

Microfluidic Components

Connectors, Fittings, Filters, Tubing, and Accessories

IDEX Health & Science components for microscale and nanoscale applications including connections for UHPLC applications



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Need Help With Microscale & Nanoscale Fluid Transfer?

This IDEX Health & Science brochure features Upchurch Scientific® products that are designed to simplify your micro and nanoscale applications — including Lab-on-a-Chip, Microbore HPLC and CEC — as well as components for interfacing hyphenated systems such as LC-MS. Throughout this brochure, you will also find fittings and sleeves to facilitate fused silica and other capillary tubing connections, along with a variety of accessories designed for a wide variety of low-flow techniques.

IDEX Health & Science LLC

Phone (toll free): 800 426 0191

Phone Outside USA: +1 360 679 2528

Fax (toll free): 800 359 3460

Fax Outside USA: +1 360 679 3830

E-mail: CustomerService.hs@idexcorp.com

www.idex-hs.com

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PEEKsil™ is a Trademark of SGE International Pty. Ltd.

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NanoTight™ Fittings

- ▶ For connecting 1/16" OD or capillary tubing (using NanoTight tubing sleeves) to standard 10-32 ports
- ▶ Nuts manufactured from PEEK™ polymer, ferrules manufactured from ETFE

NanoTight Fittings and Sleeves 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 (below). 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 constriction. NanoTight fittings, when used with NanoTight Tubing Sleeves, will hold capillary tubing up to 4,000 psi (276 bar).

Ferrules for Direct-Connecting Capillary Tubing

- ▶ PCTFE, PEEK, and Perfluoroelastomer versions available
- ▶ Versions available to directly connect 190 µm, 360 µm, and 1/32" OD tubing

Specialty ferrules couple with our standard Fingertight fittings to directly connect capillary tubing into standard 10-32 coned receiving ports, without the use of sleeves. In electrospray applications, try our M-215 Conductive Perfluoroelastomer Ferrule. Unlike other ferrules in this family, the elastomeric properties of this ferrule let you use it through many tightening/retightening cycles. Additionally, when using this ferrule in a metallic port block or with a metallic nut, you can apply your voltage to the metal component and have it translate to the flow path through the ferrule.

Capillary Tubing Sleeves

- ▶ For connecting capillary tubing to standard ports

Sleeves let you connect fused silica or other capillary tubing to various standard ports intended for larger diameter tubing. When choosing the right sleeve for your capillary tubing, look for a sleeve with an inner diameter that is 0.001"–0.002" (25–50 µm) larger than the outer diameter of your flow path tubing.

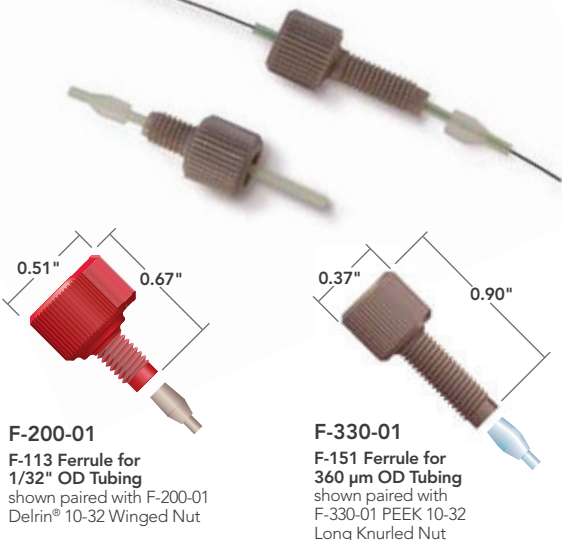
Sleeve OD	Type/ Material	Fitting/Port	Capillary Tubing ODs	Max Temp.
1/16"	NanoTight (FEP)	NanoTight/10-32 Super Flangeless™/6-32, 6-40 MINSTAC® Compatible TinyTight™/6-40	70 µm–1 mm	50 °C
1/16"	PEEK	10-32 Stainless Steel (wrench-tightened)	175–770 µm	125 °C
0.025"	MicroTight® (PEEK)	MicroTight/6-32	70–520 µm	125 °C
1/32"	FEP	MicroTight/6-32 Valco Nanovolume® Compatible/6-40	20–380 µm	50 °C
1/32"	PEEK	MicroTight/6-32, 6-40 (best suited for higher-pressure applications)	70–495 µm	125 °C

NanoTight and MicroTight sleeves also come in convenient kits, which include popular fittings and connectors. Visit www.idex-hs.com for more information.



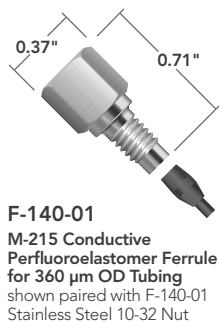
F-330N
NanoTight Fitting with F-142N Ferrule shown with F-239 NanoTight Sleeve (not included)

F-331N
NanoTight Fitting with F-142N Ferrule shown with F-242 NanoTight Sleeve (not included)



F-200-01
F-113 Ferrule for 1/32" OD Tubing shown paired with F-200-01 Delrin® 10-32 Winged Nut

F-330-01
F-151 Ferrule for 360 µm OD Tubing shown paired with F-330-01 PEEK 10-32 Long Knurled Nut



F-140-01
M-215 Conductive Perfluoroelastomer Ferrule for 360 µm OD Tubing shown paired with F-140-01 Stainless Steel 10-32 Nut



MicroTight® Fittings

- ▶ Includes fittings for UHPLC applications with capillary tubing rated to 15,000 psi (1,024 bar)
- ▶ Options available for connecting capillary tubing ODs ranging from 70–520 µm, with direct-connect options for 360 µm and 1/32" ODs

MicroTight one-piece fittings work with MicroTight Unions, Adapters and Inline MicroFilters, as well as NanoPorts™ featured throughout this brochure. As with all of our PEEK™ polymer fittings, MicroTights withstand temperatures up to 125 °C. The MicroTight fittings that are used with the MicroTight tubing sleeves (F-125, F-125H, F-172) will hold tubing to 4,000 psi (276 bar). The MicroTight fittings that do not require sleeves are rated to 5,000 psi (345 bar). The very high pressure MicroTight fittings, PK-126 and UH-904, will hold 1/32" OD stainless steel tubing to 15,000 psi (1,034 bar) in a stainless steel port. The PK-152 and PK-112 are also designed to hold to 15,000 psi (1,024 bar).

To tighten one-piece MicroTights and NanoPort nuts in hard-to-reach places, we offer a variety of tightening tools, both for hand tightening and for interfacing with a torque wrench. Visit our web site for more information.

Please Note: These ferrules are not interchangeable; they must be used with the products for which they were designed.

The MicroTight Fittings family also includes a female nut matched with one of five dedicated ferrules for direct-connecting specific tubing ODs.

6-32 and 6-40 Threaded Fittings

- ▶ Options for various tubing ODs, port configurations

There are several options for connecting 1/16", 1/32" and capillary OD tubing into 6-32 and 6-40 threaded ports — including alternatives for MINSTAC®* receiving ports. These are Super Flangeless™ fittings, which consist of a PEEK nut, plus a PEEK ferrule and stainless steel lock ring. The ring allows the fitting to hold to the tubing firmly in place while preventing the tubing from twisting during tightening.

PRESSURE RATINGS^{1, 2}

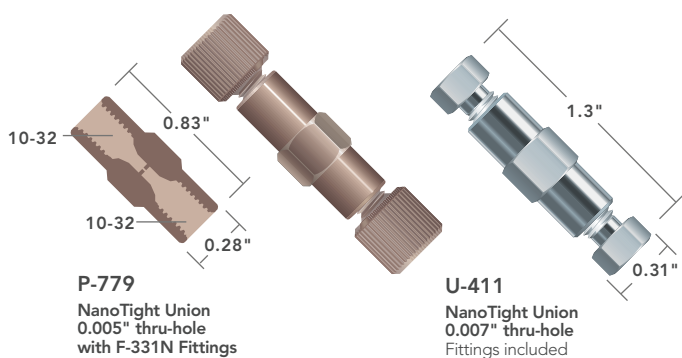
	Tubing	Pressure Rating
Fittings for 6-32 Port M-650, M-660	FEP, 1/16" OD x 0.010" ID	1,750 psi (121 bar)
	PEEK, 1/16" OD x 0.010" ID	3,750 psi (259 bar)
	Stainless Steel, 1/16" OD x 0.010" ID	3,750 psi (259 bar)
	Fused Silica, 360 µm OD x 75 µm ID (using F-242 tubing sleeve)	750 psi (52 bar)
Fittings for 6-40 Port M-650, M-644-03	FEP, 1/16" OD x 0.010" ID	1,750 psi (121 bar)
	PEEK, 1/16" OD x 0.010" ID	3,750 psi (259 bar)
	Stainless Steel, 1/16" OD x 0.010" ID	3,750 psi (259 bar)
	Fused Silica, 360 µm OD x 75 µm ID (using F-242 tubing sleeve)	750 psi (52 bar)
Fittings for MINSTAC-Compatible 6-40 Port M-647 / M-657, M-644-03	FEP, 1/16" OD x 0.010" ID	600 psi (41 bar)
	PEEK, 1/16" OD x 0.010" ID	1,500 psi (103 bar)
	Stainless Steel, 1/16" OD x 0.010" ID	2,500 psi (172 bar)

¹ This chart is intended for reference only and refers to the pressure rating of the fittings, NOT the tubing. Tests were conducted with room temperature water as the solvent. Your results may vary depending on the specific port and tubing materials, tubing ID, actual tubing diameters (with manufacturers' tolerances), temperature, chemical compatibility, etc.

² The fittings were finger tightened for these tests.

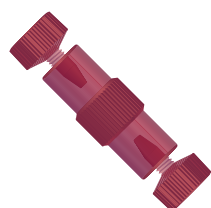
*IDEX Health & Science's Upchurch Scientific product line includes many products designed as direct replacements for other manufacturers' components. Reference to these companies does not imply their endorsement of our products.



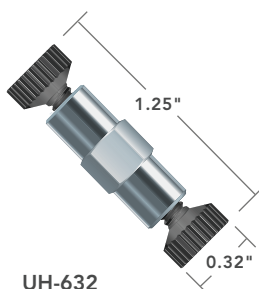


P-779
NanoTight Union
0.005" thru-hole
with F-331N Fittings

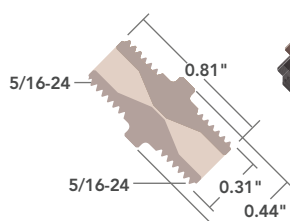
U-411
NanoTight Union
0.007" thru-hole
Fittings included



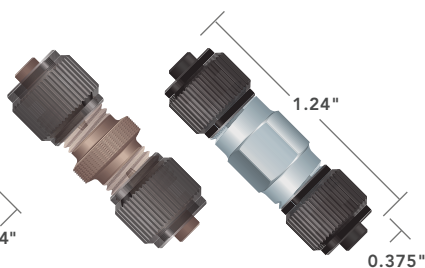
P-771
MicroTight True
ZDV Union
for 1/32" OD tubing
Fittings and gauge plug
included



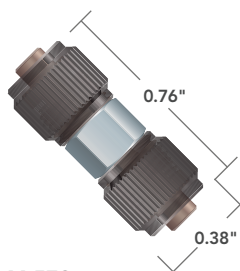
UH-632
VHP MicroTight
Union for 1/32"
OD tubing
Fittings included



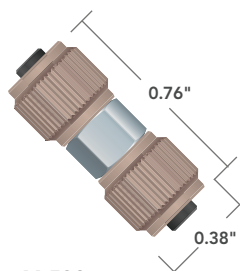
P-772
MicroTight Union
0.006" thru-hole
for 360 µm OD tubing
Fittings included



UH-436
VHP MicroTight Union
for 360 µm OD tubing
Fittings and capsule
union included



M-572
Conductive MicroTight Union
for 360 µm OD tubing
with fittings and capsule
union included



M-539
Conductive MicroTight Union
for 1/32" OD tubing
with fittings and capsule
union included

NanoTight™ Unions

These unions improve capillary tubing connections in several ways. The sleeving system and internal design of the unions greatly reduce the incidence of misalignment, and the thin internal web's 0.005" (127 µm) thru-hole (P-779) or 0.007" (180 µm) thru-hole (U-411) protects fragile fused silica at the junction point while adding only miniscule void volume (8 nL for the P-779 PEEK™ version and 13 nL for the stainless steel U-411). **Results: fewer blockages, fewer flow rate reductions and fewer back pressure problems.**

Capillary tubing can be easily connected to one or both ports of either union, using the appropriate tubing sleeves — use our NanoTight Sleeves to connect capillary tubing to the P-779, and use PEEK Sleeves to connect capillary tubing to the U-411. (NanoTight sleeves may also be used with the U-411; however, for best performance, we recommend that NanoTight sleeves be paired with NanoTight fittings.)

MicroTight® Unions

Use these unions to connect two pieces of fused silica or other capillary tubing. Choose from our selection of MicroTight Tubing Sleeves (see www.idex-hs.com) to use with the true zero dead volume (ZDV) P-720 Union. The P-771 ZDV Union allows direct connection of 1/32" OD tubing without sleeves. The P-772 Union allows direct connection of popular 360 µm OD capillary/fused silica tubing without sleeves, adding only 5 nL of swept volume with its 0.006" (150 µm) thru-hole.

For very high-pressure connections, use the UH-632 to connect 1/32" OD tubing in a true ZDV union rated to 15,000 psi (1,034 bar) and UH-436 to connect 360 µm tubing in an ultra low volume union with 5 nL of swept volume.

Our Conductive MicroTight Unions provide an excellent opportunity to introduce voltage into an electrospray or capillary electrophoresis system. With extremely low internal volumes, these unions can be placed inline with 360 µm or 1/32" OD capillary tubing without contributing significantly to band dispersion. Mount and apply voltage to these unions using our Insulating Mounting Bracket, M-447.

A Word About Volume...

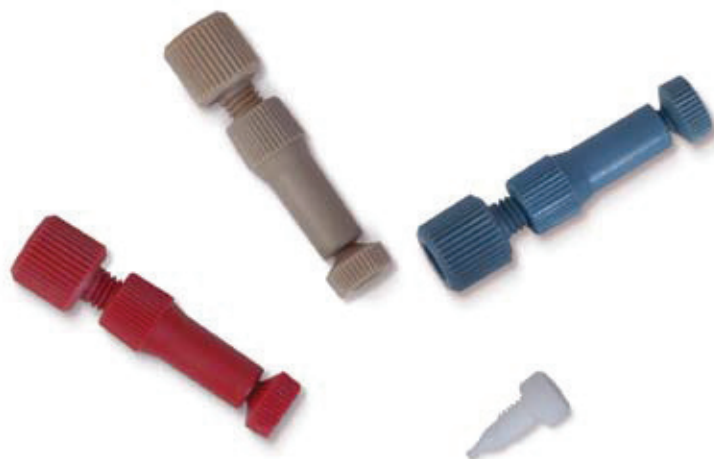
We use the term "void volume" in this brochure to mean total internal volume. Void volume equals the sum of swept volume (in the intended flow path) and dead volume (outside the intended flow path). Ideally, void volume will equal swept volume, leaving zero dead volume. Keeping dead volume as low as possible is especially important in capillary connections to prevent undesirable effects, such as analysis delays, broadened and/or split peaks, poor resolution, sample carryover and gas collection.

True zero dead volume (ZDV) connections are created when the ends of the two pieces of tubing touch directly in the middle of the connector, so there is no additional volume introduced by the connector to the flow path. Care must be taken when creating these connections using the proper gauge plugs to make sure the tubing is positioned in the middle of the connector.

MicroTight® Adapters

Create a true zero dead volume (ZDV) connection between 1/16" OD tubing and capillary tubing with our MicroTight PEEK™ adapters. P-770 connects 1/16" OD tubing to a variety of capillary tubing sizes using 0.025" OD MicroTight Tubing Sleeves and is pressure rated to 4,000 psi (276 bar). Our P-881 and P-882 Adapters allow connection of 1/16" OD tubing directly to 1/32" OD and 360 µm tubing respectively and are pressure rated to 5,000 psi (345 bar). For very high pressure applications, use the UH-630 adapter to connect 1/16" to 1/32" OD tubing when pressures go up to 15,000 psi (1,034 bar).

Please Note: Use only the 6-32 threaded fitting supplied with each adapter — they are not interchangeable. Replacement 6-32 fittings are on page 3 and listed on www.idex-hs.com. Replacement F-120R and F-120B nuts are listed on www.idex-hs.com.



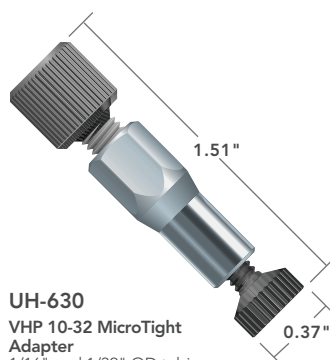
MicroTees, MicroCrosses and MicroElbow

Use MicroTees, MicroCrosses or MicroElbow to join capillary tubing. Precision manufacturing results in very low void volumes.

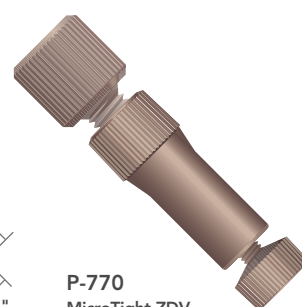
	PEEK (0.006"/150 µm thru-holes)	SST (0.010"/0.25 mm thru-holes)
MicroTees:	29 nL	84 nL
MicroCrosses:	38 nL	101 nL
MicroElbow:	20 nL	N/A

The standard products are made entirely of PEEK polymer and will accept only the supplied ferrules (or the P-116 MicroFerrule Plug). Versions are available to make capillary tubing connections using MicroTight Tubing Sleeves or direct connections for 360 µm and 1/32" OD tubing. The MicroElbow and one version of the MicroTee (P-875) come with convenient predrilled 0.13" (3.3 mm) mounting holes.

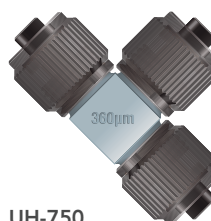
For very high pressure applications, stainless steel versions of these connectors with the VHP MicroTight ferrules will hold tubing securely up to 15,000 psi (1,034 bar).



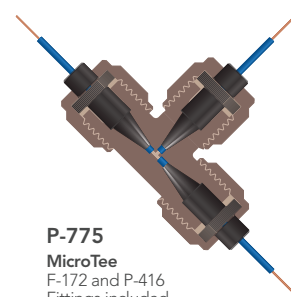
UH-630
VHP 10-32 MicroTight Adapter
1/16" and 1/32" OD tubing
with fittings included



P-770
MicroTight ZDV Adapter
F-125 and F-120 fittings included



UH-750
VHP MicroTee
for 360 µm OD tubing
with fittings included



P-775
MicroTee
F-172 and P-416 Fittings included
(tubing sleeves not included)

APPLICATION NOTE

Several researchers have used our PEEK MicroTee to introduce ionizing voltage to their fluid stream just prior to a Mass Spectrometer¹. The P-775 and P-875 MicroTees are well suited for this application due to their internal geometry and PEEK polymer's electrical resistance. This setup requires one gold or platinum conducting wire, one P-775 or P-875 MicroTee, one MicroTight Tubing Sleeve for the conducting wire (as needed to accommodate wire diameter), and at least two more MicroTight Tubing Sleeves to connect your capillary tubing.

This setup typically provides effective electrospray ionization in applications having a flow rate of 100 µL/min or greater.

¹ One such paper describing pioneering electrospray work: "Protein Identification at the Low Femtomole Level from Silver-Stained Gels Using a New Fritless Electrospray Interface for Liquid Chromatograph-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.

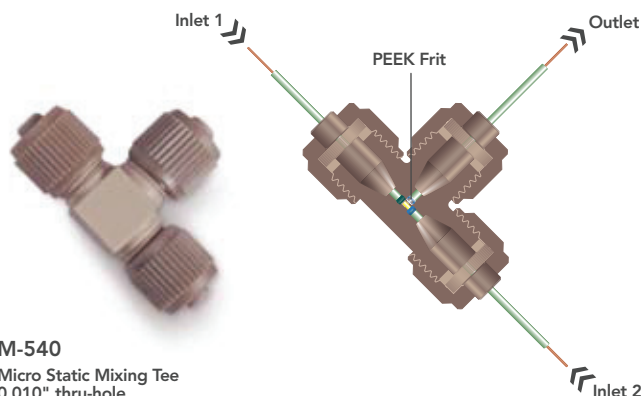


Micro Static Mixing Tee

- ▶ Constructed of inert PEEK™ and PCTFE
- ▶ Low swept volume of 0.95 µL
- ▶ Designed for flow rates of 20–250 µL/min

The Micro Static Mixing Tee utilizes a specifically-engineered internal geometry to efficiently mix two fluid streams into one combined stream. The center port also features a 0.5 µm porosity PEEK polymer frit to aid in mixing. This frit adds a maximum of 20 psi (1.4 bar) back pressure to most systems (within the stated flow rate range). The Mixing Tee handles pressures up to 5,000 psi (345 bar) when directly connecting 1/16" OD tubing, or up to 4,000 psi (276 bar) with capillary tubing when using our NanoTight™ Tubing Sleeves.

Please Note: Turbulent mixing of solvents often increases outgassing; therefore, we recommend solvent degassing when using this product. The Systec® brand of degassers offers solutions for removing dissolved gas from the fluid stream. Visit www.idex-hs.com/Systec.



M-540
Micro Static Mixing Tee
0.010" thru-hole
F-132 and P-416 fittings included
(tubing sleeves not included)

NanoTight Y Connector

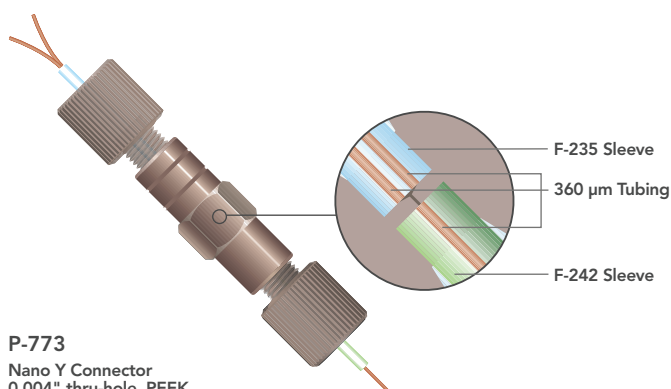
- ▶ Only 17 nL void volume!

This product improves laminar flow over traditional MicroTee designs — meaning less turbulence and mixing when combining two fluid paths or splitting one fluid path into two.

One end of the NanoTight Y Connector has been engineered to bring two 360 µm OD capillary tubing lines together through a 1.6" long FEP Dual-Lumen NanoTight Tubing Sleeve and special internal port geometry. The opposite end uses our F-242 NanoTight Tubing Sleeve (also FEP for 360 µm OD) for the single inlet or outlet flow path.

This assembly will hold up to 4,000 psi (276 bar), and with its 0.004" (102 µm) thru-hole and miniscule 17 nL void volume, the NanoTight Y Connector does not contribute significantly to band broadening or mixing effects.

The NanoTight Y Connector includes sleeves and NanoTight Fittings. Besides the included single lumen sleeve (for 360 µm OD), you can choose from other available sleeves to connect capillary tubing with ODs ranging from 70 µm to 1 mm; however, only 360 µm OD capillary tubing can be accommodated with a dual-lumen sleeve.



P-773
Nano Y Connector
0.004" thru-hole, PEEK
F-331N & sleeves, 360 µm OD, included
(360 µm OD capillary tubing not included)

NanoPort™ Assemblies

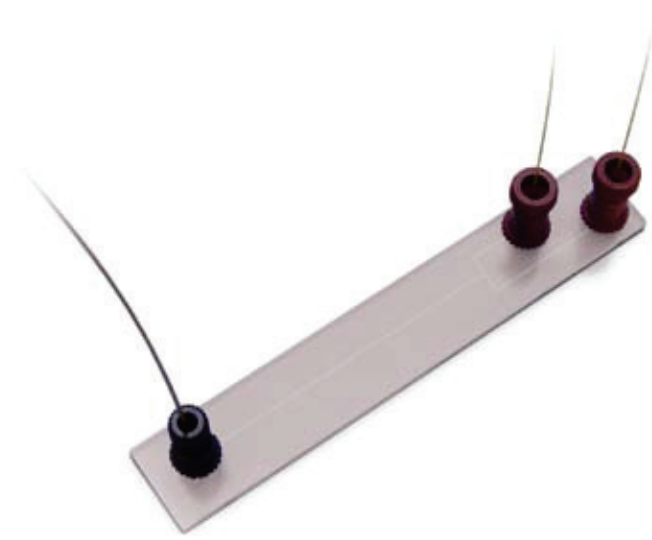
- ▶ For chip-based applications
- ▶ Wetted materials: PEEK™ and perfluoroelastomer
- ▶ Options for connecting 70–520 µm OD tubing (using MicroTight® tubing sleeves), as well as 360 µm OD, 1/32" OD and 1/16" OD tubing directly

NanoPort Assemblies are the first commercially-available products to provide reliable fluid connections for chip-based analyses. These products bond to chip surfaces with the provided Preformed Adhesive Rings. Once attached, NanoPort connections can withstand pressures up to 1,000 psi (69 bar), except the N-333 NanoPort Assembly, which is rated to 500 psi (34.5 bar). NanoPorts will adhere to silicon, quartz, glass, and polymers. Their unique design also prevents adhesive contamination of the fluid path. And, because tubing sits directly on the chip surface, NanoPort connections add virtually no additional volume to the fluid path, eliminating dead volume typically associated with chip-based connections.

While most of the NanoPort connectors are designed to help tubing interface with chip-based devices, the NanoPort Reservoir Assembly (80 µL volume) is designed for open-well applications, such as CE.

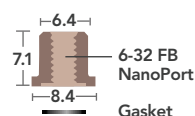
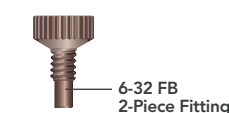
Literature References on NanoPort Applications

- ▶ Hulvey, Matthew and Martin, R. Scott. "A Microchip-based Endothelium Mimic Utilizing Open Reservoirs for Cell Immobilization and Integrated Carbon Ink Microelectrodes for Detection." *Analytical & Bioanalytical Chemistry*. January 2009: 393(2): 599–605
- ▶ Li, Chen and Lee, Kelvin. "Affinity Depletion of Albumin from Human Cerebrospinal Fluid Using Cibacron-blue-3G-A-derivatized Photopatterned Copolymer in a Microfluidic Device." *Analytical Biochemistry*: 2004: 333: 281–288
- ▶ Haapala, Markus, Luosujärvi, Laura, Saarela, Ville, Kotiaho, Tapio, Ketola, Raimo A., Franssila, Sami and Kostianen, Risto. "Microchip for Combining Gas Chromatography or Capillary Liquid Chromatography with Atmospheric Pressure Photoionization-Mass Spectrometry." *Analytical Chemistry*. May, 2007: 79: 4994–4999

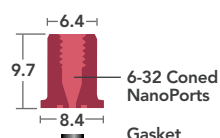
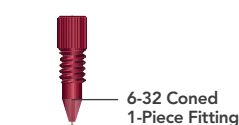


Please Note: All measurements below are in millimeters (mm).

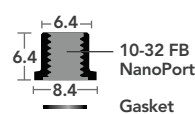
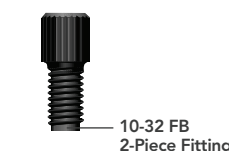
6-32 Flat-Bottom Assemblies



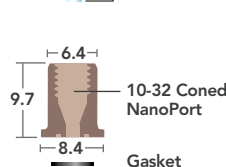
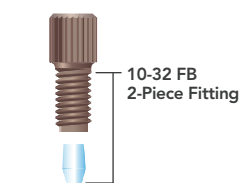
6-32 Coned Assemblies



10-32 Flat-Bottom Assembly



10-32 Coned Assembly



APPLICATION NOTE

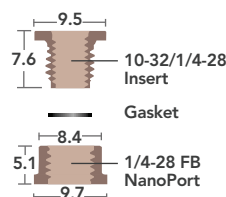
NanoPort Adhesive Cure Requirements

- ▶ Preformed Adhesive Rings

Cure Temperature	Cure Time
165–177 °C (330–350 °F)	1 hour

- ▶ Please contact us regarding adherence to specific polymer substrates and other adhesive options.

Reservoir Assembly





Capillary/Microbore PEEK™ Tubing

- ▶ ODs from 360 µm to 1/16"
- ▶ IDs as small as 25 µm (0.001")

In addition to our more traditional 1/32" and 1/16" OD PEEK tubing, we offer capillary PEEK polymer tubing that provides all the benefits of larger-sized PEEK tubing (strength, biocompatibility, chemical compatibility), while offering an excellent alternative to more traditional fused silica and stainless steel capillary tubing. This tubing comes in 360 µm (0.0145") OD and 510 µm (0.020") OD.

Tolerances for our capillary PEEK tubing are ±0.0005" for both OD and ID of our 360 µm OD and ±0.001" for OD and ID of our 510 µm OD tubing. Tubing in this family of products is rated to hold to 2,000 psi (138 bar) or greater.

Tubing Specifications

OD	OD/ID Tolerance	Pressure Rating
360 µm (0.0145")	±0.0005"	2,000 psi (138 bar)–5,000 psi (345 bar) depending on ID
510 µm (.020")	±0.001"	2,000 psi (138 bar)
1/32"	±0.0005"	3,000 psi (207 bar)–5,000 psi (345 bar)
1/16"	±0.001"	7,000 psi (483 bar)

FEP Capillary Tubing

- ▶ Superb chemical compatibility

Ideal for applications where PEEK or fused silica are chemically incompatible, we offer 1/16" and 1/32" OD FEP capillary tubing in IDs as small as 0.004" (100 µm) and 0.003" (75 µm), respectively.

Tubing Specifications

OD	OD/ID Tolerance	Pressure Rating
1/16"	±0.001"	4,000 psi (276 bar)
1/32"	±0.0005"	2,500 psi (172 bar) to 4,000 psi (276 bar), depending on ID

PFA HP Plus Capillary Tubing

- ▶ Virtually contaminant free!
- ▶ 50–150 µm IDs available

With purity in the parts per billion (perfect for medical, diagnostic, pharmaceutical, biotechnology and semiconductor applications), this virtually transparent tubing also withstands repeated flexing, and it resists stress cracking when exposed to aggressive fluorosurfactants.

To cut this tubing to the length you need, we highly recommend our A-350 Polymer Tubing Cutter (see the following page). The OD and ID tolerance for all sizes of tubing in this family are ±0.0005". Additionally, the tubing has a pressure holding ability of between 1,750 psi (121 bar) and 3,500 psi (241 bar), depending upon the ID.

Please Note: Once held in place by connecting fittings, take care not to stretch the tubing, which will likely distort both the OD and ID.

PEEK™-Lined Stainless Steel (PLS)

PEEK-Lined Stainless Steel (PLS) Tubing combines the strength of stainless steel with the chemical inertness of PEEK polymer. Featuring an all-PEEK fluid pathway fully jacketed by 316 stainless steel, this unique tubing offers biocompatibility at UHPLC pressures.

Available only in pre-cut lengths, PLS tubing is available in a 1/16" outer diameter and with inner diameters ranging from 25 µm–254 µm.

PLS Tubing is pressure rated to 15,000 psi (1,034 bar) and comes complete with Upchurch Scientific® VHP fittings for 10-32 coned ports.



PEEKsil™ Tubing

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

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. 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 only be used at its pre-cut lengths because of permanent damage caused by conventional cutters.

Fused Silica Tubing

360 µm OD fused silica tubing (synthetic fused silica with polyimide coating) is offered in convenient 2 meter lengths. Choose from 20, 50, 75, 100, and 150 µm inner diameters. Connect the tubing to a variety of receiving ports using NanoTight™ fittings and accessories (page 2) and MicroTight® fittings and accessories (page 3).

Tubing Cutters

For precise, burr-free cuts, use one of these reliable, easy-to-operate cutters.

For capillary polymer tubing up to 1/32" OD:	A-350
For 1/16" and 1/8" OD polymer tubing:	A-327 (not shown)
For fused silica tubing (SGT Shortix™)	FS-315 (not shown)

Capillary/Microbore SS Tubing

We offer seamless, pre-cut stainless steel tubing offers flat, burr-free ends for zero dead volume connections and improved chromatographic results. Search by **Tubing** at www.idex-hs.com.



Inline MicroFilters

- ▶ Void volume as low as 109 nL
- ▶ 100% biocompatible PEEK™ polymer version available
- ▶ Two versions: direct-connect 1/32" OD tubing or connect a range of capillary tubing ODs (when using MicroTight® tubing sleeves)

Inline MicroFilters protect your columns with 1.0 µm stainless steel micro screens (M-135) or 0.5 µm biocompatible PEEK polymer frits (M-520 or M-525), both incorporated into PEEK end fittings (five included). Each version features a 0.006" (150 µm) thru-hole and total theoretical void volumes of 109 nL and 240 nL, respectively. Also included are two F-125 MicroTight Fittings, designed to work with our MicroTight Tubing Sleeves and your capillary tubing (70–520 µm OD), or two F-126 fittings to connect 1/32" OD tubing into the M-525 inline filter. Replacement Filter End Fittings are available in convenient 10 packs.

Please Note: Use only the same 6-32 threaded fittings that come with each filter assembly, as the 6-32 threaded fittings for different sizes of tubing are not interchangeable.

Precolumn MicroFilters

- ▶ Only 0.5 µL void volume
- ▶ Directly connects to most columns with 10-32 threads

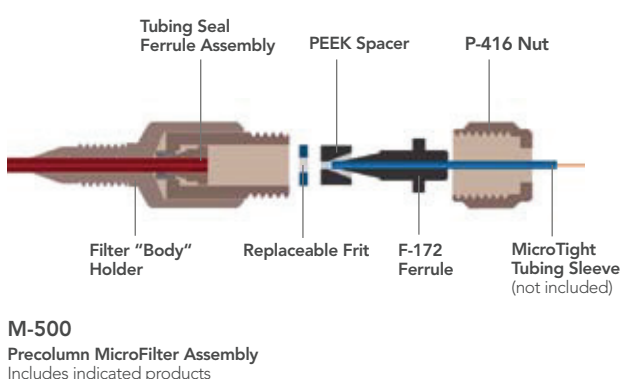
With standard 10-32 male threads, these Precolumn MicroFilters direct connect into your microbore or analytical columns. Total theoretical void volume, including frit volume, is only 0.5 µL, and the PEEK polymer tubing used in the assembly has a 0.005" (125 µm) ID, virtually eliminating any mixing. Two versions are available: one for standard 1/16" OD tubing, the other for capillary or fused silica tubing using our MicroTight Tubing Sleeves. These MicroFilter Assemblies come complete with 0.5 µm stainless steel or PEEK replacement frits.

Please Note: The components of M-500 and M-510 Precolumn MicroFilters are not interchangeable with those of M-550 and M-560 versions (see www.idex-hs.com). They are tubing specific.

Inline & Precolumn Micro Filter Specifications

Product	Porosity	Frit/Screen Material	For use with Tubing OD Size	Void Volume
Inline MicroFilters				
M-520	0.5 µm	PEEK	70–520 µm*	109 nL
M-135	1.0 µm	SST	70–520 µm*	240 nL
M-525	0.5 µm	PEEK	1/32" OD	109 nL
Precolumn MicroFilters				
M-500	0.5 µm	SST	70–520 µm*	0.5 µL
M-510	0.5 µm	PEEK	70–520 µm*	0.5 µL
M-550	0.5 µm	SST	1/16"	0.5 µL
M-560	0.5 µm	PEEK	1/16"	0.5 µL

* Using MicroTight Tubing Sleeves (see www.idex-hs.com).



M-500
Precolumn MicroFilter Assembly
Includes indicated products



Mini MicroFilters

- ▶ Void volume as low as 10 nL!
- ▶ Stainless steel and titanium filtration surfaces

Mini MicroFilter Assemblies filter effectively along capillary tubing flow paths with internal volumes low enough to ensure acceptable chromatographic results — even at nanoliter flow rates! They achieve this using replaceable NanoFilter™ capsules — some versions with a thin, stainless steel micro screen (0.25 mm thick x 1 mm diameter) and others with a miniscule sintered stainless steel or titanium frit disc (0.25 mm thick x 0.5 mm diameter). These encapsulated filters feature internal volumes as low as 85 nL with the micro-screen and 10 nL with the frit disc option!

Choose from 1 µm and 2 µm porosities. The micro-screen filter capsules have versions for connecting various tubing sizes in combination with our MicroTight Tubing Sleeves, or for direct-connecting 360 µm and 1/32" (790 µm) OD tubing. The frit-disc filter capsules are designed specifically to direct connect 360 µm and 1/32" OD tubing.

Filter Capsules for Mini MicroFilters

Product	Porosity	Frit/Screen Material	For Mini MicroFilter Assembly	For use with Ferrule	For use with Tubing OD Size	Void Volume
M-121	1 µm	SST Screen	M-530, M-531	F-172	70–520 µm*	85 nL
M-122	2 µm	SST Screen	M-530, M-531	F-172	70–520 µm*	85 nL
M-123	1 µm	SST Screen	M-532, M-533	F-152	360 µm	85 nL
M-124	2 µm	SST Screen	M-532, M-533	F-152	360 µm	85 nL
M-125	1 µm	SST Frit	M-537, M-538	F-152	360 µm	10 nL
M-126	1 µm	Titanium Frit	M-537, M-538	F-152	360 µm	10 nL
M-131	1 µm	SST Screen	M-542, M-543	F-112	1/32" (790 µm)	97 nL
M-132	2 µm	SST Screen	M-542, M-543	F-112	1/32" (790 µm)	97 nL
M-133	1 µm	SST Frit	M-547, M-548	F-112	1/32" (790 µm)	22 nL
M-134	1 µm	Titanium Frit	M-548	F-112	1/32" (790 µm)	22 nL

* Using MicroTight Tubing Sleeves (see www.idex-hs.com).

APPLICATION NOTE

The Mini MicroFilters and Inline MicroFilters can be used to pack capillary tubing. Simply position one of these filters on the effluent side of the capillary tubing, then slurry pack the capillary tubing. Once packed, place a filter at the head of the tube. This creates a reliable capillary column, without fusing the packing material to make frits or pressing filter paper inside the capillary tube.

Conductive Mini MicroFilter

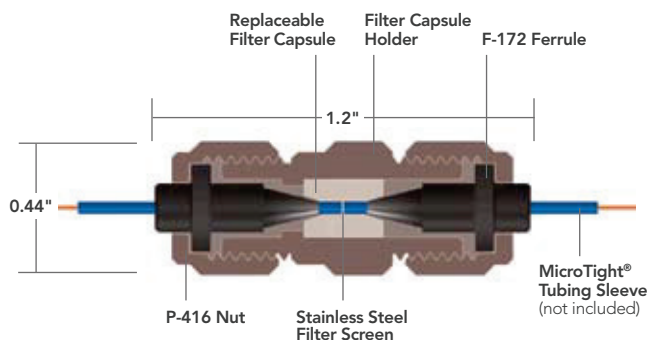
- ▶ 1 µm porosity with a void volume of 10 nL
- ▶ For CEC and mass spectrometry applications

This product has the same design and function of the Mini MicroFilters above, with the added benefit of being conductive. Apply voltage to the stainless steel filter holder body for applications such as mass spectrometry and CEC analysis. The voltage is conducted through to the stainless steel portion of the NanoFilter capsule and on to the fluid stream.

Each NanoFilter capsule has an encased 1 µm stainless steel sintered frit disc with 10 nL total internal volume. The fittings included with the assembly allow easy connection of 360 µm OD capillary tubing.

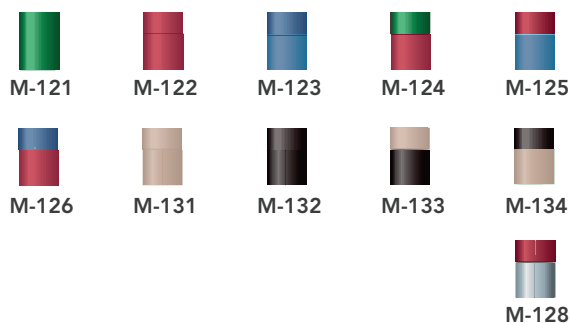
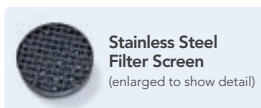
Conductive Mini MicroFilter

Product	Porosity	Frit/Screen Material	For Mini MicroFilter Assembly	For use with Ferrule	For use with Tubing OD Size	Void Volume
M-128	1 µm	SST Screen	M-534	F-152	360 µm*	10 nL



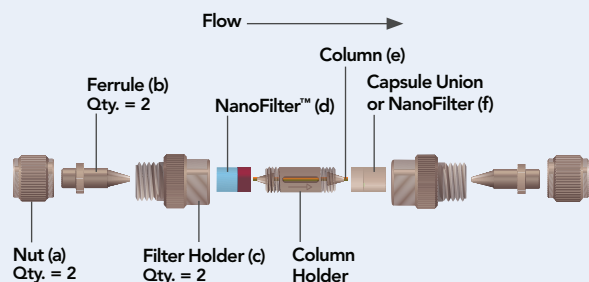
M-530

Mini MicroFilter Assembly
Includes indicated products



Sample Trap Column Assembly 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)
Non-Conductive						
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. NanoFilter capsule bodies are made of PEEK polymer.

Abbreviation Key: SST = Stainless Steel; Ti = Titanium; SCX = Strong Cation Exchange

Capillary Sample Trap Columns

- ▶ Pressure rated to 5,000 psi (345 bar)
- ▶ Designed to directly connect to 360 µm OD tubing
- ▶ Packed and unpacked columns

Capillary Sample Trap Columns are ideal for separating and concentrating and/or purifying biological samples. These products can be used for rapid sample analysis, or they can be placed inline with an injection loop for sample preparation. Capillary Sample Trap Columns can also function as nanobore guard columns.

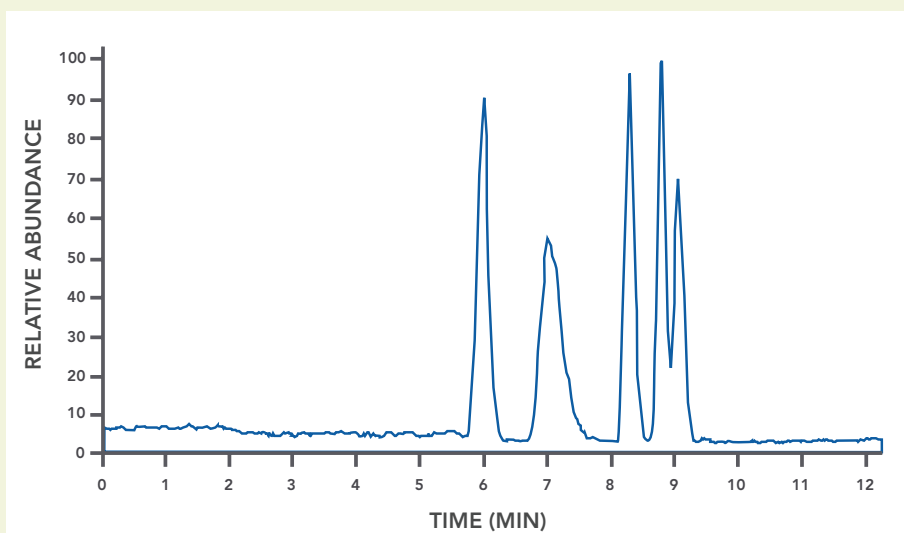
The heart of the Sample Trap is a fused silica capillary column. Available packing includes: reversed-phase C18, high-carbon load, 5 µm / 300Å spherical silica; and a SCX (Strong Cation Exchange) 5 µm / 85Å material. Each column supports a recommended maximum sample loading capacity of approximately 0.1 µg with a capillary bed volume at 0.19 µL or less. Unpacked and Conductive Column Assemblies are also available.

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. Connect your 360 µm OD capillary tubing directly to our Sample Trap Column Assemblies using the fittings provided. Each Capillary Sample Trap Column Assembly is rated to 5,000 psi (345 bar).

Also try our Column Coupler (C-1210), which makes it possible to connect two or more columns in sequence.



Example Separation Chromatogram of Five Angiotensins



Chromatographic Conditions, using C18 Sample Trap Column:

Binary Gradient	A: Water; B: Acetonitrile w/0.1% Formic Acid
Gradient Profile	<ul style="list-style-type: none"> ▶ 2% B for 0.1 minutes ▶ Ramp to 95% B over 10 minutes ▶ Hold at 95% B for 4 minutes ▶ Return to 2% B over 1 minute
Flow Rate	250 nL/minute



Our Distributors

IDEX Health & Science has established relationships with a large, global network of Distributors, many of whom can offer product support and assistance we cannot, including:

- ▶ Carrying local inventory of commonly-ordered items
- ▶ Understanding YOUR working environment and requirements
- ▶ Providing technical application assistance
- ▶ Answering questions regarding new and existing products
- ▶ Being available during your time zone business hours
- ▶ Offering personal visits as required
- ▶ Providing access to complementary product lines

We have come to rely on our authorized Distributors to provide value-added service to end-users of our products. We encourage you to contact your local Distributor!

Custom OEM Components

The micro and nanoscale products featured in this brochure represent only a small portion of the thousands of products manufactured for our customers around the world. Every day we work with equipment manufacturers to customize tubing assemblies, filters, fittings, connectors, check valves, and other instrument components to their exact specifications. We also create custom prototypes for designers working with advanced technologies. You can visit our website to contact a sales representative in your region or submit a design application for review: www.idex-hs.com.

Capabilities

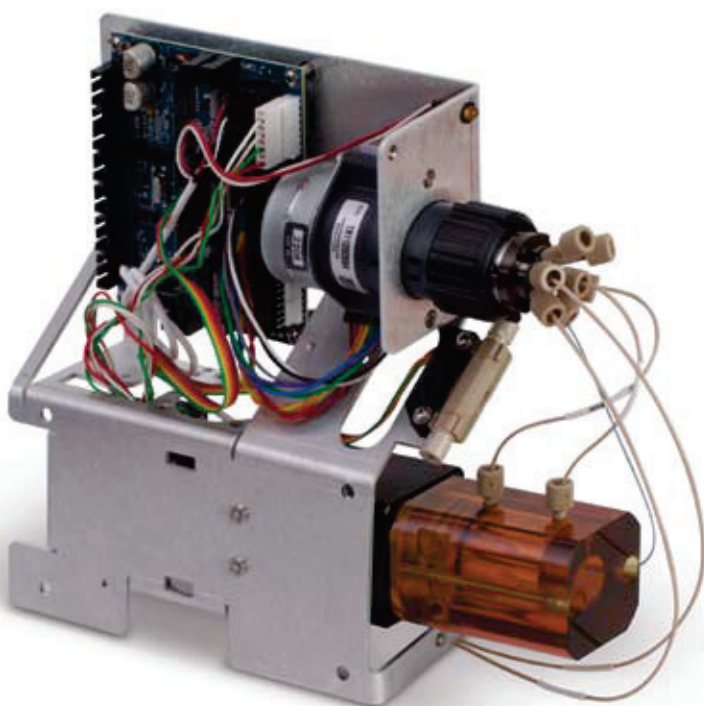
We won't try to convince you that we're your resource for high-volume, commoditized production machining, molding, or extrusion. We are, however, highly specialized in challenging aspects of each of these specialties. Call us if you need:

Machining: Proprietary processing of complex, material-specific components for highly specialized, precision-flow applications. We machine metals, plastics, and ultrahard materials to hard-to-match tolerances and specifications.

Molding: Small, complicated, insert-molded jobs in difficult, high-temperature, high-value resins.

Extrusion: High-value, hard-to-process polymers with extreme tolerances, consistent batch-to-batch process control, and tight control of inner and outer dimensions.

Assembly: Tubing kits and formed assemblies pre-packaged, labeled, bar-coded or specially contoured for your production needs.



Polymer Information

The chart below encapsulates the essential characteristics of polymers used to manufacture many of the components featured in this brochure. For more extensive data on properties and compatibility, please visit the Materials Guide on our website: www.idex-hs.com/materials/materials_guide.aspx.

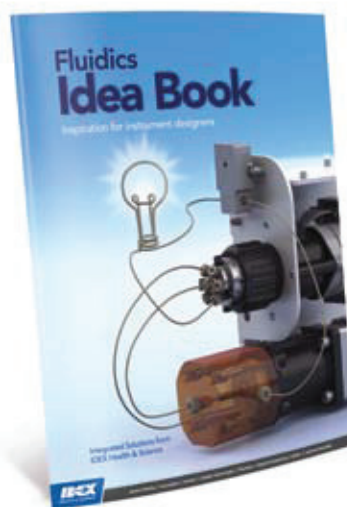
PCTFE (polychloro-trifluoroethylene). PCTFE has excellent chemical resistance. In general, only THF and a few halogenated solvents will react with it. This resilient fluoropolymer is ideal for fittings and sealing surfaces, and is generally used for high-pressure fittings and frit containment rings.

PEEK™ (polyetheretherketone). PEEK polymer 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[‡]. PEEK polymer is used extensively throughout our product line to manufacture tubing, fittings, filters, and other accessories.

FEP (fluorinated ethylene-propylene) and PFA (perfluoroalkoxy alkane). Both of these polymers are virtually inert to all chemicals used in HPLC. However, because of their relative softness and low durability, these polymers are generally used for low pressure fittings, tubing, and accessories. Choose PFA for high purity applications, or choose FEP for general, low pressure applications.

ETFE (ethylene-tetrafluoroethylene). As a member of the fluoropolymer family, ETFE has excellent solvent resistance. Its relatively high tensile strength makes it ideal for demanding sealing applications. While most commonly used solvents do not interact with ETFE, take caution when using some chlorinated chemicals. ETFE is used extensively in our product line to manufacture a variety of fittings, tubing, and accessories.

The Idea Book



Learn from our experience! **The IDEA Book** shows actual examples of component integration and coordination. Download your copy now at www.idex-hs.com.

Technical Resources

IDEX Health & Science offers a number of technical resources to help solve your fluid transfer challenges — including micro and nanoscale applications.

- ▶ Support Center at www.idex-hs.com, which features the HPLC Center, Fittings Primer, Materials Guide, Conversion Tools, Standard Port Drawings, and an Information Exchange.
- ▶ Technical Reference Chapter in the IDEX Health & Science Catalog, which includes conversion tables and a Fittings Primer.
- ▶ “All About Fittings” — a 64-page booklet, authored by John Batts, that helps unravel the often-misunderstood area of fittings for chromatography and other related fluid transfer applications.



	PCTFE	PEEK™‡	FEP & PFA	ETFE	
Chemical Family					
Aromatics	R	R	R	R	
Chlorinated	M	M	R	R	
Ketones	R	R	R	R	
Aldehydes	R	R	R	R	
Ethers	M	M	R	R	
Amines	R	R	R	M	
Aliphatic Solutions	R	R	R	R	
Organic Acids	R	M	R	R	
Inorganic Acids	R	M	R	M	
Bases	R	R	R	R	
Sulfonated Compounds	R	M	R	R	
Thread Strength*	Better	Best	Good	Good	
Max. Recommended Operating Temp. (°C)			FEP	PFA	
Fittings	80	125**	N/A	80	80
Tubing	N/A	100**	50	80	80

¹ While the chemical compatibility of FEP & PFA is virtually identical, please note the temperature limit differences.

R Recommended

M Some solvents in this category are satisfactory, others are not. In addition, maximum concentration can vary with the specific product type and chemical. Please contact IDEX Health & Science for further information.

NR Chemicals in this category are generally not recommended for use with this polymer.

N/A Information not available.

* Shear Strength

** In some cases, PEEK fittings can be used to 150 °C, and the UHPLC fittings and accessories manufactured from our proprietary blend of PEEK polymer can handle up to 200 °C. Please contact IDEX Health & Science for specific information.

‡ In some circumstances, acetonitrile has been reported to interact negatively with PEEK tubing.

Exercise caution when using high concentrations of acetonitrile at or near the maximum pressure tubing manufactured from PEEK polymer.

For ordering and technical support, please call:

North/South America

CustomerService.hs@idexcorp.com
+1 866 339 4653

Europe

CustomerService.hseurope@idexcorp.com
+49 (0) 1801 808 800

Asia

CustomerService.hsasia@idexcorp.com
Japan: +81 48 259 0711
China, Beijing: +86 10 6566 9090
China, Shanghai: +86 21 5241 5599
Singapore: +65 6763 6633
India, Mumbai: +91 22 6643 5550

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