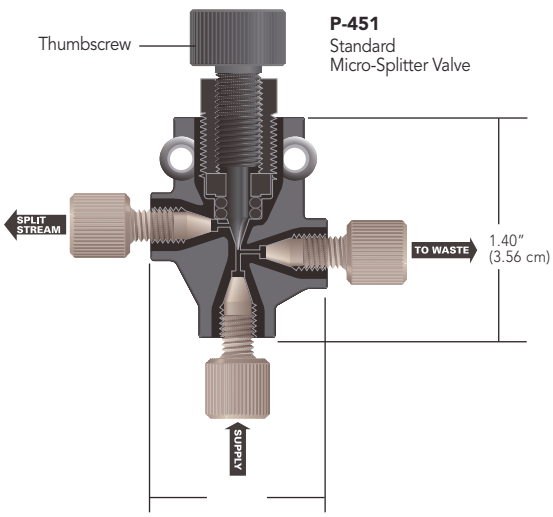
- For interfacing LC-MS systems
- Adjustable split stream flow rates
- Versions for up to 800 psi (55 bar) and up to 4,000 psi (276 bar)

The Upchurch Scientific® line of Micro-Splitter Valves is designed to accurately split and control a low-flow stream off a single incoming supply.

Choose between 1/4-28 flat-bottom and 10-32 coned threaded versions.

The High Pressure Micro-Splitter Valves are designed to operate successfully up to 4,000 psi (276 bar) and the standard Micro-Splitter valves are pressure rated to 800 psi (55 bar).

The Graduated Valve offers many of the benefits and features of Micro-Splitter Valves, plus the ability to adjust and set the split flow to repeatable settings. This allows documentation of settings and the resulting flow rates for easier method development. The graduations also make it easier to employ the valve in a system used to run multiple analyses that require different split flow rates.



## APPLICATION NOTE

- With an incoming flow rate of 1 mL/min using room temperature water and equal pressures on both outlet lines, the minimum split flow rate is 2 µL/min for the standard micro-splitter valves and 4.8 µL/min for the high pressure micro-splitter valves.
- All Micro-Splitter Valves have been tested at flow rates to 100 mL/min, with a maximum resulting pressure drop of only 45 psi (3.1 bar) when the valve is fully opened.

## SPECIFICATIONS & DETAILS

| Part No. | Valve Type | Threads | Internal Volume[1] (closed/fully open) | Max. Operating Pressure |
|---|---|---|---|---|
| **P-450** | Standard | 1/4-28 | 2.1 / 4.1 µL | 800 psi (55 bar) |
| **P-451** | Standard | 10-32 | 1.2 / 2.8 µL | 800 psi (55 bar) |
| **P-460S, T** | High Pressure | 10-32 | 1.2 / 2.8 µL | 4,000 psi (276 bar) |
| **P-470** | High Pres. Graduated | 10-32 | 1.2 / 2.8 µL | 4,000 psi (276 bar) |

*[1] The supply and waste port thru-holes have IDs of 0.020" (0.50 mm). The ID for the split-stream port thru-hole is 0.020" (0.50 mm) in standard versions; in capillary versions it is 0.010" (0.25 mm).*

| Part No. | Description | Includes |
|---|---|---|
| **MICRO-SPLITTER VALVES** | | |
| **P-450** | Standard, 1/4-28, Biocompatible | (3) XP-235 |
| **P-451** | Standard, 10-32, Biocompatible | (3) F-120 |
| **P-460S** | High Pressure, 10-32, with Stainless Steel Needle | (3) F-120 |
| **P-460T** | High Pressure, 10-32, with Titanium Needle | (3) F-120 |
| **GRADUATED MICRO-SPLITTER VALVES** | | |
| ★ **P-470** | High Pressure Graduated, 10-32, with Stainless Steel Needle | (3) F-120 |

** Use with the MicroTight Tubing Sleeves, found on page 19.*

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# Micro-Metering Valves

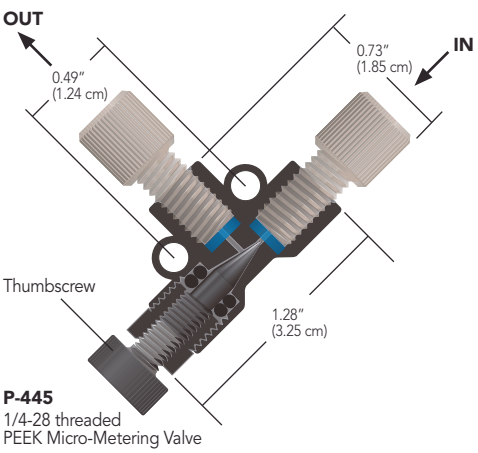
- Flow rates as low as 3.5 µL/min*
- 1/4-28 flat-bottom and 10-32 coned designs available
- Materials of construction: PEEK, PTFE

For fine control of fluid flow rates, Micro-Metering Valves can reduce outgoing flow to as low as 3.5 µL/min*. These needle valves are perfect for use with peristaltic pump fluid-transfer applications, mass spectrometry, and fraction collection.

Upchurch Scientific® Micro-Metering Valves can also be used to regulate gas flow in helium sparging lines and as a flow-dependent variable back pressure regulator. For flow independent regulation of back pressure, please see pages 152–153.

Flow path materials are PEEK polymer and PTFE. All versions of this valve have 0.020" (0.50 mm) thru-holes.

**At 1.0 mL/min incoming flow rate with room temperature water.*




**P-445**
1/4-28 threaded
PEEK Micro-Metering Valve

## APPLICATION NOTE

### Back Pressure Considerations

The Micro-Splitter Valves are designed to work when both effluent flow path pressures are nearly identical. However, the split flow path will often have higher back pressure than the waste flow path, making it hard to achieve any split flow at all. There are two possible solutions. Place a back pressure regulator (see pages 152–153) on the waste flow path that is equal to or slightly greater than the pressure on the split flow path. Or, switch the two effluent pathways such that the split flow pathway is attached to the "waste" port on the valve and the waste flow pathway is attached to the "split" port on the valve. *(Please Note: This second method may result in a loss of adjustment sensitivity.)*

### Prime/Purge Valve

Air within the pump head can cause noisy pump operation and flow instability. Solve this problem by placing a High Pressure Micro-Splitter Valve (page 146) inline between the pump and the injector valve. You can then safely divert pump flow to a waste container at a sufficient rate to dislodge the air. Remove air from the solvent line leading to the pump with a Prime/Purge Valve (page 155).

### Multi-Column and Detector Systems

Does your work require analyses with multiple columns and detectors that use the same mobile phase? If so, install one of our High Pressure Micro-Splitter Valves after your injector. A single injection can then be split to two separate columns and detector systems, at two different flow rates. This economical set-up eliminates the need for an additional pump and injector valve, while allowing data to be obtained simultaneously.

### Post-Detector Interfacing

Use a Standard Micro-Splitter Valve to route fluid exiting an initial detector to other devices, such as a mass spectrometer and a fraction collector. The valve will split and reduce the flow rate to that required for MS interfacing, while diverting the remainder of the flow to the collector (a back pressure regulator may also be required for this set up, available on pages 152–153).

### Other Applications

These valves are also suited for other applications, such as adapting a standard HPLC system to handle microbore analyses. For more information and plumbing diagrams for this application and those listed above, please contact your local distributor or IDEX Health & Science directly.

| | Part No. | Material | OD Tubing | Thru-hole | Internal Volume* | Includes |
|---|---|---|---|---|---|---|
| | MICRO-METERING VALVES | | | | | |
| | P-445 | PEEK, Black | 1/16" | 0.020" (0.50 mm) | 7.7 µL | (2) XP-230 |
| ★ | P-446 | PEEK, Black | 1/16" | 0.020" (0.50 mm) | 7.2 µL | (2) F-120 |
| | P-447 | PEEK, Black | 1/8" | 0.020" (0.50 mm) | 7.7 µL | (2) XP-330 |

** Maximum internal volume, with valve fully open.*

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# CHECK VALVES & PRESSURE REGULATORS

**INLINE CHECK VALVES**
PAGE 149

**BACK PRESSURE REGULATORS**
PAGE 152

**PRIME/PURGE VALVES**
PAGE 155

SEE STARRED PRODUCTS FOR **TOP SELLERS!**

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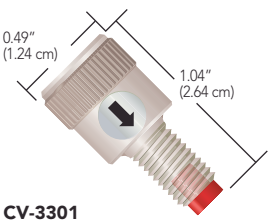
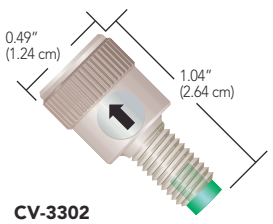
# Standard 1/4-28 Inline Check Valves

- Add back-flow protection to any 1/4-28 flat-bottom port
- 15 psi (1 bar) and 3 psi (0.2 bar) cracking pressure versions
- Excellent chemical resistance
- Materials of construction: PEEK; PCTFE; perfluoroelastomer; PTFE (CV-3301 and CV-3302); stainless steel (CV-3301 and CV-3302); or gold-plated stainless steel (CV-3315 and CV-3316)

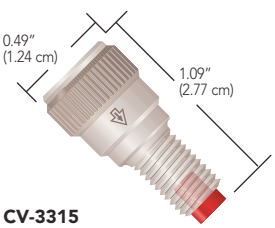
Connect these Upchurch Scientific® Inline Check Valves to any 1/4-28 flat-bottom port. Then thread your 1/4-28 flat-bottom fitting into the check valve to connect the tubing. Once installed, the spring-actuated sealing system eliminates back flow, helping to prevent upstream contamination or damage. In addition, the unique design of this product eliminates the additional tubing cuts and connections required to install conventional inline check valves.



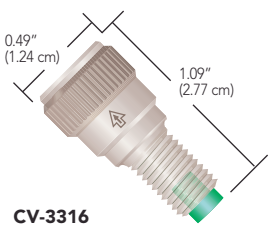

**CV-3301**
Standard, Inlet
1/4-28 FB Male to 1/4-28 FB Female
15 psi (1 bar) cracking pressure




**CV-3302**
Standard, Outlet
1/4-28 FB Male to 1/4-28 FB Female
15 psi (1 bar) cracking pressure




**CV-3315**
Standard, Inlet
1/4-28 FB Male to 1/4-28 FB Female
3 psi (0.2 bar) cracking pressure

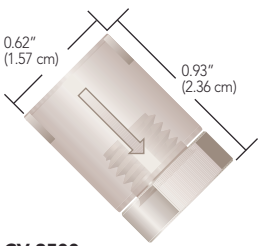



**CV-3316**
Standard, Outlet
1/4-28 FB Male to 1/4-28 FB Female
3 psi (0.2 bar) cracking pressure

# Nonmetallic 10-32 Micro-Volume Inline Check Valve

- Cracking pressure of 8 psi (0.6 bar)
- Excellent chemical resistance
- Materials of construction: PEEK and perfluoroelastomer, suitable for biological applications

With a swept volume of only 7.4 µL, the Upchurch Scientific Inline Micro-Volume Check Valve is perfect for applications where low flow path volume is critical, such as delivery to lab-on-a-chip, single-cell analysis and micro- or nano-LC post-column derivatization. Once installed, this check valve helps prevent back flow and the potential for contamination or damage to sensitive upstream equipment.




**CV-3500**
Micro-Volume Inline
10-32 C Female to 10-32 C Female

## NOTE

### Check valves are specified by:

- **Cracking Pressure:** the pressure required for the valve to open in the direction of the arrow.
- **Maximum Pressure:** the maximum pressure the valve can experience in the reverse direction without leaking backwards.
- **Back Pressure Created:** the amount of back pressure generated by the check valve with 50 mL/min room temperature water flowing in the direction of the arrow.

## SPECIFICATIONS & DETAILS

| | Swept Volume | Thru-Hole | Max. Pressure Rating | Back Pressure Created | Cracking Pressure Tolerance |
|---|---|---|---|---|---|
| **Standard 1/4-28 FB** | | | | | |
| **CV-3301, CV-3302** | 20 µL | 0.020" (0.50 mm) | 2,000 psi (138 bar) | 45 psi (3.1 bar) | ± 5 psi (0.34 bar) |
| **CV-3315, CV-3316** | 16 µL | 0.020" (0.50 mm) | 2,000 psi (138 bar) | 10 psi (0.7 bar) | ± 1.5 psi (0.10 bar) |
| **Nonmetallic 10-32 Coned Micro-Volume** | | | | | |
| **CV-3500** | 7.4 µL | 0.010" (0.25 mm) | 3,000 psi (207 bar) | 25 psi (1.7 bar) | ± 5 psi (0.34 bar) |

| Part No. | Description | Cracking Pressure |
|---|---|---|
| **STANDARD 1/4-28 INLINE CHECK VALVES** | | |
| **CV-3301** | Inlet Check Valve, 1/4-28 FB, M to 1/4-28 FB, F* | 15 psi (1 bar) |
| **CV-3302** | Outlet Check Valve, 1/4-28 FB, M to 1/4-28 FB, F* | 15 psi (1 bar) |
| ★ **CV-3315** | Inlet Check Valve, 1/4-28 FB, M to 1/4-28 FB, F* | 3 psi (0.2 bar) |
| **CV-3316** | Outlet Check Valve, 1/4-28 FB, M to 1/4-28 FB, F* | 3 psi (0.2 bar) |
| **NONMETALLIC 10-32 MICRO-VOLUME INLINE CHECK VALVE** | | |
| **CV-3500** | Inlet/Outlet Check Valve, 10-32 C, F to 10-32 C, F* | 8 psi (0.6 bar) |

** M = Male (external) threads; F = Female (internal) threads; C = Coned; FB = Flat-Bottom*

## RELATED PRODUCTS

- 1/4-28 Inline Check Valves and Non-Metallic Check Valves with 1/4-28 flat-bottom ports (next page) can be used with any 1/4-28 Flangeless, Super Flangeless™, and VacuTight™ fitting on pages 21–28 of the Fittings Chapter.
- Micro-Volume Inline Check Valves and Non-Metallic Check Valves with 10-32 coned ports (next page) can be used with any 10-32 polymer Fingertight or SealTight™ fitting on pages 11–15. Connect capillary tubing using the optional ferrules listed on page 15 or the NanoTight™ Fittings and Tubing Sleeves on page 17.

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# Nonmetallic 1/4-28 & 10-32 Inline Check Valves

- Low cracking pressure of 1 psi (0.07 bar)
- Multiple configurations for different applications
- Excellent chemical resistance
- Materials of construction: PEEK and perfluoroelastomer

Upchurch Scientific® Nonmetallic Inline Check Valves provide excellent backflow protection for sensitive equipment along with outstanding chemical resistance guaranteed by the PEEK polymer and perfluoroelastomer construction. Metal-free composition makes these check valves perfect for use with corrosive fluids or biological samples.

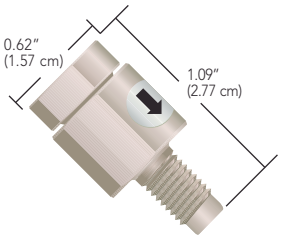
These check valves function well up to moderately-high pressure applications. Low internal volume also allows them to be used in areas where flow path volume is important; however, higher flow rates can pass through with minimal pressure drop.

## NOTE

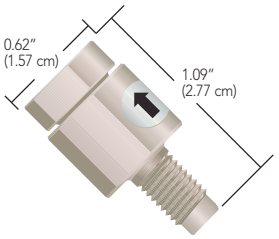
Upon initial use — or following a period of extended inactivity — the cracking pressure for these check valves may be somewhat higher than the stated cracking pressure.

## APPLICATION NOTE

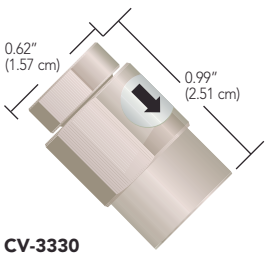
- The CV-3320 or CV-3321 style can be connected to any 1/4-28 flat-bottom port for trouble-free back flow protection.
- When using a pump after the analytical column, consider placing a CV-3330 Check Valve after the column to prevent fluid from the post-column pump from flowing backwards through the column. This product also serves as an excellent nonmetallic alternative to our CV-3010 (page 151) in sparging applications where the mobile phase may be corrosive to the stainless steel or ethylene propylene components inside the CV-3010 assembly.
- The CV-3335 Inlet and CV-3336 Outlet Check Valves allow tubing larger than 1/16" OD (up to 1/8") to be connected into a 10-32 coned internal port. Use both of these check valves when attaching a larger-volume sample loop to an analytical-scale injection valve. This setup limits the flow of the sample into the loop to one direction, minimizing back flow and sample carry-over.
- The CV-3340 is useful in virtually any high pressure fluid pathway using 1/16" or smaller OD tubing, where limiting the direction of flow is desirable.



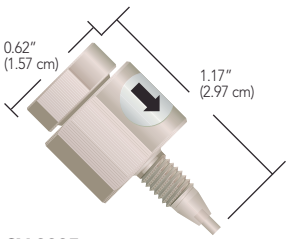

**CV-3320, CV-3322, CV-3324**
Nonmetallic, Inlet
1/4-28 FB Male to 1/4-28 FB Female



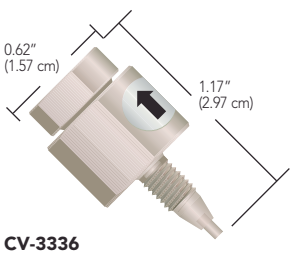

**CV-3321, CV-3323, CV-3325**
Nonmetallic, Outlet
1/4-28 FB Male to 1/4-28 FB Female



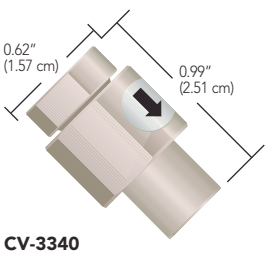

**CV-3330**
Nonmetallic, Inline
1/4-28 FB Female to 1/4-28 FB Female




**CV-3335**
Nonmetallic, Inlet
1/4-28 FB Female to 10-32 C Male




**CV-3336**
Nonmetallic, Outlet
1/4-28 FB Female to 10-32 C Male




**CV-3340**
Nonmetallic, Inline
10-32 C Female to 10-32 C Female

## SPECIFICATIONS & DETAILS

| | Swept Volume | Max. Pressure Rating | Back Pressure Created | Cracking Pressure Tolerance |
|---|---|---|---|---|
| **CV-3320, CV-3321** | 37 µL | 2,000 psi (138 bar) | 30 psi (2.1 bar) | ± 0.5 psi (0.03 bar) |
| **CV-3330** | 34 µL | 2,000 psi (138 bar) | 30 psi (2.1 bar) | ± 0.5 psi (0.03 bar) |
| **CV-3335, CV-3336** | 49 µL | 2,000 psi (138 bar) | 30 psi (2.1 bar) | ± 0.5 psi (0.03 bar) |
| **CV-3340** | 34 µL | 2,000 psi (138 bar) | 30 psi (2.1 bar) | ± 0.5 psi (0.03 bar) |
| **CV-3322, CV-3323** | 49 µL | 2,000 psi (138 bar) | 30 psi (2.1 bar) | ± 0.5 psi (0.03 bar) |
| **CV-3324, CV-3325** | 182 µL | 2,000 psi (138 bar) | 30 psi (2.1 bar) | ± 0.5 psi (0.03 bar) |

| | Part No. | Description | Cracking Pressure | Thru-Hole |
|---|---|---|---|---|
| | **NONMETALLIC 1/4-28 AND 10-32 INLINE CHECK VALVES** | | | |
| ★ | **CV-3320** | Inlet Check Valve, 1/4-28 FB, M to 1/4-28 FB, F* | 1 psi (0.07 bar) | 0.020" (0.50 mm) |
| ★ | **CV-3321** | Outlet Check Valve, 1/4-28 FB, M to 1/4-28 FB, F* | 1 psi (0.07 bar) | 0.020" (0.50 mm) |
| | **CV-3322** | Inlet Check Valve, 1/4-28 FB, M to 1/4-28 FB, F* | 1 psi (0.07 bar) | 0.040" (1.0 mm) |
| | **CV-3323** | Outlet Check Valve, 1/4-28 FB, M to 1/4-28 FB, F* | 1 psi (0.07 bar) | 0.040" (1.0 mm) |
| | **CV-3324** | Inlet Check Valve, 1/4-28 FB, M to 1/4-28 FB, F* | 1 psi (0.07 bar) | 0.060" (1.60 mm) |
| ★ | **CV-3325** | Outlet Check Valve, 1/4-28 FB, M to 1/4-28 FB, F* | 1 psi (0.07 bar) | 0.060" (1.60 mm) |
| | **CV-3330** | Inlet/Outlet Check Valve, 1/4-28 FB, F to 1/4-28 FB, F* | 1 psi (0.07 bar) | 0.020" (0.50 mm) |
| | **CV-3335** | Inlet Check Valve, 1/4-28 FB, F to 10-32 C, M* | 1 psi (0.07 bar) | 0.020" (0.50 mm) |
| ★ | **CV-3336** | Outlet Check Valve, 1/4-28 FB, F to 10-32 C, M* | 1 psi (0.07 bar) | 0.020" (0.50 mm) |
| | **CV-3340** | Inlet/Outlet Check Valve, 10-32 C, F to 10-32 C, F* | 1 psi (0.07 bar) | 0.020" (0.50 mm) |

** M = Male (external) threads; F = Female (internal) threads; C = Coned; FB = Flat-Bottom*

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# Quick-Stop Luer Inline Check Valve

- Check valve protection with luer convenience
- Remains open when engaged
- Materials of construction: PEEK, perfluoroelastomer, and gold-plated stainless steel spring

The Quick-Stop Luer Check Valve is designed to provide inline luer connect/disconnect convenience without the mess and hazard of spills. Just connect the valve assembly to your inline tubing using standard 1/4-28 flat-bottom fittings (see pages 22–29). The check valve is automatically opened once the luer connection is engaged, allowing flow in either direction. Disconnecting the luer union causes the check valve to close. Please see the "Application Note" on this page for specific ideas regarding use of this valve.

*P-696 Quick-Stop Luer Check Valve Assembly.*

## APPLICATION NOTE

### Inlet Solvent Reservoir:

Quickly change your solvent on the low pressure end of an HPLC system, while preventing potentially hazardous spills! Just install a Quick-Stop Luer Check Valve Assembly between your solvent reservoir and the pump, with the valve towards the bottle. The valve will prevent solvent leakage from the line coming from the reservoir, while the check valves in your pump prevent spills from the line leading to the pump. With both lines still full of solvent, this system also helps reduce the need to reprime your pump.

### FIA Sample Injection:

The Quick-Stop Luer Check Valve provides a practical means to introduce a sample into FIA and other low pressure systems, when used in conjunction with a P-612 Pressure Relief Valve Tee (page 154). Simply connect the Tee into the appropriate flow path line with the included fittings and thread the P-697 Quick-Stop Luer Valve onto the 1/4-28 male end of the Tee. Sample can then be introduced conveniently by using a standard luer-tipped syringe. The check valve is automatically opened when the syringe is attached and closed when the syringe is removed.

### Post Column Derivitization:

For post-column derivitization, place a CV-3000 Inline Check Valve on the effluent side of your column to prevent derivatizing agents from flowing backwards and poisoning the column. Placement on the post-column reagent line will also prevent mobile phase from contaminating the reagent if the auxiliary pump fails.

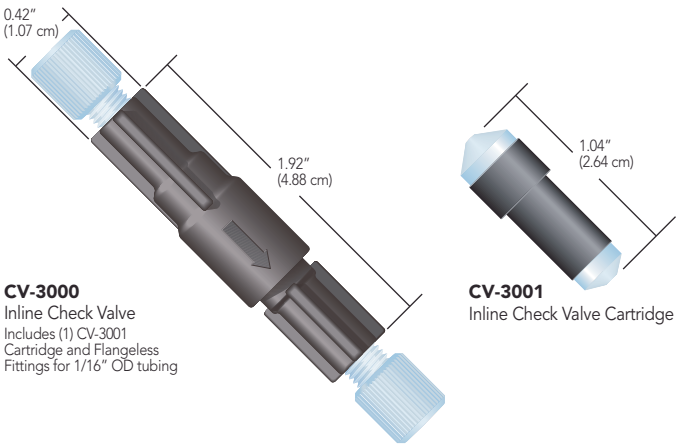
### Helium Sparging Tank Protection:

Try the CV-3010 Assembly, designed specifically for degassing (sparging) lines to prevent solvent backup if the sparging gas runs out. This check valve will help prevent potential solvent cross-contamination and damage to the gas regulating valve.

# Inline Cartridge Check Valves

- Low cracking pressures
- Less than 150 µL internal volume
- Materials of construction: PEEK; perfluoroelastomer (CV-3001); gold-plated stainless steel spring (CV-3001); ethylene propylene (CV-3011); and stainless steel spring (CV-3011)

Upchurch Scientific® cartridge-style Inline Check Valves are designed to limit flow to one direction. These assemblies withstand system pressures of 1,000 psi (69 bar). The cracking pressures for the Inline Check Valve Cartridges are 1.5 psi (0.1 bar) for the CV-3001 and 3 psi (0.2 bar) for the CV-3011. Tolerance on the cracking pressure for CV-3001 is ± 0.5 psi (0.03 bar) and ± 1.5 psi (0.1 bar) on CV-3011.




**CV-3000**
Inline Check Valve
Includes (1) CV-3001 Cartridge and Flangeless Fittings for 1/16" OD tubing

**CV-3001**
Inline Check Valve Cartridge

| | Part No. | Description | Includes | Swept Volume |
|---|---|---|---|---|
| | **QUICK-STOP LUER CHECK VALVE** | | | |
| | **P-696** | Quick-Stop Luer Check Valve Assembly | (1) P-697, (1) P-655 | 127 µL |
| ★ | **P-697** | Quick-Stop Luer Check Valve | | 107 µL |
| | **P-698** | Bulkhead Quick-Stop Luer Valve Assembly | (1) P-699, (1) P-655, (1) nut/lock washer set | 127 µL |
| | **P-699** | Bulkhead Quick-Stop Luer Valve | (1) nut/lock washer set | 107 µL |
| | **INLINE CARTRIDGE CHECK VALVES** | | | |
| ★ | **CV-3000** | Inline Check Valve Assembly for 1/16" OD tubing | (1) CV-3001, (2) XP-215 | 96 µL |
| | **CV-3001** | Inline Check Valve Cartridge for CV-3000 | | 91 µL |
| | **CV-3010** | Inline Check Valve Assembly for 1/8" OD tubing | (1) CV-3011, (2) XP-315 | 100 µL |
| | **CV-3011** | Inline Check Valve Cartridge for CV-3010 | | 92 µL |

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# Back Pressure Regulators (BPRs)

- Proven outgassing protection
- Flow-independent pump preload for greater pump efficiency
- 5 to 1,000 psi cartridges and assemblies available

Back Pressure Regulators are designed to enhance system performance through outgassing prevention and improved pump check valve efficiency.

Upchurch Scientific® back pressure regulators include:

- 5 and 20 psi assemblies (replacement cartridges not available)
- 40, 75, 100, 250, 500, 750, and 1,000 psi cartridges and assemblies
- PEEK and stainless steel BPR holders
- High pressure adjustable BPR for pressures between 2,000 and 5,000 psi
- Ultra low volume BPRs set to 100 and 500 psi (page 154)

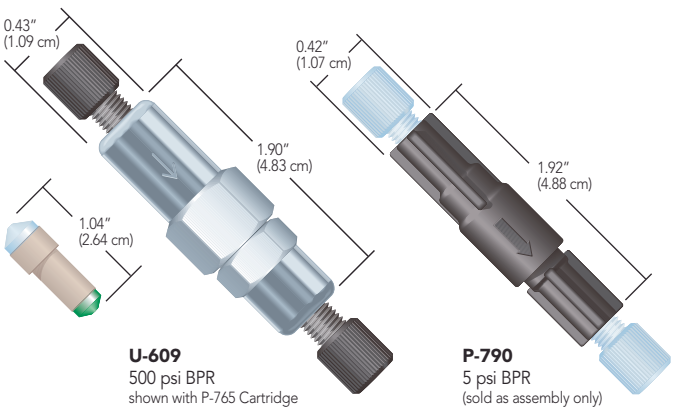
For flow control options try the Micro-Metering Valves found on page 147.

*Biocompatible Back Pressure Regulator Holder, shown with available Cartridges*

# BPR Assemblies

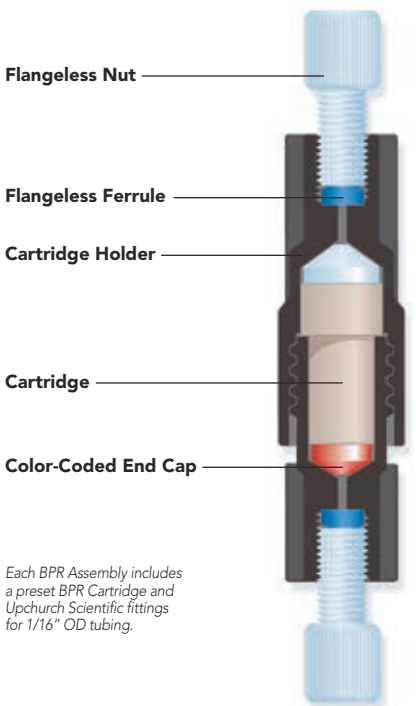
Choose from our line of Biocompatible and Stainless Steel BPR Assemblies, each complete with a replaceable, factory preset cartridge (except the 5 and 20 psi versions).

Upchurch Scientific BPR Assemblies create incremental back pressures ranging from 5 to 1,000 psi (0.3 to 69 bar). The Biocompatible BPR Assemblies feature a PEEK holder; polymer-based fittings; biocompatible BPR cartridges and wrenches for tightening. Stainless Steel BPR Assemblies feature the same biocompatible BPR cartridges with a 316 stainless steel holder and polymer fittings.




**U-609**
500 psi BPR
shown with P-765 Cartridge

**P-790**
5 psi BPR
(sold as assembly only)




*Each BPR Assembly includes a preset BPR Cartridge and Upchurch Scientific fittings for 1/16" OD tubing.*

## APPLICATION NOTE

Small gas bubbles often form as solvent moves from the high pressure of an HPLC column to the low pressure environment leading to the detector. This outgassing can cause erratic baseline readings and loss of sensitivity. Placing an Upchurch Scientific BPR (usually a 40–100 psi) after the detector provides an excellent, low-cost method for reducing this problem by maintaining enough back pressure on the mobile phase to keep gases dissolved in solution.

A back pressure regulator can also be used as a pump preload for low and fluctuating pressure applications. Many of today's pumps require a steady back pressure to function properly. Install an Upchurch Scientific BPR (usually 500–1,000 psi) between the pump and the injector to enhance pump performance.

*Caution: Do not exceed the maximum operating pressure of your system — please refer to the operating manuals for your system components before choosing the appropriate BPR.*

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# Replacement Back Pressure Regulator (BPR) Cartridges

- Materials of construction: PEEK, ETFE, perfluoroelastomer, and gold-plated stainless steel

These replacement cartridges will operate in any of the standard BPR holders shown on this page. These cartridges create back pressures from 40 to 1,000 psi (2.8 to 69 bar)—all independent of flow except as noted below.

The recommended operating flow rate range for our BPR Cartridges is 0.1 mL–10 mL/min. Within this range, the amount of back pressure created by the BPR Cartridges and Assemblies will not vary more than ±10%. Lower or higher flow rates may result in larger pressure fluctuations.

**P-761**
40 psi BPR Cartridge

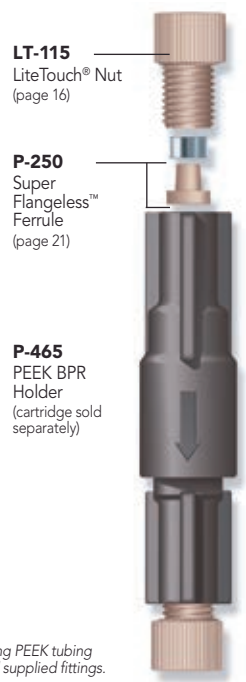
**P-796**
1,000 psi BPR Cartridge

# BPR Holders

Upchurch Scientific® P-465 PEEK and U-469 Stainless Steel BPR Holders work with any of our replacement BPR Cartridges. Each holder comes with fittings for 1/16" OD tubing (see below). The U-469 Holder is surface-treated to prevent galling, a potential problem with large, threaded metal parts.

*Please Note: These Back Pressure Regulator Holders are designed to allow each cartridge to operate at its stated pressure setting when tightened to 20 in–lbs. of torque. To approximate this level of torque, first finger tighten the Holder, then tighten an additional 1/8–1/4 turn with the supplied wrenches.*

**Pressure Rating 3,000 psi (207 bar)***




* *Using PEEK tubing and supplied fittings.*

**Pressure Rating 4,000 psi (276 bar)****

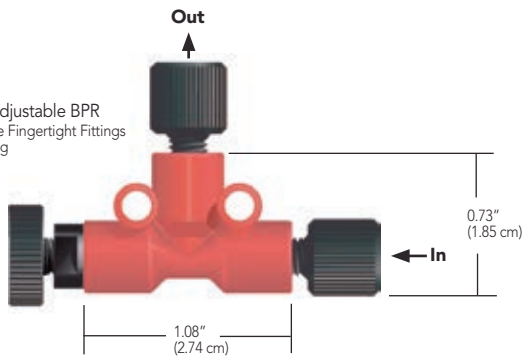
** *Using stainless steel tubing and supplied fittings.*

# High Pressure Adjustable BPR

- Materials of construction: PEEK, perfluoroelastomer, and PTFE

The biocompatible P-880 High Pressure Adjustable BPR offers the flexibility to adjust your system back pressure between 2,000 and 5,000 psi (138 and 345 bar), independent of the flow. Only 10% fluctuation in pressure generally occurs with flow rates of 0.1–10 mL/min. Lower or higher flow rates will lead to greater fluctuations in pressure. To achieve the desired back pressure setting, simply turn the thumbscrew while monitoring your system pressure. Because this product creates such high back pressure, please check system component specifications prior to using to avoid damaging any sensitive components.

**P-880**
High Pressure Adjustable BPR
Includes One-Piece Fingertight Fittings for 1/16" OD tubing




| | Part No. | Pressure Setting | Material | Includes | Volume |
|---|---|---|---|---|---|
| | **BPR ASSEMBLIES** | | **Holder** | | **Swept** |
| | **P-790** | 5 psi (0.3 bar) | PEEK | (2) XP-215 | 134 µL |
| ★ | **P-791** | 20 psi (1.4 bar) | PEEK | (2) XP-215 | 134 µL |
| ★ | **P-785** | 40 psi (2.8 bar) | PEEK | (1) P-761, (2) XP-215 | 131 µL |
| ★ | **P-786** | 75 psi (5.2 bar) | PEEK | (1) P-762, (2) XP-215 | 131 µL |
| ★ | **P-787** | 100 psi (7 bar) | PEEK | (1) P-763, (2) XP-215 | 131 µL |
| | **P-788** | 250 psi (17 bar) | PEEK | (1) P-764, (2) XP-235 | 102 µL |
| | **P-789** | 500 psi (34 bar) | PEEK | (1) P-765, (2) P-250, (2) LT-115 | 96 µL |
| | **P-455** | 1,000 psi (69 bar) | PEEK | (1) P-796, (2) P-250, (2) LT-115 | 89 µL |
| | **U-605** | 40 psi (2.8 bar) | SST | (1) P-761, (2) XP-201 | 129 µL |
| | **U-606** | 75 psi (5.2 bar) | SST | (1) P-762, (2) XP-201 | 129 µL |
| ★ | **U-607** | 100 psi (7 bar) | SST | (1) P-763, (2) XP-201 | 129 µL |
| | **U-608** | 250 psi (17 bar) | SST | (1) P-764, (2) XP-201 | 99 µL |
| | **U-609** | 500 psi (34 bar) | SST | (1) P-765, (2) XP-201 | 93 µL |
| | **U-610** | 750 psi (52 bar) | SST | (1) P-795, (2) P-250, (2) LT-115 | 91 µL |

| | Part No. | Pressure Setting | COLOR CODING Body | COLOR CODING End-Cap | Swept Volume |
|---|---|---|---|---|---|
| | **REPLACEMENT CARTRIDGES** | | | | |
| | **P-761** | 40 psi (2.8 bar) | Tan | Blue | 125 µL |
| | **P-762** | 75 psi (5.2 bar) | Tan | Yellow | 125 µL |
| ★ | **P-763** | 100 psi (7 bar) | Tan | Red | 125 µL |
| | **P-764** | 250 psi (17 bar) | Tan | White | 95 µL |
| | **P-765** | 500 psi (34 bar) | Tan | Green | 89 µL |
| | **P-795** | 750 psi (52 bar) | Black | Blue | 87 µL |
| | **P-796** | 1,000 psi (69 bar) | Black | Green | 83 µL |

| | Part No. | Holder Style | Holder Material | Includes | Swept Volume |
|---|---|---|---|---|---|
| | **BPR HOLDERS** | | | | |
| | **P-465** | Biocompatible BPR | PEEK | (2) P-250, (2) LT-115 | 7 µL |
| | **U-469** | High Pressure BPR | SST | (2) F-300 | 4 µL |
| | **HIGH PRESSURE ADJUSTABLE BPR ASSEMBLY** | | | | |
| ★ | **P-880** | 2,000–5,000 psi (138-345 bar) | | (2) F-120BLK | 9 µL |

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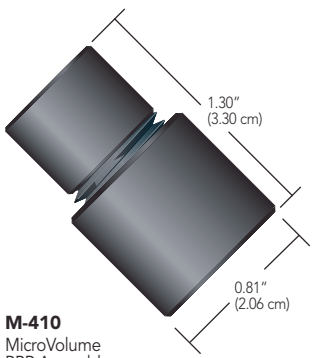
# Ultra-Low Volume Back Pressure Regulators (BPR)

- Wetted flow path materials: PEEK, perfluoroelastomer, and ETFE
- Available pressure settings of 100 or 500 psi (7 or 34 bar)
- Low swept volume of only 6 µL

Ultra-Low Volume Back Pressure Regulators (BPRs) were developed to minimize swept volume, which is especially important for multi-detector applications. With a maximum swept volume of only 6 µL*, it is nearly impossible to detect these BPRs as part of your fluid pathway. To minimize the swept volume added to your flow path, we recommend trimming the length of the attached tubing. And because the flow path is completely polymeric, you are assured of biocompatibility.

*Please Note: Our Ultra-Low Volume Back Pressure Regulators cannot be used as check valves due to their unique internal design. Try our Micro-Volume Inline Check Valve on page 149.*

** The maximum internal swept volume listed above is for the back pressure regulator only and does not include the volume of the attached tubing lines.*



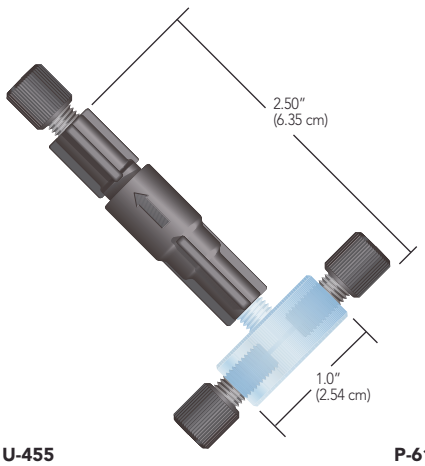

**M-410**
MicroVolume
BPR Assembly
Attached tubing not shown

# Pressure Relief Valves

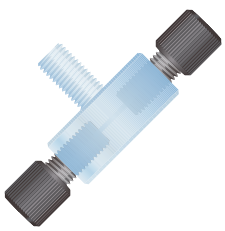
- Prevent system over-pressurization

Upchurch Scientific® Pressure Relief Valves are ideal for preventing system over-pressurization. These products protect system components by diverting fluid flow automatically when inline pressure exceeds the set limit. Choose between preset 100 psi (7 bar) and 5 psi (0.3 bar) assemblies, both shipped with Flangeless Fittings. The 100 psi version is a good, general purpose valve, while the 5 psi version is perfect for protecting syringe and peristaltic pump systems (see pages 93–108). The void volume of both relief valves is low due to the small 0.020" (0.50 mm) thru-holes in the valve tee body.

If you wish to have the Pressure Relief Valve open at a different pressure than 5 or 100 psi, simply combine one of the other replacement Back Pressure Regulator Assemblies listed on page 152 with the P-612 Pressure Relief Valve Tee. Choose the P-612S for larger bore tubing and higher flow applications.




**U-455**
Pressure Relief Valve
Includes Flangeless Fittings
for 1/16" OD tubing
(Drawing is not actual size)



**P-612**
Pressure Relief Valve Tee
Includes Flangeless Fittings
for 1/16" OD tubing
(Drawing is not actual size)

## SPECIFICATIONS & DETAILS

| | Back Pressure Setting psi (bar) | Flow Rate Recommendations | Recommended Pressure Range psi (bar) | 1/16" OD Tubing |
|---|---|---|---|---|
| **M-410** | 100 [2] (7)[2] | Optimal: 100 µL–1 mL/min<br>Max.: 4 mL/min | 40–150 (3–10) | PEEK, 0.010" ID |
| **M-412** | 500 [2] (34)[2] | Optimal: 100 µL–1 mL/min<br>Max.: 4 mL/min | 250–525 (17–36) | PEEK, 0.010" ID |
| **M-420** | 100 [3] (7)[3] | Optimal: 3–8 mL/min<br>Max.: 10 mL/min | 40–150 (3–10) | PEEK, 0.020" ID |

[1] All data generated using water at room temperature.
[2] Set at a flow rate of 0.5 mL/min.
[3] Set at a flow rate of 5 mL/min.

| | Part No. | Description | Pressure Setting | Tubing OD | Includes | Swept Volume |
|---|---|---|---|---|---|---|
| | **ULTRA-LOW VOLUME BPRs** | | | | | |
| | **M-410** | Low Flow | 100 psi (7 bar) | 1/16" | XP-230 | 6 µL |
| ★ | **M-412** | Low Flow | 500 psi (34 bar) | 1/16" | XP-230 | 6 µL |
| | **M-420** | High Flow | 100 psi (7 bar) | 1/16" | XP-230 | 6 µL |
| | **PRESSURE RELIEF VALVES** | | | | | |
| | **U-455** | Pressure Relief Assembly | 5 psi (0.3 bar) | 1/16" | XP-201 | 148 µL |
| ★ | **U-456** | Pressure Relief Assembly | 100 psi (7 bar) | 1/16" | XP-201, wrenches | 139 µL |
| ★ | **P-612** | Pressure Relief Tee | | 1/16" | XP-201 | 14 µL |
| | **P-612S** | Pressure Relief Tee | | 3/16" | XP-201 | 348 µL |

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# Prime/Purge Valve for Waters® Pumps

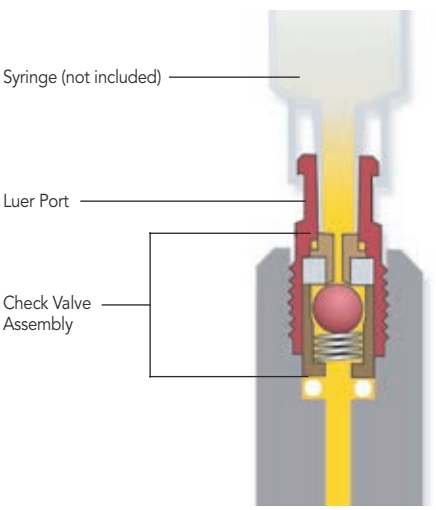
- Automatic valve operation with a simple twist of a luer lock syringe
- No tubing to cut or ferrules to swage
- No wear on the internal seal
- Materials of construction: ruby, sapphire, PEEK, PTFE, and stainless steel

The Upchurch Scientific® Prime/Purge Valve for Waters pumps automatically opens when a luer syringe is attached and closes when the syringe is removed. No valve rotation is required after the initial installation, so wear on the internal seal is eliminated.

In addition, our Waters-compatible Prime/Purge Valve is simpler to operate and more economically priced than alternative valves available for Waters systems.

A Waters-compatible internal PTFE seal is included with the valve. This seal can also be purchased separately. It can be used both with the Upchurch Scientific valve and the original valve supplied with the pump.

### Attaching/Removing the Syringe Automatically Opens and Closes the Valve

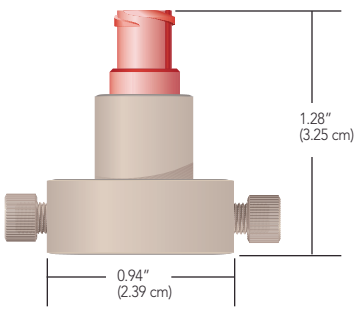



# Universal Prime/Purge Valve

- For any style HPLC system
- Automatic luer syringe operation
- Featuring handy mounting holes
- Materials of construction: ruby, sapphire, PEEK, PTFE, and stainless steel

The Upchurch Scientific Universal Prime/Purge Valve is easy to operate. Simply install a valve along the flow path with the included fittings and attach a luer-tipped syringe. Then, withdraw the plunger and watch as solvent and residual bubbles are removed from the solvent line. The valve automatically closes when the syringe is removed.

The valve is designed to be used with 1/8" OD tubing. Optional mounting is made easy by the handy holes in the body of each unit.




**V-321**
Universal Prime/Purge Valve
Mounting holes are 0.75" (1.91 cm) apart

## APPLICATION NOTE

### Air in the Inlet Solvent Line

Install the Low Pressure Universal Prime/Purge Valve along the inlet solvent path near the pump to remove bubbles from the inlet solvent line. The valve can also be used to rapidly "wet" your solvent inlet filter. When a new filter is installed, it often contains a substantial amount of air within its pores. At standard flow rates, it may require several minutes before the inlet fluid pathway is completely free of gas. Using this valve you are able to rapidly draw solvent through the inlet filter, dislodging the gas and minimizing downtime.

| Part No. | Description | Includes |
|---|---|---|
| PRIME/PURGE VALVES | | |
| **B-310** | 10 cc Disposable Luer-Tipped Syringe | |
| **V-320** | Prime/Purge Valve for Waters Pumps | (1) V-320-06 |
| **V-320-06** | Replacement PTFE Seal (for V-320) | |
| **V-321** | Universal Prime/Purge Valve | (2) P-300N, (2) P-335 |

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# FILTERS & COLUMN ACCESSORIES

**INLET SOLVENT FILTERS**
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**INLINE SOLVENT FILTERS**
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**PRECOLUMN FILTERS**
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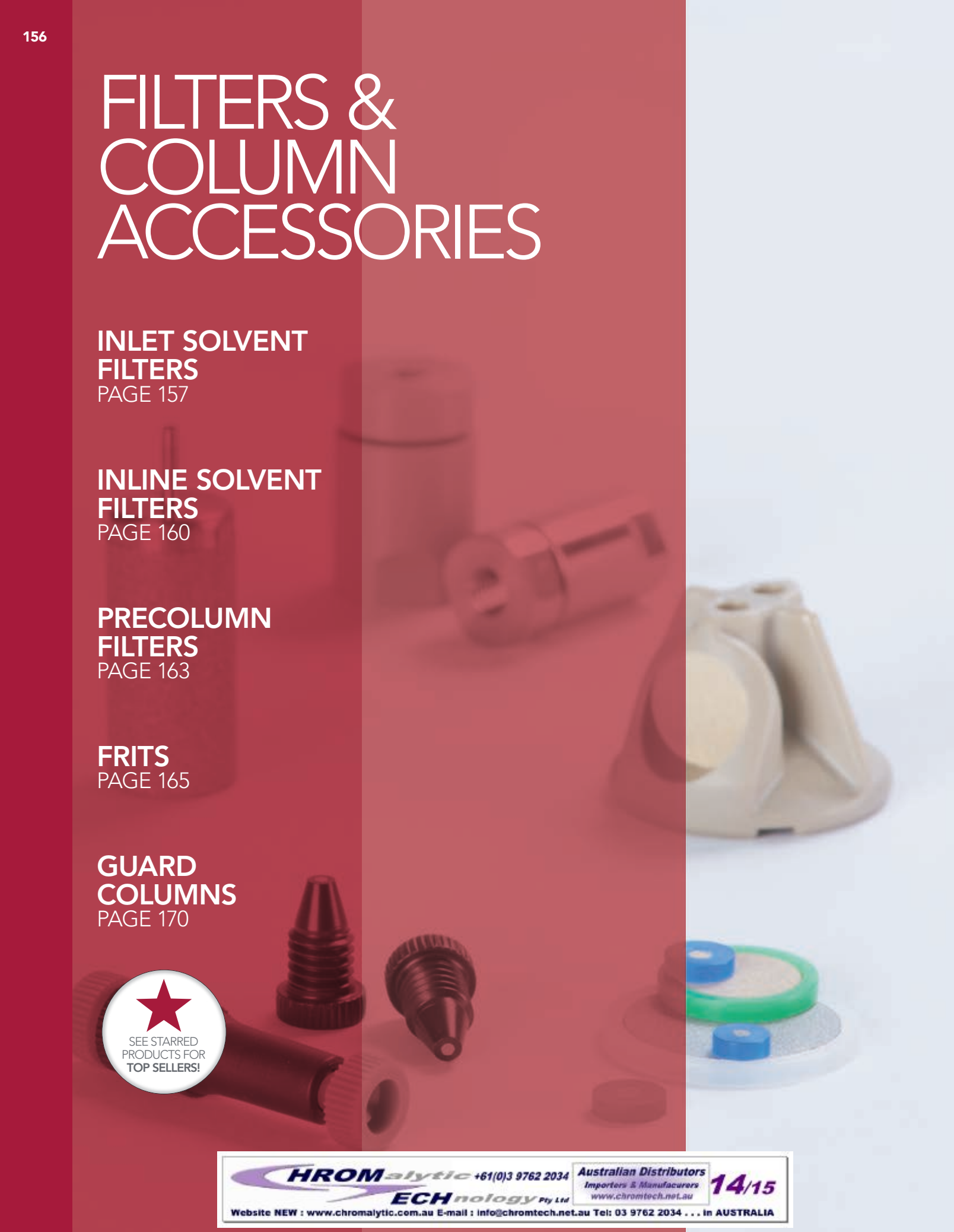
**FRITS**
PAGE 165

**GUARD COLUMNS**
PAGE 170



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# General Use Inlet Solvent Filters

- Large surface areas prevent pump cavitation
- Disposable
- 2 µm, 10 µm, and 20 µm pore sizes available
- General use and prep filters for higher flow applications

It is good practice to filter your solvents to prevent pump damage. Upchurch Scientific® 316 stainless steel filters provide that protection.

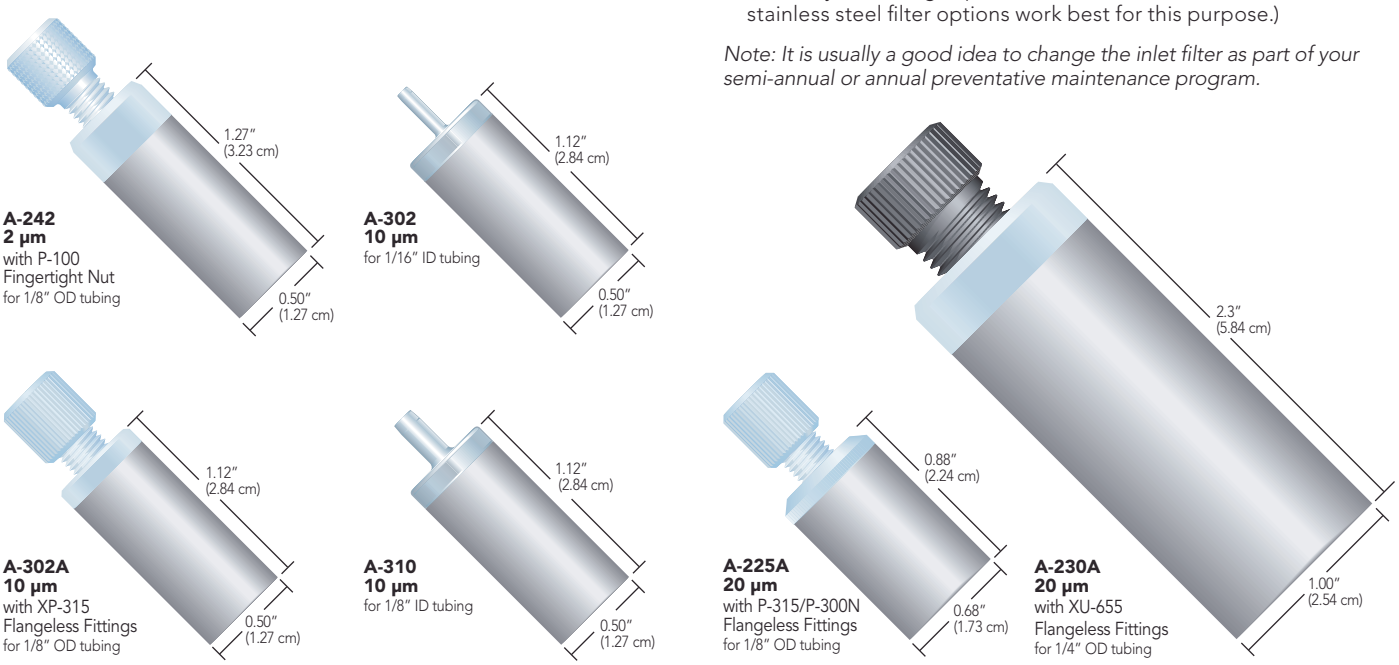
Because filters should be changed periodically, we make it easy to replace them without tools. For those filters using a plastic fitting, the tubing can be reconnected by finger tightening the fitting into the new filter. The filters with stems allow easy insertion into the inlet tubing.

## APPLICATION NOTE

### Why Use An Inlet Solvent Filter?

- To filter out particulate matter from the solvent that may otherwise damage expensive hardware. (Use a 10 µm or 20 µm version for this purpose. The A-309 and A-230A filters have an added "Bottom of the Bottle™" feature to help draw solvent to within 1/8" of the bottom of your solvent bottle.)
- To prevent particulates originating from the sparging system from entering the mobile phase reservoir and to help disperse the sparging gas efficiently. (Use a 2 µm filter for this purpose.)
- To hold your tubing in place at the bottom of the bottle. (Most stainless steel filter options work best for this purpose.)

*Note: It is usually a good idea to change the inlet filter as part of your semi-annual or annual preventative maintenance program.*




| | Part No. | Description | Porosity | Material | For Tubing Size | Includes | Max. Suggested Flow Rate* |
|---|---|---|---|---|---|---|---|
| | **GENERAL USE INLET SOLVENT FILTERS** | | | | | | |
| | **For Analytical HPLC** | | | | | | |
| | **A-242** | Inlet Solvent Filter with One-Piece Fitting | 2 µm | PCTFE, SST | 1/8" OD | (1) P-100 | 10 mL/min |
| | **A-243** | A-242, 5-pack | 2 µm | PCTFE, SST | 1/8" OD | (5) P-100 | 10 mL/min |
| | **A-228** | Inlet Solvent Filter with stem | 2 µm | SST | 1/8" ID | — | 80 mL/min |
| ★ | **A-302** | Inlet Solvent Filter with stem | 10 µm | SST | 1/16" ID | — | 40 mL/min |
| ★ | **A-302A** | Inlet Solvent Filter with Flangeless Fittings | 10 µm | PCTFE, SST | 1/8" OD | (1) XP-315 | 40 mL/min |
| | **A-309** | Inlet Solvent Filter with stem | 10 µm | SST | 1/16" ID | — | 40 mL/min |
| | **A-231A** | Inlet Solvent Filter with Flangeless Fittings | 20 µm | PCTFE, SST | 3/16" OD | (1) XP-132 | 100 mL/min |
| ★ | **A-310** | Inlet Solvent Filter with stem | 10 µm | SST | 1/8" ID | — | 40 mL/min |
| | **For Preparative HPLC Systems** | | | | | | |
| | **A-225** | Inlet Solvent Filter with stem | 20 µm | SST | 1/16" ID | — | 100 mL/min |
| ★ | **A-225A** | Inlet Solvent Filter with Flangeless Fittings | 20 µm | PCTFE, SST | 1/8" OD | (1) P-315, (1) P-300N | 100 mL/min |
| | **A-227A** | Inlet Solvent Filter with Flangeless Fittings | 10 µm | PCTFE, SST | 1/4" OD | (1) XU-655 | 100 mL/min |
| | **A-230A** | Inlet Solvent Filter with Flangeless Fittings | 20 µm | PCTFE, SST | 1/4" OD | (1) XU-655 | 100 mL/min |
| | **A-311** | Inlet Solvent Filter with stem | 10 µm | SST | 1/16" ID | — | 100 mL/min |
| | **A-311A** | Inlet Solvent Filter with Flangeless Fittings | 10 µm | PCTFE, SST | 1/8" OD | (1) XP-315 | 100 mL/min |

** Maximum suggested flow rates are determined by porosity and surface area.*

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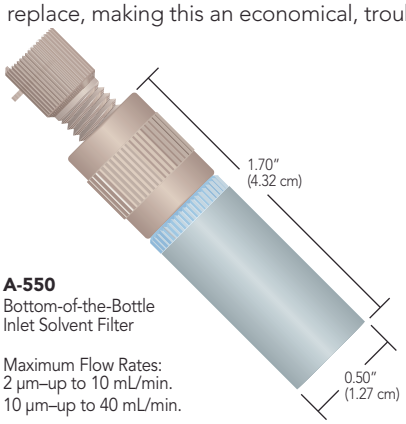
## Stainless Steel Bottom-of-the-Bottle™ Solvent Filters

- Draws solvent from within 1/8" of the bottom of the bottle
- Replaceable stainless steel filter cups
- Versions for 1/8" and 3/16" OD tubing
- Materials of construction: PEEK, ETFE, and 316 Stainless Steel

Patented Stainless Steel Bottom-of-the-Bottle Solvent Filter Assemblies feature a 2 µm or 10 µm replaceable stainless steel filter cup and a design that allows solvent to be drawn from within 1/8" of the bottom of your solvent bottle. The filter cups are inexpensive and easy to replace, making this an economical, trouble-free choice.




**A-550**
Bottom-of-the-Bottle
Inlet Solvent Filter

Maximum Flow Rates:
2 µm–up to 10 mL/min.
10 µm–up to 40 mL/min.

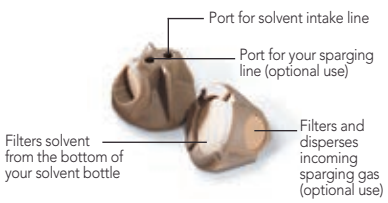
## All-PEEK Bottom-of-the-Bottle Solvent Filters

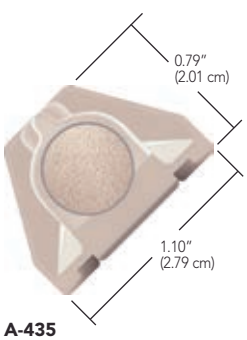
- Most recommended filtering unit
- 100% PEEK polymer construction
- Easy operation — no fittings required

Biocompatible

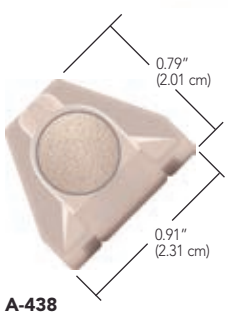
These biocompatible filters are made from 100% PEEK polymer, including the two built-in PEEK frits. The bottom frit (2 µm or 10 µm) will draw solvents from within 0.080" (2.0 mm) of the bottom of the solvent bottle. The 2 µm frit on the side may be used for a 1/8" OD helium sparging line.

To use, simply press fit your appropriately sized fluoropolymer tubing firmly into the top holes. That's it!




**A-435**
Bottom-of the-Bottle Filter




**A-438**
Bottom-of the-Bottle Filter
(for small neck bottles)

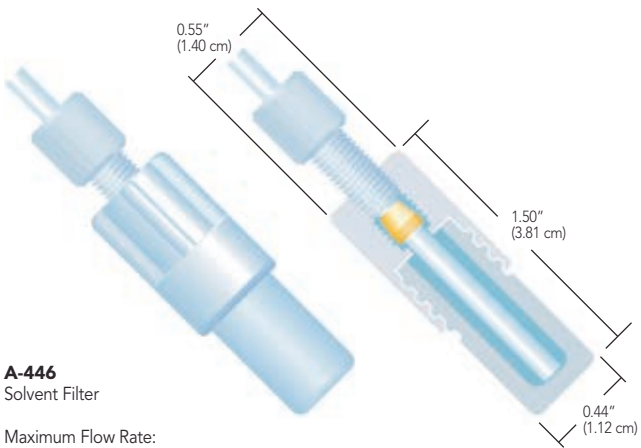
Maximum Flow Rate: up to 30 mL/min

## UHMWPE Bottom-of-the-Bottle Solvent Filters

- Replaceable filter cup
- Economical
- Materials of construction: UHMWPE, ETFE
- Versions for 1/16" and 1/8" OD tubing

The design of the UHMWPE solvent filters allows tubing to pass through to the bottom of the filter cup, enabling the filter to draw solvent from within 0.10" (2.5 mm) of the bottom of your solvent bottle.

*Please Note: UHMWPE is a hydrophobic material. To establish proper surface wetting, you may need to prime the filter with methanol or acetonitrile.*




**A-446**
Solvent Filter

Maximum Flow Rate:
up to 5 mL/min

| | Part No. | Description | Porosity | For Tubing Size | Includes |
|---|---|---|---|---|---|
| | **STAINLESS STEEL BOTTOM-OF-THE-BOTTLE SOLVENT FILTERS** | | | | |
| ★ | **A-550** | SST Filter Assembly, with A-520 filter cup | 10 µm | 1/8" OD | (1) XP-130 |
| | **A-551** | SST Filter Assembly, with A-522 filter cup | 2 µm | 1/8" OD | (1) XP-130 |
| | **A-520x** | SST Replacement Solvent Filter Cups, 10-pk | 10 µm | — | — |
| | **A-522x** | SST Replacement Solvent Filter Cups, 10-pk | 2 µm | — | — |
| | **ALL-PEEK BIOCOMPATIBLE BOTTOM-OF-THE-BOTTLE SOLVENT FILTERS** | | | | |
| | **A-435** | PEEK Filter | 2 µm | 1/8" OD | — |
| | **A-437** | PEEK Filter, for small-neck (GL-38) bottles | 2 µm | 1/8" OD | — |
| | **A-438** | PEEK Filter, for small-neck (GL-38) bottles | 10 µm | 1/8" OD | — |
| ★ | **A-440** | PEEK Filter | 10 µm | 1/8" OD | — |
| | **A-441** | PEEK Filter | 10 µm | 3/16" OD | — |
| | **A-451** | PEEK Filter | 10 µm | 1/16" OD | — |
| | **UHMWPE BIOCOMPATIBLE BOTTOM-OF-THE-BOTTLE SOLVENT FILTERS** | | | | |
| | **A-445** | UHMWPE Filter Assembly | 10 µm | 1/16" OD | (1) XP-245 |
| ★ | **A-446** | UHMWPE Filter Assembly | 10 µm | 1/8" OD | (1) XP-345 |
| | **A-427** | UHMWPE Replacement Solvent Filter Cups, 5-pk | 10 µm | — | — |

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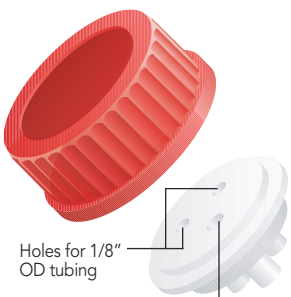
# Bottle Caps

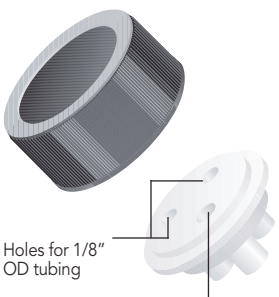
- Extremely simple — no threaded ports or fittings
- Manufactured from ETFE and Polypropylene

If you are looking for a bottle cap that is quick and easy to use, but still allows many connection options, we have just what you need! The Bottle Caps fit standard GL-45 (1 L) or smaller-neck GL-38 (4 L) glass bottles.

Each cap has three holes. With two of the holes you simply push your tubing straight through. The third hole, with a luer taper, can be used for a number of options. Any male luer (such as a luer-lock syringe) will fit snugly in this hole, or you can use the A-626 or A-627 Plug. Exceptions are the A-610 and A-610B Bottle Caps. Please see the note below.




**A-620**
GL-45 Bottle Cap
for 1/8" tubing



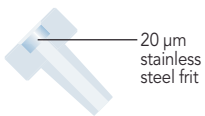

**A-622**
GL-38 Bottle Cap
for 1/8" tubing

# Bottle Cap Plugs & Adapters

Use the A-626 Bottle Cap Plug to seal the third "tapered" luer hole found in most Upchurch Scientific® Bottle Caps. Or, use the A-628 Plug to seal any unused 1/16" or 1/8" bottle cap holes.

Alternatively, try the A-627 or A-629 Filter Bottle Cap Plug to cap an unused hole in your bottle cap. The 20 µm stainless steel frit in these products prevents foreign matter from contaminating your solvent while leaving the bottle open to the atmosphere, thus allowing fluid to be pulled out without creating a vacuum (generally not used with sparging applications). All plug bodies are manufactured from ultra-high molecular weight polyethylene (UHMWPE).

**A-626**
Bottle Cap Plug




**A-629**
Filter Bottle Cap Plug

## APPLICATION NOTE

- A self-regulating sparging system can help reduce helium consumption and improve pump performance. Set this up by pressing your tubing through the appropriate holes in your bottle cap and attaching each line to a filter. Sparge your mobile phase with an inert gas (preferably helium) for 15–20 minutes. Then reduce the outlet pressure of the sparging gas to a maximum of 5 psi (0.34 bar) and insert a plug (A-626 or A-628) into the remaining port of the cap. The sparging gas will shut off once the incoming pressure equals the pressure inside the reservoir. As the mobile phase is consumed and the internal pressure lowers, sparging gas will enter to keep the system pressurized and degassed. Please Note: If gas leaks while pressurizing the bottle, try removing the sealing ring from the bottle, as it sometimes interferes with the sealing of these bottle caps.
- One concern with sparging systems is the possibility of solvent backing up the sparging inlet line. This can occur if the gas tank completely evacuates with the regulating valves open, creating a vacuum in the tubing. Solvent backup may damage sparging system components and cause cross-contamination of mobile phase reservoirs. To help prevent solvent backup, install the CV-3010 Inline Check Valve (page 151) along the tubing line that runs between the gas supply and the solvent bottle.
- For a more efficient degassing system, please see the Systec® HPLC Vacuum Degassing Systems on page 178.
- Please see the Quick-Stop Luer Check Valve on page 151 for another solvent inlet Application Note.

## NOTE

The A-610 and A-610B Bottle Caps have a slightly different configuration than the other caps. One hole accepts 3/16" OD tubing, the typical size used with some Waters® systems. The remaining two holes accept 1/8" OD tubing. Unlike the other caps, the A-610 does not have a tapered luer hole. If desired, use our A-628 Plug or A-629 Filter Plug for one of the 1/8" holes.

## RELATED PRODUCTS

To ensure a tight seal, use Upchurch Scientific fluoropolymer tubing with these bottle caps (pages 70–73).

| | Part No. | Description |
|---|---|---|
| | **BOTTLE CAPS FOR GL-45, 1 L BOTTLES** | |
| | **A-610** | for 3/16" OD tubing, Red |
| | **A-610B** | for 3/16" OD tubing, Blue |
| ★ | **A-620** | for 1/8" OD tubing, Red |
| ★ | **A-620B** | for 1/8" OD tubing, Blue |
| | **A-630** | for 1/16" OD tubing, Red |
| | **A-630B** | for 1/16" OD tubing, Blue |
| | **BOTTLE CAPS FOR GL-38, 4 L BOTTLES** | |
| ★ | **A-622** | for 1/8" OD tubing, Black |
| | **BOTTLE CAP PLUGS AND ADAPTER** | |
| ★ | **A-626** | Bottle Cap Plug for luer hole, UHMWPE |
| | **A-627** | Filter Bottle Cap Plug for luer hole, UHMWPE with 20 µm stainless steel frit |
| ★ | **A-628** | Bottle Cap Plug for 1/16", 1/8" or 3/16" hole, UHMWPE |
| | **A-629** | Filter Bottle Cap Plug for 1/16", 1/8" or 3/16" hole, UHMWPE with 20 µm stainless steel frit |

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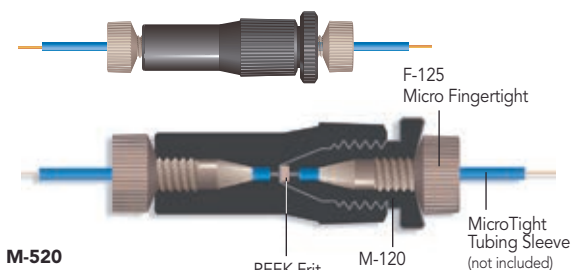
# Inline Solvent Filters

- Specially engineered for inline filtration
- Versions include Micro, Standard, and Semi-Preparative
- Bio-inert and stainless steel options offered
- Variety of porosities, application appropriate

# Inline MicroFilters

- 100% biocompatible PEEK polymer option available
- Miniscule 240 nL void volume
- Two versions: direct connect 1/32" OD tubing or use MicroTight® tubing sleeves for 70–520 µm OD capillary tubing

Upchurch Scientific® Inline MicroFilters protect your column from particles originating in the mobile phase or sample, or from pump seal and sample injection valve wear. These filters have a 0.006" (150 µm) thru-hole. Choose the M-520 with a 0.5 µm 100% PEEK frit to connect to capillary tubing using the MicroTight tubing sleeves (page 19). You may also directly connect 1/32" OD tubing using the M-525 which contains a 0.5 µm PEEK frit.



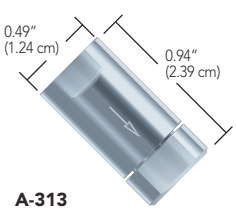

**M-520**
Inline MicroFilter Assembly

**M-525**
Inline MicroFilter Assembly

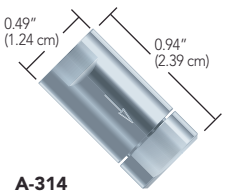
# Standard Inline Solvent Filters

- For 1/16" OD tubing
- Versions for Standard HPLC (6,000 psi/414 bar) and UHPLC (25,000 psi/1,725 bar)
- Replacement frits available
- Help prevent particulate contamination from clogging sensitive equipment
- Ideally suited for placement along the flow path line between the pump and injection valve/autosampler

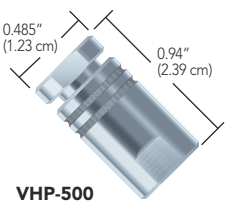
Inline filter assemblies that begin with the letter "A" are engineered for standard HPLC applications (up to 6,000 psi/414 bar). Inline Filter Assemblies that begin with the "VHP" prefix are suitable for use in UHPLC systems, where pressures can reach 25,000 psi (1,725 bar).



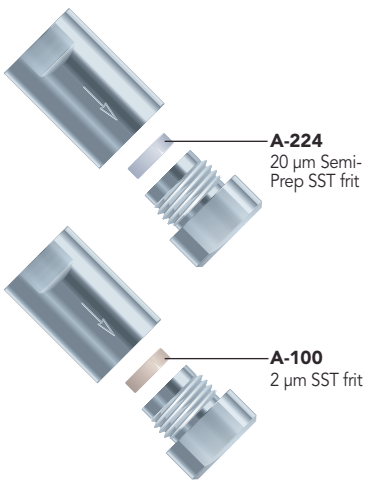

**A-313**
Inline Solvent Filter




**A-314**
Inline Solvent Filter




**VHP-500**
Inline VHP Filter




## RELATED PRODUCTS

### Fittings

All Standard Inline Solvent Filters have 10-32 threads for 1/16" OD tubing, allowing the use of most standard chromatography high pressure fittings.

| | Part No. | Description | Porosity | For Tubing Size | Threads | Includes | Swept Volume | Pressure Rating | Qty. |
|---|---|---|---|---|---|---|---|---|---|
| | **INLINE MICROFILTERS** | | | | | | | | |
| ★ | **M-520** | Inline MicroFilter Assembly, PEEK Frit | 0.5 µm | MicroTight Tubing Sleeve | MicroTight Tubing Sleeve | (5) M-120, (2) F-125 | 240 nL | 4,000 psi (276 bar) | ea. |
| | **M-525** | Inline MicroFilter Assembly, PEEK Frit | 0.5 µm | 1/32" OD | 1/32" OD | (5) M-140, (2) F-126 | 240 nL | 4,000 psi (276 bar) | ea. |
| | **REPLACEMENT INLINE MICROFILTER END-FITTINGS** | | | | | | | | |
| ★ | **M-120x** | End-Fittings, Black, with PEEK Frit | 0.5 µm | MicroTight Tubing Sleeve | MicroTight Tubing Sleeve | N/A | 216 nL | N/A | 10-pk |
| | **M-140x** | End-Fittings, Natural, with PEEK Frit | 0.5 µm | 1/32" OD | 1/32" OD | N/A | 216 nL | N/A | 10-pk |
| | **INLINE SOLVENT FILTERS** | | | | | | | | |
| | **A-313** | Solvent Filter Assembly | 20 µm | 1/16" OD | 10-32 Coned | (1) A-224 | 12.3 µL | 6,000 psi (414 bar) | ea. |
| ★ | **A-314** | Solvent Filter Assembly | 2 µm | 1/16" OD | 10-32 Coned | (1) A-100 | 4 µL | 6,000 psi (414 bar) | ea. |
| | **A-100x** | Replacement Frits, Stainless Steel, 10-pk | 2 µm | N/A | — | — | 1.4 µL | N/A | 10-pk |
| | **A-224** | Replacement Frits, Stainless Steel, ea. | 20 µm | N/A | — | — | 9.7 µL | N/A | ea. |
| | **VHP-500** | Inline VHP Filter | 0.5 µm | 1/16" OD | 10-32 Coned | (5) VHP-501 | 1.2 µL | 25,000 psi (1,725 bar) | ea. |
| | **VHP-505** | Inline VHP Filter | 0.2 µm | 1/16" OD | 10-32 Coned | (5) VHP-506 | 1.1 µL | 25,000 psi (1,725 bar) | ea. |
| | **VHP-501x** | Replacement Inline VHP Frit | 0.5 µm | N/A | N/A | N/A | 0.60 µL | N/A | 10-pk |
| | **VHP-506x** | Replacement Inline VHP Frit | 0.2 µm | N/A | N/A | N/A | 0.54 µL | N/A | 10-pk |

**Swept volumes include/reflect theoretical frit volume values.*
*SST = Stainless Steel*

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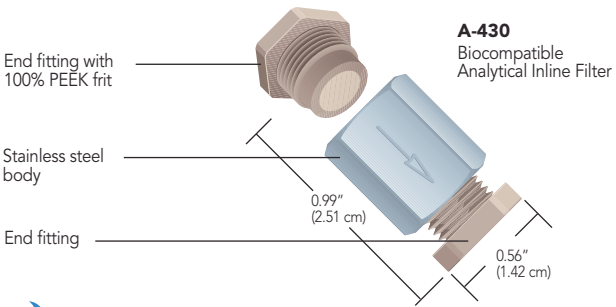
# Biocompatible Standard Inline Filters

- 0.5 µm and 2 µm versions available
- Features 100% PEEK flow path

Upchurch Scientific® A-430 and A-431 Inline Filters consist of a stainless steel body and two PEEK end fittings. Maximum recommended flow rate is 25 mL/min for the A-430 Filter and 10 mL/min for the A-431 Filter. And, you get the added benefit of biocompatibility since all wetted surfaces are PEEK. When you need to replace the frit, simply dispose of the end fitting that contains the frit and replace it with a new one.

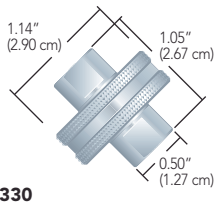



**A-430**
Biocompatible Analytical Inline Filter

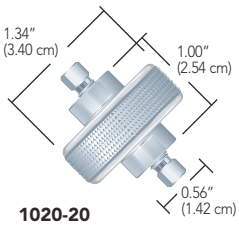
Biocompatible

# Semi-Prep Inline Filters

- Designed for high-flow applications
- Economical protection for larger columns and injections
- SFC and HPLC compatible




**A-330**
High Pressure Semi-Prep Inline Filter

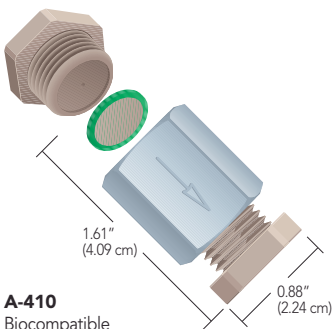



**1020-20**
Iso-Prep Filter
Shown with standard 10-32 stainless steel nuts and ferrules (not included)

# Biocompatible Semi-Prep Inline Filters

- Versions for 1/16", 1/8", 3/16", 1/4", and 5/16" OD tubing
- 100% PEEK flow path

Biocompatible Semi-Prep Filters consist of a stainless steel body, two PEEK end fittings, and a separate PEEK frit. These filters are ideal for many higher flow analytical, semi-prep and preparative applications. Best of all, if the filter becomes clogged, simply unscrew the assembly, remove the frit and replace it. The frits are interchangeable.




**A-410**
Biocompatible

| | Part No. | Description | Porosity | Threads | Includes | Swept Volume* | Pressure Rating | Qty. |
|---|---|---|---|---|---|---|---|---|
| | **BIOCOMPATIBLE INLINE FILTERS** | | | | | | | |
| ★ | **A-430** | Biocompatible Filter Assembly | 2 µm | 10-32 Coned | (1) A-429 | 7.1 µL | 6,000 psi (414 bar) | ea. |
| | **A-431** | Biocompatible Filter Assembly | 0.5 µm | 10-32 Coned | (1) A-428 | 5.9 µL | 6,000 psi (414 bar) | ea. |
| | **A-428x** | PEEK Filter End Fittings, Black PEEK body, 10-pk | 0.5 µm | 10-32 Coned | — | 5.7 µL | N/A | 10-pk |
| ★ | **A-429x** | PEEK Filter End Fittings, Natural PEEK body, 10-pk | 2 µm | 10-32 Coned | — | 6.9 µL | N/A | 10-pk |
| | **SEMI-PREP INLINE FILTERS** | | | | | | | |
| ★ | **A-330** | Semi-Prep Filter Assembly | 10 µm | 10-32 Coned | (1) A-331 | 223 µL | 7,500 psi (517 bar) | ea. |
| | **A-360** | Semi-Prep Filter Assembly | 10 µm | 5/16-24 Flat Bottom | (1) A-331 | 235 µL | 3,500 psi (207 bar) | ea. |
| | **A-331x** | Stainless Steel Frits, Natural ETFE ring | 10 µm | N/A | N/A | 142 µL | N/A | 10-pk |
| | **A-332x** | Stainless Steel Frits, Natural ETFE ring | 2 µm | N/A | N/A | 122 µL | N/A | 10-pk |
| | **A-337x** | Stainless Steel Frits, Natural ETFE ring | 20 µm | N/A | N/A | 152 µL | N/A | 10-pk |
| | **ISO-PREP FILTERS** | | | | | | | |
| | **1020-05** | 21.2 mm Filter Holder | 0.5 µm | 10-32 Coned | (1) 7031-05 | 203 uL | 8,000 psi (552 bar) | ea. |
| | **1020-20** | 21.2 mm Filter Holder | 2 µm | 10-32 Coned | (1) 7031-20 | 196 uL | 8,000 psi (552 bar) | ea. |
| | **7031-05** | 21.2 mm Replacement Filter | 0.5 µm | N/A | N/A | 122 uL | 8,000 psi (552 bar) | ea. |
| | **7031-20** | 21.2 mm Replacement Filter | 2 µm | N/A | N/A | 115 uL | 8,000 psi (552 bar) | ea. |
| | **BIOCOMPATIBLE SEMI-PREP INLINE FILTERS** | | | | | | | |
| ★ | **A-410** | Biocompatible Filter Assembly | 2 µm | 10-32 Coned | (1) OC-802 | 89 µL | 6,000 psi (414 bar) | ea. |
| | **A-411** | Biocompatible Filter Assembly | 10 µm | 10-32 Coned | (1) OC-803 | 103 µL | 6,000 psi (414 bar) | ea. |
| | **A-510** | Biocompatible Filter Assembly | 5 µm | 5/16-24 Flat Bottom | (1) OC-805 | 89 µL | 500 psi (34 bar) | ea. |
| | **OC-802** | PEEK Frit, Green PCTFE ring | 2 µm | N/A | N/A | 46 µL | N/A | ea. |
| | **OC-803** | PEEK Frit, Natural PCTFE ring | 10 µm | N/A | N/A | 57 µL | N/A | ea. |
| | **OC-805** | PEEK Frit, Natural PCTFE ring | 5 µm | N/A | N/A | 50 µL | N/A | ea. |

**Swept volumes include/reflect theoretical frit volume values.*

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# Mini MicroFilters

- Total volume as low as 10 nL
- Conductive version for CEC and mass spectrometry applications
- Three styles available: direct connect 1/32" OD or 360 µm OD tubing and a variety of capillary sizes using MicroTight® tubing sleeves (70–520 µm)

Upchurch Scientific® Inline Mini MicroFilter Assemblies filter effectively with internal volumes low enough to ensure reliable chromatographic results — even at nanoliter per minute flow rates! Internal volumes of these encapsulated filters are as low as 85 nL with the micro-screen and 10 nL to 22 nL with the frit disc option.

Apply voltage to the stainless steel filter holder body of the Conductive Mini MicroFilter for applications such as mass spectrometry and CEC analysis. The voltage is conducted through to the stainless steel portion of the 1 µm NanoFilter™ Capsule and on to the fluid stream. Try our Insulating Mounting Bracket on page 39 to apply voltage easily and more safely.

**M-530**
Mini MicroFilter Assembly

**M-534**
Conductive Mini MicroFilter Assembly

## APPLICATION NOTE

The Mini MicroFilters can be used to pack capillary tubing. Simply place one of these filters on the effluent side of the capillary tubing, then slurry pack. Once packed, place a filter at the head of the tubing. This creates a reliable capillary column without fusing the silica to make frits or pressing filter paper inside the capillary tubing.

### Increase the Life of Your Column

Why use a Precolumn Filter when there is a frit at the head of the column itself? Changing the column frit is extremely difficult to do without disturbing the column packing. A Precolumn Filter provides relatively inexpensive insurance against column damage, and changing its frit is easy. A Precolumn Filter placed between the sample injection valve and the HPLC column protects the column from particles originating in the sample and from pump and valve seal wear.

## SPECIFICATIONS & DETAILS

Because of the size-specific nature of the ferrules included with each Mini MicroFilter assembly, please note that these ferrules are not interchangeable with other MicroFerrules for different tubing sizes.

### Filter Capsule Color Identification

**M-121** **M-122** **M-124** **M-125** **M-126**
**M-128** **M-131** **M-132** **M-133** **M-134**

### What's the Difference Between Precolumn & Inline Filters?

You may have noticed that the bodies of Precolumn and Inline Filters look similar, and as such, you may have wondered what the differences are. Because Precolumn Filters, by definition, are typically placed in a volume-sensitive area immediately preceding the column, these filters usually feature smaller thru-holes and smaller frit diameters. In contrast, Inline Filters are often placed where the internal volume is not as critical and where longer life and less fluid restriction is more important.

| Part No. | Description | Porosity | Frit Type | For use with Tubing | Includes | Swept Volume | Pressure Rating |
|---|---|---|---|---|---|---|---|
| **MINI MICROFILTER ASSEMBLY** | | | | | | | |
| **M-530** | Mini MicroFilter Assembly | 2 µm | SST Screen | MicroTight tubing sleeves | (5) M-122, (2) F-172, (2) P-416 | 85 nL | 4,000 psi (276 bar) |
| **M-531** | Mini MicroFilter Assembly | 1 µm | SST Screen | MicroTight tubing sleeves | (5) M-121, (2) F-172, (2) P-416 | 85 nL | 4,000 psi (276 bar) |
| **M-532** | Mini MicroFilter Assembly | 2 µm | SST Screen | 360 µm OD | (5) M-124, (2) F-152, (2) P-416BLK | 85 nL | 4,000 psi (276 bar) |
| **M-537** | Mini MicroFilter Assembly | 1 µm | SST Frit | 360 µm OD | (5) M-125, (2) F-152, (2) P-416BLK | 10 nL | 4,000 psi (276 bar) |
| ★ **M-538** | Mini MicroFilter Assembly | 1 µm | Ti Frit | 360 µm OD | (5) M-126, (2) F-152, (2) P-416BLK | 10 nL | 4,000 psi (276 bar) |
| **M-543** | Mini MicroFilter Assembly | 1 µm | SST Screen | 1/32" (790 µm) OD | (5) M-131, (2) F-112, (2) P-416 | 97 nL | 4,000 psi (276 bar) |
| **M-547** | Mini MicroFilter Assembly | 1 µm | SST Frit | 1/32" (790 µm) OD | (5) M-133, (2) F-112, (2) P-416 | 22 nL | 4,000 psi (276 bar) |
| **M-548** | Mini MicroFilter Assembly | 1 µm | Ti Frit | 1/32" (790 µm) OD | (5) M-134, (2) F-112, (2) P-416 | 22 nL | 4,000 psi (276 bar) |
| **M-534** | Conductive Mini MicroFilter Assembly | 1 µm | SST Frit | 360 µm OD | (5) M-128, (2) F-152, (2) P-416BLK | 10 nL | 4,000 psi (276 bar) |
| **REPLACEMENT MINI MICROFILTER CAPSULES** | | | | | | | |
| **Part No.** | **Description** | **Porosity** | **Frit Type** | **For Use With** | **Material** | **Swept Volume** | **Qty.** |
| **M-121** | Filter Capsule | 1 µm | SST Screen | M-530 and M-531 | PEEK | 85 nL | 2-pk |
| **M-122** | Filter Capsule | 2 µm | SST Screen | M-530 and M-531 | PEEK | 85 nL | 2-pk |
| **M-124** | Filter Capsule | 2 µm | SST Screen | M-532 | PEEK | 85 nL | 2-pk |
| **M-125** | NanoFilter Capsule | 1 µm | SST Frit | M-537 and M-538 | PEEK | 10 nL | 2-pk |
| ★ **M-126** | NanoFilter Capsule | 1 µm | Ti Frit | M-537 and M-538 | PEEK | 10 nL | 2-pk |
| **M-131** | Filter Capsule | 1 µm | SST Screen | M-543 | PEEK | 85 nL | 2-pk |
| **M-132** | Filter Capsule | 2 µm | SST Screen | M-543 | PEEK | 85 nL | 2-pk |
| **M-133** | NanoFilter Capsule | 1 µm | SST Frit | M-547 and M-548 | PEEK | 10 nL | 2-pk |
| **M-134** | NanoFilter Capsule | 1 µm | Ti Frit | M-547 and M-548 | PEEK | 10 nL | 2-pk |
| **M-128** | Conductive NanoFilter Capsule | 1 µm | SST Frit | M-534 | SST/PEEK | 10 nL | 2-pk |

*SST = Stainless Steel; Ti = Titanium*

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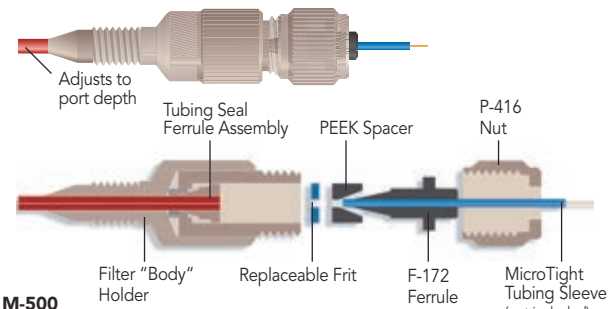
# Precolumn MicroFilters

- Direct connects to columns with 10-32 threads
- Total void volume of 0.5 µL
- Two versions: direct connect 1/16" OD tubing or use MicroTight® tubing sleeves for 70–520 µm OD capillary tubing

The Precolumn MicroFilters directly connect into your microbore or analytical column. Total theoretical void volume is only 0.5 µL (includes frit volume) and the PEEK tubing used in the assembly of these units has a 0.005" (125 µm) ID, virtually eliminating any mixing of the sample with the mobile phase.




**M-500**
Precolumn MicroFilter Assembly
(Includes indicated products)

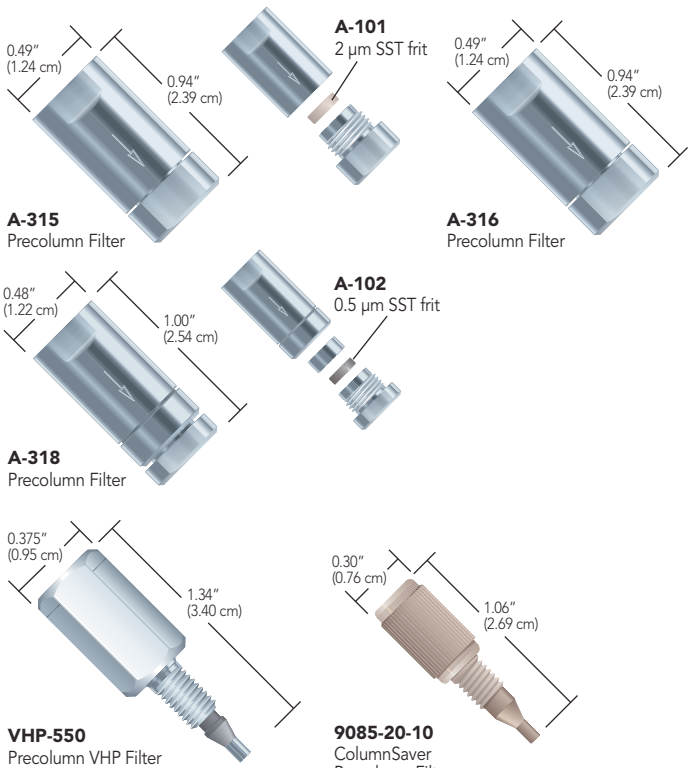
**VHP-550 and VHP-551**
VHP Precolumn Filter Assembly and replaceable frit assembly

# Standard Precolumn Filters

- Economical protection for analytical columns in HPLC and UHPLC
- Traditional versions connect tubing on both sides
- Direct-connect versions attach to the inlet port of most standard columns
- All versions feature 10-32 coned ports for 1/16" OD tubing

These are designed to protect columns by filtering out particulate matter originating from the sample or from rotor seal wear.

- Assemblies that begin with the letter "A" are traditional versions for standard HPLC
- Assemblies that begin with "VHP" are direct-connect versions for UHPLC applications
- Versions that begin with "9085" are direct-connect for standard HPLC and must be used with polymer fittings




| | Part No. | Description | Porosity | For Tubing Size | Threads | Includes | Swept Volume* | Pressure Rating | Qty. |
|---|---|---|---|---|---|---|---|---|---|
| | **PRECOLUMN MICROFILTER ASSEMBLIES** | | | | | | | | |
| | **M-500** | Precolumn MicroFilter Assembly, SST Frit | 0.5 µm | MicroTight Tubing Sleeve | 10-32 Coned | (5) C-425, (1) F-172, (1) P-416 | 0.5 µL | 4,000 psi (276 bar) | ea. |
| | **M-510** | Precolumn MicroFilter Assembly, PEEK Frit | 0.5 µm | MicroTight Tubing Sleeve | 10-32 Coned | (5) A-735, (1) F-172, (1) P-416 | 0.5 µL | 4,000 psi (276 bar) | ea. |
| | **M-550** | Precolumn MicroFilter Assembly, SST Frit | 0.5 µm | 1/16" OD | 10-32 Coned | (5) C-425, (1) F-132, (1) P-416 | 0.5 µL | 4,000 psi (276 bar) | ea. |
| ★ | **M-560** | Precolumn MicroFilter Assembly, PEEK Frit | 0.5 µm | 1/16" OD | 10-32 Coned | (5) A-735, (1) F-132, (1) P-416 | 0.5 µL | 4,000 psi (276 bar) | ea. |
| | **REPLACEMENT PRECOLUMN MICROFILTER FRITS (FRIT DIAMETER X FRIT THICKNESS X OVERALL DIAMETER)** | | | | | | | | |
| ★ | **A-735x** | PEEK Frits, 0.045" x 0.031" x 0.192" | 0.5 µm | N/A | N/A | N/A | 216 nL | N/A | 10-pk |
| | **C-420x** | SST Frits, 0.038" x 0.028" x 0.192" | 2 µm | N/A | N/A | N/A | 101 nL | N/A | 10-pk |
| | **C-425x** | SST Frits, 0.038" x 0.028" x 0.192" | 0.5 µm | N/A | N/A | N/A | 101 nL | N/A | 10-pk |
| | **PRECOLUMN FILTERS** | | | | | | | | |
| ★ | **A-315** | Solvent Filter Assembly | 2 µm | 1/16" OD | 10-32 Coned | (1) A-101 | 1.4 µL | 6,000 psi (414 bar) | ea. |
| ★ | **A-316** | Solvent Filter Assembly | 0.5 µm | 1/16" OD | 10-32 Coned | (1) A-102 | 1.3 µL | 6,000 psi (414 bar) | ea. |
| ★ | **A-318** | Solvent Filter Assembly | 0.5 µm | 1/16" OD | 10-32 Coned | (1) A-102 | 0.84 µL | 6,000 psi (414 bar) | ea. |
| | **A-101x** | Replacement Frits, Stainless Steel, 10-pk | 2 µm | N/A | — | — | 0.74 µL | N/A | 10-pk |
| | **A-102x** | Replacement Frits, Stainless Steel, 10-pk | 0.5 µm | N/A | — | — | 0.61 µL | N/A | 10-pk |
| | **VHP-550** | Precolumn VHP Filter | 0.5 µm | 1/16" OD | 10-32 Coned | (5) VHP-551 | 1.9 µL | 20,000 psi (1,380 bar) | ea. |
| | **VHP-555** | Precolumn VHP Filter | 0.2 µm | 1/16" OD | 10-32 Coned | (5) VHP-556 | 1.8 µL | 20,000 psi (1,380 bar) | ea. |
| | **VHP-551x** | Replacement Precolumn VHP Frit Assembly | 0.5 µm | N/A | N/A | N/A | 1.9 µL | N/A | 10-pk |
| | **VHP-556x** | Replacement Precolumn VHP Frit Assembly | 0.2 µm | N/A | N/A | N/A | 1.8 µL | N/A | 10-pk |
| | **9085-05-10** | ColumnSaver Precolumn Filter, with SST frit | 0.5 µm | 1/16" OD | 10-32 Coned | N/A | 3.1 µL | 6,000 psi (414 bar) | 10-pk |
| | **9085-20-10** | ColumnSaver Precolumn Filter, with SST frit | 2 µm | 1/16" OD | 10-32 Coned | N/A | 3.1 µL | 6,000 psi (414 bar) | 10-pk |

*SST = Stainless Steel*
**Swept volumes include/reflect theoretical frit volume values.*

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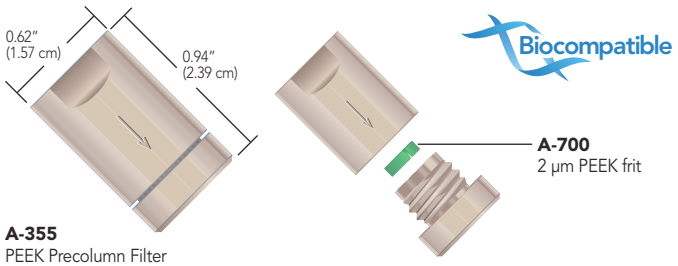
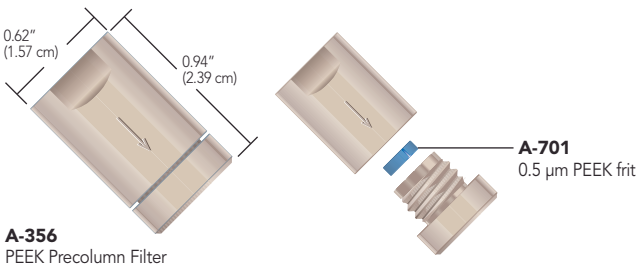
# Biocompatible Precolumn Filters

- Pre-assembled with either 0.5 µm or 2 µm porosity frits
- Great column protection
- Feature PEEK bodies and PCTFE-surrounded PEEK frits

Upchurch Scientific® Biocompatible Precolumn Filters have 0.020" (0.50 mm) diameter thru-holes and 8° distribution cones for minimal band spreading and mixing. The bodies of these filters are manufactured from biocompatible PEEK polymer and are pressure rated to 5,000 psi (345 bar). These filters are designed for use with 1/16" OD tubing, which can be connected to these filters using standard Fingertight fittings.




**A-355**
PEEK Precolumn Filter



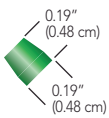

**A-356**
PEEK Precolumn Filter

# Frit-In-A-Ferrule™

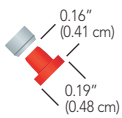
- Seals and filters simultaneously
- Less expensive and more convenient than traditional inline filter systems
- Available in both Flangeless and Super Flangeless™ versions

Now you can filter at any point in your system where 1/16" or 1/8" OD tubing is used in a flat-bottom 1/4-28, M6 or 5/16-24 connection.

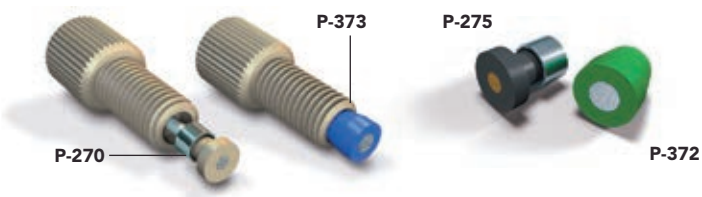
The Upchurch Scientific® Frit-In-A-Ferrule product line is designed to seal and filter simultaneously by incorporating a frit into the body of a flat-bottom ferrule. This simple design allows you to eliminate traditional inline filters and reduce the number of additional connections in your system.




**P-372**
Flangeless Frit-In-A-Ferrule
for 1/8" OD tubing




**P-276**
Super Flangeless Frit-In-A-Ferrule
for 1/16" OD tubing




# Disposable Sample Filters

- Excellent system protection
- Ultra-low hold-up volume
- 0.5 µm and 2 µm porosity

**B-100 and B-101**
Disposable Sample Filters

These Disposable Sample Filters are designed to remove particles from analytical HPLC samples. The polypropylene holder incorporates a 1/32" thick, 1/8" diameter stainless steel frit, which causes very little back pressure. To use, just attach one of these filters onto the end of any standard luer syringe, such as our B-310 found on page 155.

| | Part No. | Description | Porosity | Threads | Includes | Swept Volume* | Pressure Rating |
|---|---|---|---|---|---|---|---|
| | **BIOCOMPATIBLE PRECOLUMN FILTERS** | | | | | | |
| ★ | **A-355** | Solvent Filter Assembly, Biocompatible | 2 µm | 10-32 Coned | (1) A-700 | 1.4 µL | 5,000 psi (345 bar) |
| ★ | **A-356** | Solvent Filter Assembly, Biocompatible | 0.5 µm | 10-32 Coned | (1) A-701 | 1.3 µL | 5,000 psi (345 bar) |
| | **A-700** | Replacement Frit, PEEK Polymer, ea. | 2 µm | — | — | 0.74 µL | N/A |
| | **A-701** | Replacement Frit, PEEK Polymer, ea. | 0.5 µm | — | — | 0.61 µL | N/A |

| | Part No. | Description | Porosity | Frit Material | Frit Diameter | Frit Thickness | Swept Volume | Maximum Pressure | Qty. |
|---|---|---|---|---|---|---|---|---|---|
| | **FRIT-IN-A-FERRULE FOR 1/16" OD TUBING** | | | | | | | | |
| | **P-270x** | Super Flangeless, Natural PEEK, SST lock ring | 2 µm | SST | 0.062" | 0.062" | 0.74 µL | 2,000 psi (138 bar) | 10-pk |
| | **P-272x** | Flangeless, Green PCTFE | 2 µm | SST | 0.062" | 0.062" | 0.74 µL | 2,000 psi (138 bar) | 10-pk |
| | **P-273x** | Flangeless, Blue PCTFE | 0.5 µm | SST | 0.062" | 0.062" | 0.61 µL | 2,000 psi (138 bar) | 10-pk |
| | **P-274x** | Super Flangeless, Natural PEEK, SST lock ring | 2 µm | PEEK | 0.046" | 0.030" | 0.20 µL | 2,500 psi (172 bar) | 10-pk |
| ★ | **P-275x** | Super Flangeless, Black PEEK, SST lock ring | 0.5 µm | PEEK | 0.046" | 0.030" | 0.16 µL | 2,500 psi (172 bar) | 10-pk |
| | **P-276** | Super Flangeless, Red ETFE, SST lock ring | 10 µm | SST | 0.062" | 0.062" | 0.90 µL | 2,500 psi (172 bar) | ea. |
| | **FRIT-IN-A-FERRULE FOR 1/8" OD TUBING** | | | | | | | | |
| ★ | **P-372x** | Flangeless, Green PCTFE | 2 µm | SST | 0.094" | 0.062" | 1.69 µL | 500 psi (34 bar) | 10-pk |
| | **P-373x** | Flangeless, Blue PCTFE | 0.5 µm | SST | 0.094" | 0.062" | 1.41 µL | 500 psi (34 bar) | 10-pk |
| | **P-374x** | Super Flangeless**, Natural PEEK, SST lock ring | 2 µm | PEEK | 0.094" | 0.042" | 1.15 µL | 2,500 psi (172 bar) | 10-pk |
| | **DISPOSABLE HPLC SAMPLE FILTERS** | | | | | | | | |
| | **B-100** | Disposable Filters | 2 µm | SST | 0.125" | 0.031" | 15.8 µL | N/A | 100-pk |
| ★ | **B-101** | Disposable Filters | 0.5 µm | SST | 0.125" | 0.031" | 15.6 µL | N/A | 100-pk |

** Swept volumes include/reflect theoretical frit volume values.*
*** The 1/8" Super Flangeless versions cannot be used in M6 ports.*

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# PEEK Frits

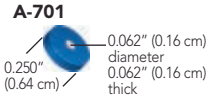
- Inert, biocompatible, and metal-free
- Uniform porosity, longer filtration life
- Sealing rings manufactured from PCTFE

Patented Upchurch Scientific® PEEK Frits offer exceptionally uniform porosity. This property ensures longer filtration life and consistent frit-to-frit swept volumes. The PEEK polymer frit discs are biocompatible and inert to most solvents, making them well-suited for bioanalytical applications. PEEK's robust properties make these products suitable for low and high pressure applications.

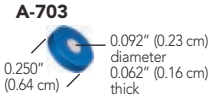
Disc rings, included on most PEEK frits, are made of PCTFE and are slightly thicker than the frit disc, providing enhanced sealing and excellent chemical resistance. PCTFE surrounded PEEK frits can be used up to 80 °C, and PEEK frits alone are a good choice for applications up to 100 °C.

## 0.5 µm PEEK Frits

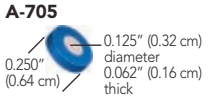
**A-701**



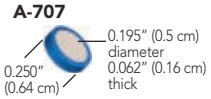

**A-703**



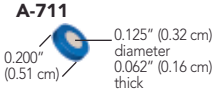

**A-705**




**A-707**

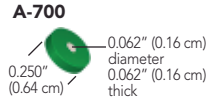



**A-711**

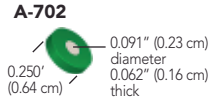



## 2 µm PEEK Frits

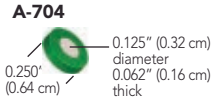
**A-700**



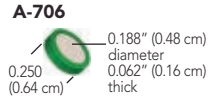

**A-702**



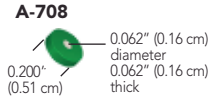

**A-704**



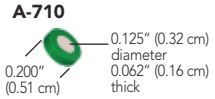

**A-706**




**A-708**

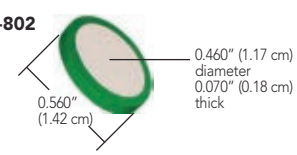



**A-710**




## 2 µm Semi-Prep PEEK Frits

**OC-802**

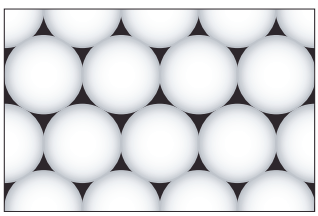



Biocompatible

## APPLICATION NOTE

### Frit Volume

The term "frit volume" refers to the volume of the various fluid pathways that comprise the matrix of a frit. A standard frit is a mass of small particles fused together through a controlled process of compression and heat. Because of their shape, there are gaps between the fused particles. Fluid makes its way through these gaps, creating a pathway from one side of the frit to the other (see the diagram, below, where the white circles represent frit particles, and the black area represents the void between the particles.)



Generally, when the frit particles increase in size, the frit's porosity increases as well. The larger the particles, the larger the gaps between particles. Cumulatively, these gaps comprise what is known as "frit volume." Using gravimetric determination, it has been experimentally shown that the total volume of any given frit may range from 18%–30%, depending upon the porosity of the frit.

Frit volume is calculated by determining what the mass of the frit would be if it were a solid block of material of equal size. Then the solid mass of the frit is multiplied by the percentage assigned to the porosity to determine the theoretical frit volume.

18% for 0.2 µm frits
20% for 0.5 µm frits
24% for 2 µm frits
26% for 5 µm frits
28% for 10 µm frits
30% for 20 µm frits

From a chromatographic perspective, it's important to know the volume of the frit used in your system. It is possible for a frit to negatively impact your chromatography if the total frit volume is too large and if it is placed in an area through which the sample will pass. To avoid frit-related problems like band broadening and loss of resolution, most inline filters placed after the sample introduction point (e.g., between the injection valve and the column) are smaller in size and porosity than inline filters that are placed in areas before the sample is introduced into the flow path (e.g., between the pump and the injection valve).

| | Part No. | Porosity | Disc Diameter | Disc Thickness | Ring OD | Ring Material | Frit Volume | Qty. |
|---|---|---|---|---|---|---|---|---|
| | PEEK FRITS | | | | | | | |
| ★ | A-700 | 2 µm | 0.062" (0.16 cm) | 0.062" (0.16 cm) | 0.250" (0.64 cm) | PCTFE | 0.7 µL | ea. |
| ★ | A-701 | 0.5 µm | 0.062" (0.16 cm) | 0.062" (0.16 cm) | 0.250" (0.64 cm) | PCTFE | 0.6 µL | ea. |
| | A-702 | 2 µm | 0.091" (0.23 cm) | 0.062" (0.16 cm) | 0.250" (0.64 cm) | PCTFE | 1.7 µL | ea. |
| | A-703 | 0.5 µm | 0.092" (0.23 cm) | 0.062" (0.16 cm) | 0.250" (0.64 cm) | PCTFE | 1.4 µL | ea. |
| | A-704 | 2 µm | 0.125" (0.32 cm) | 0.062" (0.16 cm) | 0.250" (0.64 cm) | PCTFE | 3.0 µL | ea. |
| | A-705 | 0.5 µm | 0.125" (0.32 cm) | 0.062" (0.16 cm) | 0.250" (0.64 cm) | PCTFE | 2.4 µL | ea. |
| ★ | A-706 | 2 µm | 0.188" (0.48 cm) | 0.062" (0.16 cm) | 0.250" (0.64 cm) | PCTFE | 7.1 µL | ea. |
| ★ | A-707 | 0.5 µm | 0.195" (0.5 cm) | 0.062" (0.16 cm) | 0.250" (0.64 cm) | PCTFE | 6.1 µL | ea. |
| | A-708 | 2 µm | 0.062" (0.16 cm) | 0.062" (0.16 cm) | 0.200" (0.51 cm) | PCTFE | 0.7 µL | ea. |
| | A-710 | 2 µm | 0.125" (0.32 cm) | 0.062" (0.16 cm) | 0.200" (0.51 cm) | PCTFE | 3.0 µL | ea. |
| | A-711 | 0.5 µm | 0.125" (0.32 cm) | 0.062" (0.16 cm) | 0.200" (0.51 cm) | PCTFE | 2.5 µL | ea. |
| | SEMI-PREP PEEK FRITS | | | | | | | |
| ★ | OC-802 | 2 µm | 0.460" (1.17 cm) | 0.070" (0.18 cm) | 0.560" (1.42 cm) | PCTFE | 46.4 µL | ea. |

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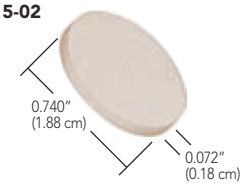
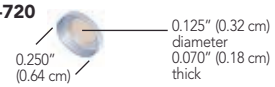
# PEEK Frits (cont.)

## 5 µm and 10 µm PEEK Frits

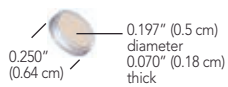
**A-715-02**



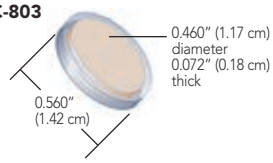

**A-720**



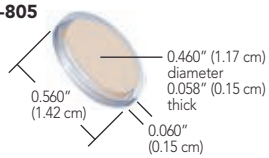

**A-722**



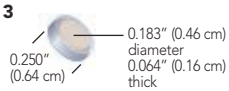

**OC-803**



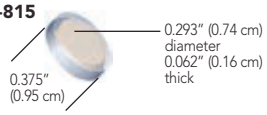

**OC-805**




**OC-813**




**OC-815**




## NOTE

- The thickness dimension in the part drawings and the pricing tables represents the thickness of the frit disc not the frit ring. Frit rings are often slightly thicker to ensure a proper seal. When tightened into a filter holder the ring compresses to nearly match the thickness of the frit disc.
- The manufacturing process may cause some slight color variance in our PEEK frits. This does not affect their quality or performance. Frit dimensions are approximate. Actual batch-to-batch frit dimensions may vary slightly.

## RELATED PRODUCTS

Any 0.247" to 0.254" diameter frit (including polymer ring) can be used with the Standard HPLC Inline Solvent Filters on page 160 and the Standard Precolumn Filters on page 163.

| Part No. | Porosity | Disc Diameter | Disc Thickness | Ring OD | Ring Material | Frit Volume | Qty. |
|---|---|---|---|---|---|---|---|
| SEMI-PREP PEEK FRITS | | | | | | | |
| **A-715-02** | 10 µm | 0.740" (1.88 cm) | 0.072" (0.18 cm) | N/A | N/A | 142.1 µL | ea. |
| ★ **A-720** | 10 µm | 0.125" (0.32 cm) | 0.070" (0.18 cm) | 0.250" (0.64 cm) | PCTFE | 4.2 µL | ea. |
| ★ **A-722** | 10 µm | 0.197" (0.5 cm) | 0.070" (0.18 cm) | 0.250" (0.64 cm) | PCTFE | 9.9 µL | ea. |
| **OC-803** | 10 µm | 0.460" (1.17 cm) | 0.072" (0.18 cm) | 0.560" (1.42 cm) | PCTFE | 57.2 µL | ea. |
| **OC-805** | 5 µm | 0.460" (1.17 cm) | 0.058" (0.15 cm) | 0.560" (1.42 cm) | PCTFE | 41.1 µL | ea. |
| **OC-813** | 5 µm | 0.183" (0.46 cm) | 0.064" (0.16 cm) | 0.250" (0.64 cm) | PCTFE | 7.2 µL | ea. |
| **OC-815** | 5 µm | 0.293" (0.74 cm) | 0.062" (0.16 cm) | 0.375" (0.95 cm) | PCTFE | 17.8 µL | ea. |

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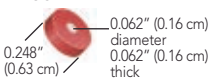
# Titanium Frits

- Excellent alternative to stainless steel
- PEEK or PCTFE polymer rings

Titanium is a biocompatible alternative to stainless steel. Our 0.2 µm, 0.5 µm, and 2 µm porosity titanium frits are surrounded by PEEK or PCTFE polymer rings for enhanced sealing. The dimensions of most of these frits make them suitable replacement frits for most Upchurch Scientific® standard inline and precolumn filters.

## 0.2 µm Titanium Frits

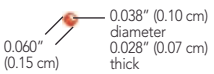
**A-501**



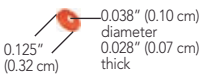

**A-503**

**A-504**

**A-505**

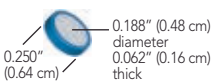



**A-507**



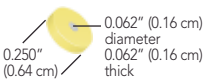

## 0.5 µm Titanium Frit

**A-131**

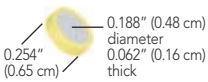



## 2 µm Titanium Frits

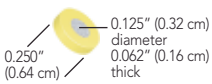
**A-108**




**A-110**




**A-111**




**A-342-02**

## NOTE

- While all of the frits listed in this chapter are capable of withstanding high pressures (> 5,000 psi or 345 bar), the actual pressure holding capability of each frit is usually dependent on the filter body in which it is placed.

| Part No. | Porosity | Disc Diameter | Disc Thickness | Ring OD | Ring Material | Frit Volume | Qty. |
|---|---|---|---|---|---|---|---|
| TITANIUM FRITS | | | | | | | |
| **A-108x** | 2 µm | 0.062" (0.16 cm) | 0.062" (0.16 cm) | 0.250" (0.64 cm) | PCTFE | 0.7 µL | 10-pk |
| **A-110x** | 2 µm | 0.188" (0.48 cm) | 0.062" (0.16 cm) | 0.254" (0.65 cm) | PCTFE | 7.1 µL | 10-pk |
| **A-111** | 2 µm | 0.125" (0.32 cm) | 0.062" (0.16 cm) | 0.250" (0.64 cm) | PCTFE | 2.7 µL | ea. |
| **A-131** | 0.5 µm | 0.188" (0.48 cm) | 0.062" (0.16 cm) | 0.250" (0.64 cm) | PCTFE | 5.6 µL | ea. |
| **A-342-02** | 2 µm | 0.730" (1.85 cm) | 0.062" (0.16 cm) | N/A | N/A | 93.6 µL | ea. |
| **A-501** | 0.2 µm | 0.062" (0.16 cm) | 0.062" (0.16 cm) | 0.248" (0.63 cm) | PEEK | 0.6 µL | ea. |
| **A-503** | 0.2 µm | 0.188" (0.48 cm) | 0.062" (0.16 cm) | 0.247" (0.63 cm) | PCTFE | 5.1 µL | ea. |
| **A-504** | 0.2 µm | 0.118" (0.30 cm | 0.062" (0.16 cm) | 0.250" (0.64 cm) | PCTFE | 2 µL | ea. |
| **A-505** | 0.2 µm | 0.038" (0.10 cm) | 0.028" (0.07 cm) | 0.060" (0.15 cm) | PCTFE | 0.1 µL | ea. |
| **A-507** | 0.2 µm | 0.038" (0.10 cm) | 0.028" (0.07 cm) | 0.125" (0.32 cm) | PCTFE | 0.1 µL | ea. |

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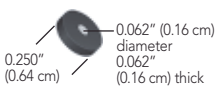
# Stainless Steel Frits

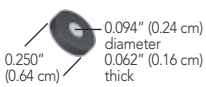
Upchurch Scientific® Analytical-scale 316 Stainless Steel Frits are available in 0.5 µm or 2 µm porosity—the most common HPLC filtration ratings. Each frit includes a PCTFE or PEEK polymer sealing ring. Many of the frits shown have the common 0.250" (0.64 cm) and 0.254" (0.64 cm) ODs, which allow them to be used in many of the Precolumn and Inline Filters found starting on page 160. Choose the larger diameter faces and/or larger porosity frits for faster flow rates. Choose frits with a smaller diameter face and/or smaller porosity for applications sensitive to extra flow path volume.

## 0.5 µm Stainless Steel Frits

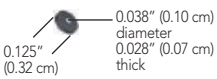
**A-102**




**A-103**

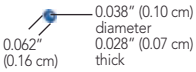



**C-128-31**

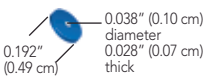



**C-140-30**

**C-409**

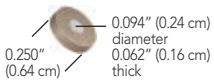



**C-425**

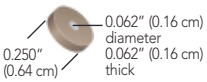



## 2 µm Stainless Steel Frits

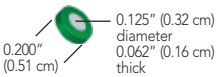
**A-100**



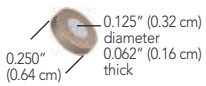

**A-101**



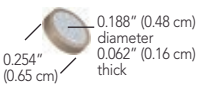

**A-420**



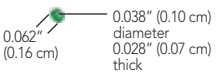

**C-401**



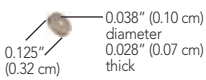

**C-402**



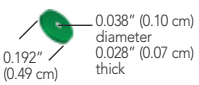

**C-407**




**C-408**




**C-420**




## APPLICATION NOTE

### To Clean Or Not To Clean?

It is rarely worth the time and effort to clean frits, given the relatively low cost of replacements. Furthermore, cleaning may leave some debris embedded in the frit pores. If the washed frit is accidently returned to your instrument in a reverse orientation, any remaining debris could be flushed out and deposited further down the fluid path. If this frit is being used as a column head frit, the debris may be washed directly onto the column bed.

| | Part No. | Porosity | Disc Diameter | Disc Thickness | Ring OD | Ring Material | Frit Volume | Qty. |
|---|---|---|---|---|---|---|---|---|
| | STAINLESS STEEL FRITS | | | | | | | |
| ★ | **A-100x** | 2 µm | 0.094" (0.24 cm) | 0.062" (0.16 cm) | 0.250" (0.64 cm) | PEEK | 1.7 µL | 10-pk |
| ★ | **A-101x** | 2 µm | 0.062" (0.16 cm) | 0.062" (0.16 cm) | 0.250" (0.64 cm) | PEEK | 0.7 µL | 10-pk |
| ★ | **A-102x** | 0.5 µm | 0.062" (0.16 cm) | 0.062" (0.16 cm) | 0.250" (0.64 cm) | PEEK | 0.6 µL | 10-pk |
| ★ | **A-103x** | 0.5 µm | 0.094" (0.24 cm) | 0.062" (0.16 cm) | 0.250" (0.64 cm) | PEEK | 1.4 µL | 10-pk |
| | **A-420** | 2 µm | 0.125" (0.32 cm) | 0.062" (0.16 cm) | 0.200" (0.51 cm) | PCTFE | 3.0 µL | ea. |
| | **C-128-31** | 0.5 µm | 0.038" (0.10 cm) | 0.028" (0.07 cm) | 0.125" (0.32 cm) | PEEK | 0.1 µL | ea. |
| | **C-140-30x** | 0.5 µm | 0.188" (0.48 cm) | 0.062" (0.16 cm) | 0.254" (0.65 cm) | PCTFE | 6.5 µL | 10-pk |
| | **C-401x** | 2 µm | 0.125" (0.32 cm) | 0.062" (0.16 cm) | 0.250" (0.64 cm) | PEEK | 3.0 µL | 10-pk |
| | **C-402x** | 2 µm | 0.188" (0.48 cm) | 0.062" (0.16 cm) | 0.254" (0.65 cm) | PEEK | 7.8 µL | 10-pk |
| | **C-407x** | 2 µm | 0.038" (0.10 cm) | 0.028" (0.07 cm) | 0.062" (0.16 cm) | PCTFE | 0.1 µL | 10-pk |
| | **C-408x** | 2 µm | 0.038" (0.10 cm) | 0.028" (0.07 cm) | 0.125" (0.32 cm) | PEEK | 0.1 µL | 10-pk |
| | **C-409x** | 0.5 µm | 0.038" (0.10 cm) | 0.028" (0.07 cm) | 0.062" (0.16 cm) | PCTFE | 0.1 µL | 10-pk |
| | **C-420x** | 2 µm | 0.038" (0.10 cm) | 0.028" (0.07 cm) | 0.192" (0.49 cm) | PCTFE | 0.1 µL | 10-pk |
| | **C-425x** | 0.5 µm | 0.038" (0.10 cm) | 0.028" (0.07 cm) | 0.192" (0.49 cm) | PCTFE | 0.1 µL | 10-pk |

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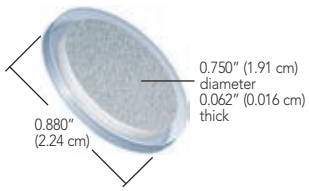
# Stainless Steel Semi-Prep Frits

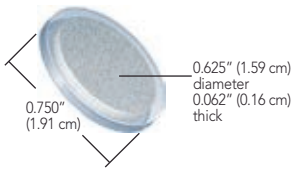
Many of these frits come complete with a PCTFE, ETFE, or PTFE sealing ring. Choose from 2 µm, 5 µm, 10 µm, and 20 µm filtration porosities and a range of diameters to match your intended flow rate and filtration requirements.

## 2 µm Semi-Prep Stainless Steel Frits

**A-332**

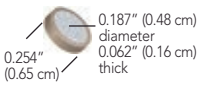



**A-343**



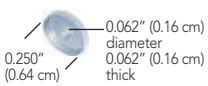

## 5 µm Semi-Prep Stainless Steel Frits

**C-417**

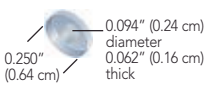



## 10 µm Semi-Prep Stainless Steel Frits

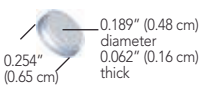
**A-105**



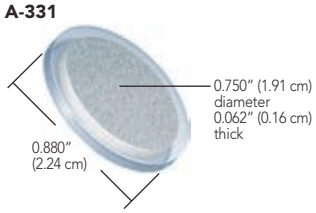

**A-106**




**A-107**

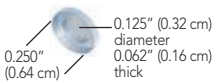



**A-331**

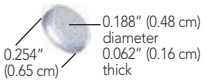



## 20 µm Semi-Prep Stainless Steel Frits

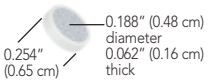
**A-120**



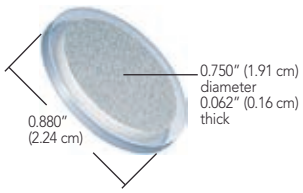

**A-122**




**A-224**

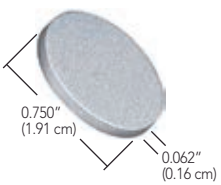



**A-337**

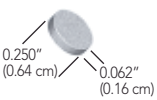



## Stainless Steel Frit Discs

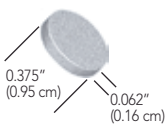
**A-337-02**



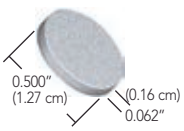

**C-413**




**C-414**




**C-415**




## NOTE

Frits without the polymer rings cannot be used with our standard Precolumn and Inline Filter assemblies.

| | Part No. | Porosity | Disc Diameter | Disc Thickness | Ring OD | Ring Material | Frit Volume | Qty. |
|---|---|---|---|---|---|---|---|---|
| | SEMI-PREP STAINLESS STEEL FRITS | | | 0.062" (0.16 cm) | 0.250" (0.64 cm) | PCTFE | | |
| | A-105x | 10 µm | 0.062" (0.16 cm) | 0.062" (0.16 cm) | 0.250" (0.64 cm) | PCTFE | 0.9 µL | 10-pk |
| | A-106x | 10 µm | 0.094" (0.24 cm) | 0.062" (0.16 cm) | 0.254" (0.65 cm) | PCTFE | 2.0 µL | 10-pk |
| | A-107x | 10 µm | 0.189" (0.48 cm) | 0.062" (0.16 cm) | 0.250" (0.64 cm) | PCTFE | 9.1 µL | 10-pk |
| | A-120x | 20 µm | 0.125" (0.32 cm) | 0.062" (0.16 cm) | 0.254" (0.65 cm) | PCTFE | 3.7 µL | 10-pk |
| | A-122x | 20 µm | 0.188" (0.48 cm) | 0.062" (0.16 cm) | 0.254" (0.65 cm) | PTFE | 9.7 µL | 10-pk |
| | A-224 | 20 µm | 0.188" (0.48 cm) | 0.062" (0.16 cm) | 0.880" (2.24 cm) | ETFE | 9.7 µL | ea. |
| ★ | A-331x | 10 µm | 0.750" (1.91 cm) | 0.062" (0.16 cm) | 0.880" (2.24 cm) | ETFE | 141.9 µL | 10-pk |
| ★ | A-332x | 2 µm | 0.750" (1.91 cm) | 0.062" (0.16 cm) | 0.880" (2.24 cm) | ETFE | 141.9 µL | 10-pk |
| | A-337x | 20 µm | 0.750" (1.91 cm) | | 0.750" (1.91 cm) | PCTFE | 152 µL | 10-pk |
| | A-343 | 2 µm | 0.625" (1.59 cm) | 0.062" (0.16 cm) | | | 112.6 µL | ea. |
| | C-417 | 5 µm | 0.187" (0.48 cm) | 0.062" (0.16 cm) | 0.254" (0.65 cm) | PEEK | 7.2 µL | ea. |
| | STAINLESS STEEL FRIT DISCS (NO POLYMER RINGS) | | | | | | | |
| | A-337-02 | 20 µm | 0.750" (1.91 cm) | 0.062" (0.16 cm) | N/A | N/A | 134.7 µL | ea. |
| | C-412 | 5 µm | 0.250" (0.64 cm) | 0.062" (0.16 cm) | N/A | N/A | 13 µL | ea. |
| | C-413 | 10 µm | 0.250" (0.64 cm) | 0.062" (0.16 cm) | N/A | N/A | 14 µL | ea. |
| | C-414 | 2 µm | 0.375" (0.95 cm) | 0.062" (0.16 cm) | N/A | N/A | 26.9 µL | ea. |
| | C-415 | 2 µm | 0.500" (1.27 cm) | 0.062" (0.16 cm) | N/A | N/A | 47.9 µL | ea. |

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# Iso-Prep™ Guard

- 21.2 mm and 30 mm ID column protection
- Improves plate count and symmetry
- New anti-rotation feature aids guard holder assembly

Iso-Prep Guard is a guard cartridge system designed to protect valuable prep columns. It offers superior column protection for adsorptive samples and a proven sample distribution mechanism via a precision machined holder. Iso-Prep Guard is ideal for protecting prep columns with no degradation of peak shape or plate count.

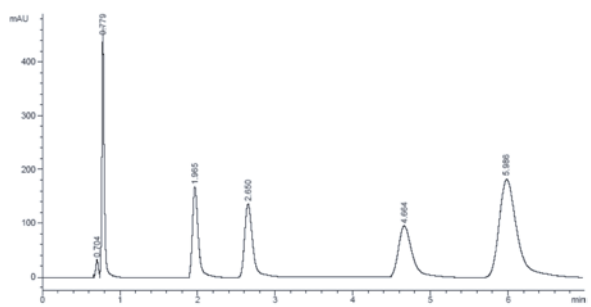
The high-performance guard protects columns in two ways. First, it acts as a filter, trapping particles in the frits. Second, when the guard cartridge is packed with the same material as the prep column, it removes compounds that irreversibly adsorb to the packing material.

## APPLICATION NOTE

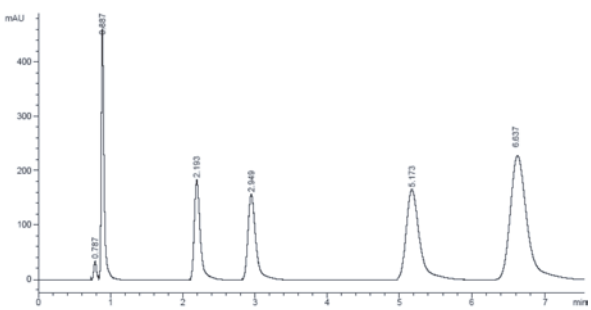
### Low Pressure Drop

- 60:40 Acetonitrile:Water
- 50 mL/min
- Kromasil 10 µm C18
- Backpressure: 100 psi

### 10 µ C18 100 x 21.2 mm, 60:40 Acetonitrile:Water, 20 mL/min




Without Iso-Prep Guard — 38,150 Plates/M 1.24 As




With Iso-Prep Guard — 41,920 Plates/M 1.20 As

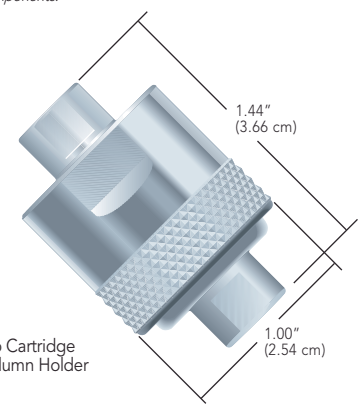
# Unpacked Semi-Prep Guard Column

- 10 mm ID column protection
- Convenient cartridge system
- Easy to pack

The internal volume of this Upchurch Scientific® semi-prep guard column is just 780 µL, which only requires approximately 1.50 g of packing material — ideally the same material used in your semi-prep column. The C-1000 Holder will hold to high pressures, and is specially treated to prevent galling.* Use standard 10-32 coned fittings (not included) to connect your 1/16" OD tubing.

** Galling is a form of "cold welding." When two fittings manufactured from the same metal are wrench-tightened too tightly, they can "weld" together, making it virtually impossible to separate the two components.*

**C-1000 Semi-Prep Guard Column**
Fittings, tubing and column shown are not included.




**C-1000**
Semi-Prep Cartridge Guard Column Holder

| Part No. | Description |
|---|---|
| **ISO-PREP GUARD ORDERING INFORMATION** | |
| **9197-P** | Iso-Prep Guard Holder |
| **9197-P-AR** | Iso-Prep Guard Holder, 21.2mm, Anti Rotation |
| **9197-20** | Iso-Prep Guard Cartridge, 21.2 mm x 1 cm, 1 Frit |
| **8056-MOD** | Iso-Prep Guard, 21.2 mm Frit, 2 µm |
| **9197-S** | Iso-Prep Guard Finishing Tool |
| **9196-P** | Iso-Prep Guard Holder, 30 mm |
| **9196-P-AR** | Iso-Prep Guard Holder, 30 mm, Anti Rotation |
| **9196-20** | Iso-Prep Guard Cartridge, 30 mm x 1 cm, 2 µm Frit |
| **8083-MOD** | Iso-Prep Guard, 30 mm Frit, 2 µm |
| **9196-S** | Iso-Prep Guard Finishing Tool, 30 mm |
| **10 mm ID x 1 cm** | |
| **C-1000** | Semi-Prep Cartridge Guard Column Holder |
| **C-1035** | Semi-Prep Cartridge |
| **C-1030** | Threaded Frit Cap with 2 µm Stainless Steel Frit |
| **C-1031** | Threaded Frit Cap with 2 µm Titanium Frit |

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# Cartridge Guard Columns

- 100% biocompatible flow path
- Pressure rated to 4,000 psi (276 bar)
- Wetted materials are Titanium and PEEK
- Reusable holder complete with fingertight fittings

Insert one of these Upchurch Scientific® analytical guard columns between the injection valve and column of your HPLC system to extend the life of your column and help ensure reproducible results. Convenient, prepacked PEEK polymer cartridges complete the system and are available in a variety of bonded phases to match your column chemistry held in place by Titanium frits.

The C-270 Stainless Steel Guard Column Holder is engineered for high-pressure applications to 4,000 psi (276 bar). Each of these holders is surface treated to prevent galling*, a potential problem with threaded metal parts.

The flow path of the C-270 Guard Column Holder is biocompatible. Each comes complete with fittings for 1/16" OD tubing, and can be used with any of the C-28X or C-7XX guard column cartridges listed on this page.

** Galling is a form of "cold welding." When two fittings manufactured from the same metal are wrench-tightened too tightly, they can "weld" together, making it virtually impossible to separate the two components.*

Biocompatible

## APPLICATION NOTE

### Why Use A Guard Column?

A guard column can increase the life of your analytical column up to five-fold[1]. Use a guard column with the same packing as your column — it will act as a chemical filter, removing strongly retained materials in your sample that might otherwise contaminate your analytical column. And, it is more economical to replace a guard column cartridge than to buy a new analytical column.

*[1]Uwe D. Neue, HPLC Troubleshooting – Column Durability, American Laboratory, 1999; 22:44-7.*

## SPECIFICATIONS & DETAILS

Packing Material Specifications: The cartridges on this page are packed with 5 µm or 10 µm base-deactivated 80 Å spherical silica.

| | Part No. | Description | |
|---|---|---|---|
| | **CARTRIDGE GUARD COLUMN KITS** | | |
| | **C-281** | 2.0 mm ID C18 Cartridges (6-pk) with (1) C-270 Assembly | |
| | **C-751** | 4.3 mm ID C18 Cartridges (6-pk) with (1) C-270 Assembly | |
| | **GUARD COLUMN CARTRIDGE HOLDERS, BIOCOMPATIBLE** | | |
| | **C-270** | High Pressure, Stainless Steel, with (2) F-200 Fittings | |
| | **GUARD COLUMN CARTRIDGES, BIOCOMPATIBLE** | | |
| | **2.0 mm ID x 1 cm, 10 µm Silica** | | **Qty.** |
| | **C-280** | Reversed Phase C18 | 3-pk |
| ★ | **C-282** | Reversed Phase C18 | 10-pk |
| | **C-753** | Adsorption Silica | 3-pk |
| | **4.3 mm ID x 1 cm, 5 µm Silica** | | |
| | **C-750** | Reversed Phase C18 | 3-pk |
| ★ | **C-752** | Reversed Phase C18 | 10-pk |
| | **C-759** | Adsorption Silica | 3-pk |
| | **C-760** | Adsorption Silica | 10-pk |
| | **C-763** | Cyano Phase CN | 3-pk |
| | **C-764** | Cyano Phase CN | 10-pk |

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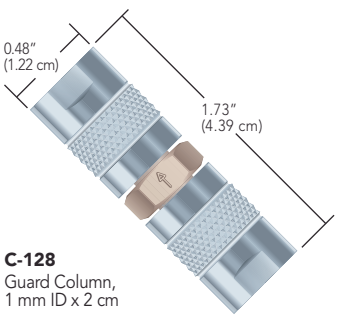
# Microbore Guard Columns

- Ideal for Microbore HPLC
- Easily dry packed (or slurry packed with adapter)
- Made of PEEK polymer and stainless steel

This Upchurch Scientific® ultralow volume guard column (1.0 mm ID x 2 cm length) is ideal for narrow-bore chromatography. The unpacked guard column allows you to exactly match the chemistry of your column, resulting in optimum column protection. The total packing volume of 16.2 µL ensures maximum column efficiency and analytical column protection. The column can be easily dry packed using the specially designed funnel (C-128-20). A 3 g bottle of our C18 packing material will pack this column more than 120 times.

Frits often become plugged before a guard column is contaminated. The two 0.5 µm frits included with this guard column can be changed in minutes. Optional 2 µm frits may be purchased separately (C-408).




**C-128**
Guard Column,
1 mm ID x 2 cm

## APPLICATION NOTE

### Signs Indicating the Guard Column Needs to be Changed

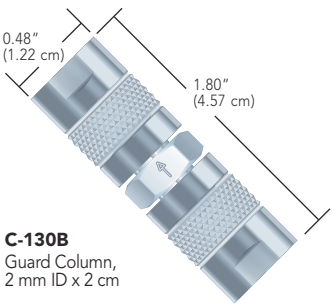
- System pressure build-up
- Faster than usual retention times
- Reduced resolution

# Analytical Guard Columns

- Easy to pack
- Available as a kit with funnel and extra frits

The C-130B is our most popular guard column. HPLC users find this column easy to pack and extremely economical. This narrow-bore short column (2.0 mm ID x 2 cm length) creates only a slight pressure increase with virtually no detectable theoretical plate loss when used with a 3 mm ID or larger column. The 2 µm frits are easy to change, prolonging the life of the guard column. With only 62 µL packing volume per guard column, a 3 g bottle of packing material will pack about 30 guard columns.

For convenience, we offer the C-135B kit with two unpacked guard columns and a ten pack of frits. With two guard columns, there is always a back-up available to help eliminate downtime.




**C-130B**
Guard Column,
2 mm ID x 2 cm

# Analytical Guard Column Kit

For complete convenience, try the Upchurch Scientific guard column kit with packing material. This kit contains 10 replacement frits, a packing funnel and 3 g of C18 reversed phase.

| Part No. | Description | Includes |
|---|---|---|
| **MICROBORE GUARD COLUMNS** | | |
| **1.0 mm ID x 2 cm Unpacked** | | |
| **C-128** | Guard Column | (2) C-128-31 |
| **C-128-20** | Packing Funnel | |
| **C-128-31** | 0.5 µm Stainless Steel Replacement Frit | |
| **C-408** | 2 µm Stainless Steel Replacement Frit | |
| **C-128-40** | Slurry Packing Adapter | |
| **C-128-50** | Guard Column Kit | (2) C-128, (1) C-128-20, (10) C-128-31 |
| **ANALYTICAL GUARD COLUMNS** | | |
| **2.0 mm ID x 2 cm Unpacked** | | |
| **C-130B** | Guard Column | (2) A-100 |
| **C-130-20** | Packing Funnel | |
| **A-100** | 2 µm Stainless Steel Replacement Frit | |
| **A-103** | 0.5 µm Stainless Steel Replacement Frit | |
| **C-130-40** | Slurry Packing Adapter | |
| **C-135B** | Guard Column Kit | (2) C-130B, (1) C-130-20, (10) A-100 |
| **1602** | Guard Column Kit with Reversed Phase C18 | (2) C-130B, (1) C-130-20, (10) A-100, 3 g C18 packing material |
| **PACKING MATERIAL** | | |
| **Part No.** | **Particle Size** | **Qty.** |
| **C-603** | Reversed Phase C18, 30–40 µm pellicular | 3 g |

## RELATED PRODUCTS

- All Guard Columns featured on this page include 10-32 Coned threads. Use any of the 10-32 coned fittings on pages 9–17 to connect tubing to these guard columns.

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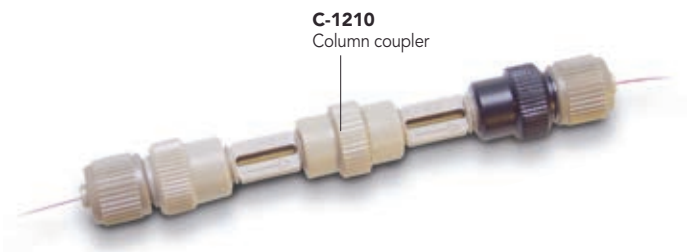
# Capillary Sample Trap Columns

- Packed and unpacked columns
- Pressure rated to 5,000 psi (345 bar)
- Direct connect 360 µm OD capillary tubing

Upchurch Scientific® Capillary Sample Trap Columns are ideal for separating and concentrating and/or purifying biological samples.

Capillary Sample Trap Column Assemblies include one or more 1 µm NanoFilter™ Capsules, each containing either a stainless steel (SST) or biocompatible titanium (Ti) frit. The swept volume of these unique filters is only 10 nL each. Connect your 360 µm OD capillary tubing directly to our Sample Trap Column Assemblies using the fittings provided. The maximum flow rate for these products is 10 µL/min; 250 nL is the optimal flow rate.

*Please Note: Reversing flow in these columns can result in loss of packing material. For more information regarding the proper setup involving these Sample Trap Columns, please contact your local distributor or IDEX Health & Science customer service.*



## SPECIFICATIONS & DETAILS

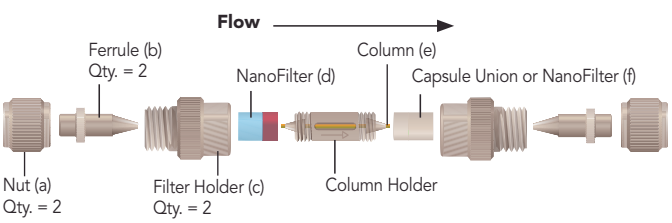
- Packing material specifications: C18, high carbon load, 5 µm/300A spherical silica and SCX, 5 µm 85A material.
- Maximum sample loading capacity of 0.1 µg and capillary bed volume of 0.19 µL or less.

## RELATED PRODUCTS

- Use the P-116 MicroFerrule Plug on page 18 to plug a Sample Trap Column for storage.
- Find 360 µm OD PEEK polymer and fused silica tubing on page 67.

### Components Chart

Please refer to the drawing and part numbers below when ordering replacement components:




| Column Assembly | Nuts (a) | Ferrules (b) | Filter Holder Color(c) | NanoFilter (d) | Column (e) | Capsule Union or NanoFilter (f) |
|---|---|---|---|---|---|---|
| C-1200 | P-416 | F-152 | Tan | M-125 (SST) | C-1250 (C18) | M-124NF (no frit) |
| C-1300 | P-416BLK | F-152 | Tan | M-126 (Ti) | C-1250 (C18) | M-124NF (no frit) |
| C-1500 | P-416 | F-152 | Tan | M-125 (SST) | FS-1000-25 (unpacked) | M-125 (SST) |
| C-1600 | P-416BLK | F-152 | Tan | M-126 (Ti) | FS-1000-25 (unpacked) | M-126 (Ti) |

*All nuts, ferrules, and column holders are made of PEEK polymer. Filter holders are made of PEEK polymer (non-conductive) or stainless steel (conductive). NanoFilter Capsule bodies are made of PEEK polymer (non-conductive) or stainless steel and PEEK (conductive). See page 162 for NanoFilter Capsule color coding. Abbreviation Key: SST = stainless steel; Ti = titanium; SCX = Strong Cation Exchange*

| Part No. | Description | Frit Material | Includes |
|---|---|---|---|
| **CAPILLARY SAMPLE TRAP COLUMNS** | | | |
| **Assemblies** | | | |
| **C-1200** | C18 Column | SST | (1) 2-pk C-1250, (1) M-125, (2) P-416, (2) F-152, (1) M-124NF |
| **C-1300** | C18 Column | Ti | (1) 2-pk C-1250, (1) M-126, (2) P-416BLK, (2) F-152, (1) M-124NF |
| **C-1500** | C18 Column | SST | (1) FS-1000-25, (2) M-125, (2) P-416, (2) F-152 |
| **C-1600** | C18 Column | Ti | (1) FS-1000-25, (2) M-126, (2) P-416BLK, (2) F-152 |
| **Column Coupler and Replacement Parts** | | | |
| ★ **C-1210** | Column Coupler, PEEK | | |
| **C-1250** | C18 Columns, 100 µm ID x 2.5 cm x 360 µm OD | | |
| ★ **F-152** | MicroFerrule for 360 µm OD tubing, PEEK | | |
| **FS-1000-25** | Unpacked Column, 100 µm ID x 2.5 cm x 360 µm OD | | |
| **M-124NF** | | | |
| **M-125** | | | |
| ★ **M-126** | | | |
| ★ **P-416** | | | |
| **P-416BLK** | | | |
| **P-416G** | | | |

| Part No. | Description | Swept Volume | Qty. |
|---|---|---|---|
| **C-1210** | Capsule Union, no Frit, PEEK | 9.5 nL | ea. |
| **C-1250** | 1 µm NanoFilter Capsules, with SST Frits | 10 nL | 2-pk |
| ★ **F-152** | 1 µm NanoFilter Capsules, with Ti Frits | 10 nL | ea. |
| **FS-1000-25** | Female Nut, Natural PEEK | — | ea. |
| **M-124NF** | Female Nut, Black PEEK | — | ea. |
| **M-125** | Female Nut, Green PEEK | — | 2-pk |
| ★ **M-126** | | | 2-pk |
| ★ **P-416** | | | ea. |
| **P-416BLK** | | | ea. |
| **P-416G** | | | ea. |

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# DEBUBBLERS & DEGASSERS


## ACTIVE DEBUBBLERS
PAGE 175

## APPLICATION NOTE — WHY DEGAS YOUR MOBILE PHASE?
PAGE 177

## STAND ALONE DEGASSERS
PAGE 178

SEE STARRED PRODUCTS FOR **TOP SELLERS!**


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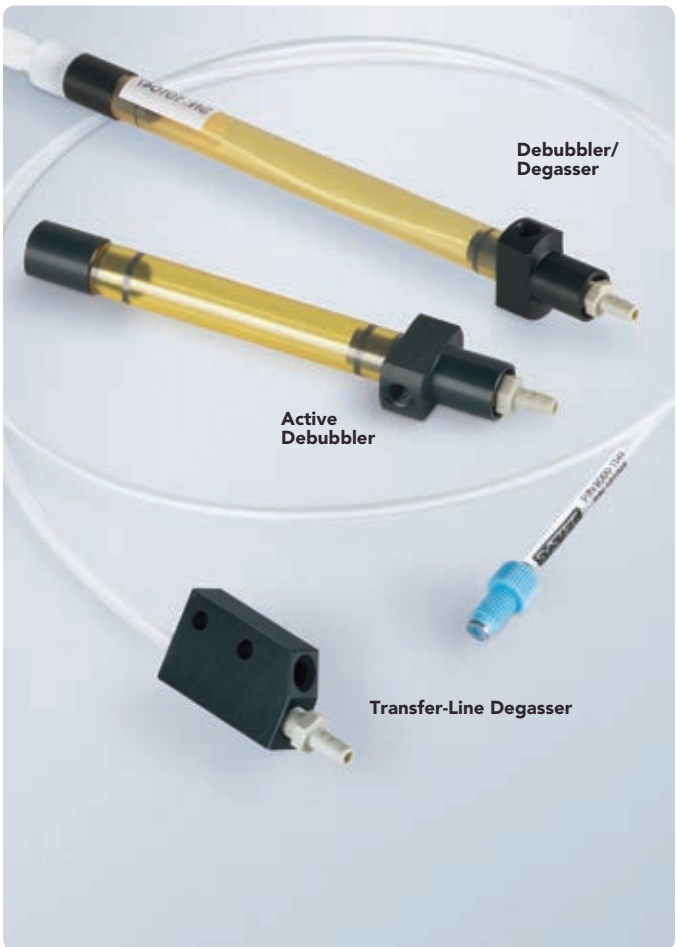
# Systec® Debubbler Series

## Remove Bubbles, Dissolved Gas, or Both!

Dissolved gases and bubbles in system liquids cause dispense volume anomalies in many instruments, negatively affecting both dispense precision and analytical accuracy. Now you have a choice of components for actively removing bubbles with or without also removing dissolved system gases. Online Vacuum Degassing offers operating convenience, high efficiency and low operating costs compared to other common degassing technologies.




## Debubbler/Degasser

**Combines Vacuum Degassing with Active Bubble Removal**

- Improves instrument performance — reduces downtime due to bubble formation.
- Fewer false positives due to reduction of partial reagent dispenses.
- Easily integrates into any pump, degassing tray, or stand-alone degassing application.

## Active Debubbler

**Remove Bubbles in Fluid Stream Before or After the Pump**

- Improves instrument performance — reduces downtime due to bubble formation.
- Fewer false positives due to reduction of partial reagent dispenses.
- Easily integrates into any pump, degassing tray, or stand-alone degassing application.

## Transfer-Line Degasser

**Removes Dissolved Gases During Fluid Transfer**

- Eliminates baseline fluctuations for improved detector sensitivity.
- Coaxial design reduces number of connections, improves reliability.
- Single lumen design increases degassing reliability.

## APPLICATION NOTE

- Liquid handling
- IVD
- HPLC/UHPLC
- $O_2$ and $CO_2$ removal

In medical analyzers, bubbles interfere with critical volumetric reagent dispenses and cause sample failures, wasting time and money. Because bubbles adhere to nearly every part of a dispensing system, high velocity or induced turbulent flow is often used to displace and discharge bubbles from the flow stream and into a waste area. These alternative processes waste reagents and are time consuming, unpredictable, and may additionally require designing the system to recognize bubbles are present. Regardless of how the systems are designed, aqueous systems will always be subject to the laws of physics that cause out-gassing during changes in fluid temperature, pressure, or chemicals mixture. In fluid applications like these, debubblers are the optimal solution to capture and remove formed bubbles to prevent sample dispense inaccuracies, and degassing is ideal to prevent downstream bubble formation from recurring.

| | Part No. | Description | Standard Bubble Trap Size | Transfer Line Length | Internal Volume | Max Bubble Capacity |
|---|---|---|---|---|---|---|
| | DEBUBBLER SERIES – AVAILABLE STANDARD CONFIGURATION | | | | | |
| | **9000-1540** | 2.5 mL Active Debubbler | 2.5 mL | — | 2.5 mL | 2.5 mL |
| | **9000-1541** | 5 mL Active Debubbler | 5 mL | — | 5 mL | 5 mL |
| | **9000-1544** | 2.5 mL Debubbler/ Degasser | 2.5 mL | 17.5" (444.5 mm) | 2.5 mL in transfer line + 2.5 mL in bubble trap | 2.5 mL |
| | **9000-1545** | 5 mL Debubbler/ Degasser | 5 mL | 34" (863.6 mm) | 5 mL in transfer line + 5 mL in bubble trap | 5 mL |
| ★ | **9000-1549** | 1.1 m Transfer-Line Degasser | — | 1.1 m (43") | 4 mL | N/A |

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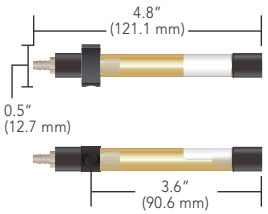
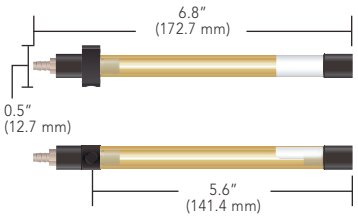
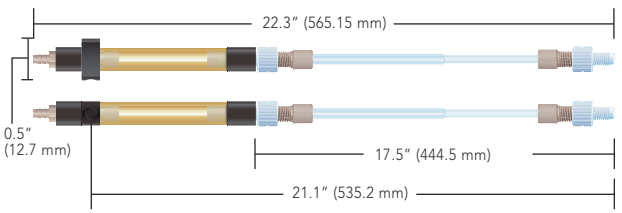
## Overall Dimensions



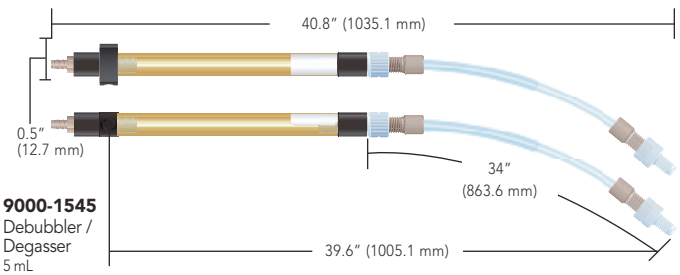

**9000-1540**
Active Debubbler
2.5 mL



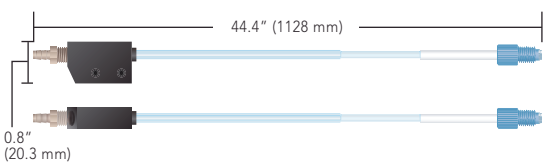

**9000-1541**
Active Debubbler
5 mL




**9000-1544**
Debubbler / Degasser
2.5 mL




**9000-1545**
Debubbler / Degasser
5 mL




**9000-1549**
Transfer-Line Debubbler
1.1 meter

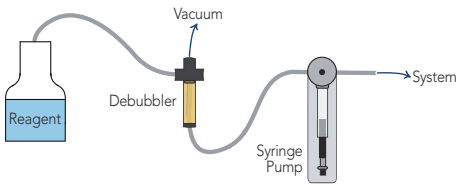
*Please note: These drawings are not actual size.*

## BENEFITS

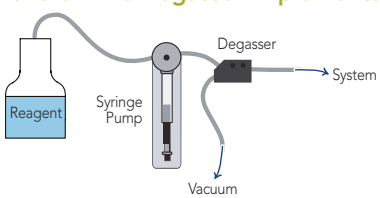
| | Active Debubbler | Debubbler/ Degasser | Transfer-Line Degasser |
|---|---|---|---|
| Perfect for applications that require dissolved gas like oxygen for reaction kinetics | ✓ | | |
| Improves dispense precision by capturing and removing bubbles | ✓ | ✓ | |
| Eliminates false positives and reduces reagent waste by improving instrument performance | ✓ | ✓ | |
| Easily integrates into fluidic path | ✓ | ✓ | ✓ |
| Creates stable instrument performance across system and environmental fluctuations | ✓ | ✓ | ✓ |
| Prevents the formation of bubbles downstream of the degasser | | ✓ | ✓ |
| Eliminates fluctuations for improved detector sensitivity and accuracy by preventing bubble formation | | ✓ | ✓ |
| Improves fluidic system reliability because coaxial design reduces the number of connections | | | ✓ |
| Flexible design can be implemented as transfer line in new instruments or existing instruments that don't have space available | | | ✓ |
| Minimizes fluidic system internal volumes to reduce reagent cost | | | ✓ |

## IMPLEMENTATIONS

### Typical Debubbler Implementation




### Transfer-Line Degasser Implementation



Gas bubbles are actively removed from a flowing liquid stream by vacuum via the PORIDEX membrane.

## NOTE

Degassing tubing is flexible and therefore can be coiled to shorten the overall length or used to transfer the fluid within an instrument to the next desired location.

## SPECIFICATIONS (ALL PLATFORMS)

| | Active Debubblers | Degasser/ Debubblers | Transfer-Line Degasser |
|---|---|---|---|
| **Bubble Removal (volume of air removed/min @ 10 mL/min $H_2O$)** | Up to 30 cc | Up to 30 cc | N/A |
| **Degassing Efficiency† @ 1 mL/min $H_2O$** | N/A | 2.5 mL size: 36% $O_2$ removal<br>5.0 mL size: 55% $O_2$ removal | < 4 ppm dissolved $O_2$ at 5 mL/min |
| **Membrane Material** | PORIDEX® | PORIDEX | PORIDEX |
| **Wetted Materials** | PORIDEX, Polyolefin, FEP, ETFE, Ultem® | PORIDEX, Polyolefin, FEP, ETFE, Ultem | PORIDEX, Polyolefin, FEP, ETFE |
| **Solvent Compatibility** | Solutions > 50% aqueous. Not compatible with detergent concentrations > 0.05%. | | |
| **Standard Bubble Trap Volume** | 2.5 / 5.0 mL | 2.5 / 5.0 mL | N/A |
| **Transfer-Line Volume** | N/A | 2.5 / 5.0 mL | < 4 mL |
| **Maximum Operating Pressure** | 200 kPa (30 psi) @ 25 °C | | |
| **Maximum Operating Temperature** | 40 °C | | |
| **Recommended Vacuum Level** | Minimum 16 kPa absolute | | |
| **Liquid Connection** | 1/4-28 fitting system | | |
| **Vacuum Connection** | Tubing vacuum port(s) for 1/8" (3 mm) ID elastomeric tubing | | |
| **Pressure Drop** | 0.8 mm Hg / mL / min (assumes laminar flow and viscosity of 1 cP) | | |

*† Debubbling / degassing efficiency can be optimized based on flow rate, fluid to be degassed, and gas to be removed.*

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## APPLICATION NOTE

### Why Degas Your Mobile Phase?

Dissolved air in HPLC mobile phases can result in flow rate instability and baseline disturbance.

**Flow rate instability:** Non-degassed mobile phase can outgas in the pump head, causing bubbles to be formed and trapped inside the head or check valves. These bubbles can cause flow disturbances and pressure fluctuations, resulting in flow rate instability.

**Baseline disturbance:** As the mobile phase passes through the column, it experiences a large pressure drop. Non-degassed mobile phase can outgas due to this pressure differential, causing air bubbles to form. Air bubbles passing through or lodging in the flow cell cause detection disturbances, exhibited as baseline noise.

### Why Use a Degassing System?

Helium sparging is a common means of degassing HPLC solvents. This method has its drawbacks, however. Helium tanks are expensive and bulky, and solvent backup and contamination are concerns. In addition, helium sparging can change the composition of a premixed mobile phase over time, due to the difference in the evaporation rates of mobile phase components.

In contrast, the Systec® Degassing System has none of these drawbacks, and it is extremely fast and efficient at removing dissolved gases — more efficient than helium sparging or PTFE-based degassing systems.

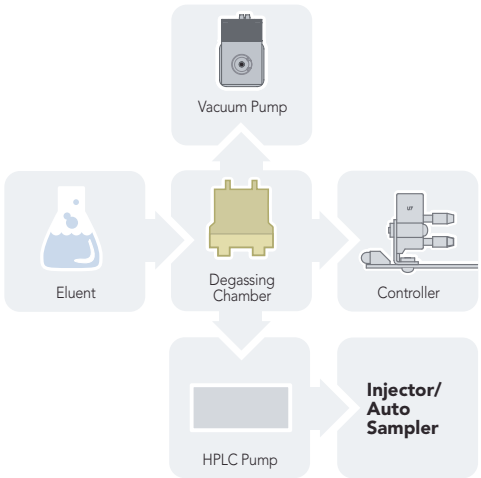
### Tubing Connections

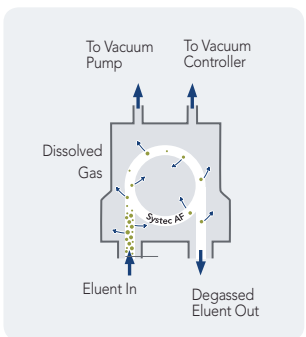
We recommend ETFE tubing (page 73) be used to limit regassing of mobile phase between the degasser and your pump. ETFE is recommended because of its superior impermeability to gases (compared to PTFE, FEP, and PFA tubing). Applicable flangeless fittings for 1/8" OD tubing are found on page 26.

### GPC and HFIP Applications

Standard degassing chambers, with PEEK bulkhead unions, are not recommended for GPC applications or for use with HFIP (hexafluoroisopropanol). Special GPC "hardened" versions are available. Please contact us for more information.

## TYPICAL DEGASSER IMPLEMENTATION




Dissolved gases are actively removed from a flowing liquid stream by vacuum via the Systec AF® membrane.

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# Systec® Stand Alone MINI & Prep Scale Vacuum Degassing Systems

- Analytical and Prep scale models
- Ultra-high degassing efficiency
- Low volume, easy to prime
- Patented control eliminates baseline fluctuations
- Inert flow path
- 5+ year lifetime

The Systec Stand-Alone MINI and Prep-Scale HPLC vacuum degassing systems are high-efficiency, in-line modules that remove dissolved gases from the mobile phase. Their unique design assures reliable continuous operation and the highest level of performance available without the need for helium sparging. Up to five solvent lines may be degassed simultaneously by one unit.

## ZHCR® Control with Built-in Test Diagnostics

- Microcontroller self-test vacuum sensor validation on power-up
- Continuous vacuum system monitoring to ensure optimum operational conditions are maintained
- Vacuum system fault detection and shutdown function indicators

## AF / ZHCR Degassing Technology

Flow-through vacuum degassing chamber with a single amorphous perfluorinated copolymer (Systec AF®) degassing membrane, enabling degassing efficiency 50 times that of PTFE.

The ZHCR (Zero Hysteresis / Constant Run) vacuum pump employs a patented closed-loop, micro-stepping rpm control strategy permitting the pump to run with continuously variable speed, providing quick pull-down at high rpm, and then sustaining a consistent vacuum level at low rpm.

Fluctuations in detector baseline due to changes in vacuum level are eliminated by not having to repeatedly stop and start a single-speed pump. This also greatly reduces wear and noise.

The brushless motor enables quiet operation and is appropriate for environments where solvent vapors may be present.

## SPECIFICATIONS

| | |
|---|---|
| **Stand-Alone Degassing Modules** | |
| **Maximum Number of Degassing Channels** | 5 |
| **Degassing Efficiency† @ 1 mL / min MeOH** | > 70% $O_2$ Removal |
| **Membrane Material** | SYSTEC AF |
| **Other Wetted Materials** | PEEK, PPS(GF), PTFE(GF), FEP |
| **Solvent Compatibility** | Not compatible with fluorinated solvents. Special version available for GPC solvents. |
| **Flow Path ID** | 1.14 mm (0.045") |
| **Internal Volume** | 480 µL (standard) |
| **Maximum Pressure (@ 25 °C)** | 0.5 MPa (70 psi) |
| **Pressure Drop** | 0.18 kPa/mL/min |

*† Degassing efficiency can be optimized based on flow rate, fluid to be degassed, and gas to be removed.*
*[1] Standard ID; other sizes available.*

## NOTE

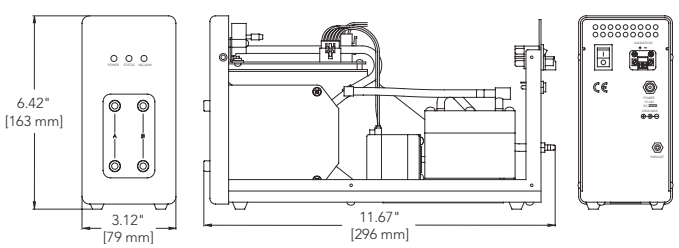
### Power Requirement

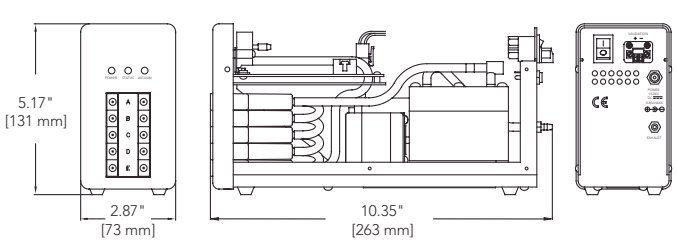
**Input Power required with AC Adapter (included):** 100 to 240 V AC (±10%), 1A, 50 to 60 Hz (±3 Hz). Four interchangeable wall sockets are supplied with the AC Adapter: North America/Japan, U.K., Continental Europe, Australia.

### CE Certification

This product has been certified under the following CE testing standards: EN61326-1; EN55011; EN61300-3-2; EN61300-3-3, & EN61010-1.

## Overall Dimensions




| | Part No. | Number of Channels | Channel Volume | Max HPLC Gradient Flow Capability | Pressure Drop[E] | Degassing Flow Path ID |
|---|---|---|---|---|---|---|
| | **SYSTEC STAND ALONE MINI VACUUM DEGASSING SYSTEMS — AVAILABLE CONFIGURATIONS[A]** | | | | | |
| ★ | **0001-6500** | 2 | 480 µL | 2.0 mL/min[C] | 0.18 kPa/mL/min | 0.045" (1.14 mm) |
| ★ | **0001-6501** | 4 | 480 µL | 2.0 mL/min[C] | 0.18 kPa/mL/min | 0.045" (1.14 mm) |
| | **SYSTEC STAND ALONE PREP SCALE VACUUM DEGASSING SYSTEMS — AVAILABLE CONFIGURATIONS[A, B]** | | | | | |
| | **0001-6482** | 2 | 8.4 mL | 20 mL/min[D] | 0.04 kPa/mL/min | 0.065" (1.65 mm) |
| ★ | **0001-6484** | 2 | 13.8 mL | 40 mL/min[D] | 0.06 kPa/mL/min | 0.065" (1.65 mm) |

*A. Custom configurations are available. Consult us for your own OEM solution to your specific application.*
*B. The standard prep scale chambers are not recommended for GPC applications or for use with HFIP (hexafluoroisopropanol).*
*C. The flow rates given are for a gradient mixture of 50/50 MeOH/$H_2O$, with a typical low pressure gradient mixing valve. Higher flow rates are possible with high pressure mixing.*
*D. The flow rates given are for a gradient mixture of 60/40 MeOH/$H_2O$, with a typical low pressure gradient mixing valve. Higher flow rates are possible with high pressure mixing.*
*E. Estimated tubing pressure per unit change in flow assuming laminar flow with a viscosity of 1.0 cP*

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# TECHNICAL RESOURCES

**CONVERSION TABLES**
PAGE 182

**FITTINGS PRIMER**
PAGE 184

**TUBING REFERENCE DATA**
PAGE 187

**PUMPS REFERENCE**
PAGE 190



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# Technical Resources available at www.idex-hs.com

Help is only a click away at www.idex-hs.com! To access a wealth of product and application support information, including:

## Fittings Primer

Learn how to:

- Describe the fittings needed for your application
- Classify your fitting needs

Visit **www.idex-hs.com/fittings_primer**

## Materials Guide

- Material Properties Guide
- Chemical Compatibility
- Polymer Information Summary

Visit **www.idex-hs.com/materials**

## Conversion Tools

- Calculator to help determine volumes and tubing sizes to achieve specific volume requirements
- Conversion calculators for pressure, temperature and length

Visit **www.idex-hs.com/conversions**

## Standard Port Drawings

- 6-40 flat-bottom
- 6-32 coned
- 10-32 coned and flat-bottom
- 1/4-28 coned and flat-bottom
- 5/16-24 flat-bottom
- 1/2-20 flat-bottom
- M6 flat-bottom

Visit **www.idex-hs.com/standard_ports**

Visit our column hardware website with interactive column selector guides!

www.idexcolumnhardware.com

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***Please Note: For more information regarding the properties of the polymers listed below, please refer to www.idex-hs.com/materials. Find refractive index data on pages 62 and 70; gas permeability data on pages 75–76.***

**Delrin®** (acetal). Delrin exhibits excellent chemical resistance to most organic solvents as well as to most neutral-pH aqueous solvents. However, it is not suitable for use with acids, bases or oxidizing agents. This polymer's high tensile strength yields superior, highly wear-resistant threads and excellent thread strength.

**FEP** (fluorinated ethylene-propylene) and **PFA** (perfluoroalkoxy alkane). Both of these polymers are in the same family as PTFE, and as such are inert to virtually all chemicals used in HPLC. However, because of their relative softness and low durability, these polymers are generally used for low pressure applications. Choose PFA for high purity applications, or choose FEP as a general, all-purpose material. Both FEP and PFA have good thread strength.

**Halar® ECTFE** (ethylene-chlorotrifluoroethylene). Halar is a member of the fluoropolymer family. It offers excellent chemical resistance coupled with a mechanical strength superior to many other fluoropolymers. Halar also outperforms PTFE and similar fluoropolymers in ability to withstand radiation, making it an attractive alternative for medical applications. Its exceptionally smooth surface enhances optical clarity while also helping prevent the shedding of microparticles into the fluid stream.

**PCTFE** (polychloro-trifluoroethylene). PCTFE has excellent chemical resistance. In general, only THF and a few halogenated solvents will react with it. This resilient fluoropolymer is ideal for fittings and sealing surfaces and also has good thread strength.

**PEEK** (polyetheretherketone). PEEK polymer is the flagship member of the poly(aryl)ether ketone family of polymers. It has excellent chemical resistance to virtually all commonly used solvents. However, the following solvents are usually not recommended for use with PEEK: nitric acid; sulfuric acid; halogenated acids, such as hydrofluoric acid and hydrobromic acid (hydrochloric acid is approved for use in most applications); and pure halogenated gases. Additionally, due to a swelling effect, be cautious in using the following solvents with PEEK tubing: methylene chloride, THF, and DMSO in any concentration and acetonitrile in higher concentrations. Excellent thread strength.

**PK** A proprietary polymer blend comprised mainly of polyether-etherketone (PEEK). PK demonstrates all of the superior chemical resistance of PEEK (see PEEK above). The proprietary blend however, will allow a fitting to attain a higher pressure while reducing the cold flow properties of pure PEEK. CAUTION: some fittings molded of PK are known to be conductive. Use caution when employing PK fittings in high voltage applications.

**Polypropylene** Polypropylene is a relatively soft polymer commonly used in low pressure applications, and is especially prevalent in IVD and similar equipment. Polypropylene is excellent for aqueous solutions; however, it should not be used with chlorinated, aromatic, and some organic solvents. Fair thread strength.

**PPS** (polyphenylene sulfide). PPS is a resilient polymer known for its high tensile strength and excellent chemical resistance. PPS may be safely used at room temperature with most organic solvents and neutral-to-high pH aqueous solvents. However, it is not recommended for use with chlorinated solvents, inorganic acids, or any solvent at elevated temperatures.

**Radel®** (polyphenylsulphone). Radel is an amorphous thermopolymer that is mechanically strong and offers good chemical resistance. This polymer withstands repeated autoclave sterilization cycles without suffering thermal breakdown. This property, coupled with its optical clarity, makes Radel tubing an excellent choice for medical and other applications where visual monitoring is essential. Radel is also a readily wetted material, minimizing air bubble accumulation on the inner walls of tubing manufactured with this polymer.

**ETFE** (ethylene-tetrafluoroethylene). As a member of the fluoropolymer family, ETFE has excellent solvent resistance. Its physical properties make it ideal for demanding sealing applications. While most commonly used solvents do not interact with ETFE, take caution when using some chlorinated chemicals. ETFE has good thread strength.

**UHMWPE** (ultra-high molecular weight polyethylene). UHMWPE is a well-known and durable manufacturing polymer. Its physical properties make it ideal for general, aqueous-based environments. Take caution when using this polymer in heavily organic-based applications. Good thread strength.

**Ultem® PEI** (polyetherimide). An amorphous thermoplastic offering high heat resistance, high strength, and broad chemical resistance. Tubing made from Ultem offers a high degree of transparency. This polymer withstands various sterilization methods, such as repeated autoclaving as well as gamma radiation, ethylene oxide gas, and dry heat. Ultem meets the criteria for ISO10993, FDA, and USP Class VI certification.

**Vespel®** (polyimide). Vespel thermoplastic offers high heat resistance, high mechanical strength, and broad chemical resistance in most common liquid chromatography applications. However, it is particularly susceptible to attack by high pH chemical environments. Vespel can be autoclaved and sterilized using gamma radiation. Vespel offers inherent lubricity, making it ideal as a chemically resistant bearing surface.

**RoHS Compliance** Search for RoHS at www.idex-hs.com. For items not included in the catalog, please contact IDEX Health & Science directly.

Download the Lab Assistant for chemical compatibility to your iPad or iPhone

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The fluid transfer community uses both the International System of Units (Metric System) and the U.S. Customary System. To access automatic conversion calculation tools, please go to **www.idex-hs.com/conversions**.

## Dimensions — Inches to Metric

| Decimal Inches | Fractional Inches | Metric |
|---|---|---|
| 0.031″ | 1/32″ | 0.79 mm |
| 0.062″ | 1/16″ | 1.57 mm |
| 0.125″ | 1/8″ | 3.18 mm |
| 0.188″ | 3/16″ | 4.78 mm |
| 0.250″ | 1/4″ | 6.35 mm |
| 0.313″ | 5/16″ | 7.95 mm |
| 0.375″ | 3/8″ | 9.53 mm |
| 0.438″ | 7/16″ | 11.13 mm |
| 0.500″ | 1/2″ | 12.70 mm |
| 0.563″ | 9/16″ | 14.30 mm |
| 0.625″ | 5/8″ | 15.88 mm |
| 0.688″ | 11/16″ | 17.48 mm |
| 0.750″ | 3/4″ | 19.05 mm |
| 0.813″ | 13/16″ | 20.65 mm |
| 0.875″ | 7/8″ | 22.23 mm |
| 0.938″ | 15/16″ | 23.83 mm |
| 1″ | 1″ | 2.54 cm |
| 2″ | 2″ | 5.08 cm |
| 3″ | 3″ | 7.62 cm |
| 4″ | 4″ | 10.16 cm |
| 5″ | 5″ | 12.70 cm |
| 6″ | 6″ | 15.24 cm |
| 7″ | 7″ | 17.78 cm |
| 10″ | 10″ | 25.40 cm |

## Dimensions — Metric to Inches

| Metric | Decimal Inches |
|---|---|
| 1.0 mm | 0.039″ |
| 1.8 mm | 0.071″ |
| 2.0 mm | 0.079″ |
| 3.0 mm | 0.118″ |
| 3.2 mm | 0.126″ |
| 4.0 mm | 0.157″ |
| 4.3 mm | 0.169″ |
| 4.6 mm | 0.181″ |
| 5.0 mm | 0.197″ |
| 6.0 mm | 0.236″ |
| 7.0 mm | 0.276″ |
| 8.0 mm | 0.315″ |
| 9.0 mm | 0.354″ |
| 1.0 cm | 0.394″ |
| 2.0 cm | 0.787″ |
| 3.0 cm | 1.181″ |
| 4.0 cm | 1.575″ |
| 5.0 cm | 1.969″ |
| 6.0 cm | 2.362″ |
| 7.0 cm | 2.756″ |
| 8.0 cm | 3.150″ |
| 9.0 cm | 3.543″ |
| 10.0 cm | 3.937″ |

## Conversion Factors

| Conversion Desired | Formula |
|---|---|
| Inches to millimeters | Inches x 25.4 mm/in. |
| Inches to centimeters | Inches x 2.54 cm/in. |
| Inches to microns | Inches x 25.4 mm/in. x 1,000 µm/mm |
| Diameter in inches to linear volume (µL/inch)* | 12870.4 (d2) |
| Diameter in µm to linear volume (µL/cm)* | 7.85 x 10-6 (d2) |
| Celsius to Fahrenheit | (Celsius x 9/5) + 32 |
| Fahrenheit to Celsius | (Fahrenheit - 32) x 5/9 |
| psi to bar | psi x 0.06894757 |
| psi to MPa | psi x 0.00689476 |
| psi to torr | psi x 51.7150733 |
| psi to ATM | psi x 0.06804596 |
| **d = internal diameter* | |

## Temperature

| Celsius (°C) | Fahrenheit (°F) |
|---|---|
| 0 | 32 |
| 1 | 34 |
| 5 | 41 |
| 10 | 50 |
| 15 | 59 |
| 20 | 68 |
| 25 | 77 |
| 30 | 86 |
| 35 | 95 |
| 40 | 104 |
| 45 | 113 |
| 50 | 122 |
| 55 | 131 |
| 60 | 140 |
| 65 | 149 |
| 70 | 158 |
| 75 | 167 |
| 80 | 176 |
| 85 | 185 |
| 90 | 194 |
| 95 | 203 |
| 100 | 212 |
| 105 | 221 |
| 110 | 230 |
| 115 | 239 |
| 120 | 248 |
| 125 | 257 |
| 130 | 266 |
| 135 | 275 |
| 140 | 284 |
| 145 | 293 |
| 150 | 302 |
| 155 | 311 |
| 160 | 320 |
| 165 | 329 |
| 170 | 338 |
| 175 | 347 |
| 180 | 356 |
| 185 | 365 |
| 190 | 374 |
| 195 | 383 |
| 200 | 392 |
| 205 | 401 |
| 210 | 410 |
| 215 | 419 |

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# What Threads Do I Have?

Hold your fitting over the thread silhouettes below to identify the threads.

## U.S. Customary Threads

| | |
|---|---|
| 6-40 | |
| 6-32 | |
| 10-32 | |
| 1/4-28 | |
| 5/16-24 | |
| 1/2-20 | |

## Metric Threads

| | |
|---|---|
| M4 x 0.7 | |
| M6 x 1 | |

*Refer to page 223 for an explanation of thread nomenclature.*

# Pressure Conversion

| psi | bar | MPa | ATM |
|---|---|---|---|
| 100 | 6.9 | 0.7 | 6.8 |
| 500 | 34.5 | 3.4 | 34.0 |
| 1,000 | 68.9 | 6.9 | 68.0 |
| 1,500 | 103.4 | 10.3 | 102.1 |
| 2,000 | 137.9 | 13.8 | 136.1 |
| 2,500 | 172.4 | 17.2 | 170.1 |
| 3,000 | 206.8 | 20.7 | 204.1 |
| 3,500 | 241.3 | 24.1 | 238.2 |
| 4,000 | 275.8 | 27.6 | 272.2 |
| 4,500 | 310.3 | 31.0 | 306.2 |
| 5,000 | 344.7 | 34.5 | 340.2 |
| 5,500 | 379.2 | 37.9 | 374.3 |
| 6,000 | 413.7 | 41.4 | 408.3 |
| 6,500 | 448.2 | 44.8 | 442.3 |
| 7,000 | 482.6 | 48.3 | 476.3 |
| 7,500 | 517.1 | 51.7 | 510.3 |
| 8,000 | 551.6 | 55.2 | 544.4 |
| 8,500 | 586.1 | 58.6 | 578.4 |
| 9,000 | 620.5 | 62.1 | 612.4 |
| 10,000 | 689.5 | 68.9 | 680.5 |

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# Fittings Primer

## Fittings

Fittings — typically comprised of a nut and ferrule — are designed to connect and seal tubing. While simple in function, fittings can be complex in description and use. General descriptive terms include: the geometry of the receiving port (coned or flat-bottom); the tubing size for which the fitting is designed; and a description of the threads on the nut, e.g., 10-32, 1/4-28, etc. Fittings may also be classified by dimensions and by the type of material from which they are manufactured. Additional information — such as tubing and port material, solvent(s) to be used, and expected system pressure — is required to determine which fittings are best suited for a particular application.

## Threads

Several thread sizes are commonly used in analytical fluid transfer. The most common sizes are 1/4-28, 10-32, and M6. The first two are U.S. Customary System measurements. The third, M6, is measured in the Metric System.

**U.S. Customary System** Two numbers are used to describe a thread size. The first number indicates the diameter of the threaded portion of the nut. Thread diameter numbers range from gauge 1 (0.073") to gauge 12 (0.216"). Beyond 0.216" the thread diameter is given as the actual diameter in fractions of an inch. The second number indicates the threads-per-inch count. Thus, a 1/4-28 nut (Figure 1) has a 1/4" (0.250") diameter thread barrel and 28 threads-per-inch. A 10-32 male nut (Figure 2) has a gauge 10 (0.190") thread barrel with 32 threads-per-inch.

**Metric System** The Metric System also uses a two number system to describe the threads. The first number, preceded by the letter M (for metric), indicates the diameter of the threads in millimeters. The second number indicates how many millimeters between each thread. When the spacing between threads is 1 mm, the callout for the thread often excludes that second number. Thus, an M6x1 thread is often denoted by a simple M6 (Figure 3).

Please see the previous page for a visual comparison of common threads.

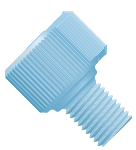

**Figure 1**
1/4-28 Nut

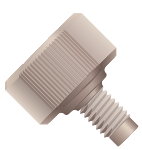

**Figure 2**
10-32 Nut

**Figure 3**
M6 Nut

## MATERIAL STRUCTURAL COMPATIBILITY

| Fitting | Tubing | Port | Recommended? |
|---|---|---|---|
| Plastic | Plastic | Plastic | Yes |
| Plastic | Steel | Plastic | Yes |
| Plastic | Steel | Steel | Yes |
| Plastic | Plastic | Steel | Yes |
| Steel | Steel | Steel | Yes |
| Steel | Plastic | Steel | Sometimes |
| Steel | Plastic | Plastic | No |
| Steel | Steel | Plastic | No |

## Stainless Steel Fittings

Although restrictive in use and application (see the Fittings Applications table, bottom left), stainless steel fittings remain popular for many analytical applications due to their chemical inertness and high pressure-holding capabilities.

The dimensions and shapes of stainless steel fittings vary and can be manufacturer specific (Figures 4 and 5). Even so, the most commonly-used stainless steel fittings for chromatography employ 10-32 threads, allowing many stainless steel fittings to be paired with a variety of receiving ports prior to being swaged onto a tube.

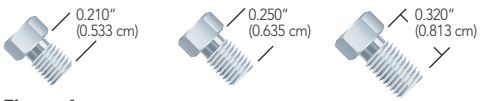


**Figure 4**

**Figure 5**

To be used properly stainless steel fittings must be swaged (permanently attached) to the tubing they are connecting. To do this correctly, IDEX Health & Science recommends the following procedure:

Place the nut and ferrule, in that order, on the tubing. Place this loose assembly into a mating port and tighten the nut finger tight, while ensuring the tubing is bottomed out inside the port. Now wrench tighten the nut an additional 3/4 turn. ***Please Note:*** *The ferrule is now permanently attached to the tubing and should only be used in the port into which it was swaged. Attempting to use a pre-swaged ferrule in a receiving port that is different from the one into which it was initially swaged may result in dead volume or leaks (see the Interchangeability section, next page).*

To properly tighten a pre-swaged stainless steel fitting, IDEX Health & Science recommends wrench tightening only an additional 1/4 to 1/2 turn past finger tight. Should any leaking occur, continue tightening the fitting a little at a time until the leak stops. If the fitting requires more than one complete revolution past finger tight, we recommend it be replaced, as excessive tightening typically indicates a damaged product.

## Polymer-Based Fittings

Unlike their stainless steel counterparts, polymer fittings are nearly universal in application (see the Fittings Applications table) and are comparatively easy to use. Polymer fittings do not permanently attach to tubing, and they usually do not require any tool (besides your fingers!) to properly tighten. Additionally, these fittings come in a variety of polymers, providing several cost, pressure and chemical-resistance options.

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# Fittings Primer

## Interchangeability

Because swaged stainless steel ferrules are permanently attached to the tubing, interchangeability is almost impossible with stainless steel fittings. The key factor that limits interchangeability of stainless steel fittings is "Dimension X"—the length of tubing that extends past a swaged ferrule (Figure 6; see page 184 for details on swaging a ferrule into place).

Dimension X varies among manufacturers (Figure 7). Dimension X can also vary for the same manufacturer due to production tolerances. Because of these differences, if you are using all stainless steel fittings we recommend you only use swaged fittings in the port where they were initially swaged (Figure 8a). Interchanging fitting assemblies and receiving ports can introduce leaks and/or dead-volume chambers to the flow path (Figure 8b). Therefore, for stainless steel fittings, we generally recommend new fittings, new ferrules, and new connections each time receiving ports are changed.

Even though interchangeability is a problem with stainless steel fittings, it is generally not a problem with polymer fittings. Because polymer ferrules don't permanently attach to the tubing wall, Dimension X can be adjusted each time the fitting assembly is connected to a receiving port. This helps ensure a good connection with minimal dead volume.

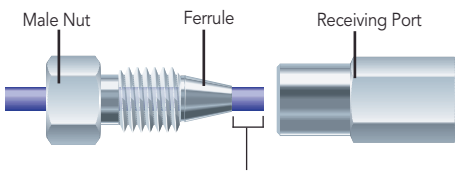
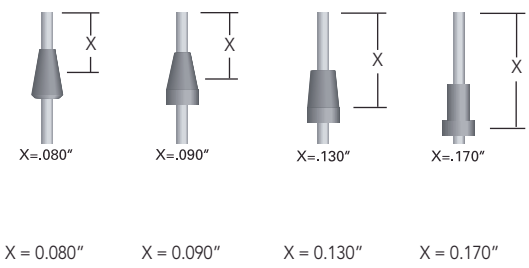



**Figure 6**




*Dimension X can range from 0.080" to 0.170" among various manufacturers.*

**Figure 7**

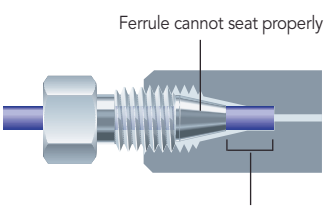



**Figure 8a**

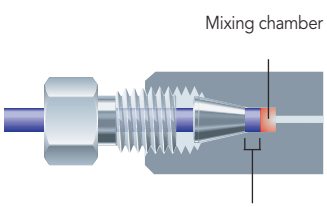



**Figure 8b**

## If Your Fittings Leak

**1. Check to make sure your tubing is seated properly.** When using universal Fingertight fittings, the tubing must bottom out in the receiving port before the nut and ferrule are tightened. If a gentle tug disengages your tubing after the fittings have been tightened, loosen the nut and ferrule and try again.

**2. The fitting may not be tightened enough.** Stainless steel nuts and ferrules require a wrench to tighten them, even after repeated use. Fingertight fittings also require a good turn; however, using tools may lead to over-tightening and damage to the fitting, and as such, tools should be used with caution on Fingertight fittings.

**3. You may be using incompatible fittings.** Make sure you are using a nut and ferrule that are compatible with each other and with the components of your system. To avoid this problem and ensure compatibility, use IDEX Health & Science universal Fingertight fittings. Because the ferrule does not permanently swage onto your tubing, a Fingertight can be used repeatedly for several cycles in most systems.

**4. Check the condition of the sealing area.** After repeated use, a fitting's "sealing area" (at the tip of the fitting or ferrule), will gradually become deformed to the point of being incapable of creating a seal. As such, it is a good idea to keep an extra supply of the fittings you are using so you can replace them quickly and avoid unnecessary downtime.

**5. Check the receiving port for damage.** Sometimes a leaking connection has nothing at all to do with the nut and ferrule, but with the receiving port. Ports that have had stainless steel fittings swaged into them are especially susceptible to damage. Check the receiving port for visible burrs or scratches and replace if necessary.

**6. Evaluate chemical compatibility.** Using fittings made of material incompatible with your mobile phase is a sure way of creating leaks. Please visit the IDEX Health & Science website, www.idex-hs.com, for more information about chemical compatibility.

## TELLTALE SIGNS OF SYSTEM LEAKS

Before you see the first drip of mobile phase, your system can warn you that a problem exists. The most common signs of system leaks are:

1. No flow or pressure
2. Pump pressures up, but there is no flow
3. Noisy baseline
4. Baseline drift

While all of these symptoms could also indicate problems unrelated to leaking connections, it is always easiest to start there. Not only are leaking connections usually easy to repair, they are also typically the least expensive option.

Download a copy of All About Fittings for your lab!

www.idex-hs.com/AllAboutFittings

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# Adapters & Unions

With all the different tubing sizes and threaded port configurations, scientists frequently use adapters to make connections. However, adapters are not always the only choice, or even the best choice, when making connections between dissimilar components.

Adapters have two different thread configurations, such as 1/4-28 flat-bottom to 10-32 coned, or 1/4-28 male flat-bottom to luer. Unions have the same thread on both sides, such as 10-32 coned to 10-32 coned. Please refer to Figure 9 for examples of adapters and unions.

Unions are typically less expensive than adapters while performing equally as well. Thus, it is often advantageous to use a union wherever possible. To determine whether a union or an adapter is appropriate for a particular connection, first determine if the connection is designed for low pressure or high pressure. This is not always obvious, but you can make some assumptions.

(For example, when connecting 1/16" OD PEEK tubing to 1/8" OD FEP or PFA tubing, you likely have a low pressure connection since the connection pressure is limited by the amount of pressure the fluoropolymer tubing can withstand.)

Once you know the pressure classification for your connection, determine what connectors are available for that classification. For the low pressure example given, there are a number of unions available with 1/4-28 internal flat-bottom geometry on both sides (see pages 40 – 41). Other options with matching M6 and 5/16-24 internal threads are also available (pages 40 and 50, respectively).

After you identify the connector needed, the focus turns to finding fittings that work with your tubing sizes to mate with each side of the selected union. In our example, the connection is between 1/16" OD and 1/8" OD tubing, and there are several 1/4-28 flat-bottom fittings for both 1/16" and 1/8" OD tubing, such as those on pages 22 – 28.

Of course, a number of cases remain where only an adapter will do. For recommendations on making typical threaded connections, please see the "Connections Reference" on page 35.

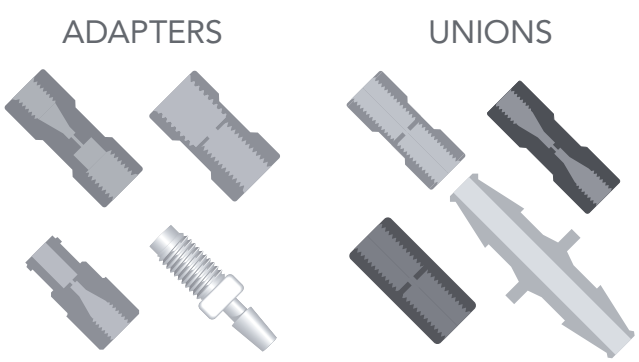


**Figure 9 — Adapters and Unions**

# Connectors

## Void, Dead, and Swept Volume

When making connections, in most instances, what is of primary importance is how much internal volume exists within a connection and how that internal volume will impact chromatographic results.

Three terms describe the internal volume of a product: void volume, dead volume, and swept volume. Void volume is simply another way of describing the total internal space within a connection into which fluid can flow. Dead volume is that portion of the void volume that is out of the intended flow path, while swept volume is that portion of the void volume which is in the intended flow path (see Figure 10). Therefore, Void Volume = Dead Volume + Swept Volume.

Dead volume, particularly in capillary connections, can cause undesirable chromatographic effects, including:

- Analysis delays
- Broadened peaks
- Poor resolution
- Sample carry-over
- Split peaks
- Gas collection

Because of the negative impact of dead volume in a connection, all dead volume should be removed from the connection if possible.

To keep most of the void volume truly swept volume, match the tubing ID as closely as possible with the diameter of the holes in your equipment. This ensures the fluid runs completely through the entire passageway. Matching internal diameters also helps reduce turbulence as the fluid passes through the connection.

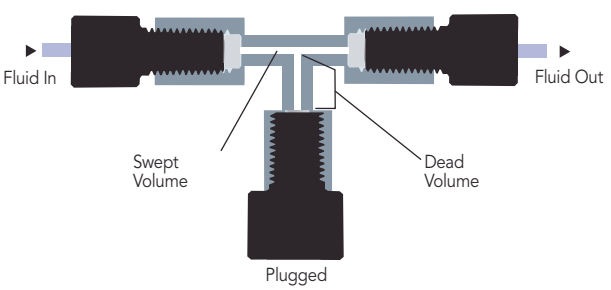


**Figure 10 — Internal Volume Defined**

See the full range of Micro/Nano connections!

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# Differential Pressure Per 5–Foot Length

Which ID is best for your application? Refer to flow rates (using water as the solvent) and tubing IDs below and the corresponding differential pressure per 5-foot length.

These theoretical data are presented in psi with the bar equivalent in parentheses, and were calculated using the formula presented to the right.

| | Tubing ID | | | | | | |
|---|---|---|---|---|---|---|---|
| **Flow Rate** | **0.0025"** | **0.005"** | **0.007"** | **0.010"** | **0.020"** | **0.030"** | **0.062"** |
| 0.1 mL/min | 923 | 58 | 15 | 4 | 0 | 0 | 0 |
| | (64) | (4.0) | (1.0) | (0.3) | (0) | (0) | (0) |
| 1.0 mL/min | NR* | 577 | 150 | 36 | 2 | 0 | 0 |
| | | (40) | (10) | (2.5) | (0.1) | (0) | (0) |
| 2.0 mL/min | NR* | 1,154 | 300 | 72 | 5 | 1 | 0 |
| | | (80) | (21) | (5.0) | (0.3) | (0.1) | (0) |
| 10.0 mL/min | NR* | 5,770 | 1,502 | 361 | 23 | 5 | 0 |
| | | (398) | (103) | (25) | (1.6) | (0.3) | (0) |
| 25.0 mL/min | NR* | NR* | 3,755 | 902 | 56 | 11 | 0 |
| | | | (259) | (62) | (3.9) | (0.8) | (0) |

**Not Recommended — Exceeds the pressure rating of the tubing.*

# Theoretical Pressure Drop Along a Length of Tubing

$$\Delta P = \left(9.86 \times 10^{-8}\right)\left(\frac{F\,L\,V}{d^4}\right)$$

Where: ΔP = pressure drop in psi
F = flow rate in mL/min
L = tubing length in cm
V = viscoscity in centipoise (cp)
d = tubing inside diameter in cm

*(See table above for data calculated using this formula.)*

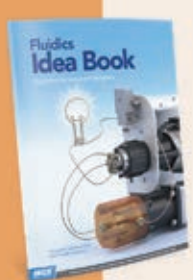
# Tubing Internal Diameters & Volumes

**Tubing Internal Diameter (d) in inches to Linear Volume (µL/inch):** 12870.4 (d2)

**Tubing Internal Diameter (d) in µm to Linear Volume (µL/cm):** 7.85 x 10-6 (d2)

| Internal Diameters | | | | Linear Volumes | |
|---|---|---|---|---|---|
| **Inches** | **Wire Gauge*** | **Millimeters** | **Microns** | **µL/in** | **µL/cm** |
| 0.0008 | — | 0.020 | 20 | 0.008 | 0.003 |
| 0.001 | — | 0.025 | 25 | 0.013 | 0.005 |
| 0.002 | — | 0.051 | 51 | 0.051 | 0.020 |
| 0.0025 | — | 0.064 | 64 | 0.081 | 0.032 |
| 0.003 | — | 0.076 | 76 | 0.116 | 0.046 |
| 0.004 | 36 | 0.102 | 102 | 0.206 | 0.081 |
| 0.005 | 35 | 0.127 | 127 | 0.322 | 0.127 |
| 0.006 | — | 0.152 | 152 | 0.463 | 0.182 |
| 0.007 | 34 | 0.178 | 178 | 0.631 | 0.248 |
| 0.008 | 33 | 0.203 | 203 | 0.824 | 0.324 |
| 0.009 | 32 | 0.229 | 229 | 1.042 | 0.410 |
| 0.010 | 31 | 0.254 | 254 | 1.287 | 0.507 |
| 0.012 | 30 | 0.305 | 305 | 1.853 | 0.730 |
| 0.014 | 28 | 0.356 | 356 | 2.523 | 0.993 |
| 0.015 | — | 0.381 | 381 | 2.896 | 1.140 |
| 0.018 | 26 | 0.457 | 457 | 4.170 | 1.642 |
| 0.020 | 25 | 0.508 | 508 | 5.148 | 2.027 |
| 0.028 | 22 | 0.711 | 711 | 10.090 | 3.973 |
| 0.030 | — | 0.762 | 762 | 11.583 | 4.560 |
| 0.032 | 21 | 0.813 | 813 | 13.179 | 5.189 |
| 0.040 | — | 1.016 | 1016 | 20.593 | 8.107 |
| 0.042 | 19 | 1.067 | 1067 | 22.703 | 8.938 |
| 0.046 | — | 1.168 | 1168 | 27.234 | 10.722 |
| 0.055 | — | 1.397 | 1397 | 38.933 | 15.328 |
| 0.062 | — | 1.575 | 1575 | 49.474 | 19.478 |
| 0.080 | 14 | 2.032 | 2032 | 82.370 | 32.429 |
| 0.093 | — | 2.362 | 2362 | 111.316 | 43.825 |
| 0.120 | 9 | 3.048 | 3048 | 185.333 | 72.966 |
| 0.125 | — | 3.175 | 3175 | 201.099 | 79.173 |

** Wire Gauge numbers are referencing Birmingham or Stub's Iron Wire Gauge values, which are commonly used by most stainless steel syringe manufacturers.*

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# Rating Comparison

All information has been supplied to IDEX Health & Science by the tubing manufacturers. It is for your guidance only. We recommend that you test the tubing before use.

**Rating:** + meets the stated property
± meets the stated property to limited extent
– does not meet the stated property
1 not recommended
10 excellent

| Properties | | Tygon® LMT-55 | Tygon E-LFL | Pharmed® | Tygon 2001 | Tygon MHLL |
|---|---|---|---|---|---|---|
| **FDA** | | + | + | + | + | + |
| **US Pharmacopoeia Class VI** | | – | + | + | – | + |
| **Transparency** | | + | + | – | + | – |
| **Long Life** | | 1 | 7 | 10 | 3 | 10 |
| **Gas Permeability** | $CO_2$ | 7 | 8 | 5 | 5 | 5 |
| | $O_2$ | 9 | 9 | 8 | 9 | 8 |
| | $N_2$ | 9 | 10 | 8 | 6 | 8 |
| **Temperature, above 0 °C** | | 2 | 2 | 7 | 1 | 7 |
| **Temperature, below 0 °C** | | 4 | 3 | 8 | 7 | 8 |
| **Pressure** | | 5 | 9 | 1 | 1 | 1 |
| **Absorption / Adsorption** | | 6 | 6 | 9 | 10 | 9 |
| **Chemical Resistance** | | | | | | |
| **Acids (H2SO4)** | **10%** | 10 | 10 | 10 | 10 | 10 |
| | **30%** | 10 | 7 | 10 | 10 | 10 |
| | **95–98%** | 1 | 1 | 1 | 7 | 1 |
| **Bases (NaOH)** | **10–15%** | 10 | 10 | 10 | 10 | 10 |
| | **30–40%** | 4 | 2 | 10 | 10 | 10 |
| **Hydrocarbons (aliphatic)** | | 1 | 1 | 1 | 1 | 1 |
| **Mineral Salts** | | 10 | 10 | 10 | 10 | 10 |
| **Alcohols** | | 1 | 1 | 10 | 10 | 10 |
| **Ketones (Acetone)** | | 1 | 1 | 1 | 7 | 1 |

**Maximum recommended operating pressure**

| Wall Thickness | Inner Diameter | bar (psi) | bar (psi) | bar (psi) | bar (psi) | bar (psi) |
|---|---|---|---|---|---|---|
| 1.6 mm | 0.8 mm | 8.7 (126) | 8.7 (126) | 3.7 (54) | N/A | N/A |
| 1.6 mm | 1.6 mm | 4.8 (70) | 4.8 (70) | 2.1 (30) | 3.1 (45) | N/A |
| 1.6 mm | 2.4 mm | 3.8 (55) | 3.8 (55) | 1.6 (23) | N/A | N/A |
| 1.6 mm | 3.2 mm | 3.0 (44) | 3.0 (44) | 1.3 (19) | 2.0 (29) | N/A |
| 1.6 mm | 4.8 mm | 2.2 (32) | 2.2 (32) | 0.9 (13) | 1.5 (22) | N/A |
| 1.6 mm | 6.4 mm | 1.8 (26) | 1.8 (26) | 0.8 (12) | 1.1 (16) | N/A |
| 1.6 mm | 8.0 mm | 1.5 (22) | 1.5 (22) | 0.6 (9) | 0.9 (13) | N/A |
| 1.6 mm | 9.5 mm | 1.3 (19) | 1.3 (19) | 0.5 (7) | 0.8 (12) | N/A |
| 1.6 mm | 11.1 mm | 1.2 (17) | 1.2 (17) | 0.5 (7) | N/A | N/A |
| 1.6 mm | 12.7 mm | 1.1 (16) | 1.1 (16) | 0.5 (7) | N/A | N/A |
| 1.6 mm | 15.9 mm | 1.0 (15) | 1.0 (15) | 0.4 (6) | N/A | N/A |
| 2.4 mm | 4.8 mm | 3.0 (44) | 3.0 (44) | 1.3 (19) | N/A | N/A |
| 2.4 mm | 6.4 mm | 2.4 (35) | 2.4 (35) | 1.0 (15) | N/A | N/A |
| 2.4 mm | 8.0 mm | 2.0 (29) | 2.0 (29) | 0.8 (12) | N/A | N/A |
| 2.4 mm | 9.5 mm | 1.8 (26) | 1.8 (26) | 0.8 (12) | N/A | N/A |
| 2.4 mm | 11.1 mm | 1.5 (22) | 1.5 (22) | 0.6 (9) | N/A | N/A |
| 2.4 mm | 12.7 mm | 1.3 (19) | 1.3 (19) | 0.6 (9) | N/A | N/A |
| 2.4 mm | 15.9 mm | 1.2 (17) | 1.2 (17) | 0.5 (7) | N/A | N/A |
| 3.2 mm | 6.4 mm | 3.0 (44) | 3.0 (44) | 1.3 (19) | N/A | N/A |
| 3.2 mm | 9.6 mm | 2.2 (32) | 2.2 (32) | 0.9 (13) | N/A | N/A |
| 3.2 mm | 12.7 mm | 1.8 (26) | 1.8 (26) | 0.8 (12) | 1.1 (16) | N/A |
| 3.2 mm | 15.9 mm | 1.5 (22) | 1.5 (22) | 0.6 (9) | 0.9 (13) | N/A |

*N/A = Not applicable*

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# Rating Comparison

All information has been supplied to IDEX Health & Science by the tubing manufacturers. It is for your guidance only. We recommend that you test the tubing before use.

**Rating:** + meets the stated property
± meets the stated property to limited extent
– does not meet the stated property
1 not recommended
10 excellent

| Properties | Tygon® HC F-4040-A | Tygon 3350 | Silicone Peroxide | Norprene® A-60-G | Fluran® F-5500-A |
|---|---|---|---|---|---|
| **FDA** | – | + | + | – | – |
| **US Pharmacopoeia Class VI** | – | + | + | – | – |
| **Transparency** | ± | ± | ± | – | – |
| **Long Life** | 2 | 4 | 4 | 10 | 3 |
| **Gas Permeability $CO_2$** | 9 | 1 | 1 | 5 | 10 |
| **$O_2$** | 10 | 1 | 1 | 8 | 10 |
| **$N_2$** | 10 | 1 | 1 | 8 | 10 |
| **Temperature, above 0 °C** | 2 | 10 | 10 | 7 | 9 |
| **Temperature, below 0 °C** | 1 | 10 | 10 | 8 | 4 |
| **Pressure** | 7 | 1 | 1 | 1 | 1 |
| **Absorption / Adsorption** | 6 | 1 | 1 | 9 | 7 |
| **Chemical Resistance** | | | | | |
| **Acids (H2SO4) 10%** | 10 | 10 | 10 | 10 | 10 |
| **30%** | 7 | 7 | 8 | 10 | 10 |
| **95–98%** | 1 | 1 | 1 | 1 | 10 |
| **Bases (NaOH) 10–15%** | 1 | 10 | 10 | 10 | 10 |
| **30–40%** | 1 | 10 | 10 | 10 | 10 |
| **Hydrocarbons (aliphatic)** | 7 | 1 | 1 | 1 | 7 |
| **Mineral Salts** | 10 | 7 | 7 | 10 | 10 |
| **Alcohols** | 7 | 7 | 10 | 10 | 1 |
| **Ketones (Acetone)** | 1 | 4 | 1 | 1 | 1 |

**Maximum recommended operating pressure**

| Wall Thickness | Inner Diameter | bar (psi) | bar (psi) | bar (psi) | bar (psi) | bar (psi) |
|---|---|---|---|---|---|---|
| 1.6 mm | 0.8 mm | 10.9 (158) | 1.9 (28) | 1.9 (28) | 3.7 (54) | 3.7 (54) |
| 1.6 mm | 1.6 mm | 6.1 (88) | 1.0 (15) | 1.0 (15) | 2.1 (30) | 2.1 (30) |
| 1.6 mm | 2.4 mm | 4.8 (70) | 0.8 (12) | 0.8 (12) | 1.6 (23) | 1.6 (23) |
| 1.6 mm | 3.2 mm | 3.8 (55) | 0.6 (9) | 0.6 (9) | 1.3 (19) | 1.3 (19) |
| 1.6 mm | 4.8 mm | 2.7 (39) | 0.5 (7) | 0.5 (7) | 0.9 (13) | 0.9 (13) |
| 1.6 mm | 6.4 mm | 2.2 (32) | 0.4 (6) | 0.4 (6) | 0.8 (12) | 0.8 (12) |
| 1.6 mm | 8.0 mm | 1.8 (26) | 0.3 (4) | 0.3 (4) | 0.6 (9) | 0.6 (9) |
| 1.6 mm | 9.5 mm | 1.6 (23) | 0.3 (4) | 0.3 (4) | 0.5 (7) | 0.5 (7) |
| 1.6 mm | 11.1 mm | 1.5 (22) | 0.3 (4) | 0.3 (4) | 0.5 (7) | 0.5 (7) |
| 1.6 mm | 12.7 mm | 1.4 (20) | 0.2 (3) | 0.2 (3) | 0.5 (7) | 0.5 (7) |
| 1.6 mm | 15.9 mm | 1.2 (17) | 0.2 (3) | 0.2 (3) | 0.4 (6) | 0.4 (6) |
| 2.4 mm | 4.8 mm | 3.8 (55) | 0.6 (9) | 0.6 (9) | 1.3 (19) | 1.3 (19) |
| 2.4 mm | 6.4 mm | 3.0 (44) | 0.5 (7) | 0.5 (7) | 1.0 (15) | 1.0 (15) |
| 2.4 mm | 8.0 mm | 2.5 (36) | 0.4 (6) | 0.4 (6) | 0.8 (12) | 0.8 (12) |
| 2.4 mm | 9.5 mm | 2.2 (32) | 0.4 (6) | 0.4 (6) | 0.8 (12) | 0.8 (12) |
| 2.4 mm | 11.1 mm | 1.8 (26) | 0.3 (4) | 0.3 (4) | 0.6 (9) | 0.6 (9) |
| 2.4 mm | 12.7 mm | 1.7 (25) | 0.3 (4) | 0.3 (4) | 0.6 (9) | 0.6 (9) |
| 2.4 mm | 15.9 mm | 1.5 (22) | 0.3 (4) | 0.3 (4) | 0.5 (7) | 0.5 (7) |
| 3.2 mm | 6.4 mm | 3.8 (55) | 0.6 (9) | 0.6 (9) | 1.3 (19) | 1.3 (19) |
| 3.2 mm | 9.6 mm | 2.7 (39) | 0.5 (7) | 0.5 (7) | 0.9 (13) | 0.9 (13) |
| 3.2 mm | 12.7 mm | 2.2 (32) | 0.4 (6) | 0.4 (6) | 0.8 (12) | 0.8 (12) |
| 3.2 mm | 15.9 mm | 1.8 (26) | 0.3 (4) | 0.3 (4) | 0.6 (9) | 0.6 (9) |

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# Pumps Reference

| Part No. | Pump ID | Model Description | Min* | Max* | Differential Pressure Max bar* | Gear Material | Seals | Housing Material | Temp Min | Temp Max | System Pressure Max bar | Type | Cross Reference Part Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **MI0006** | Z-186 | GA-X21.CFS.B | 1 | 99 | 1.4 | Graphite | PTFE | SS - 316 | - 46 | + 177 | 21 | Suction Shoe | 82092 |
| **MI0007** | Z-181 | GA-V21.CFS.B | 2 | 252 | 2.8 | Graphite | PTFE | SS - 316 | - 46 | + 177 | 21 | Suction Shoe | 82114 |
| **MI0008** | Z-183 | GA-V23.CFS.B | 4 | 504 | 2.8 | Graphite | PTFE | SS - 316 | - 46 | + 177 | 21 | Suction Shoe | 82115 |
| **MI0013** | Z-120 | GJ-N23.FF1S.B.B1 | 32 | 3950 | 3.5 | PTFE | PTFE | SS - 316 | - 46 | + 54 | 21 | Cavity Style | 82004 |
| **MI0015** | Z-122 | GJ-N25.FF1S.B.B1 | 455 | 5460 | 3.5 | PTFE | PTFE | SS - 316 | - 46 | + 54 | 21 | Cavity Style | 82006 |
| **MI0016** | Z-140 | GJ-N23.FF1S.B | 32 | 3950 | 3.5 | PTFE | PTFE | SS - 316 | - 46 | + 54 | 21 | Cavity Style | 82001 |
| **MI0018** | Z-142 | GJ-N25.FF1S.B | 455 | 5460 | 3.5 | PEEK | PTFE | SS - 316 | - 46 | + 54 | 21 | Cavity Style | 82003 |
| **MI0019** | Z-130 | GJ-N23.PF1S.B.B1 | 32 | 3950 | 5.2 | PPS | PTFE | SS - 316 | - 46 | + 54 | 21 | Cavity Style | 81529 |
| **MI0020** | Z-150 | GJ-N23.PF1S.B | 32 | 3950 | 5.2 | PPS | PTFE | SS - 316 | - 46 | + 54 | 21 | Cavity Style | 81531 |
| **MI0022** | Z-200 | GB-P25.PVS.A.B1 | 292 | 3509 | 3.5 | PPS | Viton® | SS - 316 | - 29 | + 177 | 21 | Suction Shoe | 81281 |
| **MI0023** | Z-201 | GB-P35.PVS.A.B1 | 585 | 7020 | 3.5 | PPS | Viton | SS - 316 | - 29 | + 177 | 21 | Suction Shoe | 81282 |
| **MI0131** | Z-1830 | GA-T23.PFS.B | 5 | 460 | 5.2 | PPS | PTFE | SS - 316 | - 46 | + 177 | 21 | Suction Shoe | 81473 |
| **MI0280** | Z-1830 | GA-T23.JFS.B | 5 | 460 | 5.2 | PEEK | PTFE | SS - 316 | - 46 | + 177 | 21 | Suction Shoe | L18489 |
| **MI0284** | Z-140 HC | GJ-N23.FF1C.B | 32 | 3950 | 3.5 | PTFE | PTFE | Hastelloy®-C276 | - 46 | + 54 | 21 | Cavity Style | L20284 |
| **MI0306** | Z-200 | GB-P25.JVS.B | 35 | 3480 | 3.5 | PEEK | Viton | SS - 316 | - 29 | + 177 | 21 | Suction Shoe | 220004 |
| **MI0310** | Z-183 | GA-V23.CFC.B | 4 | 504 | 2.8 | Graphite | PTFE | Hastelloy-C276 | - 46 | + 177 | 21 | Suction Shoe | L2383 |
| **MI0311** | Z-142 HC | GJ-N25.FF1C.B | 55 | 5480 | 3.5 | PTFE | PTFE | Hastelloy-C276 | - 46 | + 54 | 21 | Cavity Style | L21812 |
| **MI0312** | Z-186 | GA-X21.JFS.B | 1 | 99 | 2.3 | PEEK | PTFE | SS - 316 | - 46 | + 177 | 21 | Suction Shoe | L20820 |
| **MI0313** | Z-140 | GJ-N23.JF1S.B | 32 | 3950 | 5.6 | PEEK | PTFE | SS - 316 | - 46 | + 54 | 21 | Cavity Style | L197735 |
| **MI0378** | Z-201 | GB-P35.JKS.B | 73 | 7241 | 3.5 | PEEK | Kalrez® | SS - 316 | - 29 | + 177 | 21 | Suction Shoe | L22609 |

** Absolute flow rates dependent on the drive used.*

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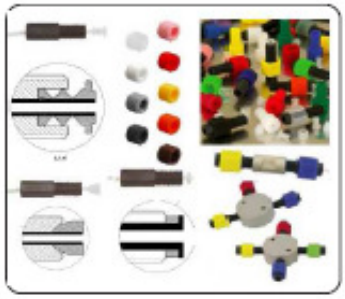
# GC & HPLC Fittings

## - VICI Valco/Cheminert

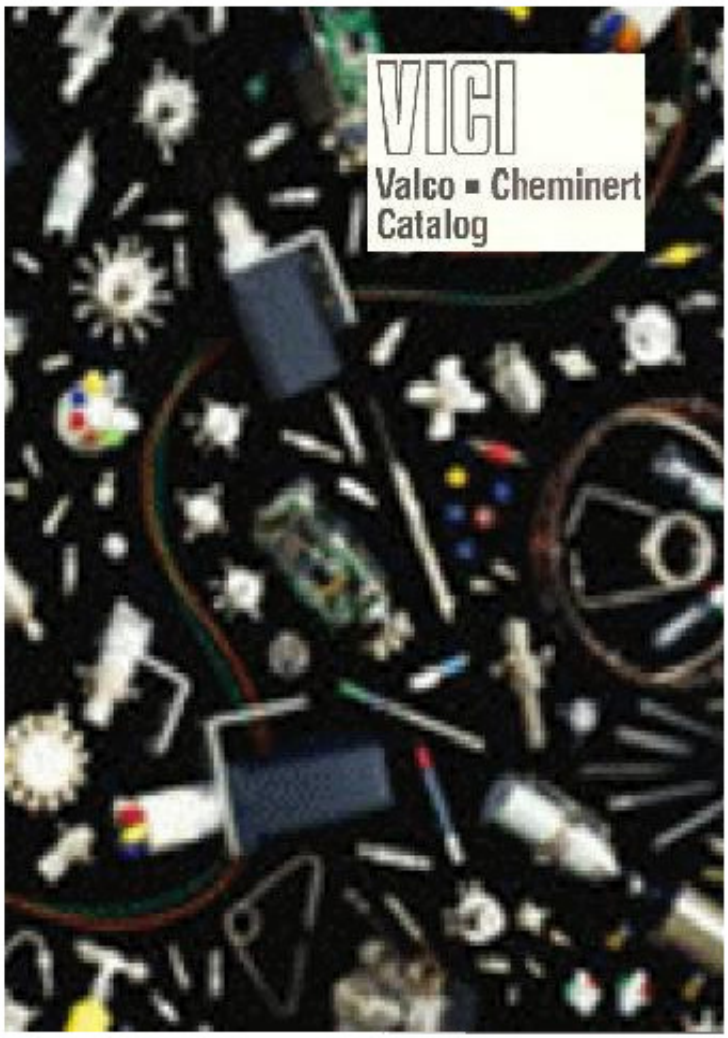
PEEK Fittings High Pressure

360um & 1/32 Fittings



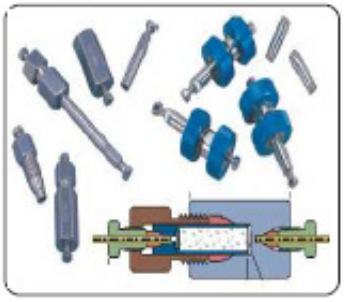
PEEK/PPS Low Pressure

Stainless steel Fittings



Adaptors, Tees, Crosses

Filters & Frits

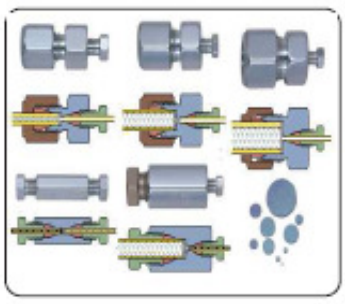


PreColumns FT Cartridge

Nuts M&F, Caps,Plugs

Ferrules/Reducers/FS

Pipe Adaptors



HPLC End-Fittings

Injection Valves / Loops

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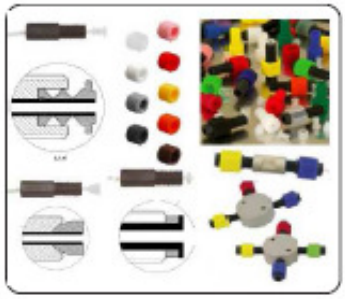
## - VICI Valco/Cheminert

PEEK Fittings High Pressure

360um & 1/32 Fittings



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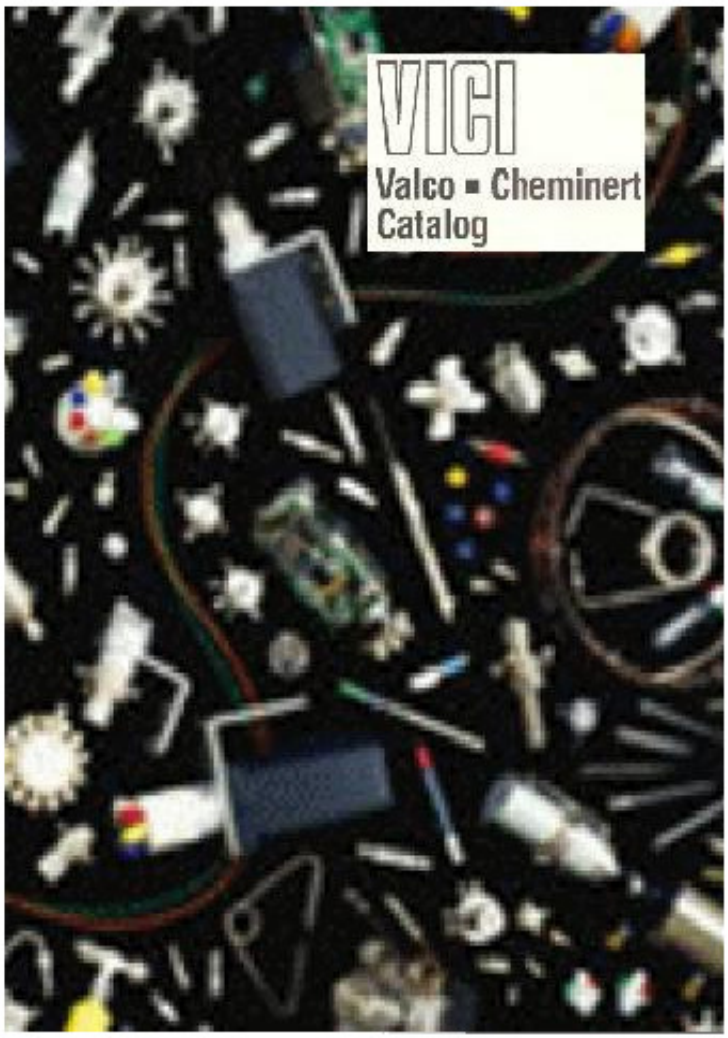

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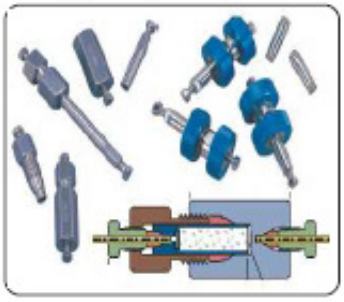

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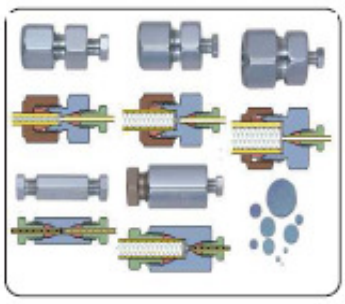

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# Valco Fittings

The two piece compression fitting (**Figure 1**), in which a 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.

**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.

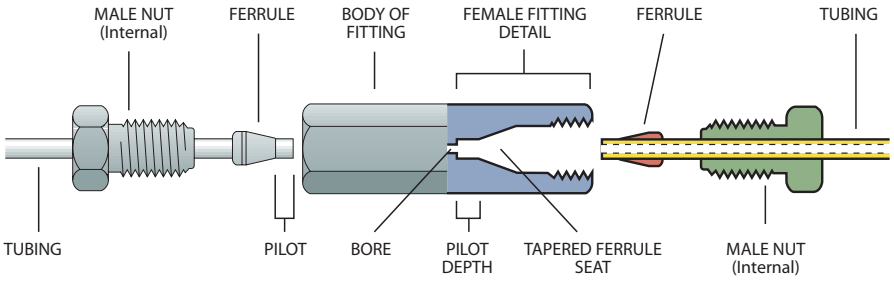


**Figure 1**
Valco compression fitting

**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 |

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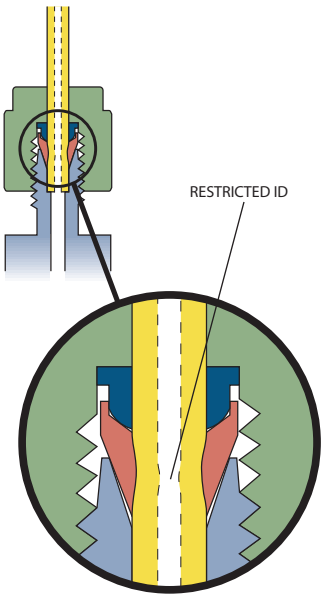



**Figure 2**
ID restriction
in common compression fitting

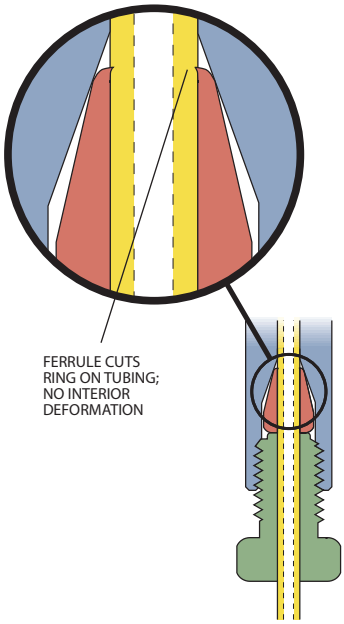



**Figure 3**
No ID restriction
in Valco compression fitting

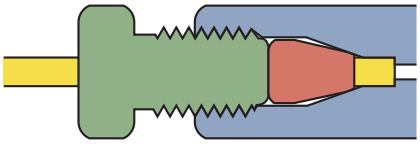
## Interchangeability

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.

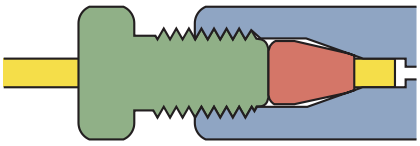
Because of variations in tubing OD and in pilot and taper designs from manufacturer to manufacturer, the amount of tubing extending beyond the made up ferrule can vary. (The most radical variation is in the fittings manufactured by Waters. Based on the old Swagelok design, they have a pilot depth considerably 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

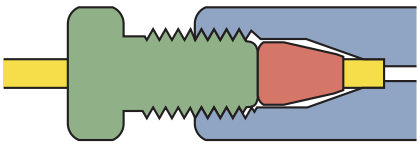
Most of our state of the art CNC machines use water-based lubricants. After each part comes off the machine, it is cleaned with water-soluble detergents and then rinsed in hot deionized water. Finally, every metal fitting that we make is given a thorough cleaning with steam from deionized water at 140°C. 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**

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## Introduction

### Precision Machining, Finishing, and Tolerances

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

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

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

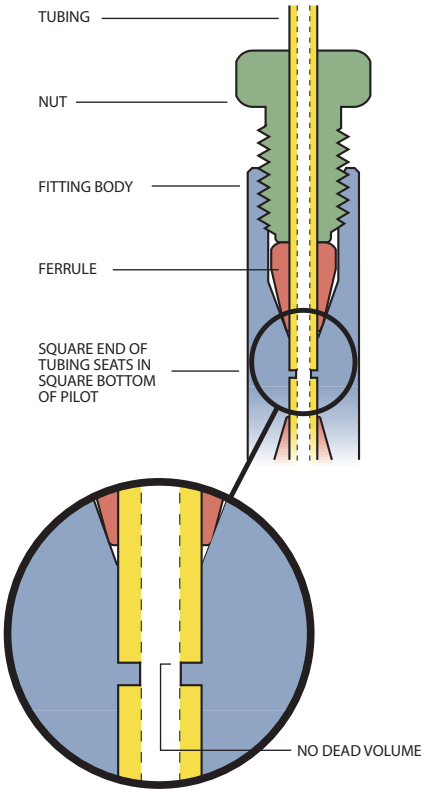


**Figure 5**
Valco/Cheminert high pressure compression fitting

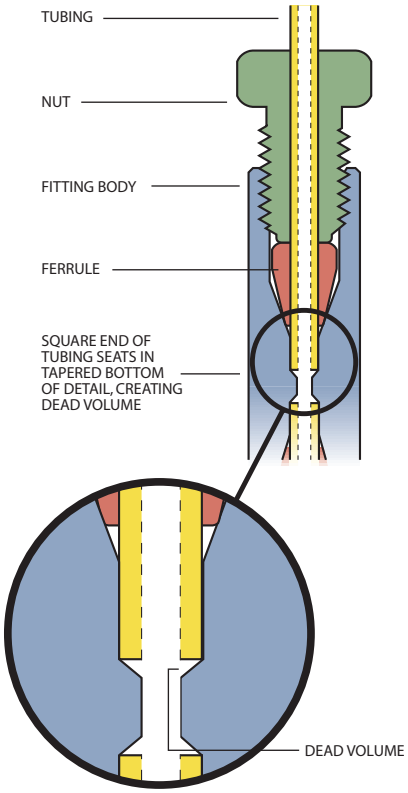


**Figure 6**
Poor quality compression fitting

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## Comparison of Compression Fitting Designs

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

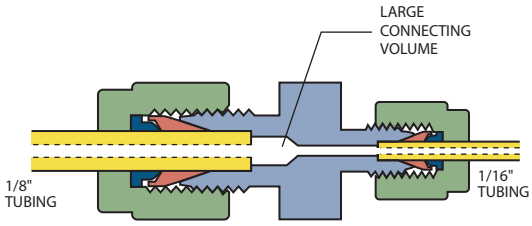


**Figure 7**
Common commercial reducing union

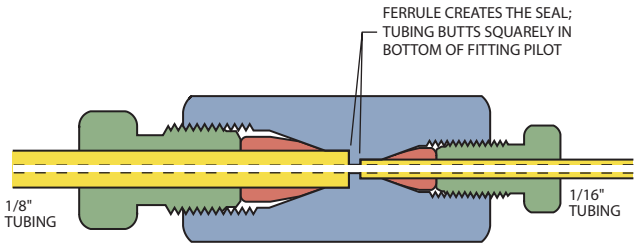


**Figure 8**
Valco zero dead volume reducing union

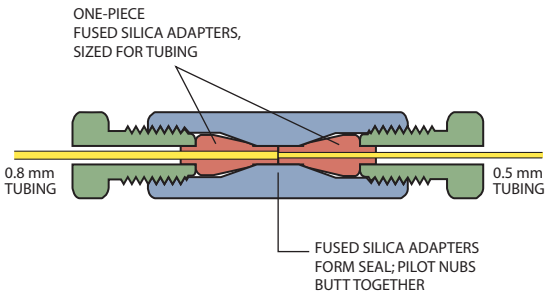


**Figure 9**
Valco zero dead volume through-bore union

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 impossible to get the nut on, and the tube end often flares out in the fitting detail so that it's difficult to remove the tube.

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

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

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

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## Nuts

### Internal nuts – stainless steel

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

**Stainless nuts**

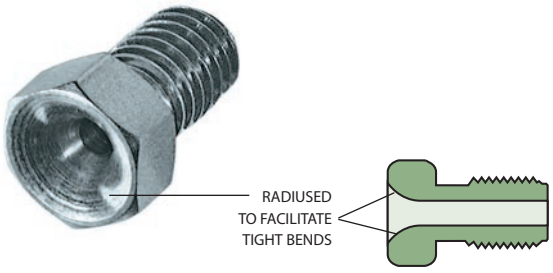
| *Package of 10:* | *Length* | *Prod No* | *Price* |
|---|---|---|---|
| 1/32" nut | .30" | ZN.5-10 | |
| 1/32" nut | .45" | LZN.5-10 | |
| 1/16" nut | .43" | ZN1-10 | |
| 1/16" nut | .50" | MZN1-10 | |
| 1/16" nut | .75" | LZN1-10 | |
| 1/16" nut | 1.00" | XLZN1-10 | |
| 1/8" nut | .57" | ZN2-10 | |
| 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 | |

### *NEW* Specialty nuts – stainless steel

These special purpose nuts facilitate a tight bend as the tube exits the fitting, and can also help prevent kinks in very thin wall tubing. Quick bend nuts are available in standard length (.43") and in a short version (.30") for certain custom applications. Note that the short version (ZSN1) can *only* be used in certain applications. Call for more information.

**Stainless nuts**

| *Description* | *Length* | *Prod No* | *Price* | |
|---|---|---|---|---|
| 1/16", standard | .43" | ZN1Q | | |
| 1/16", short | .30" | ZSN1 | | |




**Specialty nut**
Standard length

**MORE INFORMATION**

PEEK nuts ..... page 63
HPLC column end fittings .....43-46
Reducing unions
Internal.....29
External .....30
External/internal.....31
Internal/external.....31
Unions
Internal.....26
External .....27
External/internal.....27

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

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

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

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

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

27.0 mm = 1.08"

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

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

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## 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.

| | Stainless nuts | |
|---|---|---|
| *Description* | *Prod No* | *Price* |
| 1/32″ external 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.

| | | Stainless plugs | | High pressure Stainless plugs | |
|---|---|---|---|---|---|
| *Description* | *Length of nut** | *Prod No* | *Price* | *Prod No* | *Price* |
| 1/32" | .30" | ZP.5 | | ZP.5H | |
| 1/16" | .43" | ZP1 | | ZP1H | |
| 1/16" | .75" | LZP1 | | LZP1H | |
| 1/8" | .57" | ZP2 | | ZP2H | |
| 1/8" | .82" | LZP2 | | LZP2H | |
| 1/4" | .70" | 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.

| | | Stainless caps | |
|---|---|---|---|
| *Description* | *Length of nut** | *Prod No* | *Price* |
| 1/32" | .30" | ZC.5 | |
| 1/16" | .43" | ZC1 | |
| 1/8" | .57" | ZC2 | |
| 1/4" | .70" | ZC4 | |

**MORE INFORMATION**

PEEK plugs . . pages 64, 71
PEEK plugs for high pressure Cheminert valves . . . . . 64
PEEK caps . . . . . .57, 64

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## Ferrules

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

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

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

**MORE INFORMATION**
For more detailed information on metals, refer to the discussion on pages 254-255.

### Metal ferrules

| | *Prod No* | *Price* | *Prod No* | *Price* | *Prod No* | *Price* |
|---|---|---|---|---|---|---|
| *Package of 10:* | **Stainless, Type 303** | | **Stainless, Type 316** | | **Stainless, Gold-plated** | |
| 1/32" | ZF.5-10 | | ZF.5S6-10 | $40 | ZF.5GP-10 | |
| 1/16" | ZF1-10 | | ZF1S6-10 | 30 | ZF1GP-10 | |
| 1/8" | ZF2-10 | | ZF2S6-10 | 22 | ZF2GP-10 | |
| 1/4" | – | | ZF4S6-10 | 19 | ZF4GP-10 | |
| *Sold individually:* | **Hastelloy C** | | **Nickel** | | **Titanium** | |
| 1/32" | ZF.5HC | | ZF.5NI | $9 | ZF.5TI | |
| 1/16" | ZF1HC | | ZF1NI | 8 | ZF1TI | |
| 1/8" | ZF2HC | | ZF2NI | 8 | ZF2TI | |
| 1/4" | ZF4HC | | ZF4NI | 9 | ZF4TI | |
| *Package of 10:* | **Brass** | | | | | |
| 1/32" | ZF.5B-10 | | | | | |
| 1/16" | ZF1B-10 | | | | | |
| 1/8" | ZF2B-10 | | | | | |
| 1/4" | 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-plated .....GP
*More inert than standard stainless*

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

Stainless steel, Type 316 ..... S6
*LC with high chloride ion in solutions*

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

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

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

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

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

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

27.0 mm = 1.08"

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

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

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## Polymeric ferrules

| | Prod No | Price | Prod No | Price | Prod No | Price |
|---|---|---|---|---|---|---|
| *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** | |
| 1/32" | ZF.5PFA-10 | ZF.5KF-10 | |
| 1/16" | ZF1PFA-10 | ZF1KF-10 | |
| 1/8" | ZF2PFA-10 | ZF2KF-10 | |
| 1/4" | ZF4PFA-10 | ZF4KF-10 | |
| 3/8" | ZF6PFA-10 | ZF6KF-10 | |
| 1/2" | ZF8PFA-10 | ZF8KF-10 | |

| | | | |
|---|---|---|---|
| *Package of 5:* | **Polyimide, Graphite** | **Polyimide, Valcon** | **Polyimide, 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 |

**MORE INFORMATION**

PEEK ferrules .... page 63
Grooved PEEK ferrules..... 63

For more detailed information on polymers, refer to the discussion on page 256.

**POLYMERS AT A GLANCE**

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

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

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

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

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

Polyimide, Valcon..... V
*High temp, graphite reinforced*

Polyimide, Virgin..... V1
*High temp, electrical insulator*

**FERRULE IDENTIFICATION**

To differentiate among the most commonly ordered metal ferrules, ring(s) are engraved on the non-sealing surfaces.

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## Reducing Ferrules

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.

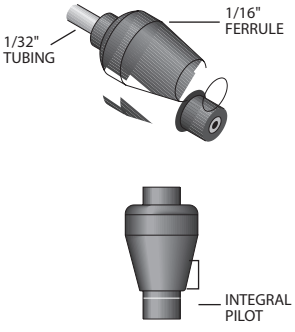
**External** ZDV reducing ferrules are designed for use with all standard external style fittings – that is, those with a female nut and a male fitting detail. This ferrule has a slightly longer pilot than the internal version, to accommodate the longer external detail. The result is a zero dead volume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

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

### nternal reducing ferrules

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

| | *Prod No* | *Price* | *Prod No* | *Price* | *Prod No* | *Price* |
|---|---|---|---|---|---|---|
| *Package of 5:* | **PTFE, Glass-filled** | | **PEEK** | | **Polyimide, Valcon** | |
| 1/16" to 1/32" | ZRF1.5TFG-5 | | ZRF1.5PK-5 | | ZRF1.5V-5 | |
| 1/8" to 1/32" | ZRF2.5TFG-5 | | ZRF2.5PK-5 | | ZRF2.5V-5 | |
| 1/8" to 1/16" | ZRF21TFG-5 | | ZRF21PK-5 | | ZRF21V-5 | |
| 1/4" to 1/16" | ZRF41TFG-5 | | ZRF41PK-5 | | ZRF41V-5 | |
| 1/4" to 1/8" | ZRF42TFG-5 | | ZRF42PK-5 | | ZRF42V-5 | |
| *Package of 5:* | **CTFE** | | **Polyimide, Virgin** | | | |
| 1/16" to 1/32" | ZRF1.5KF-5 | | ZRF1.5V1-5 | | | |
| 1/8" to 1/32" | ZRF2.5KF-5 | | ZRF2.5V1-5 | | | |
| 1/8" to 1/16" | ZRF21KF-5 | | ZRF21V1-5 | | | |
| 1/4" to 1/16" | ZRF41KF-5 | | ZRF41V1-5 | | | |
| 1/4" to 1/8" | ZRF42KF-5 | | ZRF42V1-5 | | | |




**Internal reducing ferrule**
(ZRF)

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

**MORE INFORMATION**

Internal reducers (IZR) . . . . . page 34
External reducers (EZR) . . . . . 35
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.

**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 ®.

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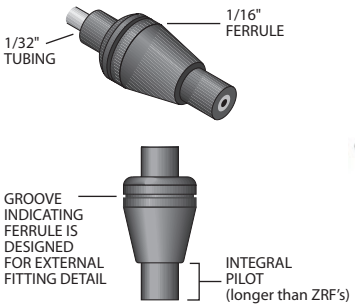
**OPTION**
Available in Virgin Polyimide.

## External reducing ferrules

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

| | *Prod No* | *Price* | *Prod No* | *Price* | *Prod No* | *Price* |
|---|---|---|---|---|---|---|
| *Package of 5:* | **PTFE, Glass-filled** | | **PEEK** | | **Polyimide, Valcon** | |
| 1/16" to 1/32" | EZRF1.5TFG-5 | | EZRF1.5PK-5 | | EZRF1.5V-5 | |
| 1/8" to 1/32" | EZRF2.5TFG-5 | | EZRF2.5PK-5 | | EZRF2.5V-5 | |
| 1/8" to 1/16" | EZRF21TFG-5 | | EZRF21PK-5 | | EZRF21V-5 | |
| 1/4" to 1/16" | EZRF41TFG-5 | | EZRF41PK-5 | | EZRF41V-5 | |
| 1/4" to 1/8" | EZRF42TFG-5 | | EZRF42PK-5 | | EZRF42V-5 | |
| *Package of 5:* | **CTFE** | | | | | |
| 1/16" to 1/32" | EZRF1.5KF-5 | | | | | |
| 1/8" to 1/32" | EZRF2.5KF-5 | | | | | |
| 1/8" to 1/16" | EZRF21KF-5 | | | | | |
| 1/4" to 1/16" | EZRF41KF-5 | | | | | |
| 1/4" to 1/8" | EZRF42KF-5 | | | | | |



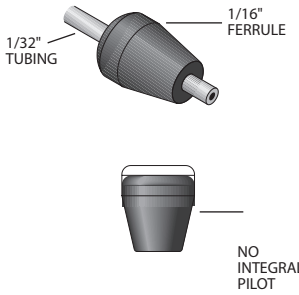

**External reducing ferrule**
(EZRF)

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




**Standard reducing ferrule**
(RF)

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

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

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

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

27.0 mm = 1.08"

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

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

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## Fused Silica Adapters

Fused silica adapters are available in Valcon polyimide for use up to 350°C and in PEEK for lower temperature applications (up to 175°C). Valcon polyimide is a unique graphite-reinforced composite, specially prepared to maximize mechanical stability at high temperatures. Small blocks are subjected to extreme loads by a process known as hot isostatic pressing, with individual ferrules subsequently machined from these blocks. The result of this two-step process is a fused silica adapter with high temperature stability which far exceeds that of parts produced by conventional molding. 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* | *Price* | *Prod No* | *Price* | *Prod No* | *Price* |
| **1/32" Adapters** | Tubing OD: | | | | | | |
| | < 0.25 mm | FS.25-5 | | FS.25PK-5 | | FS.25V1-5 | |
| | 0.25 ≤ 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 ≤ 0.80 mm | ZF.5V-5 | | ZF.5PK-5 | | ZF.5V1-5 | |
| **1/16" Adapters** | Tubing OD: | | | | | | |
| | <0.25 mm | FS1.2-5 | | FS1.2PK-5 | | FS1.2V1-5 | |
| | 0.25 ≤ 0.30 mm | FS1.25-5 | | FS1.25PK-5 | | FS1.25V1-5 | |
| | 0.30 ≤ 0.35 mm | FS1.3-5 | | FS1.3PK-5 | | FS1.3V1-5 | |
| | 0.35 ≤ 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 ≤ 0.80 mm | FS1.8-5 | | FS1.8PK-5 | | FS1.8V1-5 | |
| | 0.80 ≤ 0.90 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 kit

These tapered tools have teeth designed to grip and remove fused silica adapters if they get stuck in a fitting detail. Each kit has two sizes of tools, so they can retrieve 1/32" and 1/16" adapters.

| *Prod No* | *Price* |
|---|---|
| FRK1 | $23 |

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

Our **ferrule removal kit**, left, can be used to remove ferrules from all types of fittings.

**WHICH ADAPTER FOR WHICH COLUMN?**

| Column ID | Typical column OD | 1/32" adapter | 1/16" adapter |
|---|---|---|---|
| < 0.20 mm | 0.25 mm | FS.25 | FS1.25 |
| 0.25 mm | 0.4 mm | FS.4 | FS1.4 |
| 0.32 mm | 0.5 mm | FS.5 | FS1.5 |
| 0.53 mm | 0.8 mm | ZF.5V | FS1.8 |

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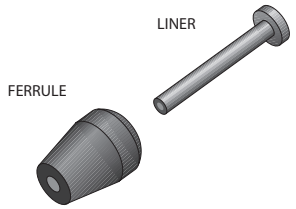
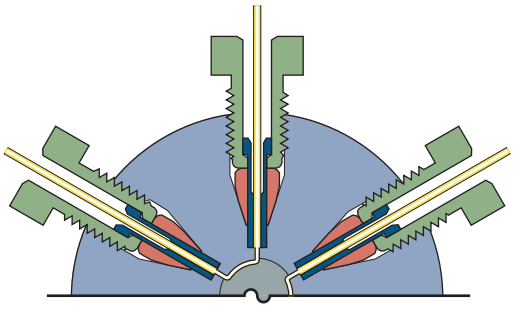



## Removable fused silica adapters (FSR)

The FSR adapter is the only adapter recommended for use in valves. It consists of a liner which slides over the fused silica tubing and a ferrule which makes up on the liner. The polyimide liner has an enlarged diameter at one end which is captured by the nut, so the liner and the tube within it are removed as the nut is unscrewed from the valve. The 1/16" FSR adapter includes a special counter-bored 1/16" nut. The 1/32" FSR adapter uses standard Valco 1/32" nuts.

| *Package of 5:* | | **Polyimide, Valcon** *Prod No* | *Price* |
|---|---|---|---|
| **1/32"** | | | |
| **Removable adapters** | Tubing OD: | | |
| | < 0.25 mm | FSR.25-5 | |
| | 0.30 ≤ 0.35 mm | FSR.3-5 | |
| | 0.35 ≤ 0.40 mm | FSR.4-5 | |
| | 0.40 ≤ 0.50 mm | FSR.5-5 | |
| **1/32"** | | | |
| **Replacement liners** | Tubing OD: | | |
| | < 0.25 mm | FSL.25-5 | |
| | 0.25 ≤ 0.40 mm | FSL.4-5 | |
| | 0.40 ≤ 0.50 mm | FSL.5-5 | |

| *Package of 5:* | | **Polyimide, Valcon** *Prod No* | *Price* | **PEEK** *Prod No* | *Price* |
|---|---|---|---|---|---|
| **1/16"** | Tubing OD: | | | | |
| **Removable adapters** | < 0.15 mm | – | | FS1R.15PK-5 | |
| | < 0.20 mm | FS1R.2-5 | | FS1R.2PK-5 | |
| | 0.20 ≤ 0.40 mm | FS1R.4-5 | | FS1R.4PK-5 | |
| | 0.40 ≤ 0.50 mm | FS1R.5-5 | | FS1R.5PK-5 | |
| | 0.50 ≤ 0.80 mm | FS1R.8-5 | | FS1R.8PK-5 | |
| | 0.90 ≤ 1.0 mm | FS1R1.0-5 | | FS1R1.0PK-5 | |
| **1/16"** | | | | | |
| **Replacement liners** | Tubing OD: | | | | |
| | < 0.15 mm | – | | FS1L.15PK-5 | |
| | < 0.20 mm | FS1L.2-5 | | FS1L.2PK-5 | |
| | 0.20 ≤ 0.40 mm | FS1L.4-5 | | FS1L.4PK-5 | |
| | 0.40 ≤ 0.50 mm | FS1L.5-5 | | FS1L.5PK-5 | |
| | 0.50 ≤ 0.80 mm | FS1L.8-5 | | FS1L.8PK-5 | |
| | 0.90 ≤ 1.0 mm | FS1L1.0-5 | | FS1L1.0PK-5 | |



**Removable FSR adapters in a valve**

**MORE INFORMATION**

Fused silica
Unions . pp 18-19, 58, 61
Fittings . . . . . 18-21
A pin vise and drill index are useful for enlarging the inner diameters of the FS adapters.
Pin vise and drill index . . . . . 55

**REPLACEMENT PARTS**

| **Ferrules** | | *(package of 5)* |
|---|---|---|
| 1/32" Polyimide | ZF.5V-5 | $30 |
| 1/16" Polyimide | ZF1V-5 | 25 |
| | *(package of 10)* | |
| 1/16" PEEK | ZF1PK-10 | 33 |
| **Nuts** | | *(package of 10)* |
| 1/32" SS | ZN.5-10 | 29 |
| *Special nuts for FSRs:* | | |
| 1/16" SS | ZCN1-10 | 30 |
| 1/16" SS long | LZCN1-10 | 45 |

100 µm = .004"
150 µm = .006"

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

1.0 mm = .040"
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## Fused Silica Fittings

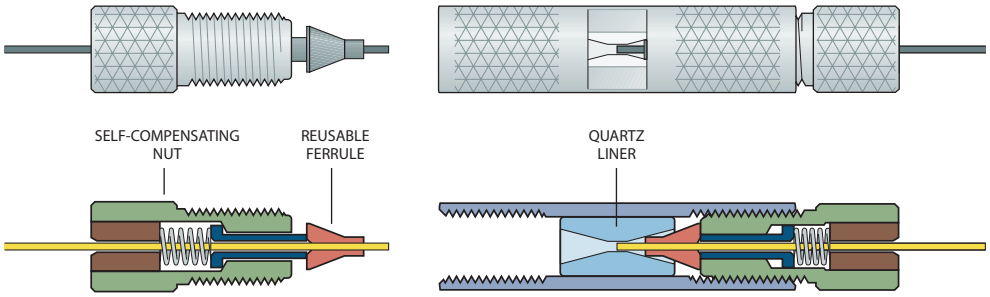
The patented design of our fused silica fittings ensures stable, leak-free connections at temperatures up to 400°C, and undistorted ferrules that are easily removed and reused. Columns may be changed without the risk of the leaks which can devastate systems such as mass spectrometers or atomic emission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

Self-compensating nuts are currently employed in two basic designs: a fused silica-lined union and an injector/detector nut for Agilent 6890 and 5890 GCs.

### Fused silica unions

The fused silica union* has a quartz liner, providing an inert connection zone of minimal volume. Since the seal occurs only at the ferrule tip, the total sealing force is minimized, leaving the ferrule undistorted and reusable.
*Note:* The ferrules used in this union are unique, due to the seal at the tip. Standard ferrules will not work in this union.

| *Description* | *Prod No* | *Price* |
|---|---|---|
| Fused silica union | FSKZU1 | |
| Replacement liner | FSQ1 | |
| Replacement nut | FSZN1 | |




**Fused silica union**
with self-compensating nut

### Replacement ferrules for fused silica unions and self-compensating nuts (Agilent injector nuts)

These reusable ferrules seal at the tip, and are different from standard ferrules. Order for use with FSKZU1 fused silica unions and FSZNA-HP nuts on these two pages.

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

*U.S. patent numbers 5,234,235 and 4,991,883.

100 µm = .004"
150 µm = .006"

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

1.0 mm = .040"
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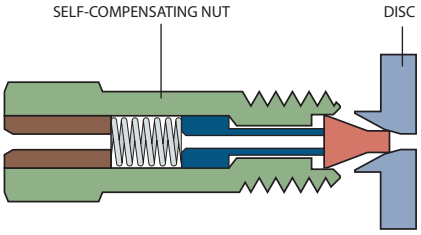
## Injector nut for Agilent 6890 and 5890, Series I and II

This self-compensating nut is a direct replacement for the standard nut on the split/splitless injectors of Agilent 6890 and 5890 series GCs. This retrofit offers enhanced ferrule reusability and temperature stability, resulting in fingertight leak-free connections over the full programmed temperature range of mass spectrometry and gas chromatography. To use this nut, the split/splitless disk must also be upgraded; the new disk will also work with older HP nuts and ferrules.

| | *Prod No* | *Price* |
|---|---|---|
| Injector nut system<br>Includes nut and seal disk | FSZA-HP | |
| Replacement parts | | |
| Self-compensating nut | FSZNA-HP | |
| HP-5890 split/splitless seal disk | SEAL1-HP | |

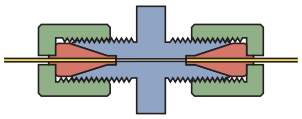



**Self-compensating nut**
for the 6890/5890 GC

## 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 *(see box at left)*.

| *Bore* | *Prod No* | *Price* |
|---|---|---|
| 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

**MORE INFORMATION**
1/32" fused silica adapter ferrules..... page 16

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

Tubing OD:

| | | | |
|---|---|---|---|
| | ≤ 0.25 mm | FS.25-5 | $25 |
| 0.25 mm | ≤ 0.4 mm | FS.4-5 | 25 |
| 0.4 mm | ≤ 0.5 mm | FS.5-5 | 25 |
| 0.5 mm | ≤ 0.8 mm | ZF.5V-5 | 25 |

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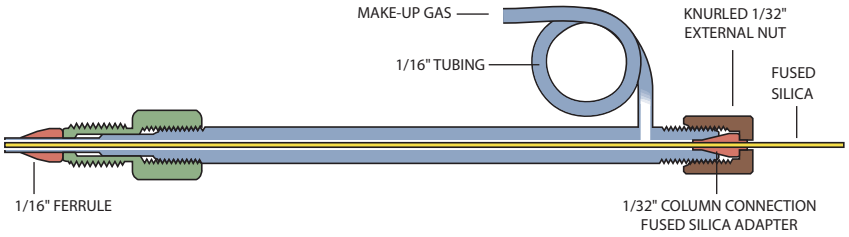
## Fused Silica Adapters

### 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* | *Price* |
|---|---|---|---|---|
| 1/16" to 1/32" | 1.5" | 0.5 mm | FSMUAS1.5M | |
| | 1.5" | 0.75 mm | FSMUAS1.5 | |
| | 1.5" | 1.0 mm | FSMUAS1.5L | |
| | 3.5" | 0.75 mm | FSMUA1.5 | |




**Fused silica make-up adapter**
(FSMUA1.5)

100 µm = .004"
150 µm = .006"

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

1.0 mm = .040"
1.5 mm = .060"
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4.6 mm = .180"
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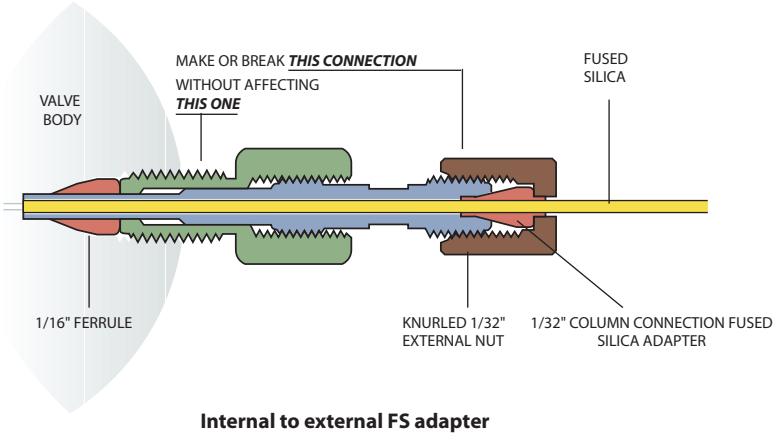
## Internal to external reducer/adapters

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 without affecting the 1/16" connection. Order 1/32" fused silica adapter ferrules separately *(see box below)*.

| *Description* | *Bore* | *Prod No* | *Price* |
|---|---|---|---|
| 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

**MORE INFORMATION**
1/32" fused silica adapter ferrules..... page 16

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

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

Tubing OD:

| | | | |
|---|---|---|---|
| | ≤ 0.25 mm | FS.25-5 | $30 |
| 0.25 mm | ≤ 0.4 mm | FS.4-5 | 30 |
| 0.4 mm | ≤ 0.5 mm | FS.5-5 | 30 |
| 0.5 mm | ≤ 0.8 mm | ZF.5V-5 | 30 |

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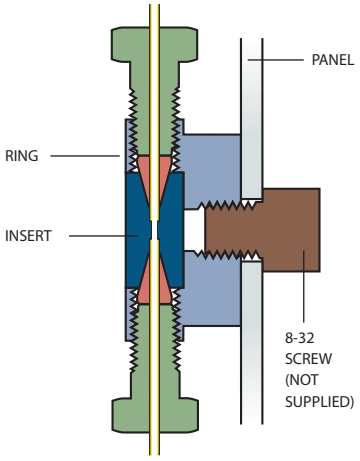
## Microvolume Connectors

Micro-unions, -tees, -crosses, and -Y's have a unique two-piece 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.

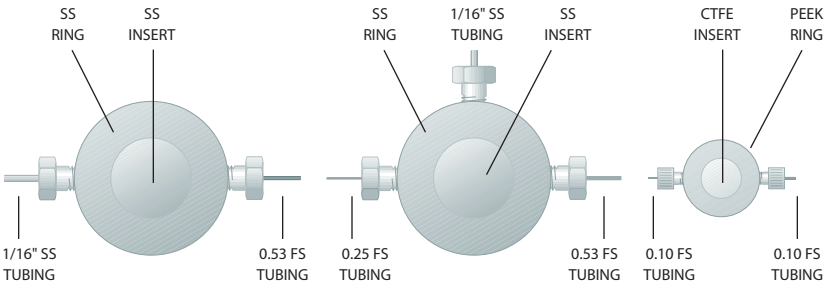
Valco microvolume fittings make it possible to couple 100 micron ID capillary GC, HPLC, or CZE columns without special nuts and ferrules. A stainless ring with one of the plastic inserts provides electrical insulation within the insert, while the PEEK ring achieves total isolation.

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 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

**MORE INFORMATION**

FS fused silica adapters. . . . . page 16
FSR fused silica adapters. . . . . 17
ZRF internal reducing ferrules . . . . . 14

Ferrules
Metal. . . . . 12
Polymeric . . . . . 13

100 µm = .004"
150 µm = .006"

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

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

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

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

27.0 mm = 1.08"

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

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

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## 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* | *Price* | *Prod No* | *Price* | *Prod No* | *Price* | *Prod No* | *Price* | *Prod No* | *Price* |
| **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 | |
| Y | 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 | |
| Y | 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 Material: | Stainless steel | | Hastelloy C | | Titanium | | PEEK | | CTFE | |
|---|---|---|---|---|---|---|---|---|---|---|
| | *Prod No* | *Price* | *Prod No* | *Price* | *Prod No.* | *Price* | *Prod No* | *Price* | *Prod No* | *Price* |
| **0.15 mm bore** | | | | | | | | | | |
| Union | MU1XCS6 | | MU1XCHC | | MU1XCTI | | MU1XCPK | | MU1XCKF | |
| Tee | MT1XCS6 | | MT1XCHC | | MT1XCTI | | MT1XCPK | | MT1XCKF | |
| Y | 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 | |
| Y | MY1CS6 | | MY1CHC | | MY1CTI | | MY1CPK | | MY1CKF | |
| Cross | MX1CS6 | | MX1CHC | | MX1CTI | | MX1CPK | | MX1CKF | |

## Replacement components

| | 1/32" connectors | | 1/16" connectors | |
|---|---|---|---|---|
| *Description* | *Prod No* | *Price* | *Prod No* | *Price* |
| 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, and deduct $5 from the connector price.
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.

**NANOVOLUME CONNECTIONS**
For 0.10 mm (100 µm) bore fittings, see pages 57- 60.

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## Unions

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

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

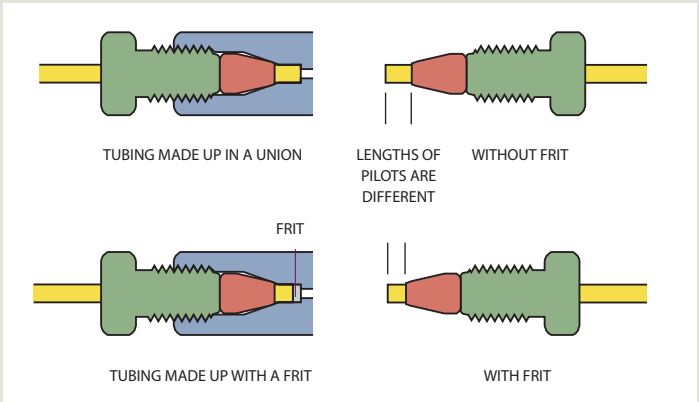
Internal fittings are almost always the best with tubing of 1/8" OD or smaller. They make a stronger connection and offer the lower volume necessary for high performance instrumentation. Also, because 1/16" external fittings have very thin, easily distorted walls, they are not as durable as 1/16" internal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

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

**TECH TIP**

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

Filters . . . . . pages 50-52
Frits and screens. . . . . 53




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

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

4.6 mm = .180"
6.0 mm = .236"
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1/32" = 0.8 mm
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1/8" = 3.2 mm

1/4" = 6.4 mm
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1/2" = 12.7 mm

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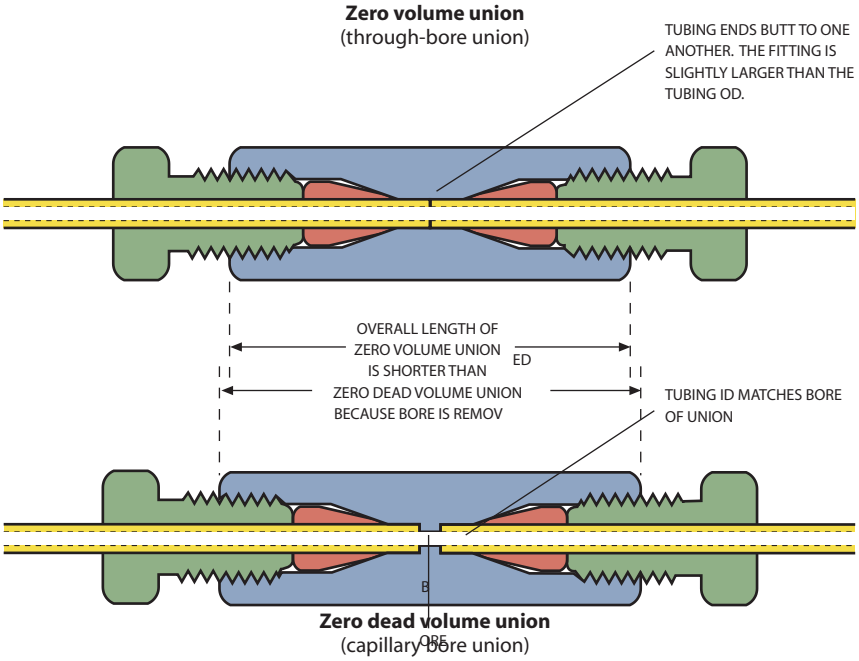
## Zero Volume vs. Zero Dead Volume

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.




**MORE INFORMATION**

Reducing unions to connect two tubes with different ODs . . . . . p 29-31
Unions with 1/4-28 fittings . . . . . 72

**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.

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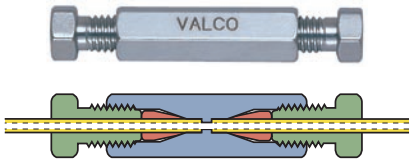
## Unions

### Internal unions – stainless steel

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

**Standard internal unions**

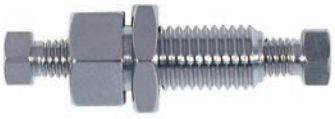
| *Tubing OD* | *Bore* | *Prod No* | *Price* |
|---|---|---|---|
| 1/32" | 0.15 mm | ZU.5XC | |
| | 0.25 mm | ZU.5 | |
| | 0.50 mm | ZU.5L | |
| | 1/32" | ZU.5T | |
| 1/16" | 0.15 mm | ZU1XC | |
| | 0.25 mm | ZU1C | |
| | 0.50 mm | ZU1M | |
| | 0.75 mm | ZU1 | |
| | 1.0 mm | ZU1L | |
| | 1/16" | ZU1T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




**Internal union – metal**
Standard bore version
(ZU1)
Ends of tubing seat squarely
at bottoms of fitting details

**Bulkhead internal unions**

| *Tubing OD* | *Bore* | *Prod No* | *Price* | **Bulkhead panel 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.

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

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

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

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

27.0 mm = 1.08"

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

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

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

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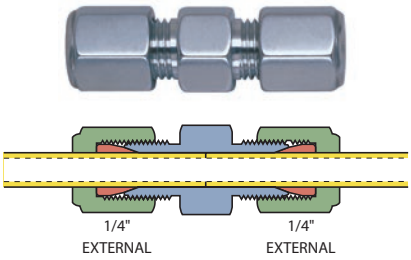
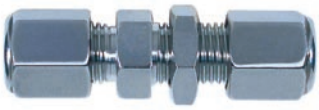



**External union**
Through-bore version
(EU4T)
Ends of tubing butt together



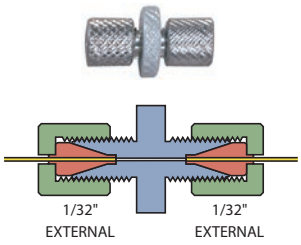
**Bulkhead external union**
(EBU2L)

## 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 OD* | *Bore* | **Standard** *Prod No* | *Price* | **Bulkhead** *Prod No* | *Price* | **Bulkhead panel hole diameter** |
|---|---|---|---|---|---|---|
| 1/16" | See note above | | | | | |
| 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" |

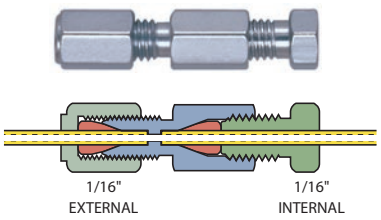



**1/32" external union**
(EU.5)
For use with GC capillary columns

## 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* | *Price* |
|---|---|---|
| 0.25 mm | EU.5 | |
| 0.50 mm | EU.5L | |
| 1/32" | EU.5T | |




**External/internal union**
Standard bore
(EZU1)
Adapts existing external fittings
to Valco zero volume internal fittings

**Bulkhead external/internal union**
(EZBU1)

## External/internal unions

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

| *Tubing OD* | *Bore* | **Standard** *Prod No* | *Price* | **Bulkhead** *Prod No* | *Price* | **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" |

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## Reducing Unions

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

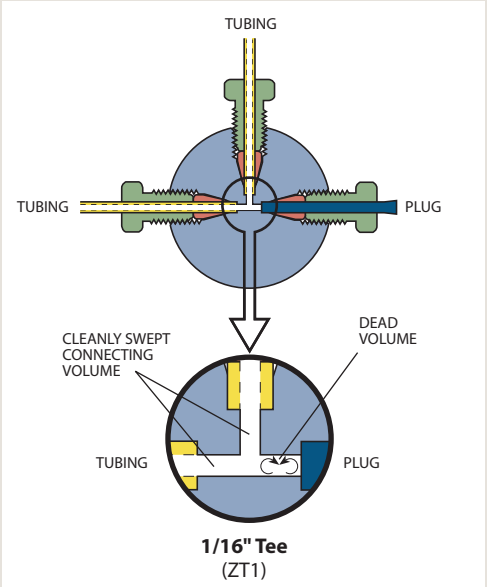
- Internal reducing unions have female threads and a fitting detail for zero volume fittings. The nuts have male (external) threads.
- External reducing unions have male threads, requiring a nut with internal threads.
- External/internal and internal/external reducing unions have male threads on one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

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

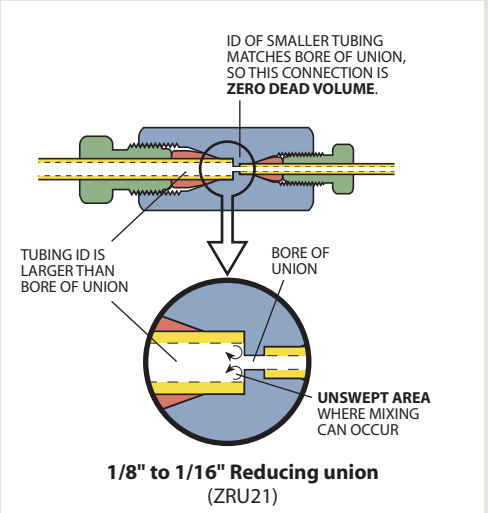
"Dead volume" is created in obvious situations such as the one shown.




**1/16" Tee**
(ZT1)

### UNSWEPT VOLUME

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




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

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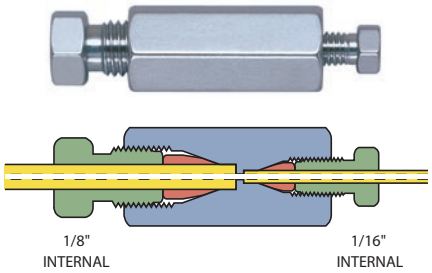



**Internal reducing union – metal**
Standard bore
(ZRU21)

## 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.

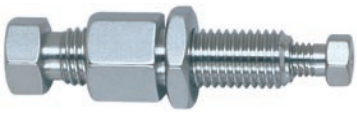
Standard material is 300 series stainless. Also available in Hastelloy C, gold-plated stainless, and titanium.

**Standard internal reducing unions**

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

**Bulkhead internal reducing unions**

| *Tubing OD* | *Bore* | *Prod No* | *Price* | **Bulkhead panel 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 . . . . . page 65
External/internal reducing unions . . . . . 31
Internal/external reducing unions . . . . . 31
Standard unions. . . . . 26
Unions with 1/4-28 fittings . . . . . 72

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

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

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

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

27.0 mm = 1.08"

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

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

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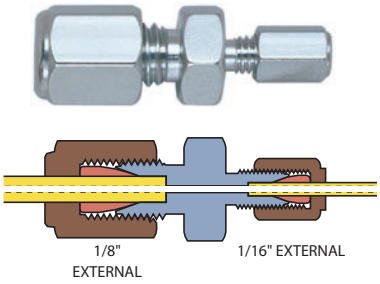
## Reducing Unions

### 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**

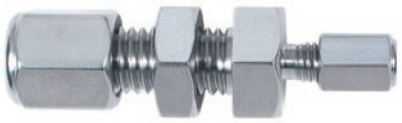
| *Tubing OD* | *Bore* | *Prod No* | *Price* |
|---|---|---|---|
| 1/8" to 1/16" | 0.75 mm | ERU21 | |
| | 1.00 mm | ERU21L | |
| | 1/16" | ERU21T | |
| 1/4" to 1/16" | 0.75 mm | ERU41 | |
| | 1/16" | ERU41T | |
| 1/4" to 1/8" | 1.0 mm | ERU42 | |
| | 2.0 mm | ERU42L | |
| | 1/8" | ERU42T | |




**External reducing union**
Standard bore
(ERU21)

**Bulkhead external reducing unions**

| *Tubing OD* | *Bore* | *Prod No* | *Price* | **Bulkhead panel hole diameter** |
|---|---|---|---|---|
| 1/8" to 1/16" | 1.0 mm | EBRU12L | | 5/16" |
| | 1/16" | EBRU12T | | 5/16" |
| 1/4" to 1/16" | 1.0 mm | EBRU14L | | 7/16" |
| | 1/16" | EBRU14T | | 7/16" |
| 1/4" to 1/8" | 2.0 mm | EBRU24L | | 7/16" |



**Bulkhead external reducing union**
(EBRU12L)

**TECH TIP**
***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.

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

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

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

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

27.0 mm = 1.08"

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

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

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

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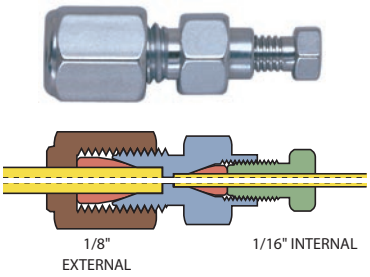
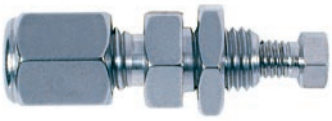



**External/internal reducing union**
Standard bore
(EZRU21)



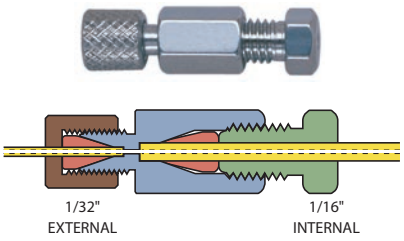
**Bulkhead external/internal reducing union**
(EZBRU21)

## External/internal reducing unions

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

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

| | | Standard | | Bulkhead | | Bulkhead |
|---|---|---|---|---|---|---|
| *Tubing OD* | *Bore* | *Prod No* | *Price* | *Prod No* | *Price* | **panel hole diameter** |
| 1/16" to 1/32" | 0.25 mm | EZRU1.5 | | – | | – |
| | 0.50 mm | EZRU1.5L | | EZBRU1.5L | | 5/16" |
| | 1/32" | EZRU1.5T | | EZBRU1.5T | | 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 | | |




**Internal/external reducing union**
Standard bore
(EZRU.51)

**Bulkhead internal/external reducing union**
(EZBRU.51)

## Internal/external reducing unions

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

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

Only polymeric ferrules should be used with 1/32" external details – metal ferrules will distort them. 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.)*

| | | Standard | | Bulkhead | | Bulkhead |
|---|---|---|---|---|---|---|
| *Tubing OD* | *Bore* | *Prod No* | *Price* | *Prod No* | *Price* | **panel 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" |

**MORE INFORMATION**

Fused silica adapters. . . . page 16-17
Polymeric ferrules . . . . . 13
External unions. . . . . 27
Internal reducing unions . . . . . 29
Internal unions . . . . . 26

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## Tees and Crosses

### 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* | *Price* |
|---|---|---|---|
| 1/32" | 0.25 mm | ZT.5 | |
| | 0.50 mm | ZT.5L | |
| 1/16" | 0.25 mm | ZT1C | |
| | 0.50 mm | ZT1M | |
| | 0.75 mm | ZT1 | |
| | 1.00 mm | ZT1L | |
| 1/8" | 0.75 mm | ZT2 | |
| | 2.00 mm | ZT2L | |
| 1/4" | 1.00 mm | ZT4 | |
| | 4.60 mm | 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* | *Price* |
|---|---|---|---|
| 1/32" | 0.25 mm | ZX.5 | |
| | 0.50 mm | ZX.5L | |
| 1/16" | 0.25 mm | ZX1C | |
| | 0.50 mm | ZX1M | |
| | 0.75 mm | ZX1 | |
| | 1.00 mm | ZX1L | |
| 1/8" | 0.75 mm | ZX2 | |
| | 2.00 mm | ZX2L | |
| 1/4" | 1.00 mm | ZX4 | |
| | 4.60 mm | ZX4L | |

**MORE INFORMATION**

PEEK tees. . . . pages 57, 64
PEEK crosses . . . . . .57, 64

**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 connectors . . . .pp 22-23
High pressure PEEK connectors. . 63-66
Nanovolume connectors . . . . . .57-61

**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 34

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

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

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

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

27.0 mm = 1.08"

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

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

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## 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* | *Price* |
|---|---|---|---|---|---|
| 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 | 0.40 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 37.*) Standard material is 300 series stainless steel.

| | *Inlet bore* | *Outlet bore* | *Prod No* | *Price* |
|---|---|---|---|---|
| 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 | |
| 12 inlets | 2.00 mm | 2.00 mm | Z12M2 | |

**TECH TIP**
A manifold used with an SD flowpath multiposition valve allows HPLC column selection with a single valve. See page 139 for an illustration.

SD UW valves. . . . . .pg 132

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## Internal Reducers

### *NEW* Internal reducers — *for 360 µm tubing*

Directly connect 360 µm tubing into a 1/32" Valco valve or fitting detail, providing a positive leak-free seal with zero dead volume. The same patented design as our larger internal reducers (below). Both versions have a stainless steel body.

| *Tubing OD* | *Nut/ferrule material* | *Prod No* | *Price* |
|---|---|---|---|
| 1/32" to 360 µm | Stainless | C360IZR.5S6 | |
| | PEEK | C360IZR.5S6PKG | |

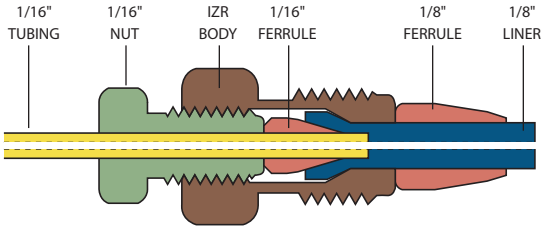
### Internal reducers

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

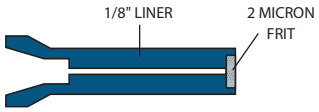
A second version has a 2 micron stainless steel frit pressed into the end of the liner, adding filtering capability. However, we suggest using these only as a final or backup filter, with a standard filter (*see page 52*) as the primary filter. Because IZRs have a much smaller surface area than the standard filter, they tend to plug too often if used in a stand-alone capacity.

Patent No. 4,173,363.

| | | **Without frit** | | **With 2µ frit** | |
|---|---|---|---|---|---|
| *Tubing OD* | *Bore* | *Prod No* | *Price* | *Prod No* | *Price* |
| 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**
(IZR21)




**IZR liner with pressed-in frit**

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

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

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

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

27.0 mm = 1.08"

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

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

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## External to internal adapters (injector/detector adapters)

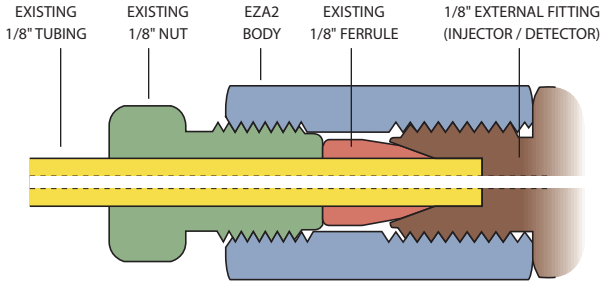
EZAs (external adapters) and EZRs (external reducers) adapt an external tee or union or the external type fittings common on injectors and detectors to Valco zero dead volume connections. Since EZAs are commonly used to connect an external fitting to an existing tube already made up with a Valco internal 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.

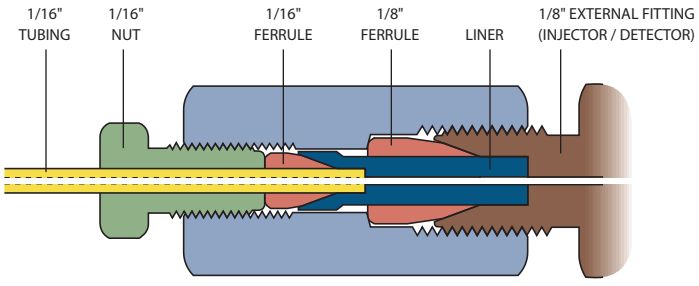
Standard material is 300 series stainless. The EZA does not include a nut or ferrule. The EZR includes a liner, one nut, and two ferrules.

Patent No. 4,173,363

| *Description* | *Bore* | *Prod No* | *Price* |
|---|---|---|---|
| **External to internal adapters** | | | |
| 1/16" ext. to 1/16" int. | – | EZA1 | |
| 1/8" ext. to 1/8" int. | – | EZA2 | |
| **External reducers** | | | |
| 1/16" ext. to 1/32" int. | 0.25 mm | EZR1.5 | |
| | 1/32" | EZR1.5T | |
| 1/8" ext. to 1/32" int. | 0.25 mm | EZR2.5 | |
| 1/8" ext. to 1/16" int. | 0.50 mm | EZR21 | |
| | 1/16" | EZR21T | |
| 1/4" ext. to 1/16" int. | 1.00 mm | EZR41 | |
| | 1/16" | EZR41T | |
| 1/4" ext. to 1/8" int. | 1.00 mm | EZR42 | |
| | 1/8" | EZR42T | |




**External to internal adapter** (EZA2)




**External to internal reducer** (EZR21)

**MORE INFORMATION**

Ferrules ..... page 12
Nuts ..... 10

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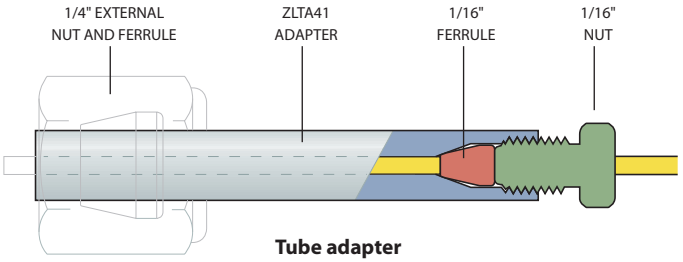
## Special Fittings

### 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.

| *Description* | *Bore* | *Prod No* | *Price* |
|---|---|---|---|
| 1/4" to 1/16" | | | |
| 0.975" long | 1/16" | ZTA41 | |
| 2.075" long | 1/16" | ZLTA41 | |
| 2.800" long | 1/16" | ZXLTA41 | |



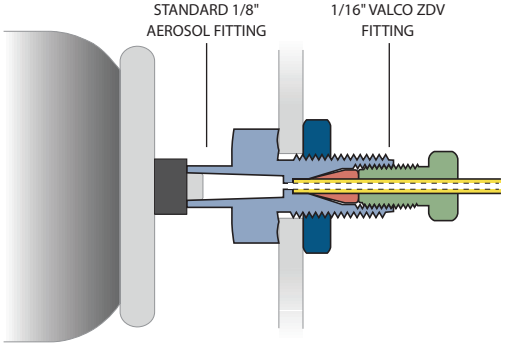

**Tube adapter**
(ZLTA41)

### Aerosol adapter bulkhead union

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

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

| *Description* | *Prod No* | *Price* |
|---|---|---|
| Aerosol adapter bulkhead union | ZBAA1 | |




**Aerosol adapter bulkhead union**
(ZBAA1)

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

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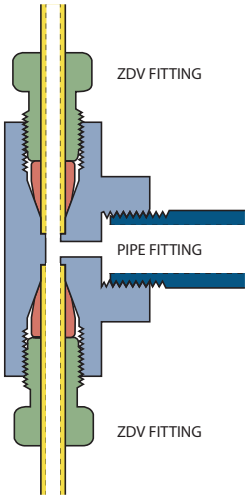
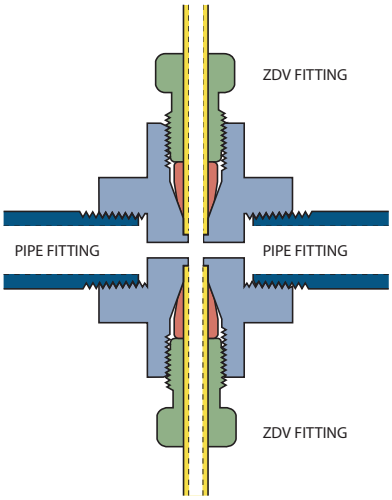
## Manifold pipe adapters

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.

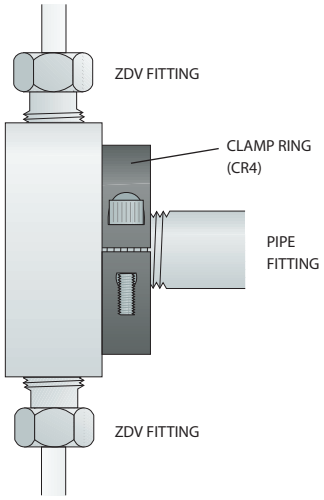
| *Description* | *Bore* | *Prod No* | *Price* |
|---|---|---|---|
| One 1/8" female pipe to: | | | |
| three 1/16" ZDV fittings | 1.0 mm | FP1Z3M21 | |
| three 1/8" ZDV fittings | 2.0 mm | FP1Z3M22 | |
| three 1/4" ZDV fittings | 4.6 mm | FP1Z3M24 | |
| One 1/4" female pipe to: | | | |
| three 1/16" 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 | |




**One pipe fitting**
to Valco ZDV fittings




**Two pipe fittings**
to Valco ZDV fittings




**Adapter with optional mounting clamp ring**

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## Pipe Adapters

### 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* | *Price* |
|---|---|---|---|
| 1/8" NPT male 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 male 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 male 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 | |

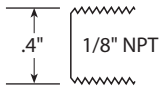
**MORE INFORMATION**
Our manifold pipe adapters on page 37 allow you to connect one or two pipe fittings to three Valco zero dead volume fittings.

### Female pipe to Valco internal adapters

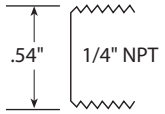
Female pipe adapters make a minimum volume connection from the male pipe fittings typically found in gas distribution plumbing to Valco zero dead volume internal fittings. Standard material is 300 series stainless. Also available in Hastelloy C and titanium.

| *Description* | *Bore* | *Prod No* | *Price* |
|---|---|---|---|
| 1/8" NPT female to: | | | |
| 1/16" ZDV fitting | 1.0 mm | FPZA21 | |
| 1/8" ZDV fitting | 1.0 mm | FPZA22 | |
| 1/8" ZDV fitting | 2.0 mm | FPZA22L | |
| 1/4" NPT female to: | | | |
| 1/16" ZDV fitting | 1.0 mm | FPZA41 | |
| 1/8" ZDV fitting | 1.0 mm | FPZA42 | |
| 1/8" ZDV fitting | 2.0 mm | FPZA42L | |
| 1/4" ZDV fitting | 4.6 mm | FPZA44L | |
| 1/2" NPT female to: | | | |
| 1/16" ZDV fitting | 1.0 mm | FPZA81 | |
| 1/8" ZDV fitting | 1.0 mm | FPZA82 | |
| 1/8" ZDV fitting | 2.0 mm | FPZA82L | |
| 1/4" ZDV fitting | 4.6 mm | FPZA84L | |

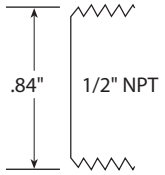
**TECH TIP**
NPT, National Pipe Thread, is a standard developed a long time ago by people without rulers. 1/8" NPT is nowhere close to 1/8"! Measure the diameter of the fitting across the narrow end. You can also count the number of threads in a 1" section. Then look at the diagrams below to determine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



27 threads per inch



18 threads per inch



14 threads per inch

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## 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 facing page.

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

**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.)*

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

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

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

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

27.0 mm = 1.08"

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

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

## 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 facing page.

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

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## Syringe Adapters

### *NEW* 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* | *Price* |
|---|---|---|---|
| **For high pressure 1/16" 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 | |
| **For low pressure 1/16" Cheminert injectors, fittings, and most Valco injectors** | | | |
| 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* | *Price* |
|---|---|---|
| **For high pressure injectors (C2, C3, C4, and C52 series injectors)** | C-VISF-1H | |
| **For fittings and low pressure injectors (C22Z and C62Z series injectors)** | C-VISF-1 | |
| **Replacement liners and ferrules** | | |
| Liner for C-VISF-1 | VISL-1 | |
| Liner for C-VISF-1H | VISL-1H | |
| Ferrule for C-VISF-1 (or 1H) | ZF1VISF | |

### Fill ports *for metal Valco and 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* | *Price* |
|---|---|---|
| **For use with blunt tip needle** | | |
| For 1/16" fittings and injectors - 22 ga | VISF-1 | |
| For 1/32" fittings and injectors - 26 ga | VISF.5FPK | |
| **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 | ZF1VISF | |

**TECH TIP**
When using Cheminert Nanovolume® CN2 injectors and valves, use fill ports designed just for them.

Nanovolume fill ports ..... page 60

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*for Cheminert C2 and C4 valves*

## Loop fill port assembly

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 µl, and the other is 0.50 mm ID and 17 µl.

| *Description* | *Prod No* | *Price* |
|---|---|---|
| Loop fill port assembly | C-LFP | |

## Female luer adapters

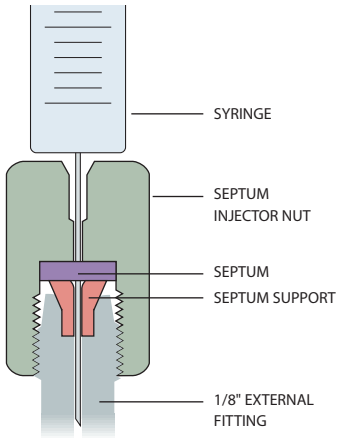
Female luer adapters provide direct syringe connections to zero dead volume fittings and valves.

| *Description* | | *Prod No* | *Price* |
|---|---|---|---|
| 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* | *Price* |
|---|---|---|
| Septum injector nut with support | EN2SI | |
| Replacement support | ZF2SI | |
| Septum, low bleed, pkg. of 10 | SI4G | |




**Septum injector nut**
with septum and support (EN2SI)

**MORE INFORMATION**

External/internal reducing unions . . pg 31
External/internal unions . . . . . 27

**Cheminert valves**

Model C2 . . . . . 158, 161
Model C4 . . . . . 159, 162

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

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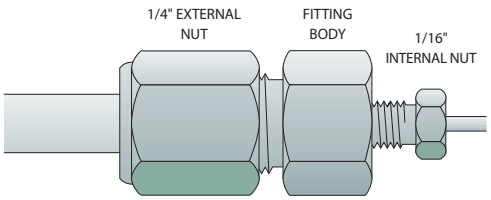
## HPLC Column End Fittings

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

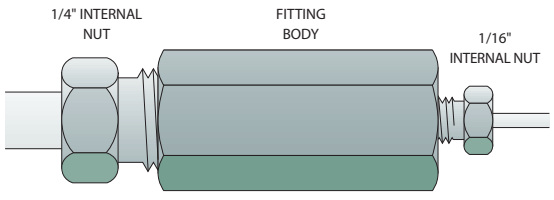
If a temporary frit is used during column packing, the frit OD should match the column OD. Permanent frits should have an OD matched to the column ID, and should be pressed in to give the lowest dead volume. Our frits are available in a variety of pore sizes, and we offer titanium and Hastelloy C frits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

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

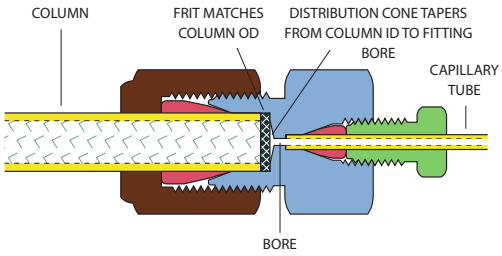
The newest addition to the line is the Nanovolume® column end fitting. *(See page 62.)* These all-PEEK fittings feature fingertight zero dead volume connections with 100 or 150 micron bore. PEEK sleeves permit use with any fused silica tubing.

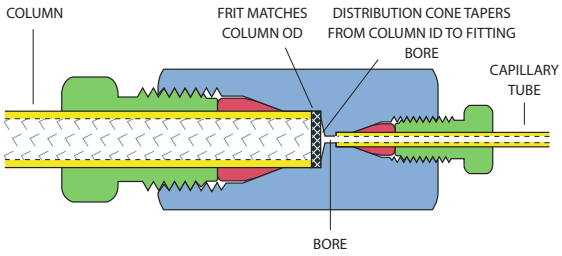



**External column end fitting**
1/4" to 1/16", 4.6 mm column ID, with removable frit
(ECEF414.6F)




**Internal column end fitting**
1/4" to 1/16", 4.6 mm column ID, with removable frit
(CEF414.6F)




**MORE INFORMATION**
Frits . . . . . page 45

**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

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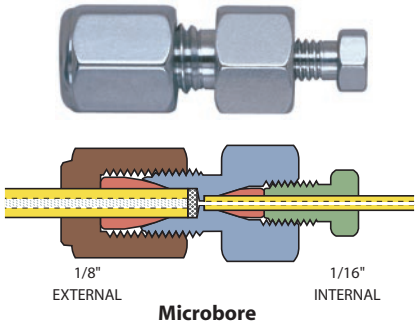
## Microbore column end fittings *(1.0 mm – 2.0 mm column ID)*

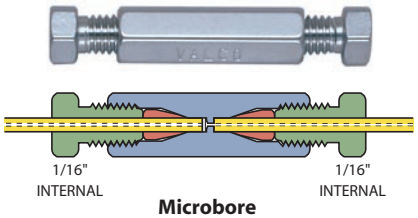
Standard material is Type 316 stainless.

| | Bore | Column ID | Without frit Prod No | Price | Removable 2µ frit Prod No | Price |
|---|---|---|---|---|---|---|
| **External column end fittings** | | | | | | |
| 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 | |




**Microbore external column end fitting**
(ECEF211.0F)

| | Bore | Column ID | Without frit Prod No | Price | Removable 2µ frit Prod No | Price |
|---|---|---|---|---|---|---|
| **Internal column end fittings** | | | | | | |
| 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 | |




**Microbore internal column end fitting**
(CEF1F)

**NANOBORE COLUMN END FITTINGS**
See our complete line of 100 µm and 150 µm bore fittings on page 62.

100 µm = .004"
150 µm = .006"

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

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

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

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

27.0 mm = 1.08"

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

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

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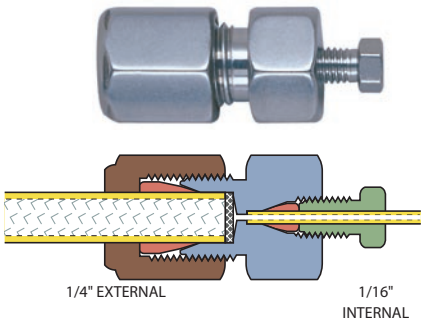
## HPLC Column End Fittings

### Analytical column end fittings *(2.0 mm – 4.6 mm column ID)*

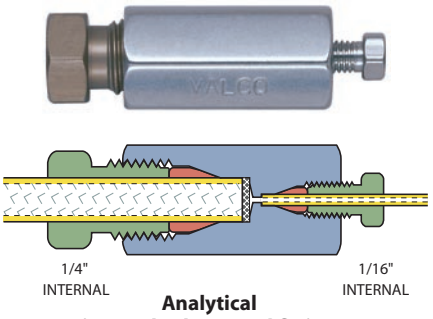
Standard material is Type 316 stainless.

| | Bore | Column ID | Without frit Prod No | Price | Removable 2µ frit Prod No | Price |
|---|---|---|---|---|---|---|
| **External column end fittings** | | | | | | |
| 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 | |




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

| | Bore | Column ID | Without frit Prod No | Price | Removable 2µ frit Prod No | Price |
|---|---|---|---|---|---|---|
| **Internal column end fittings** | | | | | | |
| 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 | CEF414.6 | | CEF414.6F | |




**Analytical internal column end fitting** with removable frit (CEF414.6F)

**NANOBORE COLUMN END FITTINGS**
See our complete line of 100 µm and 150 µm bore fittings on page 62.

100 µm = .004"
150 µm = .006"

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

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

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

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

27.0 mm = 1.08"

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

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

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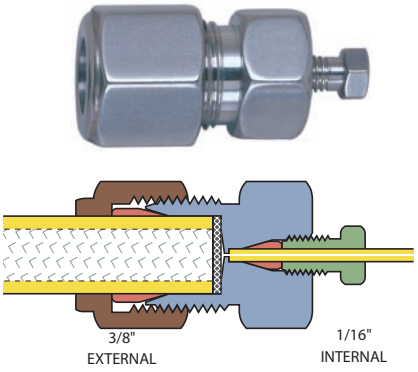
## Semi-preparative and preparative column end fittings

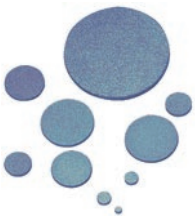
Standard material is Type 316 stainless.

| | Bore | Column ID | Without frit Prod No | Price | Removable 2µ frit Prod No | Price |
|---|---|---|---|---|---|---|
| **External column end fittings** | | | | | | |
| 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.

| | Pore Size | Frit thickness | Stainless steel Prod No | Price | Hastelloy C Prod No | Price | Titanium Prod No | Price |
|---|---|---|---|---|---|---|---|---|
| *Package 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 | | – | | – | |
| 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 | |

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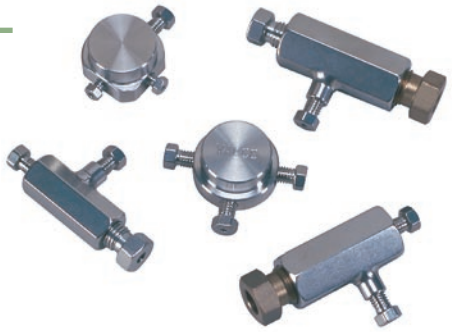
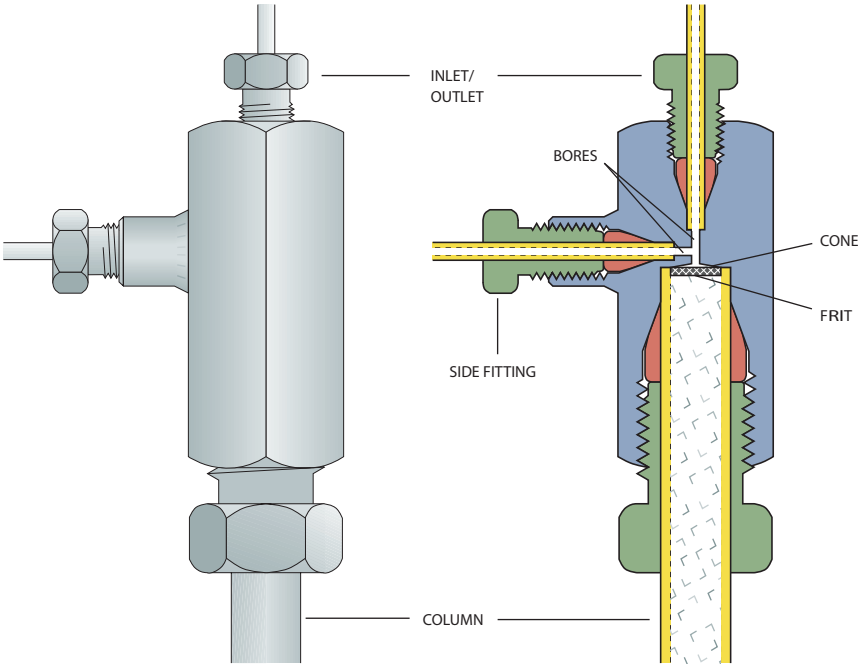
## Post-Column Reaction Tee Fittings

### 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* | *Price* |
|---|---|---|---|---|---|---|---|
| 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" | 0.50 mm | 1/16" | 0.50 mm | TCEF211 | |
| 1/8" | 1.0 mm | 1/16" | 1.65 mm | 1/16" | 0.40 mm | TCEF211T | |
| 1/4" | 4.6 mm | 1/16" | 0.25 mm | 1/16" | 0.25 mm | TCEF411C | |
| 1/4" | 4.6 mm | 1/16" | 0.75 mm | 1/16" | 0.75 mm | TCEF411 | |
| 1/4" | 4.6 mm | 1/16" | 1.65 mm | 1/16" | 0.75 mm | TCEF411T | |
| 1/4" | 4.6 mm | 1/8" | 0.75 mm | 1/16" | 0.75 mm | TCEF421 | |
| 3/8" | 6.0 mm | 1/16" | 0.75 mm | 1/16" | 0.75 mm | TCEF611 | |
| 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)

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
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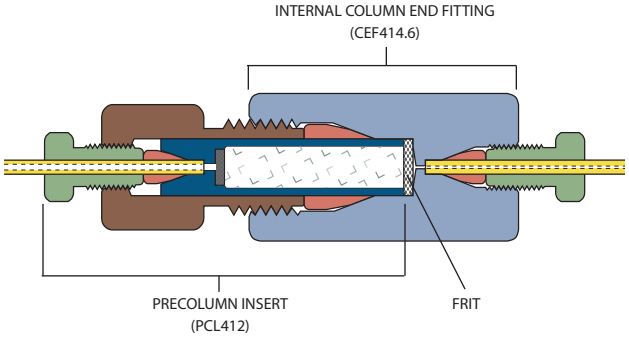
## Precolumns (guard columns)

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* | *Price* |
|---|---|---|
| 1/4" x 2 cm precolumn system | PCS412F | |
| Includes: | | |
| One precolumn insert | | |
| One internal column end fitting | | |
| One 2µ frit | | |
| 1/4" x 5 cm precolumn system | PCS415F | |
| 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* | *Price* |
|---|---|---|
| 0.25 ml (4.0 mm ID x 2 cm) | | |
| Fin gertight cartridge assembly | SFECH412 | |
| Replaceable cartridge | SFEC42 | |

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

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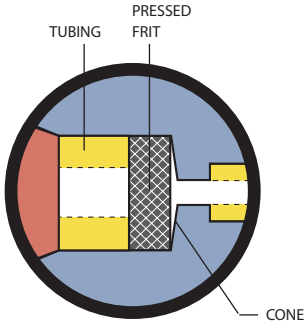
## Filters

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.

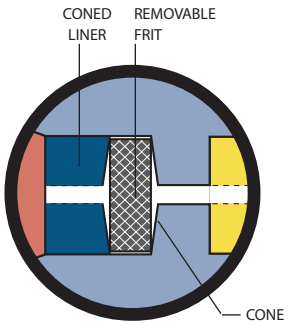
Valco's unique patented* filter design results in extremely low internal volume and simplifies filter element replacement. Filter bodies are "coned" for uniform flow and maximum filter surface area. The filters are made entirely of metal, so they can be used at any instrumentation temperature. While 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.)

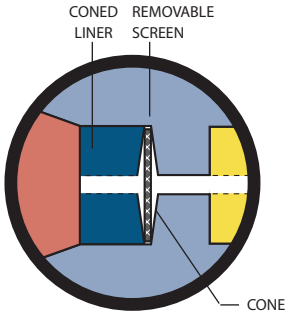
- **Pressed frits**, permanently installed in the filter, are recommended where contaminants are the exception and not the rule. The frits are 2µ stainless.
- **Removable frits** are the best choice for maximum filtration, or if the application requires Hastelloy C or titanium. However, they allow more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




**Pressed frit**




**Removable frit**




**Removable screen**

* Patent Numbers 4,281,679 and 4,173,363

**MORE INFORMATION**

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

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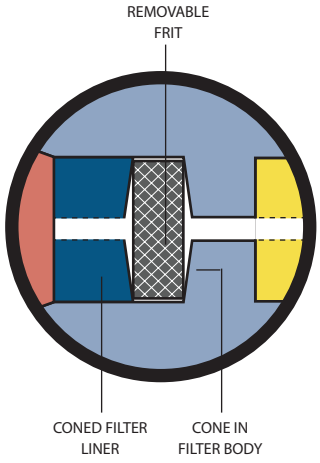
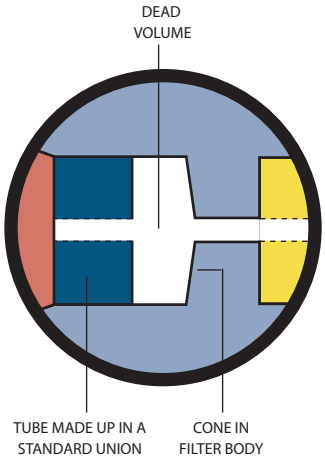
Filters with removable frits are designed to compensate for the thickness of the filter element – the resulting pilot depths are identical with the rest of the Valco product line, facilitating interchangeability of *made up* fittings. Therefore, although our filters look very much like our unions, they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

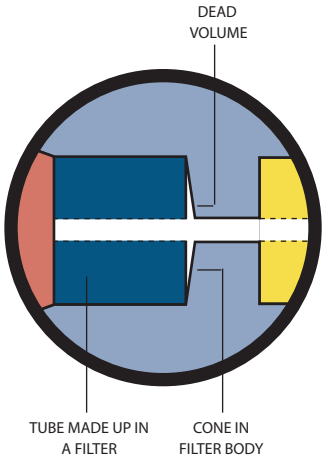
An arrow imprinted on all filter bodies serves to differentiate them from unions and to indicate recommended flow direction.



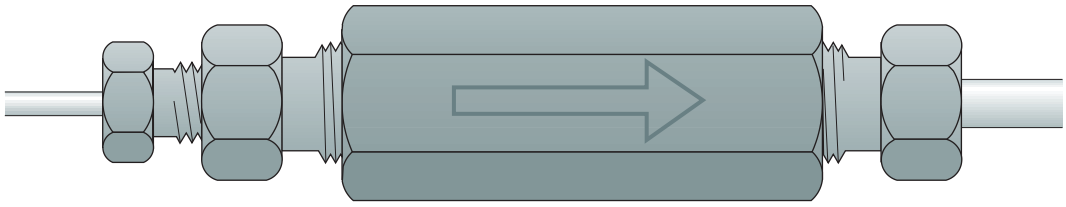

**Filter with removable frit**
Coned for uniform flow and maximum filter surface




**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**

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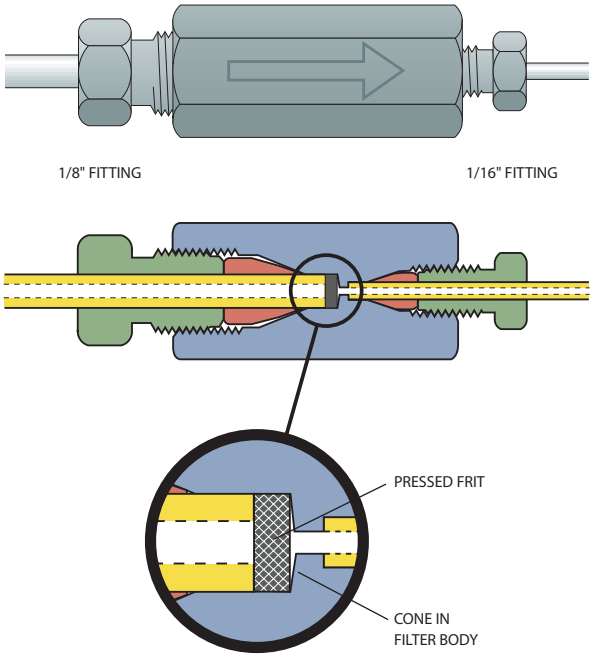
## Filters with a pressed frit

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* | *Price* | *Prod No* | *Price* |
| 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 | |




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

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
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1/4" = 6.4 mm
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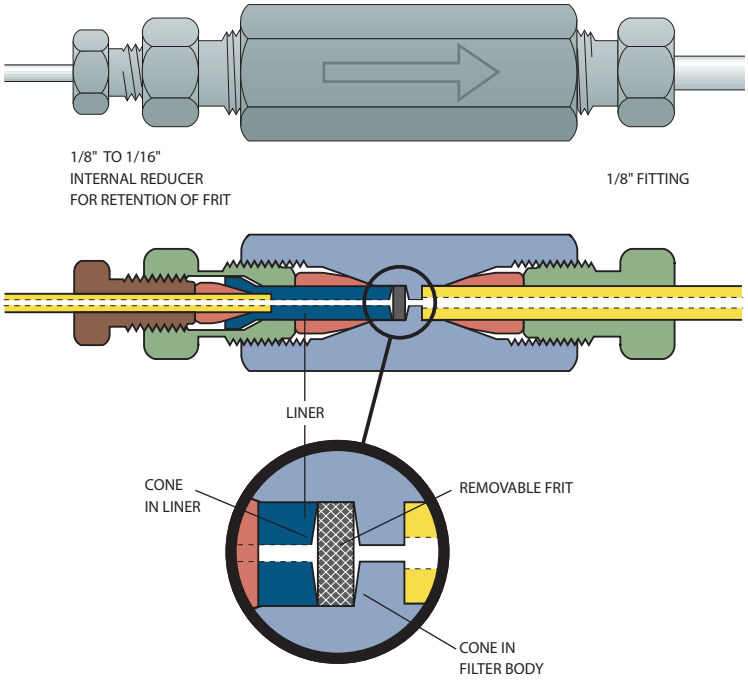
## Filters with a removable frit

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.

Patent Numbers 4,281,679 and 4,173,363

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




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

**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 frits ..... page 53

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## Filters

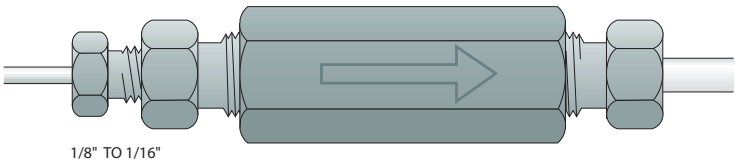
### ilters with a removable screen

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.

atent Numbers 4,281,679 and 4,173,363

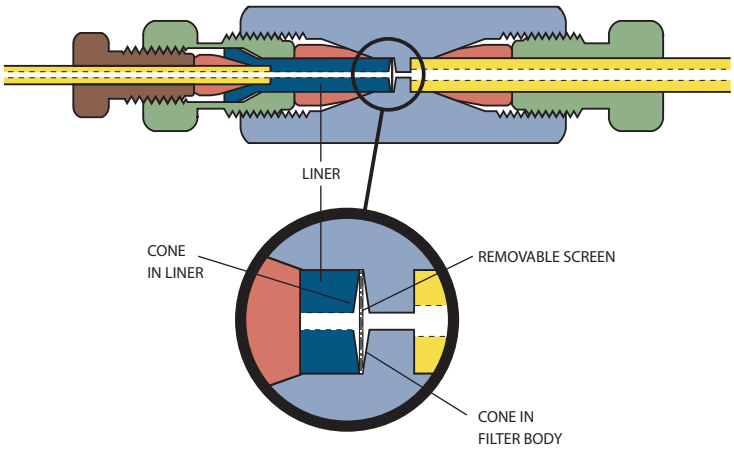
P

| | | Standard | | Bulkhead | |
|---|---|---|---|---|---|
| *Description* | *Bore* | *Prod No* | *Price* | *Prod No* | *Price* |
| 1/32" to 1/32" | 0.25 mm | ZUFR.5 | | ZBUFR.5 | |
| 1/16" to 1/32" | 0.25 mm | ZRUFR1.5 | | ZBRUFR1.5 | |
| 1/16" to 1/16" | 0.25 mm | ZUFR1C | | ZBUFR1C | |
| | 0.50 mm | ZUFR1 | | ZBUFR1 | |
| 1/8" to 1/16" | 0.75 mm | ZRUFR21 | | ZBRUFR21 | |
| 1/8" to 1/8" | 2.00 mm | ZUFR2 | | ZBUFR2 | |
| 1/4" to 1/16" | 1.00 mm | ZRUFR41 | | ZBRUFR41 | |
| 1/4" to 1/8" | 2.00 mm | ZRUFR42 | | ZBRUFR42 | |



1/8" TO 1/16"
INTERNAL REDUCER
TO HOLD SCREEN IN POSITION

1/8" FITTING




**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

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

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

4.6 mm = .180"
6.0 mm = .236"
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7.0 mm = .275"
10.0 mm = .400"

27.0 mm = 1.08"

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

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

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

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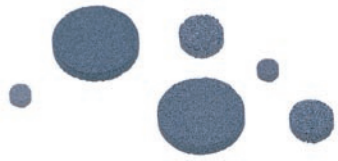
## Replacement frits

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.



| *Package of 10:* | *Pore Size* | *Frit Thickness* | Stainless Steel *Prod No* | *Price* | Hastelloy C *Prod No* | *Price* | Titanium *Prod No* | *Price* |
|---|---|---|---|---|---|---|---|---|
| 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 | | .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 | | – | | – | |
| 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 | | – | |

**WHICH FRIT FITS MY FILTER?**

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

ZRUFR1.5F
ZBRUFR1.5F

**1/8" frit fits:**
ZUFR1CF
ZBUFR1CF

ZUFR1F
ZBUFR1F

ZRUFR21F
ZBRUFR21F

**1/4" frit fits:**
ZUFR2F
ZBUFR2F

ZRUFR41F
ZBRUFR41F

ZRUFR42F
ZBRUFR42F

**WHICH SCREEN FITS MY FILTER?**

**1/16" screen fits:**
ZUFR.5
ZBUFR.5

ZRUFR1.5
ZBRUFR1.5

**1/8" screen fits:**
ZUFR1C
ZBUFR1C

ZUFR1
ZBUFR1

ZRUFR21
ZBRUFR21

**1/4" screen fits:**
ZUFR2
ZBUFR2

ZRUFR41
ZBRUFR41

ZRUFR42
ZBRUFR42

## Replacement screens

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

| *Package of 10:* | *Pore Size* | *Screen Thickness* | Stainless Steel *Prod No* | *Price* |
|---|---|---|---|---|
| 1/32" screens | 0.5µ | 0.040 mm | .5SR.5-10 | |
| | 1µ | 0.050 mm | 1SR.5-10 | |
| | 2µ | 0.075 mm | 2SR.5-10 | |
| | 10µ | 0.125 mm | 10SR.5-10 | |
| 1/16" screens | 0.5µ | 0.040 mm | .5SR1-10 | |
| | 1µ | 0.050 mm | 1SR1-10 | |
| | 2µ | 0.075 mm | 2SR1-10 | |
| | 10µ | 0.125 mm | 10SR1-10 | |
| 1/8" screens | 0.5µ | 0.040 mm | .5SR2-10 | |
| | 1µ | 0.050 mm | 1SR2-10 | |
| | 2µ | 0.075 mm | 2SR2-10 | |
| | 10µ | 0.125 mm | 10SR2-10 | |
| 1/4" screens | 0.5µ | 0.040 mm | .5SR4-10 | |
| | 1µ | 0.050 mm | 1SR4-10 | |
| | 2µ | 0.075 mm | 2SR4-10 | |
| | 10µ | 0.125 mm | 10SR4-10 | |

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## Tools

### Custom socket wrench

This 1/4" socket wrench with a slot to slip over 1/16" tubing works great for all types of 1/4" hex nuts (such as Valco 1/16" ZDV fitting nuts). It's especially useful when nuts are difficult to access with an open end wrench.

| *Prod No* | *Price* |
|---|---|
| SWH4 | |

### Ferrule removal kit

When polymeric ferrules get stuck in a fitting detail, these little ferrule spears will save you from becoming so irritated that you tear up your entire lab in frustration. Each kit includes two sizes of tapered stabbers for retrieving capillary size ferrules.

| *Prod No* | *Price* |
|---|---|
| FRK1 | |

### Hex key set

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

| *Prod No* | *Price* |
|---|---|
| HKS | |

**TECH TIP**

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

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

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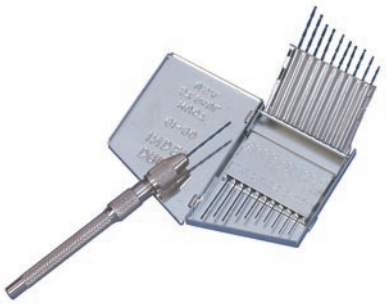
## Open end wrenches

| *Size* | *For use with* | *Prod No* | *Price* |
|---|---|---|---|
| 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

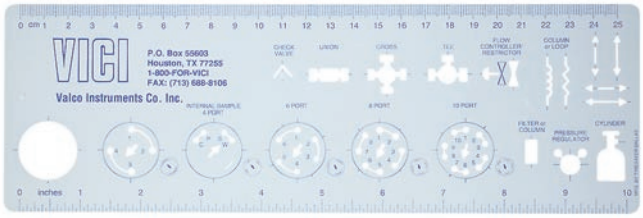
The drill index has drills sized from 0.0135" to 0.039" (0.34 to 1 mm). These are useful tools when a fused silica tube breaks in a union (see Tech Tip on the facing page) and for enlarging the inner diameter of fused silica adapters.

| *Prod No* | *Price* |
|---|---|
| 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* | *Price* |
|---|---|
| TEMPLATE1 | |




**MORE INFORMATION**

Tools for valves
Pencil magnet . . . . p 210
Valve spanner handle. . . . . 211
Tightening tools for PEEK fittings. . . . . 67
Tubing accessories . . . . 90

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# Cheminert® Fittings and Accessories

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

**MORE INFORMATION**

High pressure Cheminert fittings.....pp 63-67
Low pressure Cheminert fittings .....68-81
Nanovolume fittings .....57-62
Valco fittings .....6-55

**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 |

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

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

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

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

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

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

27.0 mm = 1.08"

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

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

## 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

Nanovolume generally refers to components with bore sizes of 100-150 µm (.004" - .006"). The minimal transfer volume contributed by nanovolume components makes them especially beneficial in applications with flow rates in the µl/min range, when the transfer volume can be critical.

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

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## 360 µm Nanovolume Fittings *NEW*

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

**MORE INFORMATION**

Nanovolume fittings
For fused silica tubing, 10,000+ psi . . . . . pg 58
For metal tubing, up to 20,000 psi. . . . 58

1/32" Nanovolume fittings . . . . . 59-60
Injectors with 360 micron fittings. . 152

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

These fittings are constructed from premium grade natural PEEK material. They are intended for use with PEEK or fused silica tubing at pressures up to 10,000 psi, or the maximum pressure for which the tubing is rated, whichever is lower. Quick-mount versions have integral base with double stick tape to secure fittings to a surface.

### Nut/ferrules, caps, plugs, tightening tool

*for 360 µm tubing*

| | *Prod No* | *Price* |
|---|---|---|
| Nut/ferrule | C360NFPKG | |
| Cap | C360CPKG | |
| Plug | C360PPK | |
| Tightening tool | C360ET | |

### Unions and reducing unions

*for 360 µm tubing*

| **Bore size:** | **50 micron** | | **100 micron** | | **150 micron** | |
|---|---|---|---|---|---|---|
| | *Prod No* | *Price* | *Prod No* | *Price* | *Prod No* | *Price* |
| Union, quick mount | C360QUPKG2 | | C360QUPKG4 | $65 | C360QUPKG6 | |
| Union | C360UPKG2 | | C360UPKG4 | 48 | C360UPKG6 | |
| Reducing union, 1/16" to 360 µm | — | | — | | C360RU1PK6 | |

### Tees and crosses

*for 360 µm tubing*

| **Bore size:** | **50 micron** | | **100 micron** | | **150 micron** | |
|---|---|---|---|---|---|---|
| | *Prod No* | *Price* | *Prod No* | *Price* | *Prod No* | *Price* |
| Tee, quick mount | C360QTPKG2 | | C360QTPKG4 | $82 | C360QTPKG6 | |
| Cross, quick mount | C360QXPKG2 | | C360QXPKG4 | 100 | C360QXPKG6 | |

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## *NEW* 360 µm Nanovolume Fittings

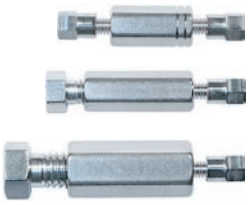
### For fused silica tubing — 10,000 psi and above

These fittings are constructed from HPLC grade stainless steel, with 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* | *Price* |
|---|---|---|
| Nut/ferrule | C360NFFS | |
| Cap | C360CFS | |

#### Unions and reducing unions — *for 360 µm FS tubing*



| **Bore size:** | **50 micron** | | **100 micron** | | **150 micron** | |
|---|---|---|---|---|---|---|
| | *Prod No* | *Price* | *Prod No* | *Price* | *Prod No* | *Price* |
| Union | C360UFS2 | | C360UFS4 | | C360UFS6 | |
| Reducing unions, 1/32" to 360 µm | C360RU.5FS2 | | C360RU.5FS4 | | C360RU.5FS6 | |
| Reducing unions, 1/16" to 360 µm | — | | — | | C360RU1FS6 | |

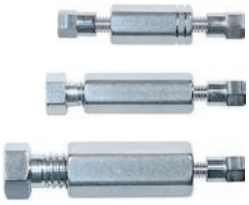
### For metal tubing — up to 20,000 psi

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.

#### Nut/ferrules and caps — *for 360 µm tubing*

| | *Prod No* | *Price* |
|---|---|---|
| Nut/ferrule | C360NFS6 | |
| Cap | C360C | |

#### Unions and reducing unions — *for 360 µm tubing*



| **Bore size:** | **50 micron** | | **100 micron** | | **150 micron** | |
|---|---|---|---|---|---|---|
| | *Prod No* | *Price* | *Prod No* | *Price* | *Prod No* | *Price* |
| Union | C360US62 | | C360US64 | | C360US66 | |
| Reducing unions, 1/32" to 360 µm | C360RU.5S62 | | C360RU.5S64 | | C360RU.5S66 | |
| Reducing unions, 1/16" to 360 µm | — | | — | | C360RU1S66 | |

***NEW*** **INTERNAL REDUCERS FOR 360 µm TUBING**

Directly connect 360 µm tubing into a 1/32" Valco valve or fitting detail, providing a positive leak-free seal with zero dead volume.
The same patented design as our larger internal reducers (page 34).
Both versions have a stainless steel body.

| *Tubing OD* | *Nut/ferrule material* | *Prod No* | *Price* |
|---|---|---|---|
| 1/32" to 360 µm | Stainless | C360IZR.5S6 | $34 |
| | PEEK | C360IZR.5S6PK | 34 |

**MORE INFORMATION**

360 µm fittings for use below 10,000 psi. . . . . 57
360 µm tubing
Electroformed nickel. 87
PEEK . . . . . 88
1/32" Nanovolume fittings . . . . . 59-60

**TECH TIP**

Use these **metal 360 micron nuts** with nano injectors:
C72MU . . . . . p 152
C72MX . . . . . 152

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

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

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

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

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

27.0 mm = 1.08"

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

1/4" = 6.4 mm
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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 and ferrules

*for 1/32" tubing*

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

| | | *Prod No* | *Price each:* |
|---|---|---|---|
| | **Internal nut** with collapsible ferrule<br>*For use with:*<br>*Fittings on pages 60-62*<br>*6 port valve CN2-4346, page 154*<br>*4 port internal sampling injector CN4-4344, page 155* | C-NNFFPK | |
| | **Internal nut** with collapsible ferrule<br>*For use with:*<br>*10 port nanovolume valve CN2-4340*, page 154 | C-NNFLFPK | |
| | **External nut**<br>*For use with:*<br>*Unions on page 61*<br>*Column end fittings on page 62*<br>Note: Requires collapsible PEEK ferrule, below | C-EN.5FPKB | |
| | **Collapsible PEEK ferrule**<br>*For use with:*<br>*External nut, above* | ZGF.5PK | |

## Plugs

*for 1/32" tubing*

| | | *Prod No* | *Price each:* |
|---|---|---|---|
| | **Internal plug**<br>*For use with:*<br>*Fittings on page 60*<br>*Nanovolume valves on pages 154-155* | C-NPFPK | |

**MORE INFORMATION**

360 µm fittings . .pp 57-58
1/32" Nanovolume
column end fittings . . 62
Tubing
PEEK . . . . . 88-89
Electroformed
nickel. . . . . 87

**TECH TIP**

Use these **collapsible ferrule-nuts** with:

1/32" Nanovolume
fittings . . . . . pp 60-62
and with injectors:
CN2 . . . . . 154
CN4 . . . . . 155

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# Nanovolume Unions, Tees, Y's, and Crosses for 1/32" Tubing

## Unions *for 1/32" tubing*

| | 100 µm bore | | 150 µm bore | |
|---|---|---|---|---|
| | *Prod No* | *Price* | *Prod No* | *Price* |
| Union for 1/32" PEEK or electroformed nickel tubing<br>Does not require or include liners. | C-NEU.5XFPK | $43 | C-NEU.5FPK | |

## Reducing unions *for 1/32" tubing*

| | 200 µm bore |
|---|---|
| | *Prod No* |
| Reducing union, 1/32" to 1/16" tubing, natural PEEK | ZERU1.5FPK |

## Tees, y's, and crosses *for 1/32" tubing or FS* tubing*

| | | 100 µm bore | | 150 µm bore | |
|---|---|---|---|---|---|
| | | *Prod No* | *Price* | *Prod No* | *Price* |
| Tee | 1/32" tubing or fused silica* | C-NTXFPK | $105 | C-NTFPK | |
| Y | 1/32" tubing or fused silica* | C-NYXFPK | 105 | C-NYFPK | |
| Cross | 1/32" tubing or fused silica* | C-NXXFPK | 120 | C-NXFPK | |

*A liner is needed for use with fused silica. Order 27 mm length, page 61.

## Fill ports *for 1/32" nanovolume® valves*

These fill ports provide direct syringe connections to Model CN2 nanovolume valves. For use with 26 gauge blunt tip needle.

| | *Prod No* |
|---|---|
| Fill port for 1/32" CN2 series HPLC injectors | C-NVISF |

## 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 |

**MORE INFORMATION**
Unions for fused silica
. . . p. 18, 19, 57-58, 61

100 µm = .004"
150 µm = .006"

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

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

4.6 mm = .180"
6.0 mm = .236"
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1/8" = 3.2 mm

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

**TECH TIP**
Liners adapt nanovolume fittings for use with fused silica tubing. They are included with nanovolume **unions** for fused silica, but must be ordered separately for other fittings.

Liners . . . . . page 61

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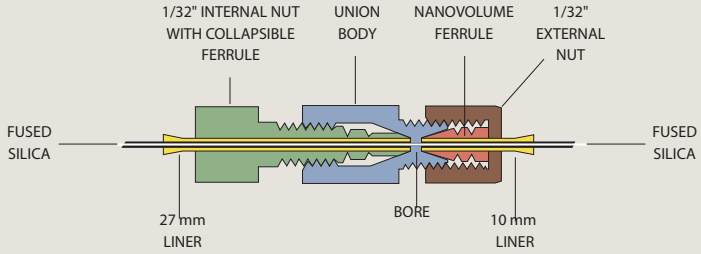
## Unions

*for fused silica tubing*

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




**Union for use with fused silica**
liners included
(C-NEU.5FPK.35)

## Liners for 1/32" connectors

*for use with fused silica tubing*

Use these liners with nanovolume connectors to adapt to the most common sizes of fused silica tubing. Natural PEEK.

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-NNFFPK or C-NNFLFPK

| For tubing OD | Prod No |
|---|---|
| 125 - 175 µm | C-NL.15L-5 |
| 175 - 225 µm | C-NL.20L-5 |
| 225 - 275 µm | C-NL.25L-5 |
| 275 - 325 µm | C-NL.30L-5 |
| 325 - 375 µm | C-NL.35L-5 |

**10 mm liners**
Use with external nut C-EN.5FPKB



| For tubing OD | Prod No |
|---|---|
| 125 - 175 µm | C-NL.15S-5 |
| 175 - 225 µm | C-NL.20S-5 |
| 225 - 275 µm | C-NL.25S-5 |
| 275 - 325 µm | C-NL.30S-5 |
| 325 - 375 µm | C-NL.35S-5 |

**MORE INFORMATION**
360 µm fittings . .pp 57-58
1/32" nanovolume
Fittings . . . . . 59-60
External nuts . . . . . 59
Internal nuts with collapsible ferrules . 59
Liners for column end fittings . . . . . 62

**TECH TIP**
Use **27 mm liners**



with internal nuts with collapsible ferrules:

Use **10 mm liners**



with external nuts:

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## Nanovolume Column End Fittings for FS Capillaries

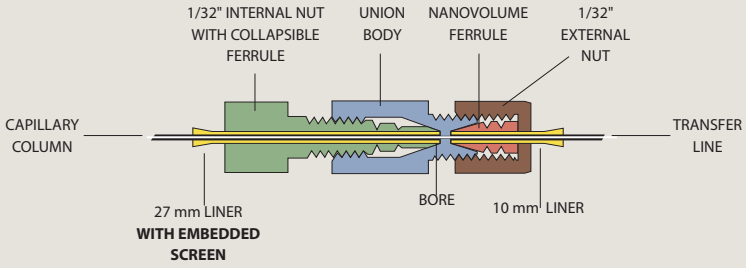
Nanovolume column end fittings include two liners to adapt the 1/32" fitting to fused silica. The 27 mm liner, used inside the internal nut, has a 1 µm 316 stainless steel screen embedded in the PEEK to provide closure for fused silica columns. The 10 mm liner is used with the external nut.

Like other nanovolume fittings, they include 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.

**Screen embedded in end of liner for column end fittings**

### Column end fittings *for 1/32" tubing*

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




**Cross-section**
Column end fitting (C-NEF.5FPK.35S1)

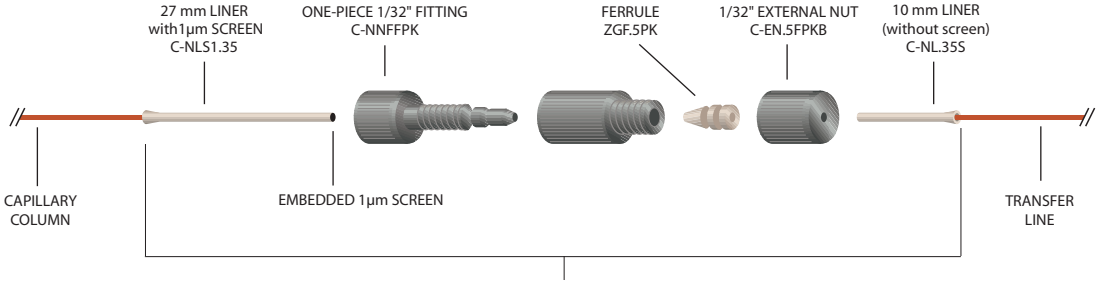
### Replacement liners for column end fittings *for FS capillaries*

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**



| *For tubing OD* | *Prod No* |
|---|---|
| 125 - 175 µm | C-NL S1.15 |
| 175 - 225 µm | C-NLS1.20 |
| 225 - 275 µm | C-NLS1.25 |
| 275 - 325 µm | C-NLS1.30 |
| 325 - 375 µm | C-NLS1.35 |




**Column end fitting for 360 µm fused silica columns**
(C-NEF.5FPK.35S1)

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

**MORE INFORMATION**
Liners for 1/32" fittings . . page 61

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

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## No twist one-piece fittings

*10-32 for 1/16" tubing*

These new 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.

| *Package of 5:* | **Glass-filled PEEK ferrule** | **PEEK ferrule** | **CTFE ferrule** |
|---|---|---|---|
| *Nut type Length* | *Prod No* | *Prod No* | *Prod No* |
| PEEK, hex short | ZNF1PKG-5 | ZNF1PK-5 | ZNF1KF-5 |
| PEEK, hex medium | MZNF1PKG-5 | MZNF1PK-5 | MZNF1KF-5 |
| PEEK, hex long | LZNF1PKG-5 | LZNF1PK-5 | LZNF1KF-5 |
| PEEK, fingertight | ZNF1FPKG-5 | ZNF1FPK-5 | ZNF1FKF-5 |

Optional ferrule materials available – FEP, PFA, PTFE, and glass-filled PTFE. Call for availability. Some 1/32" versions are available. Call for details.

Patent No. 7,316,777

## 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 175°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 | ZN.5FPK-10 | .42" |
| 1/32" fingertight | LZN.5FPK-10 | .54" |
| 1/16" fingertight | ZN1FPK-10 | .88" |
| 1/16" hex | ZN1PK-10 | .45" |
| 1/16" hex | MZN1PK-10 | .62" |
| 1/16" hex | LZN1PK-10 | .87" |
| 1/8" hex | ZN2PK-10 | .62" |

## Ferrules – high pressure PEEK

PEEK ferrules seal by the increased friction from compression.

| *Package of 10:* | *Prod No* | *Pkg of 10:* |
|---|---|---|
| 1/32" | ZF.5PK-10 | 1/4" |
| 1/16" | ZF1PK-10 | 3/8" |
| 1/8" | ZF2PK-10 | 1/2" |

## 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 generally recommended if the tubing is the same material as the ferrule.

| *Package of 10:* | *Prod No* |
|---|---|
| 1/32" | ZGF.5PK-10 |
| 1/16" | ZGF1PK-10 |

**MORE INFORMATION**
Tightening tool for hex-head PEEK nuts. . 67

**POLYMERS AT A GLANCE**
PEEK . . . . . PK
*Chemical resistance; up to 225°C*

100 µm = .004"
150 µm = .006"

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

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

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

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

27.0 mm = 1.08"

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

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

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## High Pressure PEEK Fittings

### Plugs and caps – high pressure PEEK

Polymeric plugs and caps are available in knurled finger-tight 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. For high pressure polymeric valve plugs, see below. For low pressure valve plugs, see page 71.

| | | PEEK plugs | PEEK caps |
|---|---|---|---|
| *Description* | *Length 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 polymeric valves (C1-C5 series) since the fitting detail in these valves is unique.

| *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.

| | | PEEK tees | PEEK crosses |
|---|---|---|---|
| *Tubing OD* | *Bore* | *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
*Chemical resistance; up to 225°C*

**TECH TIP**

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

PEEK ferrules . . . . page 63
PFA ferrules . . . . . 13

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

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

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

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

27.0 mm = 1.08"

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

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

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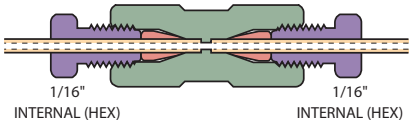
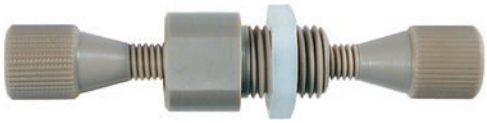
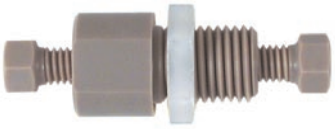



**Internal union – PEEK**
Standard bore version
(ZU1PK)



**Bulkhead fingertight internal union – PEEK**
(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* | **Bulkhead** *Prod No* | **Bulkhead panel hole diameter** |
|---|---|---|---|---|
| 1/32" fingertight | | | | |
| | 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" fingertight | | | | |
| | 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* | **Bulkhead** *Prod No* | **Bulkhead panel hole diameter** |
|---|---|---|---|---|
| 1/16" to 1/32" | 0.25 mm | ZRU1.5FPK | ZBRU1.5FPK | 5/16" |
| | 0.50 mm | ZRU1.5LFPK | ZBRU1.5LFPK | 5/16" |
| | 1/32" | ZRU1.5TFPK | ZBRU1.5TFPK | 5/16" |
| 1/8" to 1/32" | 0.25 mm | ZRU2.5FPK | ZBRU2.5FPK | 3/8" |
| | 0.50 mm | ZRU2.5LFPK | ZBRU2.5LFPK | 3/8" |
| | 1/32" | ZRU2.5TFPK | ZBRU2.5TFPK | 3/8" |
| 1/8" to 1/16" | 0.25 mm | ZRU21CFPK | ZBRU21CFPK | 3/8" |
| | 0.75 mm | ZRU21FPK | ZBRU21FPK | 3/8" |
| | 1.00 mm | ZRU21LFPK | ZBRU21LFPK | 3/8" |
| | 1/16" | ZRU21TFPK | ZBRU21TFPK | 3/8" |

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## High Pressure Specialty PEEK Fittings

### 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* |
|---|---|
| Natural | JR-5508-5 |

### 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 hex-head 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* |
|---|---|
| Multi-color (2 of each color) | JR-55016-12 |

**MORE INFORMATION**
Color-coded PEEK tubing . . . page 89

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

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

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## 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 handtight fittings |
| 5 | PEEK nuts, hex-head long |
| 20 | PEEK ferrules, double-ended 1/16" |
| 1 | PEEK union, HP body only, 10-32 |
| 2 | Tubing elbows 90° |
| 2 | Tubing elbows 180° |
| 1 | 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 PEEK fittings

These handy tools make it fast and easy to tighten PEEK hex-head fittings. The red version is for use with the C360 series fittings shown on page 57. The green tool is for any 1/32" PEEK fitting with a 3/16" hex head nut, and the blue version fits the 1/4" hex common in fittings for 1/16" tubing.

| *Color* | *For use with* | *Prod No* |
|---|---|---|
| Red | 360 µm fittings | C360ET |
| Green | 1/32" fittings | CNFT |
| Blue | 1/16" fittings | ZNFT |

**MORE INFORMATION**

Hex-head PEEK fittings
- 360 µm..... page 57
- 1/32".....63-65
- 1/16"
  - High pressure...63-65
  - Low pressure .....71

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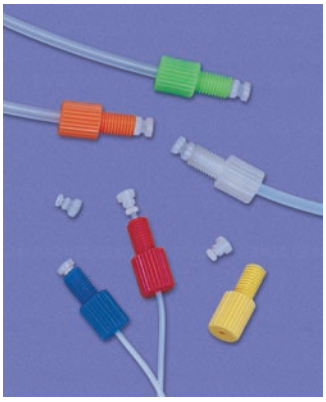
## Low Pressure Flangeless Tube End Fittings

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 our new 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*



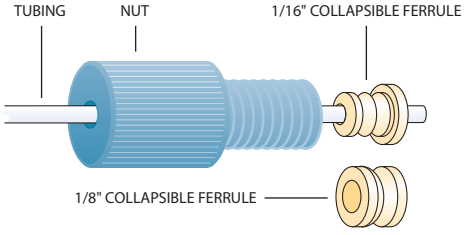
Flangeless tube end fittings eliminate the flanging tool required with standard tube end fittings. The nut turns on the tubing as freely as with our flanged fitting, eliminating the possibility of cracking or unscrewing that can occur when plastic tubing is subjected to twisting as fittings are connected.

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 takes place in a very 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. Use CTFE ferrules for soft tubing (PTFE, FEP, etc.), but use PEEK ferrules for harder tubing (PEEK, ETFE, polyurethane, etc.)

Cheminert tube end fittings work with any 1/16" or 1/8" OD polymeric tubing, and come in twelve different colors for system color coding.

| **Flangeless fittings** with CTFE ferrules | | **1/16" OD** | | **1/8" OD** | |
|---|---|---|---|---|---|
| | *(pkg/5)* | *Prod No* | *Price* | *Prod No* | *Price* |
| | Black | CFL-1BK | | CFL-2BK | |
| | Blue | CFL-1BE | | CFL-2BE | |
| | Brown | CFL-1BR | | CFL-2BR | |
| | Dark gray | CFL-1DG | | CFL-2DG | |
| | Green | CFL-1G | | CFL-2G | |
| | Lavender/pink | CFL-1L | | CFL-2L | |
| | Natural | CFL-1N | | CFL-2N | |
| | Orange | CFL-1E | | CFL-2E | |
| | Purple | CFL-1P | | CFL-2P | |
| | Red | CFL-1R | | CFL-2R | |
| | White | CFL-1W | | CFL-2W | |
| | Yellow | CFL-1Y | | CFL-2Y | |
| | Assorted *(pkg/12, one of each color)* with ferrule: | | | | |
| | CTFE | CFL-1A | | CFL-2A | |
| | PEEK | CFL-1A-PK | | CFL-2A-PK | |
| **Replacements** | | | | | |
| PEEK ferrules | *(pkg/10)* | CFL-CB1PK | | CFL-CB2PK | |
| CTFE ferrules | *(pkg/10)* | CFL-CB1KF | | CFL-CB2KF | |
| PEEK nuts | *(pkg/5)* | CFL-1PK | | CFL-2PK | |
| **Setting tool** | | CST | | CST | |

Patent No. 6,575,501




**Flangeless tube end fitting**

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

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

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

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

27.0 mm = 1.08"

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

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

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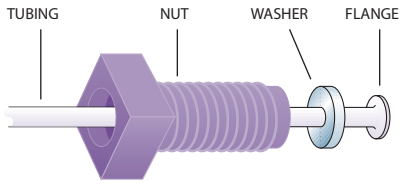
## Standard flanged tube end fittings *1/4-28*

The basic component of the Cheminert system is the polypropylene nut, retained on PTFE or FEP tubing by a flange formed with a Cheminert flanging tool *(page 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 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* | *Price* | *Prod No* | *Price* |
| | 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 *(pkg/12, one of each color)* | CF-1A | | CF-2A | |
| Washers | *(pkg/10)* | CF-W1 | | CF-W2 | |

**MORE INFORMATION**

High pressure fittings . . . . . .pp 63-66
PTFE and FEP tubing. . . . . 90

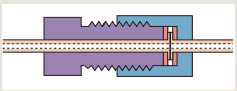
**TECH TIP**

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.



## 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* | *Price* | *Prod No* | *Price* |
| | 1/16" | CEN1PK | | CEN1KF | |
| | 1/8" | CEN2PK | | CEN2KF | |

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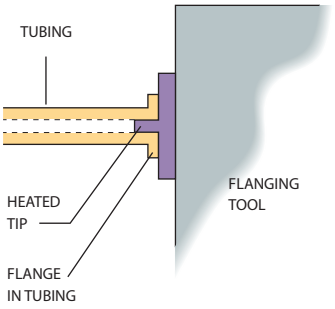
# Flanging Tool, Starter Kit

## Cheminert flanging tools

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.




**Flange being made on tubing**

| | | *Prod No* | *Price* |
|---|---|---|---|
| **Flanging tools** | 110 VAC | CFT-110 | |
| | 230 VAC | CFT-220 | |
| **Flanging tool accessories** | | | |
| Flanging tips | | | |
| | for tubing ID ≤ 0.25 mm | CFT-TXC | |
| | for tubing ID ≤ 0.75 mm | CFT-TC | |
| | for tubing ID ≤ 1.00 mm | CFT-TM | |
| | for tubing ID ≤ 1.50 mm | CFT-TL | |
| | for tubing ID ≤ 2.00 mm | CFT-TXL | |
| Razor blades *(pkg /10)* | | CFT-R | |
| Tubing holder | | CFT-H | |

## Cheminert starter kits

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* | *Price* | *Prod No* | *Price* |
| **Starter kits** | | | | |
| 1/16" tubing | CFT1K-110 | | CFT1K-220 | |
| 1/8" tubing | CFT2K-110 | | CFT2K-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

**MORE INFORMATION**

Standard tube end fittings ..... page 69
Stainless steel washers ..... 69
Couplings ..... 72
Male luer adapter ..... 76
Female luer adapter ... 76
Plug ..... 71
Tee ..... 74
Glass connector ..... 75

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## 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* | *Price* |
|---|---|---|
| Easy-Flange kit | JR-201540 | |
| *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 | | |
| PTFE tubing, 1/16" x 0.75 mm ID, 6 ft. | | |

## Plugs *1/4-28*

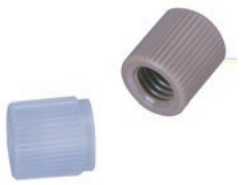
Plugs can be used to close off an unused port in a 1/4-28 valve or manifold.

| | **PEEK** | | **CTFE** | |
|---|---|---|---|---|
| *Package of 5:* | *Prod No* | *Price* | *Prod No* | *Price* |
| | CPPK | | CPKF | |

## Low pressure PEEK plugs *10-32*

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

| | | **PEEK** | |
|---|---|---|---|
| *Package of 1:Length of nut** | | *Prod No* | *Price* |
| 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* | *Price* | *Prod No* | *Price* |
| | CCPK-5 | | CCKF-5 | |

**MORE INFORMATION**

Clean-cut tubing cutter ..... page 90
Tightening tool for hex-head PEEK nuts. . 67

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

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

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

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

27.0 mm = 1.08"

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

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

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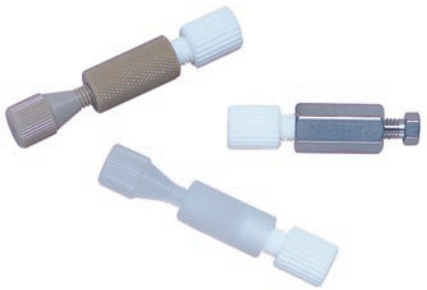
## Low Pressure Unions

### Unions — *Cheminert to Cheminert* — *1/4-28 to 1/4-28*

Includes flangeless 1/4-28 fittings for tubing OD indicated. Polypropylene unions are for use with flanged tubing only.

| *Tubing OD* | *Bore* | PEEK *Prod No* | *Price* | CTFE *Prod No* | *Price* | Polypropylene *Prod No* | *Price* |
|---|---|---|---|---|---|---|---|
| 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 | | – | |
| 1/8" | Butt connection | CUTPK | | CUTKF | | CUTPP * (* pkg/5) | |

### Unions — *Cheminert to 1/16" ZDV* — *1/4-28 to 10-32*



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

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

### Unions — *Cheminert to 1/4" tubing* — *1/4-28 to 1/2-20*

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

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

| **Components** | *Prod No* | *Price* |
|---|---|---|
| 1/2-20 nut, CTFE | CFL-4KF | |
| 1/2-20 nut, Delrin | CFL-4D | |
| CTFE ferrule | CFL-CB4KF-S | |

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

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

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

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

27.0 mm = 1.08"

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

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

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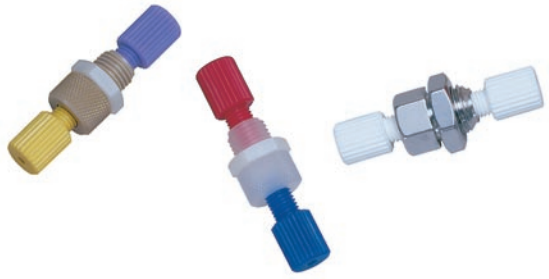
## Bulkhead unions *Cheminert to Cheminert* *1/4-28 to 1/4-28*

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

| *Tubing OD* | *Bore* | PEEK *Prod No* | *Price* | CTFE *Prod No* | *Price* | 316 Stainless *Prod No* | *Price* |
|---|---|---|---|---|---|---|---|
| 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*

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

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

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## Low Pressure Tees, Crosses, and Manifolds

### Tees *1/4-28*

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

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

### Crosses *1/4-28*

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

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

### Manifolds *1/4-28*

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

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

**MORE INFORMATION**

Flangeless tube end fittings ..... page 68

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

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

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

7.0 mm = .275"
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27.0 mm = 1.08"

1/32" = 0.8 mm
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## Mixing tees

*1/4-28*

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

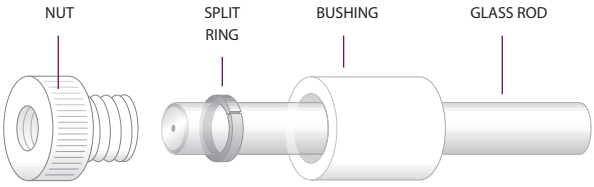
| *Tubing OD* | *Bore* | PEEK *Prod No* | *Price* | CTFE *Prod No* | *Price* |
|---|---|---|---|---|---|
| 1/16" | 0.75 mm | CM1XPK | | CM1XKF | |
| 1/8" | 1.50 mm | CM2XPK | | CM2XKF | |

## 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. They are available as individual components or as complete assemblies. 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.

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




**Glass connector**

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## Adapters

### 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* | *Price* | *Prod No* | *Price* | *Prod No* | *Price* |
| 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* | *Price* | *Prod No* | *Price* | *Prod No* | *Price* |
| Female luer | | | | | | | |
| to 1/4-28 | 1.50 mm | CFLAPK | | CFLAKF | | CFLAPFA | |
| to 10-32 | 0.75 mm | ZUFLPK | | ZUFLKF | | – | |
| Male luer | | | | | | | |
| to 1/4-28 | 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* | *Price* | *Prod No* | *Price* |
| 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 | |

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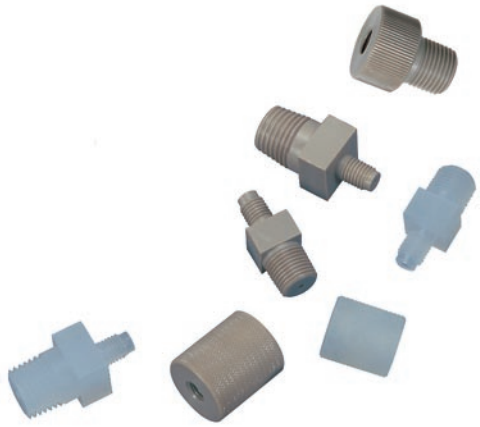
## Pipe adapters

*1/4-28 to NPT*



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

| | | PEEK | | CTFE | |
|---|---|---|---|---|---|
| *NPT* | *Bore* | *Prod No* | *Price* | *Prod No* | *Price* |
| **Female 1/4-28 to male NPT** | | | | | |
| 1/8" | 1.5 mm | CPA2PK | | CPA2KF | $18 |
| 1/4" | 1.5 mm | CPA4PK | | CPA4KF | |
| **Male 1/4-28 to male 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

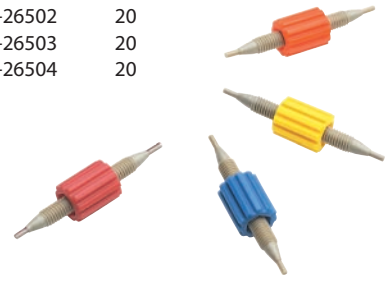
This adapter permits Valco 10-32 fittings to be installed into any 1/4-28 fitting detail. (Nut and ferrule are not included.)

| *Description* | *Bore* | *Prod No* | *Price* |
|---|---|---|---|
| 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 89). 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* | *Price* |
|---|---|---|---|
| Red | 0.13 mm ID | JR-26501 | $20 |
| Yellow | 0.17 mm ID | JR-26502 | 20 |
| Blue | 0.25 mm ID | JR-26503 | 20 |
| Orange | 0.50 mm ID | JR-26504 | 20 |



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

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

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

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

27.0 mm = 1.08"

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

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

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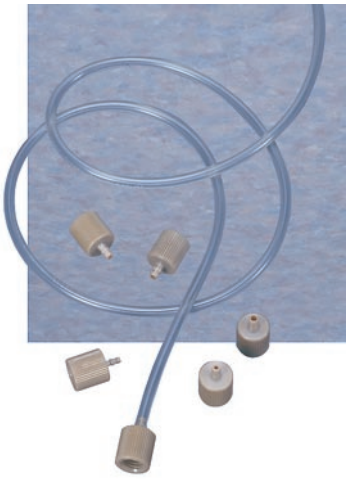
## Filters and Perifit Fittings

### Perifit fittings for peristaltic pump tubing



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

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

| *For use with tubing sizes* | *Prod No* | *Price* |
|---|---|---|
| 0.50 to 1.02 mm ID | C-PFS | |
| 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 316 stainless low-pressure-drop screen. (Fitting shown is not included.)

| *Pore size* | *Prod No* | *Price* |
|---|---|---|
| 2 micron | CFE-S2 | |
| 10 micron | 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 hand tightened.

| *Tubing OD* | *Bore* | *Prod No* | *Price* |
|---|---|---|---|
| 1/16" | 0.5 mm | ZU1FPK.5 | |

**Replacement elements (PEEK-encapsulated titanium)**

| *Pore size* | *Prod No* | *Price* |
|---|---|---|
| 0.5 micron | C-F1.5TI | |

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

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

4.6 mm = .180"
6.0 mm = .236"
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## 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 where metal surfaces may corrode or interact with samples.

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

## Filters

### No-Met biocompatible mobile phase filter

Stainless steel in the flowpath is not acceptable in a growing number of applications involving the separation of biomolecules. 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.

| | *Prod No* | *Price* |
|---|---|---|
| No-met mobile phase filter, 1/8" | JR-32178 | |
| Replacement element | JR-32179 | |

### Stainless steel mobile phase filters and helium spargers

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* | *Price* |
|---|---|---|---|---|
| 1/16" | 2 µm | 8 | JR-367016-2 | |
| 1/16" | 10 µm | 20 | JR-367016-10 | |
| 1/16" | 20 µm | 20 | JR-367016-20 | |
| 1/8" | 2 µm | 8 | JR-367008-2 | |
| 1/8" | 10 µm | 20 | JR-367008-10 | |
| 1/8" | 20 µm | 20 | JR-367008-20 | |

### Mobile phase filters *Direct connect*

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

| *Pore size* | *Prod No* | *Price* |
|---|---|---|
| 2 micron | C-MPFTI2 | |
| 10 micron | C-MPFTI10 | |

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

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

4.6 mm = .180"
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## 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 on the facing page.

| *Capacity* | *Cap* | *Prod No* | *Price* |
|---|---|---|---|
| 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-cap

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

The VICI-cap is available for either GL45 or S40 threaded bottles. It has a 1/4-28 female port and three ports for tubing insertion: two 1/8" tubing ports and a 1/16" tubing port. The tubing ports are made so that you push the tubing through the hole, while 1/4-28 fittings provide the best connection. Unused ports can be plugged as required.

| | *Prod No* | *Price* |
|---|---|---|
| VICI-cap GL-45 | JR-9000-0001 | |
| VICI-cap S40 | JR-9000-0006 | |

## Valves for vials

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

| *Pkg/12:* | *Cap/thread size* | *Prod No* | *Price* |
|---|---|---|---|
| | 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 | |

*Ethylene Propylene Diene Monomer

**MORE INFORMATION**

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

**TECH TIP**

The VICI-cap is not usable for building up a helium atmosphere within the solvent bottle. It is only designed for continuous helium sparging.

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