

# EVERYTHING FOR THE LAB

*Biotech AB – your single provider of  
HPLC and fluidic scientific  
customized parts & assemblies*





View from our office windows

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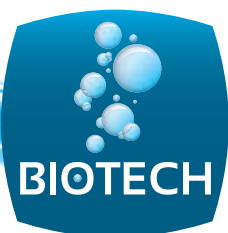
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# EVERYTHING FOR THE LAB

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# Check Valves & Pressure Regulators



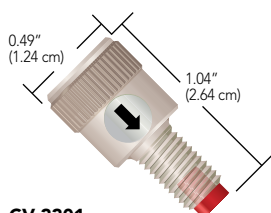
Assembling Upchurch Scientific® Back Pressure Regulator cartridges in Oak Harbor, WA.



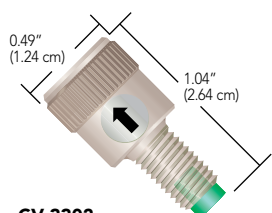
## Standard 1/4-28 Inline Check Valves

- ▶ 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)

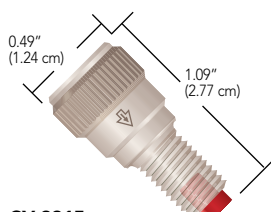
Connect these Upchurch Scientific® Inline Check Valves to any 1/4-28 flat-bottom port. Then thread your 1/4-28 flat-bottom fitting into the check valve to connect the tubing. Once installed, the spring-actuated sealing system eliminates back flow, helping to prevent upstream contamination or damage. In addition, the unique design of this product eliminates the additional tubing cuts and connections required to install conventional inline check valves.



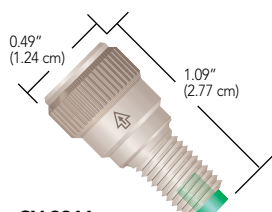
**CV-3301**  
Standard, Inlet  
1/4-28 FB Male to 1/4-28 FB Female  
15 psi (1 bar) cracking pressure



**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

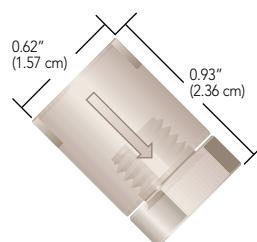


**CV-3316**  
Standard, Outlet  
1/4-28 FB Male to 1/4-28 FB Female  
3 psi (0.2 bar) cracking pressure

## 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  $\mu$ L, 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 derivitization. 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

	Swept Volume	Thru-Hole	Max. Pressure Rating	Back Pressure Created	Cracking Pressure Tolerance
<b>Standard 1/4-28 FB</b>					
<b>CV-3301, CV-3302</b>	20 $\mu$ L	0.020" (0.50 mm)	2,000 psi (138 bar)	45 psi (3.1 bar)	$\pm$ 5 psi (0.34 bar)
<b>CV-3315, CV-3316</b>	16 $\mu$ L	0.020" (0.50 mm)	2,000 psi (138 bar)	10 psi (0.7 bar)	$\pm$ 1.5 psi (0.10 bar)
<b>Nonmetallic 10-32 Coned Micro-Volume</b>					
<b>CV-3500</b>	7.4 $\mu$ L	0.010" (0.25 mm)	3,000 psi (207 bar)	25 psi (1.7 bar)	$\pm$ 5 psi (0.34 bar)

### 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.



**Top Seller** SEE STARRED PRODUCTS

Part No.	Description	Cracking Pressure
<b>STANDARD 1/4-28 INLINE CHECK VALVES</b>		
<b>CV-3301</b>	Inlet Check Valve, 1/4-28 FB, M to 1/4-28 FB, F*	15 psi (1 bar)
<b>CV-3302</b>	Outlet Check Valve, 1/4-28 FB, M to 1/4-28 FB, F*	15 psi (1 bar)
<b>CV-3315</b>	Inlet Check Valve, 1/4-28 FB, M to 1/4-28 FB, F*	3 psi (0.2 bar)
<b>CV-3316</b>	Outlet Check Valve, 1/4-28 FB, M to 1/4-28 FB, F*	3 psi (0.2 bar)
<b>NONMETALLIC 10-32 MICRO-VOLUME INLINE CHECK VALVE</b>		
<b>CV-3500</b>	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

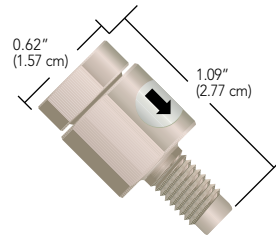


### Nonmetallic 1/4-28 and 10-32 Inline Check Valves

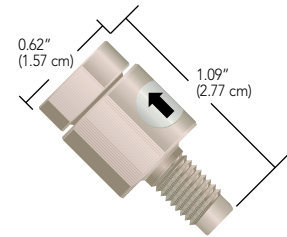
- Low cracking pressure of 1 psi (0.07 bar)
- Multiple configurations for different applications
- Excellent chemical resistance
- Materials of construction: PEEK™ and perfluoroelastomer

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.

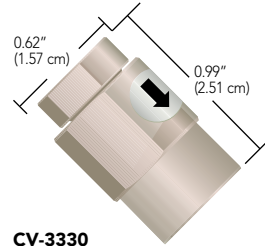
These check valves function well up to moderately-high pressure applications. Low internal volume also allows them to be used in areas where flow path volume is important; however, higher flow rates can pass through with minimal pressure drop.



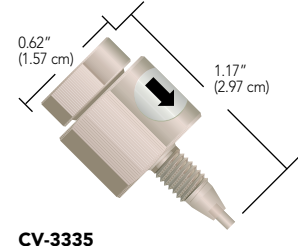
**CV-3320, CV-3322, CV-3324**  
Nonmetallic, Inlet  
1/4-28 FB Male to 1/4-28 FB Female



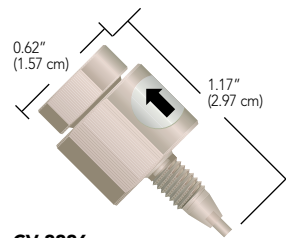
**CV-3321, CV-3323, CV-3325**  
Nonmetallic, Outlet  
1/4-28 FB Male to 1/4-28 FB Female



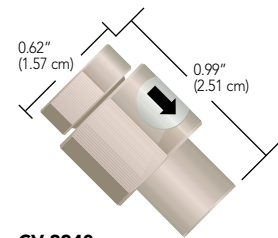
**CV-3330**  
Nonmetallic, Inline  
1/4-28 FB Female to 1/4-28 FB Female



**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

### 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.

### Specifications

	Swept Volume	Max. Pressure Rating	Back Pressure Created	Cracking Pressure Tolerance
<b>CV-3320, CV-3321</b>	37 µL	2,000 psi (138 bar)	30 psi (2.1 bar)	± 0.5 psi (0.03 bar)
<b>CV-3330</b>	34 µL	2,000 psi (138 bar)	30 psi (2.1 bar)	± 0.5 psi (0.03 bar)
<b>CV-3335, CV-3336</b>	49 µL	2,000 psi (138 bar)	30 psi (2.1 bar)	± 0.5 psi (0.03 bar)
<b>CV-3340</b>	34 µL	2,000 psi (138 bar)	30 psi (2.1 bar)	± 0.5 psi (0.03 bar)
<b>CV-3322, CV-3323</b>	49 µL	2,000 psi (138 bar)	30 psi (2.1 bar)	± 0.5 psi (0.03 bar)
<b>CV-3324, CV-3325</b>	182 µL	2,000 psi (138 bar)	30 psi (2.1 bar)	± 0.5 psi (0.03 bar)

*Please 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.*

Part No.	Description	Cracking Pressure	Thru-Hole
<b>NONMETALLIC 1/4-28 AND 10-32 INLINE CHECK VALVES</b>			
★ <b>CV-3320</b>	Inlet Check Valve, 1/4-28 FB, M to 1/4-28 FB, F	1 psi (0.07 bar)	0.020" (0.50 mm)
★ <b>CV-3321</b>	Outlet Check Valve, 1/4-28 FB, M to 1/4-28 FB, F	1 psi (0.07 bar)	0.020" (0.50 mm)
<b>CV-3322</b>	Inlet Check Valve, 1/4-28 FB, M to 1/4-28 FB, F	1 psi (0.07 bar)	0.020" (0.50 mm)
<b>CV-3323</b>	Inlet Check Valve, 1/4-28 FB, M to 1/4-28 FB, F	1 psi (0.07 bar)	0.020" (0.50 mm)
<b>CV-3324</b>	Outlet Check Valve, 1/4-28 FB, M to 1/4-28 FB, F	1 psi (0.07 bar)	0.020" (0.50 mm)
<b>CV-3325</b>	Outlet Check Valve, 1/4-28 FB, M to 1/4-28 FB, F	1 psi (0.07 bar)	0.020" (0.50 mm)
★ <b>CV-3330</b>	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)
<b>CV-3335</b>	Inlet Check Valve, 1/4-28 FB, F to 10-32 C, M	1 psi (0.07 bar)	0.020" (0.50 mm)
<b>CV-3336</b>	Outlet Check Valve, 1/4-28 FB, F to 10-32 C, M	1 psi (0.07 bar)	0.020" (0.50 mm)
★ <b>CV-3340</b>	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



**Top Seller** SEE STARRED PRODUCTS

## 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" box on this page for specific ideas regarding use of this valve.

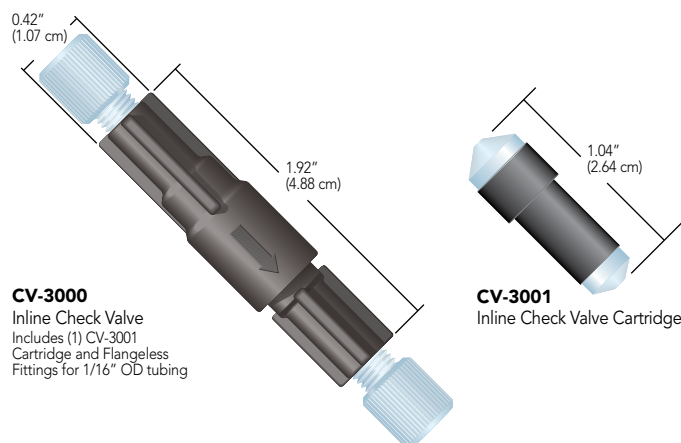


P-696 Quick-Stop Luer Check Valve Assembly

## 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  $\pm 0.5$  psi (0.03 bar) and  $\pm 1.5$  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

## 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 Derivatization:

For post-column derivatization, 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.



**Top Seller** SEE STARRED PRODUCTS

Part No.	Description	Includes	Swept Volume
<b>QUICK-STOP LUER CHECK VALVE</b>			
<b>P-696</b>	Quick-Stop Luer Check Valve Assembly	(1) P-697, (1) P-655	127 µL
★ <b>P-697</b>	Quick-Stop Luer Check Valve		107 µL
<b>P-698</b>	Bulkhead Quick-Stop Luer Valve Assembly	(1) P-699, (1) P-655, (1) nut/lock washer set	127 µL
<b>P-699</b>	Bulkhead Quick-Stop Luer Valve	(1) nut/lock washer set	107 µL
<b>INLINE CARTRIDGE CHECK VALVES</b>			
★ <b>CV-3000</b>	Inline Check Valve Assembly for 1/16" OD tubing	(1) CV-3001, (2) XP-215	96 µL
<b>CV-3001</b>	Inline Check Valve Cartridge for CV-3000		91 µL
<b>CV-3010</b>	Inline Check Valve Assembly for 1/8" OD tubing	(1) CV-3010, (2) XP-315	100 µL
<b>CV-3011</b>	Inline Check Valve Cartridge for CV-3010		92 µL

## 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)

Please Note: For flow control options try the Micro-Metering Valves found on page 147.



Biocompatible Back Pressure Regulator Holder, shown with available Cartridges

## 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.

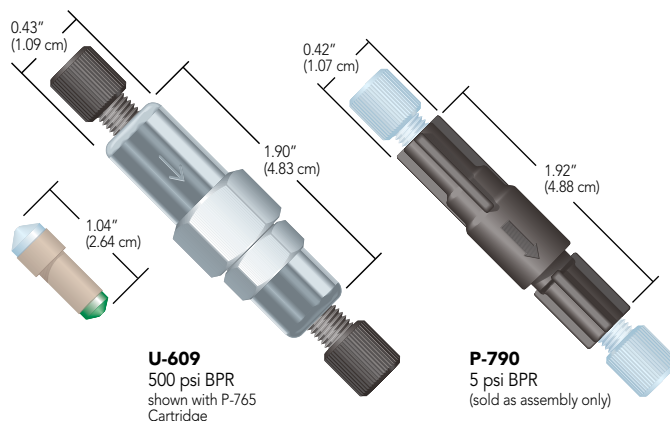
A back pressure regulator can also be used as a pump preload for low and fluctuating pressure applications. Many of today's pumps require a steady back pressure to function properly. Install an Upchurch Scientific BPR (usually 500–1,000 psi) between the pump and the injector to enhance pump performance.

**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.

## BPR Assemblies

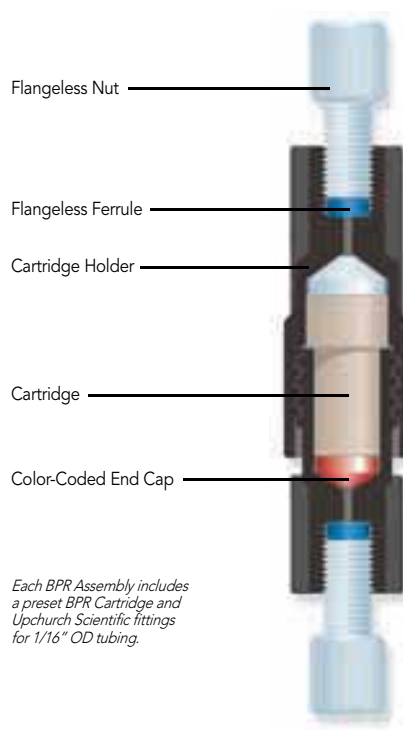
Choose from our line of Biocompatible and Stainless Steel BPR Assemblies, each complete with a replaceable, factory preset cartridge (except the 5 and 20 psi versions).

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.

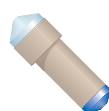


## Replacement Back Pressure Regulator (BPR) Cartridges

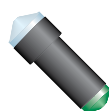
- Materials of construction: PEEK™, ETFE, perfluoroelastomer, and gold-plated stainless steel

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)\*

**LT-115**  
LiteTouch® Nut  
(page 16)

**P-250**  
Super  
Flangeless™  
Ferrule  
(page 21)

**P-465**  
PEEK BPR  
Holder  
(cartridge sold  
separately)

Pressure Rating 4,000 psi (276 bar)\*\*

**F-300**  
Two-Piece  
Fingertight  
Fitting  
(page 15)

**U-469**  
Stainless  
Steel  
BPR Holder  
(cartridge sold  
separately)

\* Using PEEK tubing  
and supplied fittings

\*\* Using stainless steel tubing and supplied fittings

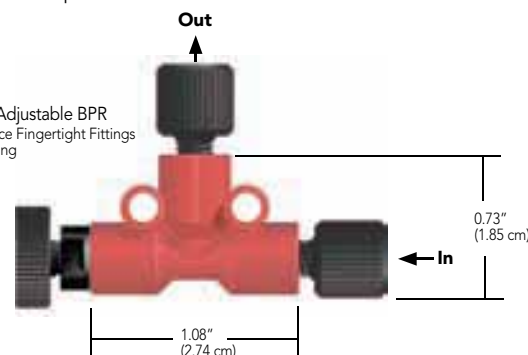
## High Pressure Adjustable BPR

- 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



**Top Seller** SEE STARRED PRODUCTS

Part No.	Pressure Setting	Holder Material	Includes	Swept Volume
<b>BPR ASSEMBLIES</b>				
<b>P-790</b>	5 psi (0.3 bar)	PEEK	(2) XP-215	134 µL
★ <b>P-791</b>	20 psi (1.4 bar)	PEEK	(2) XP-215	134 µL
★ <b>P-785</b>	40 psi (2.8 bar)	PEEK	(1) P-761, (2) XP-215	131 µL
★ <b>P-786</b>	75 psi (5.2 bar)	PEEK	(1) P-762, (2) XP-215	131 µL
★ <b>P-787</b>	100 psi (7 bar)	PEEK	(1) P-763, (2) XP-215	131 µL
<b>P-788</b>	250 psi (17 bar)	PEEK	(1) P-764, (2) XP-235	102 µL
<b>P-789</b>	500 psi (34 bar)	PEEK	(1) P-765, (2) P-250, (2) LT-115	96 µL
<b>P-455</b>	1,000 psi (69 bar)	PEEK	(1) P-796, (2) P-250, (2) LT-115	89 µL
<b>U-605</b>	40 psi (2.8 bar)	SST	(1) P-761, (2) XP-201	129 µL
<b>U-606</b>	75 psi (5.2 bar)	SST	(1) P-762, (2) XP-201	129 µL
★ <b>U-607</b>	100 psi (7 bar)	SST	(1) P-763, (2) XP-201	129 µL
<b>U-608</b>	250 psi (17 bar)	SST	(1) P-764, (2) XP-201	99 µL
<b>U-609</b>	500 psi (34 bar)	SST	(1) P-765, (2) XP-201	93 µL
<b>U-610</b>	750 psi (52 bar)	SST	(1) P-795, (2) P-250, (2) LT-115	91 µL
<b>REPLACEMENT CARTRIDGES</b>				

<b>COLOR CODING</b>				
Part No.	Pressure Setting	Body	End-Cap	Swept Volume
<b>P-761</b>	40 psi (2.8 bar)	Tan	Blue	125 µL
<b>P-762</b>	75 psi (5.2 bar)	Tan	Yellow	125 µL
★ <b>P-763</b>	100 psi (7 bar)	Tan	Red	125 µL
<b>P-764</b>	250 psi (17 bar)	Tan	White	95 µL
<b>P-765</b>	500 psi (34 bar)	Tan	Green	89 µL
<b>P-795</b>	750 psi (52 bar)	Black	Blue	87 µL
<b>P-796</b>	1,000 psi (69 bar)	Black	Green	83 µL

<b>BPR HOLDERS</b>				
Part No.	Holder Style	Holder Material	Includes	Swept Volume
<b>P-465</b>	Biocompatible BPR	PEEK	(2) P-250, (2) LT-115	7 µL
<b>U-469</b>	High Pressure BPR	SST	(2) F-300	4 µL
<b>HIGH PRESSURE ADJUSTABLE BPR ASSEMBLY</b>				
★ <b>P-880</b>	2,000 – 5,000 psi (138-345 bar)	(2) F-120BLK		9 µL

## Ultra-Low Volume Back Pressure Regulators (BPR)

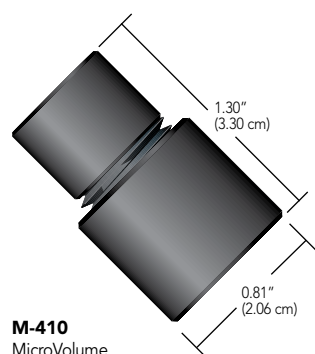
- ▶ Wetted flow path materials: PEEK™, perfluoroelastomer, and ETFE
- ▶ Available pressure settings of 100 or 500 psi (7 or 34 bar)
- ▶ Low swept volume of only 6 µL

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 (please see "Difficult to Detect" below for more details). 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.



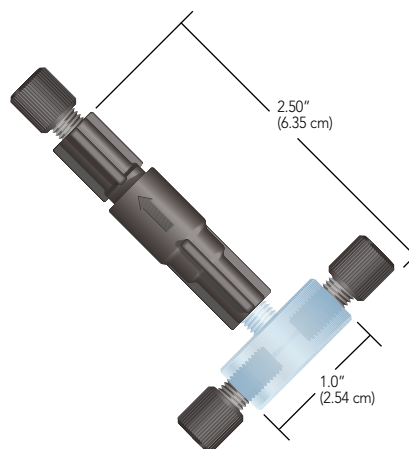
**M-410**  
MicroVolume  
BPR Assembly  
Attached tubing not shown

## Pressure Relief Valves

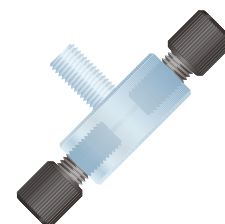
- ▶ Prevent system over-pressurization

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" (.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

	Back Pressure Setting psi (bar)	Flow Rate Recommendations	Recommended Pressure Range psi (bar)	1/16" OD Tubing
<b>M-410</b>	100 <sup>2</sup> (7) <sup>2</sup>	Optimal: 100 µL–1 mL/min Max.: 4 mL/min	40–150 (3–10)	PEEK, 0.010" ID
<b>M-412</b>	500 <sup>2</sup> (34) <sup>2</sup>	Optimal: 100 µL–1 mL/min Max.: 4 mL/min	250–525 (17–36)	PEEK, 0.010" ID
<b>M-420</b>	100 <sup>3</sup> (7) <sup>3</sup>	Optimal: 3–8 mL/min Max.: 10 mL/min	40–150 (3–10)	PEEK, 0.020" ID

<sup>1</sup> All data generated using water at room temperature

<sup>2</sup> Set at a flow rate of 0.5 mL/min

<sup>3</sup> Set at a flow rate of 5 mL/min



**Top Seller** SEE STARRED PRODUCTS

Part No.	Description	Pressure Setting	Tubing OD	Includes	Swept Volume
<b>ULTRA-LOW VOLUME BPRs</b>					
<b>M-410</b>	Low Flow	100 psi (7 bar)	1/16"	XP-230	6µL
★ <b>M-412</b>	Low Flow	500 psi (34 bar)	1/16"	XP-230	6µL
<b>M-420</b>	High Flow	100 psi (7 bar)	1/16"	XP-230	6µL
<b>PRESSURE RELIEF VALVES</b>					
<b>U-455</b>	Pressure Relief Assembly	5 psi (0.3 bar)	1/16"	XP-201	148 µL
★ <b>U-456</b>	Pressure Relief Assembly	100 psi (7 bar)	1/16"	XP-201, wrenches	139 µL
★ <b>P-612</b>	Pressure Relief Tee		1/16"	XP-201	14 µL
<b>P-612S</b>	Pressure Relief Tee		3/16"	XP-201	348 µL

## 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.



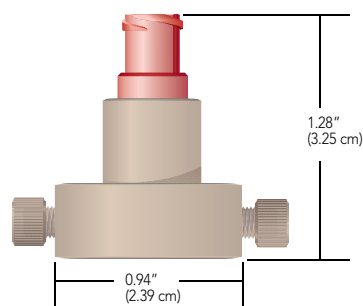
## Universal Prime/Purge Valve

- 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.

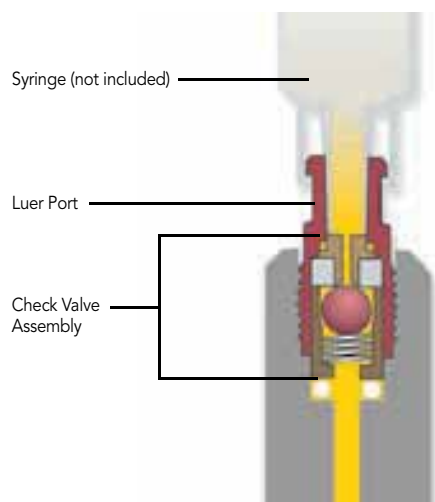


The valve is designed to be used with 1/8" OD tubing. Optional mounting is made easy by the handy holes in the body of each unit.



**V-321**  
Universal Prime/Purge Valve  
Mounting holes are 0.75" (1.91 cm) apart

## Attaching/Removing the Syringe Automatically Opens and Closes the Valve



## 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
<b>PRIME/PURGE VALVES</b>		
<b>B-310</b>	10cc Disposable Luer-Tipped Syringe	
<b>V-320</b>	Prime/Purge Valve for Waters Pumps	(1) V-320-06
<b>V-320-06</b>	Replacement PTFE Seal (for V-320)	
<b>V-321</b>	Universal Prime/Purge Valve	(2) P-300N, (2) P-335



# Column Hardware



Inspecting Isolation Technologies™ compression ferrules for imperfections from the machining process in Middleboro, MA.



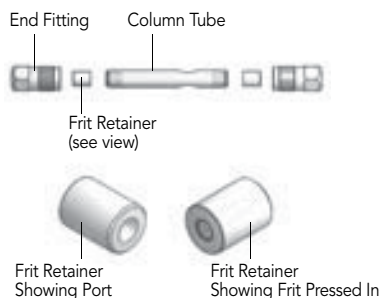
## IsoBar

- ▶ Ultra-high performance liquid chromatography (UHPLC) compatible
- ▶ Proven format for <2 µm stationary phases
- ▶ Rated to 20,000 psi (1,379 bar)

UHPLC decreases the time and cost associated with analytical separations, but to consistently maintain these technology advantages, you need column hardware that ensures the speed and precision of your processes. The Isolation Technologies™ IsoBar column platform delivers a leak-proof, reliable all-metal design with high strength threaded end fittings to meet critical system operating requirements.

Few column hardware formats are more aptly suited for the rigors of ultra-high pressure operations than IsoBar. IsoBar features a unique Isobore™ internal surface finish. This extremely smooth, flat and ultra-clean finish reduces the wall effect and significantly improves column efficiency.

IsoBar offers the stability, high pressure, and high reliability critical to the optimum performance of UHPLC systems.



## Dimensions

ID	2.1, 3.0 and 4.6 mm
Length	2.0, 3.0, 5.0, 10.0 and 15.0 cm

Part No.	Description
<b>ISOBAR 4.6 mm</b>	
5030IP-05046-002-05	IsoBar Column System, 4.6 mm x 2 cm, 0.5 µm
5030IP-05046-0025-05	IsoBar Column System, 4.6 mm x 2.5 cm, 0.5 µm
5030IP-05046-003-05	IsoBar Column System, 4.6 mm x 3 cm, 0.5 µm
5030IP-05046-005-05	IsoBar Column System, 4.6 mm x 5 cm, 0.5 µm
5030IP-05046-010-05	IsoBar Column System, 4.6 mm x 10 cm, 0.5 µm
5030IP-05046-015-05	IsoBar Column System, 4.6 mm x 15 cm, 0.5 µm
5030IP-05046-025-05	IsoBar Column System, 4.6 mm x 25 cm, 0.5 µm
2009-05046-002EP	IsoBar Column Tube, 4.6 mm x 2 cm
2009-05046-0025EP	IsoBar Column Tube, 4.6 mm x 2.5 cm
2009-05046-003EP	IsoBar Column Tube, 4.6 mm x 3 cm
2009-05046-005EP	IsoBar Column Tube, 4.6 mm x 5 cm
2009-05046-010EP	IsoBar Column Tube, 4.6 mm x 10 cm
2009-05046-015EP	IsoBar Column Tube, 4.6 mm x 15 cm
2009-05046-025EP	IsoBar Column Tube, 4.6 mm x 25 cm
907946-P-05	Assembly Frit Retainer, 4.6 mm Tapered, 0.5 µm
907946-P-10	Assembly Frit Retainer, 4.6 mm Tapered, 1.0 µm
907946-P-20	Assembly Frit Retainer, 4.6 mm Tapered, 2.0 µm
9096	End Fitting, IsoBar 5/16"
<b>ISOBAR 3.0 mm</b>	
5030IP-05030-002-05	IsoBar Column System, 3.0 mm x 2 cm, 0.5 µm
5030IP-05030-0025-05	IsoBar Column System, 3.0 mm x 2.5 cm, 0.5 µm
5030IP-05030-003-05	IsoBar Column System, 3.0 mm x 3 cm, 0.5 µm
5030IP-05030-005-05	IsoBar Column System, 3.0 mm x 5 cm, 0.5 µm
5030IP-05030-010-05	IsoBar Column System, 3.0 mm x 10 cm, 0.5 µm
5030IP-05030-015-05	IsoBar Column System, 3.0 mm x 15 cm, 0.5 µm
5030IP-05030-025-05	IsoBar Column System, 3.0 mm x 25 cm, 0.5 µm
2009-05030-002EP	IsoBar Column Tube, 3.0 mm x 2 cm
2009-05030-0025EP	IsoBar Column Tube, 3.0 mm x 2.5 cm
2009-05030-003EP	IsoBar Column Tube, 3.0 mm x 3 cm
2009-05030-005EP	IsoBar Column Tube, 3.0 mm x 5 cm
2009-05030-010EP	IsoBar Column Tube, 3.0 mm x 10 cm
2009-05030-015EP	IsoBar Column Tube, 3.0 mm x 15 cm
2009-05030-025EP	IsoBar Column Tube, 3.0 mm x 25 cm
907930-P-05	Assembly Frit Retainer, 3.0 mm Tapered, 0.5 µm
907930-P-10	Assembly Frit Retainer, 3.0 mm Tapered, 1.0 µm
907930-P-20	Assembly Frit Retainer, 3.0 mm Tapered, 2.0 µm
9096	IsoBar End Fitting, 5/16"
<b>ISOBAR 2.1 mm</b>	
5030IP-04021-002-05	IsoBar Column System, 2.1 mm x 2 cm, 0.5 µm
5030IP-04021-003-05	IsoBar Column System, 2.1 mm x 3 cm, 0.5 µm
5030IP-04021-005-05	IsoBar Column System, 2.1 mm x 5 cm, 0.5 µm
5030IP-04021-010-05	IsoBar Column System, 2.1 mm x 10 cm, 0.5 µm
5030IP-04021-015-05	IsoBar Column System, 2.1 mm x 15 cm, 0.5 µm
5030IP-04021-025-05	IsoBar Column System, 2.1 mm x 25 cm, 0.5 µm
2009-04021-002EP	IsoBar Column Tube, 2.1 mm x 2 cm
2009-04021-003EP	IsoBar Column Tube, 2.1 mm x 3 cm
2009-04021-005EP	IsoBar Column Tube, 2.1 mm x 5 cm
2009-04021-010EP	IsoBar Column Tube, 2.1 mm x 10 cm
2009-04021-015EP	IsoBar Column Tube, 2.1 mm x 15 cm
2009-04021-025EP	IsoBar Column Tube, 2.1 mm x 25 cm
907921-P-05	Assembly Frit Retainer, 2.1 mm Tapered, 0.5 µm
907921-P-10	Assembly Frit Retainer, 2.1 mm Tapered, 1.0 µm
907921-P-20	Assembly Frit Retainer, 2.1 mm Tapered, 2.0 µm
9097	IsoBar End Fitting, 1/4"
<b>PACKING ADAPTER</b>	
3160-05-46	IsoBar Assembly Packing Adapter, 4.6 mm
3160-005	Seal IsoBar Packing System, 4.6 mm
3160-05-30	IsoBar Assembly Packing Adapter, 3 mm
3160-004	Seal IsoBar Packing System, 3 mm
3160-04-21	IsoBar Assembly Packing Adapter, 2.1 mm
3160-007	Seal IsoBar Packing System, 2.1 mm

### Iso-Prep™ Guard

- ▶ 21.2 mm and larger ID column protection
- ▶ Improves plate count and symmetry
- ▶ Simple manufacturing technique

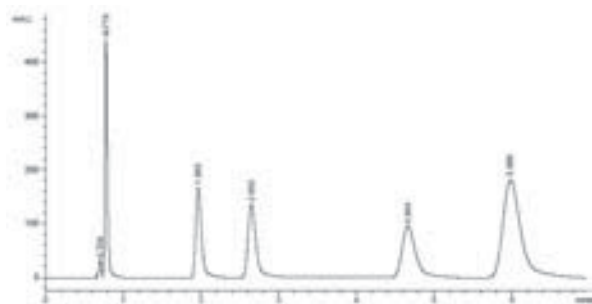


### Application Note

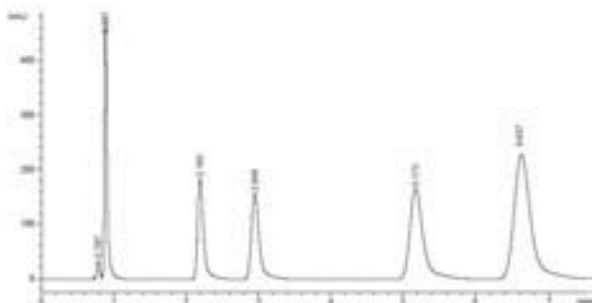
#### Low Pressure Drop

- ▶ 60:40 Acetonitrile : Water
- ▶ 50 mL/min
- ▶ Kromasil 10 µm C18
- ▶ Backpressure: 100 psi

10 µm 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

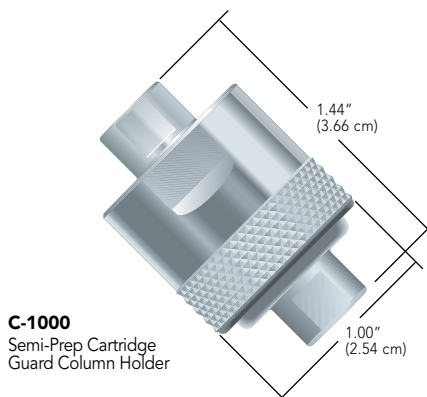
The internal volume of this Upchurch Scientific® semi-prep guard column is just 780 µL, which only requires approximately 1.50 g of packing material — ideally the same material used in your semi-prep column. The C-1000 Holder will hold to high pressures, and is specially treated to prevent galling.\* Use standard 10-32 coned fittings (not included) to connect your 1/16" OD tubing.



**C-1000 Semi-Prep Guard Column**

Fittings, tubing and column shown are not included.

\* 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 Cartridge  
Guard Column Holder

### Application Note

#### Why use guard columns?

Columns damaged by strong or irreversible adsorption include changes in retention time and selectivity, offset baseline (bleed) and peak shape deterioration. Columns damaged by particulates (from the sample matrix, mobile phase, etc.) commonly exhibit peak splitting and increased back pressure. Guard columns protect your column in two ways. First, they act as filters trapping particles in their frits or packed bed, or both. Second, when the guard column is packed with the same material as in the analytical column, it removes compounds that irreversibly or strongly bind to the packing material. By either approach, guard columns can increase your column life considerably.

Part No.	Description
<b>ISO-PREP GUARD ORDERING INFORMATION</b>	
9197-P	Iso-Prep Guard Holder
9197-20	Iso-Prep Guard Cartridge, 21.2 mm x 1 cm, 1 Frit
8056	Iso-Prep Guard, 21.2 mm Frit
9197-S	Iso-Prep Guard Finishing Tool
<b>SEMI-PREP GUARD COLUMN</b>	
<b>10 mm ID x 1 cm</b>	
C-1000	Semi-Prep Cartridge Guard Column Holder
C-1033	Dry Packing Funnel
C-1035	Semi-Prep Cartridge
<b>REPLACEABLE CARTRIDGE GUARD COLUMN FRIT CAPS</b>	
C-1030	Threaded Frit Cap with 2 µm Stainless Steel Frit
C-1031	Threaded Frit Cap with 2 µm Titanium Frit



## 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.

## Application Note

### Why Use A Guard Column?

A guard column can increase the life of your analytical column up to five-fold<sup>1</sup>. 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.

<sup>1</sup>Uwe D. Neue, HPLC Troubleshooting – Column Durability, American Laboratory, 1999; 22:44-7

## Note

Packing material specifications: the cartridges on this page are packed with 5 µm or 10 µm base-deactivated 80 Å spherical silica.



**Top Seller** SEE STARRED PRODUCTS

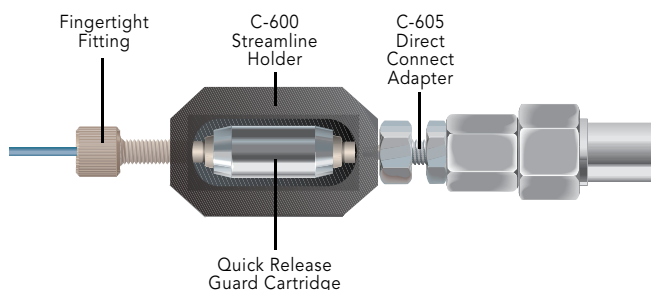
## Quick Release™ Cartridge Guard Column System

- ▶ Changing guard column cartridges was never this easy
- ▶ 100% biocompatible flow path
- ▶ Pressure rated to 6,000 psi (414 bar)

The simple design of the patented Quick Release Guard Cartridges and Streamline Cartridge Holder makes installing and changing guard columns quick and easy. Simply thread one end of the Direct Connect Adapter (included) into the end of your column and the other end into the C-600 Cartridge Holder. Insert a Quick Release Guard Cartridge into the holder. Then use the supplied F-130 Fingertight Fitting with your 1/16" OD tubing to create a Zero Dead Volume (ZDV) connection.



All hardware in contact with the mobile phase is constructed of 100% biocompatible PEEK polymer including the frits.



### 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

**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

#### QUICK RELEASE/STREAMLINE CARTRIDGE HOLDER, BIOCOMPATIBLE

**C-600** Streamline Cartridge Holder comes complete with (2) F-130 and (1) C-605

**C-600W** Waters®-compatible Streamline Cartridge Holder comes complete with (2) F-130 and (1) C-605W

#### QUICK RELEASE/STREAMLINE REPLACEMENT PARTS

**C-605** Direct Connect Column Adapter

**C-605W** Direct Connect Column Adapter, Waters-compatible

**F-130x** Long One-Piece PEEK Fingertight Nuts 10-pk

#### QUICK RELEASE GUARD CARTRIDGES, BIOCOMPATIBLE

##### 4.6 mm ID x 1 cm, 5 µm

**C-620** Reversed Phase C18 3-pk

##### 3.0 mm ID x 1 cm, 5 µm

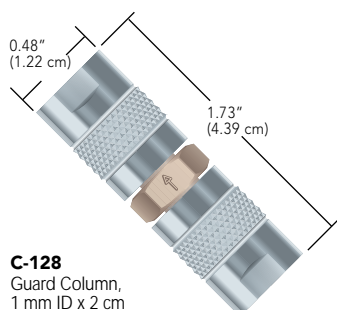
**C-623** Reversed Phase C18 3-pk

## 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).

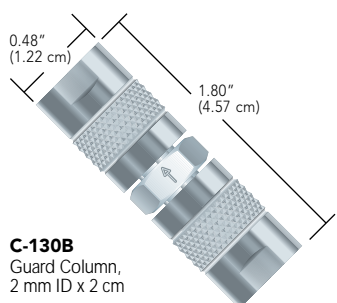


## Analytical Guard Columns

- 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.



## Analytical Guard Column Kits

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.



## 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.

## Application Note

### Signs your Guard Column Needs to be Changed

- System pressure build-up
- Faster than usual retention times
- Reduced resolution

Part No.	Description	Includes
<b>MICROBORE GUARD COLUMNS</b>		
<b>1.0 mm ID x 2 cm Unpacked</b>		
<b>C-128</b>	Guard Column	(2) C-128-31
<b>C-128-20</b>	Packing Funnel	
<b>C-128-31</b>	0.5 µm Stainless Steel Replacement Frit	
<b>C-408</b>	2 µm Stainless Steel Replacement Frit	
<b>C-128-40</b>	Slurry Packing Adapter	
<b>C-128-50</b>	Guard Column Kit	(2) C-128, (1) C-128-20, (10) C-128-31
<b>ANALYTICAL GUARD COLUMNS</b>		
<b>2.0 mm ID x 2 cm Unpacked</b>		
<b>C-130B</b>	Guard Column	(2) A-100
<b>C-130-20</b>	Packing Funnel	
<b>A-100</b>	2 µm Stainless Steel Replacement Frit	
<b>A-103</b>	0.5 µm Stainless Steel Replacement Frit	
<b>C-130-40</b>	Slurry Packing Adapter	
<b>C-135B</b>	Guard Column Kit	(2) C-130B, (1) C-130-20, (10) A-100
<b>1602</b>	Guard Column Kit with Reversed Phase C18	(2) C-130B, (1) C-130-20, (10) A-100, 3 g C18 packing material
<b>PACKING MATERIAL</b>		
Part No.	Particle Size	Qty.
<b>C-603</b>	Reversed Phase C18, 30–40 µm pellicular	3 g

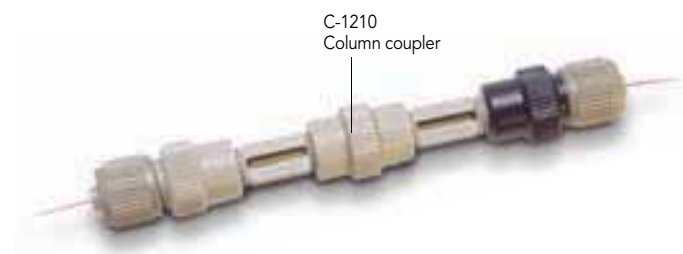
## Capillary Sample Trap Columns

- ▶ 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.

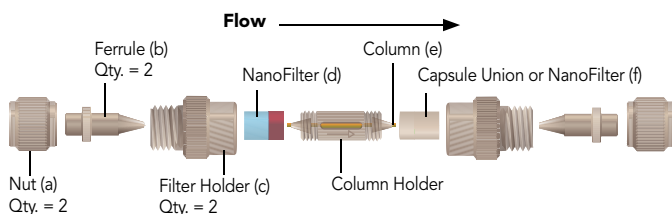
Capillary Sample Trap Column Assemblies include one or more 1 µm NanoFilter™ Capsules, each containing either a stainless steel (SST) or biocompatible titanium (Ti) frit. The swept volume of these unique filters is only 10 nL each. Connect your 360 µm OD capillary tubing directly to our Sample Trap Column 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.*



## 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-1400	P-416G	F-152	Black	M-126 (Ti)	C-1450 (SCX)	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 165 for NanoFilter Capsule color coding. Abbreviation Key: SST = stainless steel; Ti = titanium; SCX = Strong Cation Exchange



## Note

- ▶ 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 65



## Top Seller SEE STARRED PRODUCTS

Part No.	Description	Frit Material	Includes
<b>CAPILLARY SAMPLE TRAP COLUMNS</b>			
<b>Assemblies</b>			
<b>C-1200</b>	C18 Column	SST	(1) 2-pk C-1250, (1) M-125, (2) P-416, (2) F-152, (1) M-124NF
<b>C-1300</b>	C18 Column	Ti	(1) 2-pk C-1250, (1) M-126, (2) P-416BLK, (2) F-152, (1) M-124NF
<b>C-1400</b>	Strong Cation Exchange (SCX) Column	Ti	(1) 2-pk C-1450, (1) M-126, (2) P-416G, (2) F-152, (1) M-124NF
<b>C-1500</b>	Unpacked Column	SST	(1) FS-1000-25, (2) M-125, (2) P-416, (2) F-152
★ <b>C-1600</b>	Unpacked Column	Ti	(1) FS-1000-25, (2) M-126, (2) P-416BLK, (2) F-152

## Column Coupler and Replacement Parts

Part No.	Description	Swept Volume	Qty.
<b>C-1210</b>	Column Coupler, PEEK	—	ea.
<b>C-1250</b>	C18 Columns, 100 µm ID x 2.5 cm x 360 µm OD	—	2-pk
<b>C-1450</b>	Strong Cation Exchange (SCX) Columns 100 µm ID x 2.5 cm x 360 µm OD	—	2-pk
★ <b>F-152</b>	MicroFerrule for 360 µm OD tubing, PEEK	—	ea.
<b>FS-1000-25</b>	Unpacked Column, 100 µm ID x 2.5 cm x 360 µm OD	—	ea.
<b>M-124NF</b>	Capsule Union, no Frit, PEEK	9.5 nL	ea.
<b>M-125</b>	1 µm NanoFilter Capsules, with SST Frits	10 nL	2-pk
★ <b>M-126</b>	1 µm NanoFilter Capsules, with Ti Frits	10 nL	2-pk
★ <b>P-416</b>	Female Nut, Natural PEEK	—	ea.
★ <b>P-416BLK</b>	Female Nut, Black PEEK	—	ea.
<b>P-416G</b>	Female Nut, Green PEEK	—	ea.

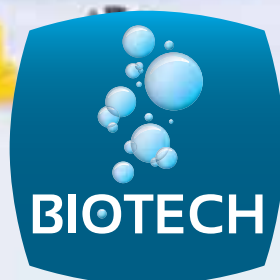
# Connectors



Testing Upchurch Scientific® VHP unions in Oak Harbor, WA.

**NEW!**

Eliminate tubing twist!  
The new Swivel Barb  
Adapters won't twist  
peristaltic tubing as you  
tighten the adapter into  
a threaded port. See  
page 58 for details!





## Connectors Reference

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"	1.8–2 mm, 2.5 mm, 3 mm	1/8"	4 mm, 3/16"	1/4"	5/16"
<b>CAPILLARY (&lt;1/32" OD)</b>	P-720 + MTSlv or P-882 or P-772 or P-779 + (2) NTSlv  Pages: 39, 19, 53, 39, 38, 19	P-779 + (2) NTSlv  Pages: 38, 19	P-779 + (2) NTSlv  Pages: 38, 19	P-779 + NTSlv  Pages: 38, 19	P-627-01 + NTSys + MFF + XP-335 <sup>1</sup>  Pages: 49, 19, 27, 26	P-627 + NTSys + XP-335 <sup>1</sup>  Pages: 49, 19, 26	P-135 + P-259 + NTSys + LT-115 <sup>2</sup> + LBFF + XP-132  Pages: 49, 22, 61, 17, 22, 153, 27, 30, 30	U-665 + P-259 + NTSlv + LT-115 <sup>2</sup>  Pages: 49, 22, 61, 19, 22, 153	U-665-01 + XU-662 + P-259 + NTSlv + LT-115 <sup>2</sup>  Pages: 49, 30, 22, 61, 19, 22, 153
<b>1/32"</b>	P-779 + (2) NTSlv  Pages: 38, 19	P-771  Page: 39	P-779 + F-247 + F-252  Pages: 38, 19, 19, 27	P-881  Page: 53	P-702-01 + P-248 + LT-115 <sup>2</sup> + MFF + XP-335 <sup>1</sup>  Pages: 40, 22, 22, 153, 27, 26	P-702-01 + P-248 + LT-115 <sup>2</sup> + XP-335 <sup>1</sup>  Pages: 40, 22, 22, 22, 153, 26	P-135 + P-248 + LT-115 <sup>2</sup> + LBFF + XP-132  Pages: 49, 22, 22, 153, 37, 30, 30	U-665 + P-248 + LT-115 <sup>2</sup>  Pages: 49, 22, 22, 153	U-665-01 + XU-662 + P-248 + LT-115 <sup>2</sup>  Pages: 49, 30, 22, 22, 153
<b>1 mm</b>	P-779 + (2) NTSlv  Pages: 38, 19	P-779 + F-247 + F-252  Pages: 38, 19, 19, 27	P-702-01 + (2) XP-235 <sup>3</sup> + (2) F-252  Pages: 40, 25, 19, 27	P-702 + F-252  Pages: 40, 19, 27	P-622 + P-200 + F-252 + P-247 + MFF + P-347  Pages: 40, 24, 25, 19, 27, 27, 27, 27	P-702 + F-252 + XP-335 <sup>1</sup>  Pages: 40, 19, 27, 26	P-135 + XP-235 <sup>3</sup> + F-252 + LBFF + XP-132  Pages: 49, 25, 19, 27, 30, 30	U-665 + XP-235 <sup>3</sup> + F-252  Pages: 49, 25, 19, 27	U-665-01 + XU-662 + XP-235 <sup>3</sup> + F-252  Pages: 49, 30, 25, 19, 27
<b>1/16"</b>	P-779 + NTSlv  Pages: 38, 19	P-881  Page: 53	P-702 + F-252  Pages: 40, 19, 27	P-742 or P-702  Pages: 38, 40	P-622 + P-200 + P-247 + MFF + P-347  Pages: 40, 24, 25, 27, 27, 27	P-703 + XP-235 <sup>3</sup>  Pages: 40, 25	P-135 + XP-235 <sup>3</sup> + LBFF + XP-132  Pages: 49, 25, 27, 30, 30	U-665 + XP-235 <sup>3</sup>  Pages: 49, 25	U-665-01 + XU-662 + XP-235 <sup>3</sup>  Pages: 49, 30, 25
<b>1.8–2 mm, 2.5 mm, 3 mm</b>	P-627-01 + NTSys + MFF + XP-335 <sup>1</sup>  Pages: 49, 17, 27, 26	P-702-01 + P-248 + LT-115 <sup>2</sup> + MFF + XP-335 <sup>1</sup>  Pages: 40, 22, 22, 153, 27, 26	P-622 + P-200 + F-252 + P-247 + MFF + P-347  Pages: 40, 25, 19, 27, 27, 27	P-622 + P-200 + P-247 + MFF + P-347  Pages: 40, 25, 27, 27, 27	P-622 + (2) MFF + (2) P-347  Pages: 40, 27, 27	P-622 + MFF + P-300 + (2) P-347  Pages: 40, 27, 26, 27	P-135 + MFF + P-355 + LBFF + XP-132  Pages: 49, 27, 23, 27, 30, 30	U-665 + MFF + XP-335 <sup>1</sup>  Pages: 49, 27, 26	U-665-01 + XU-662 + MFF + XP-335 <sup>1</sup>  Pages: 49, 30, 27, 26
<b>1/8"</b>	P-627 + NTSys + XP-335 <sup>1</sup>  Pages: 49, 17, 26	P-702-01 + P-248 + LT-115 <sup>2</sup> + XP-335 <sup>1</sup>  Pages: 40, 22, 22, 153, 26	P-702 + F-252 + XP-335 <sup>1</sup>  Pages: 40, 19, 27, 26	P-703 + XP-235 <sup>3</sup>  Pages: 40, 25	P-622 + MFF + P-300 + (2) P-347  Pages: 40, 27, 26, 27	P-703  Page: 40	P-135 + XP-335 <sup>1</sup> + LBFF + XP-132  Pages: 49, 26, 27, 30, 30	U-665 + XP-335 <sup>1</sup>  Pages: 49, 26	U-665-01 + XU-662 + XP-335 <sup>1</sup>  Pages: 49, 30, 26
<b>4 mm, 3/16"</b>	P-135 + P-259 + NTSys + LT-115 <sup>2</sup> + LBFF + XP-132  Pages: 49, 22, 61, 17, 22, 153, 30	P-135 + P-248 + LT-115 <sup>2</sup> + LBFF + XP-132  Pages: 49, 22, 22, 153, 27, 30, 30	P-135 + XP-235 <sup>3</sup> + F-252 + LBFF + XP-132  Pages: 49, 25, 19, 27, 27, 30, 30	P-135 + XP-235 <sup>3</sup> + LBFF + XP-132  Pages: 49, 25, 27, 30, 30	P-135 + MFF + XP-335 <sup>1</sup> + LBFF + XP-132  Pages: 49, 27, 26, 27, 30, 30	P-135 + XP-335 <sup>1</sup> + LBFF + XP-132  Pages: 49, 26, 27, 30, 30	P-134 + (2) LBFF + (2) XP-132  Pages: 41, 27, 30, 30	U-659 + LBFF + XP-132  Pages: 49, 27, 30, 20	U-659-01 + XU-662 + LBFF + XP-132  Pages: 49, 30, 27, 30, 30
<b>1/4"</b>	U-665 + P-259 + NTSlv + LT-115 <sup>2</sup>  Pages: 49, 22, 61, 19, 22, 153	U-665 + P-248 + LT-115 <sup>2</sup>  Pages: 49, 22, 22, 153	U-665 + XP-235 <sup>3</sup> + F-252  Pages: 49, 25, 19, 27	U-665 + XP-235 <sup>3</sup>  Pages: 49, 25	U-665 + MFF + XP-335 <sup>1</sup>  Pages: 49, 27, 26	U-665 + XP-335 <sup>1</sup>  Pages: 49, 26	U-659 + LBFF + XP-132  Pages: 49, 27, 30, 30	U-658  Page: 41	U-658 + XU-662  Pages: 41, 30
<b>5/16"</b>	U-665-01 + XU-662 + P-259 + NTSlv + LT-115 <sup>2</sup>  Pages: 49, 30, 22, 61, 19, 22, 153	U-665-01 + XU-662 + P-248 + LT-115 <sup>2</sup>  Pages: 49, 30, 22, 22, 153	U-665-01 + XU-662 + XP-235 <sup>3</sup> + F-252  Pages: 49, 30, 25, 19, 27	U-665-01 + XU-662 + XP-235 <sup>3</sup>  Pages: 49, 30, 25	U-665-01 + XU-662 + MFF + XP-335 <sup>1</sup>  Pages: 49, 30, 27, 26	U-665-01 + XU-662 + XP-335 <sup>1</sup>  Pages: 49, 30, 26	U-659-01 + XU-662 + LBFF + XP-132  Pages: 49, 30, 27, 30, 30	U-658 + XU-662  Pages: 41, 30	U-664  Page: 41

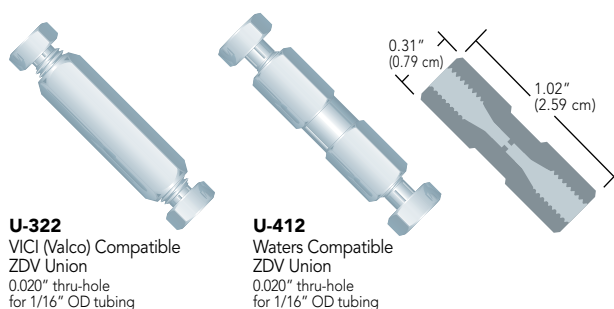
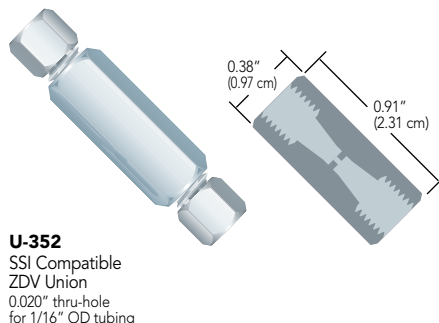
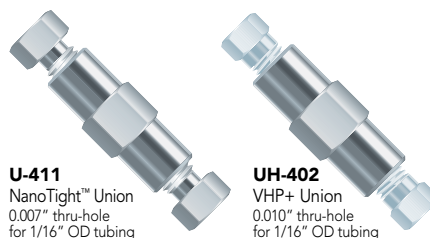
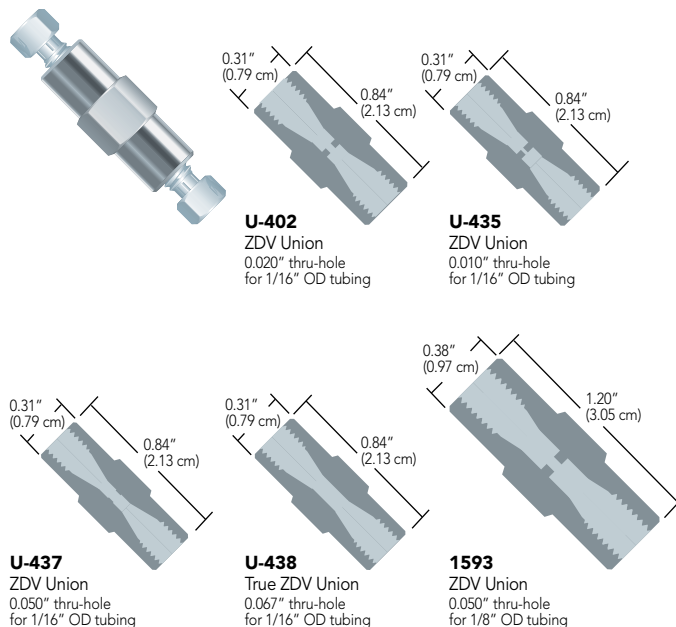
MTSlv MicroTight® Sleeves. Select the appropriate MicroTight Sleeve(s) for your tubing OD size.  
 NTSys NanoTight™ System. Select the appropriate NanoTight Sleeve(s) for your tubing OD size, and NanoTight fitting(s).  
 NTSlv Select the appropriate NanoTight Sleeves for your tubing OD size.  
 MFF Select the appropriate Metric Flangeless Ferrule(s) for your tubing OD size.  
 Choose from P-342, P-343 and P-353.  
 LBFF Select from the following Large-Bore Flangeless Ferrules: P-133 (3/16" OD) or P-139 (4.0 mm OD).

-01 Denotes a union or adapter without fittings.  
 1 While XP-335 is listed, any of our Flangeless Fittings for 1/8" OD tubing from page 26 will work in this application.  
 2 While LT-115 is listed, any 1/4-28 Super Flangeless™ Nut for 1/16" OD tubing from page 22 will work in this application.  
 3 While XP-235 is listed, any 1/4-28 Flangeless Fitting for 1/16" OD tubing from page 25 will work in this application.

## 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.



### 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.



**Top Seller** SEE STARRED PRODUCTS

Part No.	Description	Threads	Includes	Thru-hole	Swept Volume	Pressure Rating
<b>VHP STAINLESS STEEL ZDV UNIONS</b>						
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-437	Stainless Steel Union for 1/16" OD Tubing	10-32 Coned	(2) U-400/U-401	0.050" (1.25 mm)	0.84 µL	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" (0.25mm)	20 nL	30,000 psi (2,070 bar)
<b>SSI COMPATIBLE ZDV UNION</b>						
U-352	Stainless Steel Union for 1/16" OD Tubing	1/4-28 Coned	(2) U-350/U-351	0.020" (0.50 mm)	0.18 µL	20,000 psi (1,380 bar)
<b>VICI® (VALCO) COMPATIBLE ZDV UNION</b>						
★ 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)
<b>WATERS® COMPATIBLE ZDV UNION</b>						
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)

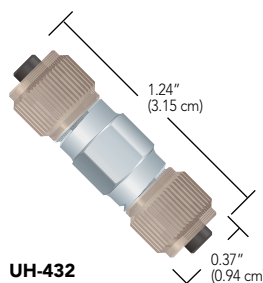
## VHP Unions for Capillary Tubing

- ▶ 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

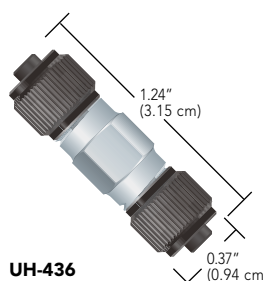
Upchurch Scientific® has expanded its line of specialized fittings and connectors for UHPLC applications to include several innovative unions and adapters.

Two of these products — the UH-432 and UH-436 — follow the design of our popular Mini MicroFilters (see page 165) 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.)

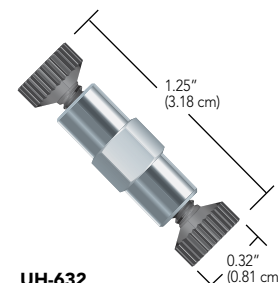
The UH-632 is a more traditionally designed connector, incorporating internally threaded ports. The union (UH-632) features a true ZDV (zero dead volume) connection between both tubes. This unique product is coupled with our one-piece Ultra-High Performance Fingertight fittings manufactured from our 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)!



**UH-432**  
UHP MicroTight® Union  
for 1/32" OD tubing  
with fittings and capsule union included



**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

## Related Products

- ▶ Find replacement VHP fittings on page 9
- ▶ Find Fused Silica tubing on page 65
- ▶ Find 1/32" OD Stainless Steel tubing on page 68 – 69
- ▶ To achieve 15,000 psi (1,034 bar) with these fittings, use the P-278 extender tool found on page 8

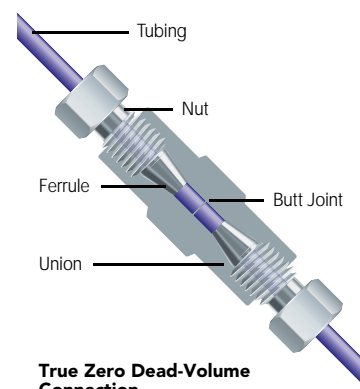
Order Online  [WWW.IDEX-HS.COM](http://WWW.IDEX-HS.COM)

## 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.

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.



**True Zero Dead-Volume Connection**

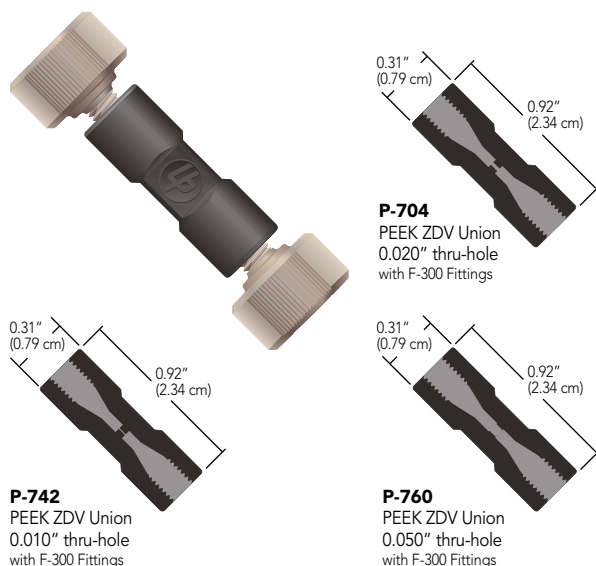


**Top Seller** SEE STARRED PRODUCTS

Part No.	Description	Threads	Includes	Thru-hole	Swept Volume	Pressure Rating
<b>VHP UNIONS FOR CAPILLARY TUBING</b>						
★ UH-432	MicroTight 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	MicroTight 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	MicroTight 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)

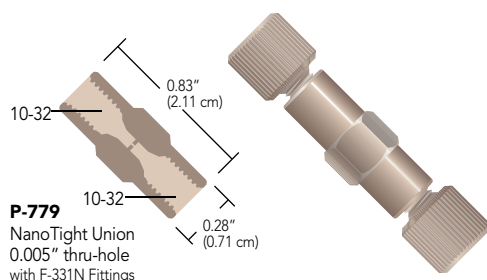
## PEEK™ ZDV Unions

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).



## NanoTight™ Unions

Upchurch Scientific NanoTight Union improves capillary tubing connections in several ways. The internal design of the unions 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.

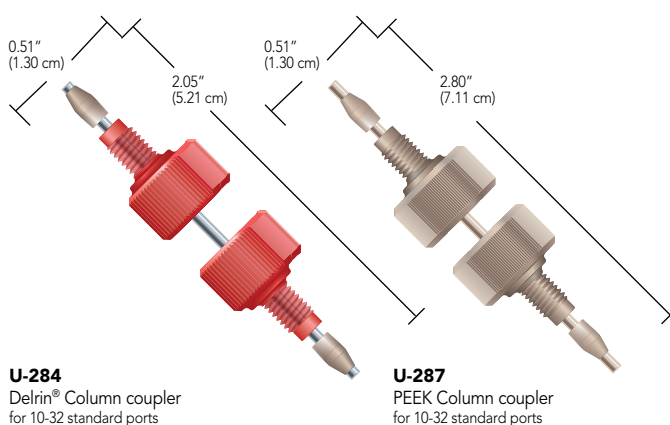
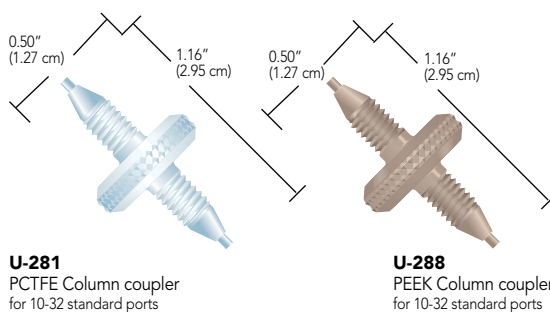


## Column Couplers

### ► Low swept-volume connections

These universal column couplers permit a low swept-volume connection, with minimal loss in column efficiency. These couplers will connect most columns with 10-32 internal threads to a precolumn filter or guard column with the same threads. They may also be used to join two columns in series.

Upchurch Scientific manufactures two styles of column couplers. One version is a single piece that makes coupling columns to guard columns or precolumn filters easy and hassle-free. We also offer our traditional couplers that consist of two Fingertight fittings and a short length of 1/16" OD tubing—an excellent option for reducing overall flow path volume while coupling two devices together reliably.



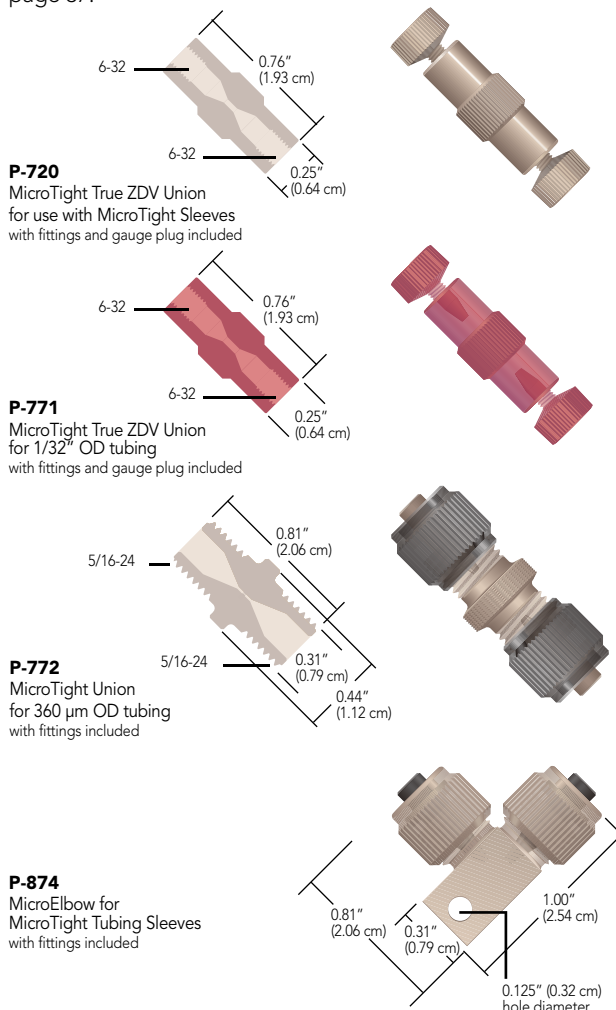
**Top Seller** SEE STARRED PRODUCTS

Part No.	Description	Threads	Includes	Thru-hole	Swept Volume	Pressure Rating
<b>PEEK ZDV UNIONS</b>						
★ <b>P-704</b>	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)
★ <b>P-742</b>	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)
★ <b>P-760</b>	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)
<b>NANOTIGHT UNION</b>						
★ <b>P-779</b>	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)
<b>COLUMN COUPLERS</b>						
★ <b>U-281</b>	PCTFE Column Coupler	10-32 Coned	N/A	0.020" (0.50 mm)	6.0 µL	4,000 psi (276 bar)
<b>U-283</b>	PCTFE Column Coupler with 0.007" ID Stainless Steel Tubing	10-32 Coned	(2) F-100	0.007" (0.17 mm)	1.3 µL	4,000 psi (276 bar)
<b>U-284</b>	Delrin Column Coupler with 0.007" ID Stainless Steel Tubing	10-32 Coned	(2) F-200	0.007" (0.17 mm)	1.3 µL	5,000 psi (345 bar)
<b>U-287</b>	PEEK Column Coupler with 0.010" ID PEEK Tubing	10-32 Coned	(2) F-300	0.010" (0.25 mm)	3.6 µL	5,000 psi (345 bar)
<b>U-288</b>	PEEK Column Coupler	10-32 Coned	N/A	0.022" (0.56 mm)	7.2 µL	5,000 psi (345 bar)



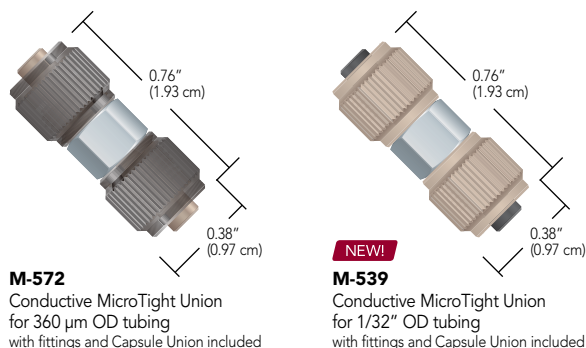
## MicroTight® Connectors for Capillary Tubing

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.



## Conductive MicroTight Unions

The Upchurch Scientific Conductive MicroTight Unions 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 or 5 nL, these unions can be placed inline with 360 µm or 1/32" OD capillary tubing. Mount and apply voltage to these unions using our Insulating Mounting Bracket below.



## Insulating Mounting Bracket

Use our Insulating Mounting Bracket to easily integrate the Conductive Mini MicroFilters shown above into your system or lab.

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.



Insulating Mounting Bracket, shown with lead wire and Conductive MicroTight Union, not included.

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



**Top Seller** SEE STARRED PRODUCTS

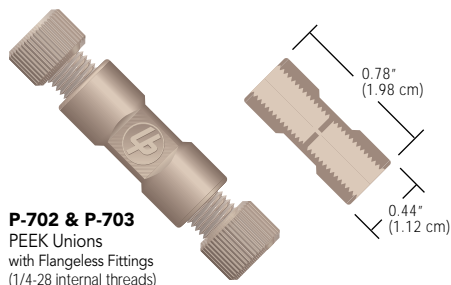
Part No.	Description	Threads	Includes	Thru-hole	Swept Volume	Pressure Rating
<b>MICROTIGHT UNIONS</b>						
★ P-720	PEEK True ZDV Union for MicroTight Sleeves	6-32 Coned	(2) F-125, (1) P-553	N/A	N/A	4,000 psi (276 bar)
★ P-771	PEEK True ZDV Union for 1/32" OD Tubing	6-32 Coned	(2) F-126S, (1) P-553	N/A	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)
<b>REPLACEMENT GAUGE PLUGS (TO ACHIEVE TRUE ZDV CONNECTIONS WITH OUR P-720 AND P-771 UNIONS)</b>						
P-553	Gauge Plug, Delrin®	6-32 Coned	N/A	N/A	N/A	N/A
<b>CONDUCTIVE MICROTIGHT UNIONS</b>						
NEW! M-539	Conductive Union for 1/32" OD tubing, PEEK/SST	5/16-24 Coned	(2) F-112, (2) P-416, (1) M-138NF	0.006" (0.150 mm)	5nL	5,000 psi (345 bar)
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)
<b>INSULATING MOUNTING BRACKET</b>						
M-447	Insulating Mounting Bracket	N/A	N/A	N/A	N/A	N/A

## Low Pressure Unions

- ▶ Manufactured from PEEK™, ETFE, Delrin®, polypropylene or PCTFE
- ▶ Available with 1/4-28, M6 or 10-32 flat-bottom threads

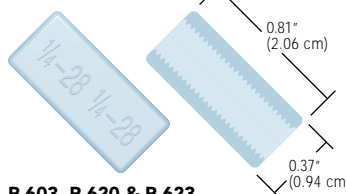
Upchurch Scientific® Low Pressure Unions are available in a variety of polymers, providing several low-cost and chemically-resistant options. The union assemblies below include fittings as shown in the table. The unions in the right column do not include fittings, allowing for customizing the fitting 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 27 they can be used with the P-603 union to connect the two different tubing sizes.

### Low Pressure PEEK Union Assemblies



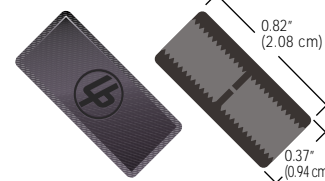
**P-702 & P-703**  
PEEK Unions  
with Flangeless Fittings  
(1/4-28 internal threads)

### Low Pressure Standard Unions



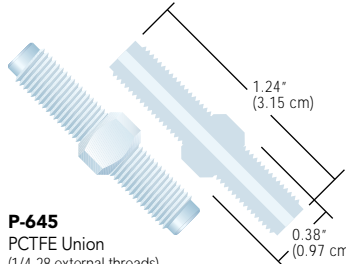
**P-603, P-620 & P-623**  
Standard Unions  
(1/4-28 internal threads)

### Low Pressure Metric Unions



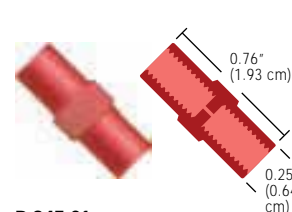
**P-602 & P-622**  
Metric Unions  
(M6 internal threads)

### Low Pressure Male Union



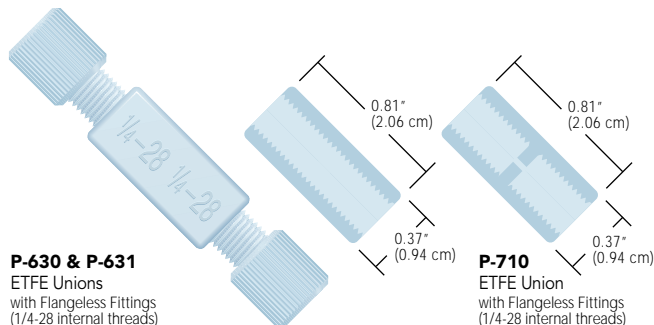
**P-645**  
PCTFE Union  
(1/4-28 external threads)

### VacuTight™ Union



**P-845-01**  
PEEK Union  
(10-32 internal threads)

### 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)

## 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.



**Top Seller** SEE STARRED PRODUCTS

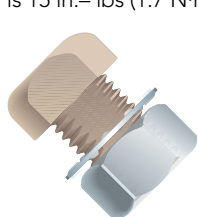
Part No.	Description	Color	Threads	Includes	Thru-hole	Swept Volume	Pressure Rating
<b>PEEK UNION ASSEMBLIES</b>							
★ P-702	PEEK Union for 1/16" OD Tubing	Natural	1/4-28 FB	(2) XP-235	0.020" (0.50 mm)	0.41 µL	1,000 psi (69 bar)
★ P-703	PEEK Union for 1/8" OD Tubing	Natural	1/4-28 FB	(2) XP-335	0.050" (1.25 mm)	2.57 µL	1,000 psi (69 bar)
<b>ETFE UNION ASSEMBLIES</b>							
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)
<b>STANDARD UNIONS</b>							
★ 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*
<b>METRIC UNIONS</b>							
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*
<b>MALE UNION</b>							
★ P-645	PCTFE Male Union	Natural	1/4-28 FB	N/A	0.062" (1.60 mm)	61.3 µL	500 psi (34 bar)
<b>VACUTIGHT UNION</b>							
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

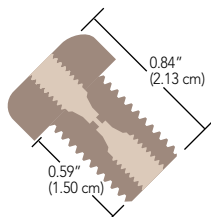
## Bulkhead Unions

- Designed for plumbing tubing through equipment housing
- For use with standard 10-32 coned, 1/4-28 or M6 flat-bottom threaded fittings

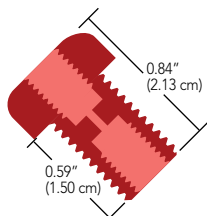
Thread Upchurch Scientific® PEEK™ Bulkhead Unions directly through your equipment housing to connect internal tubing to the outside. Each union has unique 3/8-24 external threads and comes complete with a stainless steel nut and lock washer to hold it in place. Requires a 3/8" hole to mount. The recommended torque limit for these unions is 15 in.-lbs (1.7 N-m).



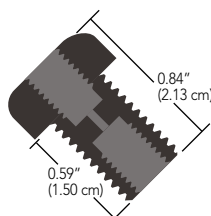
**Bulkhead Union**  
includes stainless steel nut/lock washer



**P-440**  
10-32 internal threads



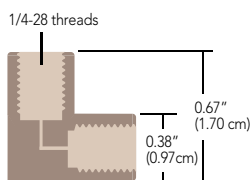
**P-441**  
1/4-28 internal threads



**P-442**  
M6 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" (1.60 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



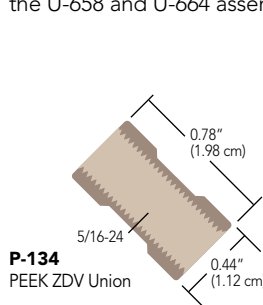
**Top Seller** SEE STARRED PRODUCTS



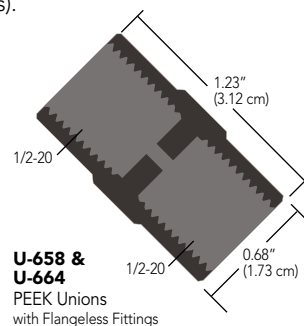
## Large Bore Unions

- 5/16-24 and 1/2-20 flat-bottom threads

Use any of the 5/16-24 fittings on page 56 and the appropriate ferrule to create a true zero dead volume (ZDV) connection with the P-134 Union. Our U-658 and U-664 Unions are designed to be used with our standard 1/2-20 flat-bottom threaded nuts and ferrules (included with the U-658 and U-664 assemblies).



**P-134**  
PEEK ZDV Union



**U-658 & U-664**  
PEEK Unions  
with Flangeless Fittings

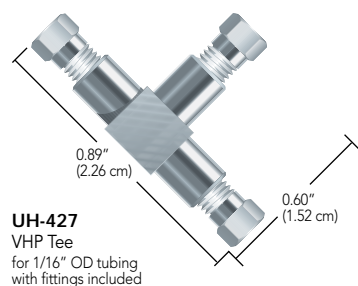
## Related Products

- 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.

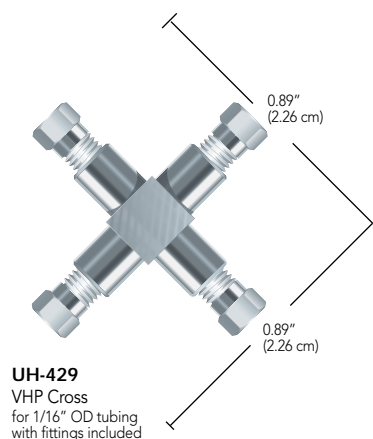
Part No.	Description	Threads	Color	Includes	Thru-hole	Swept Volume
<b>BULKHEAD UNIONS</b>						
★ <b>P-440</b>	PEEK Bulkhead Union	10-32 Coned	Natural	(1) SST Nut/Washer	0.020" (0.50 mm)	1.9 µL
★ <b>P-441</b>	PEEK Bulkhead Union	1/4-28 Flat-Bottom	Red	(1) SST Nut/Washer	0.040" (1.00 mm)	2.9 µL
★ <b>P-441N</b>	PEEK Bulkhead Union	1/4-28 Flat-Bottom	Natural	(1) SST Nut/Washer	0.040" (1.00 mm)	2.9 µL
<b>P-442</b>	PEEK Bulkhead Union	M6 Flat-Bottom	Black	(1) SST Nut/Washer	0.040" (1.00 mm)	2.9 µL
<b>ELBOW CONNECTORS</b>						
<b>P-430</b>	PEEK Elbow for 1/16" OD Tubing	1/4-28 Flat-Bottom	Natural	(2) XP-235	0.020" (0.50 mm)	1.4 µL
<b>P-432</b>	PEEK Elbow for 1/8" OD Tubing	1/4-28 Flat-Bottom	Natural	(2) XP-335	0.062" (1.60 mm)	13.6 µL
<b>LARGE BORE UNIONS</b>						
<b>P-134</b>	PEEK True ZDV Union	5/16-24 Flat-Bottom	Natural	N/A	N/A	N/A
<b>U-658</b>	PEEK Union for 1/4" OD Tubing	1/2-20 Flat-Bottom	Black	N/A	0.188" (4.80 mm)	57 µL
<b>U-664</b>	PEEK Union for 5/16" OD Tubing	1/2-20 Flat-Bottom	Black	N/A	0.188" (4.80 mm)	57 µL

## VHP Tees & Crosses for 1/16" OD Tubing

IDEX Health & Science offers Very High Pressure Connectors, designed to bring three or four pieces of tubing together. The all-316 stainless steel connectors are designed for 1/16" OD tubing, and are pressure rated to 30,000 psi (2,070 bar).



**UH-427**  
VHP Tee  
for 1/16" OD tubing  
with fittings included



**UH-429**  
VHP Cross  
for 1/16" OD tubing  
with fittings included

## Application Note

### Why 1/32" OD Tubing and 360 µm OD Tubing?

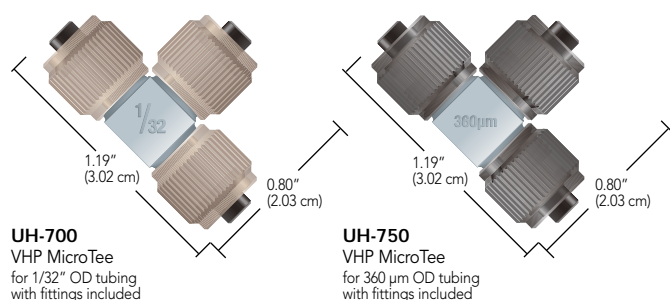
IDEX Health & Science has focused strongly on the development of a variety of connectors and accessories for 1/32" OD tubing and 360 µm OD tubing. We have focused on these specific sizes due to their overwhelming popularity in analytical instruments, especially where micro and nano-scale analyses are 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.

## 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)

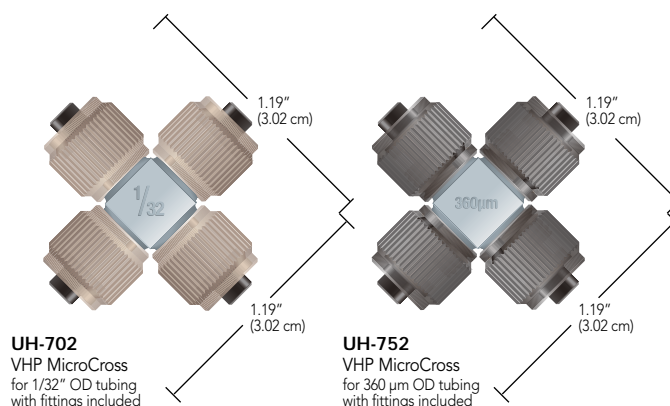
To help facilitate multi-port connections in UHPLC applications, Upchurch Scientific® has developed a line of MicroTees and MicroCrosses, manufactured from stainless steel and featuring small thru-holes and very low internal volume. Additionally, the stainless steel construction allows these products 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-702**  
VHP MicroCross  
for 1/32" OD tubing  
with fittings included

**UH-752**  
VHP MicroCross  
for 360 µm OD tubing  
with fittings included



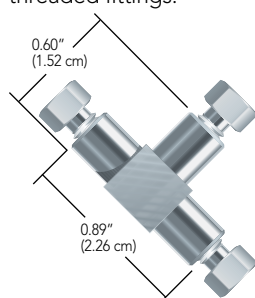
**Top Seller** SEE STARRED PRODUCTS

Part No.	Description	Threads	Includes	Thru-hole	Swept Volume	Pressure Rating
<b>STAINLESS STEEL UNIONS, TEES, CROSSES</b>						
<b>UH-427</b>	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)
<b>UH-429</b>	VHP Cross for 1/16" OD Tubing, SST	10-32 Coned	(4) VHP-200	0.020" (0.50 mm)	0.72 µL	30,000 psi (2,070 bar)
<b>VHP TEES &amp; CROSSES FOR CAPILLARY TUBING</b>						
★ <b>UH-700</b>	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)
<b>UH-702</b>	VHP MicroCross for 1/32" OD Tubing, PEEK/SST	5/16-24 Coned	(4) PK-112, (4) P-416	0.010" (0.25 mm)	101 nL	15,000 psi (1,034 bar)
<b>UH-750</b>	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)
<b>UH-752</b>	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)

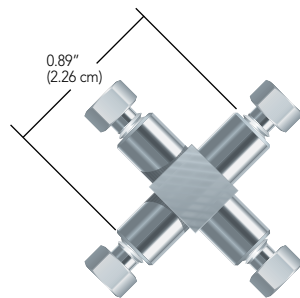


### Stainless Steel Tees & Crosses

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.



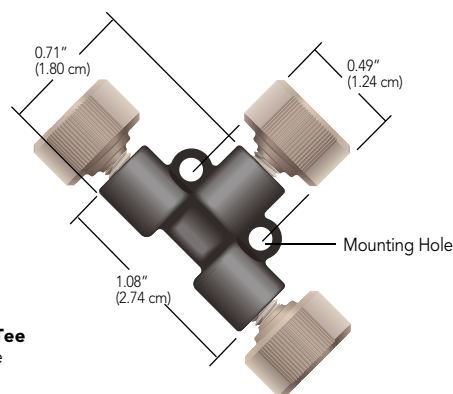
**U-428 Stainless Steel Tee**  
0.020" thru-hole  
with U-400 and U-401 Fittings



**U-430 Stainless Steel Cross**  
0.020" thru-hole  
with U-400 and U-401 Fittings

### PEEK Tees & Crosses

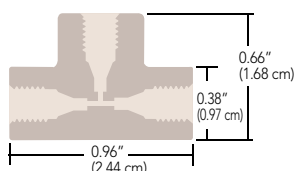
Our PEEK Tees and Crosses include high pressure F-300 PEEK Fingertight Fittings — allowing maximum operating pressures to 3,500 psi (241 bar) when used with 1/16" OD PEEK or stainless steel tubing.



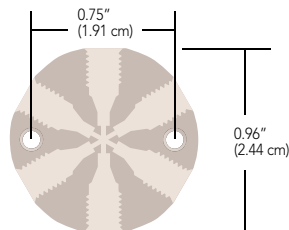
**P-727 PEEK Tee**  
0.020" thru-hole  
with F-300 Fittings

### 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 plugs on page 32.

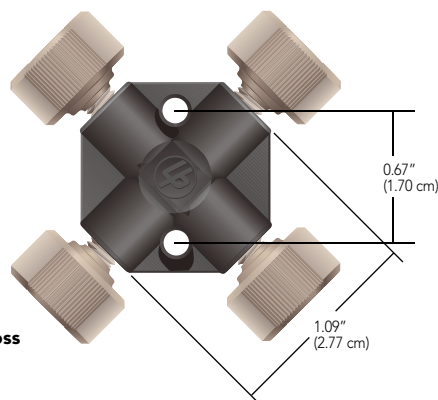


Side View



Top View

**P-170**  
PEEK 7-Port Manifold  
0.020" thru-holes  
with F-331 Fittings



**P-729 PEEK Cross**  
0.020" thru-hole  
with F-300 Fittings



**Top Seller** SEE STARRED PRODUCTS

**Order Online**  [WWW.IDEX-HS.COM](http://WWW.IDEX-HS.COM)

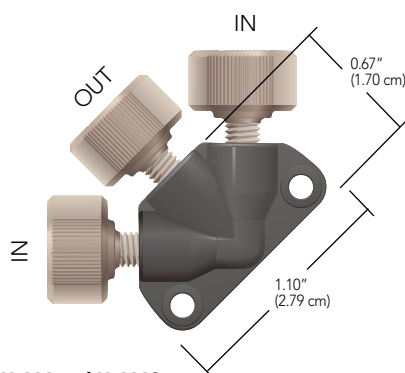
Part No.	Description	Threads	Includes	Thru-hole	Swept Volume	Pressure Rating
<b>STAINLESS STEEL TEES AND CROSSES</b>						
★ <b>U-428</b>	Stainless Steel Tee for 1/16" OD Tubing	10-32 Coned	(3) U-400, (3) U-401	0.020" (0.50 mm)	0.57 µL	20,000 psi (1,380 bar)
★ <b>U-429</b>	Stainless Steel Tee for 1/16" 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)
★ <b>U-430</b>	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)
★ <b>U-431</b>	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)
<b>PEEK MANIFOLD</b>						
<b>P-170</b>	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)
<b>PEEK TEES AND CROSSES</b>						
★ <b>P-727</b>	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)
<b>P-728</b>	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)
<b>P-729</b>	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)
<b>P-730</b>	PEEK Cross for 1/16" OD Tubing	10-32 Coned	(4) F-300	0.050" (1.25 mm)	3.5 µL	3,500 psi (241 bar)

## 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.

Please Note: Turbulent mixing of solvents often occurs as solvents mix. To maintain a bubble-free fluid pathway, we recommend solvent degassing when using this product (see the System Vacuum Degassing System on pages 177-178).



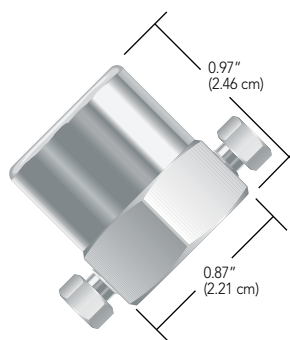
**U-466 and U-466S  
Static Mixing Tees**  
with F-300 Fingertight Fittings  
for 1/16" OD tubing

## Pressure Gauge Tee

- ▶ Complete with stainless steel fittings

Many HPLC systems have pumps that provide a digital readout of the inline system pressure. However, a number of systems do not, creating the need for a gauge along your 1/16" OD tubing pathway to monitor pressure. The Upchurch Scientific U-433 Pressure Gauge Tee is the solution. This Tee comes complete with 10-32 coned stainless steel fittings for 1/16" OD tubing and has an internal port suitable to connect to 1/4" pipe threads (NPT), standard to most gauges. Please Note: A pressure gauge is not included with this Tee; however, they are available from a number of laboratory supply companies.

Before installing your gauge into this Tee, simply wrap PTFE tape around the male threads of your pressure gauge four times. This will ensure a leak-free seal, even at standard HPLC operating pressures.



**U-433  
Pressure Gauge Tee**  
with U-400/U-401 Stainless Steel Fittings  
for 1/16" OD tubing

### Note

- ▶ 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.

### Related Products

- ▶ Our Micro Static Mixing Tee can be found on the next page. It is designed for microflow applications.



**Top Seller** SEE STARRED PRODUCTS

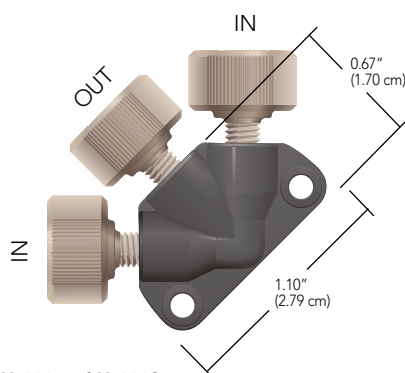
Part No.	Description	Threads	Includes	Thru-hole	Swept Volume	Pressure Rating
<b>STATIC MIXING TEE</b>						
★ U-466	PEEK Static Mixing Tee for 1/16" OD Tubing, 10 µm UHMWPE Frit	10-32 Coned	(3) F-300	0.020" (0.50 mm)	2.2 µL	5,000 psi (345 bar)
U-466S	PEEK Static Mixing Tee for 1/16" OD Tubing, 10 µm SST Frit	10-32 Coned	(3) F-300	0.020" (0.50 mm)	2.2 µL	5,000 psi (345 bar)
<b>PRESSURE GAUGE TEE</b>						
U-433	Stainless Steel Pressure Gauge Tee for 1/16" OD Tubing	10-32 Coned	(2) U-400, (2) U-401	0.040" (1.00 mm)	1.2 µL	10,000 psi (690 bar)

## 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.

*Please Note: Turbulent mixing of solvents often increases outgassing. To maintain a bubble-free fluid pathway, we recommend solvent degassing when using this product (see the Systec® Vacuum Degassing Systems on pages 177–178).*



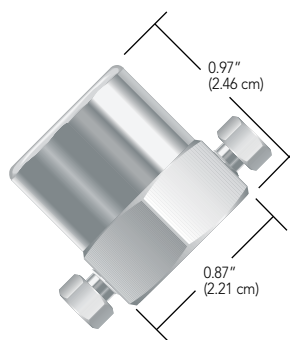
**U-466 and U-466S  
Static Mixing Tees**  
with F-300 Fingertight Fittings  
for 1/16" OD tubing

## Pressure Gauge Tee

- ▶ Complete with stainless steel fittings

Many HPLC systems have pumps that provide a digital readout of the inline system pressure. However, a number of systems do not, creating the need for a gauge along your 1/16" OD tubing pathway to monitor pressure. The Upchurch Scientific U-433 Pressure Gauge Tee is the solution. This Tee comes complete with 10-32 coned stainless steel fittings for 1/16" OD tubing and has an internal port suitable to connect to 1/4" pipe threads (NPT), standard to most gauges. *Please Note: A pressure gauge is not included with this Tee; however, they are available from a number of laboratory supply companies.*

Before installing your gauge into this Tee, simply wrap PTFE tape around the male threads of your pressure gauge four times. This will ensure a leak-free seal, even at standard HPLC operating pressures.



**U-433  
Pressure Gauge Tee**  
with U-400/U-401 Stainless Steel Fittings  
for 1/16" OD tubing

### Note

- ▶ 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.

### Related Products

- ▶ Our Micro Static Mixing Tee can be found on the next page. It is designed for microflow applications.



**Top Seller** SEE STARRED PRODUCTS

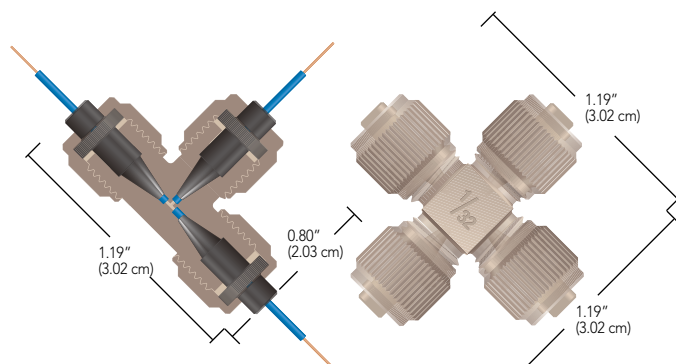
Part No.	Description	Threads	Includes	Thru-hole	Swept Volume	Pressure Rating
<b>STATIC MIXING TEE</b>						
★ U-466	PEEK Static Mixing Tee for 1/16" OD Tubing, 10 µm UHMWPE Frit	10-32 Coned	(3) F-300	0.020" (0.50 mm)	2.2 µL	5,000 psi (345 bar)
U-466S	PEEK Static Mixing Tee for 1/16" OD Tubing, 10 µm SST Frit	10-32 Coned	(3) F-300	0.020" (0.50 mm)	2.2 µL	5,000 psi (345 bar)
<b>PRESSURE GAUGE TEE</b>						
U-433	Stainless Steel Pressure Gauge Tee for 1/16" OD Tubing	10-32 Coned	(2) U-400, (2) U-401	0.040" (1.00 mm)	1.2 µL	10,000 psi (690 bar)

## MicroTee and Cross for Capillary Tubing

- ▶ Direct connect 1/16", 1/32", 360 µm OD tubing, plus other capillary tubing
- ▶ Low swept volume

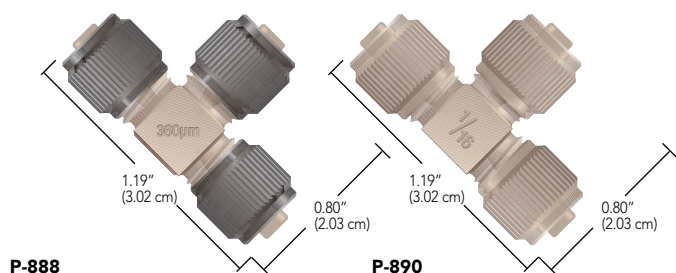
Use Upchurch Scientific® MicroTees and MicroCrosses to join capillary tubing. All of these products are made entirely of PEEK™ and have 0.006" (0.150 mm) thru-holes, with resulting swept volumes ranging from 29 to 81 nL.

*Please 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**  
MicroCross  
for 1/16" OD tubing  
0.006" thru-holes  
with fittings included

## Application Note

Several researchers use our PEEK MicroTee to introduce ionizing voltage to their fluid stream just prior to a Mass Spectrometer<sup>1</sup>. 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.

Connect the wire to the center port of the MicroTee. 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.

<sup>1</sup> 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.



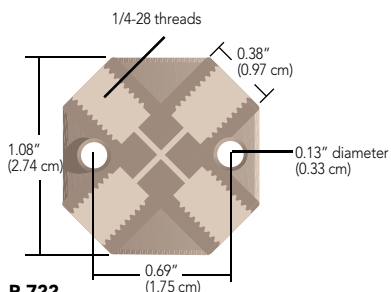
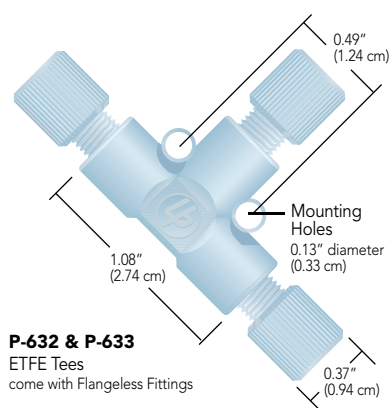
**Top Seller** SEE STARRED PRODUCTS

Part No.	Description	Threads	Includes	Thru-hole	Swept Volume	Pressure Rating
<b>MICROTEE, MICROCROSS AND MICROELBOW</b>						
★ 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)



### Tees and Crosses

Upchurch Scientific® Tees and Crosses manufactured by IDEX Health & Science are available in two inert polymers and can handle pressures to 1,000 psi (69 bar). 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-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.



**Top Seller** SEE STARRED PRODUCTS

Part No.	Description	Threads	Includes:	Thru-hole	Swept Volume	Pressure Rating
<b>TEES AND CROSSES</b>						
★ <b>P-632</b>	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)
★ <b>P-633</b>	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)
<b>P-634</b>	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)
<b>P-635</b>	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)
★ <b>P-712</b>	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)
★ <b>P-713</b>	PEEK Tee for 1/8" OD Tubing	1/4-28 Flat-Bottom	(3) XP-235	0.050" (1.25 mm)	17.5 µL	500 psi (34 bar)
★ <b>P-714</b>	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)
<b>P-722</b>	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)
<b>P-723</b>	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)

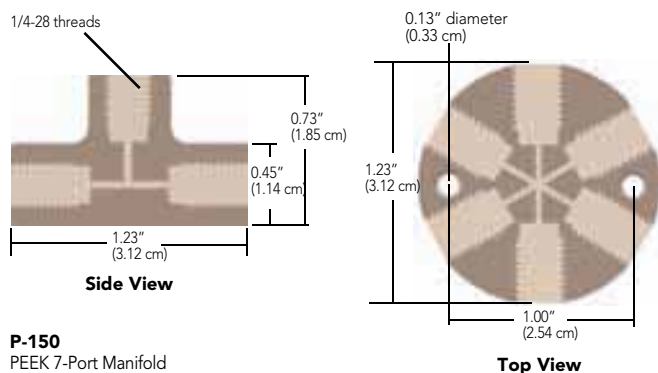
## Manifolds

Choose a 5, 6, 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.

Bulkhead mountable 6-Port versions are available, and come with a stainless steel nut and lock washer to hold them in place. These manifolds have 1/2-20 external threads, requiring a 1/2" diameter hole to mount. The recommended torque limit while mounting these products is 15 in-lbs.

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

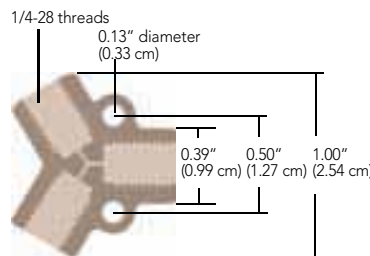


**P-150**  
PEEK 7-Port Manifold  
comes with Super Flangeless Fittings

## 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 much 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.



**P-512**  
PEEK Y  
comes with Flangeless Fittings

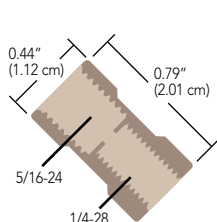


**Top Seller** SEE STARRED PRODUCTS

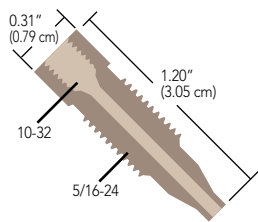
Part No.	Description	Threads	Includes	Thru-hole	Swept Volume	Pressure Rating
<b>MANIFOLDS</b>						
<b>Standard</b>						
★ P-150	PEEK 7-Port Manifold for 1/16" OD Tubing	1/4-28 FB	(7) P-255, (7) P-250	0.040" (1.00 mm)	42.0 µL	1,000 psi (69 bar)
P-151	PEEK 7-Port Manifold for 1/8" OD Tubing	1/4-28 FB	(7) P-331, (7) P-359	0.062" (1.60 mm)	83.0 µL	500 psi (34 bar)
P-152	PEEK 6-Port Manifold for 1/16" OD Tubing	1/4-28 FB	(6) P-255, (6) P-250	0.040" (1.00 mm)	26.8 µL	1,000 psi (69 bar)
P-153	PEEK 6-Port Manifold for 1/8" OD Tubing	1/4-28 FB	(6) P-331, (6) P-359	0.062" (1.60 mm)	62.3 µL	500 psi (34 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)
<b>Bulkhead</b>						
P-156	PEEK 6-Port Manifold for 1/16" OD Tubing	1/4-28 FB	(6) P-255, (6) P-250, (1) SST Nut and Lock Washer	0.040" (1.00 mm)	31.3 µL	1,000 psi (69 bar)
P-157	PEEK 6-Port Manifold for 1/8" OD Tubing	1/4-28 FB	(6) P-331, (6) P-359, (1) SST Nut and Lock Washer	0.062" (1.60 mm)	73.2 µL	500 psi (34 bar)
<b>Y CONNECTORS</b>						
★ 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

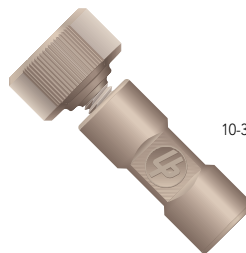
## English Threaded Adapters



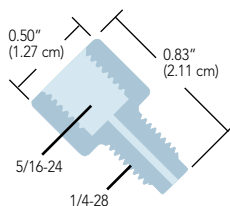
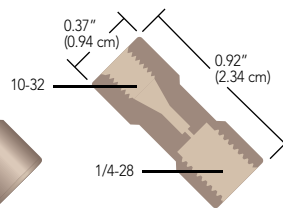
**P-135**  
0.080" (2.05 mm) thru-hole



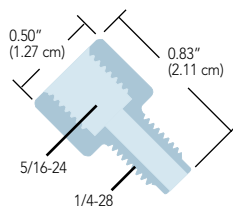
**6000-076**  
0.066" (1.70 mm) thru-hole



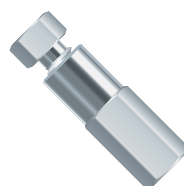
**P-627**  
0.020" (0.50 mm) thru-hole  
Includes (1) F-300 for 1/16" OD tubing



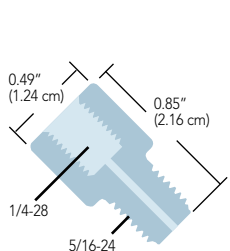
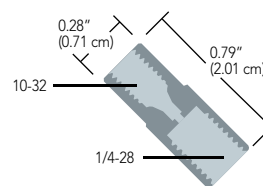
**P-674**  
0.040" (1.00 mm) thru-hole



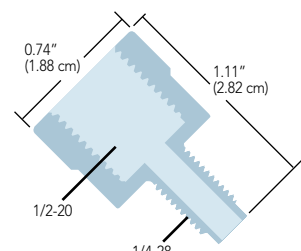
**P-681**  
0.125" (3.20 mm) thru-hole



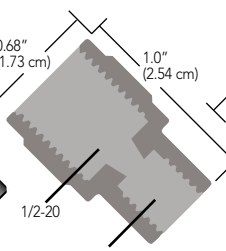
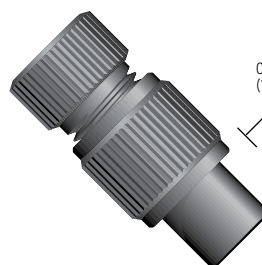
**1583**  
0.040" (1.00 mm) thru-hole  
Includes (1) U-400/U-401 for 1/16" OD tubing



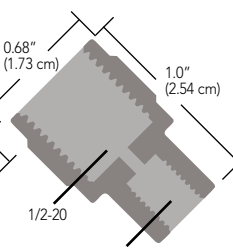
**P-718**  
0.040" (1.00 mm) thru-hole



**P-684**  
0.130" (3.30 mm) thru-hole



**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



**Top Seller** SEE STARRED PRODUCTS

## 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 (pages 131 – 133).

Part No.	Description	Includes	Thru-hole	Swept Volume	Pressure Rating
<b>ENGLISH THREADED ADAPTERS</b>					
<b>1583</b>	SST Adapter, 10-32 C, F to 1/4-28 FB, F	(1) U-400, (1) U-401	0.040" (1.00 mm)	0.60 µL	*
<b>6000-076</b>	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)
<b>P-135</b>	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)
★ <b>P-627</b>	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)
<b>P-649</b>	PCTFE Adapter, 5/16-24 FB, F to 1/4-28 FB, M	N/A	0.063" (1.60 mm)	24.5 µL	1,000 psi (69 bar)
<b>P-674</b>	PCTFE Adapter, 5/16-24 FB, F to 1/4-28 FB, M	N/A	0.040" (1.00 mm)	9.9 µL	1,000 psi (69 bar)
★ <b>P-681</b>	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)
<b>P-684</b>	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)
<b>P-718</b>	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)
<b>U-659</b>	PEEK Adapter, 5/16-24 FB, F to 1/2-20 FB, F	(1) XU-655	Tapered**	42.0 µL	250 psi (17 bar)
<b>U-665</b>	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)

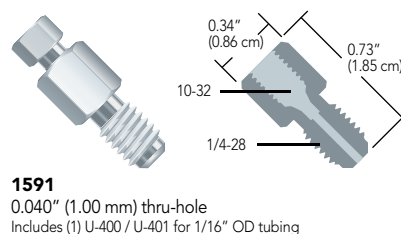
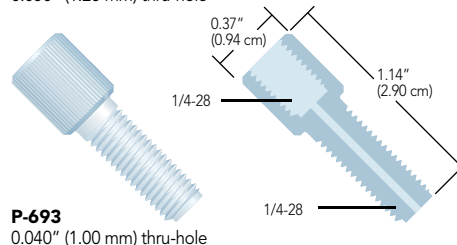
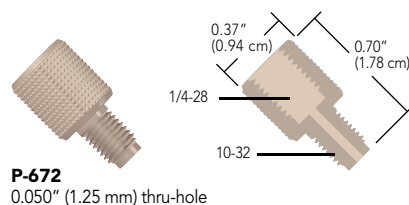
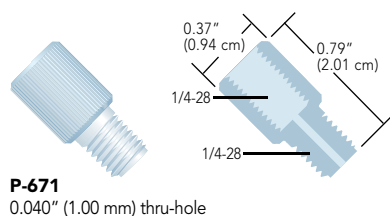
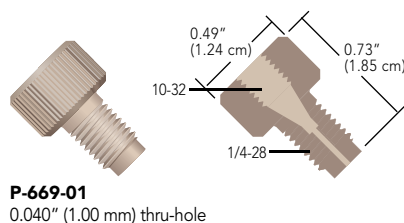
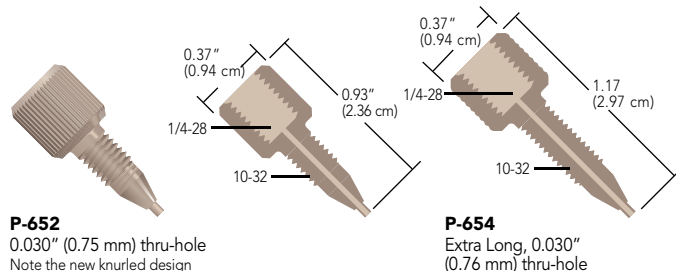
F = Female (internal) threads; M = Male (external) threads; C = Coned; FB = Flat-Bottom

\*The pressure rating of this stainless steel adapter exceeds the pressure holding ability of the fittings and tubing used with it.

\*\*Thru-hole tapers from 0.188" (4.80 mm) to 0.125" (3.20 mm)

## English Threaded Adapters

## Female to Male 10-32 to 1/4-28 Adapters



## 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.

## 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.



**Top Seller** SEE STARRED PRODUCTS

Part No.	Description	Includes	Thru-hole	Swept Volume	Pressure Rating
<b>ENGLISH THREADED ADAPTERS</b>					
★ <b>P-652</b>	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)
★ <b>P-654</b>	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)
★ <b>P-669-01</b>	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)
<b>P-671</b>	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)
<b>P-672</b>	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)
<b>P-693</b>	PTFE Adapter, 1/4-28 FB, F to 1/4-28 FB, M, Long	N/A	0.040" (1.00 mm)	16.27 µL	1,000 psi (69 bar)
<b>1591</b>	SST Adapter, 10-32 C, F to 1/4-28 FB, M	(1) U-400, (1) U-401	0.040" (1.00 mm)	6.0 µL	*

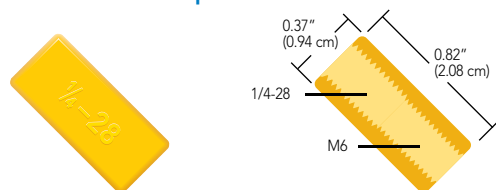
F = Female (internal) threads; M = Male (external) threads; XL = extra long; C = Coned; FB = Flat-Bottom

\* The pressure ratings of these adapters exceed the pressure holding ability of the fittings and tubing used with them.

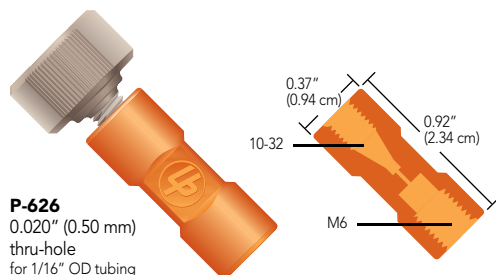


## Metric Threaded Adapters

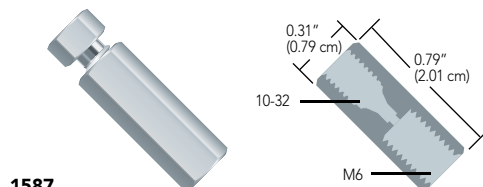
### Female M6 Adapters



**P-621**

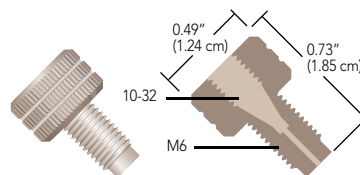


**P-626**  
0.020" (0.50 mm) thru-hole  
for 1/16" OD tubing Includes (1) F-300

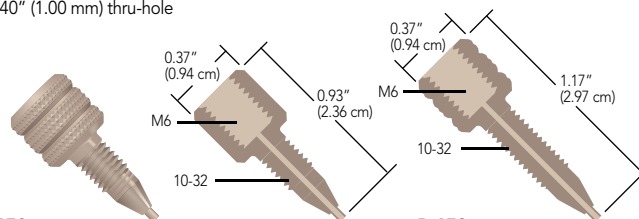


**1587**  
0.040" (1.00 mm) thru-hole  
for 1/16" OD tubing Includes (1) U-400 / U-401

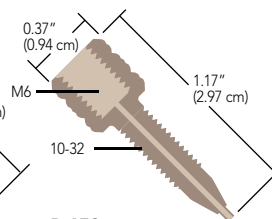
### Female to Male M6 Adapters



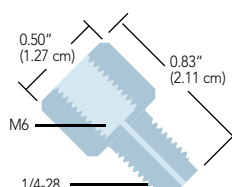
**P-920-01**  
0.040" (1.00 mm) thru-hole



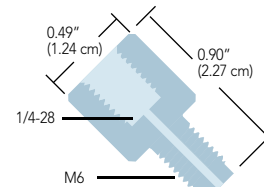
**P-650**  
0.030" (0.75 mm) thru-hole



**P-653**  
Extra Long  
0.030" (0.75 mm) thru-hole



**P-670**  
0.030" (0.75 mm) thru-hole



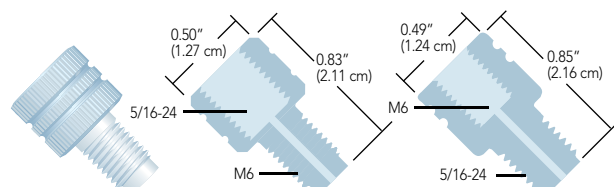
**NEW!**  
**P-694**  
0.040" (1.00 mm) thru-hole

## Related Products

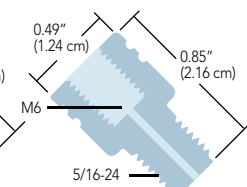
- For an alternative to the Female M6 Adapters presented in the left column of this page, try a P-602 or P-622 Low Pressure Metric Union from page 40, along with the appropriate Metric Flangeless Fittings on page 27.
- To direct connect your tubing into a flat-bottom port, find the appropriate Flangeless or Super Flangeless™ Fittings on pages 24 – 26 and 21 – 23 respectively.
- Need metric fittings for your connections? See page 27.



**Top Seller** SEE STARRED PRODUCTS



**P-673**  
0.040" (1.00 mm) thru-hole



**P-724**  
0.040" (1.00 mm) thru-hole

Part No.	Description	Includes	Thru-hole	Swept Volume	Pressure Rating
<b>METRIC M6 THREADED ADAPTERS</b>					
<b>Female M6 Adapters</b>					
<b>P-621</b>	ETFE Adapter, 1/4-28 FB, F to M6 FB, F	N/A	N/A	N/A	1,000 psi (69 bar)
<b>P-626</b>	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)
<b>1587</b>	SST Adapter, 10-32 C, F to M6 FB, F	(1) U-400, (1) U-401	0.040" (1.00 mm)	0.6 µL	*
<b>Female to Male M6 Adapters</b>					
★ <b>P-650</b>	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)
<b>P-651</b>	PEEK Adapter, M6 FB, F to 10-32 C, M Waters®-compatible	N/A	0.030" (0.75 mm)	7.2 µL	1,000 psi (69 bar)
<b>P-653</b>	PEEK Adapter, M6 FB, F to 10-32 C, M Extra Long	N/A	0.030" (0.75 mm)	9.5 µL	1,000 psi (69 bar)
<b>P-670</b>	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)
<b>P-673</b>	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)
<b>NEW! P-694</b>	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)
<b>P-724</b>	PCTFE Adapter, M6 FB, F to 5/16-24 FB, M	N/A	0.040" (1.00 mm)	10.3 µL	1,000 psi (69 bar)
<b>P-920-01</b>	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)

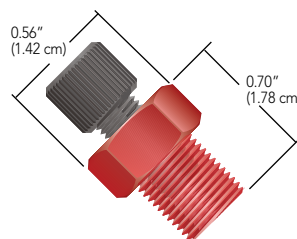
F = Female (internal) threads; M = Male (external) threads; C = Coned; FB = Flat-Bottom  
\* The pressure rating of this adapter exceeds the pressure holding ability of the fittings and tubing used with it.

## External National Pipe Thread Adapters

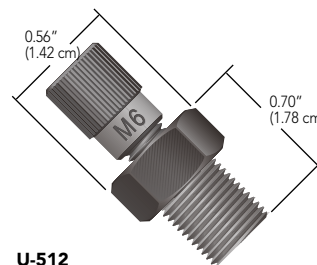
These adapters make connections to female 1/8" and 1/4" National Pipe Thread (NPT) ports.

Manufactured from PEEK™ polymer by IDEX Health & Science, Upchurch Scientific® NPT Adapters are durable and chemically resistant. We provide a variety of female threads, as well as a male threaded version, suitable for most low pressure applications.

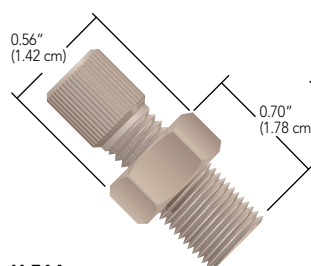
*Please Note: Wrap the threads on the NPT side of these adapters with thread seal tape (plumber's tape) to ensure a leak-free seal.*



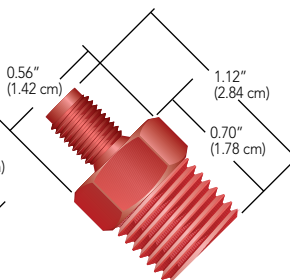
**U-510**  
1/8" NPT to 1/4-28 Flat-Bottom  
Female Adapter  
for 1/8" OD tubing  
Includes (1) XP-308 Fitting



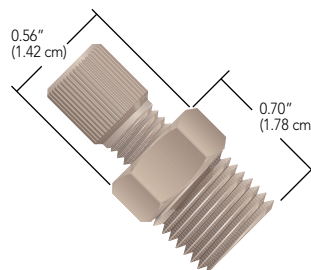
**U-512**  
1/8" NPT to M6 Flat-Bottom  
Female Adapter  
for 1/8" OD tubing  
Includes (1) P-300/P-307 Fittings



**U-514**  
1/8" NPT to 5/16-24 Flat-Bottom  
Female Adapter  
for 3/16" OD tubing  
Includes (1) XP-132 Fitting



**U-501**  
1/4" NPT to 1/4-28 Flat-Bottom  
Male Adapter



**U-503**  
1/4" NPT to 5/16-24 Flat-Bottom  
Female Adapter  
for 1/8" OD tubing  
Includes (1) P-360/P-131 Fittings

## 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
M6 for 1/8" OD tubing	26, 27
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.



**Top Seller** SEE STARRED PRODUCTS

Part No.	Description	Color	Tubing OD	Includes	Thru-hole	Swept Volume	Pressure Rating
<b>1/8" MALE NPT ADAPTERS</b>							
★ <b>U-510</b>	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)
<b>U-511</b>	PEEK 1/8" NPT, M to 1/4-28 FB, M Adapter	Red	N/A	N/A	0.062" (1.60 mm)	40.2 µL	500 psi (34 bar)
<b>U-512</b>	PEEK 1/8" NPT, M to M6 FB, F Adapter	Black	1/8"	(1) P-307, (1) P-300	0.062" (1.60 mm)	17.3 µL	500 psi (34 bar)
<b>U-513</b>	PEEK 1/8" NPT, M to 5/16-24 FB, F Adapter	Natural	1/8"	(1) P-131, (1) P-360	0.062" (1.60 mm)	17.3 µL	500 psi (34 bar)
<b>U-514</b>	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)
<b>1/4" MALE NPT ADAPTERS</b>							
<b>U-500</b>	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)
<b>U-501</b>	PEEK 1/4" NPT, M to 1/4-28 FB, M Adapter	Red	N/A	N/A	0.062" (1.60 mm)	40.2 µL	500 psi (34 bar)
<b>U-502</b>	PEEK 1/4" NPT, M to M6 FB, F Adapter	Black	1/8"	(1) P-307, (1) P-300	0.062" (1.60 mm)	17.3 µL	500 psi (34 bar)
<b>U-503</b>	PEEK 1/4" NPT, M to 5/16-24 FB, F Adapter	Natural	1/8"	(1) P-131, (1) P-360	0.062" (1.60 mm)	17.3 µL	500 psi (34 bar)
<b>U-504</b>	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)

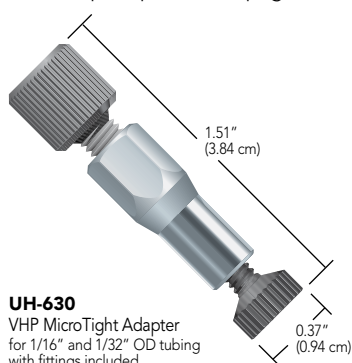
F = Female (internal) threads; M = Male (external) threads; FB = Flat-Bottom

## 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 adapter pressure rated to 12,000 psi (828 bar)

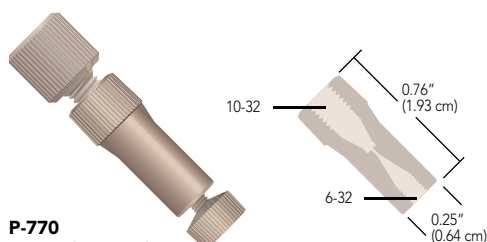
Create a true zero dead volume (ZDV) connection between 1/16" OD tubing and capillary tubing with these Upchurch Scientific® MicroTight Adapters.

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.



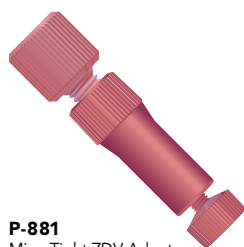
### UH-630

VHP MicroTight Adapter for 1/16" and 1/32" OD tubing with fittings included



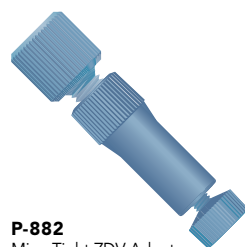
### P-770

MicroTight ZDV Adapter for 1/16" OD to MicroTight Sleeves with fittings included



### 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

## Related Products

- Replacement 6-32 fittings are on page 55.
- 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	65
360 µm OD Fused Silica Tubing	65
1/16" and 1/32" OD PEEKsil™ Tubing	66
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	68
Polymer Capillary and Fused Silica Tubing Cutters	74
Rheodyne® MX Series II™ Micro-Scale Injector and Switching Valves	126
Rheodyne Manual Micro-Scale Injectors	129
Micro Injection Port Adapters	140
Micro-Splitter Valves	146
Micro-Metering Valves	147
Microbore Guard Column	184
Ultra-Low Volume Back-Pressure Regulators	154
Nonmetallic 10-32 Micro-Volume Inline Check Valve	149
Ismatec® Peristaltic Tubing Pumps	94

## Note

Use only the style of 6-32 threaded fitting supplied with each adapter — they are not interchangeable.



**Top Seller** SEE STARRED PRODUCTS

Part No.	Description	Threads	Includes	Color	Swept Volume	Pressure Rating
<b>MICROTIGHT ADAPTERS</b>						
★ 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)
<b>REPLACEMENT GAUGE PLUGS (TO ACHIEVE TRUE ZDV CONNECTIONS WITH THE ABOVE ADAPTERS)</b>						
P-554	Delrin® Gauge Plug	10-32 C		White	N/A	N/A

C = Coned

## 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

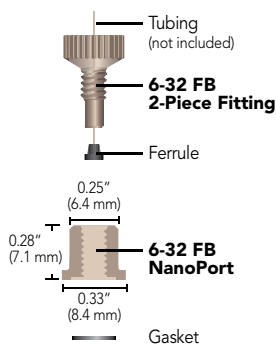
Upchurch Scientific® NanoPort Assemblies are the first commercially available products to provide consistent fluid connections for chip-based analyses. Once attached, NanoPort connections can withstand pressures to 1,000 psi (69 bar).\* NanoPorts will adhere to silicon, quartz, glass and some polymers.

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 on the following page). 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.

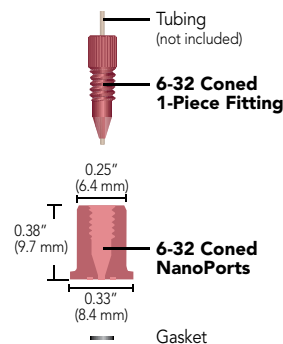
Our NanoPort Reservoir Assembly is designed for open well applications, such as CE.

*\*Except the N-333 NanoPort Assembly, which is rated to 500 psi (34.5 bar).*

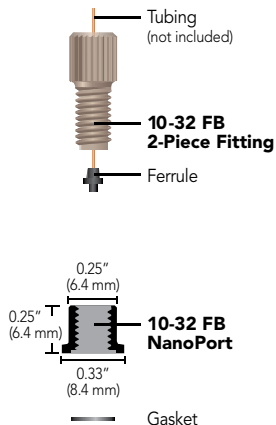
### 6-32 Flat-Bottom Assemblies



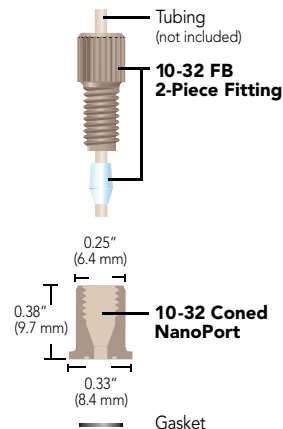
### 6-32 Coned Assemblies



### 10-32 Flat-Bottom Assemblies



### 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

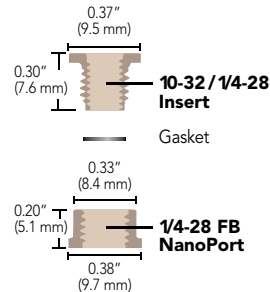
- Place clamped Ports in oven at a temperature of 165 – 177 °C (330 – 350 °F) for one hour to develop a complete bond between the Port and the substrate.
- Please contact us regarding adherence to specific polymer substrates and other adhesive options.

Please Note: For alternative epoxy adhesive options, please contact IDEX Health & Science directly.

### NanoPort Reservoir Applications

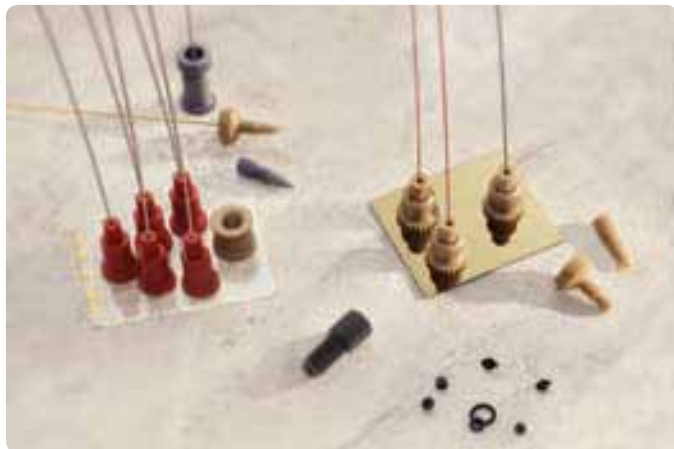
- Sample reservoir
- Open wells for capillary electrophoresis
- Syringe injection or flushing/priming, using our P-604 Luer Adapter, page 56, and luer syringe (such as our B-310) on page 155

### Reservoir Assembly





## 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.



**Top Seller** SEE STARRED PRODUCTS

Part No.	Nut	Ferrule	For Chip Hole (dia. x depth)	For Tubing OD	Qty.
NANOPORT ASSEMBLIES					
6-32 Flat-Bottom NanoPort Assemblies					
N-121H	F-123H	N-123-04	0.04" x 0.04" (1.0 mm x 1.0 mm)	360 µm	ea.
N-121S	F-123S	N-123-04	0.04" x 0.04" (1.0 mm x 1.0 mm)	360 µm	ea.
N-122H	F-123H	N-123-05	0.04" x 0.06" (1.0 mm x 1.5 mm)	360 µm	ea.
N-122S	F-123S	N-123-05	0.04" x 0.06" (1.0 mm x 1.5 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-124H	F-124H	None	Up to 0.063" (1.6 mm)	360 µm	ea.
N-124S	F-124S	None	Up to 0.063" (1.6 mm)	360 µm	ea.
N-125H	F-125H	None	Up to 0.063" (1.6 mm)	70 – 520 µm <sup>1</sup>	ea.
N-125S	F-125	None	Up to 0.063" (1.6 mm)	70 – 520 µm <sup>1</sup>	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 Flat-Bottom NanoPort Assemblies					
N-129H	F-122H	N-123-04	0.04" x 0.04" (1.0 mm x 1.0 mm)	360 µm	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.
NANOPORT REPLACEMENT PARTS					
Part No.	Description	Threads	For Chip Hole	Tubing OD	Qty.
Fittings					
F-121Hx	Headless Nuts	10-32 FB	N/A	360 µm	10-pk
F-122Hx	Headless Nuts	10-32 FB	N/A	360 µm	10-pk
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-124Hx	Headless Fittings	6-32 C	N/A	360 µm	10-pk
F-124Sx	Standard Head Fittings	6-32 C	N/A	360 µm	10-pk
★ F-125Hx	Headless Fittings	6-32 C	N/A	70 – 520 µm <sup>1</sup>	10-pk
★ F-125x	Standard Head Fittings	6-32 C	N/A	70 – 520 µm <sup>1</sup>	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, 10-32 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
<sup>1</sup> 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					

<sup>1</sup> 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

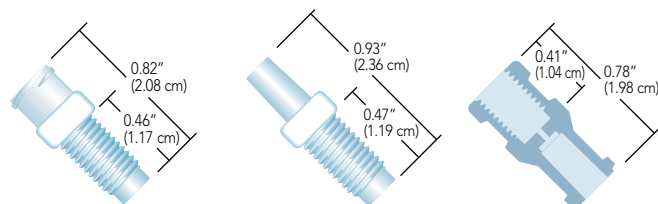
## Quick Connect Luer Adapters

- 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.

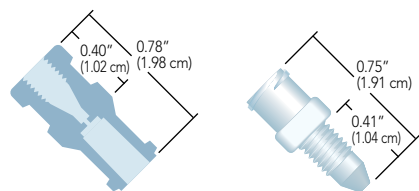
*Please Note: Our Female Quick Connect Luer Adapters can be used with any of the Male Luers on this page, i.e., those with and without lock hubs.*



**P-604, P-618, P-624**  
Female Luer to 1/4-28 Male  
(luer end of P-604 different than shown)

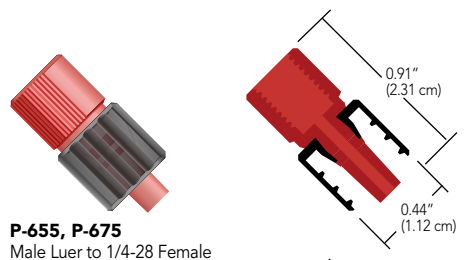
**P-605, P-619, P-625**  
Male Luer to 1/4-28 Male

**P-628**  
Female Luer to 1/4-28 Female

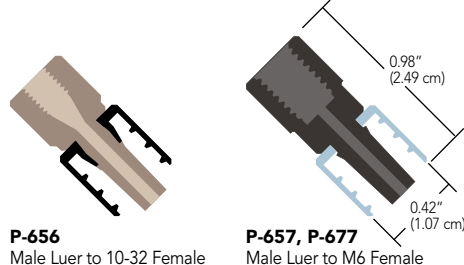


**P-629, P-629BLK**  
Female Luer to 10-32 Female

**P-642**  
Female Luer to 10-32 Male

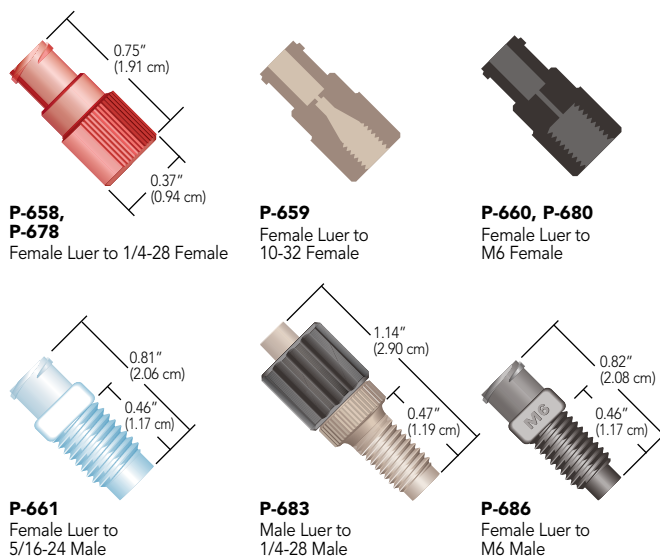


**P-655, P-675**  
Male Luer to 1/4-28 Female



**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 172) 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 pumphead.

Part No.	Description	Body Material	Lock Hub Material	Thru-hole
<b>QUICK CONNECT LUER ADAPTERS</b>				
<b>P-604</b>	F Luer to 1/4-28 FB, M	Nat. Delrin	N/A	0.05" (1.3 mm)
<b>P-605</b>	M Luer to 1/4-28 FB, M	Nat. Delrin	None *	0.05" (1.3 mm)
<b>P-618</b>	F Luer to 1/4-28 FB, M	Nat. PP	N/A	0.05" (1.3 mm)
<b>P-619</b>	M Luer to 1/4-28 FB, M	Nat. PP	None *	0.05" (1.3 mm)
★ <b>P-624</b>	F Luer to 1/4-28 FB, M	Nat. ETFE	N/A	0.05" (1.3 mm)
★ <b>P-625</b>	M Luer to 1/4-28 FB, M	Nat. ETFE	None *	0.04" (1.0 mm)
★ <b>P-628</b>	F Luer to 1/4-28 FB, F	Nat. ETFE	N/A	0.04" (1.0 mm)
<b>P-629</b>	F Luer to 10-32 C, F	Nat. ETFE	N/A	0.04" (1.0 mm)
<b>P-629BLK</b>	F Luer to 10-32 C, F	Black ETFE	N/A	0.04" (1.0 mm)
★ <b>P-642</b>	F Luer to 10-32 C, M	Nat. ETFE	N/A	0.05" (1.3 mm)
★ <b>P-655</b>	M Luer to 1/4-28 FB, F	Red PEEK	Black PEEK	0.04" (1.3 mm)
★ <b>P-656</b>	M Luer to 10-32 C, F	Nat. PEEK	Black PEEK	0.05" (1.3 mm)
<b>P-657</b>	M Luer to M6 FB, F	Black PEEK	Black PEEK	0.05" (1.3 mm)
★ <b>P-658</b>	F Luer to 1/4-28 FB, F	Red PEEK	N/A	0.05" (1.3 mm)
★ <b>P-659</b>	F Luer to 10-32 C, F	Nat. PEEK	N/A	0.05" (1.3 mm)
<b>P-660</b>	F Luer to M6 FB, F	Black PEEK	N/A	0.05" (1.3 mm)
<b>P-661</b>	F Luer to 5/16-24 FB, M	Nat. ETFE	N/A	0.05" (1.3 mm)
★ <b>P-675</b>	M Luer to 1/4-28 FB, F	Red ETFE	Natural PP	0.05" (1.3 mm)
<b>P-677</b>	M Luer to M6 FB, F	Black ETFE	Natural PP	0.05" (1.3 mm)
★ <b>P-678</b>	F Luer to 1/4-28 FB, F	Red ETFE	N/A	0.05" (1.3 mm)
<b>P-680</b>	F Luer to M6 FB, F	Black ETFE	N/A	0.05" (1.3 mm)
★ <b>P-683</b>	M Luer to 1/4-28 FB, M	Nat. PEEK	Black PEEK	0.04" (1.0 mm)
★ <b>P-686</b>	F Luer to M6 FB, M	Black ETFE	N/A	0.05" (1.3 mm)

## SYRINGE WITH MALE LUER LOCK

**B-310** 10cc 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



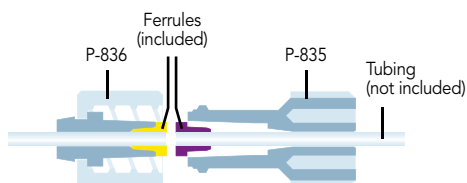
**Top Seller** SEE STARRED PRODUCTS

## LuerTight™ Fittings

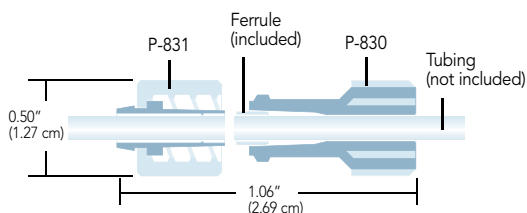
- Luer fittings for fluoropolymer tubing
- Quick disconnect and barbless
- For 1/16" and 1/8" OD tubing

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



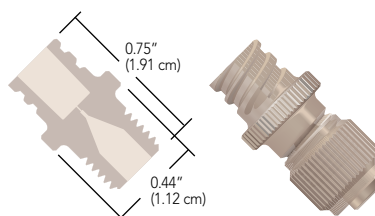
## Luer-To-MicroTight® Adapter

- 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 155) and PEEK capillary tubing (page 65), not included.*



**P-662**  
Luer-To-MicroTight Adapter  
for Luer to 360 µm OD tubing  
with fittings included

Order Online  [WWW.IDEX-HS.COM](http://WWW.IDEX-HS.COM)



**Top Seller** SEE STARRED PRODUCTS

Part No.	Description	Includes	Thru-hole	Pressure Rating
<b>LUERTIGHT FITTINGS SYSTEMS</b>				
★ <b>P-837</b>	LuerTight System for 1/16" OD Tubing	(1) P-835, (1) P-836, (1) P-830T	N/A	100 psi (7 bar)
<b>P-838</b>	LuerTight System for 1/8" OD Tubing	(1) P-830, (1) P-831, (1) P-830T	N/A	100 psi (7 bar)
<b>LUERTIGHT FITTING COMPONENTS</b>				
<b>P-830</b>	Female Fitting for 1/8" OD Tubing	(1) Ferrule	N/A	N/A
<b>P-830T</b>	Set Plug to swage Ferrules into P-835 and P-830	N/A	N/A	N/A
<b>P-831</b>	Male Fitting for 1/8" OD Tubing	No Ferrule Required	N/A	N/A
<b>P-835</b>	Female Fitting for 1/16" OD Tubing	(1) Ferrule	N/A	N/A
<b>P-836</b>	Male Fitting for 1/16" OD Tubing	(1) Ferrule	N/A	N/A
<b>LUER-TO-MICROTIGHT ADAPTER</b>				
★ <b>P-662</b>	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)*

## Swivel Barb Adapters

- ▶ Barbed connections in swivel from the nut to prevent twisting during installation
- ▶ Manufactured from polypropylene

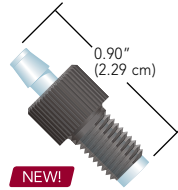
The new Swivel Barb Adapters from Upchurch Scientific® are made up of two captive pieces acting as one piece fitting for ease of use. Manufactured from Polypropylene and available in three barbed sizes the Swivel Barb will facilitate connection between flexible tubing to a 1/4-28 flat-bottom port. The barbed inserts in swivel 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

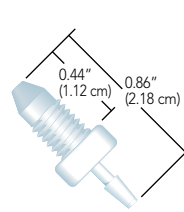


**D-648**  
1/4-28 to 1/8" ID tubing

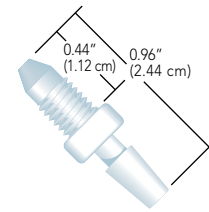
## Barbed Adapters

- ▶ Three barbed sizes for 1/16", 1/8" and 3/16" ID flexible tubing
- ▶ Adapt 1/4-28 flat-bottom, 5/16-24 flat-bottom or 10-32 coned receiving ports

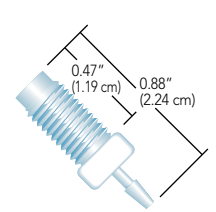
These Upchurch Scientific adapters make it easy to connect flexible tubing to any standard 1/4-28 flat-bottom or 10-32 coned receiving port. Simply thread the adapter into the receiving port and slip tubing over the barbed stem to create a reliable low pressure connection.



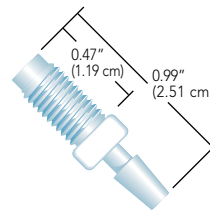
**P-663**  
10-32 to 1/16" ID tubing



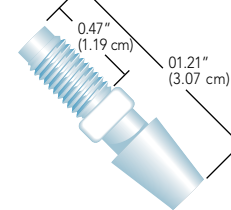
**P-664**  
10-32 to 1/8" ID tubing



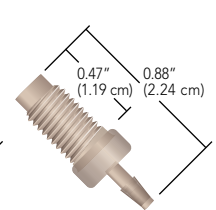
**P-646**  
1/4-28 to 1/16" ID tubing



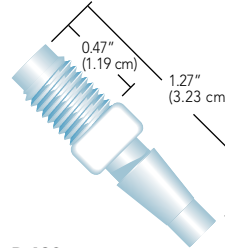
**P-647**  
1/4-28 to 1/8" ID tubing



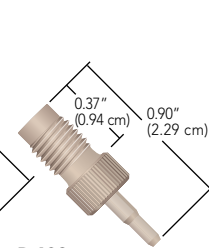
**P-648**  
1/4-28 to 3/16" ID tubing



**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 Lueright Adapter on page 57.
- ▶ To connect peristaltic tubing to low pressure fluoropolymer tubing, see page 61.
- ▶ For peristaltic tubing, see pages 75-89.



**Top Seller** SEE STARRED PRODUCTS

Part No.	Description	Material	Threads	Thru-hole
<b>SWIVEL BARB ADAPTERS</b>				
<b>D-646</b>	Swivel Barb Adapter, 1/16" (1.55 mm) ID Tubing	Polypropylene	1/4-28 Flat-Bottom	0.03" (0.75 mm)
<b>D-647</b>	Swivel Barb Adapter, 3/32" (2.40 mm) ID Tubing	Polypropylene	1/4-28 Flat-Bottom	0.06" (1.5 mm)
<b>D-648</b>	Swivel Barb Adapter, 1/8" (3.20 mm) ID Tubing	Polypropylene	1/4-28 Flat-Bottom	0.08" (2.0 mm)
<b>BARBED ADAPTERS</b>				
<b>P-663</b>	Barb Adapter, 1/16" (1.55 mm) ID Tubing	ETFE	10-32 Coned	0.04" (1.0 mm)
<b>P-664</b>	Barb Adapter, 1/8" (3.20 mm) ID Tubing	ETFE	10-32 Coned	0.04" (1.0 mm)
<b>P-646</b>	Barb Adapter, 1/16" (1.55 mm) ID Tubing	ETFE	1/4-28 Flat-Bottom	0.04" (1.0 mm)
<b>P-647</b>	Barb Adapter, 1/8" (3.20 mm) ID Tubing	ETFE	1/4-28 Flat-Bottom	0.08" (2.0 mm)
<b>P-648</b>	Barb Adapter, 3/16" (4.75 mm) ID Tubing	ETFE	1/4-28 Flat-Bottom	0.10" (2.5 mm)
<b>P-668</b>	Barb Adapter, 1/16" (1.55 mm) ID Tubing	PEEK™	1/4-28 Flat-Bottom	0.04" (1.0 mm)
<b>P-689</b>	Barb Adapter, 3/16" (4.75 mm) ID Tubing	ETFE	5/16-24 Flat-Bottom	0.10" (2.5 mm)
<b>P-692</b>	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)



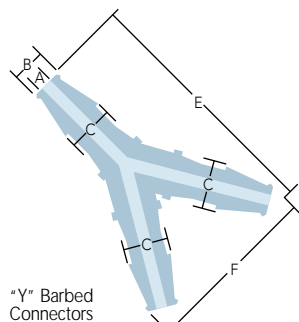
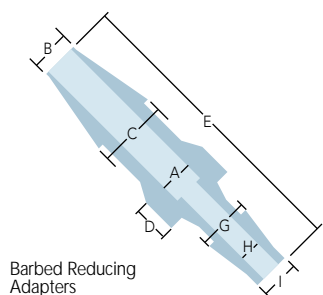
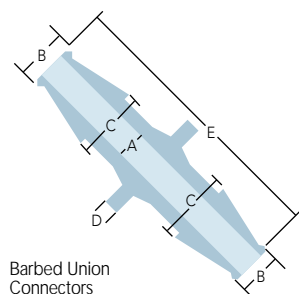
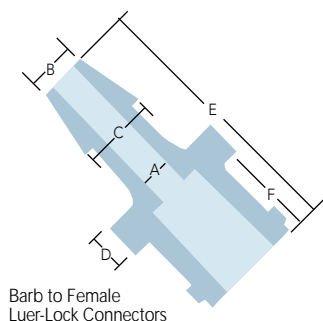
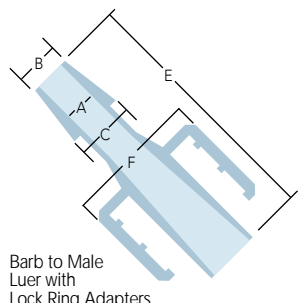
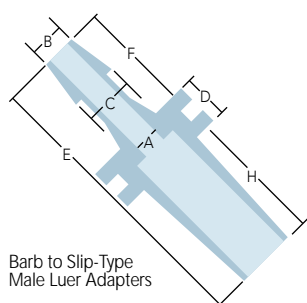
## Barbed Adapters

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).



**Top Seller** SEE STARRED PRODUCTS



Part No.	Description	Material
<b>BARB TO SLIP-TYPE MALE LUER ADAPTERS (10-pk)</b>		
<b>P-854x</b>	Male Luers (Slip-type) for use with 1/16" ID (1.55 mm) Tubing A=0.046" B=0.064" C=0.090" D=0.129" E=0.711" F=0.198" H=0.384"	PP
<b>P-855x</b>	Male Luers (Slip-type) for use with 3/32" ID (2.40 mm) Tubing A=0.069" B=0.097" C=0.138" D=0.128" E=0.803" F=0.290" H=0.385"	PP
<b>P-856x</b>	Male Luers (Slip-type) for use with 1/8" ID (3.20 mm) Tubing A=0.096" B=0.129" C=0.182" D=0.129" E=0.889" F=0.383" H=0.377"	PP
<i>These slip-type male luer fittings are for use in systems for which luer lock rings are not desired.</i>		
<b>BARB TO MALE LUER WITH LOCK RING ADAPTERS (10-pk)</b>		
<b>P-850x</b>	Male Luers with Lock Ring for use with 1/16" ID (1.55 mm) Tubing A=0.049" B=0.065" C=0.090" E=0.583" F=0.434"	PP
<b>P-851x</b>	Male Luers with Lock Ring for use with 3/32" ID (2.40 mm) Tubing A=0.071" B=0.100" C=0.139" E=0.681" F=0.436"	PP
<b>P-852x</b>	Male Luers with Lock Ring for use with 1/8" ID (3.20 mm) Tubing A=0.099" B=0.132" C=0.184" E=0.777" F=0.436"	PP
<b>P-853x</b>	Male Luers with Lock Ring for use with 5/32" ID (4.00 mm) Tubing A=0.108" B=0.164" C=0.231" E=0.874" F=0.436"	PP
<b>BARB TO FEMALE LUER-LOCK CONNECTORS (10-pk)</b>		
★ <b>P-857x</b>	Female Luer Connectors for use with 1/16" ID (1.55 mm) Tubing A=0.030" B=0.063" C=0.106" D=0.100" E=0.598" F=0.253"	PP
<b>P-858x</b>	Female Luer Connectors for use with 3/32" ID (2.40 mm) Tubing A=0.056" B=0.102" C=0.145" D=0.100" E=0.648" F=0.253"	PP
<b>P-859x</b>	Female Luer Connectors for use with 1/8" ID (3.20 mm) Tubing A=0.080" B=0.135" C=0.187" D=0.100" E=0.733" F=0.253"	PP
<b>P-870</b>	For use with 1/16" (1.55 mm) ID Tubing A=0.030" B=0.063" C=0.106" D=0.100" E=0.598" F=0.253"	ETFE
<b>P-871</b>	For use with 3/32" (2.40 mm) ID Tubing A=0.056" B=0.102" C=0.145" D=0.100" E=0.648" F=0.253"	ETFE
<b>P-872</b>	For use with 1/8" (3.20 mm) ID Tubing A=0.080" B=0.137" C=0.187" D=0.100" E=0.733" F=0.253"	ETFE
<b>BARBED UNION CONNECTORS (10-pk)</b>		
<b>P-801x</b>	Barbed Connectors to connect 1/16" ID (1.55 mm) Tubing to 1/16" ID (1.55 mm) Tubing A=0.046" B=0.063" C=0.101" D=0.100" E=0.658"	PP
<b>P-802x</b>	Barbed Connectors to connect 1/8" ID (3.20 mm) Tubing to 1/8" ID (3.20 mm) Tubing A=0.085" B=0.126" C=0.182" D=0.098" E=0.791"	PP
<b>P-803x</b>	Barbed Connectors to connect 3/16" ID (4.75 mm) Tubing to 3/16" ID (4.75 mm) Tubing A=0.122" B=0.157" C=0.275" D=0.126" E=1.179"	PP
<b>P-804x</b>	Barbed Connectors to connect 1/4" ID (6.35 mm) Tubing to 1/4" ID (6.35 mm) Tubing A=0.185" B=0.247" C=0.342" D=0.163" E=1.279"	PP
<b>P-805x</b>	Barbed Connectors to connect 3/8" ID (9.55 mm) Tubing to 3/8" ID (9.55 mm) Tubing A=0.248" B=0.373" C=0.466" D=0.249" E=2.103"	PP
<b>P-806x</b>	Barbed Connectors to connect 1/2" ID (12.7 mm) Tubing to 1/2" ID (12.7 mm) Tubing A=0.390" B=0.496" C=0.598" D=0.249" E=2.047"	PP
<b>BARBED REDUCING ADAPTERS (10-pk)</b>		
<b>P-807x</b>	Barbed Reducing Adapters to connect 1/8" ID (3.20 mm) Tubing to 1/16" ID (1.55 mm) Tubing A=0.081" B=0.120" C=0.170" D=0.104" E=0.755" G=0.102" H=0.048" I=0.067"	PP
<b>P-808x</b>	Barbed Reducing Adapters to connect 3/16" ID (4.75 mm) tubing to 1/8" ID (3.20 mm) tubing A=0.126" B=0.187" C=0.285" D=0.131" E=1.245" G=0.181" H=0.085" I=0.125"	PP
<b>P-809x</b>	Barbed Reducing Adapters to connect 1/4" ID (6.35 mm) Tubing to 3/16" ID (4.75 mm) Tubing A=0.139" B=0.209" C=0.355" D=0.125" E=1.561" G=0.270" H=0.139" I=0.184"	PP
<b>P-810x</b>	Barbed Reducing Adapters to connect 3/8" ID (9.55 mm) Tubing to 1/4" ID (6.35 mm) Tubing A=0.248" B=0.371" C=0.466" D=0.249" E=2.057" G=0.345" H=0.188" I=0.249"	PP
<b>"Y" BARBED CONNECTORS (10-pk)</b>		
★ <b>P-860x</b>	"Y" Barbed Connectors for use with 1/16" ID (1.55 mm) Tubing A=0.047" B=0.066" C=0.092" E=0.508" F=0.345"	PP
<b>P-861x</b>	"Y" Barbed Connectors for use with 3/32" ID (2.40 mm) Tubing A=0.070" B=0.099" C=0.137" E=0.757" F=0.521"	PP
<b>P-862x</b>	"Y" Barbed Connectors for use with 1/8" ID (3.20 mm) Tubing A=0.095" B=0.126" C=0.183" E=1.017" F=0.70"	PP
<b>P-863x</b>	"Y" Barbed Connectors for use with 3/16" ID (4.75 mm) Tubing A=0.157" B=0.197" C=0.280" E=1.470" F=1.051"	PP
<b>P-864x</b>	"Y" Barbed Connectors for use with 1/4" ID (6.35 mm) Tubing A=0.189" B=0.266" C=0.372" E=2.400" F=1.405"	PP

An "x" in the product part number designates "10-pk."

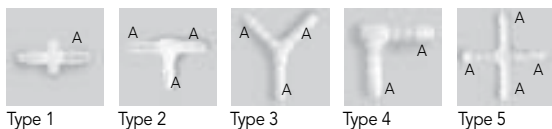
## Barbed Connectors

- 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.

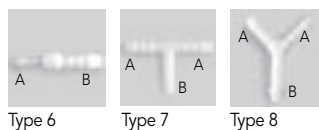
For very small peristaltic tubing, steel connectors are available to couple two pieces of the same size tubing together. Match the OD of the steel tubing connector to be slightly larger than the ID of the peristaltic tubing.

### Standard Tube Connectors in Plastic



Part No.	Tubing ID	Material	Qty.
<b>STANDARD TUBE CONNECTORS IN PLASTIC</b>			
<b>Type 1</b>			
ISM556A	0.06" (1.5 mm)	Acetal	10-pk
ISM557A	0.10" (2.5 mm)	Acetal	10-pk
ISM558A	0.12" (3.0 mm)	Polypropylene	10-pk
ISM559	0.16" (4.0 mm)	Polypropylene	10-pk
ISM560	0.20" (5.0 mm)	Polypropylene	10-pk
ISM561	0.24" (6.0 mm)	Polypropylene	10-pk
ISM562	0.31" (8.0 mm)	Polypropylene	10-pk
ISM563	0.40" (10.0 mm)	Polypropylene	10-pk
ISM564	0.47" (12.0 mm)	Polypropylene	10-pk
ISM565	0.51" (13.0 mm)	Polypropylene	10-pk
ISM566	0.55" (14.0 mm)	Polypropylene	10-pk
ISM567	0.63" (16.0 mm)	Polypropylene	10-pk
ISM568	0.75" (19.0 mm)	Polypropylene	10-pk
<b>Type 2</b>			
ISM693A	0.06" (1.5 mm)	Acetal	10-pk
ISM694	0.10" (2.5 mm)	Acetal	10-pk
ISM510	0.12" (3.0 mm)	Polypropylene	10-pk
ISM511	0.16" (4.0 mm)	Polypropylene	10-pk
ISM512	0.20" (5.0 mm)	Polypropylene	10-pk
ISM513	0.24" (6.0 mm)	Polypropylene	10-pk
ISM514	0.28" (7.0 mm)	Polypropylene	10-pk
ISM515	0.31" (8.0 mm)	Polypropylene	10-pk
ISM516	0.40" (10.0 mm)	Polypropylene	10-pk
ISM517	0.47" (12.0 mm)	Polypropylene	10-pk
ISM518	0.51" (13.0 mm)	Polypropylene	10-pk
ISM519	0.55" (14.0 mm)	Polypropylene	10-pk
ISM520	0.59" (15.0 mm)	Polypropylene	10-pk
ISM521	0.63" (16.0 mm)	Polypropylene	10-pk
ISM522	0.75" (19.0 mm)	Polypropylene	10-pk
<b>Type 3</b>			
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
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
ISM531	0.51" (13.0 mm)	Polypropylene	10-pk
ISM532	0.55" (14.0 mm)	Polypropylene	10-pk
ISM533	0.63" (16.0 mm)	Polypropylene	10-pk
ISM534	0.75" (19.0 mm)	Polypropylene	10-pk

### Reducer Tube Connectors in Plastic



### Steel 18/8 Standard Tube Connectors



Part No.	Tubing ID	Material	Qty.
<b>STANDARD TUBE CONNECTORS IN PLASTIC</b>			
<b>Type 4</b>			
ISM507	0.10" (2.5 mm)	Acetal	10-pk
ISM493	0.12" (3.0 mm)	Polypropylene	10-pk
ISM494	0.16" (4.0 mm)	Polypropylene	10-pk
ISM495	0.20" (5.0 mm)	Polypropylene	10-pk
ISM496	0.24" (6.0 mm)	Polypropylene	10-pk
ISM497	0.31" (8.0 mm)	Polypropylene	10-pk
ISM498	0.40" (10.0 mm)	Polypropylene	10-pk
ISM499	0.47" (12.0 mm)	Polypropylene	10-pk
ISM500	0.51" (13.0 mm)	Polypropylene	10-pk
ISM501	0.55" (14.0 mm)	Polypropylene	10-pk
ISM502	0.59" (15.0 mm)	Polypropylene	10-pk
ISM503	0.63" (16.0 mm)	Polypropylene	10-pk
ISM523	0.75" (19.0 mm)	Polypropylene	10-pk

<b>Type 5</b>			
ISM535	0.16" (4.0 mm)	Polypropylene	10-pk
ISM536	0.20" (5.0 mm)	Polypropylene	10-pk
ISM537	0.24" (6.0 mm)	Polypropylene	10-pk

### REDUCER TUBE CONNECTORS IN PLASTIC

Part No.	Tubing ID		Material	Qty.
Type 6	A	B		
ISM569A	0.06" (1.5 mm)	0.10" (2.5 mm)	Acetal	10-pk
ISM570A	0.06" (1.5 mm)	0.12" (3.0 mm)	Acetal	10-pk
ISM571A	0.10" (2.5 mm)	0.12" (3.0 mm)	Acetal	10-pk
ISM572	0.12" (3.0 mm)	0.16" (4.0 mm)	Polypropylene	10-pk
ISM573A	0.16" (4.0 mm)	0.24" (6.0 mm)	Polypropylene	10-pk
ISM574	0.16" (4.0 mm)	0.31" (8.0 mm)	Polypropylene	10-pk
ISM575	0.24" (6.0 mm)	0.31" (8.0 mm)	Polypropylene	10-pk
ISM576	0.24" (6.0 mm)	0.40" (10.0 mm)	Polypropylene	10-pk
ISM577	0.31" (8.0 mm)	0.40" (10.0 mm)	Polypropylene	10-pk
ISM578	0.31" (8.0 mm)	0.47" (12.0 mm)	Polypropylene	10-pk
ISM579	0.40" (10.0 mm)	0.47" (12.0 mm)	Polypropylene	10-pk

<b>Type 7</b>				
	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
ISM548	0.47" (12.0 mm)	0.40" (10.0 mm)	Polypropylene	10-pk
ISM549	0.59" (15.0 mm)	0.24" (6.0 mm)	Polypropylene	10-pk

<b>Type 8</b>				
	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

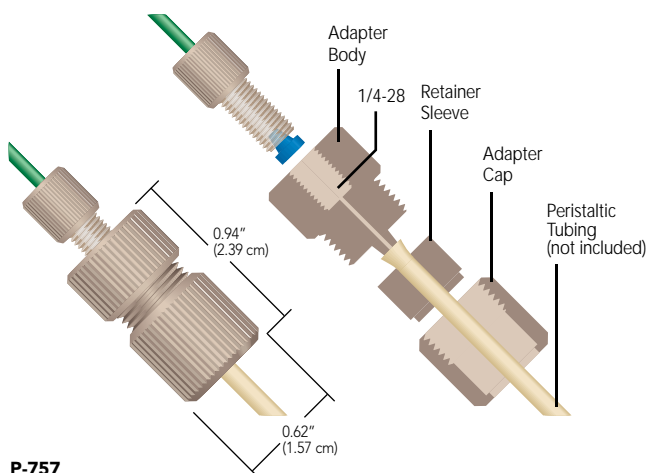
### STEEL 18/8 STANDARD TUBE CONNECTORS

Part No.	Tubing ID	Tubing OD	Connector Length	Material	Qty.
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

## 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 1/8" OD tubing, 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 flowpath, thus reducing cost.

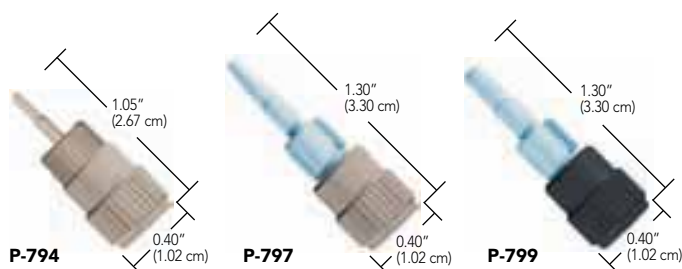


**P-757**  
Peristaltic Tubing Adapter  
includes P-200/P-235 Flangeless Fittings,  
and 3 sizes of retainer sleeves

## 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 flowpath 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.



**Top Seller** SEE STARRED PRODUCTS

## 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
<b>PERISTALTIC TUBING ADAPTERS</b>				
★ 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)
<b>CONICAL ADAPTER ASSEMBLIES</b>				
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)
<b>CONICAL ADAPTER REPLACEMENT PARTS</b>				
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-690	Conical Adapter Body	Natural ETFE	P-797, P-798	
P-691	Conical Adapter Body	Natural ETFE	P-799	
P-692	Conical Adapter Body	Natural PEEK	P-794	

# Filters & Frits

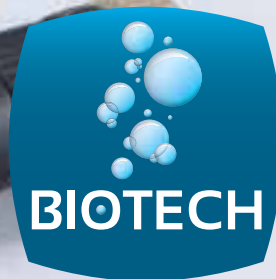


Using a scale to accurately weigh Scientific frits in the laboratory.



**NEW!**

Introducing the new Scientific range of inline very high pressure (VHP) filters to meet your needs.



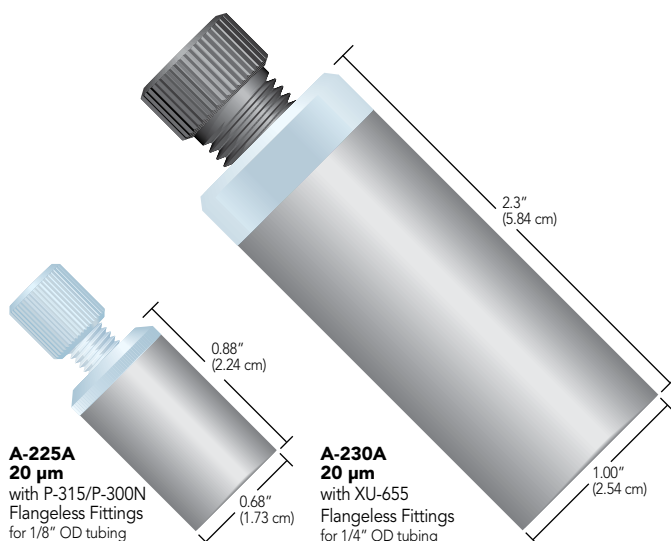
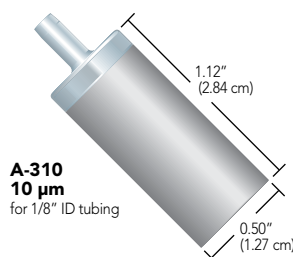
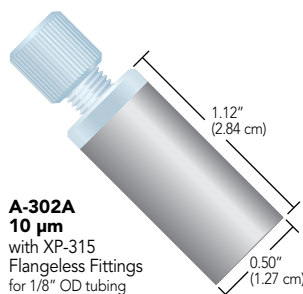
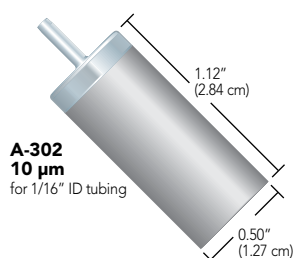
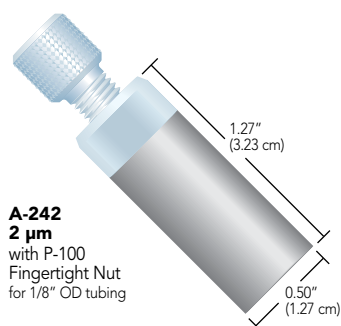


## General Use Inlet Solvent Filters

- 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.)

**Important Note:** It is usually a good idea to change the inlet filter as part of your semi-annual or annual preventative maintenance program.

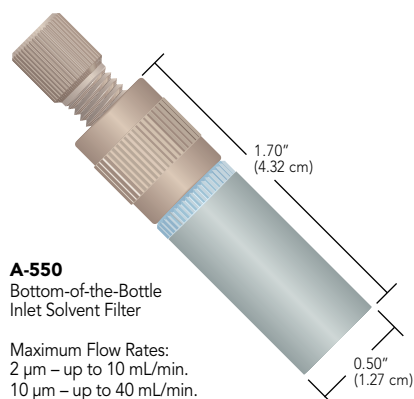
Part No.	Description	Porosity	Material	For Tubing Size	Includes	Max. Suggested Flow Rate*
<b>GENERAL USE INLET SOLVENT FILTERS</b>						
<b>For Analytical HPLC</b>						
A-240	Inlet Solvent Filter with One-Piece Fitting	10 µm	PCTFE, SST	1/8" OD	(1) P-100	40 mL/min
A-241	A-240, 5-pack	10 µm	PCTFE, SST	1/8" OD	(5) P-100	40 mL/min
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
<b>For Waters® Analytical HPLC Systems</b>						
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
<b>For Preparative HPLC Systems</b>						
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-226A	Inlet Solvent Filter with Flangeless Fittings	10 µm	PCTFE, SST	5/16" OD	(1) XU-662	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
<b>INLET SOLVENT FILTER KITS</b>						
A-200	Inlet Solvent Filter Kit	10 µm	PCTFE, SST	1/8" OD	FEP Tubing (1/8" OD x 1/16" ID x 3' length), (5) P-100, (5) A-220	
A-201	Inlet Solvent Filter Kit	2 µm	PCTFE, SST	1/8" OD	FEP Tubing (1/8" OD x 1/16" ID x 3' length), (5) P-100, (5) A-222	

\*Maximum suggested flow rates are determined by porosity and surface area.

## 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.

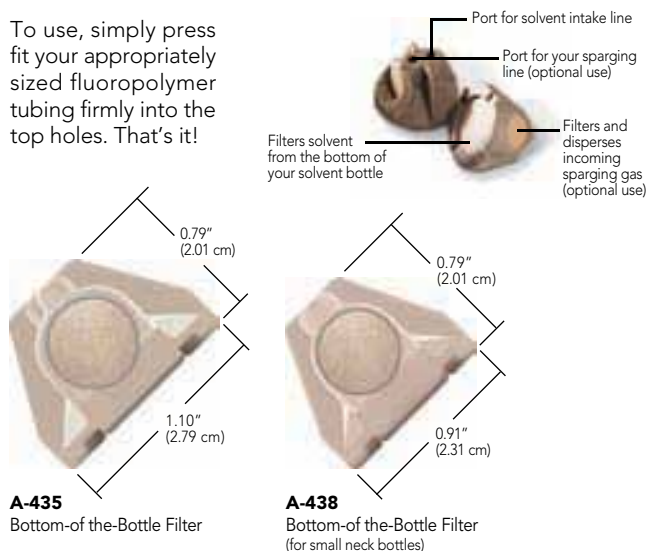


## PEEK Bottom-of-the-Bottle Solvent Filters

- ▶ Most recommended filtering unit
- ▶ 100% PEEK polymer construction
- ▶ Easy operation — no fittings required

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!



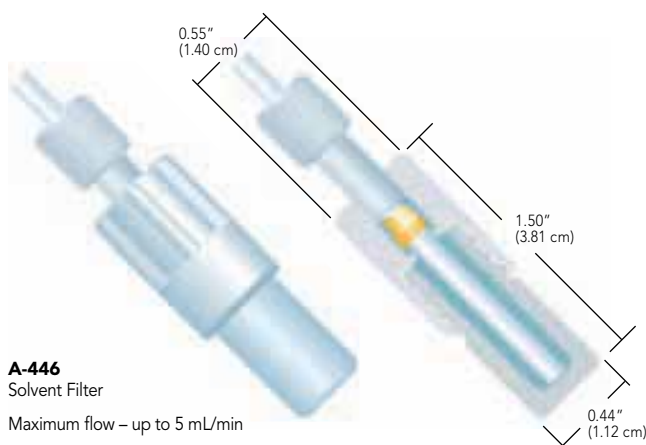
Maximum Flow Rate – up to 30 mL/min

## 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.*



**Top Seller** SEE STARRED PRODUCTS

Part No.	Description	Porosity	For Tubing Size	Includes
<b>BOTTOM-OF-THE-BOTTLE SOLVENT FILTERS</b>				
★ 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-552	SST Filter Assembly with A-520 filter cup	10 µm	3/16" OD	(1) XP-132
A-553	SST Filter Assembly with A-522 filter cup	2 µm	3/16" OD	(1) XP-132
A-520x	SST Replacement Solvent Filter Cups, 10-pk	10 µm	—	—
A-522x	SST Replacement Solvent Filter Cups, 10-pk	2 µm	—	—
<b>BIOCOMPATIBLE BOTTOM-OF-THE-BOTTLE SOLVENT FILTERS</b>				
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	—	—
<b>BIOCOMPATIBLE BOTTOM-OF-THE-BOTTLE SOLVENT FILTERS</b>				
A-435	PEEK Filter	2 µm	1/8" OD	—
A-436	PEEK Filter	2 µm	3/16" 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-450	PEEK Filter	2 µm	1/16" OD	—
A-451	PEEK Filter	10 µm	1/16" OD	—
A-452	PEEK Filter, for small-neck (GL-38) bottles	2 µm	1/16" OD	—
A-453	PEEK Filter, for small-neck (GL-38) bottles	10 µm	1/16" OD	—

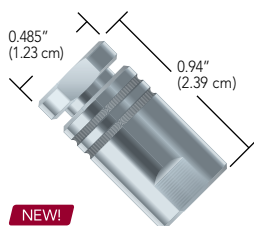
### Very High Pressure Filters

- Inline and precolumn configurations available
- Pressure rated to 15,000 psi (1,035 bar)
- Low internal volume

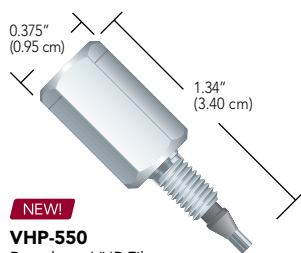
The two new VHP Filters are available for UHPLC applications, where filtering particulates from the system is extremely important to prolonging the life of sub-2 µm particle columns. Place the Inline VHP Filter between the pump and injection valve to prolong the life of the injection valve rotor seal by removing any particulates generated by wear of the pump seal. The small volume of the Inline Filter minimizes the introduction of dispersion in the system. Select from 0.2 or 0.5 µm porosity rating for both filter styles.

The unique Precolumn VHP Filter offers additional column protection designed to connect directly into the 10-32 coned port of your column or other piece of hardware. Incorporating a spring loaded, self-adjusting tube, the Precolumn Filter adjusts to any port depth, eliminating any possibility of dead volume. The Precolumn Filter can be reused in multiple ports and a good connection is ensured every time. The replacement product for the Precolumn Filter is easy to use and includes a fresh piece of stainless steel tubing, which extends the lifetime of the assembly.

Connect 1/16" OD and 10-32 coned fittings from pages 17, 19 and 20. The VHP Inline and Precolumn Filters include five replaceable frit assemblies, which can also be purchased separately in packs of ten.



**VHP-500**  
Inline VHP Filter



**VHP-550**  
Precolumn VHP Filter

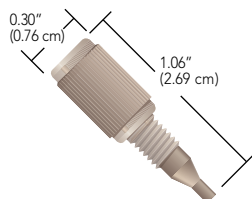
Part No.	Description	Porosity	Material	Includes	Threads	Volume	Qty.
<b>VHP FILTERS</b>							
<b>NEW!</b> VHP-500	Inline VHP Filter	0.5 µm	SST	(5) VHP-501	10-32 Coned	1.2 µL	ea.
<b>NEW!</b> VHP-505	Inline VHP Filter	0.2 µm	SST	(5) VHP-506	10-32 Coned	1.1 µL	ea.
<b>NEW!</b> VHP-501x	Replacement Inline VHP Frit	0.5 µm	SST	N/A	N/A	0.60 µL	10-pk
<b>NEW!</b> VHP-506x	Replacement Inline VHP Frit	0.2 µm	SST	N/A	N/A	0.54 µL	10-pk
<b>NEW!</b> VHP-550	Precolumn VHP Filter	0.5 µm	SST/PK	(5) VHP-551	10-32 Coned	1.9 µL	ea.
<b>NEW!</b> VHP-555	Precolumn VHP Filter	0.2 µm	SST/PK	(5) VHP-556	10-32 Coned	1.8 µL	ea.
<b>NEW!</b> VHP-551x	Replacement Precolumn VHP Frit Assembly	0.5 µm	SST	N/A	N/A	1.9 µL	10-pk
<b>NEW!</b> VHP-556x	Replacement Precolumn VHP Frit Assembly	0.2 µm	SST	N/A	N/A	1.8 µL	10-pk

### ColumnSaver™ Precolumn Filter

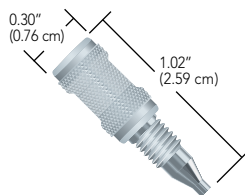
- ▶ Economical protection for your analytical column
- ▶ Finger tight to 6,000 psi (414 bar) without wrenches or other tools
- ▶ Lower dead volume than conventional filters with holders
- ▶ Universal connection compatible with all column manufacturers' fittings
- ▶ Compatibility with stainless steel or PEEK™ tubing

The PEEK ColumnSaver Precolumn Filters offer all the protection of conventional precolumn filters at a third of the cost. With its convenient direct connect design, changeover time is measured in seconds and no tools or wrenches are needed. The ColumnSaver PEEK body contains a HiFlo™ stainless steel or titanium filter element and is designed for maximum filtration of particulate matter with minimal dead volume or backpressure.

The stainless steel ColumnSaver Precolumn Filter offers similar benefits as the PEEK version, but it is especially designed for use in UHPLC applications. Manufactured with an all-stainless steel body and featuring a 2 µm stainless steel frit, the stainless steel ColumnSaver offers precolumn filtration protection in those applications where inline pressures can reach as high as 20,000 psi (1,379 bar). *(Please Note: Because of the design of this product, it needs to be wrench-tightened in place.)*



**9085-20-10**  
ColumnSaver  
Precolumn Filter



**9085-20-SS**  
ColumnSaver  
Precolumn Filter



### Related Products

For micro-scale chromatographic applications — where flow rates and sample sizes are significantly reduced from traditional analytical scale chromatography — try our M-550 or M-560 Precolumn MicroFilters on page 164.

### Application Note

The ColumnSaver can also be used as a convenient, fingertight inline filter when used with a 1/16" union. As soon as an increase in backpressure is detected, simply remove and dispose of the ColumnSaver unit and replace it with a new one. The direct-connect design is compatible with 1/16" 10-32 internal fitting ports featured on many standard, high pressure stainless steel unions.

Part No.	Description	Porosity	Threads	Material	Swept Volume	Pressure Rating	Qty.
<b>COLUMNSAVER PRECOLUMN FILTERS</b>							
<b>9085-05-10</b>	ColumnSaver Precolumn Filter, with SST frit	0.5 µm	10-32 Coned	PEEK	3.1 µL	6,000 psi (414 bar)	10-pk
<b>9085-20-10</b>	ColumnSaver Precolumn Filter, with SST frit	2 µm	10-32 Coned	PEEK	3.1 µL	6,000 psi (414 bar)	10-pk
<b>9085-20-SS</b>	ColumnSaver Precolumn Filter, with SST frit	2 µm	10-32 Coned	SST	2.04 µL	20,000 psi (1,379 bar)	ea.
<b>9085-20T</b>	ColumnSaver Precolumn Filter, with Titanium frit	2 µm	10-32 Coned	PEEK	3.1 µL	6,000 psi (414 bar)	ea.

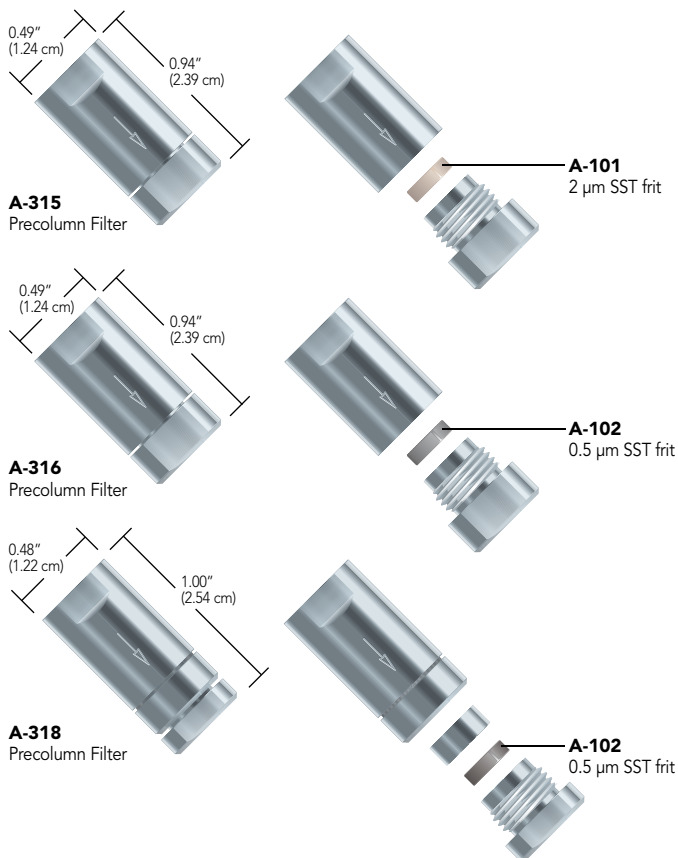
SST = Stainless Steel

## Precolumn Filters

- ▶ 0.5 µm or 2 µm porosity frits available
- ▶ Great column protection
- ▶ Feature stainless steel bodies and polymer-encased stainless steel frits

Upchurch Scientific® Standard Precolumn Filters have 0.020" (0.50 mm) diameter thru-holes and 8° distribution cones for minimal band spreading and mixing. They feature stainless steel bodies, and pressure rated to 6,000 psi (414 bar) and both accept 1/16" OD tubing and standard 10-32 threaded high pressure fittings.

With a 0.010" (0.25 mm) diameter thru-hole, our A-318 Filter has one of the lowest swept volumes (0.61 µL\*) of any analytical HPLC precolumn filter available, ensuring maximum protection with very little band broadening. Pressure rated to 6,000 psi (414 bar).

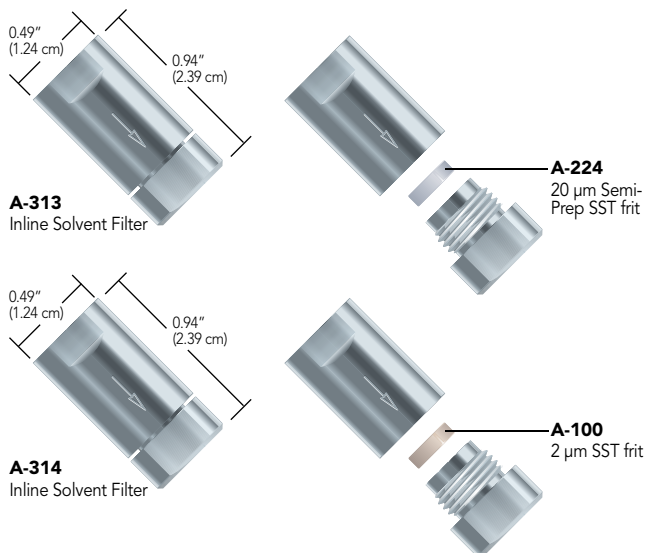


## Inline Solvent Filters

- ▶ Excellent for general purpose inline use
- ▶ 2 µm and 20 µm porosity frits available

Placed between the pump and sample injection valve, Inline Solvent Filters trap particles released through normal piston seal wear. Without an inline filter, particles can be flushed through your system's tubing to the sample injection valve, resulting in valve damage and further system contamination.

These filters are pressure rated to 6,000 psi (414 bar) and use a 2 µm or 20 µm stainless steel frit. An 8° distribution cone helps spread the flow of the mobile phase over the entire surface of the frit, while the 0.050" (1.3 mm) diameter thru-hole allows virtually unrestricted solvent flow rates.



## Related Products

### Fittings

All filters on these two pages have 10-32 internal threads for 1/16" OD tubing, conveniently allowing the use of Fingertight Fittings. Use any of the all-polymer 10-32 Fingertight Fittings found on pages 11, 13 and 15 with these filters. For the stainless steel filters, you may also use the 10-32 stainless steel fittings on page 10.

### Frits

Any of the polymer-ring encased frits from pages 167 – 171 with an overall diameter of 0.247" to 0.254" can be used with the filters on this page and the biocompatible precolumn filters.



**Top Seller** SEE STARRED PRODUCTS

Part No.	Description	Porosity	Threads	Includes	Swept Volume*	Pressure Rating
<b>PRECOLUMN FILTERS</b>						
★ A-315	Solvent Filter Assembly	2 µm	10-32 Coned	(1) A-101	1.4 µL	6,000 psi (414 bar)
★ A-316	Solvent Filter Assembly	0.5 µm	10-32 Coned	(1) A-102	1.3 µL	6,000 psi (414 bar)
★ A-318	Solvent Filter Assembly	0.5 µm	10-32 Coned	(1) A-102	0.84 µL	6,000 psi (414 bar)
A-101x	Replacement Frits, Stainless Steel, 10-pk	2 µm	—	—	0.74 µL	N/A
A-102x	Replacement Frits, Stainless Steel, 10-pk	0.5 µm	—	—	0.61 µL	N/A
<b>INLINE SOLVENT FILTERS</b>						
A-313	Solvent Filter Assembly	20 µm	10-32 Coned	(1) A-224	12.3 µL	6,000 psi (414 bar)
★ A-314	Solvent Filter Assembly	2 µm	10-32 Coned	(1) A-100	4 µL	6,000 psi (414 bar)
A-100x	Replacement Frits, Stainless Steel, 10-pk	2 µm	—	—	1.4 µL	N/A
A-224	Replacement Frits, Stainless Steel, ea.	20 µm	—	—	9.7 µL	N/A

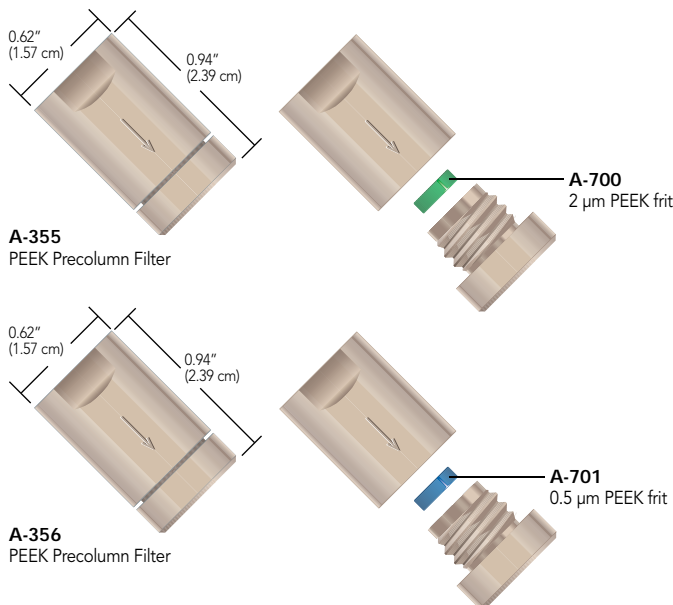
\*Swept volumes include/reflect theoretical frit volume values.



### 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

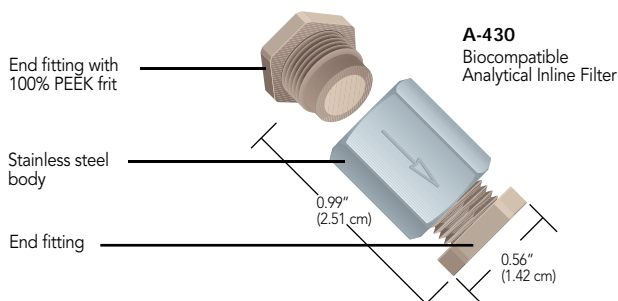
Upchurch Scientific® Biocompatible Precolumn Filters have 0.020" (0.50 mm) diameter thru-holes and 8° distribution cones for minimal band spreading and mixing. The bodies of these filters are manufactured from biocompatible PEEK polymer and are pressure rated to 5,000 psi (345 bar). These filters are designed for use with 1/16" OD tubing, which can be connected to these filters using standard Fingertight fittings.



### Biocompatible 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, one with a built-in 2 µm or 0.5 µm PEEK frit. Both filters are pressure rated to 6,000 psi (414 bar), with maximum recommended flow rates of 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. The end fittings have 10-32 female ports to connect 1/16" OD or smaller tubing using standard Fingertight fittings.



### Application Note

#### 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.

### Note

#### 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, smaller frit diameters, and lower overall internal volumes. 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.



**Top Seller** SEE STARRED PRODUCTS

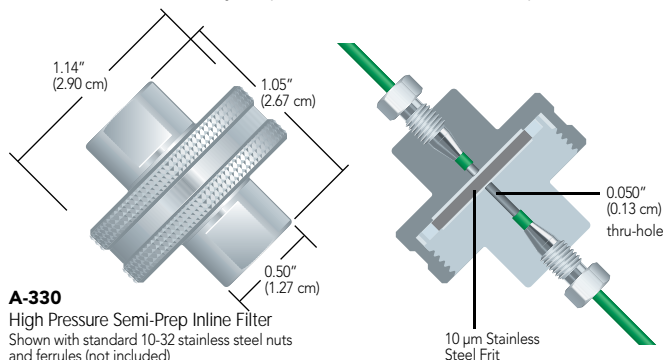
Part No.	Description	Porosity	Threads	Includes	Swept Volume*	Pressure Rating
<b>BIOCOMPATIBLE PRECOLUMN FILTERS</b>						
★ <b>A-355</b>	Solvent Filter Assembly, Biocompatible	2 µm	10-32 Coned	(1) A-700	1.4 µL	5,000 psi (345 bar)
★ <b>A-356</b>	Solvent Filter Assembly, Biocompatible	0.5 µm	10-32 Coned	(1) A-701	1.3 µL	5,000 psi (345 bar)
<b>A-700</b>	Replacement Frit, PEEK Polymer, ea.	2 µm	—	—	0.74 µL	N/A
<b>A-701</b>	Replacement Frit, PEEK Polymer, ea.	0.5 µm	—	—	0.61 µL	N/A
<b>BIOCOMPATIBLE INLINE FILTERS</b>						
★ <b>A-430</b>	Biocompatible Filter Assembly	2 µm	10-32 Coned	(1) A-429	7.1 µL	6,000 psi (414 bar)
<b>A-431</b>	Biocompatible Filter Assembly	0.5 µm	10-32 Coned	(1) A-428	5.9 µL	6,000 psi (414 bar)
<b>A-428x</b>	PEEK Filter End Fittings, Black PEEK body, 10-pk	0.5 µm	10-32 Coned	—	5.7 µL	N/A
★ <b>A-429x</b>	PEEK Filter End Fittings, Natural PEEK body, 10-pk	2 µm	10-32 Coned	—	6.9 µL	N/A

\* Swept volumes include/reflect theoretical frit volume values.

## Semi-Prep Inline Filters

- Designed for high flow applications

The A-330 High Pressure Semi-Prep Filter has a swept volume of 223  $\mu$ L and has been tested with water at flow rates up to 100 mL/min. At this rate the filter adds only 50 psi (3 bar) additional back pressure.

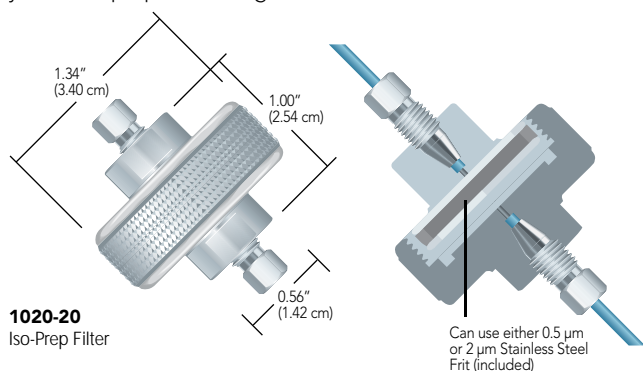


**A-330**  
High Pressure Semi-Prep Inline Filter  
Shown with standard 10-32 stainless steel nuts and ferrules (not included)

## Iso-Prep™ Filters

- Economical protection for preparative HPLC columns and injectors
- SFC & HPLC compatible
- Ideal for columns with inner diameters from 21.2 to 50 mm ID

This preparative inline filter holder with replaceable frit will help protect your semi-prep column against contamination.



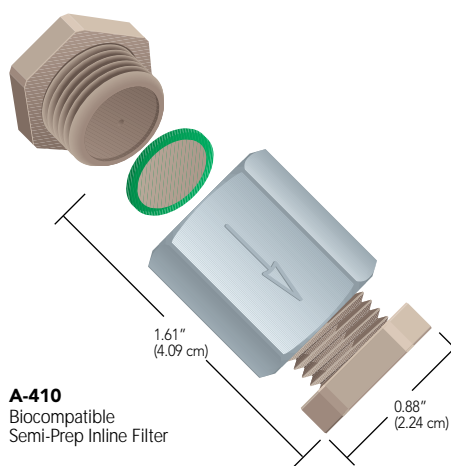
**1020-20**  
Iso-Prep Filter

## 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. The A-410 and A-411 are pressure rated to 6,000 psi (414 bar), while the A-510 and A-511 are for lower pressure applications and have threaded ports designed to connect large bore tubing. 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.

As an added benefit and for greater flexibility, the frits used with each of these assemblies are interchangeable.



**A-410**  
Biocompatible  
Semi-Prep Inline Filter



**Top Seller** SEE STARRED PRODUCTS

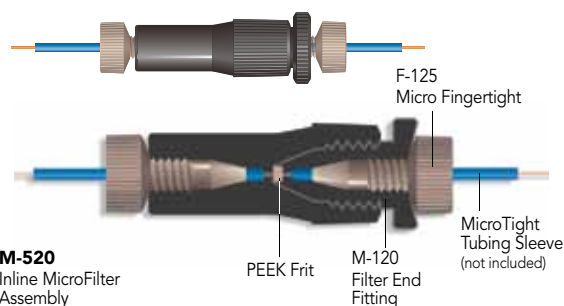
Part No.	Description	Porosity	Threads	Includes	Swept Volume*	Pressure Rating	Qty.
<b>SEMI-PREP INLINE FILTERS</b>							
★ A-330	Semi-Prep Filter Assembly	10 $\mu$ m	10-32 Coned	(1) A-331	223 $\mu$ L	7,500 psi (517 bar)	ea.
A-360	Semi-Prep Filter Assembly	10 $\mu$ m	5/16-24 Flat Bottom	(1) A-331	235 $\mu$ L	3,500 psi (207 bar)	ea.
A-331x	Stainless Steel Frits, Natural ETFE ring	10 $\mu$ m	N/A	N/A	142 $\mu$ L	N/A	10-pk
A-332x	Stainless Steel Frits, Natural ETFE ring	2 $\mu$ m	N/A	N/A	122 $\mu$ L	N/A	10-pk
A-337x	Stainless Steel Frits, Natural ETFE ring	20 $\mu$ m	N/A	N/A	152 $\mu$ L	N/A	10-pk
<b>ISO-PREP FILTERS</b>							
1020-05	21.2 mm Filter Holder	0.5 $\mu$ m	10-32 Coned	(1) 7031-05	203 $\mu$ L	8,000 psi (552 bar)	ea.
1020-20	21.2 mm Filter Holder	2 $\mu$ m	10-32 Coned	(1) 7031-20	196 $\mu$ L	8,000 psi (552 bar)	ea.
7031-05	21.2 mm Replacement Filter	0.5 $\mu$ m	N/A	N/A	122 $\mu$ L	8,000 psi (552 bar)	ea.
7031-20	21.2 mm Replacement Filter	2 $\mu$ m	N/A	N/A	115 $\mu$ L	8,000 psi (552 bar)	ea.
<b>BIOCOMPATIBLE SEMI-PREP INLINE FILTERS</b>							
★ A-410	Biocompatible Filter Assembly	2 $\mu$ m	10-32 Coned	(1) OC-802	89 $\mu$ L	6,000 psi (414 bar)	ea.
A-411	Biocompatible Filter Assembly	10 $\mu$ m	10-32 Coned	(1) OC-803	103 $\mu$ L	6,000 psi (414 bar)	ea.
A-510	Biocompatible Filter Assembly	5 $\mu$ m	5/16-24 Flat Bottom	(1) OC-805	89 $\mu$ L	500 psi (34 bar)	ea.
A-511	Biocompatible Filter Assembly	5 $\mu$ m	1/2-20 Flat Bottom	(1) OC-805	141 $\mu$ L	250 psi (17 bar)	ea.
OC-802	PEEK Frit, Green PCTFE ring	2 $\mu$ m	N/A	N/A	46 $\mu$ L	N/A	ea.
OC-803	PEEK Frit, Natural PCTFE ring	10 $\mu$ m	N/A	N/A	57 $\mu$ L	N/A	ea.
OC-805	PEEK Frit, Natural PCTFE ring	5 $\mu$ m	N/A	N/A	50 $\mu$ L	N/A	ea.

\*Swept volumes include/reflect theoretical frit volume values.

## Inline MicroFilters

- ▶ 100% biocompatible PEEK™ polymer option available
- ▶ A slow as low as 10 nL/min flow rate
- ▶ Two versions direct connect 1/32" OD tubing or use MicroTight™ tubing sleeve for 70–520 µm OD capillary tubing

Upchurch Scientific® Inline MicroFilters protect your column from particle soiling 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 or the M-135 with a stainless steel filtering screen version, 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

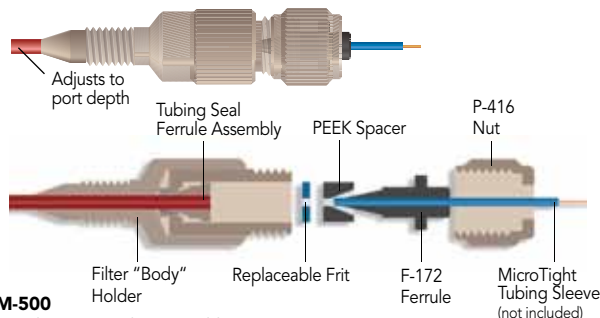


**M-525**  
Inline MicroFilter Assembly

## Precolumn MicroFilters

- ▶ Direct connect to column with 10-32 threads
- ▶ Total void volume of 0.5 µL
- ▶ Two versions direct connect 1/8" OD tubing or use MicroTight™ tubing sleeve for 70–520 µm OD capillary tubing

The Precolumn MicroFilters directly connect to 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 fits 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)

## Application Note

The Mini MicroFilter (page 165) and Inline MicroFilter can be used to pack capillary tubing. Simply place one of these filters on the effluent side of the capillary tubing, then simply pack. Once packed, place a filter at the head of the tubing. This creates a reliable capillary column without the need to slice and make frits or press filter paper inside the capillary tubing.



**Top Seller** SEE STARRED PRODUCTS

Part No.	Description	Porosity	For Tubing Size	Includes	Swept Volume*	Pressure Rating	Qty.
<b>INLINE MICROFILTERS</b>							
<b>M-135</b>	Inline MicroFilter Assembly, SST Screen	1 µm	MicroTight Tubing Sleeve	(5) M-130, (2) F-125	109 nL	4,000 psi (276 bar)	ea.
★ <b>M-520</b>	Inline MicroFilter Assembly, PEEK Frit	0.5 µm	MicroTight Tubing Sleeve	(5) M-120, (2) F-125	240 nL	4,000 psi (276 bar)	ea.
<b>M-525</b>	Inline MicroFilter Assembly, PEEK Frit	0.5 µm	1/32" OD	(5) M-140, (2) F-126	240 nL	4,000 psi (276 bar)	ea.
<b>REPLACEMENT INLINE MICROFILTER END-FITTINGS</b>							
★ <b>M-120x</b>	End-Fittings, Black, with PEEK Frit	0.5 µm	MicroTight Tubing Sleeve	N/A	216 nL	N/A	10-pk
<b>M-130x</b>	End-Fittings, Natural, with SST Filter Screen	1 µm	MicroTight Tubing Sleeve	N/A	85 nL	N/A	10-pk
<b>M-140x</b>	End-Fittings, Natural, with PEEK Frit	0.5 µm	1/32" OD	N/A	216 nL	N/A	10-pk
<b>PRECOLUMN MICROFILTER ASSEMBLIES</b>							
<b>M-500</b>	Precolumn MicroFilter Assembly, SST Frit	0.5 µm	MicroTight Tubing Sleeve	(5) C-425, (1) F-172, (1) P-416	0.5 µL	4,000 psi (276 bar)	ea.
<b>M-510</b>	Precolumn MicroFilter Assembly, PEEK Frit	0.5 µm	MicroTight Tubing Sleeve	(5) A-735, (1) F-172, (1) P-416	0.5 µL	4,000 psi (276 bar)	ea.
<b>M-550</b>	Precolumn MicroFilter Assembly, SST Frit	0.5 µm	1/16" OD	(5) C-425, (1) F-132, (1) P-416	0.5 µL	4,000 psi (276 bar)	ea.
★ <b>M-560</b>	Precolumn MicroFilter Assembly, PEEK Frit	0.5 µm	1/16" OD	(5) A-735, (1) F-132, (1) P-416	0.5 µL	4,000 psi (276 bar)	ea.
<b>REPLACEMENT PRECOLUMN MICROFILTER FRITS</b>							
★ <b>A-735x</b>	PEEK Frits, 0.045" x 0.031" x 0.192"	0.5 µm	N/A	N/A	216 nL	N/A	10-pk
<b>C-420x</b>	SST Frits, 0.038" x 0.028" x 0.192"	2 µm	N/A	N/A	101 nL	N/A	10-pk
<b>C-425x</b>	SST Frits, 0.038" x 0.028" x 0.192"	0.5 µm	N/A	N/A	101 nL	N/A	10-pk

SST = Stainless Steel

\* Swept volumes include/reflect theoretical frit volume values.

## Mini MicroFilters

- ▶ Total volume as low as 10 nL
- ▶ Conductive version for CEC and mass spectrometry applications
- ▶ Three versions 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 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.

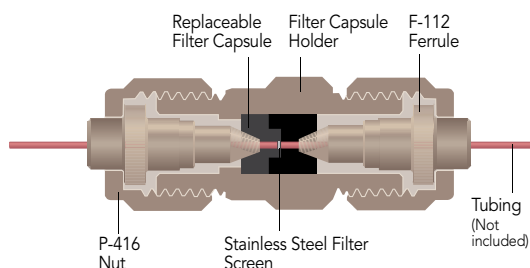
Apply voltage to the stainless steel filter holder body of the Conductive Mini MicroFilter for applications such as mass spectrometry and CEC analysis. The voltage is conducted through to the stainless steel portion of the 1 µm NanoFilter™ Capsule and on to the fluid stream. Try our Insulating Mounting Bracket on page 39 to apply voltage easily and more safely.



**M-530**  
Mini MicroFilter Assembly



**M-534**  
Conductive Mini MicroFilter Assembly



**M-542**  
Mini MicroFilter Assembly

### Note

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



**Top Seller** SEE STARRED PRODUCTS

Part No.	Description	Porosity	Frit Type	For use with Tubing	Includes	Swept Volume	Pressure Rating
<b>MINI MICROFILTER ASSEMBLY</b>							
<b>M-530</b>	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)
<b>M-531</b>	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)
<b>M-532</b>	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)
<b>M-533</b>	Mini MicroFilter Assembly	1 µm	SST Screen	360 µm OD	(5) M-123, (2) F-152, (2) P-416BLK	85 nL	4,000 psi (276 bar)
<b>M-537</b>	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)
★ <b>M-538</b>	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)
<b>M-542</b>	Mini MicroFilter Assembly	2 µm	SST Screen	1/32" (790 µm) OD	(5) M-132, (2) F-112, (2) P-416	97 nL	4,000 psi (276 bar)
<b>M-543</b>	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)
<b>M-547</b>	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)
<b>M-548</b>	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)
<b>M-534</b>	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)
<b>REPLACEMENT MINI MICROFILTER CAPSULES</b>							
Part No.	Description	Porosity	Frit Type	For Use With	Material	Swept Volume	Qty.
<b>M-121</b>	Filter Capsule	1 µm	SST Screen	M-530 and M-531	PEEK™	85 nL	2-pk
<b>M-122</b>	Filter Capsule	2 µm	SST Screen	M-530 and M-531	PEEK	85 nL	2-pk
<b>M-123</b>	Filter Capsule	1 µm	SST Screen	M-532 and M-533	PEEK	85 nL	2-pk
<b>M-124</b>	Filter Capsule	2 µm	SST Screen	M-532 and M-533	PEEK	85 nL	2-pk
<b>M-125</b>	NanoFilter Capsule	1 µm	SST Frit	M-537 and M-538	PEEK	10 nL	2-pk
★ <b>M-126</b>	NanoFilter Capsule	1 µm	Ti Frit	M-537 and M-538	PEEK	10 nL	2-pk
<b>M-131</b>	Filter Capsule	1 µm	SST Screen	M-542 and M-543	PEEK	85 nL	2-pk
<b>M-132</b>	Filter Capsule	2 µm	SST Screen	M-542 and M-543	PEEK	85 nL	2-pk
<b>M-133</b>	NanoFilter Capsule	1 µm	SST Frit	M-547 and M-548	PEEK	10 nL	2-pk
<b>M-134</b>	NanoFilter Capsule	1 µm	Ti Frit	M-548	PEEK	10 nL	2-pk
<b>M-128</b>	Conductive NanoFilter Capsule	1 µm	SST Frit	M-534	SST/PEEK	10 nL	2-pk

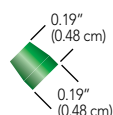
SST = Stainless Steel; Ti = Titanium

## Frit-In-A-Ferrule™

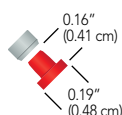
- ▶ Seals and filters simultaneously
- ▶ Less expensive and more convenient than traditional inline filter systems
- ▶ Available in both Flangeless and Super Flangeless™ versions

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.

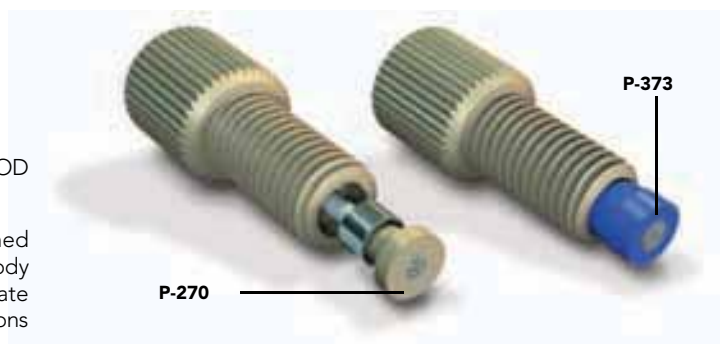
The Upchurch Scientific® Frit-In-A-Ferrule product line is designed to seal and filter simultaneously by incorporating a frit into the body of a flat-bottom ferrule. This simple design allows you to eliminate traditional inline filters and reduce the number of additional connections in your system.



**P-372**  
Flangeless Frit-In-A-Ferrule  
for 1/8" OD tubing



**NEW!**  
**P-276**  
Super Flangeless Frit-In-A-Ferrule  
for 1/16" OD tubing



## Related Products

Nuts that can be used with the Frit-In-A-Ferrule line:

- ▶ Super Flangeless, pages 21 – 23 and 30 – 31
- ▶ Flangeless, pages 24 – 27 and 30

## 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.



**Top Seller** SEE STARRED PRODUCTS

Part No.	Description	Porosity	Frit Material	Frit Diameter	Frit Thickness	Swept Volume	Maximum Pressure	Qty.
<b>FRIT-IN-A-FERRULE FOR 1/16" OD TUBING</b>								
<b>P-270x</b>	Super Flangeless, Natural PEEK™, SST lock ring	2 µm	SST	0.062"	0.062"	0.74 µL	2,500 psi (172 bar)	10-pk
<b>P-271x</b>	Super Flangeless, Black PEEK, SST lock ring	0.5 µm	SST	0.062"	0.062"	0.61 µL	2,500 psi (172 bar)	10-pk
<b>P-272x</b>	Flangeless, Green PCTFE	2 µm	SST	0.062"	0.062"	0.74 µL	2,000 psi (138 bar)	10-pk
<b>P-273x</b>	Flangeless, Blue PCTFE	0.5 µm	SST	0.062"	0.062"	0.61 µL	2,000 psi (138 bar)	10-pk
<b>P-274x</b>	Super Flangeless, Natural PEEK, SST lock ring	2 µm	PEEK	0.046"	0.030"	0.20 µL	2,500 psi (172 bar)	10-pk
★ <b>P-275x</b>	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
<b>NEW!</b> <b>P-276x</b>	Super Flangeless, Red ETFE, SST lock ring	10 µm	SST	0.062"	0.062"	0.90 µL	2,500 psi (172 bar)	10-pk
<b>FRIT-IN-A-FERRULE FOR 1/8" OD TUBING</b>								
<b>P-370x</b>	Super Flangeless*, Natural PEEK, SST lock ring	2 µm	SST	0.094"	0.062"	1.69 µL	2,500 psi (172 bar)	10-pk
<b>P-371x</b>	Super Flangeless*, Black PEEK, SST lock ring	0.5 µm	SST	0.094"	0.062"	1.41 µL	2,500 psi (172 bar)	10-pk
★ <b>P-372x</b>	Flangeless, Green PCTFE	2 µm	SST	0.094"	0.062"	1.69 µL	500 psi (34 bar)	10-pk
<b>P-373x</b>	Flangeless, Blue PCTFE	0.5 µm	SST	0.094"	0.062"	1.41 µL	500 psi (34 bar)	10-pk
<b>P-374x</b>	Super Flangeless*, Natural PEEK, SST lock ring	2 µm	PEEK	0.094"	0.042"	1.15 µL	2,500 psi (172 bar)	10-pk
<b>P-375x</b>	Super Flangeless*, Black PEEK, SST lock ring	0.5 µm	PEEK	0.094"	0.042"	0.96 µL	2,500 psi (172 bar)	10-pk
<b>DISPOSABLE HPLC SAMPLE FILTERS</b>								
<b>B-100</b>	Disposable Filters	2 µm	SST	—	—	—	—	100-pk
★ <b>B-101</b>	Disposable Filters	0.5 µm	SST	—	—	—	—	100-pk

\*The 1/8" Super Flangeless versions cannot be used in M6 ports.



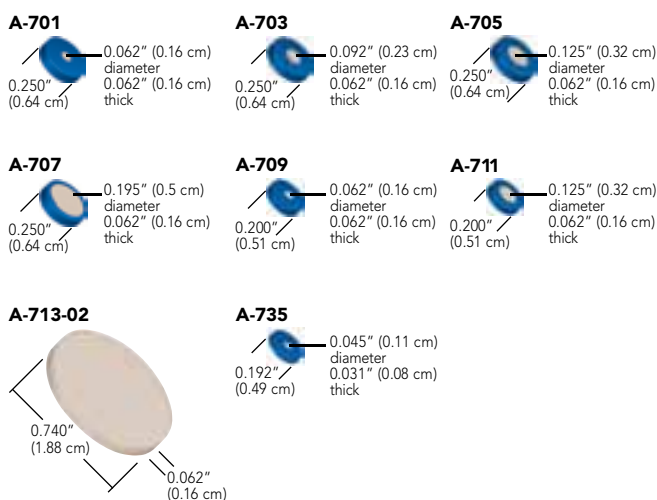
## PEEK™ Frits

- Inert, biocompatible and metal-free
- Uniform porosity, longer filtration life
- Sealing rings manufactured from PCTFE

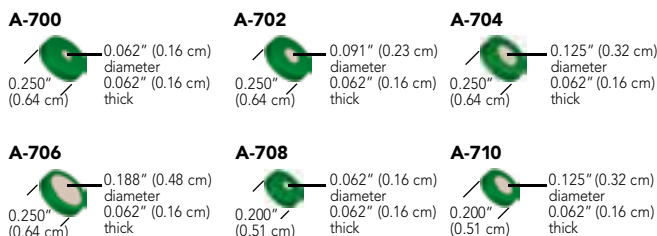
Patented Upchurch Scientific® PEEK Frits offer exceptionally uniform porosity. This property ensures longer filtration life and consistent frit-to-frit swept volumes. The PEEK polymer frit discs are biocompatible and inert to most solvents, making them well-suited for bioanalytical applications. PEEK's 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.

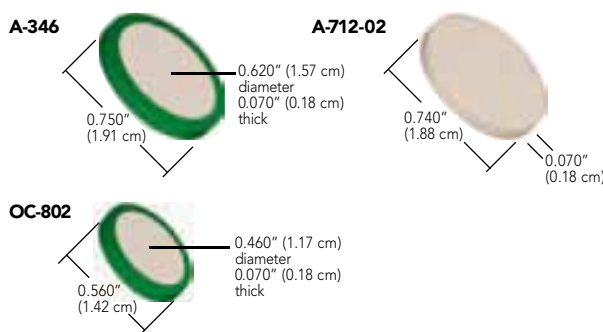
### 0.5 µm PEEK Frits



### 2 µm PEEK Frits



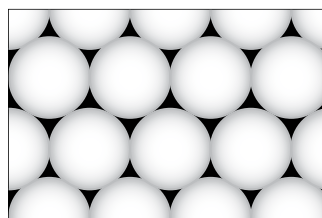
### 2 µm Semi-Prep PEEK Frits



## 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.

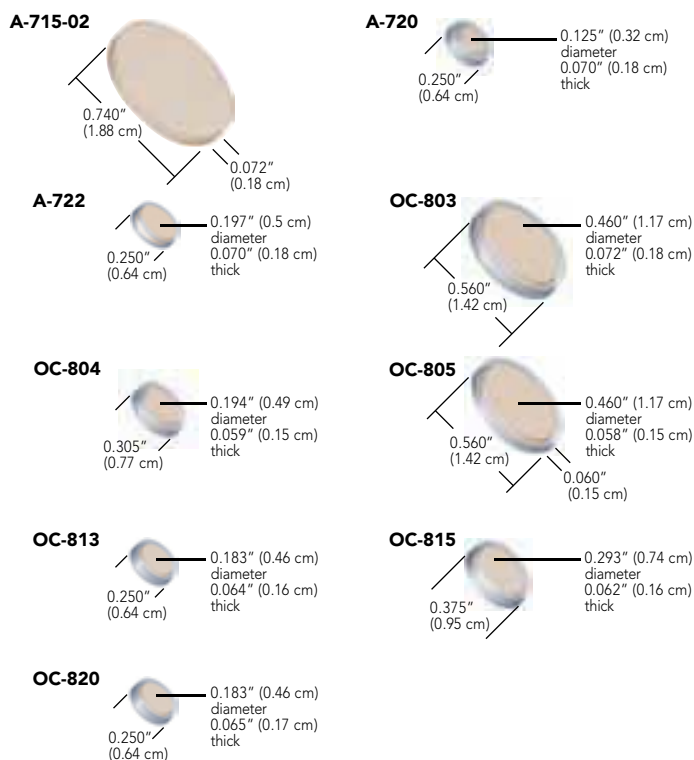
- 18% for 0.2 µm frits
- 20% for 0.5 µm frits
- 24% for 2 µm frits
- 26% for 5 µm frits
- 28% for 10 µm frits
- 30% for 20 µm frits

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).

Order Online  [WWW.IDEX-HS.COM](http://WWW.IDEX-HS.COM)

## PEEK™ Frits (cont.)

## 5 µm and 10 µm PEEK Frits



## 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 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 filters on page 161.

## PAT® and PEEK Frit Equivalents

PAT (PEEK alloyed with PTFE) frits are no longer available for purchase. PEEK frits are an excellent alternative to PAT frits. The table below shows the PEEK frit equivalents for the now obsolete PAT frit line. Still unsure of what size to order? Please contact us for more information.

Obsolete PAT Frits 5 µm	PEEK Frit Equivalent 5 µm	PEEK Frit Equivalent 10 µm
9000-0432	OC-813	A-720 A-722
9000-0435	OC-813	A-720 A-722
9000-0451	OC-815	N/A
6145-3500	N/A	OC-803



**Top Seller** SEE STARRED PRODUCTS

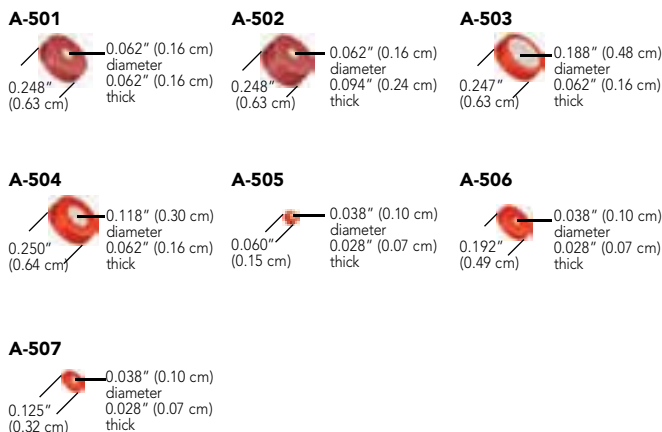
Part No.	Porosity	Disc Diameter	Disc Thickness	Ring OD	Ring Material	Frit Volume	Qty.
<b>PEEK FRITS</b>							
★ <b>A-700</b>	2 µm	0.062" (0.16 cm)	0.062" (0.16 cm)	0.250" (0.64 cm)	PCTFE	0.7 µL	ea.
★ <b>A-701</b>	0.5 µm	0.062" (0.16 cm)	0.062" (0.16 cm)	0.250" (0.64 cm)	PCTFE	0.6 µL	ea.
<b>A-702</b>	2 µm	0.091" (0.23 cm)	0.062" (0.16 cm)	0.250" (0.64 cm)	PCTFE	1.7 µL	ea.
<b>A-703</b>	0.5 µm	0.092" (0.23 cm)	0.062" (0.16 cm)	0.250" (0.64 cm)	PCTFE	1.4 µL	ea.
<b>A-704</b>	2 µm	0.125" (0.32 cm)	0.062" (0.16 cm)	0.250" (0.64 cm)	PCTFE	3.0 µL	ea.
<b>A-705</b>	0.5 µm	0.125" (0.32 cm)	0.062" (0.16 cm)	0.250" (0.64 cm)	PCTFE	2.4 µL	ea.
★ <b>A-706</b>	2 µm	0.188" (0.48 cm)	0.062" (0.16 cm)	0.250" (0.64 cm)	PCTFE	7.1 µL	ea.
★ <b>A-707</b>	0.5 µm	0.195" (0.5 cm)	0.062" (0.16 cm)	0.250" (0.64 cm)	PCTFE	6.1 µL	ea.
<b>A-708</b>	2 µm	0.062" (0.16 cm)	0.062" (0.16 cm)	0.200" (0.51 cm)	PCTFE	0.7 µL	ea.
<b>A-709</b>	0.5 µm	0.062" (0.16 cm)	0.062" (0.16 cm)	0.200" (0.51 cm)	PCTFE	0.6 µL	ea.
<b>A-710</b>	2 µm	0.125" (0.32 cm)	0.062" (0.16 cm)	0.200" (0.51 cm)	PCTFE	3.0 µL	ea.
<b>A-711</b>	0.5 µm	0.125" (0.32 cm)	0.062" (0.16 cm)	0.200" (0.51 cm)	PCTFE	2.5 µL	ea.
<b>A-713-02</b>	0.5 µm	0.740" (1.88 cm)	0.062" (0.16 cm)	N/A	N/A	87.4 µL	ea.
<b>A-735</b>	0.5 µm	0.045" (0.11 cm)	0.031" (0.08 cm)	0.192" (0.23 cm)	PCTFE	0.2 µL	ea.
<b>SEMI-PREP PEEK FRITS</b>							
<b>A-346</b>	2 µm	0.620" (0.16 cm)	0.070" (0.18 cm)	0.750" (1.91 cm)	PCTFE	85.5 µL	ea.
<b>A-712-02</b>	2 µm	0.740" (1.88 cm)	0.070" (0.18 cm)	N/A	N/A	115.2 µL	ea.
<b>A-715-02</b>	10 µm	0.740" (1.88 cm)	0.072" (0.18 cm)	N/A	N/A	142.1 µL	ea.
★ <b>A-720</b>	10 µm	0.125" (0.32 cm)	0.070" (0.18 cm)	0.250" (0.64 cm)	PCTFE	4.2 µL	ea.
★ <b>A-722</b>	10 µm	0.197" (0.5 cm)	0.070" (0.18 cm)	0.250" (0.64 cm)	PCTFE	9.9 µL	ea.
★ <b>OC-802</b>	2 µm	0.460" (1.17 cm)	0.070" (0.18 cm)	0.560" (1.42 cm)	PCTFE	46.4 µL	ea.
<b>OC-803</b>	10 µm	0.460" (1.17 cm)	0.072" (0.18 cm)	0.560" (1.42 cm)	PCTFE	57.2 µL	ea.
<b>OC-804</b>	10 µm	0.194" (0.49 cm)	0.059" (0.15 cm)	0.305" (0.77 cm)	PCTFE	8.4 µL	ea.
<b>OC-805</b>	5 µm	0.460" (1.17 cm)	0.058" (0.15 cm)	0.560" (1.42 cm)	PCTFE	41.1 µL	ea.
<b>OC-813</b>	5 µm	0.183" (0.46 cm)	0.064" (0.16 cm)	0.250" (0.64 cm)	PCTFE	7.2 µL	ea.
<b>OC-815</b>	5 µm	0.293" (0.74 cm)	0.062" (0.16 cm)	0.375" (0.95 cm)	PCTFE	17.8 µL	ea.
<b>OC-820</b>	10 µm	0.183" (0.46 cm)	0.065" (0.17 cm)	0.250" (0.64 cm)	PCTFE	7.8 µL	ea.

## Titanium Frits

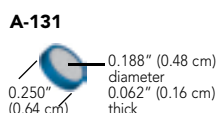
- ▶ Excellent alternative to stainless steel
- ▶ PEEK™ or PCTFE polymer rings

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 Upchurch Scientific® filters and guard columns.

### 0.2 µm Titanium Frits



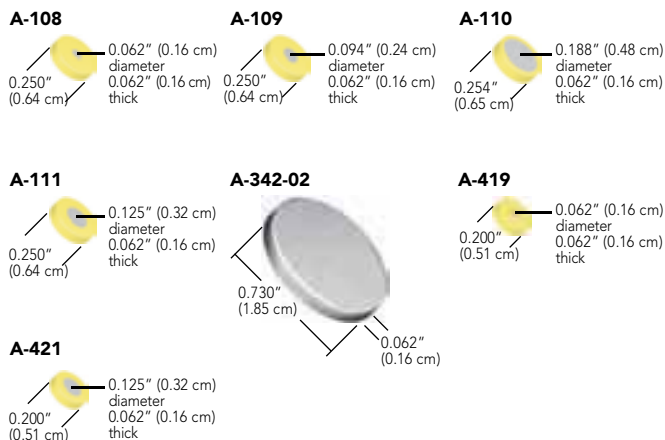
### 0.5 µm Titanium Frit



## 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.

### 2 µm Titanium Frits

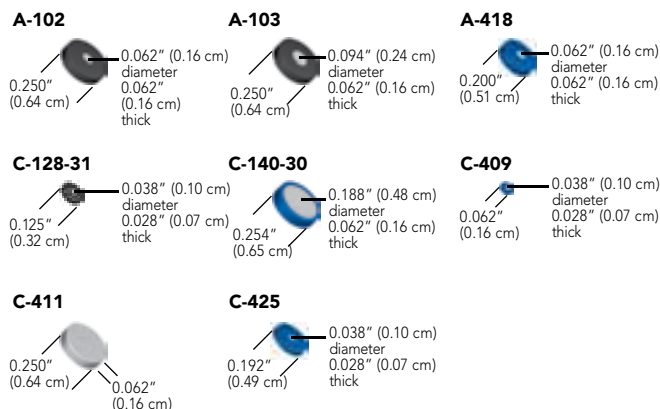


Part No.	Porosity	Disc Diameter	Disc Thickness	Ring OD	Ring Material	Frit Volume	Qty.
<b>TITANIUM FRITS</b>							
<b>A-108x</b>	2 µm	0.062" (0.16 cm)	0.062" (0.16 cm)	0.250" (0.64 cm)	PCTFE	0.7 µL	10-pk
<b>A-109x</b>	2 µm	0.094" (0.24 cm)	0.062" (0.16 cm)	0.250" (0.64 cm)	PCTFE	1.6 µL	10-pk
<b>A-110x</b>	2 µm	0.188" (0.48 cm)	0.062" (0.16 cm)	0.254" (0.65 cm)	PCTFE	7.1 µL	10-pk
<b>A-111</b>	2 µm	0.125" (0.32 cm)	0.062" (0.16 cm)	0.250" (0.64 cm)	PCTFE	2.7 µL	ea.
<b>A-131</b>	0.5 µm	0.188" (0.48 cm)	0.062" (0.16 cm)	0.250" (0.64 cm)	PCTFE	5.6 µL	ea.
<b>A-342-02</b>	2 µm	0.730" (1.85 cm)	0.062" (0.16 cm)	N/A	N/A	93.6 µL	ea.
<b>A-419</b>	2 µm	0.062" (0.16 cm)	0.062" (0.16 cm)	0.200" (0.51 cm)	PCTFE	0.7 µL	ea.
<b>A-421</b>	2 µm	0.125" (0.32 cm)	0.062" (0.16 cm)	0.200" (0.51 cm)	PCTFE	2.7 µL	ea.
<b>A-501</b>	0.2 µm	0.062" (0.16 cm)	0.062" (0.16 cm)	0.248" (0.63 cm)	PEEK	0.6 µL	ea.
<b>A-502</b>	0.2 µm	0.062" (0.16 cm)	0.094" (0.24 cm)	0.248" (0.63 cm)	PEEK	0.8 µL	ea.
<b>A-503</b>	0.2 µm	0.188" (0.48 cm)	0.062" (0.16 cm)	0.247" (0.63 cm)	PCTFE	5.1 µL	ea.
<b>A-504</b>	0.2 µm	0.118" (0.30 cm)	0.062" (0.16 cm)	0.250" (0.64 cm)	PCTFE	2 µL	ea.
<b>A-505</b>	0.2 µm	0.038" (0.10 cm)	0.028" (0.07 cm)	0.060" (0.15 cm)	PCTFE	0.1 µL	ea.
<b>A-506</b>	0.2 µm	0.038" (0.10 cm)	0.028" (0.07 cm)	0.192" (0.49 cm)	PCTFE	0.1 µL	ea.
<b>A-507</b>	0.2 µm	0.038" (0.10 cm)	0.028" (0.07 cm)	0.125" (0.32 cm)	PCTFE	0.1 µL	ea.

## Stainless Steel Frits

Upchurch Scientific® 316 Analytical-scale 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 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

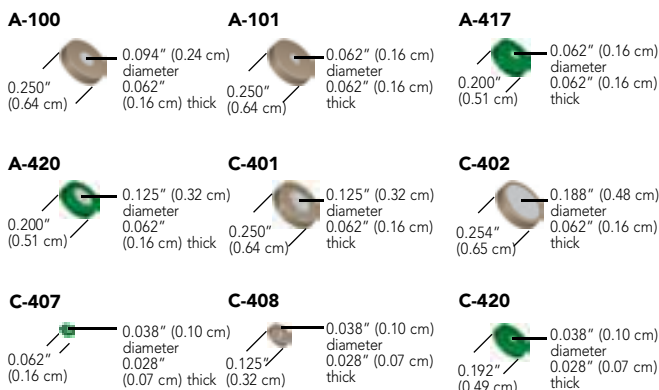


## Application Note

### 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 accidentally 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.

### 2 µm Stainless Steel Frits



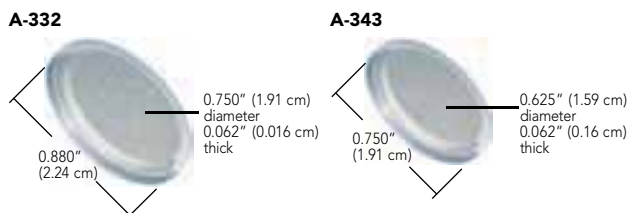
**Top Seller** SEE STARRED PRODUCTS

Part No.	Porosity	Disc Diameter	Disc Thickness	Ring OD	Ring Material	Frit Volume	Qty.
<b>STAINLESS STEEL FRITS</b>							
★ <b>A-100x</b>	2 µm	0.094" (0.24 cm)	0.062" (0.16 cm)	0.250" (0.64 cm)	PEEK	1.7 µL	10-pk
★ <b>A-101x</b>	2 µm	0.062" (0.16 cm)	0.062" (0.16 cm)	0.250" (0.64 cm)	PEEK	0.7 µL	10-pk
★ <b>A-102x</b>	0.5 µm	0.062" (0.16 cm)	0.062" (0.16 cm)	0.250" (0.64 cm)	PEEK	0.6 µL	10-pk
★ <b>A-103x</b>	0.5 µm	0.094" (0.24 cm)	0.062" (0.16 cm)	0.250" (0.64 cm)	PEEK	1.4 µL	10-pk
<b>A-417</b>	2 µm	0.062" (0.16 cm)	0.062" (0.16 cm)	0.200" (0.51 cm)	PCTFE	0.7 µL	ea.
<b>A-418</b>	0.5 µm	0.062" (0.16 cm)	0.062" (0.16 cm)	0.200" (0.51 cm)	PCTFE	0.6 µL	ea.
<b>A-420</b>	2 µm	0.125" (0.32 cm)	0.062" (0.16 cm)	0.200" (0.51 cm)	PCTFE	3.0 µL	ea.
<b>C-128-31</b>	0.5 µm	0.094" (0.10 cm)	0.028" (0.07 cm)	0.125" (0.32 cm)	PEEK	0.1 µL	ea.
<b>C-140-30x</b>	0.5 µm	0.188" (0.48 cm)	0.062" (0.16 cm)	0.254" (0.65 cm)	PCTFE	6.5 µL	10-pk
<b>C-401x</b>	2 µm	0.125" (0.32 cm)	0.062" (0.16 cm)	0.250" (0.64 cm)	PEEK	3.0 µL	10-pk
<b>C-402x</b>	2 µm	0.188" (0.48 cm)	0.062" (0.16 cm)	0.254" (0.65 cm)	PEEK	7.8 µL	10-pk
<b>C-407x</b>	2 µm	0.038" (0.10 cm)	0.028" (0.07 cm)	0.062" (0.16 cm)	PCTFE	0.1 µL	10-pk
<b>C-408x</b>	2 µm	0.038" (0.10 cm)	0.028" (0.07 cm)	0.125" (0.32 cm)	PEEK	0.1 µL	10-pk
<b>C-409x</b>	0.5 µm	0.038" (0.10 cm)	0.028" (0.07 cm)	0.062" (0.16 cm)	PCTFE	0.1 µL	10-pk
<b>C-411</b>	0.5 µm	0.250" (0.64 cm)	0.062" (0.16 cm)	N/A	N/A	10.0 µL	ea.
<b>C-420x</b>	2 µm	0.038" (0.10 cm)	0.028" (0.07 cm)	0.192" (0.49 cm)	PCTFE	0.1 µL	10-pk
<b>C-425x</b>	0.5 µm	0.038" (0.10 cm)	0.028" (0.07 cm)	0.192" (0.49 cm)	PCTFE	0.1 µL	10-pk

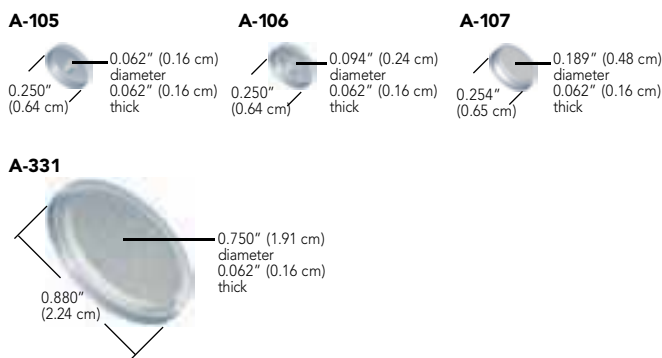
## Stainless Steel Semi-Prep Frits

Many of these frits come complete with a PCTFE, ETFE or PTFE resin 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.

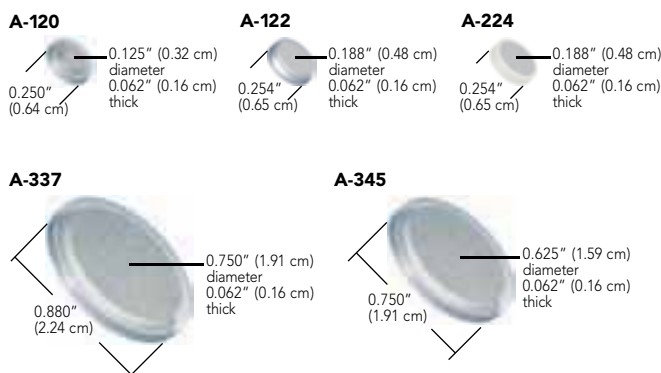
### 2 µm Semi-Prep Stainless Steel Frits



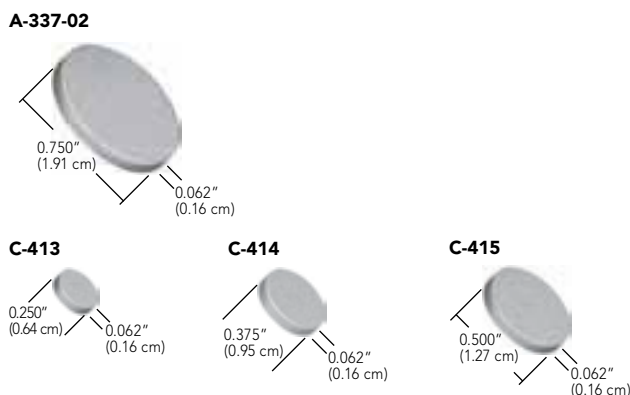
### 10 µm Semi-Prep Stainless Steel Frits



### 20 µm Semi-Prep Stainless Steel Frits



### Stainless Steel Frit Discs



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### 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.
<b>SEMI-PREP STAINLESS STEEL FRITS</b>							
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)	0.250" (0.64 cm)	PCTFE	2.0 µL	10-pk
A-107x	10 µm	0.189" (0.48 cm)	0.062" (0.16 cm)	0.254" (0.65 cm)	PCTFE	9.1 µL	10-pk
A-120x	20 µm	0.125" (0.32 cm)	0.062" (0.16 cm)	0.250" (0.64 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)	PCTFE	9.7 µL	10-pk
A-224	20 µm	0.188" (0.48 cm)	0.062" (0.16 cm)	0.254" (0.65 cm)	PTFE	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)	0.062" (0.16 cm)	0.880" (2.24 cm)	ETFE	152 µL	10-pk
A-343	2 µm	0.625" (1.59 cm)	0.062" (0.16 cm)	0.750" (1.91 cm)	PCTFE	112.6 µL	ea.
A-345	20 µm	0.625" (1.59 cm)	0.062" (0.16 cm)	0.750" (1.91 cm)	PCTFE	93.5 µL	ea.
<b>STAINLESS STEEL FRIT DISCS (NO POLYMER RINGS)</b>							
A-335-02	2 µm	0.750" (1.91 cm)	0.062" (0.16 cm)	N/A	N/A	107.7 µL	ea.
A-336-02	10 µm	0.750" (1.91 cm)	0.062" (0.16 cm)	N/A	N/A	125.7 µL	ea.
A-337-02	20 µm	0.750" (1.91 cm)	0.062" (0.16 cm)	N/A	N/A	134.7 µL	ea.
C-400x	2 µm	0.250" (0.64 cm)	0.062" (0.16 cm)	N/A	N/A	12 µL	10-pk
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.

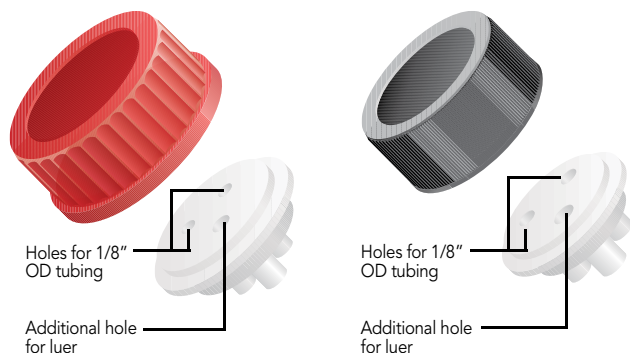


## Bottle Caps

- ▶ 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 allow many connection options we have just what you need! The Bottle Caps fit standard GL45 (1 L) or smaller neck GL38 (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 functions. 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 right.



**A-620**  
GL-45 Bottle Cap  
for 1/8" tubing

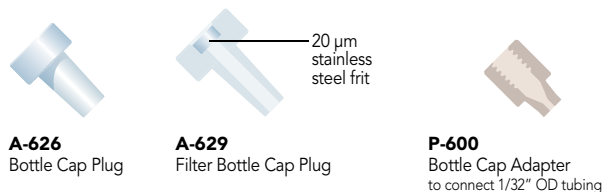
**A-622**  
GL-38 Bottle Cap  
for 1/8" tubing

## Bottle Cap Plugs and 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 1/8" or 1/16" 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 frits in these products prevent 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).

Our P-600 Bottle Cap Adapter is designed to allow the use of 1/32" OD tubing with our caps. Just insert the Adapter into a tubing cap hole, then connect your 1/32" OD tubing with our F-126S or F-126H Micro Tight Fitting (page 18).



**A-626**  
Bottle Cap Plug

**A-629**  
Filter Bottle Cap Plug

**P-600**  
Bottle Cap Adapter  
to connect 1/32" OD tubing

## Application Note

- ▶ A self-regulating sparging system can help reduce helium consumption and improve pump performance. Set it up by pressing your tubing through the appropriate hole 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) in the remaining port of the cap. The sparging gas will shut off once the incoming pressure equals the pressure inside the reservoir. A stream of mobile phase is consumed and the internal pressure lowers sparging gas inlet to keep the system pressurized and degassed. Please Note: If a leak is while pressurizing the bottle, try removing the sealing ring from the bottle, as it sometimes interferes with the sealing of Upchurch Scientific bottle caps.
- ▶ One concern with sparging system is the possibility for solvent backing up the sparging inlet line. This is an occurrence if the gas is completely vacated with the regulating valve open, creating a vacuum in the tubing. Solvent backup may damage sparging system components and cause contamination of mobile phase reservoirs. To help prevent solvent backup, install the CV-3010 In-Line 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 System HP LC Vacuum Degassing System on page 177–178.
- ▶ Please see the Quick-Stop Luer Check Valve on page 151 for another solvent application note.

## Note

The A-610 and A-610B Bottle Cap have a slightly different configuration than the other caps. One hole accepts 1/8" OD tubing, the typical size used with a Waters® system. 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 ultra-polymer tubing with these bottle caps (pages 50–73).



**Top Seller** SEE STARRED PRODUCTS

### 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
- A-632** for 1/16" 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
- P-600** Bottle Cap Adapter for 1/8" hole, PEEK™ to connect 1/32" OD tubing using F-126 or F-126H fitting (page 18)



# Fittings



Deburring an Upchurch Scientific® fitting in Oak Harbor, WA.



**NEW!**

The Very High Pressure (VHP) reusable fitting, VHP-320, is one of the exciting new products in the VHP family featured on page 6



## New All-Inclusive Fittings Chapter

In this catalog, we've taken an all-inclusive 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.

By including the pressure rating of the fittings, there are other important features to bear in mind. You select the appropriate fitting for your application.

**THREADS** (10-32, 6-32, M6, etc.)

**TUBING SIZE** (1/16", 1/32", 360 µm, etc.)

**PORT GEOMETRY** (Coned, Flat-bottom)

Specifications at the bottom of each page include the following:

- ▶ Part numbers
- ▶ Part description
- ▶ Materials for construction
- ▶ Start and stop packaging
- ▶ Pressure ratings
- ▶ Available colors

Additionally, you will find "fitting" related applications notes, if available, for each ordering option to help you utilize the chapter.

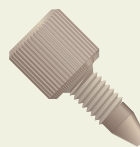
Please Note: in the product descriptions, a "Fitting" refers to a complete product ready to assemble and connect tubing into a part. This could be a one-piece connector or a nut and ferrule packaged together. A "Nut" indicates the male or female threaded product sold separately, and a "Ferrule" is sold 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 each engineering specification is based on the ISO 15848-1 standard. The ISO 15848-1 standard is the most reliable, proven product in the market. We have implemented the most stringent testing protocols and agency safety requirements 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](http://www.idex-hs.com), or contact us directly.

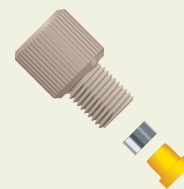
### FINGERTIGHT FITTINGS

Found on pages 11 – 15



### SUPER FLANGELESS™ FITTINGS

Found on pages 21 – 23



### TUBING SLEEVES

Found on pages 19 – 20



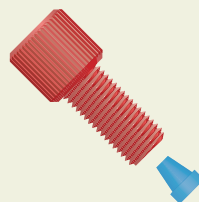
### MICROTIGHT® FITTINGS

Found on pages 18 – 19



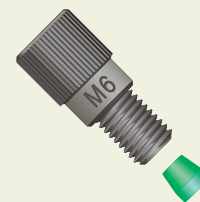
### FLANGELESS FITTINGS

Found on pages 24 – 26



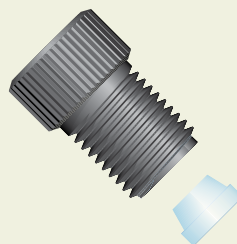
### FLANGELESS FITTINGS FOR METRIC SIZED TUBING

Found on page 27



### FITTINGS FOR 3/16" TO 5/16" OD TUBING

Found on pages 30

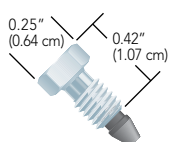


## Reusable Very High Pressure (VHP) Fittings

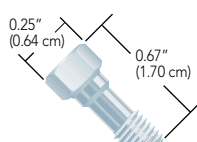
- ▶ Pressure rated up to 25,000 psi (1,720 bar)
- ▶ Patent pending innovative design
- ▶ Capable of up to ten repeat assembly cycles with no impact on pressure holding ability or carry-over
- ▶ Available in 10-32 threads for 1/16" OD tubing and M4 threads for 1/32" OD tubing
- ▶ Materials of construction: 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.

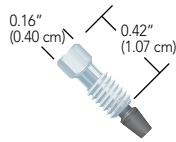
The Reusable VHP fittings can be reused when following the tightening torque specification listed below. With a polymer front ferrule, there is no damage to the tubing or receiving port, also increasing the life of these components.



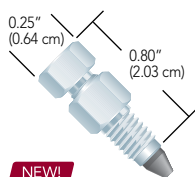
**NEW!**  
**VHP-320**  
10-32 VHP Fitting  
for 1/16" OD tubing



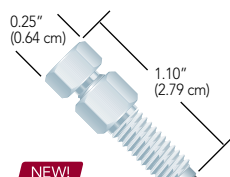
**NEW!**  
**VHP-325**  
10-32 VHP Fitting, Long  
for 1/16" OD tubing



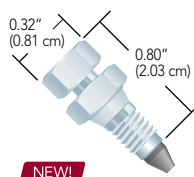
**NEW!**  
**VHP-920**  
M4 VHP Fitting  
for 1/32" OD tubing



**NEW!**  
**VHP-300**  
10-32 VHP Fitting  
for 1/16" OD tubing



**NEW!**  
**VHP-305**  
10-32 VHP Fitting, Long  
for 1/16" OD tubing



**NEW!**  
**VHP-310**  
10-32 VHP Fitting  
for 1/16" OD tubing



## Application Note

### Reusability

- ▶ Using a reusable fitting eliminates the problems described on stainless steel fitting interchangeability on page 196 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.

## Note

The pressure rating provided is an indication of the capability of the fitting, not the tubing; you should always confirm that your flow path tubing is capable of your system pressures to ensure operator safety.

## Related Products

Find tightening tools on page 8 designed to deliver the torque necessary for these fittings.

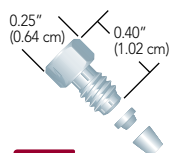
Part No.	Description	Port	Pressure Rating	Required Torque	Head Style	Material	Qty.
<b>REUSABLE VHP FITTINGS</b>							
<b>NEW!</b> VHP-300x	VHP Fitting for 1/16" OD	10-32 Coned	20,000 psi (1,380 bar)	10 in-lbs (1.10 N-m)	1/4" Hex	SST/PK	10-pk
<b>NEW!</b> VHP-305x	VHP Fitting for 1/16" OD, Long	10-32 Coned	20,000 psi (1,380 bar)	10 in-lbs (1.10 N-m)	1/4" Hex	SST/PK	10-pk
<b>NEW!</b> 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
<b>NEW!</b> 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
<b>NEW!</b> 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
<b>NEW!</b> 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



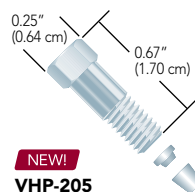
## Stainless Steel VHP Fittings

- ▶ 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 below. 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.



**NEW!**  
**VHP-200**  
VHP 10-32 Fitting  
for 1/16" OD tubing



**NEW!**  
**VHP-205**  
VHP 10-32 Fitting, Long  
for 1/16" OD tubing

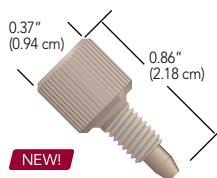


**NEW!**  
**VHP-900**  
VHP M4 Fitting  
for 1/32" OD tubing

## All-PEEK™ VHP Fitting

- ▶ Manufactured from 100% PEEK
- ▶ Patent pending
- ▶ Available with 10-32 threads for 1/16" OD tubing
- ▶ Pressure rated to 10,000 psi (690 bar)

In a one-piece design, the VHP-150 is an all-PEEK fitting that can operate up to 10,000 psi on PEEK tubing. Using a similar captive ferrule as the VHP-320 series fittings on the previous page, the patent-pending fitting design is also reusable up to 10 cycles, decreasing down time during any hardware changes. Instead of having to replace tubing and fittings if a new column is changed, the re-usable all-PEEK fitting will be able to be adjusted to the new dimension X depth. Created specifically for ion chromatography, the VHP-150 will add connection confidence at ultra high pressures.



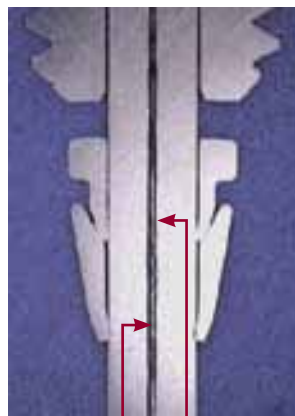
**NEW!**  
**VHP-150**  
VHP 10-32 Fitting  
for 1/16" OD tubing

## Application Note

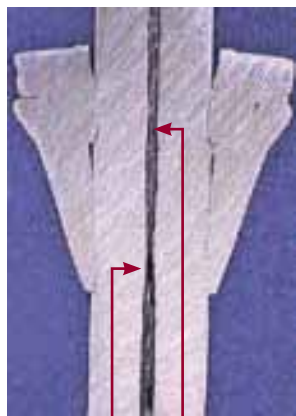
In order to seal up to the stated pressure rating, the VHP-200-01 ferrule requires 20 in-lbs (2.25 N·m) of torque. Similar ferrules on the market require tightening torque of at least 30 in-lbs (3.3 N·m), which can result in a restricted tubing passage, as shown in the picture below. This restriction 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

### Conventional Two Piece Ferrule Design



Uniform Tubing Passage



Constricted Tubing Passage

Part No.	Description	Port	Pressure Rating	Required Torque	Head Style	Material	Qty.
<b>STAINLESS STEEL VHP FITTINGS (INCLUDES NUT AND FERRULE)</b>							
<b>NEW!</b> 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
<b>NEW!</b> 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
<b>NEW!</b> 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
<b>STAINLESS STEEL VHP FERRULES</b>							
<b>NEW!</b> 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
<b>NEW!</b> 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
<b>PEEK VHP FITTING</b>							
<b>NEW!</b> VHP-150x	VHP Fitting for 1/16" OD	10-32 Coned	6,000 psi (414 bar)/ 10,000 psi (690 bar)	2 in-lbs (0.22 N·m)/5 in-lbs (0.55 N·m)	Standard Knurl	PEEK, Natural	10-pk

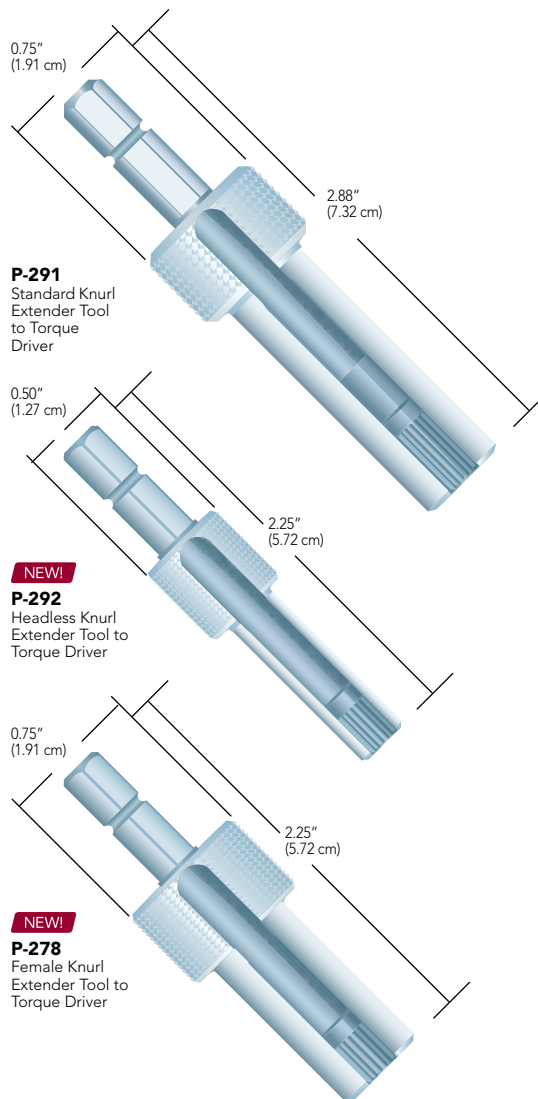
## Tightening Tools for VHP Fittings

- 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 ( $\pm 6\%$  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.

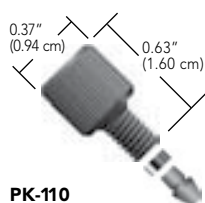


Part No.	Description	Use With Head Style	Torque Delivered	Qty.
<b>VHP TIGHTENING TOOLS</b>				
<b>NEW!</b> P-278	Extender Tool to Torque Driver	Female Nut Knurl	—	ea.
<b>NEW!</b> P-279	Extender Tool to Torque Driver	Micro Nut Knurl	—	ea.
<b>P-291</b>	Extender Tool to Torque Driver	Standard Nut Knurl	—	ea.
<b>NEW!</b> P-292	Extender Tool to Torque Driver	Headless Nut Knurl	—	ea.
<b>NEW!</b> VHP-1000	VHP Torque Tool	1/4" Hex	10 in-lbs (1.13 N-m)	ea.
<b>NEW!</b> VHP-2000	VHP Torque Tool	1/4" Hex	14 in-lbs (1.58 N-m)	ea.
<b>NEW!</b> VHP-3000	VHP Torque Tool	8 mm Hex	10 in-lbs (1.13 N-m)	ea.
<b>NEW!</b> VHP-4000	VHP Torque Driver	Extender Tool 1/4" Drive	Adjustable between 2 - 12 in-lbs (0.23 - 1.35 N-m)	ea.
<b>NEW!</b> VHP-9000	4 mm Wrench	4 mm Hex	—	ea.

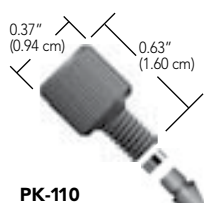
## Very High Pressure PK Fittings

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.

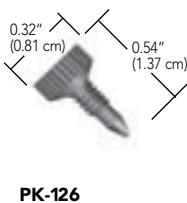
The VHP PK One-Piece fittings are available for 10-32 coned, 6-32 coned or M4 coned ports, and Two-Piece fittings are available to connect either 1/16" or 1/32" OD tubing into 10-32 coned ports in multiple styles.



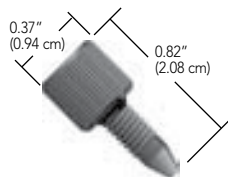
**PK-110**  
10-32 PK Fitting  
shown with PK-100  
for 1/16" OD tubing



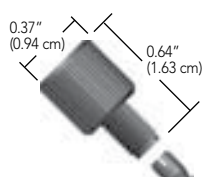
**PK-110**  
10-32 PK Fitting  
shown with PK-132  
for 1/32" OD tubing



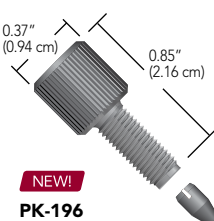
**PK-126**  
6-32 PK MicroTight®  
Fitting  
for 1/32" OD tubing



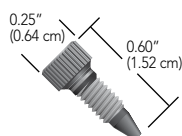
**PK-120BLK**  
10-32 PK Fitting  
for 1/16" OD tubing



**PK-195**  
10-32 PK Fitting  
with PK 192  
for 1/16" OD tubing



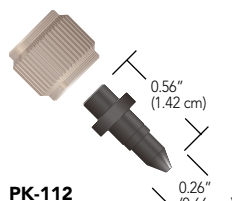
**NEW!**  
**PK-196**  
10-32 PK Fitting  
with PK 192  
for 1/16" OD tubing



**UH-904**  
M4, 1/32" Fitting  
for Rheodyne® MX valves

## 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

## 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.



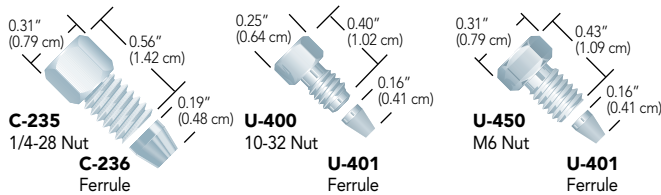
**Top Seller** SEE STARRED PRODUCTS

Part No.	Description	Port	Pressure Rating	Required Torque	Head Style	Material	Qty.
<b>PK VHP ONE-PIECE FITTINGS</b>							
★ <b>PK-120BLKx</b>	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
<b>PK-126x</b>	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
<b>UH-904x</b>	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
<b>PK VHP FITTINGS (SEALTIGHT™ STYLE, FITTINGS INCLUDE PK-192X)</b>							
<b>PK-192x</b>	PK Ferrule for 1/16" OD Tubing	10-32 Coned	11,000 psi (760 bar)	—	—	PK	10-pk
<b>PK-195x</b>	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
<b>NEW!</b> <b>PK-196x</b>	PK Fitting for 1/16" OD Tubing, Long	10-32 Coned	11,000 psi (760 bar)	8.0 in-lbs (0.90 N-m)	Standard Knurl	PK	10-pk
<b>PK VHP FITTINGS (LITETOUCH® STYLE, NUTS AND FERRULES SOLD SEPARATELY)</b>							
★ <b>PK-100x</b>	PK Ferrule for 1/16" OD Tubing	10-32 Coned	16,500 psi (1,140 bar)	—	—	PK	10-pk
<b>PK-110x</b>	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
<b>PK-132x</b>	PK Ferrule for 1/32" OD Tubing	10-32 Coned	16,500 psi (1,140 bar)	—	—	PK	10-pk
<b>PK MICRO FERRULES AND FEMALE NUTS</b>							
<b>P-416</b>	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.
<b>P-416BLK</b>	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.
★ <b>PK-112</b>	VHP MicroFerrule for 1/32" OD Tubing	5/16-24 Coned	15,000 psi (1,035 bar)	—	—	PK	ea.
<b>PK-152</b>	VHP MicroFerrule for 360 µm OD Tubing	5/16-24 Coned	15,000 psi (1,035 bar)	—	—	PK	ea.

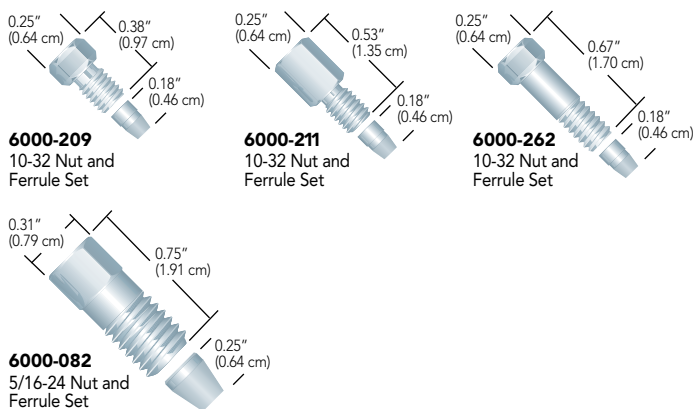
## Stainless Steel Fittings

These 316 Stainless Steel Fittings are rated to 20,000 psi (1,380 bar) when bench tested. Interfacial Co. sells Churchill Scientific® Standard Fittings or select from the Hardyne® or other manufacturer's compatible offerings.

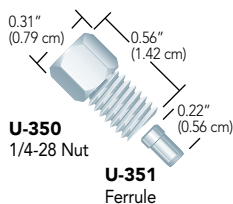
### Standard Stainless Steel Fittings



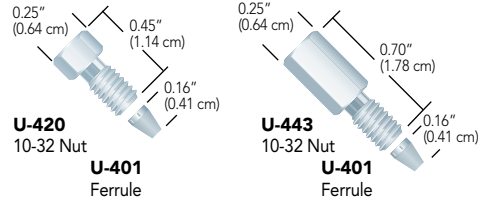
### Rheodyne Fittings



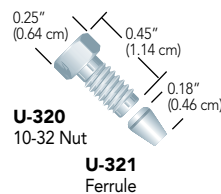
### SSI Compatible Fittings



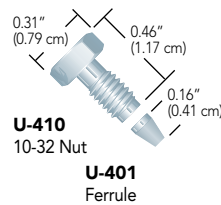
### Beckman® Compatible Fittings



### 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 Fitting Application Chart on page 195 for more information on fitting compatibility with tubing and port materials.
- The recommended torque to tighten these fittings is 20 in-lbs.



**Top Seller** SEE STARRED PRODUCTS

Part No.	Description	Port	Pressure Rating	Head Style	Material	Qty.
<b>STANDARD STAINLESS STEEL FITTINGS</b>						
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
<b>RHEODYNE FITTINGS</b>						
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
<b>MANUFACTURER COMPATIBLE FITTINGS</b>						
★ 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

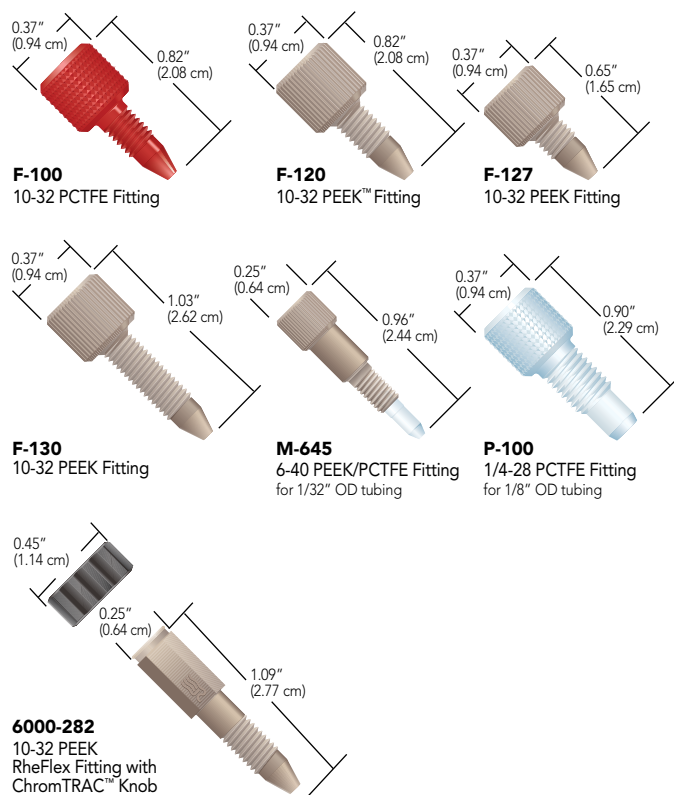
## One-Piece Fingertight Fittings

- 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 131. 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.



**Top Seller** SEE STARRED PRODUCTS

Part No.	Description	Port	Pressure Rating	Head Style	Material	Qty.
<b>ONE-PIECE FINGERTIGHT FITTINGS</b>						
<b>6000-282</b>	Fingertight Fitting for 1/16" OD Tubing	10-32 Coned	5,000 psi (345 bar)	ChromTRAC knob	PEEK, Natural	10-pk
<b>F-100x</b>	Fingertight Fitting for 1/16" OD Tubing	10-32 Coned	4,000 psi (276 bar)	Diamond Knurl	PCTFE, Red	10-pk
<b>F-100Nx</b>	Fingertight Fitting for 1/16" OD Tubing	10-32 Coned	4,000 psi (276 bar)	Diamond Knurl	PCTFE, Natural	10-pk
★ <b>F-120x</b>	Fingertight Fitting for 1/16" OD Tubing	10-32 Coned	5,000 psi (345 bar)	Standard Knurl	PEEK, Natural	10-pk
<b>F-120FUN PACK</b>	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
<b>F-127x</b>	Fingertight Fitting for 1/16" OD Tubing, Short	10-32 Coned	5,000 psi (345 bar)	Standard Knurl	PEEK, Natural	10-pk
★ <b>F-130x</b>	Fingertight Fitting for 1/16" OD Tubing, Long	10-32 Coned	5,000 psi (345 bar)	Standard Knurl	PEEK, Natural	10-pk
<b>M-645x</b>	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
<b>P-100</b>	Fingertight Fitting for 1/8" OD Tubing	1/4-28 Coned	1,000 psi (69 bar)	Diamond Knurl	PCTFE, Natural	ea.



## Sure-Fit™ Connector

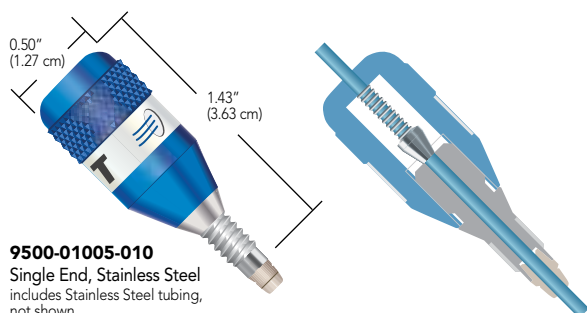
- ▶ Self-adjusting to any port depth regardless of column manufacturer
- ▶ Fingertight to 6,000 psi (414 bar)
- ▶ Available in PEEK™ or stainless steel



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.



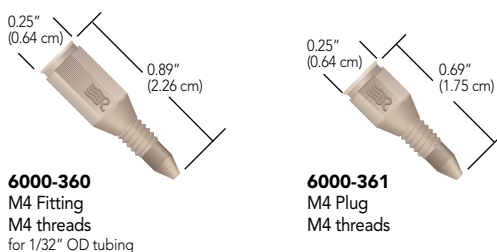
**9500-01005-010**  
Single End, Stainless Steel  
includes Stainless Steel tubing,  
not shown

## 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™ Module applications (see High Pressure Valves chapter, starting on page 126). 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

## Related Products

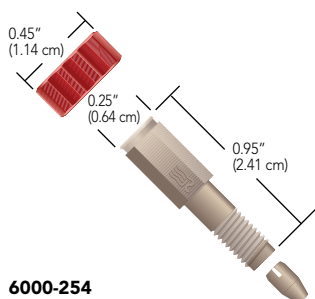
- ▶ For PEEK tubing sleeves that can be used with these M4 RheFlex fittings, see page 20.
- ▶ For reusable fittings that both work in UHPLC applications and can help ensure the tubing is fully inserted into the receiving port, see the VHP-300 fitting shown earlier in this chapter on page 6.

Part No.	Description	Port	Pressure Rating	Head Style	Material	Qty.
<b>SURE-FIT FITTINGS</b>						
<b>9500-01005-010</b>	Single End Fitting, 1/16" x 0.005" x 10 cm	10-32 Coned	6,000 psi (414 bar)	Diamond Knurl	SST	ea.
<b>9500-01007-010</b>	Single End Fitting, 1/16" x 0.007" x 10 cm	10-32 Coned	6,000 psi (414 bar)	Diamond Knurl	SST	ea.
<b>9500-01010-010</b>	Single End Fitting, 1/16" x 0.010" x 10 cm	10-32 Coned	6,000 psi (414 bar)	Diamond Knurl	SST	ea.
<b>9500-01020-030</b>	Single End Fitting, 1/16" x 0.020" x 30 cm	10-32 Coned	6,000 psi (414 bar)	Diamond Knurl	SST	ea.
<b>9502-01007-HP</b>	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.
<b>9504-01005-050</b>	Single End Fitting, 1/16" x 0.005" x 50 cm	10-32 Coned	6,000 psi (414 bar)	Diamond Knurl	PEEK, Natural	ea.
<b>9504-01007-050</b>	Single End Fitting, 1/16" x 0.007" x 50 cm	10-32 Coned	6,000 psi (414 bar)	Diamond Knurl	PEEK, Natural	ea.
<b>9504-01010-050</b>	Single End Fitting, 1/16" x 0.010" x 50 cm	10-32 Coned	6,000 psi (414 bar)	Diamond Knurl	PEEK, Natural	ea.
<b>SURE-FIT FITTINGS REPLACEMENT PARTS</b>						
<b>113-01005-050-5</b>	Replacement Tubing, 1/16" x 0.005" x 50 cm	—	6,000 psi (414 bar)	—	PEEK, Natural	5-pk
<b>113-01010-050-5</b>	Replacement Tubing, 1/16" x 0.010" x 50 cm	—	6,000 psi (414 bar)	—	PEEK, Natural	5-pk
<b>113-01007-050-5</b>	Replacement Tubing, 1/16" x 0.007" x 50 cm	—	6,000 psi (414 bar)	—	PEEK, Natural	5-pk
<b>9500-F-10</b>	Replacement Ferrule	10-32 Coned	6,000 psi (414 bar)	—	PPS	10-pk
<b>9500-FP</b>	Replacement Ferrule	10-32 Coned	6,000 psi (414 bar)	—	PEEK, Natural	ea.
<b>RHEFLEX ONE-PIECE FITTINGS</b>						
<b>6000-360</b>	Rheflex Fitting for 1/32" OD Tubing	M4 Coned	5,000 (345 bar)	1/4" Hex	PEEK, Natural	10-pk
<b>6000-361</b>	Rheflex Plug	M4 Coned	5,000 (345 bar)	1/4" Hex	PEEK, Natural	10-pk

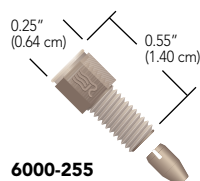
## Two-Piece RheFlex® Fingertight Fittings

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 injectors. (See pages 142 – 143 for more information on these valves.)

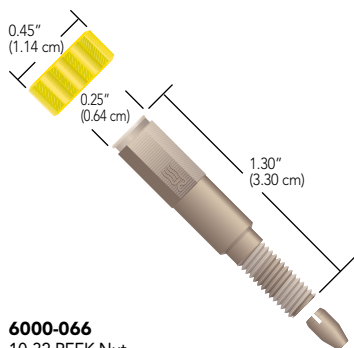
View the online product bulletin at: [www.idex-hs.com](http://www.idex-hs.com)



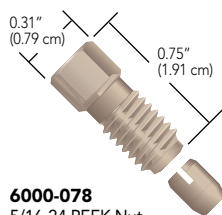
**6000-254**  
10-32 PEEK Nut  
with 6000-251 PEEK Ferrule  
(RD ChromTRAC suffix)



**6000-255**  
10-32 PEEK Nut  
with 6000-251 PEEK Ferrule



**6000-066**  
10-32 PEEK Nut  
with 6000-251 PEEK Ferrule  
(YL ChromTRAC suffix)



**6000-078**  
5/16-24 PEEK Nut  
with 6000-079 PEEK Ferrule

## 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. The 6000-283 ChromTrac kit contains 20 of the colored knobs for a variety to quickly and easily color code tubing lines leading from a column selection valve.

View the online product bulletin for RheFlex fittings at: [www.idex-hs.com](http://www.idex-hs.com)

## ChromTRAC Suffix Codes

CODE	COLOR
BLK	Black
BL	Blue
GN	Green
GY	Gray
RD	Red
WH	White
YL	Yellow
MC	Multi-color (two each of blue, green, gray, red and yellow)

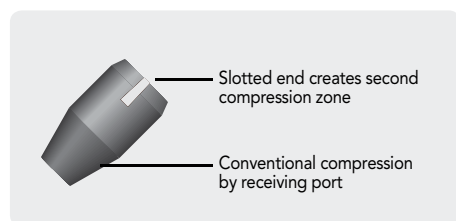
Add these two letter suffixes to the end of the seven-digit part numbers of the 10-32 and M4 threaded RheFlex Fittings on pages 11, 12, and 13.

Part No.	Description	Port	Pressure Rating	Head Style	Material	Qty.
<b>RHEFLEX TWO-PIECE FITTINGS (INCLUDES FERRULES)</b>						
<b>6000-066</b>	Rheflex Fitting for 1/16" OD Tubing, Extra Long	10-32 Coned	7,000 psi (483 bar)	ChromTRAC knob	PEEK, Natural	ea.
<b>6000-078</b>	Rheflex Fitting for 1/8" OD Tubing	5/16-24 Coned	5,000 psi (345 bar)	5/16" Hex	PEEK, Natural	ea.
<b>6000-254</b>	Rheflex Fitting for 1/16" OD Tubing	10-32 Coned	7,000 psi (483 bar)	ChromTRAC knob	PEEK, Natural	10-pk
<b>6000-255</b>	Rheflex Fitting for 1/16" OD Tubing, Short	10-32 Coned	7,000 psi (483 bar)	1/4" Hex	PEEK, Natural	10-pk
<b>6000-283</b>	ChromTRAC Identification Kit	—	—	ChromTRAC knob		20-pk
<b>REPLACEMENT FERRULES</b>						
<b>6000-079</b>	Rheflex Ferrule for 1/8" OD Tubing	5/16-24 Coned	7,000 psi (483 bar)	ChromTRAC knob	PEEK, Natural	5-pk
<b>6000-251</b>	Rheflex Ferrule for 1/16" OD Tubing	10-32 Coned	7,000 psi (483 bar)	ChromTRAC knob	PEEK, Natural	10-pk

## 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

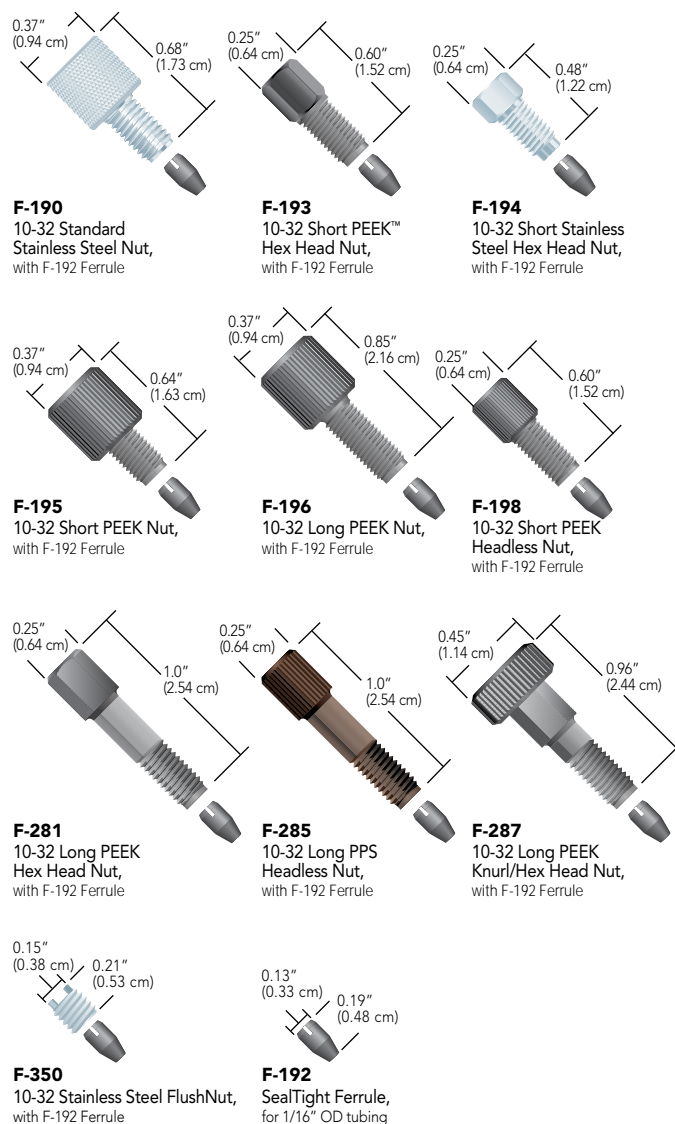
Overtightening these fittings on fluoropolymer (e.g., FEP, PFA and ETFE) tubing can cause the ID of your tubing to collapse.

### 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.



**Top Seller** SEE STARRED PRODUCTS



Part No.	Description	Port	Pressure Rating	Head Style	Material	Qty.
<b>SEALTIGHT TWO-PIECE FITTINGS (INCLUDES F-192 FERRULES)</b>						
<b>F-190x</b>	SealTight Fitting for 1/16" OD Tubing	10-32 Coned	7,000 – 9,000 psi (483 – 620 bar)	Standard Knurl	SST	10-pk
★ <b>F-193x</b>	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
<b>F-194x</b>	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
<b>F-195x</b>	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
★ <b>F-196x</b>	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
<b>F-197x</b>	SealTight Fitting for 1/16" OD Tubing, Long	M6 Coned	7,000 – 9,000 psi (483 – 620 bar)	Standard Knurl	PEEK Black	10-pk
<b>F-198x</b>	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
<b>F-198x</b>	SealTight Fitting for 1/16" OD Tubing, Long	10-32 Coned	7,000 – 9,000 psi (483 – 620 bar)	1/4" Hex	PEEK Black	10-pk
<b>F-284x</b>	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
<b>F-285x</b>	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
<b>F-287x</b>	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
<b>F-350x</b>	SealTight Fitting for 1/16" OD Tubing, FlushNut	10-32 Coned	7,000 – 9,000 psi (483 – 620 bar)	FlushNut	SST	10-pk
<b>REPLACEMENT FERRULES</b>						
★ <b>F-192x</b>	SealTight Ferrule for 1/16" OD Tubing	10-32 or M6 Coned	7,000 – 9,000 psi (483 – 620 bar)	—	PEEK/Black	10-pk

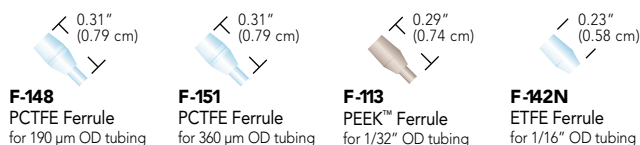
## Two-Piece Fingertight Fittings

- 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

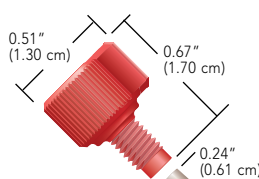
**F-151**  
PCTFE Ferrule  
for 360 µm OD tubing

**F-113**  
PEEK Ferrule  
for 1/32" OD tubing

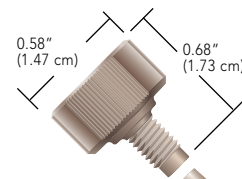
**F-142N**  
ETFE Ferrule  
for 1/16" OD tubing



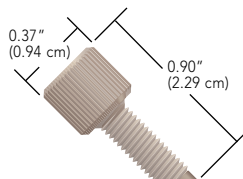
**M-215**  
Conductive Perfluoroelastomer Ferrule  
for 360 µm OD tubing



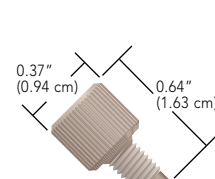
**F-200**  
10-32 Delrin® Winged Nut  
with F-142 PEEK Ferrule



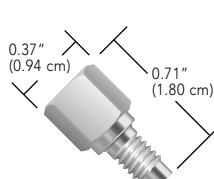
**F-300**  
10-32 PEEK Double-Winged Nut  
with F-142 PEEK Ferrule



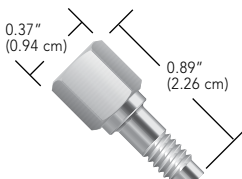
**F-330**  
10-32 PEEK Nut  
with F-142 PEEK Ferrule



**F-331**  
10-32 PEEK Nut  
with F-142 PEEK Ferrule



**F-140**  
10-32 Stainless Steel Nut  
with F-142 PEEK Ferrule



**F-150**  
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.*



**Top Seller** SEE STARRED PRODUCTS

Part No.	Description	Port	Pressure Rating	Head Style	Material	Qty.
<b>TWO-PIECE FINGERTIGHT FITTINGS (INCLUDES F-142 FERRULES)</b>						
<b>F-140x</b>	Fitting for 1/16" OD Tubing	10-32 Coned	6,000 psi (414 bar)	5/16" Hex	SST/PEEK Natural	10-pk
<b>F-150x</b>	Fitting for 1/16" OD Tubing, Long	10-32 Coned	6,000 psi (414 bar)	5/16" Hex	SST/PEEK Natural	10-pk
<b>F-200x</b>	Fingertight Fitting for 1/16" OD Tubing	10-32 Coned	6,000 psi (414 bar)	Single Wing	Delrin Red/PEEK Natural	10-pk
★ <b>F-300x</b>	Fingertight Fitting for 1/16" OD Tubing	10-32 Coned	6,000 psi (414 bar)	Double Wing	PEEK Natural	10-pk
★ <b>F-330x</b>	Fingertight Fitting for 1/16" OD Tubing, Long	10-32 Coned	6,000 psi (414 bar)	Standard Knurl	PEEK Natural	10-pk
<b>F-331x</b>	Fingertight Fitting for 1/16" OD Tubing	10-32 Coned	6,000 psi (414 bar)	Standard Knurl	PEEK Natural	10-pk
<b>REPLACEMENT FERRULES</b>						
★ <b>F-113</b>	Ferrule for 1/32" OD Tubing	10-32 Coned	6,000 psi (414 bar)	—	PEEK Natural	ea.
★ <b>F-142x</b>	Ferrule for 1/16" OD Tubing	10-32 Coned	6,000 psi (414 bar)	—	PEEK Natural	10-pk
<b>F-142Nx</b>	Ferrule for 1/16" OD Tubing	10-32 Coned	4,000 psi (276 bar)	—	ETFE Natural	10-pk
<b>F-148</b>	Ferrule for 190 µm OD tubing	10-32 Coned	6,000 psi (414 bar)	—	PCTFE Natural	ea.
<b>F-151</b>	Ferrule for 360 µm OD Tubing	10-32 Coned	6,000 psi (414 bar)	—	PCTFE Natural	ea.
★ <b>M-215</b>	Conductive Ferrule for 360 µm OD tubing	10-32 Coned	1,500 psi (103 bar)	—	Conductive Perfluoroelastomer	ea.

## LiteTouch® Fittings

- ▶ High pressure resistant fitting for polyethylene
- ▶ High pressure fitting for convenience
- ▶ Options available for 1/32", 1/16" or 1/8" OD tubing

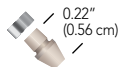
The LiteTouch Fitting System grips tubing at two compression points (see diagram), holding it high pressure resistant fitting for convenience. It also prevents polyethylene tubing from twisting, a potential problem when using standard fitting. LiteTouch Fittings are available for use with 1/32", 1/16" or 1/8" OD tubing sizes and for 10-32 or 1/4-28 or ports.

For the same application as here, the seal interference in the head of other, try the Flush Nut Fitting (Flush Nut Fitting is already fitting to O.L.P. lease see page 31 for more information about these products).

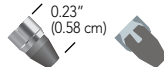
To avoid collapsing the OD of tubing, the LiteTouch system can be used on hard tubing only such as stainless steel and PEEK® polyethylene. The LiteTouch Ferrule System is not recommended for repeated use in plastic ports.



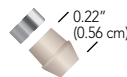
**LT-132**  
PEEK Ferrule with  
Stainless Steel Lock Ring  
for 1/32" OD tubing



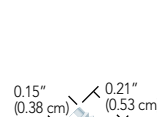
**LT-100**  
PEEK Ferrule with  
Stainless Steel Lock Ring  
for 1/16" OD tubing



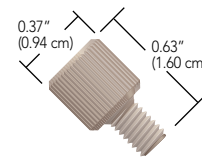
**LT-135**  
One-Piece LiteTouch  
SealTight™ Ferrule with  
Stainless Steel Lock Ring  
for 1/16" OD tubing



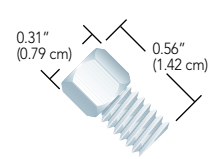
**LT-200**  
PEEK Ferrule with  
Stainless Steel Lock Ring  
for 1/8" OD tubing



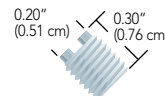
**F-354**  
10-32 Stainless  
Steel FlushNut  
for 1/32" and 1/16" OD tubing



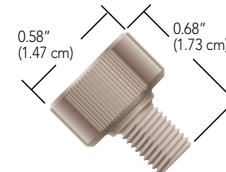
**LT-110**  
10-32 PEEK Nut  
for 1/32" and 1/16" OD tubing



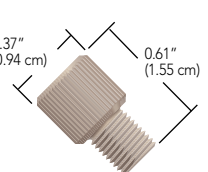
**C-235**  
1/4-28 Stainless  
Steel Nut  
for 1/8" OD tubing



**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

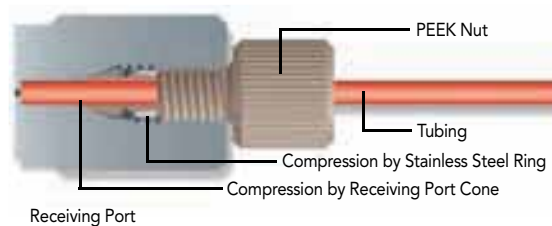


**LT-215**  
1/4-28 PEEK Nut  
for 1/8" OD tubing

## Related Products

The stainless steel nut is a 10-32 nut used with the LiteTouch ferrules in this application.

## LiteTouch Fittings Systems



**Top Seller** SEE STARRED PRODUCTS

Part No.	Description	Port	Pressure Rating	Head Style	Material	Qty.
<b>LITETOUCH NUTS</b>						
<b>C-235x</b>	LiteTouch Nut for 1/8" OD Tubing	1/4-28 Coned	4,500 psi (310 bar)	5/16" Hex	SST	10-pk
<b>F-354x</b>	LiteTouch Nut for 1/16" or 1/32" OD Tubing, Flushnut	10-32 Coned	5,000 psi (345 bar)	Flushnut	SST	10-pk
<b>F-364x</b>	LiteTouch Nut for 1/8" OD Tubing, Flushnut	1/4-28 Coned	4,500 psi (310 bar)	Flushnut	SST	10-pk
<b>LT-110x</b>	LiteTouch Nut for 1/16" or 1/32" OD Tubing	10-32 Coned	5,000 psi (345 bar)	Standard Knurl	PEEK Natural	10-pk
<b>LT-210x</b>	LiteTouch Nut for 1/8" OD Tubing	1/4-28 Coned	4,500 psi (310 bar)	Double Wing	PEEK Natural	10-pk
<b>LT-215x</b>	LiteTouch Nut for 1/8" OD Tubing, Short	1/4-28 Coned	4,500 psi (310 bar)	Standard Knurl	PEEK Natural	10-pk
<b>LITETOUCH FERRULES</b>						
<b>LT-100x</b>	LiteTouch Ferrule for 1/16" OD Tubing	10-32 Coned	5,000 psi (345 bar)	—	PEEK Natural/SST	10-pk
<b>LT-132x</b>	LiteTouch Ferrule for 1/32" OD Tubing	10-32 Coned	5,000 psi (345 bar)	—	PEEK Natural/SST	10-pk
<b>LT-135x</b>	LiteTouch Ferrule for 1/16" OD Tubing	10-32 Coned	10,000 psi (690 bar)*	—	PEEK Black/SST	10-pk
<b>LT-200x</b>	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



## NanoTight™ Fittings and 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

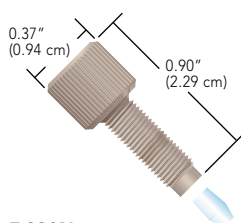
Upchurch Scientific® NanoTight Fittings and Sleeves are designed to connect 70 µm–1 mm OD capillary tubing to any standard 10-32 coned port normally intended for 1/16" OD tubing using the NanoTight Tubing Sleeves on page 19. The fittings can also be used to connect any 1/16" OD tubing. The ETFE ferrule 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 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.

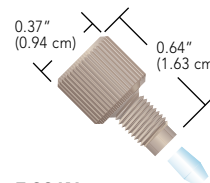


## Related Products

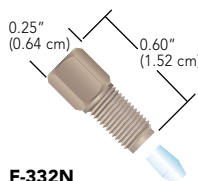
Find tightening tools for these head styles on page 33.



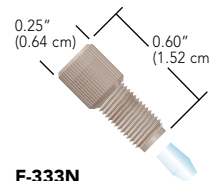
**F-330N**  
Long Standard Head Nut  
with F-142N Ferrule



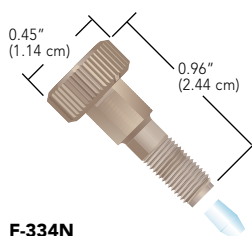
**F-331N**  
Short Standard Head Nut  
with F-142N Ferrule



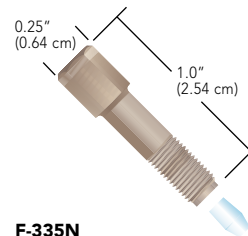
**F-332N**  
Short Hex Head Nut  
with F-142N Ferrule



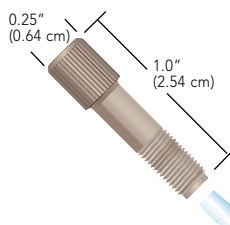
**F-333N**  
Short Headless Nut  
with F-142N Ferrule



**F-334N**  
Long Knurl/Hex Head Nut  
with F-142N Ferrule



**F-335N**  
Long Hex Head Nut  
with F-142N Ferrule



**F-336N**  
Long Headless Nut  
with F-142N Ferrule



**Top Seller** SEE STARRED PRODUCTS

Part No.	Description	Port	Pressure Rating	Head Style	Material (Nut/Ferrule)	Qty.
<b>NANOTIGHT FITTINGS (INCLUDES F-142N FERRULES)</b>						
★ <b>F-330Nx</b>	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
<b>F-331Nx</b>	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
<b>F-332Nx</b>	NanoTight Fitting for 1/16" OD Tubing and NanoTight Sleeves, Short	10-32 Coned	4,000 psi (276 bar)	1/4" Hex	PEEK Natural/ETFE Natural	10-pk
★ <b>F-333Nx</b>	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
<b>F-334Nx</b>	NanoTight Fitting for 1/16" OD Tubing and NanoTight Sleeves, Long	10-32 Coned	4,000 psi (276 bar)	Knurl-1/4" hex	PEEK Natural/ETFE Natural	10-pk
<b>F-335Nx</b>	NanoTight Fitting for 1/16" OD Tubing and NanoTight Sleeves, Long	10-32 Coned	4,000 psi (276 bar)	1/4" Hex	PEEK Natural/ETFE Natural	10-pk
<b>F-336Nx</b>	NanoTight Fitting for 1/16" OD Tubing and NanoTight Sleeves, Long	10-32 Coned	4,000 psi (276 bar)	Headless Knurl	PEEK Natural/ETFE Natural	10-pk
<b>REPLACEMENT FERRULES</b>						
<b>F-142Nx</b>	NanoTight Ferrule for 1/16" OD Tubing and NanoTight Sleeves	10-32 Coned	4,000 psi (276 bar)	—	ETFE Natural	10-pk

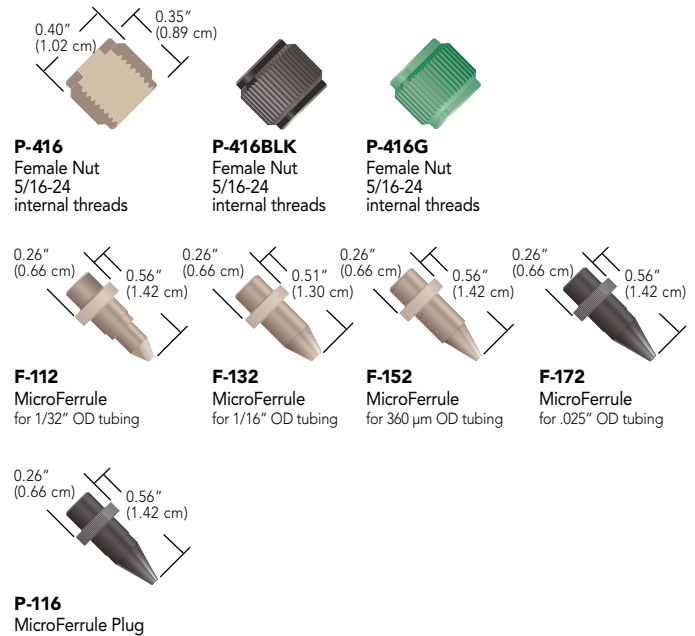
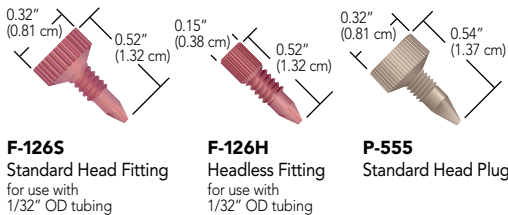
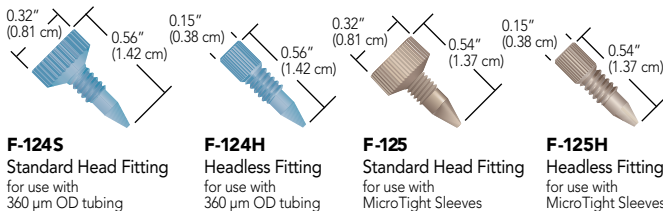
## MicroTight® Fittings

- Comprehensive Fitting System for connecting Capillary Tubing
- Made from PEEK® Polymer

Upchurch Scientific® MicroTight® fittings are designed especially for use with the Nanoport® and MicroTight® series of Adsorption Inline Micro Filters. Specifically designed for 360 µm OD tubing, 1/32" OD tubing or 1/16" OD tubing. Sleeves (see page 19), these fittings make superior fitting into microtubes with capillary tubing. MicroTight fittings withstand temperatures up to 125°C.

The MicroTight fittings include safety elements attached to the rear of fixed diameter ferrules for connecting & disconnecting ODS.

Use the -277 Extension Tool to tighten standard micro knurl 6-32 fitting in hard-to-reach places. Tighten micro headless 6-32 fittings with the -290 Tool. See page 33 for reinforcement.



## Related Products

- Connectors for capillary tubing can be found on pages 37-46
- Very high pressure fittings for capillary tubing can be found on page 9
- Capillary tubing is featured on pages 65

## Note

### MicroTight fittings and MicroFerrules

While the MicroTight fittings are all used in many different applications, the MicroFerrules are the MicroFerrules that are used in the MicroTight fittings. The MicroFerrules are thus interchangeable. Additionally, the MicroTight fittings are also interchangeable.



**Top Seller** SEE STARRED PRODUCTS

Part No.	Description	Port	Pressure Rating	Head Style	Material	Qty.
<b>MICROTIGHT FITTINGS</b>						
<b>F-124Hx</b>	MicroTight Fitting for 360 µm OD Tubing	6-32 Coned	5,000 psi (345 bar)	Micro Headless Knurl	PEEK Blue	10-pk
<b>F-124Sx</b>	MicroTight Fitting for 360 µm OD Tubing	6-32 Coned	5,000 psi (345 bar)	Standard Micro Knurl	PEEK Blue	10-pk
<b>F-125Hx</b>	MicroTight Fitting for MicroTight Tubing Sleeves	6-32 Coned	4,000 psi (276 bar)	Micro Headless Knurl	PEEK Natural	10-pk
<b>F-125x</b>	MicroTight Fitting for MicroTight Tubing Sleeves	6-32 Coned	4,000 psi (276 bar)	Standard Micro Knurl	PEEK Natural	10-pk
★ <b>F-126Hx</b>	MicroTight Fitting for 1/32" OD Tubing	6-32 Coned	5,000 psi (345 bar)	Micro Headless Knurl	PEEK Red	10-pk
<b>F-126Sx</b>	MicroTight Fitting for 1/32" OD Tubing	6-32 Coned	5,000 psi (345 bar)	Standard Micro Knurl	PEEK Red	10-pk
<b>P-555</b>	MicroTight Plug	6-32 Coned	5,000 psi (345 bar)	Standard Micro Knurl	PEEK Natural	ea.
<b>MICROFERRULES AND FEMALE NUTS</b>						
<b>F-112</b>	MicroFerrule for 1/32" OD Tubing	5/16-24 Coned	5,000 psi (345 bar)	—	PEEK Natural	ea.
<b>F-132</b>	MicroFerrule for 1/16" OD Tubing	5/16-24 Coned	5,000 psi (345 bar)	—	PEEK Natural	ea.
★ <b>F-152</b>	MicroFerrule for 360 µm OD Tubing	5/16-24 Coned	5,000 psi (345 bar)	—	PEEK Natural	ea.
<b>F-152BLK</b>	MicroFerrule for 360 µm OD Tubing	5/16-24 Coned	5,000 psi (345 bar)	—	PEEK Black	ea.
★ <b>F-172</b>	MicroFerrule for MicroTight Tubing Sleeves	5/16-24 Coned	4,000 psi (276 bar)	—	PEEK Black	ea.
<b>P-116</b>	MicroFerrule Plug	5/16-24 Coned	5,000 psi (345 bar)	—	PEEK Black	ea.
★ <b>P-416</b>	MicroTight Female Nut	5/16-24 Coned	4,000 – 5,000 psi (276 – 345 bar)	Female Knurl	PEEK Natural	ea.
<b>P-416BLK</b>	MicroTight Female Nut	5/16-24 Coned	4,000 – 5,000 psi (276 – 345 bar)	Female Knurl	PEEK Black	ea.
<b>P-416G</b>	MicroTight Female Nut	5/16-24 Coned	4,000 – 5,000 psi (276 – 345 bar)	Female Knurl	PEEK Green	ea.

## 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 and 22. 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.



**Top Seller** SEE STARRED PRODUCTS

## 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

### 1/16" OD PEEK™ Tubing Sleeves

- ▶ For connecting capillary tubing to standard 10-32 ports
- ▶ Require the use of french fitting internal stainless steel nuts
- ▶ Pressure rating to 6000 psi (414 bar)

Like the hellan fitting FEP sleeves in the previous page, these PEEK Tubing Sleeves are designed to be used with 1/16" OD, 10-32 threaded fitting to attach capillary tubing to standard or metal ports. Made of PEEK polymer, these 1/16" tubing sleeves can be used up to 125°C.

These sleeves require a french fitting internal nut to achieve proper sealing. We recommend the F-1401 two-piece Fitting Hellan Fitting (page 15), which includes a PEEK ferrule and the hex-head Sealing Hellan fitting so no page 16. Many researchers also use a stainless steel nut and ferrule with these sleeves such as the -400 and -401 (page 10).

### 1/32" OD PEEK Tubing Sleeves

These 1/32" long Upchurch Scientific® 1/32" OD PEEK Tubing Sleeves can be used with any fitting designed for 1/32" OD tubing in general tubing in most cases (see the Application Notes in this page). 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 5000 psi (345 bar).



### Related Products

Use 1/32" OD PEEK or FEP sleeves to connect capillary tubing with the following:

- ▶ The F-113 Ferrule and Two-piece Fitting Hellan Fitting for 10-32 ports (page 15)
- ▶ The F-112 (page 13) and F-416 LX Micro Fitting Hellan Fitting (page 14) - 1/32" OD PEEK Tubing Sleeves only
- ▶ The 1/32" OD Micro Fitting so no page 18
- ▶ The K-Heldyne® Reflex® 4 Fitting (page 12) for all X-Mo de applications
- ▶ The M-661 also compatible Fitting (page 11) for all analytical valve applications

### 1/32" OD FEP Tubing Sleeves

These 1/32" 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 up to 50°C and have a pressure rating of 1,750 psi (121 bar).



Choose, starting at top:

- ▶ 1/16" OD PEEK Tubing Sleeves shown with F-140 Fitting
- ▶ 1/32" OD PEEK Tubing Sleeves shown with F-128 Fitting
- ▶ 1/32" OD FEP Tubing Sleeves shown with F-126 Fitting
- ▶ Fitting and tubing only shown; high high tubing sleeves are designed to be used; they are not included with the sleeves



**Top Seller** SEE STARRED PRODUCTS

Part No.	ID	For Tubing OD Size	Color	Qty.
<b>PEEK TUBING SLEEVES FOR 1/16" OD FITTINGS</b>				
F-225	125 µm (0.005")	70 – 110 µm	Red	ea.
F-226	180 µm (0.007")	125 – 165 µm	Yellow	ea.
F-227	230 µm (0.009")	175 – 215 µm	Yellow	ea.
F-228	250 µm (0.011")	225 – 265 µm	Blue	ea.
F-229	330 µm (0.013")	275 – 315 µm	Natural	ea.
★ F-230	405 µm (0.016")	350 – 390 µm	Orange	ea.
F-231	560 µm (0.022")	505 – 545 µm	Natural	ea.
F-232	785 µm (0.031")	730 – 770 µm	Natural	ea.
F-233	865 µm (0.034")	785 – 825 µm	Blue	ea.
F-234	685 µm (0.027")	630 – 670 µm	Yellow	ea.
<b>PEEK TUBING SLEEVES FOR 1/32" OD FITTINGS</b>				
F-380x	125 µm (0.005")	70 – 110 µm	Red	10-pk
F-381x	180 µm (0.007")	125 – 165 µm	Yellow	10-pk
F-382x	205 µm (0.008")	150 – 190 µm	Natural	10-pk
F-383x	230 µm (0.009")	175 – 215 µm	Gray	10-pk
F-384x	255 µm (0.010")	200 – 240 µm	Blue	10-pk
★ F-385x	380 µm (0.015")	325 – 365 µm	Natural	10-pk
F-386x	510 µm (0.020")	455 – 495 µm	Orange	10-pk
F-387x	250 µm (0.011")	225 – 265 µm	Red	10-pk
F-388x	330 µm (0.013")	275 – 315 µm	Black	10-pk
<b>FEP TUBING SLEEVES FOR 1/32" OD FITTINGS</b>				
F-370x	75 µm (0.003")	20 – 60 µm	Natural	10-pk
F-371x	125 µm (0.005")	70 – 110 µm	Red	10-pk
F-372x	180 µm (0.007")	125 – 165 µm	Yellow	10-pk
F-373x	230 µm (0.009")	175 – 215 µm	Natural	10-pk
F-374x	280 µm (0.011")	225 – 265 µm	Blue	10-pk
F-375x	330 µm (0.013")	275 – 315 µm	Orange	10-pk
★ F-376x	395 µm (0.0155")	340 – 380 µm	Green	10-pk

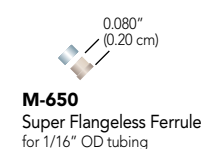
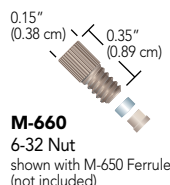
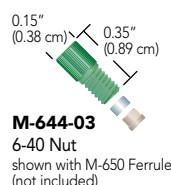
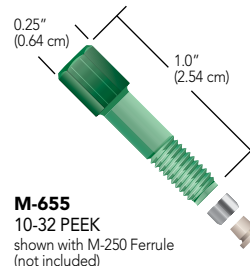
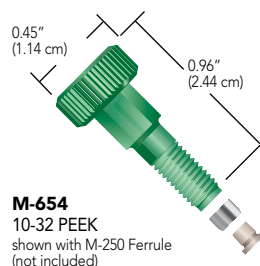
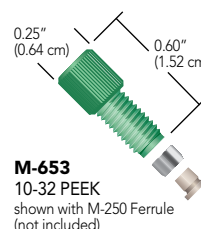
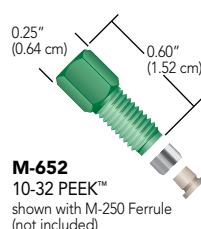


## Super Flangeless™ Fittings

- Designed to hold to higher pressures than standard flangeless fittings
- Eliminates loosening of nuts caused by tubing twist

The design of the Super Flangeless fitting system includes a two-piece ferrule with a lock ring which operates as a bearing against the nut. The nut can then spin freely without turning the ferrule while rotating, preventing the tubing from twisting during the tightening process. This feature helps eliminate subsequent loosening of the nut, making the Super Flangeless system ideal for applications subject to vibration. These products are also well suited for connections that need to be broken frequently, since the lock ring holds the ferrule in place on the tubing until intentionally removed. Use the LT-300 Removal Tool – found on page 33 – to release Super Flangeless Ferrules from tubing for repositioning.

The fittings systems on this page connect 1/16" OD tubing into any flat-bottom 6-40, 6-32 or 10-32 flat-bottom port. Use the FEP NanoTight™ Sleeves from page 19 with these fittings to connect capillary tubing with OD sizes between 70 µm and 1 mm. Choose from a variety of nut styles for the 10-32 nuts, depending on the application. The headless 6-40 and 6-32 nuts can be tightened using the N-290 extender tool found on page 33.



**Top Seller** SEE STARRED PRODUCTS

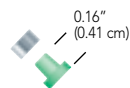
Part No.	Description	Port	Pressure Rating	Head Style	Material	Qty.
<b>SUPER FLANGELESS NUTS</b>						
★ <b>M-644-03x</b>	Super Flangeless Nut for 1/16" OD Tubing	6-40 Flat Bottom	750 – 3,750 psi (52 – 259 bar)	Micro Headless	PEEK Green	10-pk
<b>M-652x</b>	Super Flangeless Nut for 1/16" OD Tubing	10-32 Flat Bottom	1,000 – 5,000 psi (69 – 345 bar)	1/4" Hex	PEEK Green	10-pk
<b>M-653x</b>	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
<b>M-654x</b>	Super Flangeless Nut for 1/16" OD Tubing, Long	10-32 Flat Bottom	1,000 – 5,000 psi (69 – 345 bar)	Knurl-1/4" Hex	PEEK Green	10-pk
<b>M-655x</b>	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
<b>M-660x</b>	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
<b>SUPER FLANGELESS FERRULES</b>						
<b>NEW!</b> <b>M-250x</b>	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
★ <b>M-650x</b>	Super Flangeless Ferrule for 1/16" OD Tubing	6-32 or 6-40 Flat Bottom	750 – 3,750 psi (52 – 259 bar)	Micro Headless	PEEK Natural/SST	10-pk



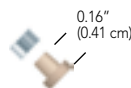
## Super Flangeless™ Fittings

- ▶ 1/4-28 and M6 flat bottom fittings for 1/32" or 1/16" OD tubing
- ▶ Fitting system designed to not loosen during vibration

With the benefits mentioned on the previous page, the Super Flangeless Fittings for 1/4-28 or M6 flat bottom ports are quickly becoming the standard for instrumentation, displacing many flanged tube assemblies. Once swaged, the fitting system is perfect in applications where repeated connections are required. Unlike with flanged tubing, the Super Flangeless fittings withstand several retightening cycles with no change in performance or damage to the tubing. Find a variety of nut styles and materials on this page, plus contact your local distributor or us for additional nut colors.



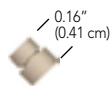
**P-248**  
ETFE Ferrule with  
Stainless Steel Lock Ring  
for 1/32" OD tubing



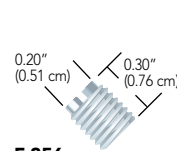
**P-250**  
PEEK™ Ferrule with  
Stainless Steel Lock Ring  
for 1/16" OD tubing



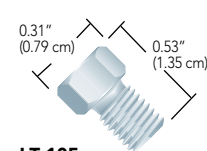
**P-259**  
ETFE Ferrule with  
Stainless Steel Lock Ring  
for 1/16" OD tubing



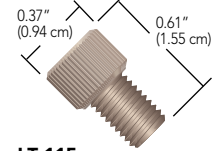
**P-260**  
PEEK One-Piece  
Ferrule with Lock Ring  
for 1/16" OD tubing



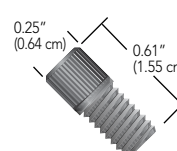
**F-356**  
1/4-28 Stainless Steel  
FlushNut™



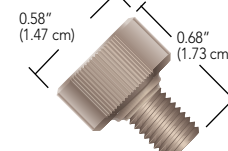
**LT-105**  
1/4-28 Stainless Steel Nut



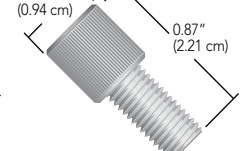
**LT-115**  
1/4-28 Short PEEK Nut



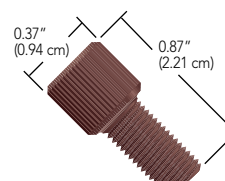
**P-213**  
M6 PEEK Nut



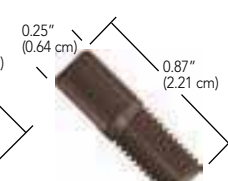
**P-251**  
1/4-28 PEEK Winged Nut



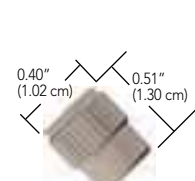
**P-252**  
1/4-28 Delrin® Nut



**P-281**  
1/4-28 PPS Nut

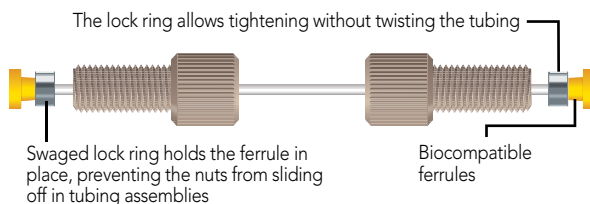


**P-287**  
1/4-28 PPS Nut



**P-420**  
1/4-28 PEEK Female Nut

## Super Flangeless Fittings System



## Related Products

Capillary tubing can also be connected using these fittings and the NanoTight™ Tubing Sleeves on page 19.



**Top Seller** SEE STARRED PRODUCTS

Part No.	Description	Port	Pressure Rating	Head Style	Material	Qty.
<b>SUPER FLANGELESS NUTS</b>						
<b>F-356x</b>	Super Flangeless Nut for 1/16" or 1/32" OD Tubing, FlushNut	1/4-28 Flat Bottom	*	FlushNut	SST	10-pk
<b>LT-105x</b>	Super Flangeless Nut for 1/16" or 1/32" OD Tubing, Short	1/4-28 Flat Bottom	*	1/4" Hex	SST	10-pk
★ <b>LT-115x</b>	Super Flangeless Nut for 1/16" or 1/32" OD Tubing, Short	1/4-28 Flat Bottom	*	Standard Knurl	PEEK Natural	10-pk
<b>P-213</b>	Super Flangeless Nut for 1/16" or 1/32" OD Tubing, Short	M6 Flat Bottom	*	Headless Knurl	PEEK Black	ea.
<b>P-217</b>	Super Flangeless Nut for 1/16" or 1/32" OD Tubing	M6 Flat Bottom	*	Standard Knurl	PPS Black	ea.
<b>P-219</b>	Super Flangeless Nut for 1/16" or 1/32" OD Tubing, Short	M6 Flat Bottom	*	Standard Knurl	PEEK Black	ea.
★ <b>P-232</b>	Super Flangeless Nut for 1/16" or 1/32" OD Tubing, Short	1/4-28 Flat Bottom	*	Headless Knurl	PEEK Natural	ea.
<b>P-246x</b>	Super Flangeless Nut for 1/16" or 1/32" OD Tubing	1/4-28 Flat Bottom	*	Standard Knurl	PFA Natural	10-pk
<b>P-251x</b>	Super Flangeless Nut for 1/16" or 1/32" OD Tubing	1/4-28 Flat Bottom	*	Double Wings	PEEK Natural	10-pk
<b>P-252x</b>	Super Flangeless Nut for 1/16" or 1/32" OD Tubing	1/4-28 Flat Bottom	*	Standard Knurl	Delrin Gray	10-pk
★ <b>P-255x</b>	Super Flangeless Nut for 1/16" or 1/32" OD Tubing	1/4-28 Flat Bottom	*	Standard Knurl	PEEK Natural	10-pk
<b>P-281</b>	Super Flangeless Nut for 1/16" or 1/32" OD Tubing	1/4-28 Flat Bottom	*	Standard Knurl	PPS Natural	ea.
<b>P-287</b>	Super Flangeless Nut for 1/16" or 1/32" OD Tubing	1/4-28 Flat Bottom	*	Headless Knurl	PPS Natural	ea.
<b>P-420</b>	Super Flangeless Nut for 1/16" or 1/32" OD Tubing, Female	1/4-28 Flat Bottom	*	Female Knurl	PEEK Natural	ea.
<b>SUPER FLANGELESS FERRULES</b>						
<b>P-248x</b>	Super Flangeless Ferrule for 1/32" OD Tubing	1/4-28 or M6 Flat Bottom	2,500 psi (172 bar)	—	ETFE Green/SST	10-pk
★ <b>P-250x</b>	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
★ <b>P-259x</b>	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
<b>P-260x</b>	Super Flangeless Ferrule for 1/16" OD Tubing	1/4-28 Flat Bottom	1,850 psi (128 bar)	—	PEEK Natural	10-pk

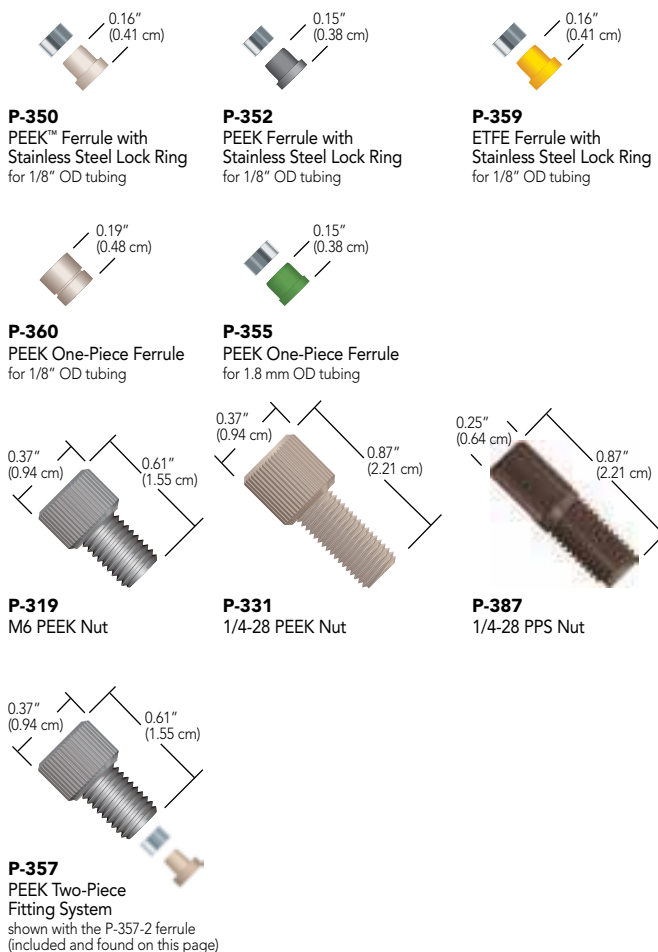
\*Pressure rating of nut depends on the ferrule used.

## Super Flangeless™ Fittings

- ▶ 1/4-28 and M6 flat-bottom fittings for 1.8 mm or 1/8" OD tubing
- ▶ M6 flat-bottom fitting for 2.0 mm OD tubing
- ▶ Pressure rated up to 2,500 psi (172 bar)

These fittings offer all of the benefits of Super Flangeless Fittings for 1.8 mm, 1/8" or 2.0 mm OD tubing. Due to the double compression by the lock ring and ferrule on the tubing, this fitting system boasts the highest pressure rating for 1/8" OD tubing into flat-bottom ports. These fittings can be used in any of the IDEX Health & Science products featured in the catalog with a 1/4-28 or M6 flat-bottom port for increased pressure holding ability. A variety of nut styles and materials are available, plus contact us for additional nut color options.

Please note the design of the Super Flangeless Fittings for 1/8" OD tubing prevents them from being used in shallow ports. For these applications, we recommend using the small valve Flangeless Ferrule on pages 24 – 26.



## Related Products

- ▶ Tightening Tools for all the nut head styles featured on this page can be found on page 33.
- ▶ Super Flangeless fittings for 3/16" OD tubing can be found on page 30.



**Top Seller** SEE STARRED PRODUCTS

Part No.	Description	Port	Pressure Rating	Head Style	Material	Qty.
<b>SUPER FLANGELESS NUTS</b>						
<b>C-235x</b>	Super Flangeless Nut for 1/8" OD Tubing	1/4-28 Flat Bottom	*	1/4" Hex	SST	10-pk
<b>F-156</b>	Super Flangeless Nut for 1/8" OD Tubing, Female	1/4-28 Flat Bottom	*	Female Knurl	PEEK Black	ea.
<b>F-364x</b>	Super Flangeless Nut for 1/8" OD Tubing, FlushNut™	1/4-28 Flat Bottom	*	FlushNut	SST	10-pk
<b>LT-210x</b>	Super Flangeless Nut for 1/8" OD Tubing	1/4-28 Flat Bottom	*	Double Wings	PEEK Natural	10-pk
<b>LT-215x</b>	Super Flangeless Nut for 1/8" OD Tubing, Short	1/4-28 Flat Bottom	*	Standard Knurl	PEEK Natural	10-pk
<b>P-317</b>	Super Flangeless Nut for 1/8" OD Tubing	M6 Flat Bottom	*	Standard Knurl	PPS Black	ea.
<b>P-319</b>	Super Flangeless Nut for 1/8" OD Tubing, Short	M6 Flat Bottom	*	Standard Knurl	PEEK Black	ea.
★ <b>P-331</b>	Super Flangeless Nut for 1/8" OD Tubing	1/4-28 Flat Bottom	*	Standard Knurl	PEEK Natural	ea.
★ <b>P-332x</b>	Super Flangeless Nut for 1/8" OD Tubing	1/4-28 Flat Bottom	*	Standard Knurl	Delrin® Black	10-pk
★ <b>P-336</b>	Super Flangeless Nut for 1/8" OD Tubing, Short	1/4-28 Flat Bottom	*	Headless Knurl	PEEK Natural	ea.
<b>P-337x</b>	Super Flangeless Nut for 1/8" OD Tubing, Short	1/4-28 Flat Bottom	*	Headless Knurl	PEEK Black	10-pk
<b>P-357x</b>	Super Flangeless Fitting for 2.0 mm OD Tubing	M6 Flat Bottom	*	Standard Knurl	PEEK Black, Natural/SST	10-pk
★ <b>P-381</b>	Super Flangeless Nut for 1/8" OD Tubing	1/4-28 Flat Bottom	*	Standard Knurl	PPS Natural	ea.
<b>P-387</b>	Super Flangeless Nut for 1/8" OD Tubing	1/4-28 Flat Bottom	*	Standard Knurl	PPS Natural	ea.
<b>SUPER FLANGELESS FERRULES</b>						
★ <b>P-350x</b>	Super Flangeless Ferrule for 1/8" OD Tubing	1/4-28 Flat Bottom	2,500 psi (172 bar)	—	PEEK Natural/SST	10-pk
<b>P-352x</b>	Super Flangeless Ferrule for 1/8" OD Tubing	1/4-28 or M6 Flat Bottom	2,500 psi (172 bar)	—	PEEK Black/SST	10-pk
<b>P-355x</b>	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
<b>P-357-2x</b>	Super Flangeless Ferrule for 2.0 mm OD Tubing	M6 Flat Bottom	5,000 psi (345 bar)	—	PEEK Natural/SST	10-pk
★ <b>P-359x</b>	Super Flangeless Ferrule for 1/8" OD Tubing	1/4-28 Flat Bottom	1,000 psi (69 bar)	—	ETFE Yellow/SST	10-pk
<b>P-360x</b>	Super Flangeless Ferrule for 1/8" OD Tubing	1/4-28 Flat Bottom	1,500 psi (102 bar)	—	PEEK Natural	10-pk

\*Pressure rating of nut depends on the ferrule used.

## Flangeless Fittings

Upchurch Scientific® Flangeless Fittings eliminate the need to flange tubing. This removable and reusable system provides several benefits:

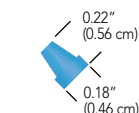
**Convenience:** Flangeless Fittings are easy to use. Just slip the nut and ferrule over the tubing and finger tighten the assembly into your receiving port. In tests, it is shown that the ideal amount of torque to achieve expected part performance should be approximately 3 – 4 in-lbs (0.34 – 0.45 N·m). Check out the line of special tightening tools designed to adapt to many standard torque wrenches, on page 33 and the new 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.

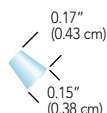
**Cost-Effectiveness:** Repairing a flanged tubing assembly requires a costly flanging tool or the purchase of a complete replacement assembly, including a new length of tubing and a set of fittings. The Flangeless Fittings system typically requires only one new ferrule at minimal cost when repairing a connection.

The 1/4-28 and M6 Flangeless Fittings for 1/16", 1/8" and metric sized OD tubing are summarized on this page and listed on pages 25 – 27.

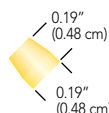
### Ferrules



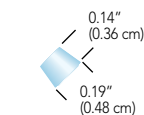
**Standard 1/16"**  
P-200 P-200R  
P-200N P-221



**Small Valve 1/16"**  
P-240



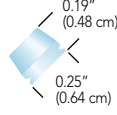
**Standard 1/8" and Metric Ferrules**  
P-300 P-300N P-342  
P-353 P-363R P-343



**Small Valve 1/8"**  
P-340



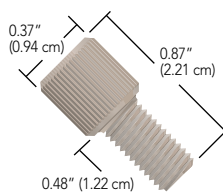
**Flangeless SealTight™**  
F-290



**Standard 4.0 mm**  
P-139

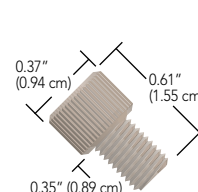
### Dimensions for 1/4-28 Flangeless Fittings (pages 25 – 27)

#### Nuts



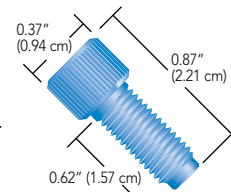
#### Standard

XP-201–XP-206 XP-301–XP-306  
XP-220 XP-320  
XP-230 XP-330  
XP-238 XP-338  
XP-245 XP-345  
XP-245B



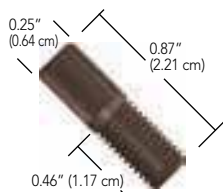
#### Short

XP-208 P-207S  
XP-218 P-247  
XP-235 P-307S  
XP-308 P-347  
XP-335



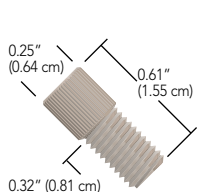
#### Extra-Long Threaded

XP-210



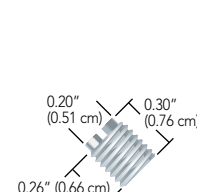
#### Headless

XP-286 XP-386  
P-288



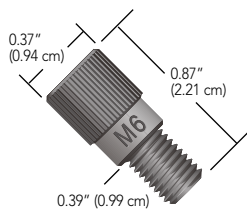
#### Short Headless

XP-283 XP-348  
P-362



#### FlushNut™

XF-358 XF-368



#### Standard Metric

P-207 P-226  
P-307 P-326

### Related Products

For the Large Bore Flangeless Fittings, please refer to page 30.

### 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.



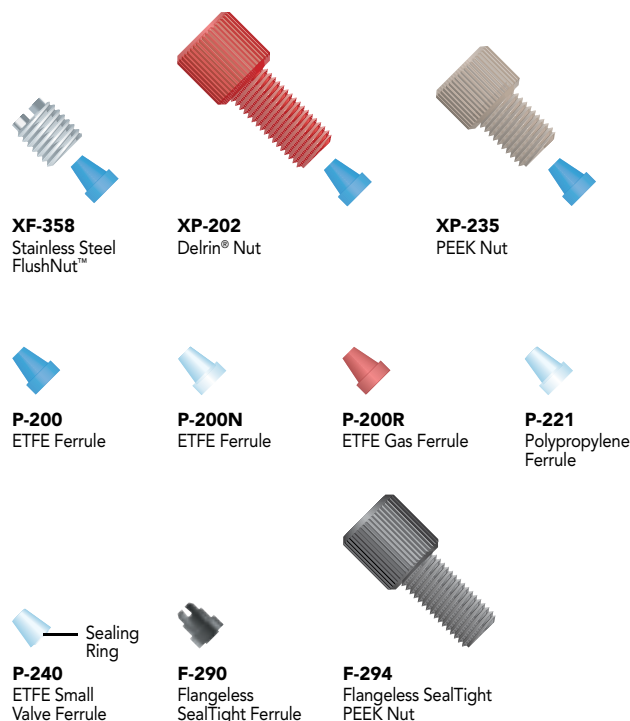
## Flangeless Fittings for 1/16" OD Tubing

- 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 P-200R gas ferrule has an enhanced sealing surface to ensure an improved seal for gas transfer applications. 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 ring 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](http://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.
<b>FLANGELESS FITTINGS (INCLUDES P-200 FERRULES)</b>						
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-203x	Flangeless Fitting for 1/16" OD Tubing	1/4-28 Flat-Bottom	2,000 psi (138 bar)	Standard Knurl	Delrin White/ETFE Blue	10-pk
XP-204x	Flangeless Fitting for 1/16" OD Tubing	1/4-28 Flat-Bottom	2,000 psi (138 bar)	Standard Knurl	Delrin Cream/ETFE Blue	10-pk
XP-205x	Flangeless Fitting for 1/16" OD Tubing	1/4-28 Flat-Bottom	2,000 psi (138 bar)	Standard Knurl	Delrin Green/ETFE Blue	10-pk
XP-206x	Flangeless Fitting for 1/16" OD Tubing	1/4-28 Flat-Bottom	2,000 psi (138 bar)	Standard Knurl	Delrin Blue/ETFE Blue	10-pk
XP-208x	Flangeless Fitting for 1/16" OD Tubing, Short	1/4-28 Flat-Bottom	2,000 psi (138 bar)	Standard Knurl	Delrin Black/ETFE Blue	10-pk
XP-210x	Flangeless Fitting for 1/16" OD Tubing, Long	1/4-28 Flat-Bottom	2,000 psi (138 bar)	Standard Knurl	ETFE Blue/ETFE Blue	10-pk
XP-215x	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-218x	Flangeless Fitting for 1/16" OD Tubing	1/4-28 Flat-Bottom	2,000 psi (138 bar)	Standard Knurl	ETFE Black/ETFE Blue	10-pk
XP-218BLKx	Flangeless Fitting for 1/16" OD Tubing	1/4-28 Flat-Bottom	2,000 psi (138 bar)	Standard Knurl	ETFE Black/ETFE Blue	10-pk
XP-220x	Flangeless Fitting for 1/16" OD Tubing	1/4-28 Flat-Bottom	2,000 psi (138 bar)	Standard Knurl	Polypropylene 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-245Bx	Flangeless Fitting for 1/16" OD Tubing	1/4-28 Flat-Bottom	2,000 psi (138 bar)	Standard Knurl	PFA Blue/ETFE Blue	10-pk
XP-283x	Flangeless Fitting for 1/16" OD Tubing, Short	1/4-28 Flat-Bottom	2,000 psi (138 bar)	Headless Knurl	PEEK 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
F-294x	SealTight Flangeless Nut for 1/16" OD Tubing	1/4-28 Flat-Bottom	5,000 psi (345 bar)	Standard Knurl	PEEK Black	10-pk
<b>REPLACEMENT FERRULES</b>						
★ 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-200Rx	Flangeless Ferrule for 1/16" OD Tubing	1/4-28 Flat-Bottom	2,000 psi (138 bar)	—	ETFE Red	10-pk
P-221x	Flangeless Ferrule for 1/16" OD Tubing	1/4-28 Flat-Bottom	2,000 psi (138 bar)	—	Polypropylene 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
F-290x	SealTight Flangeless Ferrule for 1/16" OD Tubing	1/4-28 Flat-Bottom	5,000 psi (345 bar)	—	PEEK Black	10-pk

## Flangeless Fittings for 1/8" OD Tubing

- ▶ Wide variety of materials and geometries to fit applications
- ▶ Fitting and ferrules pack tightly together easily, offering convenience

Upchurch Scientific® Flangeless Fittings for 1/8" OD tubing feature a wide assortment of materials and materials from which to choose. Fittings shown in this advertisement include 10 packs and also include P-300 Flangeless Ferrules (the nuts can be ordered separately - simply remove the receding "X" from the part number to reference the nuts separately from the receding ferrules).

All nuts in this advertisement have 1/4-28 threads.

## Lock Nut

The P-312 Lock Nut is used with any 1/4-28 Flat-Bottom Flangeless Fitting. Use this rod-ducting application where vibration can loosen fittings.

**To Use:** Thread the lock nut onto the fitting. When the fitting is fully seated into the receiving port, tighten the lock nut down against the receiving port to securely hold the fitting in place.



Please see page 24 for the dimensions of the products in this advertisement.

## Related Products

Nuts with 6 threads per inch are not available; nuts with 5/16-24 threads per inch are not available.



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## 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 Flush Nut is an excellent choice for applications where port-to-port sealing is limited; see page 31 for reinforcement in this innovative rod-ducting alternative to seal the "headless" fitting shown in this advertisement.

Part No.	Description	Port	Pressure Rating	Head Style	Material	Qty.
<b>FLANGELESS FITTINGS (INCLUDES P-300 FERRULES)</b>						
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-303x	Flangeless Fitting for 1/8" OD Tubing	1/4-28 Flat-Bottom	500 psi (34 bar)	Standard Knurl	Delrin White/ETFE Yellow	10-pk
★ XP-304x	Flangeless Fitting for 1/8" OD Tubing	1/4-28 Flat-Bottom	500 psi (34 bar)	Standard Knurl	Delrin Cream/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-306x	Flangeless Fitting for 1/8" OD Tubing	1/4-28 Flat-Bottom	500 psi (34 bar)	Standard Knurl	Delrin Blue/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-320x	Flangeless Fitting for 1/8" OD Tubing	1/4-28 Flat-Bottom	500 psi (34 bar)	Standard Knurl	Polypropylene 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-338x	Flangeless Fitting for 1/8" OD Tubing	1/4-28 Flat-Bottom	500 psi (34 bar)	Standard Knurl	Delrin Purple/ETFE Yellow	10-pk
★ XP-345x	Flangeless Fitting for 1/8" OD Tubing	1/4-28 Flat-Bottom	500 psi (34 bar)	Standard Knurl	PFA Natural/ETFE Yellow	10-pk
★ XP-348x	Flangeless Fitting for 1/8" OD Tubing, Short	1/4-28 Flat-Bottom	500 psi (34 bar)	Headless 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
<b>REPLACEMENT FERRULES</b>						
★ 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



## 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



**NEW!**  
**P-363R**  
ETFE Ferrule  
for 2.0 mm OD tubing



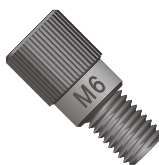
**P-353**  
ETFE Ferrule  
for 2.5 mm OD tubing



**P-343**  
ETFE Ferrule  
for 3.0 mm OD tubing



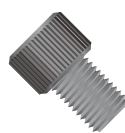
**P-139**  
PCTFE Ferrule  
for 4.0 mm OD tubing



**P-207**  
Delrin® Nut  
for 1/16" OD tubing



**P-288**  
PPS Nut  
for 1/16" OD tubing



**P-347**  
PEEK™ Nut  
for 1.8, 2.0, 3.0 mm or  
1/8" OD tubing



**P-362**  
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.



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## 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	P-200 (w/F-252 sleeve, not included)	P-207, P-207S, P-226, P-247, P-288
	1/4-28	P-200 (w/F-252 sleeve, not included)	Any 1/4-28 nut from page 25 <sup>1</sup>
1.8 mm	M6	P-342	P-307, P-307S, P-326, P-347, P-362
	1/4-28	P-342	Any nut from page 26 <sup>1</sup>
2.0 mm	M6	P-363R	P-307, P-307S, P-326, P-347, P-362
	1/4-28	P-363R	Any nut from page 26
2.5 mm	M6	P-353	P-307, P-307S, P-326, P-347, P-362
	1/4-28	P-353	Any nut from page 26 <sup>1</sup>
3.0 mm	M6	P-343	P-307, P-307S, P-326, P-347, P-362
	1/4-28	P-343	Any nut from page 30 <sup>1</sup>
4.0 mm	5/16-24	P-139	XP-132x, XP-138x from page 28
1/16"	M6	P-200	P-207, P-207S, P-226, P-247, P-288
	M6	P-840	P-931, P-933, P-935 from page 28
1/8"	M6	P-300	P-307, P-307S, P-326, P-347, P-362
	M6	P-940	P-943, P-945, P-947 from page 24

<sup>1</sup> 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

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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, above right.

Part No.	Description	Port	Pressure Rating	Head Style	Material	Qty.
<b>METRIC FLANGELESS NUTS</b>						
<b>P-207x</b>	Flangeless Nut for 1/16" OD Tubing	M6 Flat-Bottom	2,000 psi (138 bar)	Standard Knurl	Delrin Black	10-pk
<b>P-207Sx</b>	Flangeless Nut for 1/16" OD Tubing, Short	M6 Flat-Bottom	2,000 psi (138 bar)	Standard Knurl	Delrin Black	10-pk
<b>P-226x</b>	Flangeless Nut for 1/16" OD Tubing	M6 Flat-Bottom	2,000 psi (138 bar)	Standard Knurl	PFA Black	10-pk
<b>P-247x</b>	Flangeless Nut for 1/16" OD Tubing, Short	M6 Flat-Bottom	2,000 psi (138 bar)	Standard Knurl	PEEK Black	10-pk
<b>P-288x</b>	Flangeless Nut for 1/16" OD Tubing	M6 Flat-Bottom	2,000 psi (138 bar)	Standard Knurl	PPS Black	10-pk
<b>P-307x</b>	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
<b>P-307Sx</b>	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
<b>P-326x</b>	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	PFA Black	10-pk
<b>P-347x</b>	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
<b>P-362x</b>	Flangeless Nut for 1.8 mm, 2.0 mm, 3.0 mm, 1/8" OD Tubing	M6 Flat-Bottom	500 psi (34 bar)	Headless Knurl	PEEK Black	10-pk
<b>FLANGELESS FERRULES</b>						
<b>F-252x</b>	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
<b>P-139x</b>	Flangeless Ferrule for 4.0 mm OD Tubing	M6 or 1/4-28 Flat-Bottom	250 psi (17 bar)	—	PCTFE Natural	10-pk
★ <b>P-200x</b>	Flangeless Ferrule for 1/16" OD Tubing	M6 or 1/4-28 Flat-Bottom	2,000 psi (138 bar)	—	ETFE Blue	10-pk
★ <b>P-300x</b>	Flangeless Ferrule for 1/8" OD Tubing	M6 or 1/4-28 Flat-Bottom	500 psi (34 bar)	—	ETFE Yellow	10-pk
★ <b>P-342x</b>	Flangeless Ferrule for 1.8 mm OD Tubing	M6 or 1/4-28 Flat-Bottom	500 psi (34 bar)	—	ETFE Green	10-pk
<b>P-343x</b>	Flangeless Ferrule for 3.0 mm OD Tubing	M6 or 1/4-28 Flat-Bottom	500 psi (34 bar)	—	ETFE Orange	10-pk
<b>P-353x</b>	Flangeless Ferrule for 2.5 mm OD Tubing	M6 or 1/4-28 Flat-Bottom	500 psi (34 bar)	—	ETFE Natural	10-pk
<b>NEW!</b> <b>P-363Rx</b>	Flangeless Ferrule for 2.0 mm OD Tubing	M6 or 1/4-28 Flat-Bottom	500 psi (34 bar)	—	ETFE Red	10-pk

## VacuTight™ Fittings

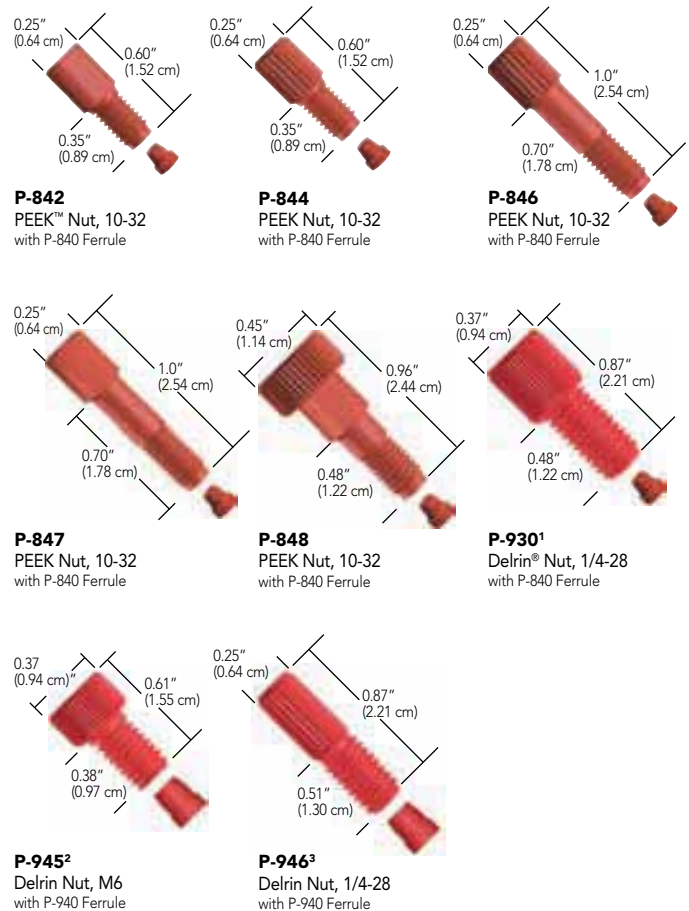
- For 1/16" or 1/8" OD tubing, connects into 10-32 1/4-28 and 6 flat-bottom ports
- Vacuum rated to 25 in-Hg (84 kPa)
- Improves transfer line consistency

Upchurch Scientific® VacuTight Fittings are designed to provide airtight, dependable connections under vacuum and low pressure conditions. Many of the VacuTight fittings have streamlined profiles for use in systems requiring a large number of connections in a small area. Furthermore, the VacuTight Ferrules are all sizes ensuring sufficient nut/thread engagement even in shallow ports. These features make VacuTight Fittings ideal for "comb" high throughput screening, clinical diagnostic automation and liquid handling applications.

The configuration of the VacuTight flat-bottom ferrules prevents overcompression and tubing deformation that can occur with any other fitting. This results in a more consistent, airtight and lasting vacuum seal system connections.

The VacuTight fittings scanals work well in simple 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 for EXH Health & Science Form or reinforcement. Additionally, please note that some of the VacuTight fittings have changed in color from red to black however, this is a color change does not affect product performance.

All VacuTight fittings must be used exclusively with VacuTight Ferrules.



<sup>1</sup> The dimensions shown apply to P-930, P-931, P-938, P-942, P-943 and P-948.

<sup>2</sup> The dimensions shown apply to P-932, P-933, P-944 and P-945.

<sup>3</sup> The dimensions shown apply to P-934, P-935, P-946 and P-947.



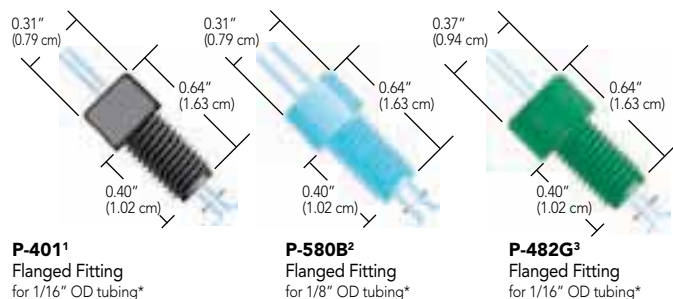
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Part No.	Description	Port	Pressure Rating	Head Style	Material	Qty.
<b>VACUTIGHT FITTINGS (INCLUDES P-840 OR P-940 FERRULES)</b>						
★ P-842x	VacuTight Fitting for 1/16" OD Tubing, Short	10-32 Flat-Bottom	400 – 800 psi (27 – 55 bar)	1/4" Hex	PEEK 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-847x	VacuTight Fitting for 1/16" OD Tubing, Long	10-32 Flat-Bottom	400 – 800 psi (27 – 55 bar)	1/4" Hex	PEEK Red	10-pk
P-848x	VacuTight Fitting for 1/16" OD Tubing, Long	10-32 Flat-Bottom	400 – 800 psi (27 – 55 bar)	Knurl-1/4" Hex	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-932x	VacuTight Fitting for 1/16" OD Tubing, Short	1/4-28 Flat-Bottom	400 – 800 psi (27 – 55 bar)	Standard Knurl	Delrin Black	10-pk
P-933x	VacuTight Fitting for 1/16" OD Tubing, Short	M6 Flat-Bottom	400 – 800 psi (27 – 55 bar)	Standard Knurl	Delrin Red	10-pk
P-934x	VacuTight Fitting for 1/16" OD Tubing	1/4-28 Flat-Bottom	400 – 800 psi (27 – 55 bar)	Headless Knurl	Delrin Black	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-943x	VacuTight Fitting for 1/8" OD Tubing	M6 Flat-Bottom	500 – 1,000 psi (34 – 69 bar)	Standard Knurl	Delrin Red	10-pk
P-944x	VacuTight Fitting for 1/8" OD Tubing, Short	1/4-28 Flat-Bottom	500 – 1,000 psi (34 – 69 bar)	Standard Knurl	Delrin Black	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
<b>REPLACEMENT FERRULES</b>						
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

## 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

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<sup>1</sup>**

Flanged Fitting  
for 1/16" OD tubing\*

**P-580B<sup>2</sup>**

Flanged Fitting  
for 1/8" OD tubing\*

**P-482G<sup>3</sup>**

Flanged Fitting  
for 1/16" OD tubing\*

<sup>1</sup> The dimensions shown apply to all square-head Flanged Fittings

<sup>2</sup> The dimensions shown apply to all hex-head Flanged Fittings

<sup>3</sup> 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.

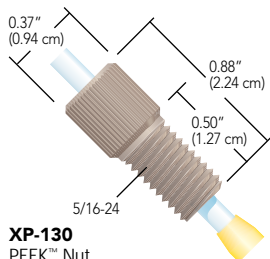


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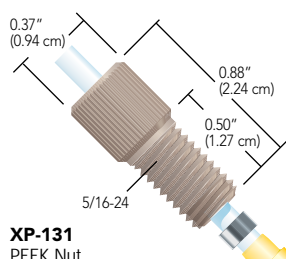
Part No.	Description	Port Geometry	Head Style	Material (Nut/Washer)	Qty.
<b>FLANGED FITTINGS (INCLUDES STAINLESS STEEL WASHERS)</b>					
<b>P-401x</b>	Flanged Fitting for 1/16" OD Tubing	1/4-28 Flat-Bottom	5/16" Square	Delrin Black/SST	10-pk
<b>P-402x</b>	Flanged Fitting for 1/16" OD Tubing	1/4-28 Flat-Bottom	5/16" Square	Delrin Red/SST	10-pk
<b>P-403x</b>	Flanged Fitting for 1/16" OD Tubing	1/4-28 Flat-Bottom	5/16" Square	Delrin White/SST	10-pk
<b>P-405x</b>	Flanged Fitting for 1/16" OD Tubing	1/4-28 Flat-Bottom	5/16" Square	Delrin Gree/SST	10-pk
<b>P-406x</b>	Flanged Fitting for 1/16" OD Tubing	1/4-28 Flat-Bottom	5/16" Square	Delrin Blue/SST	10-pk
<b>P-480B</b>	Flanged Fitting for 1/16" OD Tubing	1/4-28 Flat-Bottom	5/16" Hex	Delrin Blue/SST	ea.
★ <b>P-480BLK</b>	Flanged Fitting for 1/16" OD Tubing	1/4-28 Flat-Bottom	5/16" Hex	Delrin Black/SST	ea.
<b>P-480G</b>	Flanged Fitting for 1/16" OD Tubing	1/4-28 Flat-Bottom	5/16" Hex	Delrin Green/SST	ea.
<b>P-480R</b>	Flanged Fitting for 1/16" OD Tubing	1/4-28 Flat-Bottom	5/16" Hex	Delrin Red/SST	ea.
<b>P-480T</b>	Flanged Fitting for 1/16" OD Tubing	1/4-28 Flat-Bottom	5/16" Hex	ETFE Natural/SST	ea.
<b>P-480W</b>	Flanged Fitting for 1/16" OD Tubing	1/4-28 Flat-Bottom	5/16" Hex	Delrin White/SST	ea.
<b>P-482B</b>	Flanged Fitting for 1/16" OD Tubing	1/4-28 Flat-Bottom	Standard Knurl	Delrin Blue/SST	ea.
<b>P-482BLK</b>	Flanged Fitting for 1/16" OD Tubing	1/4-28 Flat-Bottom	Standard Knurl	Delrin Black/SST	ea.
<b>P-482G</b>	Flanged Fitting for 1/16" OD Tubing	1/4-28 Flat-Bottom	Standard Knurl	Delrin Green/SST	ea.
<b>P-482R</b>	Flanged Fitting for 1/16" OD Tubing	1/4-28 Flat-Bottom	Standard Knurl	Delrin Red/SST	ea.
<b>P-482T</b>	Flanged Fitting for 1/16" OD Tubing	1/4-28 Flat-Bottom	Standard Knurl	ETFE Natural/SST	ea.
<b>P-482W</b>	Flanged Fitting for 1/16" OD Tubing	1/4-28 Flat-Bottom	Standard Knurl	Delrin White/SST	ea.
<b>P-501x</b>	Flanged Fitting for 1/8" OD Tubing	1/4-28 Flat-Bottom	5/16" Square	Delrin Black/SST	10-pk
<b>P-502x</b>	Flanged Fitting for 1/8" OD Tubing	1/4-28 Flat-Bottom	5/16" Square	Delrin Red/SST	10-pk
<b>P-503x</b>	Flanged Fitting for 1/8" OD Tubing	1/4-28 Flat-Bottom	5/16" Square	Delrin White/SST	10-pk
<b>P-505x</b>	Flanged Fitting for 1/8" OD Tubing	1/4-28 Flat-Bottom	5/16" Square	Delrin Green/SST	10-pk
<b>P-506x</b>	Flanged Fitting for 1/8" OD Tubing	1/4-28 Flat-Bottom	5/16" Square	Delrin Blue/SST	10-pk
<b>P-508x</b>	Flanged Fitting for 1/8" OD Tubing	1/4-28 Flat-Bottom	5/16" Square	Delrin Gray/SST	10-pk
<b>P-580B</b>	Flanged Fitting for 1/8" OD Tubing	1/4-28 Flat-Bottom	5/16" Hex	Delrin Blue/SST	ea.
<b>P-580BLK</b>	Flanged Fitting for 1/8" OD Tubing	1/4-28 Flat-Bottom	5/16" Hex	Delrin Black/SST	ea.
<b>P-580G</b>	Flanged Fitting for 1/8" OD Tubing	1/4-28 Flat-Bottom	5/16" Hex	Delrin Green/SST	ea.
<b>P-580GRY</b>	Flanged Fitting for 1/8" OD Tubing	1/4-28 Flat-Bottom	5/16" Hex	Delrin Gray/SST	ea.
<b>P-580R</b>	Flanged Fitting for 1/8" OD Tubing	1/4-28 Flat-Bottom	5/16" Hex	Delrin Red/SST	ea.
<b>P-580T</b>	Flanged Fitting for 1/8" OD Tubing	1/4-28 Flat-Bottom	5/16" Hex	ETFE Natural/SST	ea.
<b>P-580W</b>	Flanged Fitting for 1/8" OD Tubing	1/4-28 Flat-Bottom	5/16" Hex	Delrin White/SST	ea.
<b>P-582B</b>	Flanged Fitting for 1/8" OD Tubing	1/4-28 Flat-Bottom	Standard Knurl	Delrin Blue/SST	ea.
<b>P-582BLK</b>	Flanged Fitting for 1/8" OD Tubing	1/4-28 Flat-Bottom	Standard Knurl	Delrin Black/SST	ea.
<b>P-582G</b>	Flanged Fitting for 1/8" OD Tubing	1/4-28 Flat-Bottom	Standard Knurl	Delrin Green/SST	ea.
<b>P-582R</b>	Flanged Fitting for 1/8" OD Tubing	1/4-28 Flat-Bottom	Standard Knurl	Delrin Red/SST	ea.
<b>P-582T</b>	Flanged Fitting for 1/8" OD Tubing	1/4-28 Flat-Bottom	Standard Knurl	ETFE Natural/SST	ea.
<b>P-582W</b>	Flanged Fitting for 1/8" OD Tubing	1/4-28 Flat-Bottom	Standard Knurl	Delrin White/SST	ea.
<b>NEW!</b> <b>P-982BLKx</b>	Flanged Fitting for 1/16" OD Tubing	M6 Flat-Bottom	Standard Knurl	Delrin Black/SST	10-pk
<b>NEW!</b> <b>P-1082BLKx</b>	Flanged Fitting for 1/8" OD Tubing	M6 Flat-Bottom	Standard Knurl	Delrin Black/SST	10-pk
<b>REPLACEMENT WASHERS</b>					
<b>P-407x</b>	Washer for 1/16" OD Tubing	1/4-28 Flat-Bottom	—	SST	10-pk
<b>P-507x</b>	Washer for 1/8" OD Tubing	1/4-28 Flat-Bottom	—	SST	10-pk
<b>NEW!</b> <b>P-987x</b>	Washer for 1/16" OD Tubing	M6 Flat-Bottom	—	SST	10-pk
<b>NEW!</b> <b>P-1087x</b>	Washer for 1/8" OD Tubing	M6 Flat-Bottom	—	SST	10-pk

## Large Bore Fittings

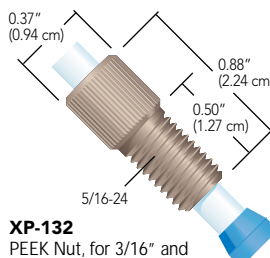
- ▶ 5/16-24 or 1/2-20 threads
- ▶ For use with 1/16", 1/8", 3/16", 1/4", 5/16", 3.0 mm or 4.0 mm OD tubing



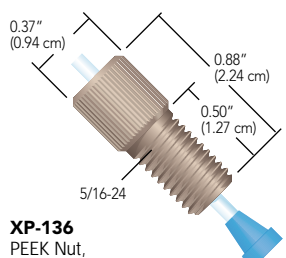
**XP-130**  
PEEK™ Nut,  
for 1/8" OD tubing  
shown with P-300 Flangeless Ferrule  
(page 26)



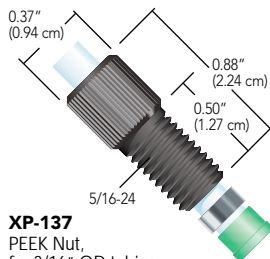
**XP-131**  
PEEK Nut,  
for 1/8" OD tubing  
shown with P-359 Super Flangeless™  
Ferrule (included and found on page 23)



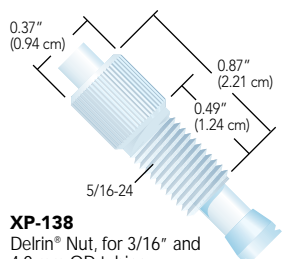
**XP-132**  
PEEK Nut, for 3/16" and  
4.0 mm OD tubing  
shown with P-133 Flangeless Ferrule  
(included and found on this page)



**XP-133**  
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-138**  
Delrin® Nut, for 3/16" and  
4.0 mm OD tubing  
shown with P-139 Flangeless Ferrule  
(included and found on page 27)



**Top Seller** SEE STARRED PRODUCTS

Part No.	Description	Port	Pressure Rating
<b>LARGE BORE FITTINGS</b>			
<b>XP-130x</b>	Flangeless Fitting for 1/8" OD tubing	5/16-24 Flat-Bottom	500 psi (34 bar)
<b>XP-131x</b>	Super Flangeless Fitting for 1/8" OD tubing	5/16-24 Flat-Bottom	1,000 psi (69 bar)
★ <b>XP-132x</b>	Flangeless Fitting for 4.0 mm OD tubing	5/16-24 Flat-Bottom	500 psi (34 bar)
<b>XP-136x</b>	Flangeless Fitting for 1/16" OD tubing	5/16-24 Flat-Bottom	2,000 psi (138 bar)
<b>XP-137x</b>	Super Flangeless Fitting for 3/16" OD tubing	5/16-24 Flat-Bottom	500 psi (34 bar)
<b>XP-138x</b>	Flangeless Fitting for 3/16" OD tubing	5/16-24 Flat-Bottom	500 psi (34 bar)
<b>XP-141x</b>	Super Flangeless Fitting for 1/16" OD tubing	5/16-24 Flat-Bottom	1,350 psi (93 bar)
<b>XP-143x</b>	Flangeless Fitting for 3.0 mm OD tubing	5/16-24 Flat-Bottom	500 psi (34 bar)
<b>XU-620x</b>	Flangeless Fitting for 1/4" OD tubing	1/2-20 Coned	250 psi (17 bar)
<b>XU-655x</b>	Flangeless Fitting for 1/4" OD tubing	1/2-20 Flat-Bottom	250 psi (17 bar)
<b>XU-662x</b>	Flangeless Fitting for 5/16" OD tubing	1/2-20 Flat-Bottom	250 psi (17 bar)
<b>REPLACEMENT FERRULES</b>			
★ <b>P-133x</b>	Flangeless Ferrule for 3/16" OD tubing	5/16-24 Flat-Bottom	500 psi (34 bar)
<b>P-133Nx</b>	Flangeless Ferrule for 3/16" OD tubing	5/16-24 Flat-Bottom	500 psi (34 bar)
<b>P-140x</b>	Super Flangeless Ferrule for 3/16" OD tubing	5/16-24 Flat-Bottom	500 psi (34 bar)
<b>U-650x</b>	Flangeless Ferrule for 1/4" OD tubing	1/2-20 Flat-Bottom	250 psi (17 bar)
<b>U-660x</b>	Flangeless Ferrule for 5/16" OD tubing	1/2-20 Flat-Bottom	250 psi (17 bar)

## 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, excepting the P-321 Plug, which is made of PEEK™ polymer.
- NEW!** XP-141 PEEK Nut, for 1/16" OD tubing, shown with P-259 Super Flangeless Ferrule (included and found on page 22).
- XU-620** PEEK Nut, shown with inverted U-650 Flangeless Ferrule for coned ports (included and found on this page).
- 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.

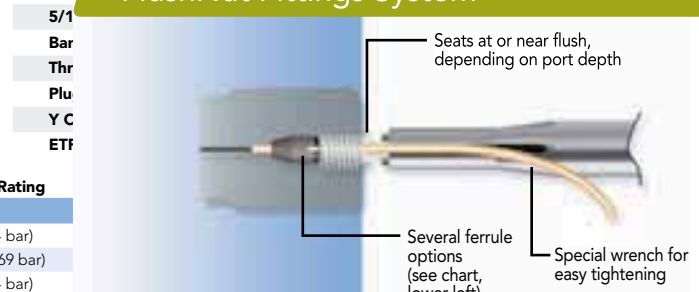


Please refer to the chart on page 27 to choose the correct nut/ferrule combination to connect to 5/16-24 threaded ports, reference the chart on page 27 to choose the correct nut/ferrule combination.

## Related Products

### More Large Bore Products

## FlushNut Fittings System



Part No.	Description	Port
<b>TINYTIGHT FITTINGS</b>		
<b>M-150</b>	Swaging Tool for TinyTight Fittings	10-ok
<b>M-644-03x</b>	Super Flangeless Nut for 1/16" OD Tubing	6-40 MINSTAC
<b>M-647x</b>	TinyTight Ferrule for 1/16" OD Tubing, 0.020" Thru-Hole	6-40 MINSTAC
★ <b>M-657x</b>	TinyTight Ferrule for 1/16" OD Tubing, 0.030" Thru-Hole	6-40 MINSTAC

Part No.	Description	Port
<b>TINYTIGHT FITTINGS</b>		
<b>M-150</b>	Swaging Tool for TinyTight Fittings	10-ok
<b>M-644-03x</b>	Super Flangeless Nut for 1/16" OD Tubing	6-40 MINSTAC
<b>M-647x</b>	TinyTight Ferrule for 1/16" OD Tubing, 0.020" Thru-Hole	6-40 MINSTAC
★ <b>M-657x</b>	TinyTight Ferrule for 1/16" OD Tubing, 0.030" Thru-Hole	6-40 MINSTAC



## FlushNut™ Fittings

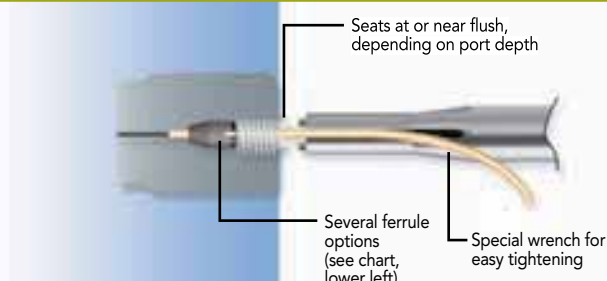
- Tightens flush with the top of the receiving port
- Several ferrule options

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



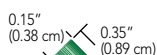
**Top Seller** SEE STARRED PRODUCTS

## 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, colletting 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
<b>F-350</b>	10-32 C	1/16"	SealTight™ F-192	14
<b>F-354</b>	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
<b>F-364</b>	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
<b>F-356</b>	1/4-28 FB	1/32"	Super Flangeless P-248	22
	1/4-28 FB	1/16"	Super Flangeless P-250, P-259, P-260	22
<b>XF-358</b>	1/4-28 FB	1/16"	Flangeless P-200, P-200N, P-200R, P-221, P-240	24
<b>XF-368</b>	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
<b>P-321</b>	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.
<b>TINYTIGHT FITTINGS</b>						
<b>M-150</b>	Swaging Tool for TinyTight Fittings	6-40 MINSTAC	—	—	SST	ea.
<b>M-644-03x</b>	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
<b>M-647x</b>	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
★ <b>M-657x</b>	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

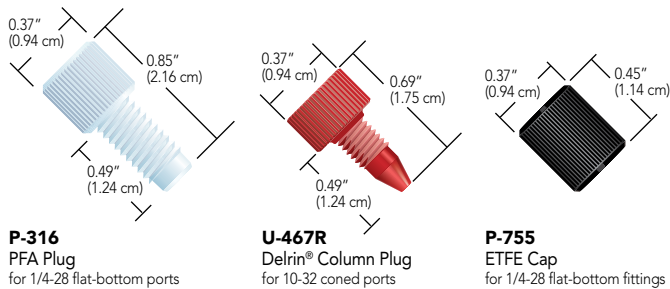


## Plugs and Caps

- Seal 6-32 6-40 10-32 1/4-28 1/2-20 5/16-24 threaded ports on fittings

Universal Scientific® plugs to close unused ports in valves and manifolds to meet ISO 1032 standard 10-32 threaded plugs are effective in identifying standard columns that have different packing materials or in which different mobile phases have been utilized. Cap off fitting with new PEEK™ or ETFE cap as presented in this page and the appropriate fitting from this chapter.

To help determine which plug or cap is suitable for your application please visit [www.id-ex.com](http://www.id-ex.com) for detailed chemical compatibility data



**Top Seller** SEE STARRED PRODUCTS

Part No.	Description	Head Style	Material	Qty.
<b>PLUGS</b>				
<b>P-120</b>	Plug for 1/4-28 Coned Ports for 1/8" OD Tubing	Standard Knurl	PCTFE Natural	ea.
<b>P-123</b>	Plug for 1/4-28 Flat-Bottom Ports	5/16" Hex	ETFE Natural	ea.
★ <b>P-309x</b>	Plug for 1/4-28 Flat-Bottom Ports	Standard Knurl	Delrin Black	10-pk
★ <b>P-311</b>	Plug for 1/4-28 Flat-Bottom Ports	Standard Knurl	ETFE Natural	ea.
<b>P-314</b>	Plug for M6 Flat-Bottom Ports	Standard Knurl	ETFE Black	ea.
★ <b>P-316</b>	Plug for 1/4-28 Flat-Bottom Ports	Standard Knurl	PFA Natural	ea.
<b>P-321</b>	Plug for 1/4-28 Flat-Bottom Ports, FlushNut™	FlushNut	PEEK Natural	ea.
<b>P-520</b>	Plug for 10-32 Coned Ports	5/16" Hex	SST	ea.
<b>P-550</b>	Plug for 10-32 Coned Ports, Extra Long	Standard Knurl	PEEK Natural	ea.
★ <b>P-551</b>	Plug for 10-32 Coned Ports	Standard Knurl	PEEK Natural	ea.
<b>P-552</b>	Plug for 6-40 Coned Ports	Headless Knurl	PEEK Natural/PCTFE	ea.
<b>P-555</b>	Plug for 6-32 Coned Ports	Standard Micro Knurl	PEEK Natural	ea.
<b>P-556</b>	Plug for 5/16-24 Flat-Bottom Ports	5/16" Hex	PEEK Natural	ea.
<b>P-557</b>	Plug for 5/16-24 Flat-Bottom Ports	5/16" Hex	Delrin White	ea.
<b>NEW!</b> <b>P-558</b>	Plug for 6-40 Flat-Bottom Ports	Micro Headless Knurl	PEEK Green	ea.
<b>NEW!</b> <b>P-559</b>	Plug for 6-32 Flat-Bottom Ports	Micro Headless Knurl	PEEK Natural	ea.
<b>P-849</b>	Plug for 10-32 Flat-Bottom Ports	Standard Knurl	Delrin Black	ea.
<b>U-467Bx</b>	Plug for 10-32 Coned Ports	Standard Knurl	Delrin Blue	10-pk
<b>U-467BLKx</b>	Plug for 10-32 Coned Ports	Standard Knurl	Delrin Black	10-pk
<b>U-467DBx</b>	Plug for 10-32 Coned Ports	Standard Knurl	Delrin Dark Blue	10-pk
<b>U-467Rx</b>	Plug for 10-32 Coned Ports	Standard Knurl	Delrin Red	10-pk
<b>U-467Wx</b>	Plug for 10-32 Coned Ports	Standard Knurl	Delrin White	10-pk
<b>U-468Bx</b>	Plug for 10-32 Coned Ports	Standard Knurl	ETFE Blue	10-pk
<b>U-468BLKx</b>	Plug for 10-32 Coned Ports	Standard Knurl	ETFE Black	10-pk
<b>U-468Nx</b>	Plug for 10-32 Coned Ports	Standard Knurl	ETFE Natural	10-pk
<b>CAPS</b>				
<b>P-754</b>	Cap for 10-32 Coned Ports	Standard Knurl	ETFE Yellow	ea.
★ <b>P-755</b>	Cap for 1/4-28 Flat-Bottom Ports	Standard Knurl	ETFE Black	ea.
<b>P-756</b>	Cap for M6 Flat-Bottom Ports	Standard Knurl	ETFE Blue	ea.

## 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 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

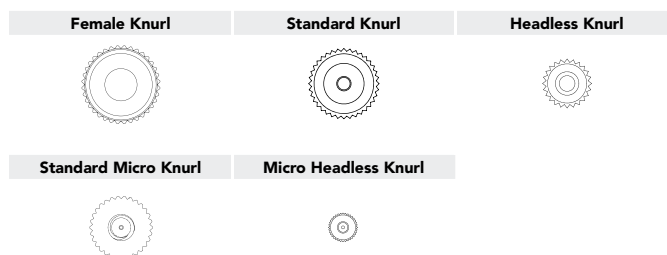
For your convenience, we offer wrenches in three standard sizes. You will need two A-304 wrenches to tighten most nuts into unions found on page 36 (for unions 1593 and U-352, you need one A-304 and one A-320 wrench).



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.



Part No.	Description	Material	Qty.
<b>EXTENDER TOOLS</b>			
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.
<b>MISCELLANEOUS TOOLS</b>			
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.

# Pumps



Assembling an Ismatec® IPC pump in Oak Harbor, WA.



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		94	110	118
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 <sup>1</sup>	Very High
Self-Priming		Yes	Possible <sup>4</sup>	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 <sup>4</sup>	Yes
	Pulse-Free	<sup>2</sup>	Yes	<sup>2</sup>
	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	<sup>3</sup>	Good	Very Good
	Gas	<sup>3</sup>	No	<sup>4</sup>

<sup>1</sup> Requires non-return valve

<sup>2</sup> Pumping with low pulsation possible; depends on the pumphead

<sup>3</sup> Depends on the tubing material

<sup>4</sup> Depends on the pumphead

## Peristaltic Pumps and 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 94 – 100, 112 – 115, and 118 – 119, 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

For a simple inexpensive fixed speed pump, such as the MS/CA line on page 108, the only variable is the tubing ID. Therefore, to change the flow rate of a fixed speed pump channel, the operator must use tubing with a different ID.

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.



Pumpheads with this sign are ideal for cell and media sensitive pumping.



## Related Products

Connectors and adapters for peristaltic tubing are on pages 59, 60 and 61.

## 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](http://www.idex-hs.com/ismatec)



PUMP SERIES		CHANNELS	FLOW RANGE	DRIVE OPTIONS	INTERFACE	PAGE
REGLO		1 – 4	0.001 – 230 mL/min	Variable	Digital = RS232 only interface Analog = Analog only	94
FLOWMASTER®		Single channel only	37 – 13,000 mL/min	Variable	Analog	97
ECOLINE		1 – 8	0.005 – 5,400 mL/min	Variable	Analog	98
BVP/MCP		1 – 24	0.001 – 3,700 mL/min	Variable	RS232, Analog	102
IP / IPC		4 – 24	0.001 – 44 mL/min	Variable	RS232, Analog	100
MS/CA STAND ALONE		2 – 4	0.021 – 26 mL/min	Fixed	N/A	108

## 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



**REGLO Digital**  
with dispensing functions  
0.001 – 68 mL/min (per channel)  
Microprocessor controlled



## Interfaces

**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)

**REGLO Digital**

- ▶ PC-controllable
- ▶ Digital is RS-232 only



**REGLO Digital**  
6-button membrane key-pad,  
LED-display  
Flow rate setting in  $\mu\text{L}/\text{min}$  and  $\text{mL}/\text{min}$

## Specifications

**REGLO Analog**

<b>Motor Type</b>	DC motor	
<b>Speed</b>	2-channel	3.2 – 160 rpm
	4-channel	2.0 – 100 rpm
<b>Speed Setting</b>	2 – 99%, resolution 1%	
	2-digit potentiometer	
<b>Power Consumption</b>	20 W	
<b>Mains Connection</b>	230V <sub>AC</sub> /50Hz, 115V <sub>AC</sub> /60Hz, selectable	
<b>Protection Rating</b>	IP 30	
<b>Depth/Width/Height</b>	2-channel	178 x 100 x 143 mm
	4-channel	190 x 100 x 143 mm
<b>Weight</b>	2-channel	2.0 kg
	4-channel	2.1 kg

**REGLO Digital**

<b>Motor Type</b>	DC motor	
<b>Speed</b>	2-channel	1.6 – 160 rpm
	4-channel	1.0 – 100 rpm
<b>Speed Setting</b>	rpm, resolution 0.1 rpm	
<b>Flow Rate Setting</b>	$\mu\text{L}/\text{min}$ or $\text{mL}/\text{min}$	
<b>Power Consumption</b>	75 W	
<b>Mains Connection</b>	100–230V <sub>AC</sub> /50–60Hz, selectable	
<b>Protection Rating</b>	IP 30	
<b>Depth/Width/Height</b>	2-channel	178 x 100 x 135 mm
	4-channel	190 x 100 x 135 mm
<b>Weight</b>	2-channel	2.0 kg
	4-channel	2.1 kg

## Flow Rates and Tubing

Model		REGLO Analog+Digital		REGLO Analog+Digital		REGLO Analog+Digital		REGLO Analog+Digital		REGLO Analog+Digital			
Channels		2		2		2		4		4			
Rollers		6		8		12		6		8			
Speed rpm		1.6 <sup>1</sup> 160		1.6 <sup>1</sup> 160		1.6 <sup>1</sup> 160		1.0 <sup>1</sup> 100		1.0 <sup>1</sup> 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			
		min. <sup>1</sup>	max. <sup>2</sup>	min. <sup>1</sup>	max. <sup>2</sup>	min. <sup>1</sup>	max. <sup>2</sup>	min. <sup>1</sup>	max. <sup>2</sup>	min. <sup>1</sup>	max. <sup>2</sup>		
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.

<sup>1</sup> Minimum flow rates shown are for the Reglo Digital. Min flow rate for Reglo Analog = 2% of max flow rate.

<sup>2</sup> Maximum flow rates shown are for both the Reglo Analog and Digital pumps.

## Related Products

- Spare cassettes MS/CA are on page 109



## 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 rpm	Speed
<b>REGLO ANALOG</b>					
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
<b>REGLO DIGITAL</b>					
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

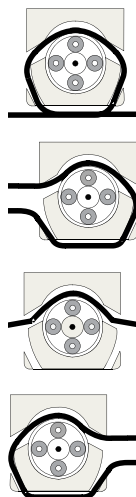
LabVIEW™ driver for Reglo Digital download for free: [www.idex-hs.com/ismatec](http://www.idex-hs.com/ismatec)

## REGLO Quick™

## Very Fast Tubing Change-Over



**REGLO Quick**  
2.1 – 230 mL/min  
Easily accessible tube-bed thanks to wide opening angle.



Flexible layout for tubing appropriate to your application.

## Interfaces



- ▶ 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 and 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 min	mL/min min
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.

## Specifications

## REGLO Quick

<b>Motor Type</b>	DC motor
<b>Speed</b>	3.2 – 160 rpm
<b>Speed Setting</b>	1 – 99 %, resolution 1% 2-digit potentiometer
<b>Power Consumption</b>	30 W
<b>Mains Connection</b>	230V <sub>ac</sub> / 50Hz, 115V <sub>ac</sub> / 60Hz, selectable
<b>Protection Rating</b>	IP 30
<b>Depth/Width/Height</b>	178 x 100 x 143 mm (pumphead closed)
<b>Weight</b>	2.2 kg

## 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

Part No.	Flow rates mL/min per channel	Channels max.	Rollers	Speed rpm
<b>REGLO QUICK</b>				
ISM897	2.1 – 230	1	4	3.2 – 160

## 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 pumphead
- Thorough cleaning thanks to easy disassembly and reassembly of the pumphead

### 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

flowmaster®



## PC Compatible Interface

PLC compatible interface with status information for process control systems (the level of the inputs can be configured: 5, 12 or 24 V)



- Speed control (0 – 5 or 0 – 10V, 0 – 20 or 4 – 20mA)
- Start/stop, rotation direction

### Settings menu

- Configuration of analog interface
- Entry of basic settings, e.g.
- Foot switch control
- Rotation speed (% or rpm)
- Service life of tubing
- Timer function, etc.

- Autostart
- Speed output
- Digital output (potential free) (error, okay, busy)

## Flow Rates and Tubing

### Tubing Information

Tygon® LFL Part No.	PharMed® Part No.	Wall (mm)	Tubing ID (mm)	Flow Rates in L/min							
				rpm 5	rpm 10	rpm 50	rpm 100	rpm 200	rpm 300	rpm 400	rpm 500
SC0531	MF0015	3.2	6.4	0.037	0.074	0.37	0.74	1.5	2.2	3.1	3.7
SC0395	MF0016	3.2	9.5	0.08	0.16	0.80	1.6	3.2	4.8	6.4	8.0
SC0396	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

## Specifications

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	230V <sub>AC</sub> /50Hz, 115V <sub>AC</sub> /60Hz, selectable
Protection rating	IP 65
Depth/Width/Height	500 x 220 x 262 mm
Weight	26 kg

## Related Products

- Tubing for aggressive media, see Pages 80 and 89

## 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!

Part No.	Description	Flow rates mL/min	Channels	Rollers	Speed rpm
<b>FLOWMASTER</b>					
ISM1020A	Flowmaster FMT300 230V 50Hz	37 – 13,000	1	3	5 – 500
ISM1022A	Flowmaster FMT300 115V 60Hz	37 – 13,000	1	3	5 – 500
<b>ACCESSORIES</b>					
IS10279	Foot switch, see Page 109				



## Ecoline VC-MS/CA8-6

0.005 – 150 mL/min

- ▶ 8 channels
- ▶ 6 rollers
- ▶ 3-stop tubing
- ▶ Differential pressure 1.0 bar<sup>1</sup> (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<sup>1</sup> (15 psi)

<sup>1</sup> 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<sup>1</sup> (22 psi)

<sup>1</sup> Differential pressure depends on tubing material; tubing with small ID's may enable higher pressures.

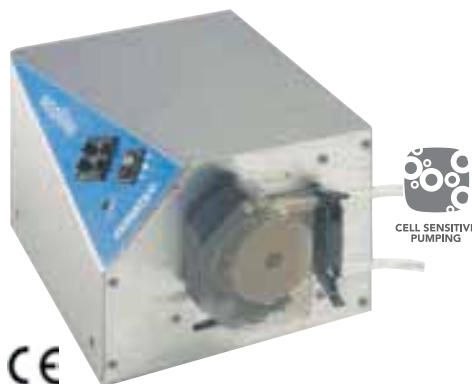


## Ecoline VC-360

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<sup>1</sup> (22 psi)

<sup>1</sup> Differential pressure depends on tubing material; tubing with small ID's may enable higher pressures.



## Interfaces



- ▶ Speed control (0 – 5 or 0 – 10 V, 0 – 20 or 4 – 20 mA)
- ▶ Start/stop, rotation direction

## Specifications

Motor Type	DC motor	
Speed	3.5 – 350 rpm	
Speed Setting	1 – 99%, resolution 1%	
	2-digit potentiometer	
Power Consumption	100 W	
Mains Connection	230V <sub>AC</sub> /50Hz,115V <sub>AC</sub> /60Hz, selectable	
Protection Rating	IP 30	
Size and Weight		
Model	Depth/Width/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

## 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 cuvet
- ▶ **Ecoline VC-MS/CA8-6**  
8-channel flushing of the tubing system of a digital fabric printing machine

## Flow Rates and Tubing



### Stopper Tubing

Model Type		Ecoline VC-MS / CA8-6		Ecoline VC-MS / CA4-12	
Channels		8		4	
Rollers		6		12	
Speed rpm		3.5		350	
Tygon® ST R-3603/R-3607 Part No.	Tubing ID (mm)	mL/min per channel		mL/min per channel	
		min.	max	min.	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.

## Note



1. Available without pumphead: ISM1077A
2. Easy stackable
3. Easily exchangeable rotor:  
WT 1.6 mm: 2 or 3 rollers, VC-280 or VC-380  
WT 2.4 mm: 2 or 3 rollers, VC-281 or VC-381

## Related Products

- Find tubing for these pumps beginning on page 78.
- Tubing for aggressive media see Pages 80 and 89.

## Flow Rates and 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		mL/min per channel		mL/min per channel	
			min.	max	min.	max	min.	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
<b>COMPLETE ECOLINE PUMPS</b>				
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
<b>ECOLINE PUMPS WITH SPECIALTY PUMPHEADS</b>				
ISM1077A	Ecoline Drive	0.005 – 150	8	6
<b>Order One of the Following Pumpheads with the Ecoline Drive</b>				
ISM185A	VC-MS/CA 8 – 6	0.005 – 150	8	6
ISM737A	VC-MS/CA 4 – 12	0.003 – 83	4	12
MF0313	VC-EasyLoad	0.23 – 1,600	1	3

\*For standard tubing 2.4 mm wall thickness 4.8 – 9.5 mm (3/16 – 3/8") inner diameter

## IPC / IP and 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)

## Interfaces



## IPC, IPC-N

- ▶ PC-controllable
- ▶ Analog: same as IP, IP-N



## 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



DISPENSING &amp; CALIBRATING



Standard Speed (IPC)

## Specifications

## Specifications IPC and IPC-N

Motor Type	DC motor
Speed	IPC 0.4 – 44 rpm 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	230V <sub>AC</sub> /50Hz, 115V <sub>AC</sub> /60Hz, selectable
Protection Rating	IP 30

## Specifications IP and IP-N

Motor Type	DC motor
Speed	IP 0.4 – 44 rpm IP-N 0.11 – 11.25 rpm
Speed Setting	1 – 100 %, resolution 0.1% IP rpm, resolution 0.1 rpm IP-N rpm, resolution 0.03 rpm
Power Consumption	30 W
Mains Connection	230V <sub>AC</sub> /50Hz, 115V <sub>AC</sub> /60Hz, selectable
Protection Rating	IP 30

## Dimensions / Weight

<b>4 Channels</b>	
Depth/Width/Height	180 x 175 x 130 mm
Weight	4.6 kg
<b>8 Channels</b>	
Depth/Width/Height	220 x 175 x 130 mm
Weight	5.1 kg
<b>12 Channels</b>	
Depth/Width/Height	260 x 175 x 130 mm
Weight	5.8 kg
<b>16 Channels</b>	
Depth/Width/Height	300 x 175 x 130 mm
Weight	6.5 kg
<b>24 Channels</b>	
Depth/Width/Height	380 x 175 x 130 mm
Weight	7.9 kg

## Flow Rates and 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	
SC0222	3.17	0.44	44	0.11	

Approx. values: determined with water, at 22 °C, no differential pressure, Tygon tubing.



## 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

## Related Products

### Ordering Tubing & Accessories

Standard Accessory		Page
<b>Tubing</b>	2-Stop	78 – 82, 84 – 88
<b>Spare Cassettes<sup>1</sup></b>	CA Click'n'go	109
<b>Foot Switch<sup>2</sup></b>	ISM016 / IS10039	109



<sup>1</sup> One set of cassettes provided with each pump.

<sup>2</sup> Depending on firmware (see page 109)



Tablet dissolution

Part No.	Model	Flow rates mL/min per channel	Channels	Speed rpm
<b>IPC AND IPC-N</b>				
<b>ISM930</b>	IPC 4	0.002 – 44	4	0.4 – 45
<b>ISM931</b>	IPC 8	0.002 – 44	8	0.4 – 45
<b>ISM932</b>	IPC 12	0.002 – 44	12	0.4 – 45
<b>ISM933</b>	IPC 16	0.002 – 44	16	0.4 – 45
<b>ISM934</b>	IPC 24	0.002 – 44	24	0.4 – 45
<b>ISM935</b>	IPC-N 4	0.0004 – 11	4	0.11 – 11.25
<b>ISM936</b>	IPC-N 8	0.0004 – 11	8	0.11 – 11.25
<b>ISM937</b>	IPC-N 12	0.0004 – 11	12	0.11 – 11.25
<b>ISM938</b>	IPC-N 16	0.0004 – 11	16	0.11 – 11.25
<b>ISM939</b>	IPC-N 24	0.0004 – 11	24	0.11 – 11.25
<b>IP AND IP-N</b>				
<b>ISM940</b>	IP 4	0.002 – 44	4	0.4 – 45
<b>ISM941</b>	IP 8	0.002 – 44	8	0.4 – 45
<b>ISM942</b>	IP 12	0.002 – 44	12	0.4 – 45
<b>ISM943</b>	IP 16	0.002 – 44	16	0.4 – 45
<b>ISM944</b>	IP 24	0.002 – 44	24	0.4 – 45
<b>ISM945</b>	IP-N 4	0.0004 – 11	4	0.11 – 11.25
<b>ISM946</b>	IP-N 8	0.0004 – 11	8	0.11 – 11.25
<b>ISM947</b>	IP-N 12	0.0004 – 11	12	0.11 – 11.25
<b>ISM948</b>	IP-N 16	0.0004 – 11	16	0.11 – 11.25
<b>ISM949</b>	IP-N 24	0.0004 – 11	24	0.11 – 11.25

LabVIEW™ driver, download for free [www.idx-hs.com/ismatec](http://www.idx-hs.com/ismatec)

## BVP Standard

### Economical

- ▶ Robust, powerful drive
- ▶ Variable speed

### Without Dispensing Functions

- ▶ 3-digit potentiometer for speed setting
- ▶ More than 20 pumpheads available
- ▶ Bayonet coupling system enables a system change without tools
- ▶ Flow rates, channels, rollers and differential pressure depend on the mounted pumphead (see pages 104 to 107)



**BVP Standard Drive**  
(pumpheads on pages 104 to 107)

## 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 pumphead (see pages 104 to 107)



**BVP Process drive**  
(pumpheads on pages 104 to 107)

## Interfaces



### BVP Standard

- ▶ Speed control (0 – 5 or 0 – 10V, 0 – 20 or 4 – 20mA)
- ▶ Speed output (0 – 10 V<sub>DC</sub> or 0 – 12 kHz)
- ▶ Start/stop, rotation direction



### BVP Process

- ▶ Speed control (0 – 5 or 0 – 10V, 0 – 20 or 4 – 20mA)
- ▶ Speed output (0 – 10 V<sub>DC</sub> or 0 – 7.2 kHz)
- ▶ Start/stop, rotation direction, autostart

## Specifications

	BVP Process	BVP Standard
<b>Motor Type</b>	DC motor	DC motor
<b>Speed</b>	1 – 240 rpm	2.4 – 240 rpm
<b>Speed Setting</b>	rpm, resolution 0.1 rpm	1 – 99.9%, resolution 0.1% 3-digit potentiometer
<b>Power Consumption</b>	120 W	100 W
<b>Mains Connection</b>	230V <sub>AC</sub> /50Hz, 115V <sub>AC</sub> /60Hz, selectable	230V <sub>AC</sub> /50Hz, 115V <sub>AC</sub> /60Hz, selectable
<b>Protection Rating</b>	IP 65	IP 30
<b>Depth/Width/Height</b>	220 x 155 x 260 mm (without pumphead)	220 x 155 x 260 mm (without pumphead)
<b>Weight</b>	6.9 kg (without pumphead)	5.7 kg (without pumphead)

### Part No. Includes

#### THE COMPLETE PUMP SYSTEM BVP PROCESS CONSISTS OF:

**ISM920A** Drive, Page 102

#### Order the Following to Complete the BVP Process Pump System

Pumphead, Pages 104 – 107

Tubing, Pages 62 to 89

Accessories, Page 109

**IS10039** Foot switch, Page 109

#### THE COMPLETE PUMP SYSTEM BVP STANDARD CONSISTS OF:

**ISM444B** Drive, Page 102

#### Order the Following to Complete the BVP Standard Pump System

Pumphead, Pages 104 – 107

Tubing, Pages 62 to 89

Accessories, Page 109

**IS10039** Foot switch, Page 109



## MCP Standard

### Multi-Purpose

- Saves individual application parameters
- Robust, powerful drive
- Ideal for dispensing and filling
- Pre-programmed tube sizes and pumpheads allow you to work with flow rates
- Membrane key-pad, LED display
- 4 program memories for saving individual application parameters
- More than 20 pumpheads available
- Bayonet coupling system enables a system change without tools
- Flow rates, channels, rollers and differential pressure depend on the pumphead mounted (see pages 104 to 107)



**MCP Standard Drive**  
(pumpheads on  
pages 104 – 107)



## 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 pumpheads 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 pumpheads available
- Bayonet coupling system enables a system change without tools
- Flow rates, channels, rollers and differential pressure depend on the pumphead mounted (see pages 104 to 107)



**MCP Process Drive**  
(pumpheads on  
pages 104 to 107)



## Interfaces



### MCP Standard

- PC controllable:
- RS232
- Speed control (0 – 5 or 0 – 10V, 0 – 20 or 4 – 20mA)
- Speed output (0–10 V<sub>DC</sub> or 0–7.2 kHz)
- Start/stop, rotation direction, autostart



### MCP Process

- PC controllable:
- RS232
- Speed control (0 – 5 or 0 – 10V, 0 – 20 or 4 – 20mA)
- Speed output (0 – 10 V<sub>DC</sub> or 0 – 7.2 kHz)
- Start/stop, rotation direction, autostart
- 2 universal inputs
- 2 universal outputs



## Specifications

	MCP Process	MCP Standard
<b>Motor Type</b>	DC motor	DC motor
<b>Speed</b>	1 – 240 rpm	1 – 240 rpm
<b>Speed Setting</b>	rpm, resolution 0.1 rpm	rpm, resolution 0.1 rpm
<b>Flow Rate Settings</b>	µL/min, mL/min, L/min	µL/min, mL/min, L/min
<b>Power Consumption</b>	100 W	100 W
<b>Mains Connection</b>	100 – 230 V <sub>AC</sub> / 50 – 60 Hz, selectable	230V <sub>AC</sub> /50Hz, 115V <sub>AC</sub> /60Hz, selectable
<b>Protection Rating</b>	IP 65	IP 30
<b>Depth/Width/Height</b>	220 x 155 x 260 mm (without pumphead)	220 x 155 x 260 mm (without pumphead)
<b>Weight</b>	6.9 kg (without pumphead)	6.4 kg (without pumphead)

Part No.	Includes
<b>THE COMPLETE PUMP SYSTEM MCP PROCESS CONSISTS OF:</b>	
<b>ISM915</b>	Drive, Page 103
<b>Order the Following to Complete the MCP Process Pump System</b>	
	Pumphead, Pages 104 to 107
	Tubing, Pages 62 to 89
	Accessories, Page 109
<b>IS10039</b>	Foot switch, Page 109
<b>THE COMPLETE PUMP SYSTEM MCP STANDARD CONSISTS OF:</b>	
<b>ISM404B</b>	Drive, Page 103
<b>Order the Following to Complete the MCP Standard Pump System</b>	
	Pumphead, Pages 104 to 107
	Tubing, Pages 62 to 89
	Accessories, Page 109
<b>IS10039</b>	Foot switch, Page 109

LabVIEW™ driver download for free: [www.idx-hs.com/ismatec](http://www.idx-hs.com/ismatec)

## BVP/MCP – an Investment for the Future

## Instantly Interchangeable Pump Systems



**BVP Standard**  
ISM 444



**MCP Standard**  
ISM 404



**BVP Process**  
ISM 920  
IP 65



**MCP Process**  
ISM 915  
IP 65

**Pumphead + Tubing + Drive (MCP or BVP)  
= Complete Pump System**

## Easy Interchangeable Pumpheads

► Mount the pumphead without using a tool

The MCP and BVP drives enable the user to choose individually from a large variety of different pumpheads. These heads are interchangeable and can be mounted or exchanged within seconds.



REVERSIBLE



CONTINUOUS  
DUTY



2 YEAR  
WARRANTY



CELL SENSITIVE  
PUMPING

## Single-Channel



**0.072 – 530 mL/min**  
Type 360



**0.44 – 2,800 mL/min**  
Type 380



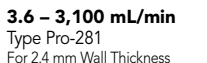
**0.41 – 3,600 mL/min**  
Type 380 AD



**0.49 – 3,700 mL/min**  
Type Pro-280  
For 1.6 mm Wall Thickness



**0.45 – 3,400 mL/min**  
Type Pro-380  
For 1.6 mm Wall Thickness



**3.6 – 3,100 mL/min**  
Type Pro-281  
For 2.4 mm Wall Thickness



**3.3 – 2,900 mL/min**  
Type Pro-381  
For 2.4 mm Wall Thickness



**0.07 – 1,100 mL/min**  
Type MF Easy-Load®



**0.24 – 1,000 mL/min**  
Type MF Easy-Load II  
(with adjustable pressure setting)

## Single-Channel for Corrosive Media



## Rigid PTFE Tubing Pumphead

**0.07 – 15 mL/min**  
PTFE tubing 2 mm ID

**0.19 – 45 mL/min**  
PTFE tubing 4 mm ID

## Multi-Channel



**1.1 – 1,100 mL/min**  
2 channels, Type SB2V

**0.09 – 530 mL/min**  
3 channels, Type SB3V



**0.002 – 230 mL/min**  
4–12 channels  
Type CA 4, CA 8 and CA 12



**0.001 – 57 mL/min**  
4–16 channels  
Type MS/CA 4–12  
(Option: 3 extension blocks of 4 channels each)



**0.002 – 100 mL/min**  
8 – 24 channels  
Type MS/CA 8-6  
(Option: 2 extension blocks of 8 channels each)

## BVP/MCP Pumpheads

### Pro-280

0.49 – 3,700 mL/min

- ▶ Coated aluminum pumphead
- ▶ 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<sup>1</sup>



### Pro-281

3.6 – 3,100 mL/min

**Same pumphead as Pro-280, but**

- ▶ For tubing with 2.4 mm wall thickness
- ▶ 2.5 bar (36 psi) differential pressure<sup>1</sup>

### Pro-380

0.45 – 3,400 mL/min

**Same pumphead as Pro-280, but**

- ▶ 3 stainless steel rollers (less pulsation but lower max. flow rate than with 2 rollers)



### Pro-381

3.3 – 2,900 mL/min

**Same pumphead 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<sup>1</sup>

<sup>1</sup> 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.

## Flow Rates and Tubing

Tygon® ST R-3603/R-3607 Part No.	Wall (mm)	Tubing ID (mm)	mL/min	
			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

## BVP/MCP Pumpheads

360<sup>1</sup>

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<sup>2</sup>

380<sup>1</sup>

0.44 – 2,800 mL/min

**Same design as pumphead 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<sup>2</sup>
- ▶ Ideal for sterile media



## 380AD

0.41 – 3,600 mL/min

- ▶ Pressure on tubing adjustable via rollers
- ▶ Rotor accepts tubing with 1.6 and 2.4 mm wall thickness and 1.6 to 11.1 mm ID
- ▶ 3 stainless steel rollers
- ▶ 1.5 bar (22 psi) differential pressure<sup>2</sup> (with tubing wall thickness 1.6 mm)
- ▶ 2.5 bar (36 psi) differential pressure<sup>2</sup> (with tubing wall thickness 2.4 mm)
- ▶ Ideal for media with high viscosity or up to 50% particulates



## 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.

## BVP/MCP Pumpheads

### Easy-Load®<sup>3</sup>

0.07 – 1,100 mL/min

- ▶ Easily accessible pumphead
- ▶ 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<sup>2</sup>



### Easy-Load II<sup>3</sup>

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<sup>2</sup>



### Rigid PTFE Tubing Pumphead

0.07 – 45 mL/min pumphead for PTFE tubing

- ▶ 6 stainless steel rollers
- ▶ Stainless steel rotor
- ▶ Anodized aluminum body
- ▶ Adjustable tube-bed pressure with locking knob
- ▶ Up to 6.9 bar (100 psi) differential pressure
- ▶ Ideal for dispensing and pumping aggressive chemicals and for the filtration of organic solvents



## Flow Rates and Tubing

Tygon® ST R-3603/R-3607 Part No.	Wall (mm)	Tubing ID (mm)	mL/min	
			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
FLOW RATES FOR RIGID PTFE TUBING PUMPHEAD				
Tubing ID		Flow Rates mL/min		
2 mm		0.17 – 15		
4 mm		0.19 – 45		

Part No.	Description	Specifications	Qty.
<b>PTFE TUBING PUMPHEAD</b>			
<b>MF0330</b>	PTFE Tubing Pumphead	0.07 – 45 mL/min	ea.
<b>MF0331</b>	PTFE pump tubing, 38 cm long	2 mm ID / 4 mm OD, for 0.07 – 15 mL/min	2-pc
<b>MF0332</b>	PTFE pump tubing, 38 cm long	4 mm ID / 6 mm OD, for 0.19 – 45 mL/min	2-pc
<b>MF0333</b>	Tube connectors (straight) (2 connectors are needed for one tube)	for tubing with 2 mm ID	3-pc
<b>MF0334</b>	Tube connectors (straight) (2 connectors are needed for one tube)	for tubing with 4 mm ID	1-pc
<b>SC1017BO</b>	PTFE extension tubing, 3.65 m long	for tubing with 2 mm ID	1 x 3.65 m
<b>SC1016BO</b>	PTFE extension tubing, 3.65 m long	for tubing with 4 mm ID	1 x 3.65 m
<b>MF0337</b>	Tubing grooving tool (Use only tubing with 4 mm ID)	Important for connections which must withstand 2.8 bar (40 psi) or greater.	1-pc

<sup>1</sup> An OEM version of this pumphead is also available. Ask for the detailed data sheet.

<sup>2</sup> Differential pressure depends on tubing material; tubing with small IDs may enable higher pressures.

<sup>3</sup> Two pumpheads can be mounted on one drive. (Special mounting sets must be ordered separately).



## MS-CA Pumps

## 0.021 – 26 mL/min (Per Channel)

- ▶ 2 or 4 channels
- ▶ 6 or 8 rollers
- ▶ Click'n'Go cassettes
- ▶ Each channel can take different tube sizes
- ▶ 3-stop tubing – extend longer tubing life by switching tubing stops
- ▶ Differential pressure 1.0 bar (15psi)

*Possible with appropriate tubing material; tubing with small ID's and/or pressure lever cassettes (see page 109) may enable higher pressures.*



## Interfaces

No interfaces for external control.

## Specifications

<b>Motor type</b>	Synchronous motor	
<b>Speed</b>	20, 40 or 60 rpm	
<b>Power Consumption</b>	8 W	
<b>Mains Connection<sup>1</sup></b>	230V <sub>AC</sub> (50/60 Hz) or 115V <sub>AC</sub> (50/60 Hz)	
<b>Protection Rating</b>	IP 30	
<b>Depth/Width/Height</b>	2-channel	125 x 88 x 135 mm
	4-channel	145 x 88 x 135 mm
<b>Weight</b>	2-channel	1.2 kg
	4-channel	1.3 kg

<sup>1</sup> Please state required mains voltage and frequency on your order.

## Application Note

- ▶ Multi-channel delivery processes with constant flow rate, e.g.
- ▶ Sipper pump for flow-through cuvettes
- ▶ Feeding of overflow level control systems

## Related Products

- ▶ Spare cassettes MS/CA are on page 109



## Flow Rates and Tubing

	Model	MS-CA _620	MS-CA 4/640	MS-CA 2/660	MS-CA _820	MS-CA 4/840	MS-CA 2/860
	Channels	2 / 4	4	2	2 / 4	4	2
	Rollers	6	6	6	8	8	8
	Speed rpm	20	40	60	20	40	60
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
SC0189	0.13	0.028	0.055	0.083	0.021	0.043	0.064
SC0050	0.25	0.10	0.19	0.29	0.08	0.16	0.24
SC0053	0.51	0.38	0.77	1.2	0.34	0.67	1.0
SC0056	0.76	0.84	1.7	2.5	0.73	1.5	2.2
SC0059	1.02	1.5	2.9	4.4	1.3	2.5	3.8
SC0062	1.22	2.0	4.1	6.1	1.8	3.5	5.3
SC0065	1.52	3.0	6.0	9.1	2.6	5.1	7.7
SC0068	1.85	4.2	8.4	13	3.5	7.0	10
SC0071	2.54	6.6	13	20	5.5	11	16
SC0224	3.17	8.5	17	26	7.1	14	21

*Approx. values: determined with water, at 22 °C, no differential pressure, Tygon tubing.*

Part No.	Model	Flow rates* mL/min per channel	Channels max.	Rollers	Speed rpm
<b>MS-CA STAND-MOUNTED PUMPS</b>					
<b>ISM844</b>	MS-CA 2/620	0.028 – 8.5	2	6	20
<b>ISM845</b>	MS-CA 2/640	0.055 – 17.0	2	6	40
<b>ISM846</b>	MS-CA 2/660	0.083 – 26.0	2	6	60
<b>ISM847</b>	MS-CA 2/820	0.021 – 7.1	2	8	20
<b>ISM848</b>	MS-CA 2/840	0.043 – 14.0	2	8	40
<b>ISM849</b>	MS-CA 2/860	0.064 – 21.0	2	8	60
<b>ISM850A</b>	MS-CA 4/620	0.028 – 8.5	4	6	20
<b>ISM851</b>	MS-CA 4/640	0.055 – 17.0	4	6	40
<b>ISM852</b>	MS-CA 4/820	0.021 – 7.1	4	8	20
<b>ISM853</b>	MS-CA 4/840	0.043 – 14.0	4	8	40

\* 26 different tubing ID's give 26 flow rates!

Please state required mains connection 230V<sub>AC</sub> (50/60 Hz) or 115V<sub>AC</sub> (50/60 Hz) on your order.

## Tubing Cassettes

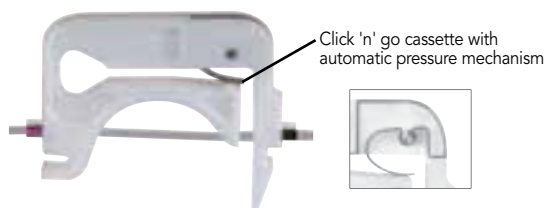
- Developed and consistently improved by Ismatec®

### Click 'n' go Cassettes (Standard)<sup>1</sup>

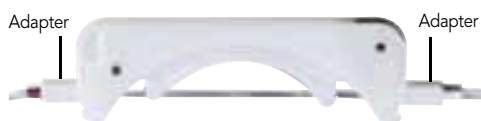
Advantages:

- 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.*



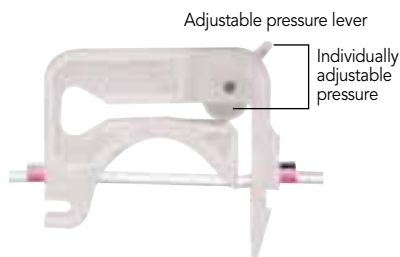
MS/CA Click 'n' go



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?
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### TUBING CASSETTES AND ADAPTERS

#### Click 'n' go Spare Cassettes<sup>1</sup>

IS3510A	MS/CA Click 'n' go	POM-C <sup>4</sup>	No
IS3710	CA Click 'n' go	POM-C <sup>4</sup>	Yes <sup>2</sup>

#### Pressure Lever Optional Cassettes

IS0649A	MS/CA Pressure Lever	POM-C <sup>4</sup>	No
IS3629A	MS/CA Pressure Lever	PVDF <sup>3,4</sup>	No
IS0122	CA Pressure Lever	POM-C <sup>4</sup>	Yes <sup>2</sup>
IS3820	CA Pressure Lever	PVDF <sup>3,4</sup>	Yes <sup>2</sup>

#### Replacement Adapters for CA Cassettes<sup>2</sup>

IS0123	Adapter for CA Cassettes	POM-C <sup>4</sup>	
IS3861	Adapter for CA Cassettes	PVDF <sup>3,4</sup>	

### 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

<sup>1</sup> One set is included with all Ismatec cassette-style pumps.

<sup>2</sup> When ordering replacement CA Cassettes, two Adapters per cassette must also be ordered

<sup>3</sup> PVDF offers higher chemical resistance.

<sup>4</sup> POM-C = Polyoxymethylene Copolymer, PVDF = Polyvinylidene Fluoride

## Gear Pumps

### Pulsefree Pumping

- ▶ Gear pumps allow differential pressures up to maximum 5.6 bar (81 psi)

### Low Operation Costs

- ▶ Interchangeable, magnetically coupled pumpheads
- ▶ 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

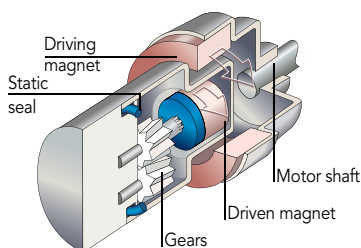
ISMATEC® gear pumps run only in the clockwise direction (Exception REGLO-Z Digital).



CONTINUOUS DUTY

## 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 pumphead 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.

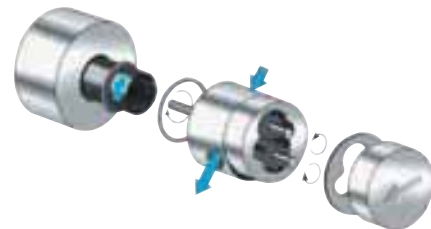
## Application Range of Gear Pumps

Industries	Applications	Special Media
Biotechnological	Sampling	Special Media
Chemical	Refrigeration Technology	Biozides
Food	Water Treatment	Dye Stuffs
Mining	Liquid Chromatography	Thixotropic Products
Power	Surface Treatment	Liquid Waxes
Pulp and Paper	Distillation Systems	Hydrogen Peroxide
Semiconductor		Flux
Textile		Not suited for media containing particulates

## Cavity Style

### Series GJ

- ▶ Max. suction height with water and flooded pumphead: 8 m, depending on pumphead and tubing
- ▶ Pumping out of a vacuum of 200 mbar
- ▶ Based on the traditional gear pump technology
- ▶ For application with moderate differential pressure

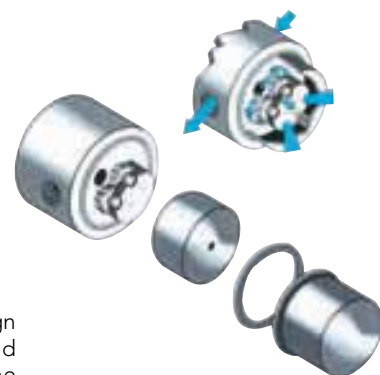


In comparison to the Suction Shoe pumpheads, the Cavity style pumpheads can be used for viscous media and applications with a certain suction height.

## 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 pumphead 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 pumphead, rotation direction is reversible



CLOCKWISE

With Suction shoe pumphead, run only in the clockwise direction

## Pumphead Material Options

### Enhance the chemical compatibility and application potential

<b>Base material</b>	Standard:	Stainless Steel 316
	Options:	e.g. Hastelloy® B2, Hastelloy C-276, Alloy 20 and Titanium
<b>Gears</b>	Standard:	PPS, Graphite, PTFE (depends on pumphead)
	Options:	e.g. PEEK™, PPSKV
<b>Static seals</b>	Standard:	Viton®, PTFE (depends on pumphead)
	Options:	EP, Buna N, Kalrez®
<b>Magnets</b>	Standard:	Ferrite
	Options:	e.g. SmCo, NdFeB

### Further pumphead options

Integral Drive  
High System Pressure  
Deck Ports  
1/4-18 NPT Ports  
Tri-clamp Fittings

PTFE = Polytetrafluoroethylene, PPS = Polyphenylenesulphide, PEEK = Polyetheretherketone

PUMP SERIES	PUMP STYLE	FLOW RANGE	GEAR MATERIALS	DRIVE OPTIONS	INTERFACE	PAGE
REGLO-Z	 Suction Shoe	33 – 3,290 mL/min	PEEK™, PTFE, PPS, Graphite	Variable	Analog	112
	 Cavity Style		PEEK, PTFE, PPS			
REGLO-ZS, DIGITAL	 Suction Shoe	1 – 466 mL/min	PEEK, PTFE, PPS, Graphite	Variable	RS232, Digital	112
	 Cavity Style		PEEK, PTFE, PPS			
BVP-Z	 Suction Shoe	1 – 7,271 mL/min	PEEK, PTFE, PPS, Graphite	Variable	Analog	114
	 Cavity Style		PEEK, PTFE, PPS			
MCP-Z	 Suction Shoe	40 – 5,480 mL/min	PEEK, PTFE, PPS, Graphite	Variable	RS232, Analog	115
	 Cavity Style		PEEK, PTFE, PPS			

## REGLO-Z, REGLO-ZS

## REGLO-Z Analog

1 – 3,290 mL/min

- ▶ Variable speed
- ▶ Differential pressure max. 5.2 bar (75 psi)



## REGLO-ZS

- ▶ Drive and pumphead are separated by a 2 m long cable.



## REGLO-Z Digital

1 – 3,290 mL/min with dispensing functions

- ▶ Membrane key-pad
- ▶ LED display with setting Mmenu
- ▶ Differential pressure max. 5.2 bar (75 psi)



## Interfaces



## 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



## REGLO-Z Digital

- ▶ RS232 PC-controllable
- ▶ Speed output 0 – 12 KHz, start/stop and autostart



## Specifications

	REGLO-Z/ZS Analog	REGLO-Z
<b>Motor Type</b>	DC motor	DC motor
<b>Speed</b>	50 – 5,000 rpm	50 – 5,000 rpm
<b>Speed Setting</b>	1 – 99%, resolution 1% 2-digit potentiometer	rpm, resolution 1 rpm
<b>Flow Rate Setting</b>		mL/min, L/min
<b>Power Consumption</b>	50 W	75 W
<b>Mains Connection</b>	230V <sub>AC</sub> /50Hz, 115V <sub>AC</sub> /60Hz, selectable	100 – 230V <sub>AC</sub> /50 – 60Hz
<b>Protection Rating</b>	IP 30	IP 30
<b>Depth/Width/Height</b>		
<b>Drive REGLO-Z</b>	178 x 100 x 143 mm	178 x 100 x 135 mm
<b>Drive REGLO-ZS</b>	175 x 65 x 80 mm	175 x 65 x 80 mm
<b>External Control Unit</b>	178 x 100 x 143 mm	178 x 100 x 135 mm
<b>Weight</b>		
<b>Drive REGLO-Z</b>	2.1 kg (without Pumphead)	1.7 kg (without Pumphead)
<b>Drive REGLO-ZS</b>	0.7 kg (without Pumphead)	0.7 kg (without Pumphead)
<b>External Control Unit</b>	1.7 kg	1.2 kg



REVERSIBLE

With Cavity Style pumphead, rotation direction is reversible



CLOCKWISE

With Suction shoe pumphead, run only in the clockwise direction

Part No.	Description
<b>REGLO-Z AND REGLO-ZS</b>	
<b>ISM895</b>	REGLO-Z Analog
<b>ISM896</b>	REGLO-ZS Analog
<b>ISM901</b>	REGLO-Z Digital
<b>ISM1143</b>	REGLO-ZS Digital
<b>ISM891</b>	Footswitch
	Pumphead, Page 113
	2 Nozzles, Pages 113, 116


LabVIEW™ drivers for Reglo-Z Digital download for free: [www.idex-hs.com/ismatec](http://www.idex-hs.com/ismatec)  
Never use a gear pump for media containing particulates.



## Ordering Information Pumpheads for REGLO-Z / -ZS


### Pumpheads » Suction Shoe «

- Enhanced pumping performance at elevated differential pressures
- Suited for higher temperature ranges
- Not recommended for applications requiring suction lift

SUCTION SHOE	Part No.	Pumphead No.	Flow rate (mL/min)		Differential pressure max. bar	Gear material	Seals	Stainless steel housing	System pressure, max. (bar)	Temperature range °C	Internal Bypass
			min.	max.							
	MI0006	GA-X21.CFS.B	0.85	85	1.4 (20 psi)	Graphite	PTFE	SS316	21	-46 – +177	–
	MI0312	GA-X21.J9FS.B	0.85	85	2.3 (33.4 psi)	PEEK™	PTFE	SS316	21	-46 – +177	–
	MI0007	GA-V21.CFS.B	2.1	210	2.8 (40 psi)	Graphite	PTFE	SS316	21	-46 – +177	–
	MI0008	GA-V23.CFS.B	4.2	420	2.8 (40 psi)	Graphite	PTFE	SS316	21	-46 – +177	–
	MI0131	GA-V23.PFS.B	4.6	460	5.2 (75 psi)	PPS	PTFE	SS316	22	-46 – +177	–
	MI0280	GA-T23.JFS.B	4.6	460	5.2 (75 psi)	PEEK	PTFE	SS316	22	-46 – +177	–
	MI0309	GA-X21.CFC.B	0.85	85	1.4 (20 psi)	Graphite	PTFE	Hastelloy®-C276	21	-46 – +177	–
	MI0310	GA-V23.CFC.B	4.2	420	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										

### Pumpheads » Cavity style «

- Excellent chemical resistance
- Smooth and precise flow
- Recommended for applications requiring a modest suction lift

<div>CAVITY STYLE</div> <div></div>			Flow rate (mL/min)		Differential pressure			Stainless steel housing	System pressure, max. (bar)	Temperature range °C	Internal Bypass
	Part No.	Pumphead No.	min.	max.	max. bar	Gear material	Seals				
	MI0013	GJ-N23.FFS.B.B1	32	3,200	1* (15 psi)	PTFE	PTFE	SS316	21	-46 – +54	✓
	MI0016	GJ-N23.FFS.B	32	3,200	1* (15 psi)	PTFE	PTFE	SS316	21	-46 – +54	–
	MI0313	GJ-N23.JFS.B	32	3,200	1* (15 psi)	PEEK	PTFE	SS316	21	-46 – +54	–
	MI0019	GJ-N23.JFS.B.B1	32	3,200	1* (15 psi)	PPS	PTFE	SS316	21	-46 – +54	✓
	MI0020	GJ-N23.JFS.B	32	3,200	1* (15 psi)	PPS	PTFE	SS316	22	-46 – +54	–
For corrosive media	MI0284	GJ-N23.FFC.B	32	3,200	1* (15 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											
* For applications with differential pressures exceeding 1 bar we recommend using the MCP-Z drive.											



#### 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 PUMPHEADS

##### Threaded Stainless Steel Connectors

AR0001	1/8" NPT	Tube nozzle	6
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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## BVP-Z Standard

## BVP-Z Standard without dispensing functions

- ▶ 3-digit potentiometer (for speed setting)
- ▶ Over 20 interchangeable Micropump® pumpheads
- ▶ Flow rates and differential pressure depend on the pumphead mounted



## 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 pumpheads (pre-programmed)
- ▶ Flow rates and differential pressure depend on the pumphead mounted



## Interfaces

**BVP-Z Standard**

- ▶ Speed control (0 – 5 or 0 – 10V, 0 – 20 or 4 – 20mA)
- ▶ Speed output (0 – 10V<sub>DC</sub> or 0 – 12 kHz)
- ▶ Start/stop

**MCP-Z Standard**

- ▶ PC-controllable
- ▶ RS232
- ▶ Speed control (0 – 5 or 0 – 10V, 0 – 20 or 4 – 20mA)
- ▶ Speed output (0 – 10V<sub>DC</sub> or 0 – 12 kHz)
- ▶ Start/stop
- ▶ Autostart



## Specifications

	BVP-Z Standard	MCP-Z Standard
<b>Motor Type</b>	DC motor	DC motor
<b>Speed</b>	60 – 6,000 rpm	60 – 6,000 rpm
<b>Speed Setting</b>	1 – 99.9%, resolution 0.1% 3-digit potentiometer	rpm, resolution 1 rpm
<b>Flow Rate Setting</b>		μL/min, mL/min, L/min
<b>Power Consumption</b>	150 W	150 W
<b>Mains Connection</b>	230V <sub>AC</sub> /50Hz, 115V <sub>AC</sub> /60Hz selectable	230V <sub>AC</sub> /50Hz, 115V <sub>AC</sub> /60Hz selectable
<b>Protection Rating</b>	IP 30	IP 30
<b>Depth/Width/Height</b>	220 x 155 x 260 mm (without pumphead)	220 x 155 x 260 mm (without pumphead)
<b>Weight</b>	5.7 kg (without pumphead)	6.4 kg (without pumphead)

## 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 pumpheads GJ-N23 and GA-X21: Pulseless dispensing under pressure of different reagents with 2 pumps in different quantity r: via a mixing valve into a reactor

## Part No. Includes

**THE COMPLETE PUMP SYSTEM BVP-Z STANDARD CONSISTS OF:**

**ISM446B** Drive (magnet included), Page 114

**Order the Following to Complete the BVP-Z Standard Pump System**

Pumphead, Page 116  
2 Nozzles, Pages 113, 116  
Accessories, Page 109

**ISM891** Foot switch, Page 109

**THE COMPLETE PUMP SYSTEM MCP-Z STANDARD CONSISTS OF:**

**ISM405** Drive (magnet included), Page 114

**Order the Following to Complete the MCP-Z Standard Pump System**

Pumphead, Page 116  
2 Nozzles, Pages 113, 116  
Accessories, Page 109

**IS10039** Foot switch, Page 109

## 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 pumpheads
- ▶ Over 20 interchangeable Micropump® pumpheads
- ▶ Flow rates and differential pressure depend on the pumphead mounted



**MCP-Z Process**  
with interchangeable gear pumpheads  
(material options, see Page 110)



DISPENSING  
& CALIBRATING

### Interfaces



RS232



ANALOG

- ▶ PC-controllable:
- ▶ Speed control (0 – 5 or 0 – 10V, 0 – 20 or 4 – 20mA)
- ▶ Speed output (0 – 10V<sub>DC</sub> or 0 – 12 kHz)
- ▶ Start/stop
- ▶ Autostart
- ▶ 2 universal inputs
- ▶ 2 universal outputs



**Software ProgEdit  
LabVIEW™ drivers**  
Free download at  
[www.idex-hs.com/ismatec](http://www.idex-hs.com/ismatec)

### Specifications

<b>Motor Type</b>	DC motor
<b>Speed</b>	60 – 6,000 rpm
<b>Speed Setting</b>	rpm, resolution 1 rpm
<b>Flow Rate Setting</b>	µL/min, mL/min, L/min
<b>Power Consumption</b>	200 W
<b>Mains Connection</b>	100 – 230 V <sub>AC</sub> / 50 – 60 Hz, selectable
<b>Protection Rating</b>	IP 65
<b>Depth/Width/Height</b>	260 x 160 x 262 mm (without pumphead)
<b>Weight</b>	6.9 kg (without pumphead)

### Application Note

- ▶ Single-channel delivery and dispensing processes under pressure for particulate-free solutions
- ▶ Addition of various reagents in different quantity ratios via mixing into reactor
- ▶ Ideal for dispensing and filling applications in a dusty, humid or c environment, and in clean room areas (IP 65, dust-tight and prote against water jets)

Part No.	Includes
<b>THE COMPLETE PUMP SYSTEM MCP-Z PROCESS CONSISTS OF:</b>	
<b>ISM918A</b>	MCP-Z Process Pump System
<b>Order the Following to Complete the MCP-Z Process Pump System</b>	
	Drive (magnet included), Page 115
	Pumphead, Page 116
	2 Nozzles, Pages 113, 116
	Accessories, Page 109
<b>Software Download</b>	ProgEdit Software
<b>IS10039</b>	Foot Switch, Page 109

LabVIEW driver download for free: [www.idex-hs.com/ismatec](http://www.idex-hs.com/ismatec)

## Ordering Information Pumpheads for BVP-Z / MCP-Z

### Pumpheads » Suction Shoe «

- Enhanced pumping performance at elevated differential pressures
- Suited for higher temperature ranges
- Not recommended for applications requiring suction lift



### BVP-Z & MCP-Z

**ISMATEC® gear pumps run only in the clockwise direction**

Never use a gear pump for media containing particulates

SUCTION SHOE	Part No.	Pumphead No.	Flow rate (mL/min)		Differential pressure max. bar	Gear material	Seals	Stainless steel housing	System pressure, max. (bar)	Temperature range °C	Internal Bypass
			min.	max.							
	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	✓
	MI0378	GB-P35.JKS.B	73	7,241	3.5 (51 psi)	PEEK	Kalrez®	SS316	21	-29 – +177	✓
	MI0309	GA-X21.CFC.B	1	99	1.4 (20 psi)	Graphite	PTFE	Hastelloy®-C276	21	-46 – +177	–
Organic solvents	MI0310	GA-V23.CFC.B	5	504	2.8 (40 psi)	Graphite	PTFE	Hastelloy-C276	21	-46 – +177	–
For corrosive media											
Ports (internal thread) 1/8"-27NPT Flow rates without differential pressure Operating temperature: with other seals up to 99 °C possible											

### Pumpheads » Cavity style «

- Excellent chemical resistance
- Smooth and precise flow
- Recommended for applications requiring a modest suction lift

CAVITY STYLE	Part No.	Pumphead No.	Flow rate (mL/min)		Differential pressure max. bar	Gear material	Seals	Stainless steel housing	System pressure, max. (bar)	Temperature range °C	Internal Bypass
			min.	max.							
	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	–
	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	–
For corrosive media											
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
<b>TUBING ADAPTERS FOR GEAR PUMPHEADS</b>			
<b>Threaded stainless steel connectors</b>			
AR0001	1/8" NPT	Tube nozzle	6
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)
<b>Threaded connectors in Hastelloy-C</b>			
AR0001-HC	1/8" NPT	Tube nozzle	6

## Rotary Piston Pumps Introduction

### For Corrosive Media and Very Accurate Dispensing

The pumpheads are available with ceramic pistons and ceramic cylinder liners, which makes these components very resistant even to highly aggressive chemicals.

### Inexpensive to Maintain

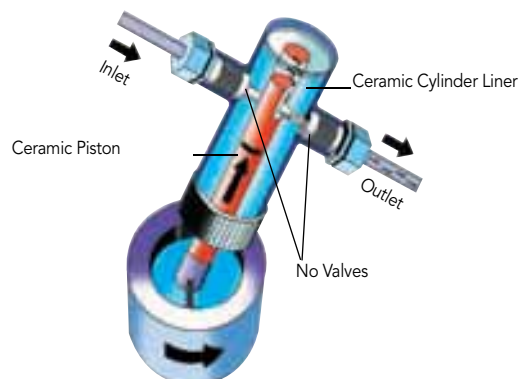
- Interchangeable pumpheads
- No valves
- Only one moving part – the piston
- High quality and precision guarantee an optimum performance even after many years of intensive use



## 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 pumphead angle, determines the actual flow rate.



### Only the ISMATEC® Rotary Piston Pump MCP-CPF Process Features:

#### Carrying out programs independently of a PC

- Create the application profile in the PC (with ProgEdit software, page 115)
- 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 Range of Piston Pumps

Industries	Applications	Special Media
Biotechnology	Accurate dispensing e.g. into bioreactors	Biozides
Chemistry	Emulsion and slurry dosing	Dyes
Industry	Medical diagnostics production	Flux compound
Electronic	Milk and beverage enrichment	Hydrogen peroxide
Food and Dairy	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		
Medical		

### Note

All microprocessor controlled drives are LabVIEW™ compatible and can easily be integrated into process control systems.



PUMP SERIES		FLOW RANGE	PISTON
RH00		0.025 – 45 mL/min	316 SS
RH00		0.045 – 45 mL/min	316 SS
RH0		0.1 – 180 mL/min	Ceramic
RH0		0.18 – 180 mL/min	Ceramic
RH1		0.1 – 180 mL/min	Ceramic
RH1		0.18 – 180 mL/min	Ceramic
		0.04 – 144 mL/min	316 SS
		0.13 – 576 mL/min	316 SS
		0.29 – 1,300 mL/min	316 SS
		0.51 – 2,300 mL/min	Ceramic

## RH Pumpheads

## Pumphead 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)
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 PUMPHEADS

## 1.6 mm ID, 3.2 mm OD

Part No.	Length
IC0053	0.25 m

Part No.	Length
IC0061	0.75 m

## Pumphead 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



Part No.	FMI005A	FMI013
TYPE	RH0.CKC	RH0.CKC
Piston	Ceramic	Ceramic
Cylinder Case	Kynar (Fluorocarbon (PVDF))	Kynar (Fluorocarbon)
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)

## PTFE tubing 4 mm ID, 6 mm OD

Part No. MF0336

(For other tubing material;  
use tubing adapters, see Page 124)

## RH Pumpheads

### Pumphead 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	FMI011	FMI012
TYPE	RH00.CKC-LF	RH00.SKY-LF	RH00.STY-LF	RH00.CTC-LF
Piston	Ceramic	316 Stainless Steel	316 SS	Ceramic
Cylinder Case	Kynar® (Fluorocarbon (PVDF))	Kynar (Fluorocarbon (PVDF))	ETFE	ETFE
Cylinder Liner	Ceramic	Carbon	Carbon	Ceramic
Lip Seals	Rulon® AR	Rulon J	Rulon J	Rulon AR
Gland Washers	PTFE	PTFE	PTFE	PTFE
Max. Temperature	100 °C	60 °C	60 °C	100 °C
Max. Differential Pressure	6.9 bar (100 psi)	6.9 bar (100 psi)	6.9 bar (100 psi)	6.9 bar (100 psi)
Flow Ports	Kynar UNF 1/4"-28 (female)	Kynar UNF 1/4"-28 (female)	UNF 1/4"-28 (female)	UNF 1/4"-28 (female)

PTFE TUBING FOR PUMPHEADS 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	Part No.	Length	Part No.	Length
IC0053	0.25 m	IC0061	0.75 m	IC0057	0.50 m	IC0065A	1.00 m

### Pumphead 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



Part No.	FMI005A	FMI013	FMI006
TYPE	RH0.CKC	RH0.CKC-LF	RH0.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

Part No. MF0336

(For other tubing material;  
use tubing adapters, see Page 124)

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

PTFE tubing 4 mm ID, 6 mm OD

Part No. MF0336

(For other tubing material;  
use tubing adapters, see Page 124)

## Pumphead 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



Part No.

FMI007

FMI015

FMI008A

TYPE	RH1.CKC	RH1.CKC-LF	RH1.CTC
<b>Piston</b>	Ceramic	Ceramic	Ceramic
<b>Cylinder Case</b>	Kynar® (Fluorocarbon {PVDF})	Kynar (Fluorocarbon {PVDF})	ETFE
<b>Cylinder Liner</b>	Ceramic	Ceramic	Ceramic
<b>Lip Seals</b>	Rulon® AR	Rulon AR	Rulon AR
<b>Gland Washers</b>	PTFE	PTFE	PTFE
<b>Max. Temperature</b>	100 °C	100 °C	100 °C
<b>Max. Differential Pressure</b>	6.9 bar (100 psi)	6.9 bar (100 psi)	6.9 bar (100 psi)
<b>Flow Ports</b>	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

Part No. MF0336

(For other tubing material;  
use tubing adapters, see Page 124)

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

## PTFE tubing 4 mm ID, 6 mm OD

Part No. MF0336

(For other tubing material;  
use tubing adapters, see Page 124)

## REGLO-CPF Analog



## REGLO-CPF Digital



### Interfaces

- 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

**REGLO-CPF Digital**

  - ▶ RS232
  - ▶ Speed output 0 – 9 kHz, Start/stop, autostart

### Specifications

	REGLO-CPF Analog	REGLO-CPF Digital
<b>Motor Type</b>	DC motor	DC motor
<b>Speed</b>	18 – 1,800 rpm	40 – 1,800 rpm
<b>Speed Setting</b>	1 – 99%, resolution 1% 2-digit potentiometer	rpm, resolution 0.1 rpm
<b>Flow Rate Setting</b>		μL/min and mL/min
<b>Power Consumption</b>	50 W	75 W
<b>Mains Connection</b>	230V <sub>ac</sub> /50Hz, 115V <sub>ac</sub> /60Hz, selectable	100 – 230V <sub>ac</sub> / 50 – 60Hz, selectable
<b>Protection Rating</b>	IP 30	IP 30
<b>Depth/Width/Height</b>	250 x 100 x 143 mm	250 x 100 x 135 mm
<b>Weight</b>	2.5 kg	2.1 kg

### 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

### 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

Part No. (Drive Only)	Model (Drive Only)	Flow rates	Channels	Speed
REGLO-CPF				
ISM1014B	REGLO-CPF Analog	0.045 – 180	1	18 – 1,800
ISM321	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 121				
Select Piston pumphead, Pages 119 – 120				

## MCP-CPF Process

DISPENSING  
& CALIBRATING

REVERSIBLE

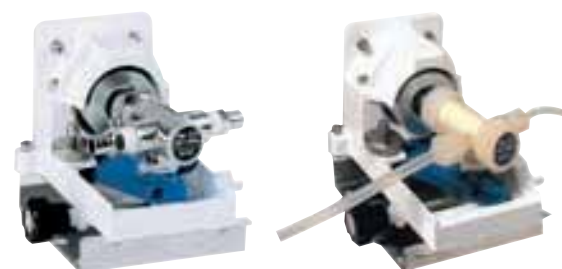
Rotation direction reversible

**MCP-CPF Process**  
with rotary piston pumphead QP Q0.SSY-LF



'RH' pumpheads (description see pages 119 to 120)

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' pumpheads (description see pages 123 to 124)

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

## Interfaces



RS232



ANALOG

- ▶ PC-controllable:
- ▶ RS232
- ▶ Speed control (0 – 5 or 0 – 10 V, 0 – 20 or 4 – 20 mA)
- ▶ Speed output (0 – 10 V<sub>DC</sub> or 0 – 7.2 kHz)
- ▶ Start/stop
- ▶ Rotation direction
- ▶ Autostart
- ▶ 2 universal inputs
- ▶ 2 universal outputs

## Specifications

<b>Motor Type</b>	DC motor
<b>Speed</b>	10.0 – 1,800 rpm
<b>Speed Setting</b>	rpm, resolution 0.1 rpm
<b>Flow Rate Setting</b>	μL/min, mL/min, L/min
<b>Power Consumption</b>	100 W
<b>Mains Connection</b>	100 – 230 V <sub>AC</sub> / 50 – 60 Hz
<b>Protection Rating</b>	IP 65
<b>Depth/Width/Height</b>	220 x 155 x 260 mm (without pumphead)
<b>Weight</b>	6.9 kg (without pumphead)

## 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



**Software ProgEdit  
LabVIEW™ drivers**  
Free download at  
[www.idex-hs.com/ismatec](http://www.idex-hs.com/ismatec)

Part No.	Description
<b>THE COMPLETE PUMP SYSTEM MCP-CPF PROCESS CONSISTS OF:</b>	
<b>ISM919A</b>	MCP-CPF Process Pump System
<b>Order the Following to Complete the MCP-CPF Process Pump System</b>	
	Drive, Page 122
	Pumphead and tubing, Pages 123 – 124
<b>Software Download</b>	
<b>IS10039</b>	ProgEdit Software
	Foot switch, Page 109

LabVIEW driver download for free: [www.idex-hs.com/ismatec](http://www.idex-hs.com/ismatec)



## Q-Type Pumpheads

### Pumphead 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**



**Part No.**  
**FMI316**



**Part No.**  
**FMI217**

TYPE	QP Q0.SSY	QP Q0.SKY	QP Q3.CKC
<b>Piston</b>	316 Stainless Steel	316 Stainless Steel	Ceramic
<b>Cylinder Case</b>	316 Stainless Steel	Kynar® (Fluorocarbon (PVDF))	Kynar (Fluorocarbon (PVDF))
<b>Cylinder Liner</b>	Carbon	Carbon	Ceramic
<b>Lip Seals</b>	Rulon® J	Rulon J	Rulon AR
<b>Gland Washers</b>	PTFE	PTFE	PTFE
<b>Cylinder Head Seal</b>	PTFE	none	none
<b>Max. Temperature</b>	60 °C	60 °C	100 °C
<b>Max. Differential Pressure</b>	6.9 bar	4.1 bar	1.7 bar (to 1,600 rpm) 0.5 bar (from 1,600 rpm)
<b>Flow Ports</b>	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 Includes: 2 Kynar (PVDF) adapters for tubing with 6 mm OD	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	Part No.	Tubing ID
<b>Tygon® ST R-3603</b>		<b>Tygon ST R-3603</b>		<b>Tygon ST R-3603</b>	
<b>MF0031</b>	6.4 mm	<b>SC0382</b>	12.7 mm	<b>SC0382</b>	12.7 mm
<b>Accessories</b>		<b>PTFE Tubing</b>		<b>PTFE Tubing</b>	
<b>FMI056A</b>	Low Flow Kit R 479 (see below)	<b>MF0336</b>	4 mm / 6 m 3.6 m long	<b>MF0336</b>	4 mm / 6 m 3.6 m long

### Pumpheads 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**



**Part No.**  
**FMI212**



**Part No.**  
**FMI320**

**Part No.**  
**FMI321**

**Part No.**  
**FMI219**

**Part No.**  
**FMI218A**

TYPE	QP Q1.CSC	QP Q2.CSC	QP Q1.CSC-W	QP Q2.CSC-W	QP 1.CSC-WT	QP Q2.CSC-WT
<b>Piston</b>		Ceramic				
<b>Cylinder Case</b>		316 Stainless Steel				
<b>Cylinder Liner</b>		Ceramic				
<b>Lip Seals</b>		Rulon AR				
<b>Gland Washers</b>		PTFE				
<b>Cylinder Head Seal</b>		PTFE				
<b>Max. Temperature</b>		177 °C				
<b>Max. Differential Pressure</b>		6.9 bar (100 psi)				
<b>Main Flow Ports</b>		1/4 NPT (female) Includes: 2 stainless steel adapters with thread 1/4 NPT (male) and fitting for tubing with 9.5 mm ID	<b>Material and design like QP Q1.CSC and QP Q2.CSC but with isolation gland (2 extra ports 10-32 – female)</b>  Thanks to a barrier gland of fluid, gas, steam or whatever is needed, the pumped fluid can be isolated from the seal area and atmosphere. Slurries, particulates, crystal formers and anaerobics are easily handled.  <b>Includes for barrier gland ports:</b> 2 Polypropylene adapters, thread 10-32 UNF and fitting for tubing with 3.2 mm ID		<b>Material and design like QP Q1.CSC and QP Q2.CSC but with isolation gland (2 extra ports 1/8" NPT – female) and heating mantle</b>  Same barrier gland as described under QP Q1/Q2.CSC-W In addition, 2 cartridge heaters (1/4" diam. x 1 1/2" long) and 1 thermocouple (1/8" diam. x 1" long) can be used for heating the pumphead.  <b>Not included:</b> Tubing adapters for: • barrier gland ports 1/8" NPT (female) • main flow ports 1/4" NPT (female)	

TUBING (MUST BE ORDERED SEPARATELY)		TUBING AND CONNECTIONS (MUST BE ORDERED SEPARATELY)	
Part No.	Tubing ID	Part No.	Description
<b>Tygon ST R-3603</b>		<b>For pumpheads with the suffix -W or -WT</b>	
<b>SC0383A</b>	9.5 mm	<b>FMI060</b>	2 stainless steel fittings for inlet/outlet, thread 1/4" NPT male, with fittings for tubing with 6.4 mm ID
<b>Accessories</b>		<b>MF0031</b>	Tubing for inlet/outlet (Tygon ST R-3603) 6.4 mm ID, 15 m long
<b>FMI056A</b>	Low Flow Kit R 479		

## Other Materials for Wetted Parts for:

## Pumpheads 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.	FMI352	FMI355	FMI356	FMI357	FMI358	FMI353	FMI359	FMI360	FMI361	FMI362	FMI363	FMI364	FMI365	FMI366
TYPE	QP Q1.CKC	QP Q2.CKC	QP Q1.CKC-W	QP Q2.CKC-W	QP Q1.CKY	QP Q2.CKY	QP Q1.CSY	QP Q2.CSY	QP Q1.SKY	QP Q2.SKY	QP Q1.SSY	QP Q2.SSY	QP Q1.SAN <sup>1</sup>	QP Q2.SAN <sup>1</sup>
<b>Piston</b>	Ceramic		Ceramic		Ceramic		Ceramic		316 Stainless Steel		316 Stainless Steel		Ceramic	
<b>Cylinder Case</b>	Kynar <sup>2</sup>		Kynar <sup>2</sup>		Kynar <sup>2</sup>		316 Stainless Steel		Kynar <sup>2</sup>		316 Stainless Steel		316 Stainless Steel	
<b>Cylinder Liner</b>	Ceramic		Ceramic		Carbon		Carbon		Carbon		Carbon		316 Stainless Steel	
<b>Lip Seals</b>	Rulon <sup>®</sup> AR		Rulon AR		Rulon AR		Rulon AR		Rulon J		Rulon J		PTFE	
<b>Gland Washers</b>	PTFE		PTFE		PTFE		PTFE		PTFE		PTFE		PTFE	
<b>Cylinder Head Seal</b>	none		none		none		PTFE		none		PTFE		PTFE	
<b>Max. Temperature</b>	100 °C		100 °C		100 °C		177 °C		60 °C		60 °C		177 °C	
<b>Max. Diff. Pressure</b>	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)	
<b>Main Flow Ports</b>	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	

<sup>1</sup> designed for sanitary applications<sup>2</sup> Kynar = Fluorocarbon (PVDF)

## Low Flow Kit R 479

## Part No. FMI056

Suitable for the following pumpheads:

- ▶ 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 pumpheads 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 Pumpheads 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.

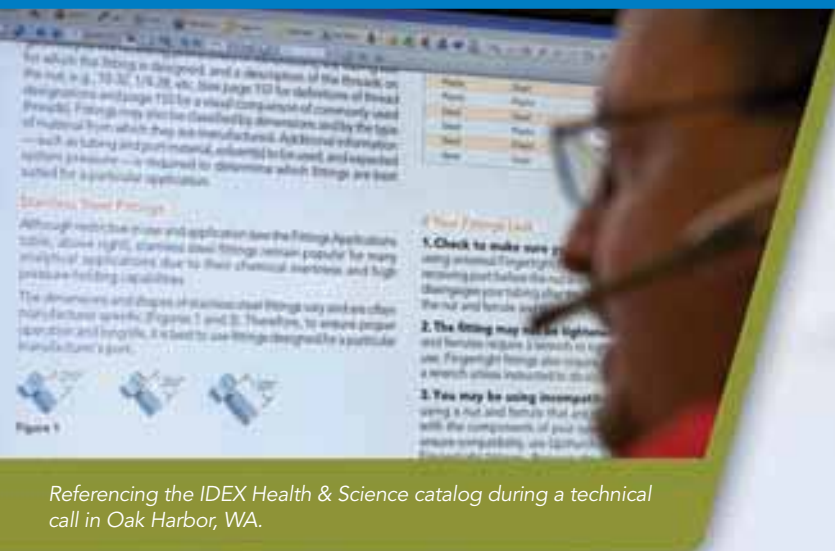


## Part No. Description

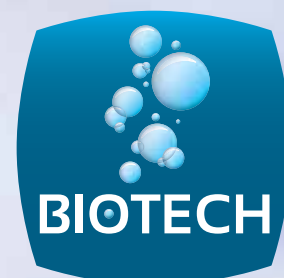
Part No.	Description	
FMI050	R412-0K	For tubing with 3.2 mm ID
FMI051	R412-1K	For tubing with 6.4 mm ID
FMI052	R412-2K	For tubing with 9.5 mm ID
FMI053	R412-5K	For tubing with 1/4-28 ferrule fittings
FMI054	H476K	For tubing with 3.2 mm OD



# Technical Resources



Referencing the IDEX Health & Science catalog during a technical call in Oak Harbor, WA.



**Please Note: For more information regarding the properties of the polymers listed below, please refer to [www.idex-hs.com/materials](http://www.idex-hs.com/materials). Refractive index and gas permeability data for tubing materials are presented on pages 63, 70 and 75, 76, respectively.**

**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.

*Maximum operating temperatures (°C):*  
Fittings 60; Tubing N/A

**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.

*Maximum operating temperatures (°C):*  
Fittings FEP-N/A and PFA-80; Tubing FEP-50 and PFA-80

**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.

*Maximum operating temperatures (°C):*  
Fittings N/A; Tubing 50

**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.

*Maximum operating temperatures (°C):*  
Fittings 80; Tubing N/A

**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.

*Maximum operating temperatures (°C):*  
Fittings 125; Tubing 100

**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.

*Maximum operating temperatures (°C):*  
Fittings 40; Tubing 40

**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.

*Maximum operating temperatures (°C):*  
Fittings 50; Tubing N/A

**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.

*Maximum operating temperatures (°C):*  
Fittings N/A; Tubing 100

**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.

*Maximum operating temperatures (°C):*  
Fittings 80; Tubing 80

**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.

*Maximum operating temperatures (°C):*  
Fittings 50; Tubing N/A

**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.

*Maximum operating temperatures (°C):*  
Fittings N/A; Tubing 125

**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.

*Maximum operating temperatures (°C):*  
Sealing Components 200; Tubing N/A

**RoHS Compliance** As IDEX Health & Science brands work to satisfy compliance to the RoHS standard, you'll notice that some of our products have changed color. This is due to new, more environmentally friendly colorants being used in our manufacturing processes. If you have any questions about a specific part, search for RoHS at the IDEX Health & Science website: [www.idex-hs.com](http://www.idex-hs.com). For items not included in the catalog, please contact IDEX Health & Science directly.

*N/A = information not available or not applicable*



The fluid transfer community uses both the International System of Units (Metric System) and the U.S. Customary System. The tables on these two pages provide easy cross-referencing of commonly used units of measure. To access automatic conversion calculation tools, please search for "Conversion Tools" on the IDEX Health & Science website: [www.idex-hs.com](http://www.idex-hs.com).

## 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 1000 µm/mm
Diameter in inches to linear volume (µL/inch)*	12870.4 (d <sup>3</sup> )
Diameter in µm to linear volume (µL/cm)*	7.85 x 10 <sup>-6</sup> (d <sup>3</sup> )
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

## 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 195 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

View Online



## 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.

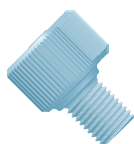
### Threads

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.

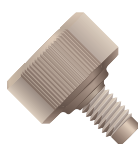
**U.S. Customary System** Two numbers are used to describe a thread size. The first number indicates the diameter of the threaded portion of the nut. Thread diameter numbers range from gauge 1 (0.073") to gauge 12 (0.216"). Beyond 0.216" the thread diameter is given as the actual diameter in fractions 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

## Application Note

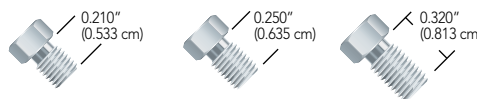
### Fittings Applications

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.

## 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 195 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.

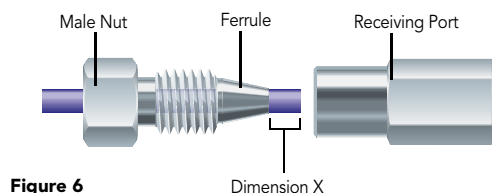
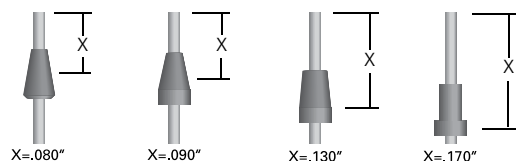


Figure 6



X = 0.080"      X = 0.090"      X = 0.130"      X = 0.170"

Dimension X can range from 0.080" to 0.170" among various manufacturers

Figure 7

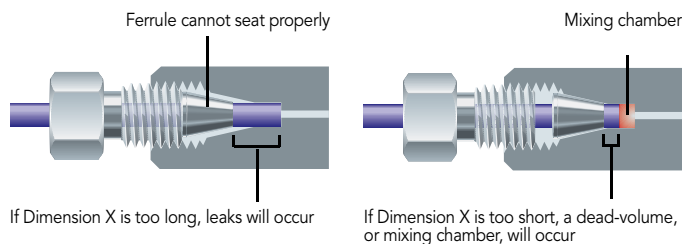


Figure 8a

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](http://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.

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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.

Flow Rate	Tubing ID						
	0.0025"	0.005"	0.007"	0.010"	0.020"	0.030"	0.062"
0.1 mL/min.	923 (64)	58 (4.0)	15 (1.0)	4 (0.3)	0 (0)	0 (0)	0 (0)
1.0 mL/min	NR*	577 (40)	150 (10)	36 (2.5)	2 (0.1)	0 (0)	0 (0)
2.0 mL/min	NR*	1,154 (80)	300 (21)	72 (5.0)	5 (0.3)	1 (0.1)	0 (0)
10.0 mL/min	NR*	5,770 (398)	1,502 (103)	361 (25)	23 (1.6)	5 (0.3)	0 (0)
25.0 mL/min	NR*	NR*	3,755 (259)	902 (62)	56 (3.9)	11 (0.8)	0 (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:  $\Delta P$  = pressure drop in psi  
 $F$  = flow rate in mL/min  
 $L$  = tubing length in cm  
 $V$  = viscosity in centipoise (cp)  
 $d$  = tubing inside diameter in cm

(See table to the left for data calculated using this formula.)

## Tubing Internal Diameters and Volumes

**Tubing Internal Diameter (d) in inches to Linear Volume (μL/inch):** 12870.4 (d<sup>2</sup>)

**Tubing Internal Diameter (d) in μm to Linear Volume (μL/cm):** 7.85 x 10<sup>-6</sup> (d<sup>2</sup>)

### Internal Diameters

Inches	Wire Gauge*	Millimeters	Microns
0.0008	—	0.020	20
0.001	—	0.025	25
0.002	—	0.051	51
0.0025	—	0.064	64
0.003	—	0.076	76
0.004	36	0.102	102
0.005	35	0.127	127
0.006	—	0.152	152
0.007	34	0.178	178
0.008	33	0.203	203
0.009	32	0.229	229
0.010	31	0.254	254
0.012	30	0.305	305
0.014	28	0.356	356
0.015	—	0.381	381
0.018	26	0.457	457
0.020	25	0.508	508
0.028	22	0.711	711
0.030	—	0.762	762
0.032	21	0.813	813
0.040	—	1.016	1016
0.042	19	1.067	1067
0.046	—	1.168	1168
0.055	—	1.397	1397
0.062	—	1.575	1575
0.080	14	2.032	2032
0.093	—	2.362	2362
0.120	9	3.048	3048
0.125	—	3.175	3175

### Linear Volumes

μL/in	μL/cm
0.008	0.003
0.013	0.005
0.051	0.020
0.081	0.032
0.116	0.046
0.206	0.081
0.322	0.127
0.463	0.182
0.631	0.248
0.824	0.324
1.042	0.410
1.287	0.507
1.853	0.730
2.523	0.993
2.896	1.140
4.170	1.642
5.148	2.027
10.090	3.973
11.583	4.560
13.179	5.189
20.593	8.107
22.703	8.938
27.234	10.722
38.933	15.328
49.474	19.478
82.370	32.429
111.316	43.825
185.333	72.966
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.

### 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® LFL	Tygon ST R-3603/R-3607	PharMed® Ismaprene	Tygon MHSL 2001	Tygon MHLL
FDA		+	+	+	+	+
US Pharmacopoeia Class VI		+	–	+	–	+
Transparency		+	+	–	+	–
Long Life		7	1	10	3	10
Gas Permeability	CO <sub>2</sub>	8	7	5	5	5
	O <sub>2</sub>	9	9	8	9	8
	N <sub>2</sub>	10	9	8	6	8
Temperature, above 0 °C		2	2	7	1	7
Temperature, below 0 °C		3	4	8	7	8
Pressure		9	5	1	1	1
Absorption / Adsorption		6	6	9	10	9
Chemical Resistance						
Acids (H <sub>2</sub> SO <sub>4</sub> )	10%	10	10	10	10	10
	30%	10	10	10	10	10
	95 – 98%	1	1	1	7	1
Bases (NaOH)	10 – 15%	10	10	10	10	10
	30 – 40%	4	4	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

## Rating Comparison



Properties		Tygon® HC F-4040-A	Tygon SI Silicone 3350 (Platinum)	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 <sub>2</sub>	9	1	1	5	10
	O <sub>2</sub>	10	1	1	8	10
	N <sub>2</sub>	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 (H <sub>2</sub> SO <sub>4</sub> )	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)

## 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
MI0309	Z-186	GA-X21.CFC.B	1	99	1.4	Graphite	PTFE	Hastelloy-C276	- 46	+ 177	21	Suction Shoe	L17164
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





# Tubing



Making 50' spools of Upchurch Scientific® FEP tubing in Oak Harbor, WA.

**NEW!**

The tubing chapter now includes a wide variety of peristaltic pump tubing for Ismatec® peristaltic pumps



TUBING	PEEK™	CAPILLARY PEEK	FUSED SILICA	PEEKsil™	SPIRAL-LINK™	RADEL®	STAINLESS STEEL
Page	64	65	65	66	67	67	68
Description	<p>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.</p> <ul style="list-style-type: none"> <li>Great alternative for stainless steel tubing in high pressure applications</li> <li>Many sizes available in color scheme to help identify ID</li> </ul>	<p>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.</p> <ul style="list-style-type: none"> <li>Available in common capillary tubing sizes with tight tolerances on OD and ID</li> <li>Tubing sleeves available for capillary tubing connections</li> </ul>	<p>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.</p> <ul style="list-style-type: none"> <li>Most commonly used OD and ID sizes available</li> <li>High quality, polyimide-clad fused silica</li> <li>Offered in convenient, two meter lengths</li> </ul>	<p>PEEKsil is mechanically strong and has ideal characteristics for sealing with metal or polymer fittings.</p> <ul style="list-style-type: none"> <li>Comprised of high quality fused silica sheathed by PEEK tubing</li> <li>Excellent chemical compatibility</li> <li>Very tight manufacturing tolerances</li> <li>Good replacement for stainless steel, PEEK or standard fused silica</li> </ul>	<p>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.</p> <ul style="list-style-type: none"> <li>Available in several specific volumes</li> <li>Includes two SealTight™ fittings</li> </ul>	<p>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.</p> <ul style="list-style-type: none"> <li>Withstands up to 12,500 psi (862 bar)</li> <li>Transparent and autoclavable</li> </ul>	<p>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.</p> <ul style="list-style-type: none"> <li>Wide selection of outside and inside diameters and lengths</li> <li>Pre-cut to ensure burr-free, flat connections</li> <li>Many sizes feature a color-coded band for easy ID identification</li> </ul>
Specifications							
OD (outside diameter)	1/16" (1.6 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" (1.6 mm)	1/16" (1.6 mm)	1/16" (1.6 mm), 1/8" (3.2 mm)	0.020" (510 µm), 1/32" (785 µm), 1/16" (1.6 mm), 1/8" (3.2 mm)
ID (inside diameter)	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)	0.004" (100 µm) – 0.080" (2.0 mm)
Operating Temp	-51 to 100 °C	-51 to 100 °C	-51 to 100 °C	-51 to 100 °C	-51 to 100 °C	-51 to 100 °C	-51 to 289 °C
Pressure Rating	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)	N/A*
Typical Tolerances	±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	±0.001" (25 µm) for 1/16" OD tubing, ±0.003" (75 µm) for 1/8" OD tubing
Refractive Index (Clarity)	Opaque	Opaque	1.78	Opaque	Opaque	1.672	Opaque
pH Range	0 – 14	0 – 14	0 – 10	0 – 10	0 – 14	1 – 14	1 – 14
Sterilization Techniques	gamma irradiation; ethylene oxide; thermal	gamma irradiation; ethylene oxide; thermal	ethylene oxide; thermal	ethylene oxide; thermal	gamma irradiation; ethylene oxide; thermal	thermal, gamma irradiation	gamma irradiation; ethylene oxide; thermal
Autoclavable?	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	65, 66, 72
•	510 µm	65
•	1/32"	65, 66, 69, 71
•	1/16"	64, 66, 67, 69, 71, 72, 73, 78, 79
•	1/8"	64, 67, 69, 71, 72, 73, 78,
•	3/16"	71, 72
•	1/4"	72, 73, 78

Size	Tubing OD	Page(s)
•	5/16"	71
•	1 mm	71
•	1.8 mm	64
•	2 mm	64, 69, 71
•	3 mm	71
•	4 mm	71, 85, 86, 87, 88

## 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 and titanium tubing, PEEK tubing is flexible and can be easily cut to desired lengths. PEEK tubing can be used with stainless steel or polymer fittings.

PEEK tubing has a very smooth internal surface, which causes less turbulence than similar 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](http://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.

PEEK tubing offers outstanding chemical compatibility, with very few solvents interacting with the polymer. For information regarding specific solvents that may interact with the polymer, please visit [www.idex-hs.com](http://www.idex-hs.com) or contact IDEX Health & Science or your local Distributor.

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.



## Specifications

Tubing OD	OD Tolerance	Tubing ID	ID Tolerance
1/16"	±0.001" (25 µm)	25 µm	±0.0005" (12.5 µm)
1/16"	±0.001" (25 µm)	All (except 25 µm)	±0.001" (25 µm)
1.8 mm	±0.002" (50 µm)	All	±0.001" (25 µm)
2.0 mm	±0.002" (50 µm)	All	±0.001" (25 µm)
1/8"	±0.003" (75 µm)	All	±0.003" (75 µm)

## Application Note

### What Size PEEK Tubing Should I Use?

- ▶ It is usually safe to use 0.010" ID x 1/16" OD 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 Agilent 1100 LC 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.



**Top Seller** SEE STARRED PRODUCTS

Part No.	ID	Color	Max. Pressure
<b>PEEK TUBING, 1/16" OD X 5'</b>			
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)
<b>PEEK TUBING, 1/8" OD X 5'</b>			
★ 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)
<b>PEEK TUBING, 1.8 MM OD X 5'</b>			
1539	0.055" (1.40 mm) ID	Natural	500 psi (34 bar)
<b>PEEK TUBING, 2.0 MM OD X 5'</b>			
1590	0.042" (1.05 mm) ID	Natural	5,000 psi (345 bar)



## 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 below). 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 125).



## Fused Silica Tubing

- ▶ Five inner diameters with most common capillary outside diameter, 360 µm
- ▶ Convenient 2 m lengths

As a service to our customers, we offer cut fused silica tubing in convenient 2 m lengths. These products are manufactured from synthetic fused silica with a polyimide coating.



## Specifications

### 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	0.100 mm (0.004") and 0.150 mm (0.006")	±0.0004" (10 µm)	±0.00016" (4 µm)

## 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](http://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 0.08" ID x 25 cm long, page 69). 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.



**Top Seller** SEE STARRED PRODUCTS

Part No.	ID	Color	Max. Pressure	Qty.
<b>CAPILLARY PEEK TUBING, 360 µm OD</b>				
<b>1574</b>	25 µm (0.001") ID x 5'	Natural	5,000 psi (345 bar)	ea.
<b>1574-12x</b>	25 µm (0.001") ID x 12"	Natural	5,000 psi (345 bar)	10-pk
<b>1570</b>	50 µm (0.002") ID x 5'	Natural	2,000 psi (138 bar)	ea.
<b>1570-12x</b>	50 µm (0.002") ID x 12"	Natural	2,000 psi (138 bar)	10-pk
<b>1573</b>	75 µm (0.003") ID x 5'	Black	2,000 psi (138 bar)	ea.
<b>1573-12x</b>	75 µm (0.003") ID x 12"	Black	2,000 psi (138 bar)	10-pk
<b>1571</b>	0.100 mm (0.004") ID x 5'	Red	2,000 psi (138 bar)	ea.
<b>1571-12x</b>	0.100 mm (0.004") ID x 12"	Red	2,000 psi (138 bar)	10-pk
<b>1572</b>	0.150 mm (0.006") ID x 5'	Yellow	2,000 psi (138 bar)	ea.
<b>1572-12x</b>	0.150 mm (0.006") ID x 12"	Yellow	2,000 psi (138 bar)	10-pk
<b>CAPILLARY PEEK TUBING, 510 µm (0.020") OD</b>				
<b>1543</b>	65 µm (0.0025") ID x 5'	Natural	2,000 psi (138 bar)	ea.
★ <b>1541</b>	0.125 mm (0.005") ID x 5'	Natural	2,000 psi (138 bar)	ea.
<b>1542</b>	0.255 mm (0.010") ID x 5'	Natural	2,000 psi (138 bar)	ea.
<b>CAPILLARY PEEK TUBING, 1/32" OD</b>				
<b>1567</b>	25 µm (0.001") ID x 5'	Natural	5,000 psi (345 bar)	ea.
<b>1567-12x</b>	25 µm (0.001") ID x 12"	Natural	5,000 psi (345 bar)	10-pk
<b>1579</b>	65 µm (0.0025") ID x 5'	Natural	5,000 psi (345 bar)	ea.
<b>1579-12x</b>	65 µm (0.0025") ID x 12"	Natural	5,000 psi (345 bar)	10-pk
<b>1578</b>	90 µm (0.0035") ID x 5'	Black	5,000 psi (345 bar)	ea.
<b>1578-12x</b>	90 µm (0.0035") ID x 12"	Black	5,000 psi (345 bar)	10-pk
<b>1576</b>	0.125 mm (0.005") ID x 5'	Red	5,000 psi (345 bar)	ea.
<b>1576-12x</b>	0.125 mm (0.005") ID x 12"	Red	5,000 psi (345 bar)	10-pk
<b>1577</b>	0.175 mm (0.007") ID x 5'	Yellow	5,000 psi (345 bar)	ea.
<b>1577-12x</b>	0.175 mm (0.007") ID x 12"	Yellow	5,000 psi (345 bar)	10-pk
<b>1575</b>	0.20 mm (0.008") ID x 5'	Natural	5,000 psi (345 bar)	ea.
<b>1575-12x</b>	0.20 mm (0.008") ID x 12"	Natural	5,000 psi (345 bar)	10-pk
<b>1580</b>	0.23 mm (0.009") ID x 5'	Gray	5,000 psi (345 bar)	ea.
<b>1580-12x</b>	0.23 mm (0.009") ID x 12"	Gray	5,000 psi (345 bar)	10-pk
<b>1581</b>	0.25 mm (0.010") ID x 5'	Blue	5,000 psi (345 bar)	ea.
<b>1581-12x</b>	0.25 mm (0.010") ID x 12"	Blue	5,000 psi (345 bar)	10-pk
<b>1568</b>	0.40 mm (0.015") ID x 5'	Natural	5,000 psi (345 bar)	ea.
<b>1568-12x</b>	0.40 mm (0.015") ID x 12"	Natural	5,000 psi (345 bar)	10-pk
★ <b>1569</b>	0.50 mm (0.020") ID x 5'	Orange	3,000 psi (207 bar)	ea.
<b>1569-12x</b>	0.50 mm (0.020") ID x 12"	Orange	3,000 psi (207 bar)	10-pk
<b>787-KIT</b>	1/32" OD x 12" Kit			Kit
Kit contains (1) 10-pack of each 1/32" OD x 12" size listed above.				
<b>FUSED SILICA TUBING, 360 µm OD</b>				
★ <b>F5-120</b>	20 µm (0.0008") ID x 2 m (6.4')	Natural	10,000 psi (690 bar)	ea.
★ <b>F5-150</b>	50 µm (0.002") ID x 2 m (6.4')	Natural	10,000 psi (690 bar)	ea.
<b>F5-175</b>	75 µm (0.003") ID x 2 m (6.4')	Natural	10,000 psi (690 bar)	ea.
<b>F5-110</b>	0.10 mm (0.004") ID x 2 m (6.4')	Natural	10,000 psi (690 bar)	ea.
<b>F5-115</b>	0.15 mm (0.006") ID x 2 m (6.4')	Natural	10,000 psi (690 bar)	ea.

## PEEKsil™ Tubing

- ▶ PEEK™ covered fused silica
- ▶ 360 µm, 1/32" or 1/16" outside diameter with wide variety of inside diameters
- ▶ Precut to a wide variety of lengths

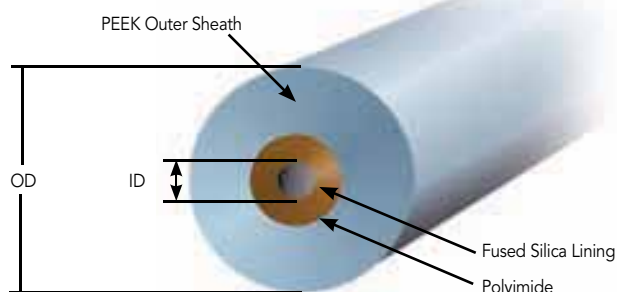
PEEKsil's sheathing is mechanically strong and has ideal characteristics for sealing with metal or polymer fittings. The fused silica core provides a consistent and rigid fluid pathway with very tight tolerances and industry-accepted chemical properties. Together, this makes PEEKsil tubing ideal for many 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

Tubing OD	OD Tolerance	Tubing ID	ID Tolerance
360 µm	±0.0004" (10 µm)	25 µm	±0.00004" (1 µm)
1/32"	±0.0008" (20 µm)	50 - 100 µm	±0.00012" (3 µm)
1/16"	±0.0012" (30 µm)	0.15 - 0.30 mm	±0.0002" (5 µm)



**Top Seller** SEE STARRED PRODUCTS

Part No.	ID	Length	Color	Max. Pressure*	Qty.
<b>PEEKsil TUBING, 360 µm OD</b>					
360255	25 µm (0.001")	5 cm (2")	Orange	10,000 psi (690 bar)	2-pk
3602510	25 µm (0.001")	10 cm (4")	Orange	10,000 psi (690 bar)	2-pk
3602515	25 µm (0.001")	15 cm (6")	Orange	10,000 psi (690 bar)	2-pk
3602525	25 µm (0.001")	25 cm (10")	Orange	10,000 psi (690 bar)	2-pk
3602550	25 µm (0.001")	50 cm (1.6')	Orange	10,000 psi (690 bar)	2-pk
360505	50 µm (0.002")	5 cm (2")	Natural	10,000 psi (690 bar)	2-pk
3605010	50 µm (0.002")	10 cm (4")	Natural	10,000 psi (690 bar)	2-pk
3605015	50 µm (0.002")	15 cm (6")	Natural	10,000 psi (690 bar)	2-pk
3605025	50 µm (0.002")	25 cm (10")	Natural	10,000 psi (690 bar)	2-pk
3605050	50 µm (0.002")	50 cm (1.6')	Natural	10,000 psi (690 bar)	2-pk

Part No.	ID	Length	Color	Max. Pressure*	Qty.
<b>PEEKsil TUBING, 1/32" OD</b>					
3255	25 µm (0.001")	5 cm (2")	Orange	10,000 psi (690 bar)	2-pk
★ 32510	25 µm (0.001")	10 cm (4")	Orange	10,000 psi (690 bar)	2-pk
32515	25 µm (0.001")	15 cm (6")	Orange	10,000 psi (690 bar)	2-pk
32520	25 µm (0.001")	20 cm (8")	Orange	10,000 psi (690 bar)	2-pk
32550	25 µm (0.001")	50 cm (1.6')	Orange	10,000 psi (690 bar)	2-pk
3505	50 µm (0.002")	5 cm (2")	Natural	10,000 psi (690 bar)	2-pk
35010	50 µm (0.002")	10 cm (4")	Natural	10,000 psi (690 bar)	2-pk
35015	50 µm (0.002")	15 cm (6")	Natural	10,000 psi (690 bar)	2-pk
35020	50 µm (0.002")	20 cm (8")	Natural	10,000 psi (690 bar)	2-pk
★ 35050	50 µm (0.002")	50 cm (1.6')	Natural	10,000 psi (690 bar)	2-pk
3755	75 µm (0.003")	5 cm (2")	Black	10,000 psi (690 bar)	2-pk
37510	75 µm (0.003")	10 cm (4")	Black	10,000 psi (690 bar)	2-pk
37515	75 µm (0.003")	15 cm (6")	Black	10,000 psi (690 bar)	2-pk
37520	75 µm (0.003")	20 cm (8")	Black	10,000 psi (690 bar)	2-pk
37550	75 µm (0.003")	50 cm (1.6')	Black	10,000 psi (690 bar)	2-pk
31005	0.10 mm (0.004")	5 cm (2")	Red	10,000 psi (690 bar)	2-pk
310010	0.10 mm (0.004")	10 cm (4")	Red	10,000 psi (690 bar)	2-pk
310015	0.10 mm (0.004")	15 cm (6")	Red	10,000 psi (690 bar)	2-pk
310020	0.10 mm (0.004")	20 cm (8")	Red	10,000 psi (690 bar)	2-pk
310050	0.10 mm (0.004")	50 cm (1.6')	Red	10,000 psi (690 bar)	2-pk
31505	0.15 mm (0.006")	5 cm (2")	Purple	10,000 psi (690 bar)	2-pk
315010	0.15 mm (0.006")	10 cm (4")	Purple	10,000 psi (690 bar)	2-pk
315015	0.15 mm (0.006")	15 cm (6")	Purple	10,000 psi (690 bar)	2-pk
315020	0.15 mm (0.006")	20 cm (8")	Purple	10,000 psi (690 bar)	2-pk
★ 315050	0.15 mm (0.006")	50 cm (1.6')	Purple	10,000 psi (690 bar)	2-pk
<b>PEEKsil TUBING, 1/16" OD</b>					
6255	25 µm (0.001")	5 cm (2")	Orange	10,000 psi (690 bar)	5-pk
62510	25 µm (0.001")	10 cm (4")	Orange	10,000 psi (690 bar)	5-pk
62515	25 µm (0.001")	15 cm (6")	Orange	10,000 psi (690 bar)	5-pk
62520	25 µm (0.001")	20 cm (8")	Orange	10,000 psi (690 bar)	5-pk
62550	25 µm (0.001")	50 cm (1.6')	Orange	10,000 psi (690 bar)	2-pk
6505	50 µm (0.002")	5 cm (2")	Natural	10,000 psi (690 bar)	5-pk
65010	50 µm (0.002")	10 cm (4")	Natural	10,000 psi (690 bar)	5-pk
65015	50 µm (0.002")	15 cm (6")	Natural	10,000 psi (690 bar)	5-pk
★ 65020	50 µm (0.002")	20 cm (8")	Natural	10,000 psi (690 bar)	5-pk
65050	50 µm (0.002")	50 cm (1.6')	Natural	10,000 psi (690 bar)	2-pk
6755	75 µm (0.003")	5 cm (2")	Black	10,000 psi (690 bar)	5-pk
67510	75 µm (0.003")	10 cm (4")	Black	10,000 psi (690 bar)	5-pk
67515	75 µm (0.003")	15 cm (6")	Black	10,000 psi (690 bar)	5-pk
67520	75 µm (0.003")	20 cm (8")	Black	10,000 psi (690 bar)	5-pk
67550	75 µm (0.003")	50 cm (1.6')	Black	10,000 psi (690 bar)	2-pk
61005	0.10 mm (0.004")	5 cm (2")	Red	10,000 psi (690 bar)	5-pk
610010	0.10 mm (0.004")	10 cm (4")	Red	10,000 psi (690 bar)	5-pk
610015	0.10 mm (0.004")	15 cm (6")	Red	10,000 psi (690 bar)	5-pk
610020	0.10 mm (0.004")	20 cm (8")	Red	10,000 psi (690 bar)	5-pk
610050	0.10 mm (0.004")	50 cm (1.6')	Red	10,000 psi (690 bar)	2-pk
61505	0.15 mm (0.006")	5 cm (2")	Purple	10,000 psi (690 bar)	5-pk
615010	0.15 mm (0.006")	10 cm (4")	Purple	10,000 psi (690 bar)	5-pk
615015	0.15 mm (0.006")	15 cm (6")	Purple	10,000 psi (690 bar)	5-pk
615020	0.15 mm (0.006")	20 cm (8")	Purple	10,000 psi (690 bar)	5-pk
615050	0.15 mm (0.006")	50 cm (1.6')	Purple	10,000 psi (690 bar)	2-pk
61755	0.175 mm (0.007")	5 cm (2")	Yellow	10,000 psi (690 bar)	5-pk
617510	0.175 mm (0.007")	10 cm (4")	Yellow	10,000 psi (690 bar)	5-pk
617515	0.175 mm (0.007")	15 cm (6")	Yellow	10,000 psi (690 bar)	5-pk
617520	0.175 mm (0.007")	20 cm (8")	Yellow	10,000 psi (690 bar)	5-pk
617550	0.175 mm (0.007")	50 cm (1.6')	Yellow	10,000 psi (690 bar)	2-pk
62005	0.20 mm (0.008")	5 cm (2")	Blue	10,000 psi (690 bar)	5-pk
620010	0.20 mm (0.008")	10 cm (4")	Blue	10,000 psi (690 bar)	5-pk
620015	0.20 mm (0.008")	15 cm (6")	Blue	10,000 psi (690 bar)	5-pk
620020	0.20 mm (0.008")	20 cm (8")	Blue	10,000 psi (690 bar)	5-pk
620050	0.20 mm (0.008")	50 cm (1.6')	Blue	10,000 psi (690 bar)	2-pk
63005	0.30 mm (0.012")	5 cm (2")	Gray	10,000 psi (690 bar)	5-pk
630010	0.30 mm (0.012")	10 cm (4")	Gray	10,000 psi (690 bar)	5-pk
630015	0.30 mm (0.012")	15 cm (6")	Gray	10,000 psi (690 bar)	5-pk
630020	0.30 mm (0.012")	20 cm (8")	Gray	10,000 psi (690 bar)	5-pk
630050	0.30 mm (0.012")	50 cm (1.6')	Gray	10,000 psi (690 bar)	2-pk

\* Pressure rating determined by SGE International Pty., Ltd., the manufacturer of this tubing.



## 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](http://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" or 1/8" outside diameter 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](http://www.idex-hs.com), for more information regarding chemical compatibility of Radel.



### Radel Tubing Specifications

Tubing OD	OD Tolerance	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)



**Top Seller** SEE STARRED PRODUCTS

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



## Stainless Steel Tubing

- ▶ Precut 316 stainless steel\*
- ▶ Color-coded banding for easy identification

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 box 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](http://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*



## Specifications

- ▶ 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)

## 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 page 64.

## Related Products

- ▶ Our 0.020" OD tubing is the size of choice for the Rheodyne® Model 8125 Micro-Scale Injector Valve (page 131).
- ▶ PEEK polymer tubing is available in all of these sizes, listed on page 64.

## 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:

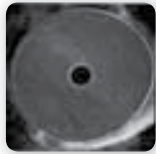
Tubing OD	Precut Passivation	Postcut Passivation
0.020"	All	All
1/32"	All	All
1/16"	All	All, ex. 25' lengths
1/8"	None	All, ex. 3 & 5 m lengths

## Application Note

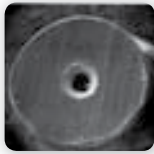
- ▶ Our 1/32" OD tubing is designed for plumbing the Agilent 1100 Capillary LC system.
- ▶ Standard 1/16" and 1/8" OD stainless steel tubing is suited for most analytical applications.

## Stainless Steel Tubing (continued)

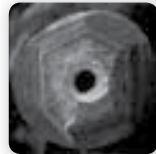
### The Beauty of Precut Tubing



Precut tubing



Tubing cut by a commercially available tubing cutter



File cut tubing

### Note

All Stainless Steel tubing longer than 1 m is coiled.



**Top Seller** SEE STARRED PRODUCTS

Part No.	ID	Length	Color
<b>STAINLESS STEEL, 0.020" OD</b>			
U-119	0.005" (0.125 mm)	5 cm (2")	N/A
U-120	0.005" (0.125 mm)	10 cm (4")	N/A
U-121	0.005" (0.125 mm)	20 cm (8")	N/A
U-122	0.005" (0.125 mm)	30 cm (12")	N/A
U-123	0.005" (0.125 mm)	50 cm (1.6')	N/A
U-124	0.005" (0.125 mm)	1 m (3.2')	N/A
U-125	0.005" (0.125 mm)	1.5 m (5')	N/A
<b>STAINLESS STEEL, 1/32" OD</b>			
U-1114	0.004" (0.10 mm)	5 cm (2")	Red
U-1115	0.004" (0.10 mm)	10 cm (4")	Red
U-1116	0.004" (0.10 mm)	20 cm (8")	Red
U-1117	0.004" (0.10 mm)	30 cm (12")	Red
U-1120	0.006" (0.15 mm)	5 cm (2")	Yellow
U-1121	0.006" (0.15 mm)	10 cm (4")	Yellow
U-1122	0.006" (0.15 mm)	20 cm (8")	Yellow
U-1123	0.006" (0.15 mm)	30 cm (12")	Yellow
U-1125	0.008" (0.20 mm)	5 cm (2")	Clear
U-1126	0.008" (0.20 mm)	10 cm (4")	Clear
U-1127	0.008" (0.20 mm)	20 cm (8")	Clear
★ U-1128	0.008" (0.20 mm)	30 cm (12")	Clear
U-1130	0.010" (0.25 mm)	5 cm (2")	Blue
U-1131	0.010" (0.25 mm)	10 cm (4")	Blue
U-1132	0.010" (0.25 mm)	20 cm (8")	Blue
U-1133	0.010" (0.25 mm)	30 cm (12")	Blue
U-1140	0.015" (0.40 mm)	5 cm (2")	Green
U-1141	0.015" (0.40 mm)	10 cm (4")	Green
U-1142	0.015" (0.40 mm)	20 cm (8")	Green
U-1143	0.015" (0.40 mm)	30 cm (12")	Green
U-1145	0.018" (0.45 mm)	5 cm (2")	Black
U-1146	0.018" (0.45 mm)	10 cm (4")	Black
U-1147	0.018" (0.45 mm)	20 cm (8")	Black
U-1148	0.018" (0.45 mm)	30 cm (12")	Black

Part No.	ID	Length	Color
<b>STAINLESS STEEL, 1/16" OD</b>			
U-152	0.005" (0.125 mm)	5 cm (2")	Red
U-153	0.005" (0.125 mm)	10 cm (4")	Red
U-154	0.005" (0.125 mm)	20 cm (8")	Red
U-155	0.005" (0.125 mm)	30 cm (12")	Red
U-156	0.005" (0.125 mm)	0.5 m (1.6')	Red
U-157	0.005" (0.125 mm)	1 m (3.2')	Red
U-158	0.005" (0.125 mm)	1.5 m (5')	Red
U-160	0.005" (0.125 mm)	7.6 m (25')	Red
U-126	0.007" (0.175 mm)	5 cm (2")	Black
U-127	0.007" (0.175 mm)	10 cm (4")	Black
U-128	0.007" (0.175 mm)	20 cm (8")	Black
U-129	0.007" (0.175 mm)	30 cm (12")	Black
U-130	0.007" (0.175 mm)	0.5 m (1.6')	Black
U-131	0.007" (0.175 mm)	1 m (3.2')	Black
U-108	0.007" (0.175 mm)	5 m (16')	Black
U-161	0.007" (0.175 mm)	7.6 m (25')	Black
★ U-111	0.010" (0.25 mm)	5 cm (2")	Blue
★ U-112	0.010" (0.25 mm)	10 cm (4")	Blue
U-113	0.010" (0.25 mm)	20 cm (8")	Blue
★ U-114	0.010" (0.25 mm)	30 cm (12")	Blue
U-132	0.010" (0.25 mm)	0.5 m (1.6')	Blue
U-133	0.010" (0.25 mm)	1 m (3.2')	Blue
U-106	0.010" (0.25 mm)	5 m (16')	Blue
U-162	0.010" (0.25 mm)	7.6 m (25')	Blue
U-101	0.020" (0.5 mm)	5 cm (2")	Yellow
U-102	0.020" (0.5 mm)	10 cm (4")	Yellow
U-103	0.020" (0.5 mm)	20 cm (8")	Yellow
U-104	0.020" (0.5 mm)	30 cm (12")	Yellow
U-134	0.020" (0.5 mm)	0.5 m (1.6')	Yellow
U-135	0.020" (0.5 mm)	1 m (3.2')	Yellow
U-105	0.020" (0.5 mm)	5 m (16')	Yellow
U-163	0.020" (0.5 mm)	7.6 m (25')	Yellow
U-115	0.030" (0.75 mm)	5 cm (2")	White
U-116	0.030" (0.75 mm)	10 cm (4")	White
U-117	0.030" (0.75 mm)	20 cm (8")	White
U-118	0.030" (0.75 mm)	30 cm (12")	White
U-136	0.030" (0.75 mm)	0.5 m (1.6')	White
U-137	0.030" (0.75 mm)	1 m (3.2')	White
U-107	0.030" (0.75 mm)	5 m (16')	White
U-164	0.030" (0.75 mm)	7.6 m (25')	White
U-138	0.040" (1.0 mm)	5 cm (2")	N/A
U-139	0.040" (1.0 mm)	10 cm (4")	N/A
U-140	0.040" (1.0 mm)	20 cm (8")	N/A
U-141	0.040" (1.0 mm)	30 cm (12")	N/A
U-142	0.040" (1.0 mm)	0.5 m (1.6')	N/A
U-143	0.040" (1.0 mm)	1 m (3.2')	N/A
U-144	0.040" (1.0 mm)	5 m (16')	N/A
U-165	0.040" (1.0 mm)	7.6 m (25')	N/A
U-145	0.046" (1.15 mm)	5 cm (2")	N/A
U-146	0.046" (1.15 mm)	10 cm (4")	N/A
U-147	0.046" (1.15 mm)	20 cm (8")	N/A
U-148	0.046" (1.15 mm)	30 cm (12")	N/A
U-149	0.046" (1.15 mm)	0.5 m (1.6')	N/A
U-150	0.046" (1.15 mm)	1 m (3.2')	N/A
U-151	0.046" (1.15 mm)	5 m (16')	N/A
<b>STAINLESS STEEL, 1/8" OD</b>			
U-815	0.080" (2.0 mm)	15 cm (6")	N/A
U-825	0.080" (2.0 mm)	25 cm (10")	N/A
U-800	0.080" (2.0 mm)	1 m (3.2')	N/A
U-803	0.080" (2.0 mm)	3 m (9.8')	N/A
U-805	0.080" (2.0 mm)	5 m (16')	N/A

TUBING	DuPONT® FEP	DuPONT PFA	DuPONT HIGH PURITY PFA	360 µm DuPONT HIGH PURITY PFA	DuPONT ETFE	HALAR® (ECTFE)
Page	71	72	72	72	73	73
<b>Description</b>	<p>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.</p> <ul style="list-style-type: none"> <li>Great for general, low pressure applications</li> <li>Many sizes available in multiple colors for easy identification</li> <li>Tight manufacturing tolerances to ensure product consistency</li> </ul>	<p>Offers excellent chemical compatibility, plus due to its inner surface smoothness, PFA tubing tends to be more translucent than PTFE tubing.</p> <ul style="list-style-type: none"> <li>Offers higher purity and enhanced translucence when compared with other fluoropolymer tubes</li> <li>Great for more critical, low pressure applications</li> </ul>	<p>This polymer tubing is manufactured from a premium grade of PFA — one of the most contaminant-free polymers on the market.</p> <ul style="list-style-type: none"> <li>Offers chemical stability, mechanical strength and purity for applications such as medical, diagnostic, pharmaceutical, biotechnology and semiconductor</li> <li>Excellent replacement for PTFE where gas permeability and surface texture are issues</li> <li>Clarity of tubing makes PFA an excellent choice for monitoring fluid movement</li> </ul>	<p>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.</p> <ul style="list-style-type: none"> <li>Replacement for capillary tubing in low pressure applications where excellent chemical compatibility is required</li> <li>Tubing sleeves available for capillary tubing connections</li> </ul>	<p>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.</p> <ul style="list-style-type: none"> <li>Excellent solvent resistance</li> <li>More durable and less gas permeable than PTFE, FEP and PFA</li> <li>Operating temperatures up to 80 °C</li> </ul>	<p>Chemically inert to many solvents, easy to cut, Halar is stronger than identically sized tubing manufactured from other fluoropolymers. The material offers much better radiation resistance than most other fluoropolymers as well, which is beneficial for medical applications where radiation-based sterilization must take place.</p> <ul style="list-style-type: none"> <li>Highest pressure resistance of all fluoropolymer tubing</li> <li>Tight manufacturing tolerances to ensure product consistency</li> <li>Good choice for medical applications due to radiation resistance</li> </ul>
<b>Specifications</b>						
<b>OD (outside diameter)</b>	1/32" (785 µm), 0.040" (1.0 mm), 1/16" (1.6 mm), 0.080" (2.0 mm), 0.120" (3.0 mm), 1/8" (3.2 mm), 0.160" (4.0 mm), 3/16" (4.8 mm), 1/4" (6.35 mm), 5/16" (7.94 mm)	1/16" (1.6 mm), 1/8" (3.2 mm)	1/16" (1.6 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)	1/16" (1.6 mm), 1/8" (3.2 mm)
<b>ID (inside diameter)</b>	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)	0.010" (0.25 mm) – 0.062" (1.55 mm)
<b>Operating Temp</b>	-51 to 50 °C	-51 to 80 °C	-51 to 80 °C	-51 to 80 °C	-51 to 80 °C	-51 to 50 °C
<b>Pressure Rating</b>	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)	2,500 – 6,000 psi (172 – 414 bar)
<b>Typical Tolerances</b>	±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	±0.001" (25 µm) for 1/16" OD tubing, ±0.003" (75 µm) for 1/8" OD tubing
<b>Refractive Index (Clarity)</b>	1.338	1.34	1.34	1.34	1.4	1.447
<b>pH Range</b>	0–14	0–14	0–14	0–14	0–14	1–14
<b>Sterilization Techniques</b>	ethylene oxide; thermal	ethylene oxide; thermal	gamma irradiation; ethylene oxide; thermal	gamma irradiation; ethylene oxide; thermal	ethylene oxide	gamma irradiation; thermal
<b>Autoclavable?</b>	Y	Y	Y	Y	Y	Y



## 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](http://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

Tubing Size	Tolerances	
	OD	ID
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" (76 µm)	±0.003" (76 µm)
3/16" OD	±0.004" (102 µm)	±0.004" (102 µm)
5/16" OD	±0.004" (102 µm)	±0.004" (102 µm)
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)



**Top Seller** SEE STARRED PRODUCTS

Part No.	ID	Length	Color	Max. Pressure
<b>FEP TUBING, 1/32" OD</b>				
1683	75 µm (0.003")	1.5 m (5')	Natural	4,000 psi (276 bar)
1684	0.10 mm (0.004")	1.5 m (5')	Black	3,000 psi (207 bar)
1685	0.125 mm (0.005")	1.5 m (5')	Red	3,000 psi (207 bar)
1686	0.15 mm (0.006")	1.5 m (5')	Violet	3,000 psi (207 bar)
1687	0.175 mm (0.007")	1.5 m (5')	Yellow	3,000 psi (207 bar)
1688	0.20 mm (0.008")	1.5 m (5')	Natural	2,500 psi (172 bar)
1689	0.23 mm (0.009")	1.5 m (5')	Blue	2,500 psi (172 bar)
1692	0.405 mm (0.016")	1.5 m (5')	Natural	1,500 psi (104 bar)

Part No.	ID	Length	Color	Max. Pressure
<b>FEP TUBING, 1/16" OD</b>				
1474	0.004" (0.10 mm)	3 m (10')	Black	4,000 psi (276 bar)
1474-20	0.004" (0.10 mm)	6 m (20')	Black	4,000 psi (276 bar)
1475	0.005" (0.125 mm)	3 m (10')	Red	4,000 psi (276 bar)
1475-20	0.005" (0.125 mm)	6 m (20')	Red	4,000 psi (276 bar)
1476	0.006" (0.150 mm)	3 m (10')	Violet	4,000 psi (276 bar)
1476-20	0.006" (0.150 mm)	6 m (20')	Violet	4,000 psi (276 bar)
1477	0.007" (0.175 mm)	3 m (10')	Yellow	4,000 psi (276 bar)
1477-20	0.007" (0.175 mm)	6 m (20')	Yellow	4,000 psi (276 bar)
1478	0.008" (0.20 mm)	3 m (10')	Natural	4,000 psi (276 bar)
1478-20	0.008" (0.20 mm)	6 m (20')	Natural	4,000 psi (276 bar)
1479	0.009" (0.23 mm)	3 m (10')	Blue	4,000 psi (276 bar)
1479-20	0.009" (0.23 mm)	6 m (20')	Blue	4,000 psi (276 bar)
1526	0.010" (0.25 mm)	3 m (10')	Natural	3,000 psi (207 bar)
1526B	0.010" (0.25 mm)	3 m (10')	Blue	3,000 psi (207 bar)
1527	0.010" (0.25 mm)	6 m (20')	Natural	3,000 psi (207 bar)
1527B	0.010" (0.25 mm)	6 m (20')	Blue	3,000 psi (207 bar)
1518	0.020" (0.50 mm)	3 m (10')	Black	2,000 psi (138 bar)
1549	0.020" (0.50 mm)	3 m (10')	Natural	2,000 psi (138 bar)
1549OR	0.020" (0.50 mm)	3 m (10')	Orange	2,000 psi (138 bar)
1519	0.020" (0.50 mm)	6 m (20')	Black	2,000 psi (138 bar)
★ 1548	0.020" (0.50 mm)	6 m (20')	Natural	2,000 psi (138 bar)
1548OR	0.020" (0.50 mm)	6 m (20')	Orange	2,000 psi (138 bar)
1522	0.030" (0.75 mm)	3 m (10')	Natural	1,000 psi (69 bar)
1522G	0.030" (0.75 mm)	3 m (10')	Green	1,000 psi (69 bar)
★ 1520	0.030" (0.75 mm)	6 m (20')	Natural	1,000 psi (69 bar)
1520G	0.030" (0.75 mm)	6 m (20')	Green	1,000 psi (69 bar)

<b>FEP TUBING, 1/8" OD</b>				
★ 1521	0.062" (1.55 mm)	6 m (20')	Natural	500 psi (34 bar)
1521BL	0.062" (1.55 mm)	15 m (50')	Blue	500 psi (34 bar)
1521GL	0.062" (1.55 mm)	15 m (50')	Green	500 psi (34 bar)
1521ORL	0.062" (1.55 mm)	15 m (50')	Orange	500 psi (34 bar)
1521RL	0.062" (1.55 mm)	15 m (50')	Red	500 psi (34 bar)
1521YL	0.062" (1.55 mm)	15 m (50')	Yellow	500 psi (34 bar)
1523	0.062" (1.55 mm)	3 m (10')	Natural	500 psi (34 bar)

<b>FEP TUBING, 3/16" OD</b>				
1524	0.125" (3.20 mm)	6 m (20')	Natural	500 psi (34 bar)
1524L	0.125" (3.20 mm)	15 m (50')	Natural	500 psi (34 bar)
★ 1524XL	0.125" (3.20 mm)	30 m (100')	Natural	500 psi (34 bar)
1525	0.125" (3.20 mm)	3 m (10')	Natural	500 psi (34 bar)

<b>FEP TUBING, 1/4" OD</b>				
1651	0.156" (4.0 mm)	3 m (10')	Natural	250 psi (17 bar)
1651L	0.156" (4.0 mm)	15 m (50')	Natural	250 psi (17 bar)
1651XL	0.156" (4.0 mm)	30 m (100')	Natural	250 psi (17 bar)
1650	0.188" (4.80 mm)	3 m (10')	Natural	250 psi (17 bar)
1650L	0.188" (4.80 mm)	15 m (50')	Natural	250 psi (17 bar)
1650XL	0.188" (4.80 mm)	30 m (100')	Natural	250 psi (17 bar)

<b>FEP TUBING, 5/16" OD</b>				
1652	0.250" (6.35 mm)	3 m (10')	Natural	250 psi (17 bar)
1652L	0.250" (6.35 mm)	15 m (50')	Natural	250 psi (17 bar)
1652XL	0.250" (6.35 mm)	30 m (100')	Natural	250 psi (17 bar)

<b>FEP TUBING, 1.0 mm OD</b>				
1671	0.50 mm (0.020")	3 m (10')	Natural	500 psi (34 bar)
1671L	0.50 mm (0.020")	15 m (50')	Natural	500 psi (34 bar)
1671XL	0.50 mm (0.020")	30 m (100')	Natural	500 psi (34 bar)

<b>FEP TUBING, 2.0 mm OD</b>				
1673	1.0 mm (0.040")	3 m (10')	Natural	500 psi (34 bar)
1673L	1.0 mm (0.040")	15 m (50')	Natural	500 psi (34 bar)
1673XL	1.0 mm (0.040")	30 m (100')	Natural	500 psi (34 bar)

<b>FEP TUBING, 3.0 mm OD</b>				
1675	1.0 mm (0.040")	3 m (10')	Natural	500 psi (34 bar)
1675L	1.0 mm (0.040")	15 m (50')	Natural	500 psi (34 bar)
1675XL	1.0 mm (0.040")	30 m (100')	Natural	500 psi (34 bar)
1677	2.0 mm (0.080")	3 m (10')	Natural	500 psi (34 bar)
1677L	2.0 mm (0.080")	15 m (50')	Natural	500 psi (34 bar)
1677XL	2.0 mm (0.080")	30 m (100')	Natural	500 psi (34 bar)

<b>FEP TUBING, 4.0 mm OD</b>				
1679	3.0 mm (0.120")	3 m (10')	Natural	500 psi (34 bar)
1679L	3.0 mm (0.120")	15 m (50')	Natural	500 psi (34 bar)
1679XL	3.0 mm (0.120")	30 m (100')	Natural	500 psi (34 bar)



## 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

- ▶ 1/16", 1/8", 3/16" or 1/4" outside diameter 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 and more! This tubing is manufactured from a premium grade of PFA that is one of the most contaminant-free polymers available.

PFA HP Plus tubing is available in 1/16" and 1/8" OD sizes. This polymer grade has the same unsurpassed purity of PFA HP, with increased ability to withstand repeated flexing and improved resistance to stress cracking when exposed to aggressive fluorosurfactants. Furthermore, tubing made from PFA HP Plus offers even smoother, clearer walls than the standard PFA HP.

## 360 µm OD PFA HP Plus Tubing

Our capillary-sized tubing is manufactured from DuPont PFA HP Plus polymer. This tubing is available in the most commonly-used outside diameter for capillary tubing applications.

To cut this tubing to the length you need, we highly recommend our A-350 Polymer Tubing Cutter (see page 74).

Once this tubing is held in place by connecting fittings, extra care must be taken not to stretch the tubing, as this will likely cause dimensional changes in both the OD and the ID of the tubing.

## Specifications

### 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 (0.10 mm)	All	±0.004 (0.10 mm)

### 360 µm OD PFA HP Plus Tubing Specifications

Tubing OD	OD Tolerance	Tubing ID	ID Tolerance
360 µm	±0.0005" (12.5 µm)	All	±0.0005" (12.5 µm)



**Top Seller** SEE STARRED PRODUCTS

Part No.	ID	Length	Color	Max. Pressure
<b>PFA TUBING, 1/16" OD</b>				
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)
<b>PFA TUBING, 1/8" OD</b>				
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)
<b>PFA HP TUBING, 1/16" OD</b>				
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)
<b>PFA HP TUBING, 1/8" OD</b>				
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)
<b>PFA HP TUBING, 3/16" OD</b>				
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)
<b>PFA HP TUBING, 1/4" OD</b>				
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)
<b>PFA HP PLUS TUBING, 1/16" OD</b>				
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)
<b>PFA HP PLUS TUBING, 1/8" OD</b>				
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)
<b>PFA HP PLUS TUBING, 360 µm OD</b>				
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	0.10 mm (0.004")	5' (1.5 m)	Natural	2,500 psi (172 bar)
1933	0.15 mm (0.006")	5' (1.5 m)	Natural	1,750 psi (121 bar)

## 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.



## Halar® Tubing

- ▶ Excellent chemical resistance
- ▶ Good for radiation sterilization
- ▶ Maximum continuous operating temperature: 50 °C

As another member of the fluoropolymer family, Halar ECTFE (ethylene-chlorotrifluoroethylene) offers excellent chemical resistance coupled with mechanical strength superior to most other fluoropolymer products. Tubing made of Halar also outperforms many other fluoropolymer products in its ability to withstand radiation, making it attractive for in vitro medical applications.



## Specifications

### 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" (0.10 mm)

### Halar Tubing Specifications

Tubing OD	Tubing ID	OD/ID Tolerances
1/16"	All	±0.001" (25 µm)
1/8"	All	±0.003" (75 µm)



**Top Seller** SEE STARRED PRODUCTS

Part No.	ID	Length	Color	Max. Pressure
<b>ETFE TUBING, 1/16" OD</b>				
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)
<b>ETFE TUBING, 1/8" OD</b>				
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)
<b>ETFE TUBING, 1/4" OD</b>				
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)
<b>HALAR TUBING, 1/16" OD</b>				
4010	0.010" (0.25 mm)	5' (1.5 m)	Natural	6,000 psi (414 bar)
4010L	0.010" (0.25 mm)	50' (15 m)	Natural	6,000 psi (414 bar)
4010XL	0.010" (0.25 mm)	100' (30 m)	Natural	6,000 psi (414 bar)
4020	0.020" (0.50 mm)	5' (1.5 m)	Natural	3,500 psi (241 bar)
4020L	0.020" (0.50 mm)	50' (15 m)	Natural	3,500 psi (241 bar)
4020XL	0.020" (0.50 mm)	100' (30 m)	Natural	3,500 psi (241 bar)
4030	0.030" (0.75 mm)	5' (1.5 m)	Natural	3,000 psi (207 bar)
4030L	0.030" (0.75 mm)	50' (15 m)	Natural	3,000 psi (207 bar)
★ 4030XL	0.030" (0.75 mm)	100' (30 m)	Natural	3,000 psi (207 bar)
<b>HALAR TUBING, 1/8" OD</b>				
4000	0.062" (1.55 mm)	5' (1.5 m)	Natural	2,500 psi (172 bar)
4000L	0.062" (1.55 mm)	50' (15 m)	Natural	2,500 psi (172 bar)
4000XL	0.062" (1.55 mm)	100' (30 m)	Natural	2,500 psi (172 bar)

## 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.



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 cutter.



### 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 and A-350 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 Cutter

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.



## Polymer Tubing Cutter for 2.0 mm OD Tubing

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.



**Top Seller** SEE STARRED PRODUCTS

Part No.	Description	Qty.
<b>FUSED SILICA TUBING CUTTERS</b>		
<b>FS-315</b>	Shortix Fused Silica Tubing Cutter	ea.
<b>CAPILLARY POLYMER TUBING CUTTER</b>		
★ <b>A-350</b>	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.
<b>F-262x</b>	Replacement Sleeves for A-350, 0.0155" ID, Green, for cutting 360 µm OD tubing	10-pk
<b>F-264x</b>	Alternative Sleeves for A-350, 0.021" ID, Natural, for cutting 510 µm OD tubing	10-pk
<b>F-267Bx</b>	Alternative Sleeves for A-350, 0.033" ID, Blue, for cutting 1/32" OD tubing	10-pk
★ <b>A-327</b>	Standard Polymer Tubing Cutter* for 1/16" and 1/8" OD tubing	ea.
<b>A-329</b>	Large Bore Polymer Tubing Cutter* for 3/16" – 5/16" OD tubing	ea.
<b>A-328</b>	Replacement Blades for A-350, A-370, A-327 and A-329	5-pk
<b>A-370</b>	Polymer Tubing Cutter for 2.0 mm OD tubing	ea.

\* Includes (1) A-328 5-pack of replacement blades

						
TUBING	TYGON® ST	TYGON LFL	TYGON 2001	TYGON MHLL	TYGON F-4040-A	TYGON MH 2075
Page	78	79	80	81	82	83
<b>Description</b>	<p>The inexpensive all-round tubing for general laboratory applications.</p> <ul style="list-style-type: none"> <li>• Transparent</li> <li>• Resistant to almost all inorganic chemicals</li> <li>• Tasteless</li> <li>• Smooth polished inner wall</li> <li>• Low gas permeability</li> <li>• Non-aging and non-oxidizing</li> <li>• High dielectric constant</li> </ul>	<p>The tubing with the longest service-life of any clear Tygon tubing.</p> <ul style="list-style-type: none"> <li>• Transparent</li> <li>• Broad chemical resistance</li> <li>• Tasteless</li> <li>• Extremely low particulate spallation</li> <li>• Meets USP Class VI and FDA criteria</li> <li>• Non-aging</li> <li>• High dielectric constant</li> </ul>	<p>The transparent, plasticiser-free tubing with superior pump-life. Especially designed for MEK and other aggressive solvents.</p> <ul style="list-style-type: none"> <li>• Plasticizer and oil-free</li> <li>• Smooth inner-bore</li> <li>• Low sorption maintains fluid and tube integrity</li> <li>• Does not impart anything into the pumping medium</li> <li>• No release of hazardous materials when properly incinerated</li> </ul>	<p>Chemically resistant to Acetone, MEK and other aggressive solvents. Long life tubing</p> <ul style="list-style-type: none"> <li>• Plasticiser-free</li> <li>• Smooth inner-bore</li> <li>• Low sorption maintains fluid integrity</li> <li>• Minimal adhesion and diffusion</li> <li>• Suitable for MEK, Acetone and other corrosive solvents</li> <li>• Long life tubing</li> </ul>	<p>The special tubing for hydrocarbons, petroleum products and distillates.</p> <ul style="list-style-type: none"> <li>• Specially formulated to transport hydrocarbons, petroleum products and distillates</li> <li>• Ideal for gasoline, kerosene, heating oils, cutting liquids and coolants based on glycols</li> <li>• High dielectric constant</li> <li>• Low gas permeability</li> </ul>	<p>The environmental-friendly tubing especially designed for solvents.</p> <ul style="list-style-type: none"> <li>• No additives</li> <li>• No plasticizers</li> <li>• Suitable for methyl ethyl ketone (MEK), acetone and other corrosive solvents</li> <li>• Extremely smooth inner surface</li> <li>• Easily disposable</li> </ul>
<b>Specifications</b>						
<b>OD (outside diameter)</b>	0.16 – 0.88" (4.0 – 22.3 mm)	0.19 – 0.75" (4.8 – 19.1 mm)	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)	0.19 – 0.88" (4.8 – 22.3 mm)
<b>ID (inside diameter)</b>	0.03 – 0.61" (0.8 – 15.9 mm)	0.06 – 0.5" (1.6 – 12.7 mm)	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)	0.06 – 0.61" (1.6 – 15.9 mm)
<b>Operating Temp</b>	-50 to 74 °C	-50 to 74 °C	-73 to 57 °C	-70 to 74 °C	-37 to 74 °C	-70 to 52 °C
<b>Certification(s)</b>	FDA 21 CFR 175.300	FDA 21 CFR 175.300; US Pharmacopoeia Class VI	FDA 21 CFR 177.2600; FDA Approved for contact with foods	FDA 21 CFR 177.2600; US Pharmacopoeia Class VI	None	FDA 21 CFR 177.2600; REACH Compliant; US Pharmacopoeia Class VI
<b>Chemical Resistance</b>						
<b>Acids</b>	Good	Good	Excellent	Excellent	Limited	Excellent
<b>Alkaline Solutions</b>	Good	Good	Excellent	Excellent	Not Recommended	Excellent
<b>Solvents</b>	Not Recommended	Not Recommended	Good	Excellent	Not Recommended	Excellent
<b>Pressure</b>	Fair	Good	Good	Not Recommended	Good	Not Recommended
<b>Vacuum</b>	Good	Good	Good	Good	Good	Good
<b>Viscous Media</b>	Excellent	Excellent	Excellent	Good	Excellent	Good
<b>Sterile Media</b>	Limited	Limited	Good	Good	Limited	Good
<b>Gas Permeability (at 25 °C)*</b>						
<b>CO<sub>2</sub></b>	360	563	1140	4900	100	4840
<b>H<sub>2</sub></b>	—	—	—	—	—	—
<b>O<sub>2</sub></b>	80	124	76	1000	22	980
<b>N<sub>2</sub></b>	40	67	190	350	12	350

\* Permeability Coefficient =  $\frac{\text{Amount of Gas (cm}^3\text{)} \times \text{tubing wall thickness (cm)}}{\text{Surface Area of tubing ID (cm}^2\text{)} \times \text{time (sec)} \times \text{pressure drop across tubing wall (cm Hg)}} \times 10^{-10}$

TUBING	TYGON® SI 3350	NORPRENE® A-60-G	PHARMED® ISMAPRENE	SILICON PEROXIDE	FLURAN® F-5500-A	GORE™ STYLE 100	GORE STYLE 100CR
Page	84	85	86	87	88	89	89
<b>Description</b>	<p>The platinum-cured silicone tubing with an ultra-smooth inner surface for sanitary transfer of sensitive fluids.</p> <ul style="list-style-type: none"> <li>• Can be autoclaved with steam</li> <li>• Excellent biological compatibility</li> <li>• Ultra-smooth inner-bore reduces potential for particle entrapment</li> <li>• Lower level of protein binding</li> <li>• Entirely non-toxic, non-hemolytic and non-pyrogenic</li> <li>• Weather, ozone, sunlight and radiation resistant</li> <li>• Resistant to fungus</li> <li>• Odorless</li> </ul>	<p>The high performance tubing for industrial use.</p> <ul style="list-style-type: none"> <li>• Offers longest service-life with good flow consistency</li> <li>• Good resistance to acids and alkaline chemicals</li> <li>• Superior weathering</li> <li>• Abrasion resistant</li> <li>• Non-aging and non-oxidizing</li> <li>• Outstanding flexural fatigue resistance</li> <li>• Low gas permeability versus rubber tubing</li> <li>• Ozone (300 ppm) and UV light resistant</li> <li>• Ideal for use in vacuum system</li> </ul>	<p>The ideal tubing for pharmaceutical and medical applications, and for foodstuffs.</p> <ul style="list-style-type: none"> <li>• Recommended for cell cultures and tissue</li> <li>• Ideal for production filtration, fermentation and bioreactor process lines</li> <li>• Very long service-life</li> <li>• Non-toxic and non-hemolytic</li> <li>• Impermeable to normal light and UV-radiation</li> <li>• Appropriate for medical products and foodstuffs</li> <li>• Low particulate spallation</li> <li>• Can be autoclaved repeatedly</li> <li>• Withstands repeated CIP and SIP cleaning and sterilization</li> <li>• Meets USP class VI, FDA and NSF criteria</li> </ul>	<p>Silicone tubing blended with organic peroxide for biological applications.</p> <ul style="list-style-type: none"> <li>• Can be autoclaved with steam</li> <li>• Excellent biological compatibility</li> <li>• Greater physical compression capability</li> <li>• Not prone to mold</li> <li>• Non-toxic</li> <li>• Waterproof and resistant to ozone, radiation and sunlight</li> <li>• Resistant to fungus</li> <li>• Odorless</li> </ul>	<p>The special tubing for concentrated acids and corrosive solvents.</p> <ul style="list-style-type: none"> <li>• High chemical resistance</li> <li>• Low gas permeability</li> <li>• Wide temperature range</li> </ul>	<p>Long life under pressure, excellent flow stability, no break-in period required, spallation-free, and excellent biocompatibility.</p> <ul style="list-style-type: none"> <li>• Virtually eliminates spallation</li> <li>• Lasts 18 times longer than silicone tubing</li> <li>• Operates at pressures as high as 60 psi (4.2 bar)</li> <li>• Superior burst strength approaching 360 psi (25 bar)</li> <li>• Extremely stable flow rate over time</li> </ul>	<p>With excellent chemical resistance, GORE Style 100CR Peristaltic Pump Tubes handle nearly all aggressive chemicals, including organic solvents such as Methyl ethyl ketone (MEK), Toluene, and Acetone</p> <ul style="list-style-type: none"> <li>• The longest-lasting tubing for increased productivity</li> <li>• The tubing with significantly higher burst resistance</li> <li>• High purity reduces contamination</li> <li>• Lowest solvent swell</li> </ul>
<b>Specifications</b>							
<b>OD (outside diameter)</b>	0.16 – 1.3" (4.0 – 33.4 mm)	0.16 – 0.9" (4.0 – 22.3 mm)	0.16 – 1.3" (4.0 – 33.4 mm)	0.16 – 1.3" (4.0 – 33.4 mm)	0.16 – 0.6" (4.0 – 15.9 mm)	0.17 – 1.37" (4.4 – 34.9 mm)	0.17 – 1.37" (4.4 – 34.9 mm)
<b>ID (inside diameter)</b>	0.03 – 1" (0.8 – 25.4 mm)	0.03 – 0.6" (0.8 – 15.9 mm)	0.03 – 1" (0.8 – 25.4 mm)	0.03 – 1" (0.8 – 25.4 mm)	0.03 – 0.4" (0.8 – 9.5 mm)	0.06 – 1" (1.6 – 25.4 mm)	0.06 – 1" (1.6 – 25.4 mm)
<b>Operating Temp</b>	-60 to +200 °C	-60 to 135 °C	-60 to 135 °C	-51 to 238 °C	-32 to 204 °C	-40 to 150 °C	-80 to 200 °C
<b>Certification(s)</b>	FDA 21 CFR, 177.2600, Also exceeds 3A sanitary standards; US Pharmacopoeia XXIII Cl.VI;	None	FDA 21 CFR 177.2600; US Pharmacopoeia Class VI, NSF listed (Standard 51)	FDA 21 CFR 177.2600; US Pharmacopoeia XXIII Cl.VI	GMP	FDA 21 CFR 177.2600; US Pharmacopoeia Class VI	FDA 21 CFR 177.1550; US Pharmacopoeia Class VI
<b>Chemical Resistance</b>							
<b>Acids</b>	Limited	Excellent	Good	Limited	Excellent	Not Recommended	Excellent
<b>Alkaline Solutions</b>	Limited	Excellent	Good	Good	Excellent	Not Recommended	Excellent
<b>Solvents</b>	Limited	Not Recommended	Not Recommended	Not Recommended	Limited	Not Recommended	Excellent
<b>Pressure</b>	Not Recommended	Not Recommended	Not Recommended	Not Recommended	Not Recommended	Excellent	Good
<b>Vacuum</b>	Good	Good	Excellent	Good	Good	Good	Good
<b>Viscous Media</b>	Fair	Excellent	Good	Fair	Good	Good	Excellent
<b>Sterile Media</b>	Excellent	Not Recommended	Excellent	Excellent	Fair	Excellent	Good
<b>Permeability (at 25 °C)</b>							
<b>CO<sub>2</sub></b>	25147	1200	1200	25147	38	20132	76
<b>H<sub>2</sub></b>	—	—	—	—	—	6579	—
<b>O<sub>2</sub></b>	4715	200	200	4715	14	7961	—
<b>N<sub>2</sub></b>	2284	80	80	2284	5	2763	4.3



## Peristaltic Pumps and 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 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 94 – 100, 112 – 115, and 119 – 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

For a fixed speed pump, such as the MS/CA line on page 108, the only variable is the tubing ID. Therefore, to change the flow rate of a fixed speed pump channel, the operator must use tubing with a different ID.

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.

## Ordering your Pump and Tubing

Follow these steps to complete your Ismatec® peristaltic tubing pump order:

1. Select the pump for your application from pages 91 – 124, 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 63, 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 59, 60 and 61.

## Tygon® ST Tubing

► The Tygon blend of choice for general laboratory applications

Tygon ST offers a small round, inexpensive option for general laboratory applications featuring transparent walls and low gas permeability—and with many different sizes from which to choose—the tubing material option is the option of choice for many laboratory applications. To determine the expected flow rate 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 be replaced frequently. For a longer life version of Tygon ST, consider Tygon LFL. Information for this material can be found on page 79.)

## Specifications

## Tygon ST R-3603/R-3607 Tubing

**Special Properties** The inexpensive all-round tubing for general laboratory applications

**Advantages**

- Transparent
- Resistant to almost all inorganic chemicals
- Tasteless
- Smooth polished inner wall
- Low gas permeability
- Non-aging and non-oxidizing
- High dielectric constant

**Limitations**

- Potential leaching of plasticizers
- Short service-life

**Physical Properties**

- Thermoplastic
- Flexible, firm, transparent
- PVC-based material with plasticizer

**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**

FDA 21 CFR 175.300

**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**

	Volume of gas [cm <sup>3</sup> ] x wall thickness [mm]	x 10 <sup>-10</sup>
CO <sub>2</sub> 360		
O <sub>2</sub> 80	Area of tubing ID [cm <sup>2</sup> ] x time [sec]	
N <sub>2</sub> 40	x pressure drop across tubing wall [cm Hg]	

**Odor and taste**

None

**Toxicity**

Non-toxic

**Tubing**

at 0 bar life 35 hrs  
at 0.7 bar 30 hrs

Part No.	ID	OD	Length
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## STANDARD TUBING

## Tygon ST Tubing, 1/16" (1.6 mm) WT

MF0001A	1/32" (0.8 mm)	5/32" (4 mm)	49.2' (15 m)
MF0028A	1/16" (1.6 mm)	3/16" (4.8 mm)	49.2' (15 m)
SC0691	1/4" (2.4 mm)	7/32" (5.6 mm)	49.2' (15 m)
MF0030	1/8" (3.2 mm)	1/4" (6.4 mm)	49.2' (15 m)
SC0462	5/32" (4 mm)	9/32" (7.2 mm)	49.2' (15 m)
SC0379	3/16" (4.8 mm)	5/16" (8 mm)	49.2' (15 m)
MF0031	1/4" (6.4 mm)	3/8" (9.6 mm)	49.2' (15 m)
MF0032	5/16" (8 mm)	7/16" (11.2 mm)	49.2' (15 m)
SC0383A	3/8" (9.5 mm)	1/2" (12.7 mm)	49.2' (15 m)
SC0384	7/16" (11.1 mm)	9/16" (14.3 mm)	49.2' (15 m)

## Tygon ST Tubing, 1/4" (2.4 mm) WT

MF0029A	3/16" (4.8 mm)	3/8" (9.6 mm)	49.2' (15 m)
MF0033A	1/4" (6.4 mm)	7/16" (11.2 mm)	49.2' (15 m)
SC0502	5/16" (8 mm)	1/2" (12.8 mm)	49.2' (15 m)
SC0503A	3/8" (9.5 mm)	9/16" (14.3 mm)	49.2' (15 m)
SC0504	7/16" (11.1 mm)	5/8" (15.9 mm)	49.2' (15 m)
SC0505	1/2" (12.7 mm)	11/16" (17.5 mm)	49.2' (15 m)
SC0506	5/8" (15.9 mm)	13/16" (20.7 mm)	49.2' (15 m)

Part No.	ID	OD	Length
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## STANDARD TUBING

## Tygon ST Tubing, 1/8" (3.2 mm) WT

SC0694	3/16" (4.8 mm)	7/16" (11.2 mm)	49.2' (15 m)
SC0380	1/4" (6.4 mm)	1/2" (12.8 mm)	49.2' (15 m)
SC0535	5/16" (8 mm)	9/16" (14.4 mm)	49.2' (15 m)
SC0381	3/8" (9.5 mm)	5/8" (15.9 mm)	49.2' (15 m)
SC0534	7/16" (11.1 mm)	11/16" (17.5 mm)	49.2' (15 m)
SC0382	1/2" (12.7 mm)	5/8" (15.9 mm)	49.2' (15 m)
SC0695	5/8" (15.9 mm)	7/8" (22.3 mm)	49.2' (15 m)

## STOPPER TUBING

Part No.	ID	OD	Color	Length
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## Tygon ST 2-Stop Tubing for CA Cassettes, 0.91 mm WT (12-pk)

SC0188	0.005" (0.13 mm)	0.076" (1.95 mm)	orange-black	15.75" (400 mm)
SC0001	0.007" (0.19 mm)	0.079" (2.01 mm)	orange-red	15.75" (400 mm)
SC0002	0.009" (0.25 mm)	0.815" (2.07 mm)	orange-blue	15.75" (400 mm)
SC0003	0.014" (0.38 mm)	0.086" (2.2 mm)	orange-green	15.75" (400 mm)
SC0004	0.017" (0.44 mm)	0.088" (2.26 mm)	green-yellow	15.75" (400 mm)
SC0005	0.02" (0.51 mm)	0.091" (2.33 mm)	orange-yellow	15.75" (400 mm)
SC0006	0.022" (0.57 mm)	0.094" (2.39 mm)	white-yellow	15.75" (400 mm)
SC0007	0.025" (0.64 mm)	0.096" (2.46 mm)	orange-white	15.75" (400 mm)

## Tygon ST 2-Stop Tubing for CA Cassettes, 0.86 mm WT (12-pk)

SC0008	0.029" (0.76 mm)	0.097" (2.48 mm)	black-black	15.75" (400 mm)
SC0009	0.035" (0.89 mm)	0.102" (2.61 mm)	orange-orange	15.75" (400 mm)
SC0010	0.037" (0.95 mm)	0.105" (2.67 mm)	white-black	15.75" (400 mm)
SC0011	0.04" (1.02 mm)	0.108" (2.74 mm)	white-white	15.75" (400 mm)
SC0012	0.436" (1.09 mm)	0.110" (2.81 mm)	white-red	15.75" (400 mm)
SC0013	0.044" (1.14 mm)	0.112" (2.86 mm)	red-red	15.75" (400 mm)
SC0014	0.048" (1.22 mm)	0.115" (2.94 mm)	red-grey	15.75" (400 mm)
SC0015	0.051" (1.3 mm)	0.118" (3.02 mm)	grey-grey	15.75" (400 mm)
SC0016	0.055" (1.42 mm)	0.123" (3.14 mm)	yellow-yellow	15.75" (400 mm)
SC0017	0.059" (1.52 mm)	0.127" (3.24 mm)	yellow-blue	15.75" (400 mm)
SC0018	0.064" (1.65 mm)	0.132" (3.37 mm)	blue-blue	15.75" (400 mm)
SC0019	0.068" (1.75 mm)	0.136" (3.47 mm)	blue-green	15.75" (400 mm)
SC0020	0.072" (1.85 mm)	0.140" (3.57 mm)	green-green	15.75" (400 mm)
SC0021	0.081" (2.06 mm)	0.148" (3.78 mm)	purple-purple	15.75" (400 mm)
SC0022	0.09" (2.29 mm)	0.157" (4.01 mm)	purple-black	15.75" (400 mm)
SC0023	0.1" (2.54 mm)	0.167" (4.26 mm)	purple-orange	15.75" (400 mm)
SC0024	0.109" (2.79 mm)	0.178" (4.51 mm)	purple-white	15.75" (400 mm)
SC0222	0.125" (3.17 mm)	0.192" (4.89 mm)	black-white	15.75" (400 mm)

## Tygon ST 3-Stop Tubing for MS/CA Cassettes, 0.91 mm WT (12-pk)

SC0189	0.005" (0.13 mm)	0.076" (1.95 mm)	orange-black	15.75" (400 mm)
SC0049	0.007" (0.19 mm)	0.079" (2.01 mm)	orange-red	15.75" (400 mm)
SC0050	0.009" (0.25 mm)	0.815" (2.07 mm)	orange-blue	15.75" (400 mm)
SC0051	0.014" (0.38 mm)	0.086" (2.2 mm)	orange-green	15.75" (400 mm)
SC0052A	0.017" (0.44 mm)	0.088" (2.26 mm)	green-yellow	15.75" (400 mm)
SC0053	0.02" (0.51 mm)	0.091" (2.33 mm)	orange-yellow	15.75" (400 mm)
SC0054A	0.022" (0.57 mm)	0.094" (2.39 mm)	white-yellow	15.75" (400 mm)
SC0055	0.025" (0.64 mm)	0.096" (2.46 mm)	orange-white	15.75" (400 mm)

## Tygon ST 3-Stop Tubing for MS/CA Cassettes, 0.86 mm WT (12-pk)

SC0056	0.029" (0.76 mm)	0.097" (2.48 mm)	black-black	15.75" (400 mm)
SC0057	0.035" (0.89 mm)	0.102" (2.61 mm)	orange-orange	15.75" (400 mm)
SC0058	0.037" (0.95 mm)	0.105" (2.67 mm)	white-black	15.75" (400 mm)
SC0059	0.04" (1.02 mm)	0.108" (2.74 mm)	white-white	15.75" (400 mm)
SC0060A	0.436" (1.09 mm)	0.110" (2.81 mm)	white-red	15.75" (400 mm)
SC0061	0.044" (1.14 mm)	0.112" (2.86 mm)	red-red	15.75" (400 mm)
SC0062	0.048" (1.22 mm)	0.115" (2.94 mm)	red-grey	15.75" (400 mm)
SC0063	0.051" (1.3 mm)	0.118" (3.02 mm)	grey-grey	15.75" (400 mm)
SC0064	0.055" (1.42 mm)	0.123" (3.14 mm)	yellow-yellow	15.75" (400 mm)
SC0065	0.059" (1.52 mm)	0.127" (3.24 mm)	yellow-blue	15.75" (400 mm)
SC0066	0.064" (1.65 mm)	0.132" (3.37 mm)	blue-blue	15.75" (400 mm)
SC0067A	0.068" (1.75 mm)	0.136" (3.47 mm)	blue-green	15.75" (400 mm)
SC0068	0.072" (1.85 mm)	0.140" (3.57 mm)	green-green	15.75" (400 mm)
SC0069	0.081" (2.06 mm)	0.148" (3.78 mm)	purple-purple	15.75" (400 mm)
SC0070A	0.09" (2.29 mm)	0.157" (4.01 mm)	purple-black	15.75" (400 mm)
SC0071	0.1" (2.54 mm)	0.167" (4.26 mm)	purple-orange	15.75" (400 mm)
SC0072	0.109" (2.79 mm)	0.178" (4.51 mm)	purple-white	15.75" (400 mm)
SC0224	0.125" (3.17 mm)	0.192" (4.89 mm)	black-white	15.75" (400 mm)

## Tygon® LFL Tubing

- ▶ Longest service life of any clear Tygon tubing material
- ▶ Excellent choice where transparency and good chemical resistance is needed

Tygon 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

## Tygon LFL Long Flex Life Tubing

Special Properties	The tubing with the longest service-life of any clear Tygon tubing.																
Advantages	<ul style="list-style-type: none"><li>• Transparent</li><li>• Broad chemical resistance</li><li>• Tasteless</li><li>• Extremely low particulate spallation</li><li>• Meets USP Class VI and FDA criteria</li><li>• Non-aging</li><li>• High dielectric constant</li></ul>																
Limitations	<ul style="list-style-type: none"><li>• Potential leaching of plasticizers</li><li>• Not recommended for human blood and tissue</li></ul>																
Physical Properties	<ul style="list-style-type: none"><li>• Thermoplastic</li><li>• PVC-based material with plasticizer</li><li>• Flexible, firm, transparent</li></ul>																
Service Temperature Range	-50 °C to +74 °C (-58 °F to + 165 °F)																
Applications	<table><tr><td>Acids</td><td>Good</td></tr><tr><td>Alkaline solutions</td><td>Good</td></tr><tr><td>Solvents</td><td>Not recommended</td></tr><tr><td>Pressure</td><td>Good</td></tr><tr><td>Vacuum</td><td>Good</td></tr><tr><td>Viscous media</td><td>Excellent</td></tr><tr><td>Sterile media</td><td>Limited</td></tr></table>			Acids	Good	Alkaline solutions	Good	Solvents	Not recommended	Pressure	Good	Vacuum	Good	Viscous media	Excellent	Sterile media	Limited
Acids	Good																
Alkaline solutions	Good																
Solvents	Not recommended																
Pressure	Good																
Vacuum	Good																
Viscous media	Excellent																
Sterile media	Limited																
Complies with the Following Standards	FDA 21 CFR 175.300; US Pharmacopoeia 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. <b>Not recommended for sterilization with radiation.</b>																
Permeability	<table><tr><td></td><td>CO<sub>2</sub></td><td>563</td><td rowspan="3"><div>Volume of gas [cm3] x wall thickness [mm]</div><div>Area of tubing ID [cm2] x time [sec]</div><div>x pressure drop across tubing wall [cm Hg]</div></td><td rowspan="3">x 10<sup>-10</sup></td></tr><tr><td></td><td>O<sub>2</sub></td><td>124</td></tr><tr><td></td><td>N<sub>2</sub></td><td>67</td></tr></table>				CO <sub>2</sub>	563	<div>Volume of gas [cm3] x wall thickness [mm]</div> <div>Area of tubing ID [cm2] x time [sec]</div> <div>x pressure drop across tubing wall [cm Hg]</div>	x 10 <sup>-10</sup>		O <sub>2</sub>	124		N <sub>2</sub>	67			
	CO <sub>2</sub>	563	<div>Volume of gas [cm3] x wall thickness [mm]</div> <div>Area of tubing ID [cm2] x time [sec]</div> <div>x pressure drop across tubing wall [cm Hg]</div>	x 10 <sup>-10</sup>													
	O <sub>2</sub>	124															
	N <sub>2</sub>	67															
Odor and taste	None																
Toxicity	Non-toxic																
Tubing	at 0 bar life	800 hrs															
	at 0.7 bar	700 hrs															

## Note

Maximum recommended operating pressure can be found on page 199.

Part No.	ID	OD	Length	
STANDARD TUBING				
Tygon LFL Tubing, 1/16" (1.6 mm) WT				
SC0389	1/16" (1.6 mm)	3/16" (4.8 mm)	24.6' (7.5 m)	
SC0390	1/8" (3.2 mm)	1/4" (6.4 mm)	24.6' (7.5 m)	
SC0391	3/16" (4.8 mm)	5/16" (8 mm)	24.6' (7.5 m)	
SC0392A	1/4" (6.4 mm)	3/8" (9.6 mm)	24.6' (7.5 m)	
SC0394A	5/16" (8 mm)	7/16" (11.2 mm)	24.6' (7.5 m)	
Tygon LFL Tubing, 5/8" (3.2 mm) WT				
SC0393	1/4" (6.4 mm)	1/2" (12.8 mm)	24.6' (7.5 m)	
SC0395	3/8" (9.5 mm)	5/8" (15.9 mm)	24.6' (7.5 m)	
SC0396	1/2" (12.7 mm)	5/8" (19.1 mm)	24.6' (7.5 m)	
STOPPER TUBING				
Part No.	ID	OD	Color	Length
Tygon LFL 2-Stop Tubing for CA Cassettes, 0.91 mm WT (12-pk)				
SC0414	0.01" (0.27 mm)	0.082" (2.09 mm)	orange-blue	15.75" (400 mm)
SC0415	0.014" (0.38 mm)	0.086" (2.2 mm)	orange-green	15.75" (400 mm)
SC0416	0.018" (0.48 mm)	0.09" (2.3 mm)	orange-yellow	15.75" (400 mm)
SC0417	0.025" (0.64 mm)	0.097" (2.46 mm)	orange-white	15.75" (400 mm)
Tygon LFL 2-Stop Tubing for CA Cassettes, 0.84 mm WT (12-pk)				
SC0418	0.029" (0.76 mm)	0.096" (2.44 mm)	black-black	15.75" (400 mm)
SC0419	0.035" (0.89 mm)	0.101" (2.57 mm)	orange-orange	15.75" (400 mm)
SC0420	0.04" (1.02 mm)	0.106" (2.7 mm)	white-white	15.75" (400 mm)
SC0421	0.044" (1.14 mm)	0.111" (2.82 mm)	red-red	15.75" (400 mm)
SC0422	0.049" (1.25 mm)	0.115" (2.93 mm)	grey-grey	15.75" (400 mm)
SC0423	0.053" (1.37 mm)	0.120" (3.05 mm)	yellow-yellow	15.75" (400 mm)
SC0424	0.059" (1.52 mm)	0.127" (3.24 mm)	yellow-blue	15.75" (400 mm)
SC0425	0.062" (1.6 mm)	0.129" (3.28 mm)	blue-blue	15.75" (400 mm)
SC0426	0.072" (1.85 mm)	0.139" (3.53 mm)	green-green	15.75" (400 mm)
SC0427	0.081" (2.06 mm)	0.147" (3.74 mm)	purple-purple	15.75" (400 mm)
SC0428	0.086" (2.2 mm)	0.152" (3.88 mm)	purple-black	15.75" (400 mm)
SC0429	0.103" (2.62 mm)	0.169" (4.3 mm)	purple-orange	15.75" (400 mm)
SC0430	0.109" (2.79 mm)	0.176" (4.47 mm)	purple-white	15.75" (400 mm)
Tygon LFL 3-Stop Tubing for MS/CA Cassettes, 0.91 mm WT (12-pk)				
SC0397	0.01" (0.27 mm)	0.082" (2.09 mm)	orange-blue	15.75" (400 mm)
SC0398	0.014" (0.38 mm)	0.086" (2.2 mm)	orange-green	15.75" (400 mm)
SC0399A	0.019" (0.48 mm)	0.09" (2.3 mm)	orange-yellow	15.75" (400 mm)
SC0400	0.025" (0.64 mm)	0.097" (2.46 mm)	orange-white	15.75" (400 mm)
Tygon LFL 3-Stop Tubing for MS/CA Cassettes, 0.84 mm WT (12-pk)				
SC0401	0.029" (0.76 mm)	0.096" (2.44 mm)	black-black	15.75" (400 mm)
SC0402	0.035" (0.89 mm)	0.101" (2.57 mm)	orange-orange	15.75" (400 mm)
SC0403	0.04" (1.02 mm)	0.106" (2.7 mm)	white-white	15.75" (400 mm)
SC0404	0.044" (1.14 mm)	0.111" (2.82 mm)	red-red	15.75" (400 mm)
SC0405	0.049" (1.25 mm)	0.115" (2.93 mm)	grey-grey	15.75" (400 mm)
SC0406	0.053" (1.37 mm)	0.12" (3.05 mm)	yellow-yellow	15.75" (400 mm)
SC0407	0.059" (1.52 mm)	0.127" (3.24 mm)	yellow-blue	15.75" (400 mm)
SC0408	0.062" (1.6 mm)	0.129" (3.28 mm)	blue-blue	15.75" (400 mm)
SC0409A	0.072" (1.85 mm)	0.139" (3.53 mm)	green-green	15.75" (400 mm)
SC0410	0.081" (2.06 mm)	0.147" (3.74 mm)	purple-purple	15.75" (400 mm)
SC0411	0.086" (2.2 mm)	0.152" (3.88 mm)	purple-black	15.75" (400 mm)
SC0412A	0.103" (2.62 mm)	0.169" (4.3 mm)	purple-orange	15.75" (400 mm)
SC0413	0.109" (2.79 mm)	0.176" (4.47 mm)	purple-white	15.75" (400 mm)

## 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).



### Note

Maximum recommended operating pressure can be found on page 199.

## Specifications

Special Properties	The transparent, plasticiser-free tubing with superior pump-life. Especially designed for MEK and other aggressive solvents.															
Advantages	<ul style="list-style-type: none"><li>• Plasticizer and oil-free</li><li>• Smooth inner-bore</li><li>• Low sorption maintains fluid and tube integrity</li><li>• Does not impart anything into the pumping medium</li><li>• No release of hazardous materials when properly incinerated</li></ul>															
Limitations	None															
Physical Properties	Polyolefin															
Service Temperature Range	-73 °C to +57 °C (-100 °F to +135 °F)															
Applications	<table><tr><td>Acids</td><td>Excellent</td></tr><tr><td>Alkaline solutions</td><td>Excellent</td></tr><tr><td>Solvents</td><td>Good / Excellent</td></tr></table>			Acids	Excellent	Alkaline solutions	Excellent	Solvents	Good / Excellent							
Acids	Excellent															
Alkaline solutions	Excellent															
Solvents	Good / Excellent															
Complies with the Following Standards	FDA certification for food contact															
Sterilization	Autoclaveable 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	<table><tr><td></td><td></td><td>Volume of gas [cm3] x wall thickness [mm]</td><td rowspan="4">x 10<sup>-10</sup></td></tr><tr><td>CO<sub>2</sub></td><td>1140</td><td></td></tr><tr><td>O<sub>2</sub></td><td>76</td><td>Area of tubing ID [cm2] x time [sec]</td></tr><tr><td>N<sub>2</sub></td><td>190</td><td>x pressure drop across tubing wall [cm Hg]</td></tr></table>					Volume of gas [cm3] x wall thickness [mm]	x 10 <sup>-10</sup>	CO <sub>2</sub>	1140		O <sub>2</sub>	76	Area of tubing ID [cm2] x time [sec]	N <sub>2</sub>	190	x pressure drop across tubing wall [cm Hg]
		Volume of gas [cm3] x wall thickness [mm]	x 10 <sup>-10</sup>													
CO <sub>2</sub>	1140															
O <sub>2</sub>	76	Area of tubing ID [cm2] x time [sec]														
N <sub>2</sub>	190	x pressure drop across tubing wall [cm Hg]														
Odor and taste	No odor or taste															
Toxicity	-															
Tubing	<table><tr><td>at 0 bar life</td><td>75 hrs</td></tr><tr><td>at 0.7 bar</td><td>-</td></tr></table>			at 0 bar life	75 hrs	at 0.7 bar	-									
at 0 bar life	75 hrs															
at 0.7 bar	-															

## Application Note

Smooth inner surface, low sorption maintains fluid and tube integrity.

- Transparent for visible flow monitoring
- Coating of tablets
- Laboratory analysis and dispensing
- Chemical-based flow in waste water treatment

Part No.	ID	OD	Length		
STANDARD TUBING					
Tygon 2001 Tubing, 1.6 mm WT					
SC0830	0.062" (1.6 mm)	0.189" (4.8 mm)	49.2' (15 m)		
SC0831	0.126" (3.2 mm)	0.252" (6.4 mm)	49.2' (15 m)		
SC0832	0.189" (4.8 mm)	0.315" (8 mm)	49.2' (15 m)		
SC0833	0.252" (6.4 mm)	0.378" (9.6 mm)	49.2' (15 m)		
SC0834	0.315" (8 mm)	0.441" (11.2 mm)	49.2' (15 m)		
SC0835	0.374" (9.5 mm)	0.50" (12.7 mm)	49.2' (15 m)		
Tygon 2001 Tubing, 3.2 mm WT					
SC0845	0.50" (12.7 mm)	0.752" (19.1 mm)	49.2' (15 m)		
SC0846	0.626" (15.9 mm)	0.878" (22.3 mm)	49.2' (15 m)		
STOPPER TUBING					
Part No.	ID	OD	Color	Length	Qty.
Tygon 2001 2-Stop Tubing for CA Cassettes, 0.9 mm WT					
SC0814	0.014" (0.38 mm)	0.085" (2.18 mm)	orange-green	15" (381 mm)	6-pk
SC0816	0.025" (0.64 mm)	0.096" (2.44 mm)	orange-white	15" (381 mm)	6-pk
Tygon 2001 2-Stop Tubing for CA Cassettes, 0.85 mm WT					
SC0818	0.04" (1.02 mm)	0.107" (2.72 mm)	white-white	15" (381 mm)	6-pk
SC0820	0.059" (1.52 mm)	0.127" (3.22 mm)	yellow-blue	15" (381 mm)	6-pk
SC0822	0.081" (2.06 mm)	0.148" (3.76 mm)	purple-purple	15" (381 mm)	6-pk
SC0824	0.109" (2.79 mm)	0.177" (4.49 mm)	purple-white	15" (381 mm)	6-pk
Tygon 2001 2-Stop Tubing for MS/CA Cassettes, 0.9 mm WT					
SC0802	0.015" (0.38 mm)	0.085" (2.18 mm)	orange-green	15" (381 mm)	6-pk
SC0804	0.025" (0.64 mm)	0.096" (2.44 mm)	orange-white	15" (381 mm)	6-pk
Tygon 2001 2-Stop Tubing for MS/CA Cassettes, 0.85 mm WT					
SC0806	0.04" (1.02 mm)	0.107" (2.72 mm)	white-white	15" (381 mm)	6-pk
SC0808	0.059" (1.52 mm)	0.127" (3.22 mm)	yellow-blue	15" (381 mm)	6-pk
SC0810	0.081" (2.06 mm)	0.148" (3.76 mm)	purple-purple	15" (381 mm)	6-pk
SC0812A	0.109" (2.79 mm)	0.177" (4.49 mm)	purple-white	15" (381 mm)	6-pk

## 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

<b>Special Properties</b>	<ul style="list-style-type: none"> <li>• The tubing can be used with acetone and MEK</li> <li>• Long life tubing</li> </ul>
<b>Advantages</b>	<ul style="list-style-type: none"> <li>• Plasticiser-free</li> <li>• Smooth inner-bore</li> <li>• Low sorption maintains fluid integrity</li> <li>• Minimal adhesion and diffusion</li> <li>• Suitable for MEK, Acetone and other corrosive solvents</li> <li>• Long life tubing</li> </ul>
<b>Limitations</b>	<ul style="list-style-type: none"> <li>• Cannot be repeatedly sterilized</li> <li>• Only available as stopper tubing</li> </ul>
<b>Physical Properties</b>	<ul style="list-style-type: none"> <li>• Special thermoplastic of high purity</li> <li>• Without additives</li> <li>• Without plasticizer</li> <li>• Environmental-friendly disposal</li> <li>• Flexible, firm, opaque</li> </ul>
<b>Service Temperature Range</b>	-70 °C to +74 °C (-94 °F to + 165 °F)
<b>Applications</b>	
Acids	Excellent
Alkaline solutions	Excellent
Solvents	Excellent
Pressure	Not recommended
Vacuum	Good
Viscous media	Good
Sterile media	Good
<b>Complies with the Following Standards</b>	FDA 21 CFR, Part 177.2600; USP Pharmacopoeia Class VI FDA certification for food contact
<b>Sterilization</b>	Autoclaveable 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 <b>Caution: Can not be repeatedly sterilized.</b>
<b>Permeability</b>	
CO <sub>2</sub>	—
O <sub>2</sub>	—
N <sub>2</sub>	—
<b>Odor and taste</b>	No odor or taste
<b>Toxicity</b>	—
<b>Tubing</b>	at 0 bar life 800+ hrs at 0.7 bar 800+ hrs

## Application Note

Its exceptionally smooth inner surface inhibits particulate buildup and reduces the potential for contamination.

- Battery acid filling
- Addition of anti-foam
- Hazardous material handling
- Applications with acids, bases, ketones, salts and alcohols

## Note

Maximum recommended operating pressure can be found on page 199.

Part No.	ID	OD	Color	Length	Qty.
<b>TYGON MHLL 2-STOP TUBING FOR CA CASSETTES, 0.92 mm WT</b>					
SC0716	0.015" (0.38 mm)	0.087" (2.22 mm)	orange-green	15" (381 mm)	6-pk
SC0717	0.029" (0.76 mm)	0.102" (2.6 mm)	black-black	15" (381 mm)	6-pk
SC0718	0.045" (1.14 mm)	0.117" (2.98 mm)	red-red	15" (381 mm)	6-pk
SC0719	0.06" (1.52 mm)	0.132" (3.36 mm)	yellow-blue	15" (381 mm)	6-pk
SC0720	0.081" (2.06 mm)	0.153" (3.9 mm)	purple-purple	15" (381 mm)	6-pk
SC0721	0.11" (2.79 mm)	0.182" (4.63 mm)	purple-white	15" (381 mm)	6-pk
<b>TYGON MHLL 2-STOP TUBING FOR MS/CA CASSETTES, 0.92 mm WT</b>					
SC0710	0.015" (0.38 mm)	0.087" (2.22 mm)	orange-green	11.8" (300 mm)	6-pk
SC0711	0.029" (0.76 mm)	0.102" (2.6 mm)	black-black	11.8" (300 mm)	6-pk
SC0712	0.045" (1.14 mm)	0.117" (2.98 mm)	red-red	11.8" (300 mm)	6-pk
SC0713	0.06" (1.52 mm)	0.132" (3.36 mm)	yellow-blue	11.8" (300 mm)	6-pk
SC0714	0.081" (2.06 mm)	0.153" (3.9 mm)	purple-purple	11.8" (300 mm)	6-pk
SC0715	0.11" (2.79 mm)	0.182" (4.63 mm)	purple-white	11.8" (300 mm)	6-pk



## Tygon® 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.



### Note

Maximum recommended operating pressure can be found on page 200.

### Specifications

Special Properties	The special tubing for hydrocarbons, petroleum products and distillates.																					
Advantages	<ul style="list-style-type: none"><li>• Specially formulated to transport hydrocarbons, petroleum products and distillates</li><li>• Ideal for gasoline, kerosene, heating oils, cutting liquids and coolants based on glycols</li><li>• High dielectric constant</li><li>• Low gas permeability</li></ul>																					
Limitations	<ul style="list-style-type: none"><li>• Not recommended for strong acids and alkalies, foodstuffs, beverages and medicines</li><li>• Potential leaching of plasticizers</li></ul>																					
Physical Properties	<ul style="list-style-type: none"><li>• Thermoplastic</li><li>• PVC-based material with plasticizer</li><li>• Flexible, firm, translucent, yellow</li></ul>																					
Service Temperature Range	-37 °C to +74 °C (-35 °F to +165 °F)																					
Applications	<table><tr><td>Acids</td><td>Limited</td></tr><tr><td>Alkaline solutions</td><td>Not recommended</td></tr><tr><td>Solvents</td><td>Not recommended</td></tr><tr><td>Pressure</td><td>Good</td></tr><tr><td>Vacuum</td><td>Good</td></tr><tr><td>Viscous media</td><td>Excellent</td></tr><tr><td>Sterile media</td><td>Limited</td></tr></table>					Acids	Limited	Alkaline solutions	Not recommended	Solvents	Not recommended	Pressure	Good	Vacuum	Good	Viscous media	Excellent	Sterile media	Limited			
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	<table><tr><td></td><td></td><td colspan="2">Volume of gas [cm3] x wall thickness (mm)</td><td rowspan="4">x 10<sup>-10</sup></td></tr><tr><td>CO<sub>2</sub></td><td>100</td><td></td><td></td></tr><tr><td>O<sub>2</sub></td><td>22</td><td colspan="2">Area of tubing ID [cm2] x time [sec]</td></tr><tr><td>N<sub>2</sub></td><td>12</td><td colspan="2">x pressure drop across tubing wall [cm Hg]</td></tr></table>							Volume of gas [cm3] x wall thickness (mm)		x 10 <sup>-10</sup>	CO <sub>2</sub>	100			O <sub>2</sub>	22	Area of tubing ID [cm2] x time [sec]		N <sub>2</sub>	12	x pressure drop across tubing wall [cm Hg]	
		Volume of gas [cm3] x wall thickness (mm)		x 10 <sup>-10</sup>																		
CO <sub>2</sub>	100																					
O <sub>2</sub>	22	Area of tubing ID [cm2] x time [sec]																				
N <sub>2</sub>	12	x pressure drop across tubing wall [cm Hg]																				
Odor and taste	Must not be used for foodstuffs, beverages and drugs.																					
Toxicity	Must not be used for foodstuffs, beverages and drugs.																					
Tubing	at 0 bar life	60 hrs																				
	at 0.7 bar	60 hrs																				

Product	ID	OD	Length		
STANDARD TUBING					
Tygon F-4040-A Tubing, 1.6 mm WT					
MF0002	0.063" (1.6 mm)	0.189" (4.8 mm)	49.2' (15 m)		
MF0004	0.126" (3.2 mm)	0.252" (6.4 mm)	49.2' (15 m)		
MF0003	0.189" (4.8 mm)	0.315" (8 mm)	49.2' (15 m)		
MF0005	0.252" (6.4 mm)	0.378" (9.6 mm)	49.2' (15 m)		
MF0006	0.315" (8 mm)	0.441" (11.2 mm)	49.2' (15 m)		
Tygon F-4040-A Tubing, 2.4 mm WT					
MF0476	0.189" (4.8 mm)	0.378" (9.6 mm)	49.2' (15 m)		
MF0007	0.252" (6.4 mm)	0.441" (11.2 mm)	49.2' (15 m)		
Tygon F-4040-A Tubing, 3.2 mm WT					
MF0008	0.374" (9.5 mm)	0.626" (15.9 mm)	49.2' (15 m)		
SC0725	0.50" (12.7 mm)	0.752" (19.1 mm)	49.2' (15 m)		
STOPPER TUBING					
Product	ID	OD	Color	Length	Qty.
Tygon F-4040-A 2-Stop Tubing for CA Cassettes, 0.91 mm WT					
SC0156	0.01" (0.25 mm)	0.082" (2.07 mm)	orange-blue	15.75" (400 mm)	12-pk
SC0157	0.015" (0.38 mm)	0.086" (2.2 mm)	orange-green	15.75" (400 mm)	12-pk
SC0158	0.02" (0.51 mm)	0.09" (2.3 mm)	orange-yellow	15.75" (400 mm)	12-pk
SC0159	0.025" (0.64 mm)	0.097" (2.46 mm)	orange-white	15.75" (400 mm)	12-pk
Tygon F-4040-A 2-Stop Tubing for CA Cassettes, 0.84 mm WT					
SC0160	0.03" (0.76 mm)	0.096" (2.44 mm)	black-black	15.75" (400 mm)	12-pk
SC0161	0.035" (0.89 mm)	0.101" (2.57 mm)	orange-orange	15.75" (400 mm)	12-pk
SC0162	0.04" (1.02 mm)	0.106" (2.7 mm)	white-white	15.75" (400 mm)	12-pk
SC0163	0.045" (1.14 mm)	0.111" (2.82 mm)	red-red	15.75" (400 mm)	12-pk
SC0164	0.051" (1.3 mm)	0.115" (2.93 mm)	grey-grey	15.75" (400 mm)	12-pk
SC0165	0.056" (1.42 mm)	0.12" (3.05 mm)	yellow-yellow	15.75" (400 mm)	12-pk
SC0166	0.06" (1.52 mm)	0.127" (3.24 mm)	yellow-blue	15.75" (400 mm)	12-pk
SC0167	0.065" (1.65 mm)	0.129" (3.28 mm)	blue-blue	15.75" (400 mm)	12-pk
SC0168	0.073" (1.85 mm)	0.139" (3.53 mm)	green-green	15.75" (400 mm)	12-pk
SC0169	0.081" (2.06 mm)	0.147" (3.74 mm)	purple-purple	15.75" (400 mm)	12-pk
SC0170	0.09" (2.29 mm)	0.152" (3.88 mm)	purple-black	15.75" (400 mm)	12-pk
SC0171	0.10" (2.54 mm)	0.169" (4.3 mm)	purple-orange	15.75" (400 mm)	12-pk
SC0172	0.11" (2.79 mm)	0.176" (4.47 mm)	purple-white	15.75" (400 mm)	12-pk
Tygon F-4040-A 3-Stop Tubing for MS/CA Cassettes, 0.91 mm WT					
SC0286	0.01" (0.25 mm)	0.082" (2.07 mm)	orange-blue	15.75" (400 mm)	12-pk
SC0287	0.015" (0.38 mm)	0.086" (2.2 mm)	orange-green	15.75" (400 mm)	12-pk
SC0288A	0.02" (0.51 mm)	0.09" (2.3 mm)	orange-yellow	15.75" (400 mm)	12-pk
SC0289A	0.025" (0.64 mm)	0.097" (2.46 mm)	orange-white	15.75" (400 mm)	12-pk
Tygon F-4040-A 3-Stop Tubing for MS/CA Cassettes, 0.84 mm WT					
SC0290A	0.03" (0.76 mm)	0.096" (2.44 mm)	black-black	15.75" (400 mm)	12-pk
SC0291	0.035" (0.89 mm)	0.101" (2.57 mm)	orange-orange	15.75" (400 mm)	12-pk
SC0292	0.04" (1.02 mm)	0.106" (2.7 mm)	white-white	15.75" (400 mm)	12-pk
SC0293	0.045" (1.14 mm)	0.111" (2.82 mm)	red-red	15.75" (400 mm)	12-pk
SC0294	0.051" (1.3 mm)	0.115" (2.93 mm)	grey-grey	15.75" (400 mm)	12-pk
SC0295	0.056" (1.42 mm)	0.12" (3.05 mm)	yellow-yellow	15.75" (400 mm)	12-pk
SC0296	0.06" (1.52 mm)	0.127" (3.24 mm)	yellow-blue	15.75" (400 mm)	12-pk
SC0297	0.065" (1.65 mm)	0.129" (3.28 mm)	blue-blue	15.75" (400 mm)	12-pk
SC0298A	0.073" (1.85 mm)	0.139" (3.53 mm)	green-green	15.75" (400 mm)	12-pk
SC0299	0.081" (2.06 mm)	0.147" (3.74 mm)	purple-purple	15.75" (400 mm)	12-pk
SC0300A	0.09" (2.29 mm)	0.152" (3.88 mm)	purple-black	15.75" (400 mm)	12-pk
SC0301	0.10" (2.54 mm)	0.169" (4.3 mm)	purple-orange	15.75" (400 mm)	12-pk
SC0302	0.11" (2.79 mm)	0.176" (4.47 mm)	purple-white	15.75" (400 mm)	12-pk

## Tygon® MH Tubing

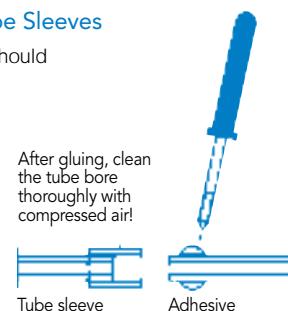
- This tubing is environmentally friendly as it contains no plasticizers or additives; the disposal of the tubing is easily handled
- Suitable for corrosive solvents yet has an extremely smooth inner surface



## Note

## How to Make Connections with Tube Sleeves

- The tubing material of the tube sleeves should be equal to the tubes to be connected.
- For the tube sleeve choose an inner diameter that equals the outer diameter of the tubes to be connected.
- If possible, clean the tube bore thoroughly with compressed air.
- For information on ordering adhesives, please go to [www.idex-hs.com](http://www.idex-hs.com) or contact IDEX Health & Science technical support.



## Specifications

Special Properties	The environmental-friendly tubing especially designed for solvents			
Advantages	<ul style="list-style-type: none"><li>• Suitable for methyl ethyl ketone (MEK), acetone and other corrosive solvents</li><li>• Easily disposable</li></ul>			
Limitations	<ul style="list-style-type: none"><li>• No additives</li><li>• No plasticizers</li></ul>			
Physical Properties	<ul style="list-style-type: none"><li>• Extremely smooth inner surface</li></ul>			
Service Temperature Range	-70 °C to +52 °C (-94 °F to +126 °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 177.2600; US Pharmacopoeia, Class VI			
Sterilization	Radiation, ethylene oxide and steam			
Permeability				
	CO <sub>2</sub>	4840	Volume of gas [cm3] x wall thickness [mm]	x 10 <sup>-10</sup>
	O <sub>2</sub>	980	Area of tubing ID [cm2] x time [sec]	
	N <sub>2</sub>	350	x pressure drop across tubing wall [cm Hg]	
Odor and taste	MH 2075 is FDA approved for food contact			
Toxicity	MH 2075 is FDA approved for food contact			
Tubing	at 0 bar life	60 hrs		
	at 0.7 bar	60 hrs		

Part No.	ID	OD	Length
<b>STANDARD TUBING</b>			
<b>Tygon MH Tubing, 1.6 mm WT</b>			
SC0540	0.063" (1.6 mm)	0.189" (4.8 mm)	49.2' (15 m)
SC0541	0.126" (3.2 mm)	0.252" (6.4 mm)	49.2' (15 m)
SC0542	0.189" (4.8 mm)	0.315" (8 mm)	49.2' (15 m)
SC0543	0.252" (6.4 mm)	0.378" (9.6 mm)	49.2' (15 m)
SC0544	0.315" (8 mm)	0.441" (11.2 mm)	49.2' (15 m)
SC0545A	0.374" (9.5 mm)	0.5" (12.7 mm)	49.2' (15 m)
<b>Tygon MH Tubing, 3.2 mm WT</b>			
SC0546	0.50" (12.7 mm)	0.752" (19.1 mm)	49.2' (15 m)
SC0547	0.626" (15.9 mm)	0.878" (22.3 mm)	49.2' (15 m)

## Tygon® SI Tubing

- Platinum-cured silicone tubing
- Features ultra-smooth inner-bore
- Biocompatible for life science applications

Tygon 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.



### Note

Maximum recommended operating pressure can be found on page 200.

### Specifications

#### Tygon SI Silicone 3350 (Platinum) Tubing

Special Properties	The platinum-cured silicone tubing with an ultra-smooth inner surface for sanitary transfer of sensitive fluids.																
Advantages	<ul style="list-style-type: none"><li>• Steam autoclavability</li><li>• Excellent biological compatibility</li><li>• Ultra-smooth inner-bore reduces potential for particle entrapment</li><li>• Lower level of protein binding</li><li>• Entirely non-toxic, non-hemolytic and non-pyrogenic</li><li>• Weather, ozone, sunlight and radiation resistant</li><li>• Resistant to fungus</li><li>• Odorless</li></ul>																
Limitations	<ul style="list-style-type: none"><li>• Not suitable for concentrated solvents, oils, acids or diluted sodium hydroxide</li><li>• Relatively high gas permeability</li></ul>																
Physical Properties	<ul style="list-style-type: none"><li>• Thermal set rubber</li><li>• Siloxane polymers and amorphous silica</li><li>• Soft, translucent, clear to light amber</li><li>• Excellent compression strength</li></ul>																
Service Temperature Range	-60 °C to +200 °C (-75 °F to +392 °F)																
Applications	<table><tr><td>Acids</td><td>Limited</td></tr><tr><td>Alkaline solutions</td><td>Limited</td></tr><tr><td>Solvents</td><td>Limited</td></tr><tr><td>Pressure</td><td>Not recommended</td></tr><tr><td>Vacuum</td><td>Good</td></tr><tr><td>Viscous media</td><td>Fair</td></tr><tr><td>Sterile media</td><td>Excellent</td></tr></table>			Acids	Limited	Alkaline solutions	Limited	Solvents	Limited	Pressure	Not recommended	Vacuum	Good	Viscous media	Fair	Sterile media	Excellent
Acids	Limited																
Alkaline solutions	Limited																
Solvents	Limited																
Pressure	Not recommended																
Vacuum	Good																
Viscous media	Fair																
Sterile media	Excellent																
Complies with the Following Standards	US Pharmacopoeia 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	<table><tr><td></td><td>CO<sub>2</sub></td><td>25147</td><td rowspan="3"><div>Volume of gas [cm3] x wall thickness [mm]</div><div>Area of tubing ID [cm2] x time [sec]</div><div>x pressure drop across tubing wall [cm Hg]</div></td><td rowspan="3">x 10<sup>10</sup></td></tr><tr><td></td><td>O<sub>2</sub></td><td>4715</td></tr><tr><td></td><td>N<sub>2</sub></td><td>2284</td></tr></table>				CO <sub>2</sub>	25147	<div>Volume of gas [cm3] x wall thickness [mm]</div> <div>Area of tubing ID [cm2] x time [sec]</div> <div>x pressure drop across tubing wall [cm Hg]</div>	x 10 <sup>10</sup>		O <sub>2</sub>	4715		N <sub>2</sub>	2284			
	CO <sub>2</sub>	25147	<div>Volume of gas [cm3] x wall thickness [mm]</div> <div>Area of tubing ID [cm2] x time [sec]</div> <div>x pressure drop across tubing wall [cm Hg]</div>	x 10 <sup>10</sup>													
	O <sub>2</sub>	4715															
	N <sub>2</sub>	2284															
Odor and taste	None																
Toxicity	Non-toxic																
Tubing	<table><tr><td>at 0 bar life</td><td>200 hrs</td></tr><tr><td>at 0.7 bar</td><td>100 hrs</td></tr></table>				at 0 bar life	200 hrs	at 0.7 bar	100 hrs									
at 0 bar life	200 hrs																
at 0.7 bar	100 hrs																

Part No.	ID	OD	Length		
STANDARD TUBING					
Tygon SI Tubing, 1.6 mm WT					
MF0291	0.032" (0.8 mm)	0.158" (4 mm)	49.2' (15 m)		
SC0580B	0.063" (1.6 mm)	0.189" (4.8 mm)	49.2' (15 m)		
SC0590B	0.095" (2.4 mm)	0.221" (5.6 mm)	49.2' (15 m)		
SC0581B	0.126" (3.2 mm)	0.252" (6.4 mm)	49.2' (15 m)		
SC0582B	0.189" (4.8 mm)	0.315" (8 mm)	49.2' (15 m)		
SC0584B	0.252" (6.4 mm)	0.378" (9.6 mm)	49.2' (15 m)		
SC0587B	0.315" (8 mm)	0.441" (11.2 mm)	49.2' (15 m)		
SC0387B	0.374" (9.5 mm)	0.5" (12.7 mm)	49.2' (15 m)		
SC0697B	0.437" (11.1 mm)	0.563" (14.3 mm)	49.2' (15 m)		
Tygon SI Tubing, 2.4 mm WT					
SC0583B	0.189" (4.8 mm)	0.378" (9.6 mm)	49.2' (15 m)		
SC0585B	0.252" (6.4 mm)	0.441" (11.2 mm)	49.2' (15 m)		
SC0515B	0.315" (8 mm)	0.504" (12.8 mm)	49.2' (15 m)		
SC0516B	0.374" (9.5 mm)	0.563" (14.3 mm)	49.2' (15 m)		
SC0517B	0.437" (11.1 mm)	0.626" (15.9 mm)	49.2' (15 m)		
SC0518B	0.50" (12.7 mm)	0.689" (17.5 mm)	49.2' (15 m)		
SC0519B	0.626" (15.9 mm)	0.815" (20.7 mm)	49.2' (15 m)		
Tygon SI Tubing, 3.2 mm WT					
SC0586B	0.025" (0.64 mm)	0.504" (12.8 mm)	49.2' (15 m)		
SC0588B	0.374" (9.5 mm)	0.626" (15.9 mm)	49.2' (15 m)		
SC0589	0.50" (12.7 mm)	0.752" (19.1 mm)	49.2' (15 m)		
SC0532B	0.626" (15.9 mm)	0.878" (22.3 mm)	49.2' (15 m)		
Tygon SI Tubing, 6 mm WT					
MF0359	0.374" (9.5 mm)	0.847" (21.5 mm)	49.2' (15 m)		
MF0361	0.748" (19 mm)	1.22" (31 mm)	49.2' (15 m)		
Tygon SI Tubing, 5 mm WT					
MF0360	0.50" (12.7 mm)	0.894" (22.7 mm)	49.2' (15 m)		
Tygon SI Tubing, 4 mm WT					
MF0362	1.0" (25.4 mm)	1.315" (33.4 mm)	49.2' (15 m)		
STOPPER TUBING					
Part No.	ID	OD	Color	Length	Qty.
Tygon SI 2-Stop Tubing for CA Cassettes, 0.91 mm WT					
SC0620A	0.02" (0.51 mm)	0.09" (2.3 mm)	orange-yellow	15.75" (400 mm)	6-pk
SC0621	0.025" (0.64 mm)	0.097" (2.46 mm)	orange-white	15.75" (400 mm)	6-pk
Tygon SI 2-Stop Tubing for CA Cassettes, 0.84 mm WT					
SC0622	0.03" (0.76 mm)	0.096" (2.44 mm)	black-black	15.75" (400 mm)	6-pk
SC0623	0.035" (0.89 mm)	0.101" (2.57 mm)	orange-orange	15.75" (400 mm)	6-pk
SC0624	0.04" (1.02 mm)	0.106" (2.7 mm)	white-white	15.75" (400 mm)	6-pk
SC0625A	0.045" (1.14 mm)	0.111" (2.82 mm)	red-red	15.75" (400 mm)	6-pk
SC0626	0.051" (1.3 mm)	0.115" (2.93 mm)	grey-grey	15.75" (400 mm)	6-pk
SC0627A	0.056" (1.42 mm)	0.12" (3.05 mm)	yellow-yellow	15.75" (400 mm)	6-pk
SC0628	0.06" (1.52 mm)	0.127" (3.24 mm)	yellow-blue	15.75" (400 mm)	6-pk
SC0629A	0.065" (1.65 mm)	0.129" (3.28 mm)	blue-blue	15.75" (400 mm)	6-pk
SC0630	0.073" (1.85 mm)	0.139" (3.53 mm)	blue-green	15.75" (400 mm)	6-pk
SC0631	0.081" (2.06 mm)	0.147" (3.74 mm)	purple-purple	15.75" (400 mm)	6-pk
SC0632	0.09" (2.29 mm)	0.152" (3.88 mm)	purple-black	15.75" (400 mm)	6-pk
SC0633	0.10" (2.54 mm)	0.169" (4.3 mm)	purple-orange	15.75" (400 mm)	6-pk
SC0634	0.11 (2.79 mm)	0.176" (4.47 mm)	purple-white	15.75" (400 mm)	6-pk
Tygon SI 3-Stop Tubing for MS/CA Cassettes, 0.91 mm WT					
SC0600A	0.02" (0.51 mm)	0.09" (2.3 mm)	orange-yellow	15.75" (400 mm)	6-pk
SC0601A	0.025" (0.64 mm)	0.097" (2.46 mm)	orange-white	15.75" (400 mm)	6-pk
Tygon SI 3-Stop Tubing for MS/CA Cassettes, 0.84 mm WT					
SC0602A	0.03" (0.76 mm)	0.096" (2.44 mm)	black-black	15.75" (400 mm)	6-pk
SC0603	0.035" (0.89 mm)	0.101" (2.57 mm)	orange-orange	15.75" (400 mm)	6-pk
SC0604A	0.04" (1.02 mm)	0.106" (2.7 mm)	white-white	15.75" (400 mm)	6-pk
SC0605	0.045" (1.14 mm)	0.111" (2.82 mm)	red-red	15.75" (400 mm)	6-pk
SC0606	0.051" (1.3 mm)	0.115" (2.93 mm)	grey-grey	15.75" (400 mm)	6-pk
SC0607A	0.056" (1.42 mm)	0.12" (3.05 mm)	yellow-yellow	15.75" (400 mm)	6-pk
SC0608	0.06" (1.52 mm)	0.127" (3.24 mm)	yellow-blue	15.75" (400 mm)	6-pk
SC0609A	0.065" (1.65 mm)	0.129" (3.28 mm)	blue-blue	15.75" (400 mm)	6-pk
SC0610	0.073" (1.85 mm)	0.139" (3.53 mm)	blue-green	15.75" (400 mm)	6-pk
SC0611	0.081" (2.06 mm)	0.147" (3.74 mm)	purple-purple	15.75" (400 mm)	6-pk
SC0612A	0.09" (2.29 mm)	0.152" (3.88 mm)	purple-black	15.75" (400 mm)	6-pk
SC0613A	0.10" (2.54 mm)	0.169" (4.3 mm)	purple-orange	15.75" (400 mm)	6-pk
SC0614	0.11 (2.79 mm)	0.176" (4.47 mm)	purple-white	15.75" (400 mm)	6-pk

## Norprene® 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.



### Note

Maximum recommended operating pressure can be found on page 200.

### Specifications

#### Norprene A-60-G Tubing

Special Properties	The high performance tubing for industrial use.																
Advantages	<ul style="list-style-type: none"><li>• Offers longest service-life with good flow consistency</li><li>• Good resistance to acids and alkaline chemicals</li><li>• Superior weathering</li><li>• Abrasion resistant</li><li>• Non-aging and non-oxidizing</li><li>• Outstanding flexural fatigue resistance</li><li>• Low gas permeability versus rubber tubing</li><li>• Ozone (300 pphm) and UV light resistant</li><li>• Ideal for use in vacuum system</li></ul>																
Limitations	<ul style="list-style-type: none"><li>• Potential leaching of blend material</li></ul>																
Physical Properties	<ul style="list-style-type: none"><li>• Thermoplastic elastomer based on polypropylene</li><li>• Excellent tensile strength</li><li>• Firm, opaque, black</li></ul>																
Service Temperature Range	-60 °C to +135 °C (-75 °F to +275 °F)																
Applications	<table><tr><td>Acids</td><td>Excellent</td></tr><tr><td>Alkaline solutions</td><td>Excellent</td></tr><tr><td>Solvents</td><td>Not recommended</td></tr><tr><td>Pressure</td><td>Not recommended</td></tr><tr><td>Vacuum</td><td>Good</td></tr><tr><td>Viscous media</td><td>Excellent</td></tr><tr><td>Sterile media</td><td>Not recommended</td></tr></table>			Acids	Excellent	Alkaline solutions	Excellent	Solvents	Not recommended	Pressure	Not recommended	Vacuum	Good	Viscous media	Excellent	Sterile media	Not recommended
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	<table><tr><td></td><td></td><td>Volume of gas [cm3] x wall thickness (mm)</td><td rowspan="4">x 10<sup>-10</sup></td></tr><tr><td>CO<sub>2</sub></td><td>1200</td><td></td></tr><tr><td>O<sub>2</sub></td><td>200</td><td>Area of tubing ID [cm2] x time [sec]</td></tr><tr><td>N<sub>2</sub></td><td>80</td><td>x pressure drop across tubing wall [cm Hg]</td></tr></table>					Volume of gas [cm3] x wall thickness (mm)	x 10 <sup>-10</sup>	CO <sub>2</sub>	1200		O <sub>2</sub>	200	Area of tubing ID [cm2] x time [sec]	N <sub>2</sub>	80	x pressure drop across tubing wall [cm Hg]	
		Volume of gas [cm3] x wall thickness (mm)	x 10 <sup>-10</sup>														
CO <sub>2</sub>	1200																
O <sub>2</sub>	200	Area of tubing ID [cm2] x time [sec]															
N <sub>2</sub>	80	x pressure drop across tubing wall [cm Hg]															
Odor and taste	Must not be used for foodstuffs, beverages and drugs.																
Toxicity	Must not be used for foodstuffs, beverages and drugs.																
Tubing	<table><tr><td>at 0 bar life</td><td>1000+ hrs</td></tr><tr><td>at 0.7 bar</td><td>1000 hrs</td></tr></table>			at 0 bar life	1000+ hrs	at 0.7 bar	1000 hrs										
at 0 bar life	1000+ hrs																
at 0.7 bar	1000 hrs																

Part No.	ID	OD	Length
<b>STANDARD TUBING</b>			
<b>Norprene Tubing, 1.6 mm WT</b>			
MF0017	0.032" (0.8 mm)	0.158" (4.0 mm)	49.2' (15 m)
SC0357	0.063" (1.6 mm)	0.189" (4.8 mm)	49.2' (15 m)
SC0358	0.126" (3.2 mm)	0.252" (6.4 mm)	49.2' (15 m)
SC0359	0.189" (4.8 mm)	0.315" (8.0 mm)	49.2' (15 m)
SC0360	0.252" (6.4 mm)	0.378" (9.6 mm)	49.2' (15 m)
SC0361	0.315" (8 mm)	0.441" (11.2 mm)	49.2' (15 m)
SC0385	0.374" (9.5 mm)	0.50" (12.7 mm)	49.2' (15 m)
SC0386	0.437" (11.1 mm)	0.563" (14.3 mm)	49.2' (15 m)
<b>Norprene Tubing, 2.4 mm WT</b>			
SC0362	0.189" (4.8 mm)	0.378" (9.6 mm)	49.2' (15 m)
SC0363	0.252" (6.4 mm)	0.441" (11.2 mm)	49.2' (15 m)
SC0511	0.315" (8 mm)	0.504" (12.8 mm)	49.2' (15 m)
SC0512	0.374" (9.5 mm)	0.563" (14.3 mm)	49.2' (15 m)
<b>Norprene Tubing, 3.2 mm WT</b>			
SC0364	0.025" (0.64 mm)	0.504" (12.8 mm)	49.2' (15 m)
SC0365	0.374" (9.5 mm)	0.626" (15.9 mm)	49.2' (15 m)
SC0366	0.50" (12.7 mm)	0.752" (19.1 mm)	49.2' (15 m)
SC0698	0.626" (15.9 mm)	0.878" (22.3 mm)	49.2' (15 m)

## PharMed® Ismaprene Tubing

- ▶ 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.



## Note

Maximum recommended operating pressure can be found on page 199.

## Specifications

Special Properties	The ideal tubing for pharmaceutical and medical applications, and for foodstuffs.																	
Advantages	<ul style="list-style-type: none"><li>• Recommended for cell cultures and tissue</li><li>• Ideal for production filtration, fermentation and bioreactor process lines</li><li>• Very long service-life</li><li>• Non-toxic and non-hemolytic</li><li>• Impermeable to normal light and UV-radiation</li><li>• Appropriate for medical products and foodstuffs</li><li>• Low particulate spallation</li><li>• Can be autoclaved repeatedly</li><li>• Withstands repeated CIP and SIP cleaning and sterilization</li><li>• Meets USP Class VI, FDA and NSF criteria</li></ul>																	
Limitations	<ul style="list-style-type: none"><li>• Potential leaching of additives (lubricants)</li></ul>																	
Physical Properties	<ul style="list-style-type: none"><li>• Thermoplastic elastomer based on polypropylene</li><li>• Firm, opaque, beige color</li></ul>																	
Service Temperature Range	-60 °C to +135 °C (-75 °F to +275 °F)																	
Applications	<table><tr><td>Acids</td><td>Good</td></tr><tr><td>Alkaline solutions</td><td>Good</td></tr><tr><td>Solvents</td><td>Not recommended</td></tr><tr><td>Pressure</td><td>Not recommended</td></tr><tr><td>Vacuum</td><td>Excellent</td></tr><tr><td>Viscous media</td><td>Good</td></tr><tr><td>Sterile media</td><td>Excellent</td></tr></table>			Acids	Good	Alkaline solutions	Good	Solvents	Not recommended	Pressure	Not recommended	Vacuum	Excellent	Viscous media	Good	Sterile media	Excellent	
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 Pharmacopoeia Class VI, NSF listed (Standard 51)																	
Sterilization	<p>Autoclaveable with steam, 30 minutes at 1 bar (15 psi) and 141 °C (250 °F) Gas sterilization with Ethylene oxide.</p> <p>Sterilization with radiation up to 2.5 mrad.</p> <p><b>Caution: Use special tubing version (welded stoppers) when autoclaving 2 or 3-stop color-coded tubing.</b></p>																	
Permeability	<table><tr><td></td><td>Volume of gas [cm3] x wall thickness [mm]</td><td rowspan="4">x 10<sup>-10</sup></td></tr><tr><td>CO<sub>2</sub></td><td>1200</td></tr><tr><td>O<sub>2</sub></td><td>200</td></tr><tr><td>N<sub>2</sub></td><td>80</td></tr><tr><td></td><td>Area of tubing ID [cm2] x time [sec]</td><td></td></tr><tr><td></td><td>x pressure drop across tubing wall [cm Hg]</td><td></td></tr></table>				Volume of gas [cm3] x wall thickness [mm]	x 10 <sup>-10</sup>	CO <sub>2</sub>	1200	O <sub>2</sub>	200	N <sub>2</sub>	80		Area of tubing ID [cm2] x time [sec]			x pressure drop across tubing wall [cm Hg]	
	Volume of gas [cm3] x wall thickness [mm]	x 10 <sup>-10</sup>																
CO <sub>2</sub>	1200																	
O <sub>2</sub>	200																	
N <sub>2</sub>	80																	
	Area of tubing ID [cm2] x time [sec]																	
	x pressure drop across tubing wall [cm Hg]																	
Odor and taste	Low																	
Toxicity	Non-toxic and non-hemolytic																	
Tubing	<table><tr><td>at 0 bar life</td><td>1000+ hrs</td></tr><tr><td>at 0.7 bar</td><td>1000 hrs</td></tr></table>			at 0 bar life	1000+ hrs	at 0.7 bar	1000 hrs											
at 0 bar life	1000+ hrs																	
at 0.7 bar	1000 hrs																	

Part No.	ID	OD	Length		
STANDARD TUBING					
PharMed Tubing, 1.6 mm WT					
MF0009A	0.032" (0.8 mm)	0.158" (4.0 mm)	0.295" (7.5 mm)		
MF0010A	0.063" (1.6 mm)	0.189" (4.8 mm)	0.295" (7.5 mm)		
SC1006	0.095" (2.4 mm)	0.221" (5.6 mm)	0.295" (7.5 mm)		
MF0012	0.126" (3.2 mm)	0.252" (6.4 mm)	0.295" (7.5 mm)		
MF0011	0.189" (4.8 mm)	0.315" (8.0 mm)	0.295" (7.5 mm)		
MF0013	0.252" (6.4 mm)	0.378" (9.6 mm)	0.295" (7.5 mm)		
MF0014	0.315" (8.0 mm)	0.441" (11.2 mm)	0.295" (7.5 mm)		
PharMed Tubing, 2.4 mm WT					
MF0448	0.189" (4.8 mm)	0.378" (9.6 mm)	0.295" (7.5 mm)		
PharMed Tubing, 3.2 mm WT					
MF0015A	0.252" (6.4 mm)	0.504" (12.8 mm)	0.295" (7.5 mm)		
MF0016	0.374" (9.5 mm)	0.626" (15.9 mm)	0.295" (7.5 mm)		
MF0034A	0.50" (12.7 mm)	0.752" (19.1 mm)	0.295" (7.5 mm)		
SC0696A	0.626" (15.9 mm)	0.878" (22.3 mm)	0.295" (7.5 mm)		
PharMed Tubing, 6 mm WT					
MF0353	0.748" (19 mm)	1.22" (31 mm)	0.295" (7.5 mm)		
PharMed Tubing, 4 mm WT					
MF0354	1.0" (25.4 mm)	1.315" (33.4 mm)	0.295" (7.5 mm)		
STOPPER TUBING					
Part No.	ID	OD	Color	Length	Qty.
PharMed 2-STOP Tubing for CA Cassettes, 0.75 mm WT					
SC0328	0.051" (1.3 mm)	0.504" (12.8 mm)	grey-grey	15.75" (400 mm)	6-pk
SC0330	0.06" (1.52 mm)	0.119" (3.02 mm)	yellow-blue	15.75" (400 mm)	6-pk
PharMed 2-Stop Tubing for CA Cassettes, 0.80 mm WT					
SC0324	0.03" (0.76 mm)	0.092" (2.36 mm)	black-black	15.75" (400 mm)	6-pk
SC0325	0.035" (0.89 mm)	0.098" (2.49 mm)	orange-orange	15.75" (400 mm)	6-pk
SC0331	0.065" (1.65 mm)	0.128" (3.25 mm)	blue-blue	15.75" (400 mm)	6-pk
SC0333	0.081" (2.06 mm)	0.144" (3.66 mm)	purple-purple	15.75" (400 mm)	6-pk
SC0334	0.09" (2.29 mm)	0.153" (3.89 mm)	purple-black	15.75" (400 mm)	6-pk
PharMed 2-Stop Tubing for CA Cassettes, 0.84 mm WT					
SC0329	0.056" (1.42 mm)	0.122" (3.1 mm)	yellow-yellow	15.75" (400 mm)	6-pk
PharMed 2-Stop Tubing for CA Cassettes, 0.85 mm WT					
SC0322	0.02" (0.51 mm)	0.087" (2.21 mm)	orange-yellow	15.75" (400 mm)	6-pk
SC0326	0.04" (1.02 mm)	0.107" (2.72 mm)	white-white	15.75" (400 mm)	6-pk
SC0327	0.045" (1.14 mm)	0.112" (2.84 mm)	red-red	15.75" (400 mm)	6-pk
SC0332	0.073" (1.85 mm)	0.14" (3.55 mm)	green-green	15.75" (400 mm)	6-pk
SC0335	0.10" (2.54 mm)	0.167" (4.24 mm)	purple-orange	15.75" (400 mm)	6-pk
PharMed 2-Stop Tubing for CA Cassettes, 0.90 mm WT					
SC0321	0.015" (0.38 mm)	0.086" (2.18 mm)	orange-green	15.75" (400 mm)	6-pk
SC0323	0.025" (0.64 mm)	0.096" (2.44 mm)	orange-white	15.75" (400 mm)	6-pk
SC0336	0.11" (2.79 mm)	0.181" (4.59 mm)	purple-white	15.75" (400 mm)	6-pk
PharMed 2-Stop Tubing for CA Cassettes, 0.91 mm WT					
SC0320	0.01" (0.25 mm)	0.082" (2.07 mm)	orange-blue	15.75" (400 mm)	6-pk
PharMed 3-Stop Tubing for MS/CA Cassettes, 0.75 mm WT					
SC0311	0.051" (1.3 mm)	0.11" (2.79 mm)	grey-grey	15.75" (400 mm)	6-pk
SC0313	0.06" (1.52 mm)	0.119" (3.02 mm)	yellow-blue	15.75" (400 mm)	6-pk
PharMed 3-Stop Tubing for MS/CA Cassettes, 0.80 mm WT					
SC0307	0.03" (0.76 mm)	0.092" (2.36 mm)	black-black	15.75" (400 mm)	6-pk
SC0308	0.035" (0.89 mm)	0.098" (2.49 mm)	orange-orange	15.75" (400 mm)	6-pk
SC0314	0.065" (1.65 mm)	0.128" (3.25 mm)	blue-blue	15.75" (400 mm)	6-pk
SC0316	0.081" (2.06 mm)	0.144" (3.66 mm)	purple-purple	15.75" (400 mm)	6-pk
SC0317	0.09" (2.29 mm)	0.153" (3.89 mm)	purple-black	15.75" (400 mm)	6-pk
PharMed 3-Stop Tubing for MS/CA Cassettes, 0.84 mm WT					
SC0312	0.056" (1.42 mm)	0.122" (3.1 mm)	yellow-yellow	15.75" (400 mm)	6-pk
PharMed 3-Stop Tubing for MS/CA Cassettes, 0.85 mm WT					
SC0305	0.02" (0.51 mm)	0.087" (2.21 mm)	orange-yellow	15.75" (400 mm)	6-pk
SC0309	0.04" (1.02 mm)	0.107" (2.72 mm)	white-white	15.75" (400 mm)	6-pk
SC0310	0.045" (1.14 mm)	0.112" (2.84 mm)	red-red	15.75" (400 mm)	6-pk
SC0315	0.073" (1.85 mm)	0.14" (3.55 mm)	green-green	15.75" (400 mm)	6-pk
SC0318	0.10" (2.54 mm)	0.167" (4.24 mm)	purple-orange	15.75" (400 mm)	6-pk
PharMed 3-Stop Tubing for MS/CA Cassettes, 0.90 mm WT					
SC0304	0.015" (0.38 mm)	0.086" (2.18 mm)	orange-green	15.75" (400 mm)	6-pk
SC0306	0.025" (0.64 mm)	0.096" (2.44 mm)	orange-white	15.75" (400 mm)	6-pk
SC0319	0.11" (2.79 mm)	0.181" (4.59 mm)	purple-white	15.75" (400 mm)	6-pk
PharMed 3-Stop Tubing for MS/CA Cassettes, 0.91 mm WT					
SC0303	0.01" (0.25 mm)	0.082" (2.07 mm)	orange-blue	15.75" (400 mm)	6-pk



## Silicone Peroxide Tubing

- Non-toxic material great for biological applications
- Soft and translucent for applications requiring visual checks



## Specifications

Special Properties	Silicone tubing blended with organic peroxide for biological applications																					
Advantages	<ul style="list-style-type: none"><li>• Steam autoclavability</li><li>• Excellent biological compatibility</li><li>• Greater physical compression capability</li><li>• Not prone to mold</li><li>• Non-toxic</li><li>• Waterproof and resistant to ozone, radiation and sunlight</li><li>• Resistant to fungus</li><li>• Odorless</li></ul>																					
Limitations	<ul style="list-style-type: none"><li>• Not recommended for concentrated solvents, oils, acids or diluted sodium hydroxide</li><li>• Relatively high gas permeability</li></ul>																					
Physical Properties	<ul style="list-style-type: none"><li>• Polydimethylsiloxane with silica filter and silicone oil</li><li>• Excellent resistance to compression</li><li>• Soft, translucent, clear to light amber</li></ul>																					
Service Temperature Range	-51 °C to +238 °C (-60 °F to +460 °F)																					
Applications	<table><tr><td>Acids</td><td>Limited</td></tr><tr><td>Alkaline solutions</td><td>Good</td></tr><tr><td>Solvents</td><td>Not recommended</td></tr><tr><td>Pressure</td><td>Not recommended</td></tr><tr><td>Vacuum</td><td>Good</td></tr><tr><td>Viscous media</td><td>Fair</td></tr><tr><td>Sterile media</td><td>Excellent</td></tr></table>					Acids	Limited	Alkaline solutions	Good	Solvents	Not recommended	Pressure	Not recommended	Vacuum	Good	Viscous media	Fair	Sterile media	Excellent			
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 Pharmacopoeia 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 <b>Gas: Not recommended to sterilize with ethylene oxide</b>																					
Permeability	<table><tr><td></td><td></td><td></td><td>Volume of gas [cm3] x wall thickness [mm]</td><td rowspan="4">x 10<sup>-10</sup></td></tr><tr><td>CO<sub>2</sub></td><td>25147</td><td></td><td></td></tr><tr><td>O<sub>2</sub></td><td>4715</td><td></td><td>Area of tubing ID [cm2] x time [sec]</td></tr><tr><td>N<sub>2</sub></td><td>2284</td><td></td><td>x pressure drop across tubing wall [cm Hg]</td></tr></table>								Volume of gas [cm3] x wall thickness [mm]	x 10 <sup>-10</sup>	CO <sub>2</sub>	25147			O <sub>2</sub>	4715		Area of tubing ID [cm2] x time [sec]	N <sub>2</sub>	2284		x pressure drop across tubing wall [cm Hg]
			Volume of gas [cm3] x wall thickness [mm]	x 10 <sup>-10</sup>																		
CO <sub>2</sub>	25147																					
O <sub>2</sub>	4715		Area of tubing ID [cm2] x time [sec]																			
N <sub>2</sub>	2284		x pressure drop across tubing wall [cm Hg]																			
Odor and taste	—																					
Toxicity	—																					
Tubing	at 0 bar life — at 0.7 bar —																					

## Note

Maximum recommended operating pressure can be found on page 200.

Part No.	ID	OD	Length		
STANDARD TUBING					
Silicone Peroxide Tubing, 1.6 mm WT					
MF0044	0.032" (0.8 mm)	0.158" (4.0 mm)	0.295" (7.5 mm)		
MF0035	0.063" (1.6 mm)	0.189" (4.8 mm)	0.295" (7.5 mm)		
MF0037	0.126" (3.2 mm)	0.252" (6.4 mm)	0.295" (7.5 mm)		
MF0045	0.189" (4.8 mm)	0.315" (8.0 mm)	0.295" (7.5 mm)		
MF0046	0.252" (6.4 mm)	0.378" (9.6 mm)	0.295" (7.5 mm)		
MF0047	0.315" (8.0 mm)	0.441" (11.2 mm)	0.295" (7.5 mm)		
Silicone Peroxide Tubing, 2.4 mm WT					
MF0288	0.189" (4.8 mm)	0.378" (9.6 mm)	0.295" (7.5 mm)		
MF0040	0.252" (6.4 mm)	0.441" (11.2 mm)	0.295" (7.5 mm)		
Silicone Peroxide Tubing, 3.2 mm WT					
MF0314	0.252" (6.4 mm)	0.504" (12.8 mm)	0.295" (7.5 mm)		
MF0041	0.374" (9.5 mm)	0.626" (15.9 mm)	0.295" (7.5 mm)		
MF0315	0.50" (12.7 mm)	0.752" (19.1 mm)	0.295" (7.5 mm)		
Silicone Peroxide Tubing, 6 mm WT					
MF0357	0.748" (19 mm)	1.22" (31 mm)	0.295" (7.5 mm)		
STOPPER TUBING					
Part No.	ID	OD	Color	Length	Qty.
Silicone Peroxide 2-Stop Tubing for CA Cassettes, 0.91 mm WT					
SC0092	0.025" (0.64 mm)	2.46 mm	orange-white	15.75" (400 mm)	6-pk
Silicone Peroxide 2-Stop Tubing for CA Cassettes, 0.84 mm WT					
SC0093	0.03" (0.76 mm)	0.096" (2.44 mm)	black-black	15.75" (400 mm)	6-pk
SC0094	0.035" (0.89 mm)	0.101" (2.57 mm)	orange-orange	15.75" (400 mm)	6-pk
SC0095	0.04" (1.02 mm)	0.106" (2.7 mm)	white-white	15.75" (400 mm)	6-pk
SC0096	0.045" (1.14 mm)	0.111" (2.82 mm)	red-red	15.75" (400 mm)	6-pk
SC0097	0.051" (1.3 mm)	0.115" (2.93 mm)	grey-grey	15.75" (400 mm)	6-pk
SC0098	0.056" (1.42 mm)	0.12" (3.05 mm)	yellow-yellow	15.75" (400 mm)	6-pk
SC0099	0.06" (1.52 mm)	0.127" (3.24 mm)	yellow-blue	15.75" (400 mm)	6-pk
SC0100	0.025" (0.64 mm)	0.129" (3.28 mm)	blue-blue	15.75" (400 mm)	6-pk
SC0101	0.073" (1.85 mm)	0.139" (3.53 mm)	green-green	15.75" (400 mm)	6-pk
SC0102A	0.081" (2.06 mm)	0.147" (3.74 mm)	purple-purple	15.75" (400 mm)	6-pk
SC0103A	0.09" (2.29 mm)	0.152" (3.88 mm)	purple-black	15.75" (400 mm)	6-pk
SC0104	0.10" (2.54 mm)	0.169" (4.3 mm)	purple-orange	15.75" (400 mm)	6-pk
SC0105A	0.11" (2.79 mm)	0.176" (4.47 mm)	purple-white	15.75" (400 mm)	6-pk
Silicone Peroxide 3-Stop Tubing for MS/CA Cassettes, 0.91 mm WT					
SC0106	0.025" (0.64 mm)	0.097" (2.46 mm)	orange-white	15.75" (400 mm)	6-pk
Silicone Peroxide 3-Stop Tubing for MS/CA Cassettes, 0.84 mm WT					
SC0107	0.03" (0.76 mm)	0.096" (2.44 mm)	black-black	15.75" (400 mm)	6-pk
SC0108	0.035" (0.89 mm)	0.101" (2.57 mm)	orange-orange	15.75" (400 mm)	6-pk
SC0109	0.04" (1.02 mm)	0.106" (2.7 mm)	white-white	15.75" (400 mm)	6-pk
SC0110	0.045" (1.14 mm)	0.111" (2.82 mm)	red-red	15.75" (400 mm)	6-pk
SC0111	0.051" (1.3 mm)	0.115" (2.93 mm)	grey-grey	15.75" (400 mm)	6-pk
SC0112	0.056" (1.42 mm)	0.12" (3.05 mm)	yellow-yellow	15.75" (400 mm)	6-pk
SC0113	0.06" (1.52 mm)	0.127" (3.24 mm)	yellow-blue	15.75" (400 mm)	6-pk
SC0114	0.065" (1.65 mm)	0.129" (3.28 mm)	blue-blue	15.75" (400 mm)	6-pk
SC0115	0.073" (1.85 mm)	0.139" (3.53 mm)	green-green	15.75" (400 mm)	6-pk
SC0116	0.081" (2.06 mm)	0.147" (3.74 mm)	purple-purple	15.75" (400 mm)	6-pk
SC0117	0.09" (2.29 mm)	0.152" (3.88 mm)	purple-black	15.75" (400 mm)	6-pk
SC0118	0.10" (2.54 mm)	0.169" (4.3 mm)	purple-orange	15.75" (400 mm)	6-pk
SC0119	0.11" (2.79 mm)	0.176" (4.47 mm)	purple-white	15.75" (400 mm)	6-pk

## Fluran® F-5500-A Tubing

- Specially formulated elastomer for use with strong acids and basic solutions
- Very low gas permeability

Fluran tubing has been specially formulated for use in applications where strong acids, strong bases, or strong oxidants are being used.

The material's very low gas permeability makes it the ideal material for applications where fluid can be transferred without being contaminated by atmospheric gases. Additionally, the low gas permeability and relative strength of the material make it a material of choice in vacuum based applications.



## Specifications

<b>Special Properties</b>	The special tubing for concentrated acids and corrosive solvents																		
<b>Advantages</b>	<ul style="list-style-type: none"><li>• High chemical resistance</li><li>• Low gas permeability</li><li>• Wide temperature range</li></ul>																		
<b>Limitations</b>	<ul style="list-style-type: none"><li>• Limited service-life</li></ul>																		
<b>Physical Properties</b>	<ul style="list-style-type: none"><li>• Fluoroelastomer</li><li>• Firm, opaque, black</li></ul>																		
<b>Service Temperature Range</b>	-31 °C to +204 °C (-25 °F to + 400 °F)																		
<b>Applications</b>	<table><tr><td>Acids</td><td>Excellent</td></tr><tr><td>Alkaline solutions</td><td>Excellent</td></tr><tr><td>Solvents</td><td>Limited</td></tr><tr><td>Pressure</td><td>Not recommended</td></tr><tr><td>Vacuum</td><td>Good</td></tr><tr><td>Viscous media</td><td>Good</td></tr><tr><td>Sterile media</td><td>Fair</td></tr></table>			Acids	Excellent	Alkaline solutions	Excellent	Solvents	Limited	Pressure	Not recommended	Vacuum	Good	Viscous media	Good	Sterile media	Fair		
Acids	Excellent																		
Alkaline solutions	Excellent																		
Solvents	Limited																		
Pressure	Not recommended																		
Vacuum	Good																		
Viscous media	Good																		
Sterile media	Fair																		
<b>Complies with the Following Standards</b>	None																		
<b>Sterilization</b>	Not recommended																		
<b>Permeability</b>	<table><tr><td></td><td></td><td><math>\frac{\text{Volume of gas [cm3]} \times \text{wall thickness [mm]}}{\text{Area of tubing ID [cm2]} \times \text{time [sec]} \times \text{pressure drop across tubing wall [cm Hg]}}</math></td><td><math>\times 10^{-10}</math></td></tr><tr><td>CO<sub>2</sub></td><td>38</td><td></td><td></td></tr><tr><td>O<sub>2</sub></td><td>14</td><td></td><td></td></tr><tr><td>N<sub>2</sub></td><td>5</td><td></td><td></td></tr></table>					$\frac{\text{Volume of gas [cm3]} \times \text{wall thickness [mm]}}{\text{Area of tubing ID [cm2]} \times \text{time [sec]} \times \text{pressure drop across tubing wall [cm Hg]}}$	$\times 10^{-10}$	CO <sub>2</sub>	38			O <sub>2</sub>	14			N <sub>2</sub>	5		
		$\frac{\text{Volume of gas [cm3]} \times \text{wall thickness [mm]}}{\text{Area of tubing ID [cm2]} \times \text{time [sec]} \times \text{pressure drop across tubing wall [cm Hg]}}$	$\times 10^{-10}$																
CO <sub>2</sub>	38																		
O <sub>2</sub>	14																		
N <sub>2</sub>	5																		
<b>Odor and taste</b>	—																		
<b>Toxicity</b>	—																		
<b>Tubing</b>	<table><tr><td>at 0 bar life</td><td>150</td></tr><tr><td>at 0.7 bar</td><td>90</td></tr></table>			at 0 bar life	150	at 0.7 bar	90												
at 0 bar life	150																		
at 0.7 bar	90																		

Part No.	ID	OD	Length		
STANDARD TUBING					
Fluran F-5500-A Tubing, 1.6 mm WT					
MF0048	0.032" (0.8 mm)	0.158" (4.0 mm)	24.6' (7.5 m)		
MF0049A	0.063" (1.6 mm)	0.189" (4.8 mm)	24.6' (7.5 m)		
MF0051	0.126" (3.2 mm)	0.252" (6.4 mm)	24.6' (7.5 m)		
MF0322	0.189" (4.8 mm)	0.315" (8.0 mm)	24.6' (7.5 m)		
MF0052	0.252" (6.4 mm)	0.378" (9.6 mm)	24.6' (7.5 m)		
MF0053	0.315" (8.0 mm)	0.441" (11.2 mm)	24.6' (7.5 m)		
Fluran F-5500-A Tubing, 2.4 mm WT					
MF0050	0.189" (4.8 mm)	0.378" (9.6 mm)	24.6' (7.5 m)		
MF0054	0.252" (6.4 mm)	0.441" (11.2 mm)	24.6' (7.5 m)		
Fluran F-5500-A Tubing, 3.2 mm WT					
MF0323	0.252" (6.4 mm)	0.504" (12.8 mm)	24.6' (7.5 m)		
MF0055L	0.374" (9.5 mm)	0.626" (15.9 mm)	24.6' (7.5 m)		
STOPPER TUBING					
Part No.	ID	OD	Color	Length	Qty.
Fluran F-5500-A 2-Stop Tubing for CA Cassettes, 0.91 mm WT					
SC0132	0.02" (0.51 mm)	0.093" (2.35 mm)	orange-yellow	7" (180 mm)	12-pk
SC0133	0.025" (0.64 mm)	0.098" (2.48 mm)	orange-white	7" (180 mm)	12-pk
SC0134	0.03" (0.76 mm)	0.102" (2.6 mm)	black-black	7" (180 mm)	12-pk
SC0135A	0.035" (0.89 mm)	0.108" (2.73 mm)	orange-orange	7" (180 mm)	12-pk
SC0136	0.04" (1.02 mm)	0.112" (2.86 mm)	white-white	7" (180 mm)	12-pk
SC0137	0.045" (1.14 mm)	0.117" (2.98 mm)	red-red	7" (180 mm)	12-pk
SC0138	0.05" (1.29 mm)	0.123" (3.13 mm)	grey-grey	7" (180 mm)	12-pk
SC0139	0.056" (1.42 mm)	0.128" (3.26 mm)	yellow-yellow	7" (180 mm)	12-pk
SC0140	0.06" (1.52 mm)	0.132" (3.36 mm)	yellow-blue	7" (180 mm)	12-pk
SC0141	0.065" (1.65 mm)	0.137" (3.49 mm)	blue-blue	7" (180 mm)	12-pk
SC0142	0.073" (1.85 mm)	0.145" (3.69 mm)	green-green	7" (180 mm)	12-pk
SC0143	0.081" (2.06 mm)	0.154" (3.9 mm)	purple-purple	7" (180 mm)	12-pk
SC0144	0.09" (2.29 mm)	0.163" (4.13 mm)	purple-black	7" (180 mm)	12-pk
SC0145	0.10" (2.54 mm)	0.172" (4.38 mm)	purple-orange	7" (180 mm)	12-pk
SC0146	0.11" (2.79 mm)	0.182" (4.63 mm)	purple-white	7" (180 mm)	12-pk
Fluran F-5500-A 3-Stop Tubing for MS/CA Cassettes, 0.92 mm WT					
SC0255A	0.02" (0.51 mm)	0.093" (2.35 mm)	orange-yellow	15.75" (400 mm)	12-pk
SC0256	0.025" (0.64 mm)	0.098" (2.48 mm)	orange-white	15.75" (400 mm)	12-pk
SC0257	0.03" (0.76 mm)	0.102" (2.6 mm)	black-black	15.75" (400 mm)	12-pk
SC0258	0.035" (0.89 mm)	0.108" (2.73 mm)	orange-orange	15.75" (400 mm)	12-pk
SC0259	0.04" (1.02 mm)	0.112" (2.86 mm)	white-white	15.75" (400 mm)	12-pk
SC0260	0.045" (1.14 mm)	0.117" (2.98 mm)	red-red	15.75" (400 mm)	12-pk
SC0261	0.05" (1.29 mm)	0.123" (3.13 mm)	grey-grey	15.75" (400 mm)	12-pk
SC0262	0.056" (1.42 mm)	0.128" (3.26 mm)	yellow-yellow	15.75" (400 mm)	12-pk
SC0263	0.06" (1.52 mm)	0.132" (3.36 mm)	yellow-blue	15.75" (400 mm)	12-pk
SC0264A	0.065" (1.65 mm)	0.137" (3.49 mm)	blue-blue	15.75" (400 mm)	12-pk
SC0265	0.073" (1.85 mm)	0.145" (3.69 mm)	green-green	15.75" (400 mm)	12-pk
SC0266	0.081" (2.06 mm)	0.154" (3.9 mm)	purple-purple	15.75" (400 mm)	12-pk
SC0267	0.09" (2.29 mm)	0.163" (4.13 mm)	purple-black	15.75" (400 mm)	12-pk
SC0268	0.10" (2.54 mm)	0.172" (4.38 mm)	purple-orange	15.75" (400 mm)	12-pk
SC0269	0.11" (2.79 mm)	0.182" (4.63 mm)	purple-white	15.75" (400 mm)	12-pk

## GORE™ Tubing for Special Applications

- ▶ For single channel tubing pumps
- ▶ Aggressive media
- ▶ High-pressure applications

### GORE Style 100 for High-Pressure Applications

- ▶ Extremely stable flow rates
- ▶ Variability in flow rate within 1% during total life time
- ▶ Virtually eliminates spallation (ensures continuously high purity in fluid transfer)
- ▶ For differential pressures up to 4 bar (60 psi)
- ▶ High burst strength up to 25 bar (360 psi)
- ▶ Exhibits 18 times the life of silicone rubber tubing



### GORE Style 100CR for Aggressive Media

- ▶ Extremely long life perfluorelastomer tubing
- ▶ Stable flow rates, variation less than 1% over tubing life
- ▶ Low solvent swell
- ▶ Extreme long service life
- ▶ Suitable for almost all aggressive chemicals, including organic solvents such as methylethylketone, toluene and acetone



## Specifications

#### GORE Style 100

Unique pressed composite material, not extruded, produced in clean room  
Platinum cured Silicone and expanded PTFE  
Available in bore sizes up to 50 mm ID  
USP Class VI approved and classified nontoxic  
Cited in FDA Type II Material Master File (MMF)  
Operates at pressures up to 4 bar (60 psi)  
In-line steam sterilizable

#### GORE Style 100CR

Fluoroelastomer tubing with expanded PTFE, not extruded, produced in clean room  
1.6 to 16 mm ID  
Permanently stable flow rates  
USP Class VI approved  
FDA approved for food contact  
Operates at pressures up to 4 bar (60 psi)

## Application Note

#### GORE Style 100

In pharmaceutical, food and biotech processes

- Tangential flow filtration and other high-pressure applications
- Addition of anti-foam
- Long-term fermentation: continuous media recirculation over 75 days
- Transfer of live-cells from one container into another featuring excellent service life at low temperatures
- Ultra-filtration: high pressure stability allows higher system pressure and flow rate, which results in longer service life and fewer down-times due to tube exchanges

#### GORE Style 100CR

In electronic, medical, textile, industry

- Solvent-based ink for gravure printing
- Coating of glass bottles
- Chemical coating of plastic plates and film
- Chemical-based flow in waste water treatment
- Solvent-based coating of tablets
- Synthesis with high through-put
- Laboratory analysis or dispensing

## Related Products

- ▶ Gore Style 100 tubing can be used with the Flowmaster® dispensing pump found on page 97, which pumps up to 13 L/min.
- ▶ Gore Style 100CR tubing can be used for the REGLO Quick™ tubing pump found on page 96, which pumps up to 230 mL/min.

Part No.	ID	OD	Length
<b>STANDARD TUBING</b>			
<b>GORE 100 Tubing, 0.8 mm WT</b>			
GX0015	0.11" (2.8 mm)	0.173" (4.4 mm)	1' (305 mm)
<b>GORE 100 Tubing, 1.6 mm WT</b>			
GX0018	0.063" (1.6 mm)	0.189" (4.8 mm)	1' (305 mm)
GX0004	0.126" (3.2 mm)	0.252" (6.4 mm)	1' (305 mm)
GX0014	0.189" (4.8 mm)	0.315" (8.0 mm)	1' (305 mm)
GX0013	0.315" (8.0 mm)	0.437" (11.1 mm)	1' (305 mm)
<b>GORE 100 Tubing, 2.4 mm WT</b>			
GX0005	0.189" (4.8 mm)	0.378" (9.6 mm)	1' (305 mm)
GX0006	0.252" (6.4 mm)	0.437" (11.1 mm)	1' (305 mm)
GX0002	0.315" (8.0 mm)	0.125" (12.7 mm)	1' (305 mm)
GX0017	0.374" (9.5 mm)	0.555" (14.1 mm)	1' (305 mm)
<b>GORE 100 Tubing, 3.2 mm WT</b>			
GX0007	0.252" (6.4 mm)	0.125" (12.7 mm)	2' (610 mm)
GX0001	0.374" (9.5 mm)	0.156" (15.9 mm)	2' (610 mm)
GX0003	0.125" (3.2 mm)	0.378" (9.6 mm)	2' (610 mm)
<b>GORE 100CR Tubing, 0.8 mm WT</b>			
GX0106	0.11" (2.8 mm)	0.173" (4.4 mm)	1' (305 mm)
<b>GORE 100CR Tubing, 1.6 mm WT</b>			
GX0008	0.063" (1.6 mm)	0.189" (4.8 mm)	1' (305 mm)
GX0011	0.126" (3.2 mm)	0.252" (6.4 mm)	1' (305 mm)
GX0010	0.189" (4.8 mm)	0.315" (8.0 mm)	1' (305 mm)
GX0012	0.252" (6.4 mm)	0.374" (9.5 mm)	1' (305 mm)
GX0009	0.315" (8.0 mm)	0.437" (11.1 mm)	1' (305 mm)
<b>GORE 100CR Tubing, 2.4 mm WT</b>			
GX0124	0.189" (4.8 mm)	0.374" (9.5 mm)	14" (355 mm)
GX0123	0.252" (6.4 mm)	0.437" (11.1 mm)	14" (355 mm)
GX0019	0.315" (8.0 mm)	0.125" (12.7 mm)	14" (355 mm)
<b>GORE 100CR Tubing, 3.2 mm WT</b>			
GX0131	0.374" (9.5 mm)	0.156" (15.9 mm)	2' (610 mm)

# Valves



Installing a sample loop on a Rheodyne® manual sample injection valve in Rohnert Park, CA





## High Pressure Valves

Rheodyne® valves fit virtually any flow control application. There are valves for preparative, analytical, nano, and microscale analysis in a variety of flow configurations. Pressure ratings of the valves in this chapter range from 125 psi (9 bar) to 15,000 psi (1,034 bar).

MX Series II™ Modules are actuated electronically and can be easily adapted to existing instrumentation using contact closure, BCD, I<sup>2</sup>C, USB, or used as stand alone devices. Industry standard sample injectors and switching valves are designed for manual actuation. Locate the valve module and flow configuration of choice using the table below.

### Valve Configurations

Valve Module	Flow Configuration	Connecting Tubing Size	Page
<b>MXT Modules: Very High Pressure (&lt;15,000 psi)</b>	<ul style="list-style-type: none"> <li>• 2-position, 10-port Switching</li> <li>• 6-position, 7-port Selection</li> <li>• 2-position, 6-port Switching</li> </ul>	1/16" OD	127
<b>MXP Modules: High Pressure (&lt;6,000 psi)</b>	<ul style="list-style-type: none"> <li>• 2-position, 6-port Switching (analytical and nano scale)</li> <li>• 2-position, 6-port Vertical Port Switching</li> <li>• 2-position, 10-port Selection (analytical and nano scale)</li> <li>• 6-position, 7-port Selection</li> </ul>	1/32" or 1/16" OD	127
<b>MXS Modules: Low Pressure (&lt;125 psi)</b>	<ul style="list-style-type: none"> <li>• 2-position, 6-port Switching</li> <li>• 2-position, 6-port Double 3-Way Switching</li> <li>• 6-position, 7-port Selection</li> <li>• 10-position, 11-port Selection</li> </ul>	1/16" or 1/8" OD	141
<b>Manual Sample Injectors</b>	<ul style="list-style-type: none"> <li>• Dual Mode Analytical, Micro and Preparative Scale Injector</li> <li>• Single Mode Analytical and Micro Scale Injectors</li> </ul>	0.020", 1/16" or 1/8" OD	131 – 132
<b>Manual Switching Valves</b>	<ul style="list-style-type: none"> <li>• 2-position, 6-port Switching</li> <li>• 2-position, 6-port 3-Way and 4-Way Switching</li> <li>• 6-position, 7-port Selection</li> </ul>	1/16" or 1/8" OD	133

Genuine Rheodyne valve accessories are also featured in this chapter. Please see the pages indicated below for more information on these valve consumables:

- ▶ Vespel®, ETFE, and PEEK™ rotor seals; stainless steel, PEEK, and propriety material stators (page 134)
- ▶ Rheodyne RheBuild® Kits (page 135)
- ▶ Stainless steel and PEEK sample loops (page 136 and 137)
- ▶ Needle port accessories, mounting brackets, and the IDEX Wrench (page 139 and 140)



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## MXT Valves for Fast Chromatography

- ▶ Valves for proprietary ultra-high performance applications
- ▶ Can withstand up to 15,000 psi (1,034 bar)
- ▶ Made from combination UltraLife™ material
- ▶ Available in a two-position and a six-position version
- ▶ Designed for use Rapid Replacement Pod™ for quick and easy maintenance



## MXP High Pressure Valves for HPLC

- ▶ Switching, selection, and injection valve models
- ▶ Can withstand up to 6,000 psi (414 bar)
- ▶ Chemically compatible for use with most mobile phase compositions
- ▶ Available with analytical and nano-scale flow paths



## Related Products

- ▶ VHP Fittings on pages 6 – 7
- ▶ Fittings for Coned Ports on pages 10 – 17
- ▶ Fittings for M4 Ports on page 12
- ▶ Tubing Sleeves to connect capillary tubing into 1/16" or 1/32" OD ports on page 20



**Top Seller** SEE STARRED PRODUCTS

Please note: flow paths for the MX Series II™ modules can be viewed on page 128.

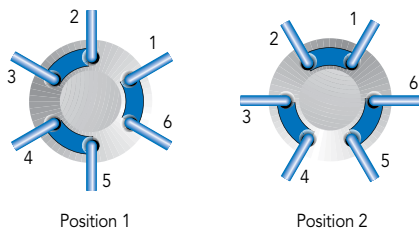
## Specifications

<b>Flow Passages</b>	Nano: 0.10 mm (0.004") diameter Analytical: 0.25 mm (0.010") diameter
<b>Power Requirements</b>	100–120 V <sub>AC</sub> , 50–60 Hz
<b>Regulatory Compliance</b>	CE Mark
<b>Remote Control</b>	USB, i°C, BCD, Level Logic
<b>Operating Temperature</b>	0 °– 40 °C, non-condensing
<b>Storage Temperature</b>	0 °– 75 °C
<b>Dimensions ( H x W x D )</b>	117 mm x 76 mm x 128 mm (4.6" x 3.0" x 5.0")

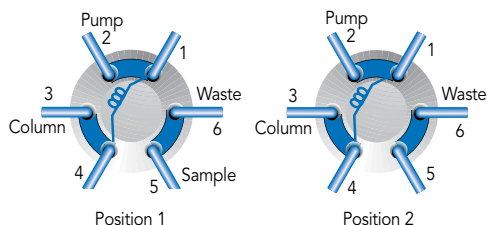
Part No.	Description	Pressure Rating	Connections	Wetted Material	Rapid Replacement Pod
<b>MXT HPLC VALVES</b>					
★ MXT715-000	2-position, 6-port, Switching Valve, MX, TitanHT™, VHP	15,000 psi (1,035 bar)	10-32 ports for 1/16" OD Tubing	UltraLife	PD715-000
MXT715-102	2-position, 10-port, Switching Valve, MX, TitanHT, VHP	15,000 psi (1,035 bar)	10-32 ports for 1/16" OD Tubing	UltraLife	PD715-102
MXT715-105	6-position, 7-port, Selection Valve, MX, TitanHT, SEL	15,000 psi (1,035 bar)	10-32 ports for 1/16" OD Tubing	UltraLife	PD715-105
<b>MXP HPLC VALVES</b>					
MXP7900-000	2-position, 6-port, Switching Valve, MX, TitanHP™	6,000 psi (410 bar)	10-32 ports for 1/16" OD Tubing	DuraLife®*	PD7900
MXP7920-000	2-position, 6-port, Vertical Port Injector, MX, TitanHP, VP	6,000 psi (410 bar)	10-32 ports for 1/16" OD Tubing	DuraLife	PD7920
MXP7960-000	2-position, 10-port, Switching Valve, MX, TitanHP	6,000 psi (410 bar)	10-32 ports for 1/16" OD Tubing	DuraLife	PD7960
MXP7970-000	6-position, 7-port, Selection Valve, MX, TitanHP	6,000 psi (410 bar)	10-32 ports for 1/16" OD Tubing	DuraLife II**	PD7970
MXP7980-000	2-position, 6-port, Nano Switching Valve, MX, TitanHP	6,000 psi (410 bar)	M4 ports for 1/32" OD Tubing	DuraLife II	PD7980
MXP7986-000	2-position, 10-port, Nano Switching Valve	6,000 psi (410 bar)	M4 ports for 1/32" OD Tubing	DuraLife II	PD7986
★ MXP9900-000	2-position, 6-port, Biocompatible Switching Valve, MX, TitanHP, SEL	6,000 psi (410 bar)	10-32 ports for 1/16" OD Tubing	PEEK™	PD9900
MXP9960-000	2-position, 10-port, Biocompatible Switching Valve, MX, TitanHP	6,000 psi (410 bar)	10-32 ports for 1/16" OD Tubing	PEEK	PD9960

\* Duralife is a propriety material combination of SST and an advanced polymer.

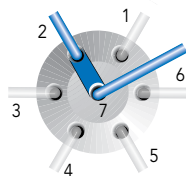
\*\*Duralife II is a propriety material combination consisting of Titanium and an advanced polymer.



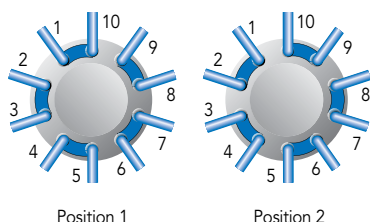
Flow path of MX Series II™ Two-Position, Six-Port Switching Valve



Flow path of MX Series II Two-Position, Six-Port as an Injection Valve



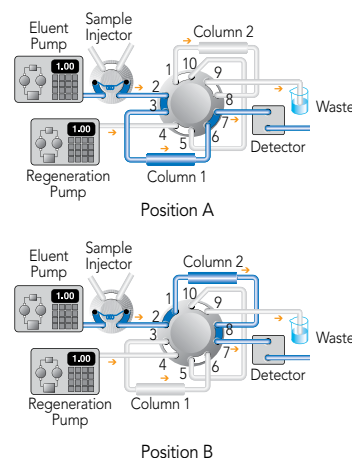
Flow path of MX Series II Six-Position, Seven-Port Selector Valve



Flow path of MX Series II Two-Position, Ten-Port Switching Valve

## Application Note

The high pressure MX Series II can increase sample throughput and laboratory productivity by automating HPLC applications. These applications can be automated with the addition of the high pressure MX Series II valve to an existing HPLC System, saving money and allowing for simple connections with little set-up time.



Alternating column regeneration using  
Rheodyne® Two-Position, Ten-Port MXP Module  
(P/N MXP7960-000, page 127)

Part No.	Description	Qty.		
REPLACEMENT PODS				
PD715-000	Rapid Replacement Pod™ for MXT715-100	ea.		
PD715-102	Rapid Replacement Pod for MXT715-102	ea.		
PD715-105	Rapid Replacement Pod for MXT715-105	ea.		
PD7900	Rapid Replacement Pod for MXP7900-000	ea.		
PD7920	Rapid Replacement Pod for MXP7920-000	ea.		
PD7960	Rapid Replacement Pod for MXP7960-000	ea.		
PD7970	Rapid Replacement Pod for MXP7970-000	ea.		
PD7980	Rapid Replacement Pod for MXP7980-000	ea.		
PD7986	Rapid Replacement Pod for MXP7986-000	ea.		
PD9900	Rapid Replacement Pod for MXP9900-000	ea.		
PD9960	Rapid Replacement Pod for MXP9960-000	ea.		
REPLACEMENT FITTINGS				
6000-209	Stainless Steel Standard Fittings, with 6000-210 Ferrules, 1/16", 10-32	10-pk		
6000-282	RheFlex® One-piece Fittings, 1/16", 10-32, PEEK™, Natural	10-pk		
6000-360	M4 RheFlex Fittings, 1/32", PEEK, Natural	10-pk		
FAST CHROMATOGRAPHY SAMPLE LOOPS				
Part No.	Description	Pressure Rating	Volume	Qty.
7755-300	Stainless Steel Sample Loop	30,000 psi (2,070 bar)	5 µL	ea.
7755-301	Stainless Steel Sample Loop	30,000 psi (2,070 bar)	10 µL	ea.
7755-302	Stainless Steel Sample Loop	30,000 psi (2,070 bar)	20 µL	ea.
7755-303	Stainless Steel Sample Loop	30,000 psi (2,070 bar)	50 µL	ea.
7755-304	Stainless Steel Sample Loop	30,000 psi (2,070 bar)	100 µL	ea.
REPLACEMENT FITTINGS				
VHP-200x	VHP Stainless Steel Fitting for 1/16" OD tubing	30,000 psi (2,070 bar)		10-pk
VHP-320x	VHP Reusable Fitting for 1/16" OD tubing	25,000 psi (1,724 bar)		10-pk

## Sample Injectors

### How to Choose a Sample Injector

Table I below compares the characteristics of Rheodyne® manual sample injectors and will help you choose the most suitable model.

### Types and Capabilities

Models ending in 25 (i.e. 7725) are dual mode injectors. Dual mode injectors can use both the partial-filling and the complete-filling method for loading the sample loop (See the "Sample Loop Loading" Application Note on page 131). They are variable volume injectors because they allow the loading of various sample volumes. These dual mode injectors, also called front-loading injectors, have a needle port for loading sample built into the handle. The unique injection port design allows the tip of the needle to connect directly to the sample loop for no sample loss during loading.

Models ending in 10 (i.e. 7010) are single mode injectors. Single mode injectors use only the complete-filling method to load the sample loop. They are called fixed loop injectors as the sample loop size determines the sample volume. These injectors require a Loop Filler Port accessory (page 139), as a needle port is not built into the valve handle. There is not a direct connection between the syringe and the sample loop. Therefore, an excess of sample must be used to overfill the Loop Filler Port and completely fill the sample loop.

Models with an "i" suffix (i.e. 7725i) are identical to the models with the same numbers but the "i" designates a built-in position sensing switch. The switch provides the chromatograph with a reproducible start signal to mark the injection time in the data system.

The reproducibility of manual sample injectors depends on operator skill, syringe calibration, and the loading method. Partial-filling method is typically reproducible to 1.0% relative standard deviation (RSD). Complete-filling method is reproducible to 0.1% RSD for loops  $\geq 5 \mu\text{L}$ .

### Scale, Sample Volume, and Loop Size

Analytical scale models are for conventional columns with samples from 1.0  $\mu\text{L}$  to 5.0 mL. Microscale models are for 1.0 mm and 2.0 mm inner diameter columns. Model 8125 has a sample range of 0.1  $\mu\text{L}$  to 500  $\mu\text{L}$ , and can be used for both analytical and micro columns. Preparative scale models are for columns with diameters from 1 to 10 cm, and operate at high flow rates with samples from 100  $\mu\text{L}$  to 20 mL.

### Liquid Contact Materials

All models have a polymeric rotor seal of Vespel® (pH 0 to 10 tolerance), ETFE or PEEK™ (both pH 0 to 14). Stators are 316 stainless steel or PEEK. Most models have an inert ceramic stator face assembly.

### Make-Before-Break (MBB®)

Models incorporating Rheodyne's MBB architecture design provide uninterrupted flow when switching between LOAD and INJECT positions. MBB greatly reduces transient pressure shocks and is beneficial for flow-sensitive detectors, fragile columns, and pumps. Models 7725, 9725, 3725, and "i" versions contain the MBB design.

### Replacement Parts

Genuine Rheodyne parts are available for easy maintenance of your Rheodyne valve. RheoBuild® Kits offer a complete solution to keep your valve running, providing all necessary parts to rebuild your valve and easy to use step by step instructions to assist you in the process. Rheodyne also offers a complete line of sample loops, fittings, and accessories designed specifically for the Rheodyne valve.

## Characteristics of Rheodyne Manual Sample Injectors

Type & Capabilities	Scale	Partial Filling Volumes (Range)	Sample Loop Sizes (Range)	Wetted Materials	Max. psi (bar) <sup>1</sup>	Max. T (°C)	MBB <sup>2</sup>	Model <sup>3</sup>
Dual Mode Can load the loop by two methods: 1) Partial filling – syringe determines volume without wasting sample 2) Complete filling – loop determines volume by over filling loop	Analytical	1 $\mu\text{L}$ – 2.5 mL 1 $\mu\text{L}$ – 5.0 mL	2 $\mu\text{L}$ – 5.0 mL 2 $\mu\text{L}$ – 10 mL	316 SST, Vespel PEEK, ETFE, ceramic	7,000 (483) 5,000 (340)	80° 50°	Yes Yes	7725, 7725i 9725, 9725i
	Micro	0.1 $\mu\text{L}$ – 500 $\mu\text{L}$	5 $\mu\text{L}$ – 1.0 mL	316 SST, PEEK, Vespel, ceramic	7,000 (483)	80°	No	8125
	Preparative	100 $\mu\text{L}$ – 10 mL	2.0 mL – 20 mL	316 SST, PEEK PEEK	5,000 (340) 4,000 (276)	50° 50°	Yes Yes	3725(i)-038 3725, 3725i
	Analytical	Not Applicable	5 $\mu\text{L}$ – 5.0 mL 5 $\mu\text{L}$ – 10 mL	316 SST, Vespel PEEK, ETFE, Ceramic	7,000 (483) 5,000 (340)	80° 50°	No No	7000 9010
Single Mode Can load the loop by one method: Complete filling – loop determines volume by over filling loop	Micro	Not Applicable	0.5 $\mu\text{L}$ – 5 $\mu\text{L}$ 0.2 $\mu\text{L}$ – 1 $\mu\text{L}$	316 SST, Vespel 316 SST, Vespel	7,000 (483) 7,000 (483)	80° 80°	No No	7410 7520

SST = Stainless Steel

<sup>1</sup> This is the maximum pressure to which the valve can be adjusted. Some models are shipped from the factory set for lower pressures.

<sup>2</sup> MBB (Make-Before-Break) is a design that provides uninterrupted flow when switching between LOAD and INJECT. MBB also greatly reduces transient pressure shocks.

<sup>3</sup> Models with an "i" suffix have a built-in position sensing switch. Models 8125 and 9010 also have a built-in switch.

## High Pressure Switching Valves

High pressure manual switching valves simplify procedures and improve the speed, resolution, and sensitivity of HPLC analysis. The switching valves are available in 316 stainless steel and PEEK™, with a choice of 1.6 mm (1/16") or 3.2 mm (1/8") ports. See Table on page 132 for valve specifications.

### Column Selection

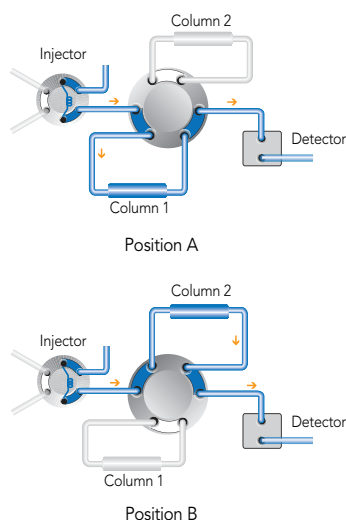
The six-position switching valves are used for column selection. These valves substitute one column for another without the need to manually disconnect the plumbing. This makes it easy to designate a separate column for each analysis, which helps eliminate equilibration delays, reduce interferences and prolong column life. Turning the valve handle selects the column desired for a particular analysis. Columns switched to off-line are automatically sealed at both ends.

### Column Switching

The two-position switching valves can be used to reroute mobile phase during the chromatographic run without changing separation techniques. They can also be used to perform sequential separations with different columns and/or mobile phases.

Although the model 7000 is the most commonly used and versatile switching valve, other models have specific uses such as for three-way or four-way switching patterns.

Many models have flow passages available in both standard bore and large bore (designated with an "L" suffix). L models use 1/16" fittings and tubing but have larger flow passage diameters than non-L models. As such, L models can accommodate higher flow rates. Large bore tubing can be used when the pressure drop must be limited. Large bore valves have a lower pressure drop than standard bore valves when both valve sizes accommodate the same flow rate.



Column Selection Using a 2-Position, 6-Port Switching Valve

## 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  $\leq 0.25$  mm (0.010") is recommended.

Consider a system with injector 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 (injector  $\rightarrow$  column  $\rightarrow$  detector) with no valve in the system. In Schemes B and C, two model 7060 Six-Position Switching Valves were placed side by side (injector  $\rightarrow$  valve #1  $\rightarrow$  column  $\rightarrow$  valve #2  $\rightarrow$  detector).

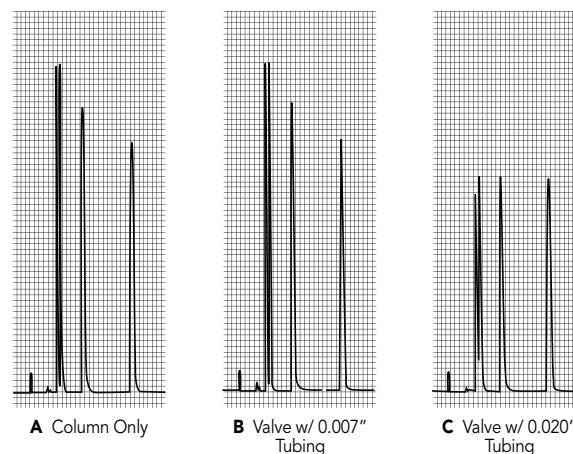
The injector and detector were connected to these valves by the same tubing used in the control. The extra tubing pieces required to connect the valves to the column were a 10 cm length for valve #1-to-column, and a 35 cm length for column-to-valve #2. The diameters of these tubes are indicated in the experimental details, below.

### Comparison of Observed Column Plates of Rheodyne® Analytical and MicroScale Injectors

	7725	8125	$\Delta$
$k' = 0.6$	2930	5054	72%
$k' = 1.5$	4653	6904	48%
$k' = 7.9$	7875	8305	5.0%

UV detector: 1  $\mu$ L volume, 4 mm path. Sample volume: 2  $\mu$ L, partial-filling method.  
Column: 2 mm ID x 100 mm long, 4  $\mu$ m C-18. True plates of column = 11,570.

### Effects of Valves and Tubing on Resolution



These chromatograms show the loss of resolution caused by the addition of two model 7060 column selection valves when using connection tubes of two different inside diameters. Conditions for all cases: 4.6 mm x 12.5 cm column, 5  $\mu$ m C-18 packing, 50% acetonitrile in water, 2.0 mL/min, 21 °C, 5.0  $\mu$ L sample partial filled into a model 7125 injector, 10 cm x 0.18 mm (0.007") bore injector outlet tube (to column or valve), 10 cm x 0.18 mm bore detector inlet tube (from column or valve), low dispersion 1.0 cm path UV detector cell, 0.2 sec detector time constant. See text above for details.

## High Pressure Dual Mode Sample Injectors

Models 7725(i), 9725(i), 8125, and 3725(i)-038

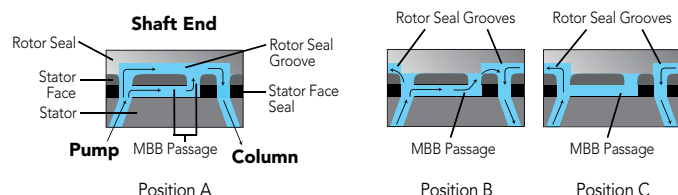
- ▶ 316 stainless steel
- ▶ Available in analytical, micro, and preparative scale
- ▶ Make-Before-Break (MBB<sup>®</sup>) architecture allows continuous flow between LOAD and INJECT positions which greatly reduces transient pressure shocks that disrupt your system
- ▶ Wide, 30° port angles offer easier access to fittings using the IDEX Wrench (Part No. 6810 on page 140)
- ▶ Front-end pressure screw makes it easy to adjust and maintain pressure
- ▶ A built-in position sensing switch ("i" versions) provides the chromatograph with a reproducible start signal



The MBB valve design is illustrated below. In the LOAD position, mobile phase flow from pump port to column port travels through both the rotor seal groove and the MBB passage (Position A). As the rotor seal grooves rotate to change from LOAD to INJECT, there is continuous mobile phase flow through both one rotor seal groove and the MBB passage (Position B) until the rotation stops and both rotor seal grooves are connected by the loop. Sample flow begins through the loop to the column just as all flow stops through the MBB passage (Position C). Sample flow never enters the MBB passage. Valve flow passages are 0.6 mm (0.024") in diameter.

### Make-Before-Break Design

Flow paths of model 7725(i) and 9725(i) with MBB design



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### 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

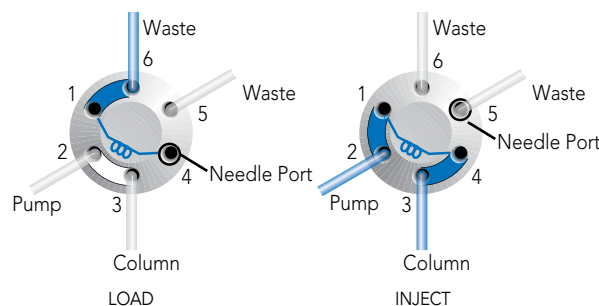
Use the complete-filling method if you have plenty of sample, if you do not vary sample volume, or if you need high reproducibility.

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<sup>®</sup> sample injectors use this method?"

**A:** There are two types of injectors available: dual mode and single mode. Dual mode injectors allow both partial- and complete-filling whereas single mode injectors allow only complete-filling. See Sample Injectors on pages 129 – 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 injectors 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 injectors 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

Part No.	Description	Pressure Rating	Sample Loop Included	Tubing/Fittings Size	Wetted Material
<b>HIGH PRESSURE MANUAL INJECTORS</b>					
<b>3725</b>	Preparative Scale Dual Mode Injector	4,000 psi (276 bar)	10 mL	5/16-24 ports for 1/8" Tubing	PEEK™
<b>3725-038</b>	Preparative Scale Dual Mode Injector	5,000 psi (345 bar)	10 mL	5/16-24 ports for 1/8" Tubing	Stainless Steel
<b>3725i</b>	Preparative Scale Dual Mode Injector with Switch	4,000 psi (276 bar)	10 mL	5/16-24 ports for 1/8" Tubing	PEEK
<b>3725i-038</b>	Preparative Scale Dual Mode Injector with Switch	5,000 psi (345 bar)	10 mL	5/16-24 ports for 1/8" Tubing	Stainless Steel
★ <b>7725</b>	Analytical Scale Dual Mode Sample Injector	5,000 psi (345 bar)	20 µL	10-32 ports for 1/16" OD Tubing	Stainless Steel
★ <b>7725i</b>	Analytical Scale Dual Mode Sample Injector, with Switch	5,000 psi (345 bar)	20 µL	10-32 ports for 1/16" OD Tubing	Stainless Steel
<b>8125*</b>	Micro Scale Dual Mode Sample Injector with Switch	5,000 psi (345 bar)	5 µL	10-32 ports for 0.020" (0.5 mm) or 1/16" Tubing	Stainless Steel
<b>9725</b>	Analytical Scale Dual Mode Sample Injector	5,000 psi (345 bar)	20 µL	10-32 ports for 1/16" OD Tubing	PEEK
★ <b>9725i</b>	Analytical Scale Dual Mode Sample Injector with Switch	5,000 psi (345 bar)	20 µL	10-32 ports for 1/16" OD Tubing	PEEK

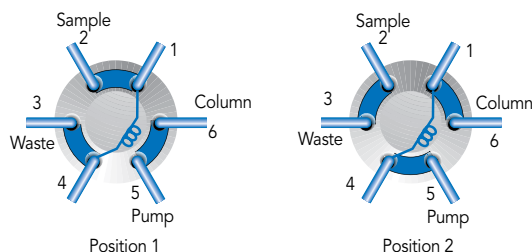
\*The 8125 requires special ferrules for 0.020" (0.5 mm) tubing. 8125-084 – 0.5 mm ferrule for 8125; 8125-086 – 0.5 mm ferrule for 8125 - 4-pk.



## High Pressure Single Mode Injectors and Switching Valves

### Models 7000(L), 7010, 3000-038, 3000 and 9010

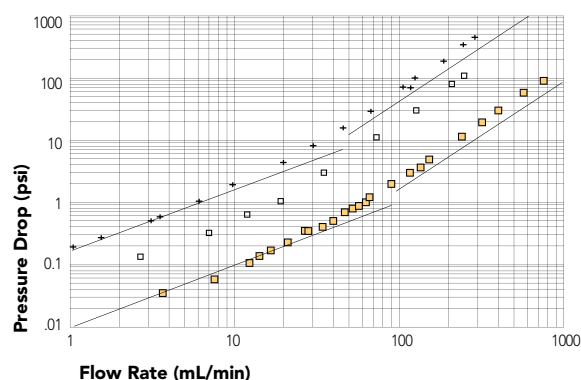
- Analytical and preparative scale available
- Stainless steel and PEEK™ materials
- Applicable for sample injection, column switching, and sample enrichment applications
- Field adjustable up to 7,000 psi (models 7000 and 9000 only)



Flow path of Two-Position, Six-Port Injection Valve



### Pressure Drop vs. Flow Rate



Pressure drop vs. flow rate for model 7000 and model 7000L (large-bore) valves; water at 20 °C. Experimental measurements: The flow channel is one stator inlet port, one rotor seal groove, one stator outlet port and two connecting tubes. Solid squares = (1.0 mm 7000L valve) + (two 1.0 mm x 5.0 cm tubes). Open squares = (0.6 mm 7000 valve) + (two 1.0 mm x 5.0 cm tubes). Cross mark = (0.6 mm 7000 valve) + (two 0.5 mm x 5.0 cm tubes). Solid lines are theoretical values for 10 cm long tubes of 1.0 mm and 0.5 mm ID. Pressure drop is in units of psi.

## Specifications

Model	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	1.0 mm (0.040")	4,000 psi (276 bar)	5,000 psi (340 bar)	50°
7000, 7010	0.6 mm (0.024")	5,000 psi (340 bar)	7,000 psi (483 bar)	80°
7000L	1.0 mm (0.040")	3,000 psi (207 bar)	5,000 psi (340 bar)	80°
7060L	1.0 mm (0.040")	3,000 psi (207 bar)	5,000 psi (340 bar)	80°

SST = Stainless Steel

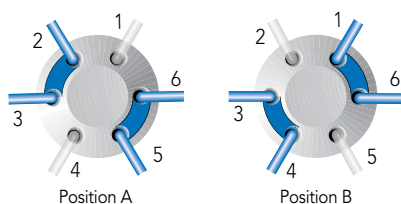
Part No.	Description	Tubing/Fitting Size	Wetted Material
<b>HIGH PRESSURE SINGLE MODE INJECTORS AND SWITCHING VALVES</b>			
<b>3000</b>	2-position, 6-port Switching Valve, Preparative Scale	5/16-24 Ports for 1/8" Tubing	PEEK
<b>3000-038</b>	2-position, 6-port Switching Valve, Preparative Scale	5/16-24 Ports for 1/8" Tubing	Stainless Steel
<b>7000</b>	2-position, 6-port Switching Valve, Large Bore	10-32 Ports for 1/16" OD Tubing	Stainless Steel
<b>7000L</b>	2-position, 6-port Switching Valve, Large Bore	10-32 Ports for 1/16" OD Tubing	Stainless Steel
<b>7010</b>	2-position, 6-port Single Mode Injector*	10-32 Ports for 1/16" OD Tubing	Stainless Steel
<b>9010</b>	2-position, 6-port Switching Valve Single Mode Injector*	10-32 Ports for 1/16" OD Tubing	PEEK

\*Ships with a 20 µL sample loop attached to ports 1 and 4.

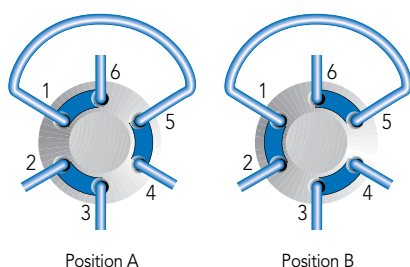
## High Pressure Two- and Six-Position Switching Valves

**Models 7030(L), 7040(L), 7060(L), 3030-038, 9030, 9060, and 3030**

- Available in 3, 4, and 6 way configurations
- Pressure rating 4,000 psi to 7,000 psi (maximum field set pressure)
- Stainless steel and PEEK™ materials
- Analytical and preparative scale available



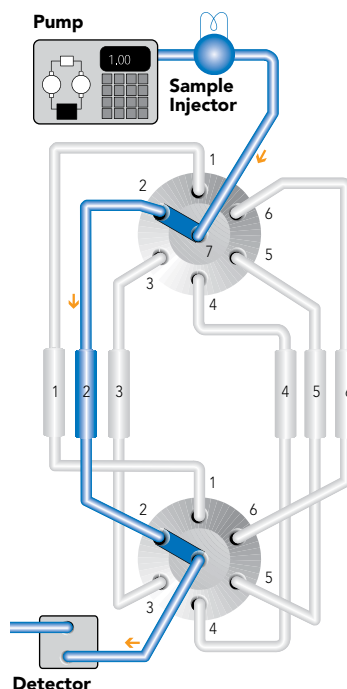
Flow path of Three-Way Switching Valve



Flow diagram of a Four-Way Switching Valve

## Application Note

Six column selection using two model 7060 switching valves.



Please Note: The valves on this page ship with one set of 10-32 (1/16") or 5/16-24 (1/8") RheFlex® Two-Piece Fittings. The material of these accessories match that of the stator material. Replacements and alternatives are available on pages 13 and 14.

## Specifications

Part No.	Stator Passage Diameter	Factory Set Pressure	Maximum Field Set Pressure	Maximum Temperature (°C)
3030 (PEEK)	1.0 mm (0.040")	3,000 psi (207 bar)	4,000 psi (276 bar)	50°
3030-038 (SST)	1.0 mm (0.040")	4,000 psi (276 bar)	5,000 psi (340 bar)	50°
7030, 7040 (SST)	0.6 mm (0.024")	5,000 psi (340 bar)	7,000 psi (483 bar)	80°
7030L, 7040L (SST)	1.0 mm (0.040")	3,000 psi (207 bar)	5,000 psi (340 bar)	80°
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°
9030, 9060 (PEEK)	0.4 mm (0.016")	5,000 psi (340 bar)	5,000 psi (340 bar)	50°

SST = Stainless Steel

Part No.	Description	Configuration	Tubing/Fitting Size	Wetted Material
<b>HIGH PRESSURE SWITCHING VALVES</b>				
<b>3030</b>	2-Position, 6-Port Switching Valve, Preparative	Double 3-Way	5/16-24 ports for 1/8" OD Tubing	PEEK
<b>3030-038</b>	2-Position, 6-Port Switching Valve, Preparative	Double 3-Way	5/16-24 ports for 1/8" OD Tubing	Stainless Steel
<b>7030</b>	2-Position, 6-Port Switching Valve	Double 3-Way	10-32 ports for 1/16" OD Tubing	Stainless Steel
<b>7030L</b>	2-Position, 6-Port Switching Valve, Large Bore	Double 3-Way	10-32 ports for 1/16" OD Tubing	Stainless Steel
<b>7040</b>	2-Position, 6-Port Switching Valve, Large Bore	4-Way	10-32 ports for 1/16" OD Tubing	Stainless Steel
<b>7040L</b>	2-Position, 6-Port Switching Valve	4-Way	10-32 ports for 1/16" OD Tubing	Stainless Steel
<b>7060</b>	6-Position, 7-port, Switching Valve	6-Way	10-32 ports for 1/16" OD Tubing	Stainless Steel
<b>7060L</b>	6-Position, 7-Port, Switching Valve, Large Bore	6-Way	10-32 ports for 1/16" OD Tubing	Stainless Steel
<b>9030</b>	2-Position, 6-Port Switching Valve	Double 3-Way	10-32 ports for 1/16" OD Tubing	PEEK

## Rotor Seals and 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.

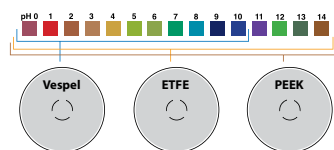
Stators are available in 316 stainless steel, PEEK™ and proprietary materials. Stators need replacement only if the ports or sealing surfaces become damaged. Avoid damage from use of improper injection needles by referring to the "Using Proper Syringe Needles" Application Note on page 139.



Please Note: Rotor seals for MX Series II™ Modules are available in RheBuild® Kits on page 135. Stators for MX Series II Modules are available on this page. MX (Series I) Module rotor seals are available in RheBuild Kits on page 135. Stators are available at [www.idex-hs.com](http://www.idex-hs.com).

### 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.



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Part No.	For Valve Model No.	Description
<b>VESPEL BLEND ROTOR SEALS</b>		
<b>7000-016</b>	7000L, 7040L	Vespel Rotor Seal
<b>7010-039</b>	7010, 7000, 7040	Vespel Rotor Seal
★ <b>7030-003</b>	7030	Vespel Rotor Seal
<b>7030-014</b>	7030L	Vespel Rotor Seal
<b>7060-070</b>	7060, 7066	Vespel Rotor Seal
<b>7060-064</b>	7060L	Vespel Rotor Seal
<b>7125-047</b>	7125, 7725	Vespel Rotor Seal
<b>7410-038</b>	7410	Vespel Rotor Seal
<b>7413-013</b>	7413	Vespel Rotor Seal
<b>8125-038</b>	8125	Vespel Rotor Seal

Part No.	For Valve Model No.	Description
<b>ETFE BLEND ROTOR SEALS</b>		
<b>7000-017</b>	7000L, 7040L	ETFE Rotor Seal
<b>7010-071</b>	7010, 7010-087, 7000, 7040	ETFE Rotor Seal
<b>7030-015</b>	7030	ETFE Rotor Seal
<b>7060-074</b>	7060, 7066, 9060	ETFE Rotor Seal
<b>7060-067</b>	7060L	ETFE Rotor Seal
<b>7125-079</b>	7125, 7125-081, 7725	ETFE Rotor Seal
<b>7410-075</b>	7410	ETFE Rotor Seal
<b>8125-097</b>	8125	ETFE Rotor Seal
<b>9010-051</b>	9010	ETFE Rotor Seal
<b>9125-082</b>	9125, 9725	ETFE Rotor Seal
<b>PEEK BLEND ROTOR SEALS</b>		
<b>3030-005</b>	3030, 3030-038	PEEK Rotor Seal
<b>3710-008</b>	3000, 3000-038, 3710, 3710-038	PEEK Rotor Seal
<b>3725-018</b>	3725, 3725-038	PEEK Rotor Seal
<b>9010-065</b>	7010, 9010	PEEK Rotor Seal
<b>8125-119</b>	8125	PEEK Rotor Seal
<b>9125-095</b>	9125, 9725	PEEK Rotor Seal
<b>STATORS FOR MX SERIES II MODULES</b>		
<b>7123-548</b>	MXT715-000	Stator
<b>7123-550</b>	MXT715-105	Stator
<b>7123-568</b>	MXT715-102	Stator
<b>7770-229</b>	MXP7920-000	Stator
<b>7980-004</b>	MXP7980-000	Stator
<b>7986-004</b>	MXP7986-000	Stator
<b>7900-146</b>	MXP9900-000	Stator
<b>7900-179</b>	MXP7900-000	Stator
<b>7900-183</b>	MXP7970-000	Stator
<b>7960-014</b>	MXP7960-000	Stator
<b>9960-002</b>	MXP9960-000	Stator
<b>STATORS FOR OTHER RHEODYNE VALVES</b>		
<b>3725-006</b>	3725, 3710-038, 3000-038 and 3030-038	Stator
<b>3725-085</b>	3725-038, 3710-038, 3000-038 and 3030-038	Stator
<b>7010-069</b>	7000L, 7030L, 7040L	Stator
<b>7010-040</b>	7010, 7125, 7000, 7030 and 7040	Stator
<b>7010-066</b>	7125-081 and 7010-087	Stator
<b>7060-039</b>	7060 and 7066	Stator
<b>7060-065</b>	7060L	Stator
<b>7123-047</b>	PR/EV500-100	Stator
<b>7123-127</b>	PR/EV750-107	Stator
<b>7123-128</b>	PR/EV700-107	Stator
<b>7123-142</b>	PR/EV500-104	Stator
<b>7123-145</b>	PR/EV550-104	Stator
<b>7123-147</b>	PR/EV550-100	Stator
<b>7123-148</b>	PR/EV500-101	Stator
<b>7123-149</b>	PR/EV550-101	Stator
<b>7123-180</b>	PR703-100 and EV700-105	Stator
<b>7123-221</b>	PR753-100 and EV750-105	Stator
<b>7123-223</b>	PR/EV700-112	Stator
<b>7123-390</b>	EV200-102	Stator
<b>7410-041</b>	7410 and 7413	Stator
<b>7520-030 (inlet)</b>	7520	Stator
<b>7520-035 (outlet)</b>	7520	Stator
<b>7650-002</b>	PR/EV700-102	Stator
<b>7725-010</b>	7725(i)	Stator
<b>7750-070</b>	7750	Stator
<b>7750-038</b>	PR/EV700-100	Stator
<b>8125-098</b>	8125	Stator
<b>9060-016</b>	9060	Stator
<b>9125-043</b>	9125, 9010, 9030 and 9725(i)	Stator
<b>9650-009</b>	PR/EV750-102	Stator
<b>9750-021</b>	PR/EV750-100	Stator

## 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.



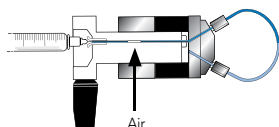
### Application Note

#### How to Avoid Pressure Transients

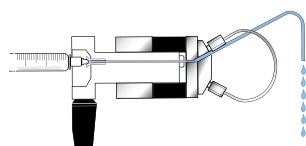
Air in the sample loop can cause an instantaneous system pressure drop that eventually returns to a normal level. Air causes the pressure to drop when the injector moves from the LOAD to the INJECT position. When large sample loops ( $\geq 100 \mu\text{L}$ ) are partially loaded, air present in the needle 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](http://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 139) when the injector is in INJECT

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Part No.	Description
<b>RHEBUILD KITS FOR MX SERIES II™ VALVES</b>	
7150-999	RheBuild Kit for MXT715-000
7152-999	RheBuild Kit for MXT715-102
7155-999	RheBuild Kit for MXT715-105
7920-999	RheBuild Kit for MXP7920-000 and MXP7900-000
7960-999	RheBuild Kit for MXP9960-000
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
<b>RHEBUILD KITS FOR MANUAL VALVES</b>	
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
7010-999	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
7725-999	RheBuild Kit for models 7725 and 7725i
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
<b>RHEBUILD KITS FOR MX SERIES I™ VALVES</b>	
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
<b>RHEBUILD KITS FOR LABPRO™ &amp; EV AUTOMATED FLUIDIC INSTRUMENTS</b>	
1001-999	RheBuild Kit for model PR100-101
1005-999	RheBuild Kit for model PR/EV100-105
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



## 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" ( $\pm 0.025$  mm) tolerance of the metal tubing bore.

Accuracy of large metal loops (1.0 mm, 0.040" bore) is about  $\pm 5\%$ , intermediate loops (0.5 mm, 0.020" bore)  $\pm 10\%$ , and small loops (0.2 mm, 0.007" bore)  $\pm 30\%$ .

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 131.

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  $\mu$ L to 50  $\mu$ L range. The 8125 sample loops are made with 0.5 mm (0.020") OD tubing.

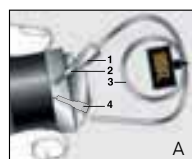


## Application Note

### 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:

- 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.
- Insert the tubing into port (4). Confirm that the tubing is bottomed in the valve port as shown in Figure A.
- While firmly pressing down on the tubing, hand-tighten the nut as tight as possible.
- With the IDEX Wrench (see pages 33 and 140), designed especially for fittings, tighten one quarter turn past finger tight. Remove the loop to confirm the ferrule is swaged onto the tube.
- Repeat steps a-d with the other end of the loop while the swaged end remains outside the valve port. See Figure B.
- Reinstall each end of the loop to their respective ports. See Figure C.

Part No.	Volume	Tubing
<b>RHEODYNE® STAINLESS STEEL LOOPS FOR MXT 715-000</b>		
<b>7755-300</b>	5 $\mu$ L Sample Loop	0.18 mm (0.007") ID x 1/16" OD
<b>7755-301</b>	10 $\mu$ L Sample Loop	0.30 mm (0.012") ID x 1/16" OD
<b>7755-302</b>	20 $\mu$ L Sample Loop	0.30 mm (0.012") ID x 1/16" OD
<b>7755-303</b>	50 $\mu$ L Sample Loop	0.51 mm (0.021") ID x 1/16" OD
<b>7755-304</b>	100 $\mu$ L Sample Loop	0.51 mm (0.021") ID x 1/16" OD
<b>RHEODYNE STAINLESS STEEL LOOPS FOR 7125, 7010 INJECTORS (DO NOT USE FOR 7725)</b>		
<b>1876</b>	10 mL Sample Loop	2.0 mm (0.080") ID x 1/8" OD
<b>1877</b>	20 mL Sample Loop	2.0 mm (0.080") ID x 1/8" OD
<b>7020</b>	5 $\mu$ L Sample Loop	0.18 mm (0.007") ID x 1/16" OD
<b>7021</b>	10 $\mu$ L Sample Loop	0.30 mm (0.012") ID x 1/16" OD
<b>7022</b>	20 $\mu$ L Sample Loop	0.51 mm (0.020") ID x 1/16" OD
<b>7023</b>	50 $\mu$ L Sample Loop	0.51 mm (0.020") ID x 1/16" OD
<b>7024</b>	100 $\mu$ L Sample Loop	0.51 mm (0.020") ID x 1/16" OD
<b>7025</b>	200 $\mu$ L Sample Loop	0.76 mm (0.030") ID x 1/16" OD
<b>7026</b>	500 $\mu$ L Sample Loop	0.76 mm (0.030") ID x 1/16" OD
<b>7027</b>	1.0 mL Sample Loop	0.76 mm (0.030") ID x 1/16" OD
<b>7028</b>	2.0 mL Sample Loop	1.0 mm (0.040") ID x 1/16" OD
<b>7029</b>	5.0 mL Sample Loop	1.0 mm (0.040") ID x 1/16" OD
<b>RHEODYNE STAINLESS STEEL LOOPS FOR 3725-038, 3725i-038 INJECTORS (DO NOT USE FOR 7725)</b>		
<b>3065-018</b>	2.0 mL Sample Loop	2.0 mm (0.080") ID x 1/8" OD
<b>3065-019</b>	5.0 mL Sample Loop	2.0 mm (0.080") ID x 1/8" OD
<b>3065-023</b>	10 mL Sample Loop	2.0 mm (0.080") ID x 1/8" OD
<b>3065-025</b>	20 mL Sample Loop	2.0 mm (0.080") ID x 1/8" OD
<b>RHEODYNE STAINLESS STEEL LOOPS FOR 7725, 7725i, PR/EV700-100, MX MODULE INJECTORS (DO NOT USE FOR 7125)</b>		
<b>1876</b>	10 mL Sample Loop	2.0 mm (0.080") ID x 1/8" OD
<b>1877</b>	20 mL Sample Loop	2.0 mm (0.080") ID x 1/8" OD
<b>7755-020</b>	5 $\mu$ L Sample Loop	0.18 mm (0.007") ID x 1/16" OD
<b>7755-021</b>	10 $\mu$ L Sample Loop	0.30 mm (0.012") ID x 1/16" OD
<b>7755-022</b>	20 $\mu$ L Sample Loop	0.30 mm (0.012") ID x 1/16" OD
<b>7755-023</b>	50 $\mu$ L Sample Loop	0.51 mm (0.020") ID x 1/16" OD
<b>7755-024</b>	100 $\mu$ L Sample Loop	0.51 mm (0.020") ID x 1/16" OD
<b>7755-025</b>	200 $\mu$ L Sample Loop	0.76 mm (0.030") ID x 1/16" OD
<b>7755-026</b>	500 $\mu$ L Sample Loop	0.76 mm (0.030") ID x 1/16" OD
<b>7755-027</b>	1.0 mL Sample Loop	0.76 mm (0.030") ID x 1/16" OD
<b>7755-028</b>	2.0 mL Sample Loop	1.0 mm (0.040") ID x 1/16" OD
<b>7755-029</b>	5.0 mL Sample Loop	1.0 mm (0.040") ID x 1/16" OD
<b>RHEODYNE STAINLESS STEEL LOOPS FOR 8125 INJECTOR (USE 7755-024 TO 7755-029 FOR VOLUMES &gt; 50 <math>\mu</math>L)</b>		
<b>8020</b>	5 $\mu$ L Sample Loop	0.20 mm (0.008") ID x 0.020" OD
<b>8021</b>	10 $\mu$ L Sample Loop	0.20 mm (0.008") ID x 0.020" OD
<b>8022</b>	20 $\mu$ L Sample Loop	0.25 mm (0.010") ID x 0.020" OD
<b>8023</b>	50 $\mu$ L Sample Loop	0.30 mm (0.012") ID x 0.020" OD
<b>8125-084</b>	Ferrules for 0.020" (0.5 mm) Tubing	
<b>8125-086</b>	Ferrules for 0.020" (0.5 mm) Tubing, 4-pk	



# Sample Loops

## 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  $\pm 0.05$  mm (0.002") tolerance of the tubing bore. Accuracy of large PEEK loops (0.8 mm, 0.030" bore) is about  $\pm 14\%$ , intermediate loops (0.5 mm, 0.020")  $\pm 21\%$ , and small loops (0.2 mm, 0.007")  $\pm 65\%$ .

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/MICI® sample injectors. Please refer to the product listing on this page to aid selection.*

## Valco/MICI-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)<sup>1</sup>. The fittings and adapters that accompany the 1/8" OD sample loops are rated to 1,000 psi (69 bar)<sup>1</sup>. Volumes are stated at  $\pm 10\%$ , with exact calibration services available. Each sample loop we calibrate is documented and supplied with a calibration certificate.



<sup>1</sup> 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.

## 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 as 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.
<b>PEEK LOOPS FOR 3725, 3725i INJECTORS</b>			

<b>3055-018</b>	2.0 mL Sample Loop	1.6 mm (0.062") ID x 1/8" OD	N/A
<b>3055-019</b>	5.0 mL Sample Loop	1.6 mm (0.062") ID x 1/8" OD	N/A
<b>3055-023</b>	10 mL Sample Loop	2.0 mm (0.080") ID x 1/8" OD	N/A
<b>3055-025</b>	20 mL Sample Loop	2.0 mm (0.080") ID x 1/8" OD	N/A

<b>PEEK LOOPS FOR 9725, 9010, PR/EV750-100, PR/EV753-100 INJECTORS</b>			
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Part No.	Volume	Bore / Tubing	Valco No.
<b>9055-020</b>	5.0 µL Sample Loop	0.18 mm (0.007") ID x 1/16" OD	SL5CWPK
<b>9055-021</b>	10 µL Sample Loop	0.25 mm (0.010") ID x 1/16" OD	SL10WPK
<b>9055-022</b>	20 µL Sample Loop	0.25 mm (0.010") ID x 1/16" OD	SL20WPK
<b>9055-023</b>	50 µL Sample Loop	0.51 mm (0.020") ID x 1/16" OD	SL50WPK
<b>9055-024</b>	100 µL Sample Loop	0.51 mm (0.020") ID x 1/16" OD	SL100WPK
<b>9055-025</b>	200 µL Sample Loop	0.51 mm (0.020") ID x 1/16" OD	N/A
<b>9055-026</b>	500 µL Sample Loop	0.76 mm (0.030") ID x 1/16" OD	SL500WPK
<b>9055-027</b>	1.0 mL Sample Loop	0.76 mm (0.030") ID x 1/16" OD	SL1KCWPK
<b>9055-028</b>	2.0 mL Sample Loop	0.76 mm (0.030") ID x 1/16" OD	SL2KCWPK
<b>9055-029</b>	5.0 mL Sample Loop	0.76 mm (0.030") ID x 1/16" OD	N/A
<b>9055-033</b>	10 mL Sample Loop	0.76 mm (0.030") ID x 1/16" OD	N/A

<b>PEEK LOOPS FOR 7725, 7725i, PR/EV700-100</b>			
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<b>7123-227</b>	1 µL Sample Loop (model PR/EV700-100 only)	internal groove	N/A
<b>7755-015</b>	2 µL Sample Loop (models 7725 and 7725i only)	internal groove	N/A

### REPLACEMENT RHEFLEX FITTINGS FOR PEEK LOOPS

Part No.	Description	Qty.
<b>6000-078</b>	Nut/Ferrule Set, Natural PEEK, 5/16-24, for 1/8" OD loops	ea.
<b>6000-079</b>	Ferrules, Natural PEEK, for 1/8" OD loops	5-pk
<b>6000-251</b>	Ferrules, Natural PEEK, for 1/16" OD loops	10-pk
<b>6000-254</b>	Nut/Ferrule Sets, Natural PEEK, 10-32, for 1/16" OD loops	10-pk

### VALCO/MICI-COMPATIBLE STAINLESS STEEL LOOPS FOR C6W, EC6W IN.

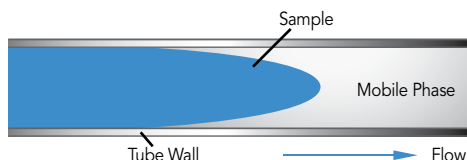
Part No.	Volume	Tubing	Valco No.
<b>1750</b>	5 µL Sample Loop	0.18 mm (0.007") ID x 1/16" OD	SL5CW
<b>1751</b>	10 µL Sample Loop	0.25 mm (0.010") ID x 1/16" OD	SL10CW
<b>1752</b>	15 µL Sample Loop	0.25 mm (0.010") ID x 1/16" OD	SL15CW
<b>1755</b>	20 µL Sample Loop	0.51 mm (0.010") ID x 1/16" OD	SL20CW
<b>1758</b>	25 µL Sample Loop	0.51 mm (0.010") ID x 1/16" OD	SL25CW
<b>1759</b>	50 µL Sample Loop	0.51 mm (0.020") ID x 1/16" OD	SL50CW
<b>1762</b>	100 µL Sample Loop	0.51 mm (0.020") ID x 1/16" OD	SL100CW
<b>1778</b>	200 µL Sample Loop	0.76 mm (0.030") ID x 1/16" OD	N/A
<b>1763</b>	250 µL Sample Loop	0.76 mm (0.030") ID x 1/16" OD	SL250CW
<b>1764</b>	500 µL Sample Loop	0.76 mm (0.030") ID x 1/16" OD	SL500CW
<b>1770</b>	1 mL Sample Loop	0.76 mm (0.030") ID x 1/16" OD	SL1KCW
<b>1772</b>	2 mL Sample Loop	1.02 mm (0.040") ID x 1/16" OD	SL2KCW
<b>1775</b>	5 mL Sample Loop	2.03 mm (0.080") ID x 1/8" OD	SL5KCW
<b>1776</b>	10 mL Sample Loop	2.03 mm (0.080") ID x 1/8" OD	SL10KCW

## 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?"

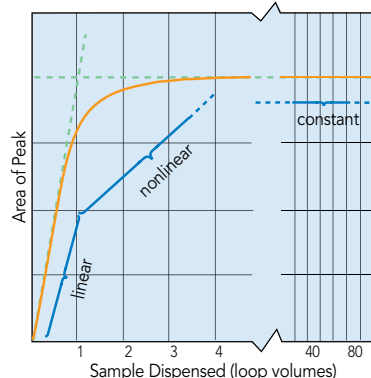
**A:** Sample occupies 2  $\mu\text{L}$  of loop for every 1  $\mu\text{L}$  loaded from the syringe. For example, 10  $\mu\text{L}$  of sample spreads out over the entire length of a 20  $\mu\text{L}$  loop. Any additional sample loaded will overflow the end of the loop and exit out to waste. Reproducibility 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.

In dual mode injectors (see "Sample Loop Loading" Application Note on page 131) 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:



**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

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.

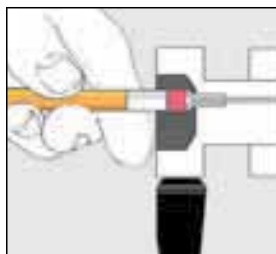
c) Complete-Filling Region. When the volume of sample dispensed is several loop volumes, the loop contains only pure sample, undiluted by residual mobile phase. Within this region, reproducibility is highest.

In the single mode injectors 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 injectors 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.



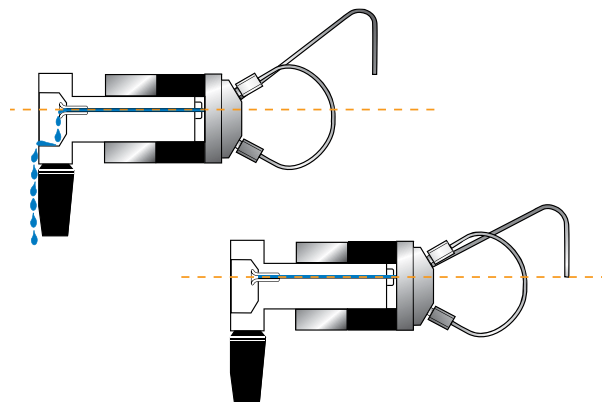
**Figure 1** To reform the needle seal, push the eraser end of a pencil against the needle port

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 134.

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](http://www.idex-hs.com) under Support.

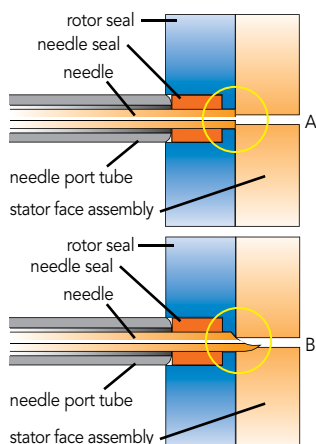


**Figure 2** Needle port level compared to the level of vent line outlet:  
(A) siphoning occurs when the vent line outlet is above the needle port level  
(B) siphoning does not occur if the vent line outlet is the same horizontal level as the needle port

# Adapters for Syringe Needles

## Application Note

### Using Proper Syringe Needles



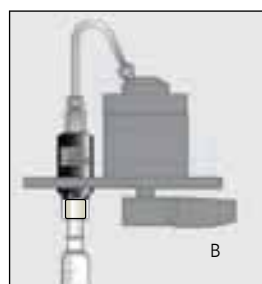
**Figure 1** A square cut needle:  
(A) stops against the stator face assembly; The tip of a pointed needle  
(B) slips into the stator face and the tip breaks off as the valve rotates

With front-loading injectors 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)

## Needle Port Accessories

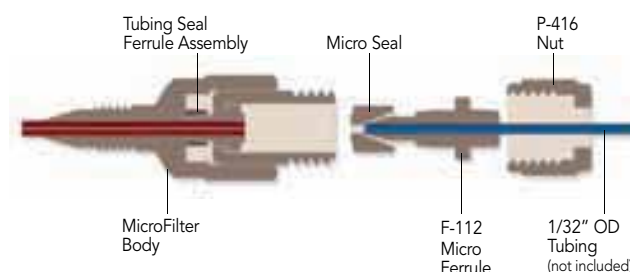
The Rheodyne® adaptable Loop Filler Ports (Part #7012 and 9012) are used to load sample from syringe needles or luer tips. The Needle Port (Part #9013) conserves sample by minimizing the volume between the needle and the valve.



## Valve Adapter for 10-32 Ports

- ▶ For 1/32" OD stainless steel tubing
- ▶ Low swept volume
- ▶ Extends the life of the rotor

As a result of customer requests, a Valve Adapter for 10-32 ports was designed specifically for use with 1/32" OD stainless steel tubing. This product extends the life of and prevents damage to the rotor, guarding against such potential hazards as tubing that may pass through the stator and scratch the rotor. This adapter has a very low swept volume, at 300 nL. The all-PEEK™ fluid pathway ensures biocompatibility.



**M-400**  
Valve Adapter  
(Includes indicated products)

Part No.	Description
<b>NEEDLE PORT ACCESSORIES</b>	
7012	Stainless Steel Loop Filler Port
7125-054	Needle Port Cleaner
9012	PEEK Loop Filler Port
9013	PEEK Needle Port
9125-076	Suction Needle Adapter (for Model 9725)
<b>VALVE ADAPTER FOR 10-32 PORTS</b>	
F-112	Replacement MicroFerrule for M-400, Natural PEEK
M-400	Valve Adapter Assembly
P-416	Replacement Female Nut for M-400, Natural PEEK

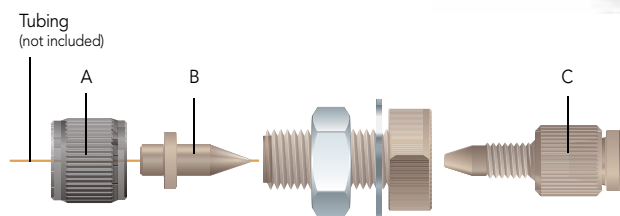
## Micro Injection Port Adapters

- For 1/32" or 360 µm OD tubing
- Mount on actuator, bracket or bulkhead

To introduce sample, connect 1/32" or 360 µm OD capillary tubing to an Upchurch Scientific® Injection Port Adapter Assembly. These adapters accept standard 22 gauge Hamilton-style injection syringe needles. No additional swept volume is added to the fluid pathway by these adapters, as the needle butts directly against the connecting tubing during injections. The adapters can be bulkhead mounted or mounted with the V-447 Kits. Refer to the chart below to select the appropriate adapter assembly.

To introduce a sample directly into a 10-32 port, purchase a M-432-03 separately.

V-447



**M-432**  
Micro Injection Port Adapter Assembly

## Replacement Parts

	A	B	C
<b>For 1/32" OD Tubing</b>			
M-433	P-416	F-112	M-432-03
<b>For 360 µm OD Tubing</b>			
M-432 and V-447	P-416BLK	F-152	M-432-03
*See diagram above			

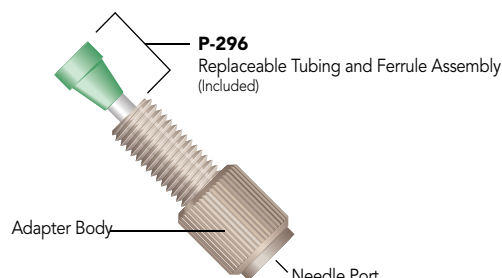
## IDEX Wrench

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.



## Medium Pressure Injection Port Adapter

This simple, biocompatible adapter is designed specifically for the Medium Pressure Injection Valves on page 142 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**  
Medium Pressure Injection Port Adapter

## 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.

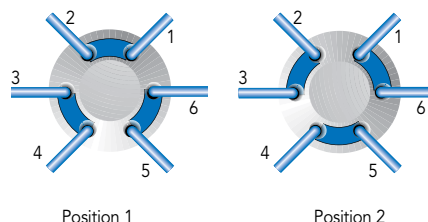


Part No.	Description
<b>MICRO INJECTION PORT ADAPTERS</b>	
<b>For 1/32" OD Tubing</b>	
F-112	Replacement MicroFerrule for M-433, Natural PEEK
M-433	Micro Injection Port Adapter Assembly
M-432-03	Replacement Tubing/Fitting Assembly for M-432 & M-433
P-416	Replacement Female Nut for M-433, Natural PEEK
<b>For 360 µm OD Tubing</b>	
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 Includes (1) M-432 with mini-actuator bracket and (2) mounting screw
<b>IDEX WRENCH</b>	
6810	IDEX Wrench
<b>MOUNTING BRACKET ACCESSORIES</b>	
7160	Mounting Panel
7160-010	Valve Angle Bracket
7160-029	Ring Stand Mounting Bracket
<b>MEDIUM PRESSURE INJECTION PORT ADAPTER</b>	
P-295	Adjustable Injection Port Adapter
P-296	Replacement Tubing/Ferrule Assembly

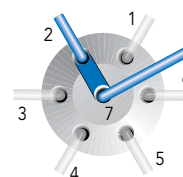


### MXX Low Pressure Valves

- ▶ Switching and selection valve models
- ▶ Can withstand up to 125 psi (9 bar)
- ▶ Proprietary polymer combination allows interface for long life
- ▶ All models accept 1/16" or 1/8" tubing (proper ferrules required)



Flow Path of MX Series II™, Two-Position, Six-Port Switching Valve



Flow path of MX Series II Six-Position, Seven-Port Selector Valve

### Specifications

<b>Flow Passages</b>	0.41 mm (0.016") – 1.5 mm (0.060") diameter
<b>Power Requirements</b>	100-120 V <sub>AC</sub> , 50-60 Hz
<b>Regulatory Compliance</b>	CE Mark
<b>Remote Control</b>	USB, I <sup>2</sup> C, BCD, Level Logic
<b>Operating Temperature</b>	0° – 40 °C, non-condensing
<b>Storage Temperature</b>	0° – 75 °C
<b>Dimensions ( H x W x D )</b>	117 mm x 76 mm x 128 mm (4.6" x 3.0" x 5.0")

Part No.	Description	Pressure Rating	Ferrule Size	Tubing/Fittings Size	Wetted Material
<b>MXX LOW PRESSURE VALVES</b>					
<b>MXX777-601</b>	2-position, 6-port, Switching Valve	125 psi (8.5 bar)	1/16"	Accepts Either 1/16" or 1/8" Tubing	RPC-7*
<b>MXX777-603</b>	2-position, Double Three Way	125 psi (8.5 bar)	1/16"	Accepts Either 1/16" or 1/8" Tubing	RPC-7
<b>MXX777-605</b>	6-position, 7-port, Selection Valve	125 psi (8.5 bar)	1/16"	Accepts Either 1/16" or 1/8" Tubing	RPC-7
<b>MXX777-612</b>	2-Position, 6-Port, Large Bore Switching Valve	125 psi (8.5 bar)	1/8"	Accepts Either 1/16" or 1/8" Tubing	RPC-7
<b>MXX777-616</b>	6-position, 7-port, Large Bore Selection Valve	125 psi (8.5 bar)	1/8"	Accepts Either 1/16" or 1/8" Tubing	RPC-7
<b>MXX778-605</b>	10-position, 11-port, Selection Valve	125 psi (8.5 bar)	1/16"	Accepts Either 1/16" or 1/8" Tubing	RPC-7
<b>REPLACEMENT FITTINGS</b>					
<b>7770-039</b>	Ferrules for 1/8" OD Tubing	—	—	—	25-pk
<b>7770-040</b>	Ferrules for 1/8" Tubing	—	—	—	50-pk
<b>7770-041</b>	Ferrules for 1/8" Tubing	—	—	—	100-pk
<b>7770-044</b>	Ferrules for 1/16" OD Tubing	—	—	—	25-pk
<b>7770-045</b>	Ferrules for 1/16" Tubing	—	—	—	50-pk
<b>7770-046</b>	Ferrules for 1/16" Tubing	—	—	—	100-pk
<b>7770-124</b>	O-rings for 1/16" OD Tubing	—	—	—	25-pk

\* RPC-7 Proprietary Polymer Combination



## Medium Pressure Injection Valves

- ▶ Biocompatible and inert
- ▶ Low swept volume
- ▶ Pressure rated to 500 psi (34 bar), ceramic version and 1,000 psi (69 bar), polymer version

The Upchurch Scientific® 6-Port Medium Pressure Injection Valves feature easy, external sample loop customization. Simply clean-cut a piece of tubing that represents the volume of sample you wish to inject, taking into account the port-to-port volume of the valve. Please refer to the "Tubing Internal Diameters and Volumes" chart on page 198 for assistance in calculating the volume of a length of tubing.

Two biocompatible injection valve options are available:

### Long-Life Ceramic

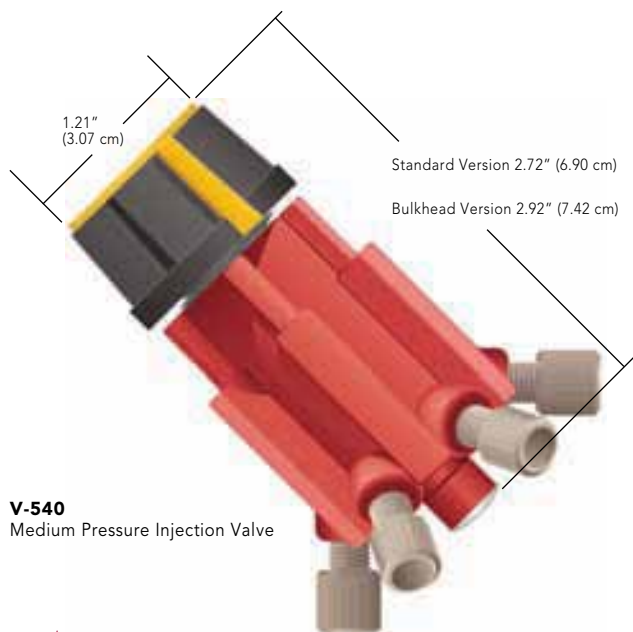
Featuring ceramic-to-ceramic sealing surfaces, these long-life valves have been tested to over one million actuations with no change in performance.\* The wetted materials are chemically resistant ceramic and PEEK™ polymer and the valves are rated to 500 psi (34 bar). Each valve includes 1/4-28 Flangeless Fittings for 1/16" OD tubing.

### Economical Polymer

These economical valves have chemically resistant Vespel® and PTFE resin wetted surfaces and are rated for a maximum pressure of 1,000 psi (69 bar). Each valve includes 1/4-28 Flangeless Fittings for 1/16" or 1/8" OD tubing.

Both valve options are available in three configurations: standard manual, bulkhead mountable manual and actuated. Valves can be premounted on a DC gear motor actuator to automate valve positioning. Each actuated valve is provided with an inline power adapter which allows operation from 110/120V and 220/240V AC power, a RS-232 and contact closure communication cable and a cable for multiplexing valves in series.

\* Tested using room-temperature water as the solvent



**V-540**  
Medium Pressure Injection Valve



**Top Seller** SEE STARRED PRODUCTS

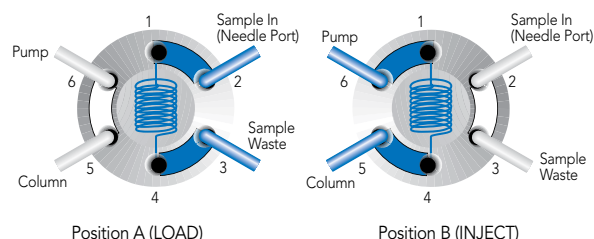


## Specifications

Valve Part No.	Thru-Hole	Dimensions (L x W), excluding fittings	Port to Port Volume
M-460	0.040" (1.0 mm)	2.75" x 1.30" (69.8 x 33.0 mm)	16.9 µL
M-461	0.040" (1.0 mm)	3.00" x 1.30" (76.2 x 33.0 mm)	16.9 µL
V-450	0.040" (1.0 mm)	2.72" x 1.24" <sup>1</sup> (69.1 x 31.5 mm)	5.1 µL
V-540	0.063" (1.6 mm)	2.72" x 1.24" <sup>1</sup> (69.1 x 31.5 mm)	12.7 µL
V-451	0.040" (1.0 mm)	2.92" x 1.24" <sup>1</sup> (74.2 x 31.5 mm)	5.1 µL
V-541	0.063" (1.6 mm)	2.92" x 1.24" <sup>1</sup> (74.2 x 31.5 mm)	12.7 µL

<sup>1</sup> Width of the knob, which is slightly wider than the valve body

## Viewpoint from Rotary Knob



**Flow Path of Medium Pressure Injection Valve**  
(highlighting flow through sample loop in each position)

Part No.	Description	Wetted Material	Tubing OD	Includes
<b>MEDIUM PRESSURE INJECTION VALVES, MANUAL</b>				
<b>M-460</b>	Injection Valve	Ceramic	1/16"	(6) XP-235
★ <b>M-461</b>	Bulkhead version of M-460	Ceramic	1/16"	(6) XP-235
<b>V-104</b>	5/64" Allen Wrench (replacement)			
<b>V-450</b>	Injection Valve	Polymer	1/16"	(6) XP-235
★ <b>V-451</b>	Bulkhead version of V-450	Polymer	1/16"	(6) XP-235
<b>V-540</b>	Injection Valve	Polymer	1/8"	(6) XP-335
★ <b>V-541</b>	Bulkhead version of V-540	Polymer	1/8"	(6) XP-335
<b>MEDIUM PRESSURE INJECTION VALVES, ACTUATED</b>				
★ <b>V-1451-DC</b>	Actuated version of V-451, DC Gear Motor (premounted)			
<b>V-1461-DC</b>	Actuated version of M-461, DC Gear Motor (premounted)			
<b>V-1541-DC</b>	Actuated version of V-541, DC Gear Motor (premounted)			

# Medium Pressure Selection Valves

## Medium Pressure 6-Way Selection Valves

- Biocompatible and inert
- Low swept volume
- Excellent choice for mobile phase selection

The Upchurch Scientific® 6-Way Medium Pressure Selection Valves have a common inlet (or outlet) port connected to six different ports.

Two biocompatible selection valve options are available. For more information on the Long-Life Ceramic and Economical Polymer valves, please see the previous page.

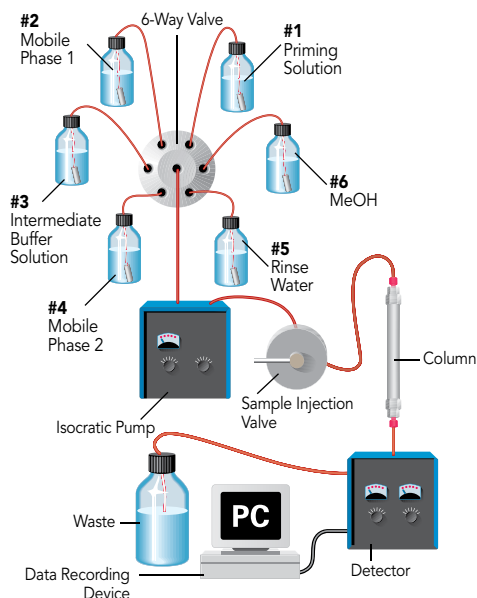
If your application does not require all six outer ports, seal the extra port(s) with any flat-bottom 1/4-28 plug from page 32.

Both valve options are available in three configurations: standard manual, bulkhead mountable manual and actuated. A valve mounting bracket (M-615-2) is listed on page 144. Valves can be premounted on a DC gear motor actuator to automate valve positioning. Each actuated valve is provided with an inline power adapter which allows operation from 110/120V and 220/240V AC power, a RS-232 and contact closure communication cable and a cable for multiplexing valves in series.



## Application Note

Use our 6-Way Medium Pressure Selection Valve to easily select different solvents with an isocratic pump. The setup below involves an isocratic pump used for two separate assays, each requiring a pre-rinsing step prior to use. Using our Selection Valve in this setup, the system can be primed with the solvent in the first reservoir. Then, solvent from the second reservoir can be used as the mobile phase for the first application. Later, the system can be rinsed with an intermediate buffer solution from the third reservoir, followed by switching over to the second mobile phase in reservoir number 4. At the end of the day, the system can be rinsed with water from a fifth reservoir to avoid the possibility of precipitation on wetted surfaces. Follow this rinse with a final rinse of methanol from the sixth reservoir for system storage.



## Specifications

Valve Part No.	Thru-Hole	Dimensions (L x W), excluding fittings	Port to Port Volume
M-470	0.040" (1.0 mm)	2.75" x 1.30" (69.8 x 33.0 mm)	16.1 µL
M-471	0.040" (1.0 mm)	3.00" x 1.30" (76.2 x 33.0 mm)	16.1 µL
V-240	0.040" (1.0 mm)	2.72" x 1.24" <sup>1</sup> (69.1 x 31.5 mm)	16.1 µL
V-241	0.040" (1.0 mm)	2.72" x 1.24" <sup>1</sup> (69.1 x 31.5 mm)	16.1 µL
V-340	0.063" (1.6 mm)	2.92" x 1.24" <sup>1</sup> (74.2 x 31.5 mm)	18.1 µL
V-341	0.063" (1.6 mm)	2.92" x 1.24" <sup>1</sup> (74.2 x 31.5 mm)	18.1 µL

<sup>1</sup> Width of the knob, which is slightly wider than the valve body



**Top Seller** SEE STARRED PRODUCTS

Part No.	Description	Wetted Material	Tubing OD	Includes
<b>MEDIUM PRESSURE 6-WAY SELECTION VALVES, MANUAL</b>				
<b>M-470</b>	6-Way Selection Valve	Ceramic	1/16"	(6) XP-235
★ <b>M-471</b>	Bulkhead version of M-470	Ceramic	1/16"	(6) XP-235
<b>V-104</b>	5/64" Allen Wrench (replacement)			
<b>V-240</b>	6-Way Selection Valve	Polymer	1/16"	(6) XP-235
★ <b>V-241</b>	Bulkhead version of V-240	Polymer	1/16"	(6) XP-235
<b>V-340</b>	6-Way Selection Valve	Polymer	1/8"	(6) XP-335
★ <b>V-341</b>	Bulkhead version of V-340	Polymer	1/8"	(6) XP-335
<b>MEDIUM PRESSURE 6-WAY SELECTION VALVES, ACTUATED</b>				
★ <b>V-1241-DC</b>	Actuated version of V-241, DC Gear (premounted)			
<b>V-1341-DC</b>	Actuated version of V-341, DC Gear (premounted)			
★ <b>V-1471-DC</b>	Actuated version of V-471, DC Gear (premounted)			

## Medium Pressure 4-Port Switching Valves

- ▶ Three flow configurations to choose from
- ▶ Biocompatible flow paths, PEEK™ and PTFE
- ▶ Pressure rated to 500 psi (34 bar)

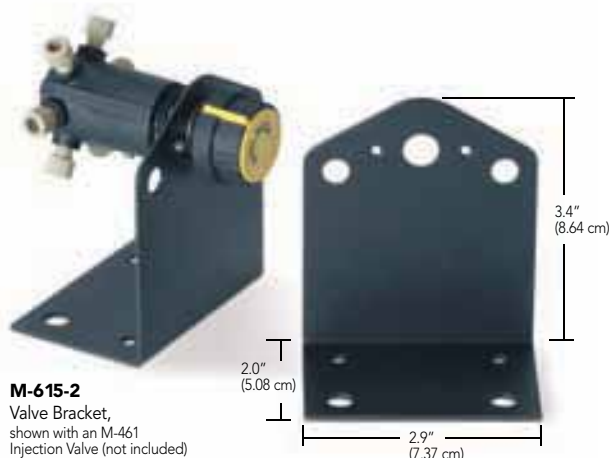
With three versions to choose from, Upchurch Scientific® Switching Valves offer several flow distribution options. Each V-100 Series Switching Valve has 0.040" (1.0 mm) thru-holes and is supplied with Flangeless Fittings for use with 1/16" OD tubing.

Each 4-Port Switching Valve is available in standard manual and bulkhead mountable manual configurations. The bulkhead mountable manual configuration can be mounted on the M-615-1 Valve Bracket (see below). DC gear motor actuated versions are also available for automated valve positioning. Each actuated valve is provided with an inline power adapter which allows operation from 110/120V and 220/240V AC power, a RS-232 and contact closure communication cable and a cable for multiplexing valves in series.

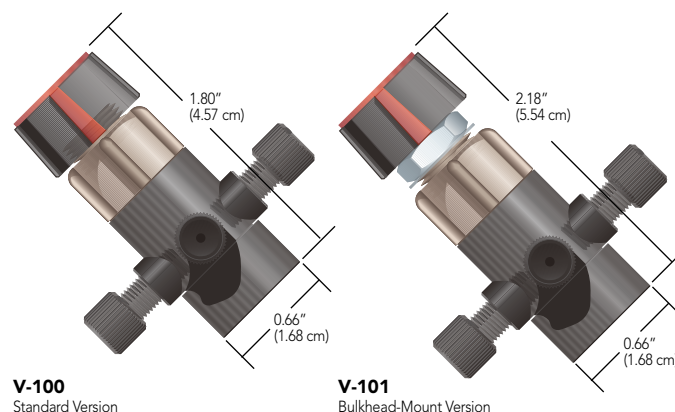
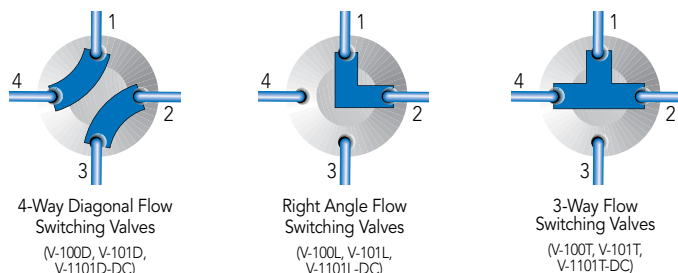
## Valve Mounting Brackets

Mount the bulkhead mountable manual valves with these Brackets. Once mounted, a valve will be positioned horizontally. Extra holes are provided for valve accessories.

Made of sturdy anodized aluminum, these brackets can be attached to almost any lab surface. Each bracket comes with the required valve mounting hardware and instructions.



## Switching Valve Options



## Related Products

To use these valves with 1/8" OD tubing, simply replace the supplied fittings with 1/4-28 Flangeless Fittings found on pages 24 – 27. *Please Note: To operate, all ports must be either connected to a line of your system or plugged. Comes complete with P-218BLK/P-240 Flangeless Fittings. "L" and "T" valve versions also include a P-309 Plug.*



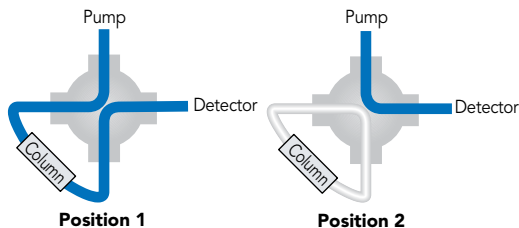
**Top Seller** SEE STARRED PRODUCTS

Part No.	Description	Swept Volume
<b>MEDIUM PRESSURE 4-PORT SWITCHING VALVES, MANUAL</b>		
<b>V-100D</b>	4-Way Diagonal Flow Switching Valve	12.4 µL
★ <b>V-100L</b>	Right Angle Flow Switching Valve	6.2 µL
★ <b>V-100T</b>	3-Way Flow Switching Valve	9.7 µL
★ <b>V-101D</b>	Bulkhead Version of V-100D	12.4 µL
★ <b>V-101L</b>	Bulkhead Version of V-100L	6.2 µL
<b>V-101T</b>	Bulkhead Version of V-100T	9.7 µL
<b>V-103</b>	0.050" Allen Wrench (replacement)	
<b>MEDIUM PRESSURE 4-PORT SWITCHING VALVES, ACTUATED</b>		
<b>V-1101D-DC</b>	Actuated Version of V-101D	12.4 µL
★ <b>V-1101L-DC</b>	Actuated Version of V-101L	6.2 µL
<b>V-1101T-DC</b>	Actuated Version of V-101T	9.7 µL
<b>VALVE BRACKET</b>		
<b>M-615-1</b>	Mounting Bracket for Switching Valves (page 144)	
<b>M-615-2</b>	Mounting Bracket for Injection and Selection Valves (this page)	

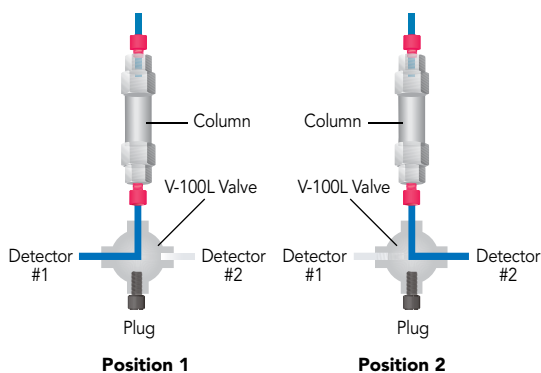
### Application Note

#### Medium Pressure Switching Valve Applications

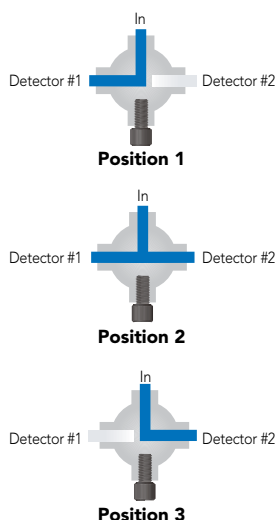
Protect sensitive system components (such as a column) during a cleaning cycle with our Diagonal Flow Switching Valve ("D"). This valve eliminates the need to remove, plug and reconnect a low pressure column (see below).



- 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).

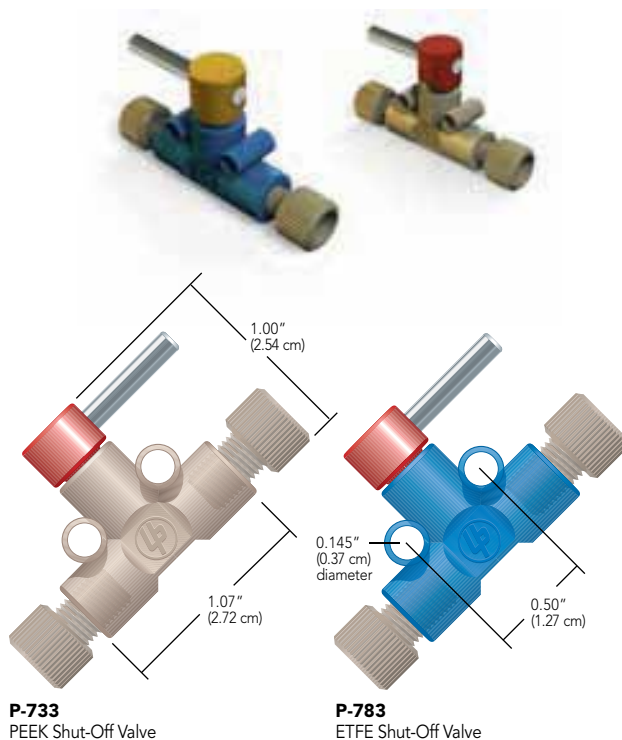


### Shut-Off Valves

- For low and medium pressure applications
- 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.



### Application Note

Install a Shut-Off Valve between the solvent reservoir and pump. Then, when it is necessary to disconnect the solvent line, a simple twist of the valve lever eliminates the potential of a hazardous spill.

Part No.	Material	OD Tubing	Thru-hole	Internal Volume*	Includes
<b>SHUT-OFF VALVES</b>					
<b>P-721</b>	ETFE, Natural	1/8"	0.040" (1.0 mm)	10.0 µL	(2) P-335, (2) P-300N
★ <b>P-732</b>	PEEK, Natural	1/16"	0.020" (0.5 mm)	2.5 µL	(2) XP-235
★ <b>P-733</b>	PEEK, Natural	1/8"	0.040" (1.0 mm)	10.0 µL	(2) XP-335
★ <b>P-782</b>	ETFE, Blue	1/16"	0.020" (0.5 mm)	2.5 µL	(2) XP-235
★ <b>P-783</b>	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

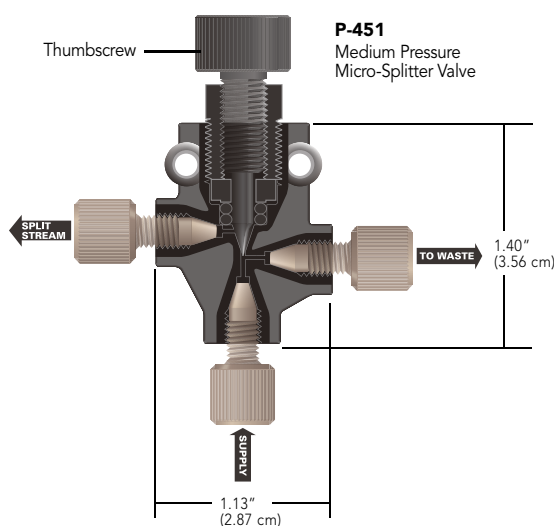
- For interfacing LC-MS systems
- Adjustable split stream flow rates
- Medium and high pressure versions

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. A valve is also available to accommodate applications involving capillary tubing with a 6-32 coned threaded fitting for MicroTight® tubing sleeves (see page 19).

The High Pressure Micro-Splitter Valves are designed to operate successfully up to 4,000 psi (276 bar) and the medium pressure Micro-Splitter valves are pressure rated to 800 psi (55 bar).

Graduated Valves offer 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. Choose from regular High Pressure and Capillary versions.



## Application Note

- With an incoming flow rate of 1mL/min using room temperature water and equal pressures on both outlet lines, the minimum split flow rate is 2 µL/min for the medium pressure 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.



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## Specifications

Part No.	Valve Type	Threads	Internal Volume <sup>1</sup> (closed/fully open)	Max. Operating Pressure
<b>M-4055,T</b>	High Pres. Capillary	10-32 / 6-32	1.2 / 2.4 µL	4,000 psi (276 bar)
<b>M-472</b>	High Pres. Cap. Grad.	10-32 / 6-32	1.2 / 2.4 µL	4,000 psi (276 bar)
<b>P-450</b>	Medium Pressure	1/4-28	2.1 / 4.1 µL	800 psi (55 bar)
<b>P-451</b>	Medium Pressure	10-32	1.2 / 2.8 µL	800 psi (55 bar)
<b>P-452</b>	Medium Pres. Capillary	10-32 / 6-32	1.2 / 2.4 µL	800 psi (55 bar)
<b>P-460S,T</b>	High Pressure	10-32	1.2 / 2.8 µL	4,000 psi (276 bar)
<b>P-470</b>	High Pres. Graduated	10-32	1.2 / 2.8 µL	4,000 psi (276 bar)

<sup>1</sup> 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
<b>MICRO-SPLITTER VALVES</b>		
<b>P-450</b>	Medium Pressure, 1/4-28, Biocompatible	(3) XP-235
<b>P-451</b>	Medium Pressure, 10-32, Biocompatible	(3) F-120
<b>P-460S</b>	High Pressure, 10-32, with Stainless Steel Needle	(3) F-120
<b>P-460T</b>	High Pressure, 10-32, with Titanium Needle	(3) F-120
<b>GRADUATED MICRO-SPLITTER VALVES</b>		
<b>M-472</b>	High Pressure Capillary Graduated, 10-32/6-32, with Stainless Steel Needle	(2) F-120, (1) F-125*
★ <b>P-470</b>	High Pressure Graduated, 10-32, with Stainless Steel Needle	(3) F-120

\* Use with the MicroTight Tubing Sleeves, found on page 19



## 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 Low Pressure 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 Medium Pressure 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.

## Micro-Metering Valves

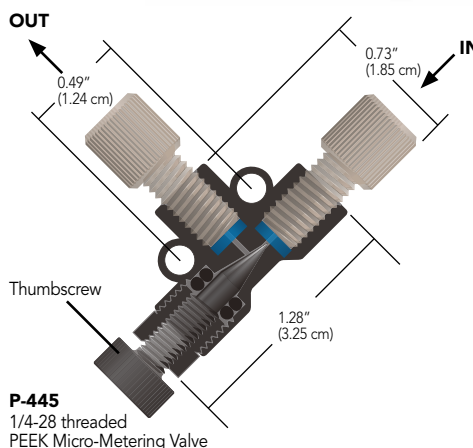
- Flow rates as low as 3.5  $\mu\text{L}/\text{min}^*$
- 1/4-28 flat-bottom and 10-32 coned designs available
- Materials of construction: PEEK™, PTFE

For fine control of fluid flow rates, Micro-Metering Valves can reduce outgoing flow to as low as 3.5  $\mu\text{L}/\text{min}^*$ . 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*



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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 $\mu\text{L}$	(2) XP-230
★ P-446	PEEK, Black	1/16"	0.020" (0.50 mm)	7.2 $\mu\text{L}$	(2) F-120
P-447	PEEK, Black	1/8"	0.020" (0.50 mm)	7.7 $\mu\text{L}$	(2) XP-330

\*Maximum internal volume, with valve fully open

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