

# FILTERS & COLUMN ACCESSORIES

**INLET SOLVENT  
FILTERS**  
PAGE 157

**INLINE SOLVENT  
FILTERS**  
PAGE 160

**PRECOLUMN  
FILTERS**  
PAGE 163

**FRITS**  
PAGE 165

**GUARD  
COLUMNS**  
PAGE 170

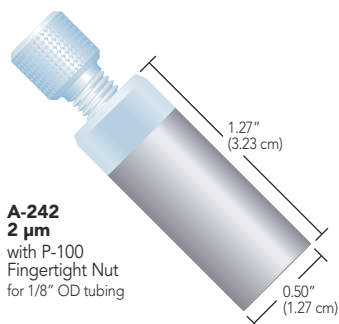


## General Use Inlet Solvent Filters

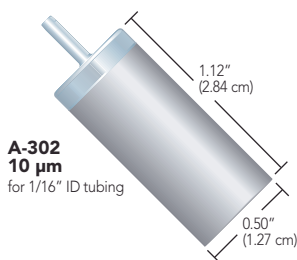
- ▶ Large surface areas prevent pump cavitation
- ▶ Disposable
- ▶ 2 µm, 10 µm, and 20 µm pore sizes available
- ▶ General use and prep filters for higher flow applications

It is good practice to filter your solvents to prevent pump damage. Upchurch Scientific® 316 stainless steel filters provide that protection.

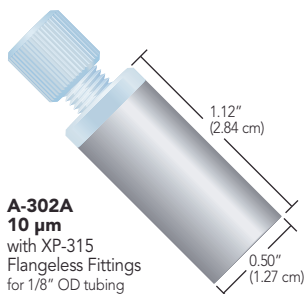
Because filters should be changed periodically, we make it easy to replace them without tools. For those filters using a plastic fitting, the tubing can be reconnected by finger tightening the fitting into the new filter. The filters with stems allow easy insertion into the inlet tubing.



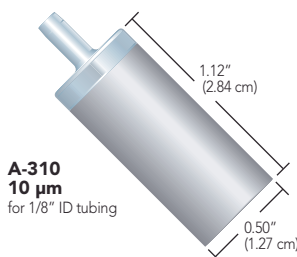
**A-242**  
2 µm  
with P-100  
Fingertight Nut  
for 1/8" OD tubing



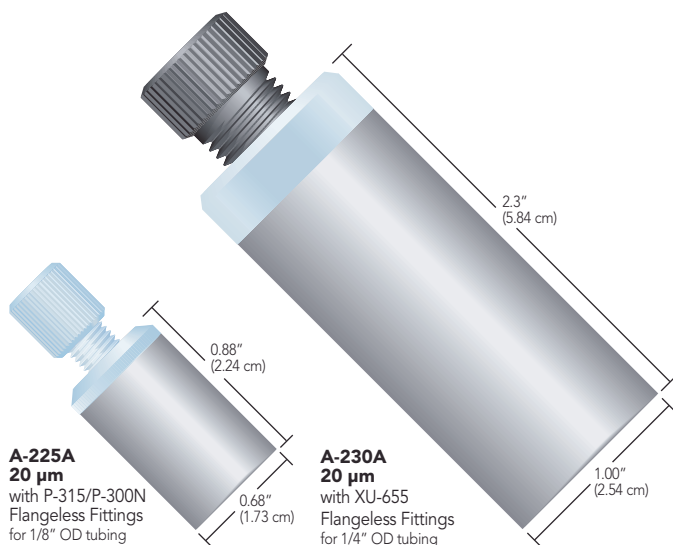
**A-302**  
10 µm  
for 1/16" ID tubing



**A-302A**  
10 µm  
with XP-315  
Flangeless Fittings  
for 1/8" OD tubing



**A-310**  
10 µm  
for 1/8" ID tubing



**A-225A**  
20 µm  
with P-315/P-300N  
Flangeless Fittings  
for 1/8" OD tubing

**A-230A**  
20 µm  
with XU-655  
Flangeless Fittings  
for 1/4" OD tubing

## APPLICATION NOTE

### Why Use An Inlet Solvent Filter?

- ▶ To filter out particulate matter from the solvent that may otherwise damage expensive hardware. (Use a 10 µm or 20 µm version for this purpose. The A-309 and A-230A filters have an added "Bottom of the Bottle™" feature to help draw solvent to within 1/8" of the bottom of your solvent bottle.)
- ▶ To prevent particulates originating from the sparging system from entering the mobile phase reservoir and to help disperse the sparging gas efficiently. (Use a 2 µm filter for this purpose.)
- ▶ To hold your tubing in place at the bottom of the bottle. (Most stainless steel filter options work best for this purpose.)

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

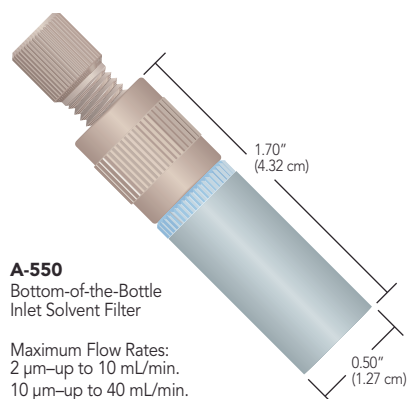
Part No.	Description	Porosity	Material	For Tubing Size	Includes	Max. Suggested Flow Rate*
<b>GENERAL USE INLET SOLVENT FILTERS</b>						
<b>For Analytical HPLC</b>						
A-242	Inlet Solvent Filter with One-Piece Fitting	2 µm	PCTFE, SST	1/8" OD	(1) P-100	10 mL/min
A-243	A-242, 5-pack	2 µm	PCTFE, SST	1/8" OD	(5) P-100	10 mL/min
A-228	Inlet Solvent Filter with stem	2 µm	SST	1/8" ID	—	80 mL/min
★ A-302	Inlet Solvent Filter with stem	10 µm	SST	1/16" ID	—	40 mL/min
★ A-302A	Inlet Solvent Filter with Flangeless Fittings	10 µm	PCTFE, SST	1/8" OD	(1) XP-315	40 mL/min
A-309	Inlet Solvent Filter with stem	10 µm	SST	1/16" ID	—	40 mL/min
A-231A	Inlet Solvent Filter with Flangeless Fittings	20 µm	PCTFE, SST	3/16" OD	(1) XP-132	100 mL/min
★ A-310	Inlet Solvent Filter with stem	10 µm	SST	1/8" ID	—	40 mL/min
<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-227A	Inlet Solvent Filter with Flangeless Fittings	10 µm	PCTFE, SST	1/4" OD	(1) XU-655	100 mL/min
A-230A	Inlet Solvent Filter with Flangeless Fittings	20 µm	PCTFE, SST	1/4" OD	(1) XU-655	100 mL/min
A-311	Inlet Solvent Filter with stem	10 µm	SST	1/16" ID	—	100 mL/min
A-311A	Inlet Solvent Filter with Flangeless Fittings	10 µm	PCTFE, SST	1/8" OD	(1) XP-315	100 mL/min

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

## Stainless Steel Bottom-of-the-Bottle™ Solvent Filters

- ▶ Draws solvent from within 1/8" of the bottom of the bottle
- ▶ Replaceable stainless steel filter cups
- ▶ Versions for 1/8" and 3/16" OD tubing
- ▶ Materials of construction: PEEK, ETFE, and 316 Stainless Steel

Patented Stainless Steel Bottom-of-the-Bottle Solvent Filter Assemblies feature a 2 µm or 10 µm replaceable stainless steel filter cup and a design that allows solvent to be drawn from within 1/8" of the bottom of your solvent bottle. The filter cups are inexpensive and easy to replace, making this an economical, trouble-free choice.



**A-550**  
Bottom-of-the-Bottle  
Inlet Solvent Filter

Maximum Flow Rates:  
2 µm—up to 10 mL/min.  
10 µm—up to 40 mL/min.

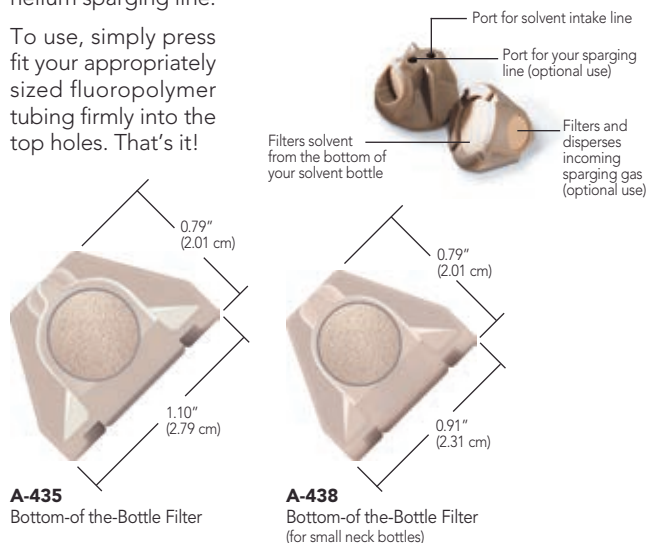
## All-PEEK Bottom-of-the-Bottle Solvent Filters

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



These biocompatible filters are made from 100% PEEK polymer, including the two built-in PEEK frits. The bottom frit (2 µm or 10 µm) will draw solvents from within 0.080" (2.0 mm) of the bottom of the solvent bottle. The 2 µm frit on the side may be used for a 1/8" OD helium sparging line.

To use, simply press fit your appropriately sized fluoropolymer tubing firmly into the top holes. That's it!



**A-435**  
Bottom-of-the-Bottle Filter

**A-438**  
Bottom-of-the-Bottle Filter  
(for small neck bottles)

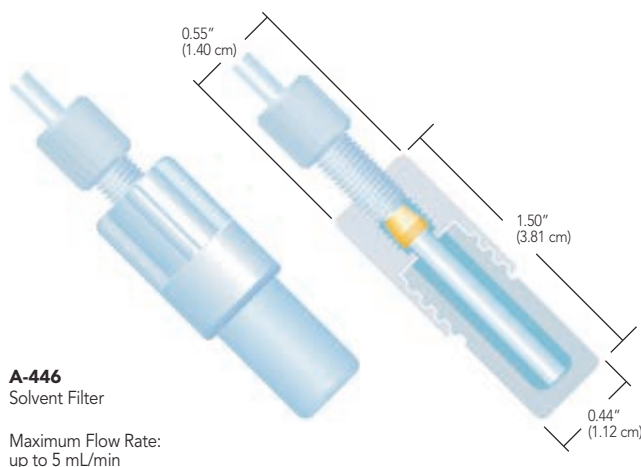
Maximum Flow Rate: up to 30 mL/min

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

- ▶ Replaceable filter cup
- ▶ Economical
- ▶ Materials of construction: UHMWPE, ETFE
- ▶ Versions for 1/16" and 1/8" OD tubing

The design of the UHMWPE solvent filters allows tubing to pass through to the bottom of the filter cup, enabling the filter to draw solvent from within 0.10" (2.5 mm) of the bottom of your solvent bottle.

*Please Note: UHMWPE is a hydrophobic material. To establish proper surface wetting, you may need to prime the filter with methanol or acetonitrile.*



**A-446**  
Solvent Filter

Maximum Flow Rate:  
up to 5 mL/min

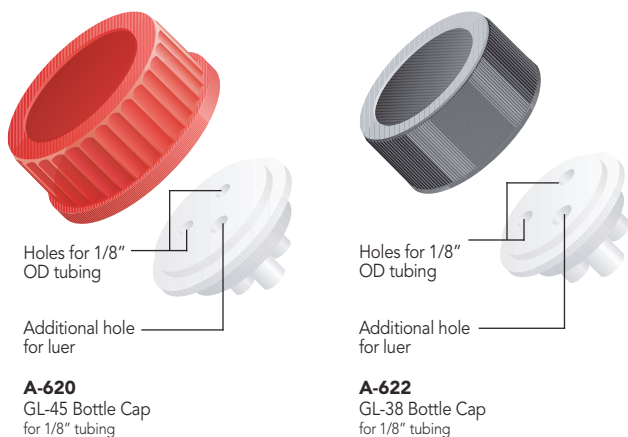
Part No.	Description	Porosity	For Tubing Size	Includes
<b>STAINLESS STEEL BOTTOM-OF-THE-BOTTLE SOLVENT FILTERS</b>				
★ A-550	SST Filter Assembly, with A-520 filter cup	10 µm	1/8" OD	(1) XP-130
A-551	SST Filter Assembly, with A-522 filter cup	2 µm	1/8" OD	(1) XP-130
A-520x	SST Replacement Solvent Filter Cups, 10-pk	10 µm	—	—
A-522x	SST Replacement Solvent Filter Cups, 10-pk	2 µm	—	—
<b>ALL-PEEK BIOCOMPATIBLE BOTTOM-OF-THE-BOTTLE SOLVENT FILTERS</b>				
A-435	PEEK Filter	2 µm	1/8" OD	—
A-437	PEEK Filter, for small-neck (GL-38) bottles	2 µm	1/8" OD	—
A-438	PEEK Filter, for small-neck (GL-38) bottles	10 µm	1/8" OD	—
★ A-440	PEEK Filter	10 µm	1/8" OD	—
A-441	PEEK Filter	10 µm	3/16" OD	—
A-451	PEEK Filter	10 µm	1/16" OD	—
<b>UHMWPE 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	—	—

## Bottle Caps

- ▶ Extremely simple — no threaded ports or fittings
- ▶ Manufactured from ETFE and Polypropylene

If you are looking for a bottle cap that is quick and easy to use, but still allows many connection options, we have just what you need! The Bottle Caps fit standard GL-45 (1 L) or smaller-neck GL-38 (4 L) glass bottles.

Each cap has three holes. With two of the holes you simply push your tubing straight through. The third hole, with a luer taper, can be used for a number of options. Any male luer (such as a luer-lock syringe) will fit snugly in this hole, or you can use the A-626 or A-627 Plug. Exceptions are the A-610 and A-610B Bottle Caps. Please see the note below.



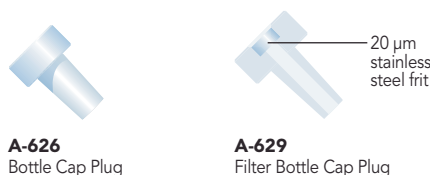
## APPLICATION NOTE

- ▶ A self-regulating sparging system can help reduce helium consumption and improve pump performance. Set this up by pressing your tubing through the appropriate holes in your bottle cap and attaching each line to a filter. Sparge your mobile phase with an inert gas (preferably helium) for 15–20 minutes. Then reduce the outlet pressure of the sparging gas to a maximum of 5 psi (0.34 bar) and insert a plug (A-626 or A-628) into the remaining port of the cap. The sparging gas will shut off once the incoming pressure equals the pressure inside the reservoir. As the mobile phase is consumed and the internal pressure lowers, sparging gas will enter to keep the system pressurized and degassed. Please Note: If gas leaks while pressurizing the bottle, try removing the sealing ring from the bottle, as it sometimes interferes with the sealing of these bottle caps.
- ▶ One concern with sparging systems is the possibility of solvent backing up the sparging inlet line. This can occur if the gas tank completely evacuates with the regulating valves open, creating a vacuum in the tubing. Solvent backup may damage sparging system components and cause cross-contamination of mobile phase reservoirs. To help prevent solvent backup, install the CV-3010 Inline Check Valve (page 151) along the tubing line that runs between the gas supply and the solvent bottle.
- ▶ For a more efficient degassing system, please see the Systec® HPLC Vacuum Degassing Systems on page 178.
- ▶ Please see the Quick-Stop Luer Check Valve on page 151 for another solvent inlet Application Note.

## Bottle Cap Plugs & Adapters

Use the A-626 Bottle Cap Plug to seal the third “tapered” luer hole found in most Upchurch Scientific® Bottle Caps. Or, use the A-628 Plug to seal any unused 1/16” or 1/8” bottle cap holes.

Alternatively, try the A-627 or A-629 Filter Bottle Cap Plug to cap an unused hole in your bottle cap. The 20 µm stainless steel frit in these products prevents foreign matter from contaminating your solvent while leaving the bottle open to the atmosphere, thus allowing fluid to be pulled out without creating a vacuum (generally not used with sparging applications). All plug bodies are manufactured from ultra-high molecular weight polyethylene (UHMWPE).



## NOTE

The A-610 and A-610B Bottle Caps have a slightly different configuration than the other caps. One hole accepts 3/16” OD tubing, the typical size used with some Waters® systems. The remaining two holes accept 1/8” OD tubing. Unlike the other caps, the A-610 does not have a tapered luer hole. If desired, use our A-628 Plug or A-629 Filter Plug for one of the 1/8” holes.

## RELATED PRODUCTS

To ensure a tight seal, use Upchurch Scientific fluoropolymer tubing with these bottle caps (pages 70–73).

Part No.	Description
<b>BOTTLE CAPS FOR GL-45, 1 L BOTTLES</b>	
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
<b>BOTTLE CAPS FOR GL-38, 4 L BOTTLES</b>	
★ A-622	for 1/8" OD tubing, Black
<b>BOTTLE CAP PLUGS AND ADAPTER</b>	
★ 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

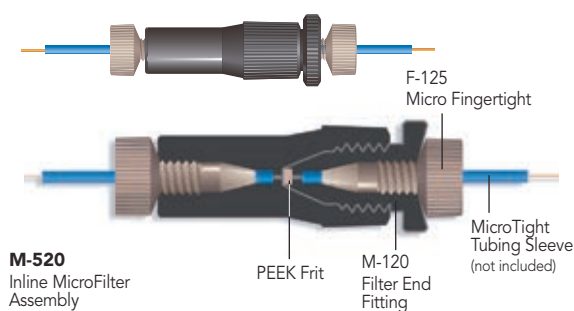
## Inline Solvent Filters

- ▶ Specially engineered for inline filtration
- ▶ Versions include Micro, Standard, and Semi-Preparative
- ▶ Bio-inert and stainless steel options offered
- ▶ Variety of porosities, application appropriate

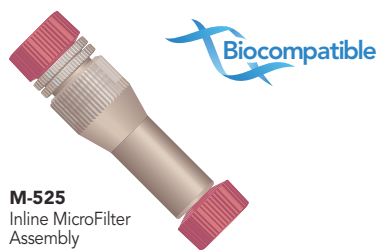
## Inline MicroFilters

- ▶ 100% biocompatible PEEK polymer option available
- ▶ Miniscule 240 nL void volume
- ▶ Two versions: direct connect 1/32" OD tubing or use MicroTight® tubing sleeves for 70–520 µm OD capillary tubing

Upchurch Scientific® Inline MicroFilters protect your column from particles originating in the mobile phase or sample, or from pump seal and sample injection valve wear. These filters have a 0.006" (150 µm) thru-hole. Choose the M-520 with a 0.5 µm 100% PEEK frit to connect to capillary tubing using the MicroTight tubing sleeves (page 19). You may also directly connect 1/32" OD tubing using the M-525 which contains a 0.5 µm PEEK frit.



**M-520**  
Inline MicroFilter  
Assembly

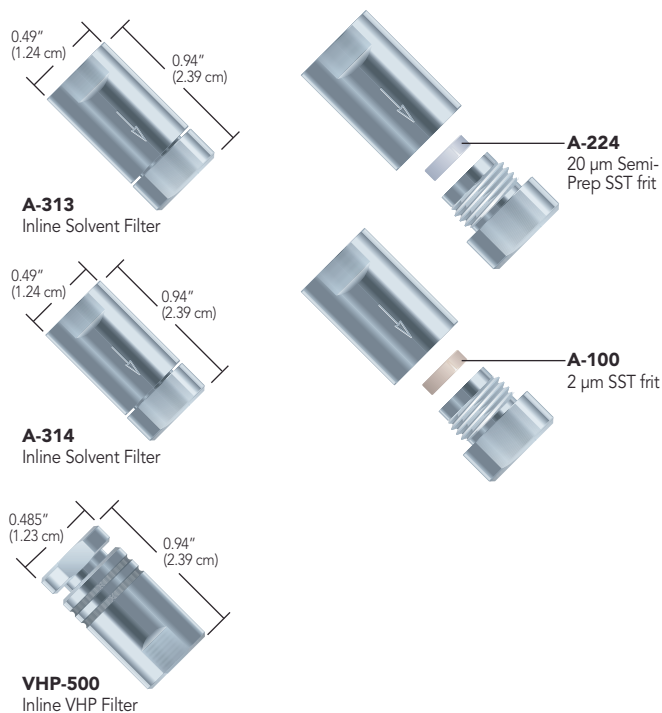


**M-525**  
Inline MicroFilter  
Assembly

## Standard Inline Solvent Filters

- ▶ For 1/16" OD tubing
- ▶ Versions for Standard HPLC (6,000 psi/414 bar) and UHPLC (25,000 psi/1,725 bar)
- ▶ Replacement frits available
- ▶ Help prevent particulate contamination from clogging sensitive equipment
- ▶ Ideally suited for placement along the flow path line between the pump and injection valve/autosampler

Inline filter assemblies that begin with the letter "A" are engineered for standard HPLC applications (up to 6,000 psi/414 bar). Inline Filter Assemblies that begin with the "VHP" prefix are suitable for use in UHPLC systems, where pressures can reach 25,000 psi (1,725 bar).



**A-313**  
Inline Solvent Filter

**A-314**  
Inline Solvent Filter

**VHP-500**  
Inline VHP Filter

## RELATED PRODUCTS

### Fittings

All Standard Inline Solvent Filters have 10-32 threads for 1/16" OD tubing, allowing the use of most standard chromatography high pressure fittings.

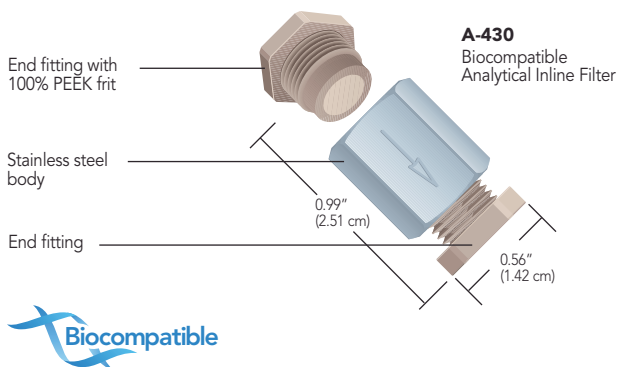
Part No.	Description	Porosity	For Tubing Size	Threads	Includes	Swept Volume	Pressure Rating	Qty.
<b>INLINE MICROFILTERS</b>								
★ M-520	Inline MicroFilter Assembly, PEEK Frit	0.5 µm	MicroTight Tubing Sleeve	MicroTight Tubing Sleeve	(5) M-120, (2) F-125	240 nL	4,000 psi (276 bar)	ea.
M-525	Inline MicroFilter Assembly, PEEK Frit	0.5 µm	1/32" OD	1/32" OD	(5) M-140, (2) F-126	240 nL	4,000 psi (276 bar)	ea.
<b>REPLACEMENT INLINE MICROFILTER END-FITTINGS</b>								
★ M-120x	End-Fittings, Black, with PEEK Frit	0.5 µm	MicroTight Tubing Sleeve	MicroTight Tubing Sleeve	N/A	216 nL	N/A	10-pk
M-140x	End-Fittings, Natural, with PEEK Frit	0.5 µm	1/32" OD	1/32" OD	N/A	216 nL	N/A	10-pk
<b>INLINE SOLVENT FILTERS</b>								
A-313	Solvent Filter Assembly	20 µm	1/16" OD	10-32 Coned	(1) A-224	12.3 µL	6,000 psi (414 bar)	ea.
★ A-314	Solvent Filter Assembly	2 µm	1/16" OD	10-32 Coned	(1) A-100	4 µL	6,000 psi (414 bar)	ea.
A-100x	Replacement Frits, Stainless Steel, 10-pk	2 µm	N/A	—	—	1.4 µL	N/A	10-pk
A-224	Replacement Frits, Stainless Steel, ea.	20 µm	N/A	—	—	9.7 µL	N/A	ea.
VHP-500	Inline VHP Filter	0.5 µm	1/16" OD	10-32 Coned	(5) VHP-501	1.2 µL	25,000 psi (1,725 bar)	ea.
VHP-505	Inline VHP Filter	0.2 µm	1/16" OD	10-32 Coned	(5) VHP-506	1.1 µL	25,000 psi (1,725 bar)	ea.
VHP-501x	Replacement Inline VHP Frit	0.5 µm	N/A	N/A	N/A	0.60 µL	N/A	10-pk
VHP-506x	Replacement Inline VHP Frit	0.2 µm	N/A	N/A	N/A	0.54 µL	N/A	10-pk

\*Swept volumes include/reflect theoretical frit volume values.  
SST = Stainless Steel

## Biocompatible Standard Inline Filters

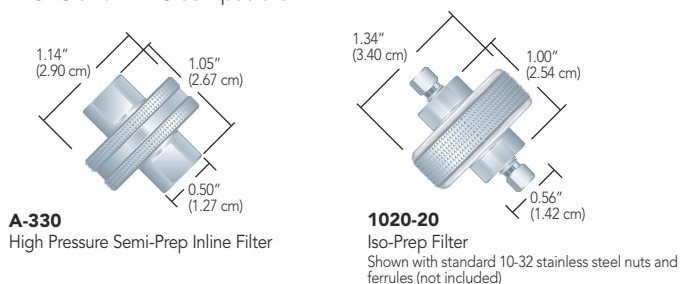
- ▶ 0.5 µm and 2 µm versions available
- ▶ Features 100% PEEK flow path

Upchurch Scientific® A-430 and A-431 Inline Filters consist of a stainless steel body and two PEEK end fittings. Maximum recommended flow rate is 25 mL/min for the A-430 Filter and 10 mL/min for the A-431 Filter. And, you get the added benefit of biocompatibility since all wetted surfaces are PEEK. When you need to replace the frit, simply dispose of the end fitting that contains the frit and replace it with a new one.



## Semi-Prep Inline Filters

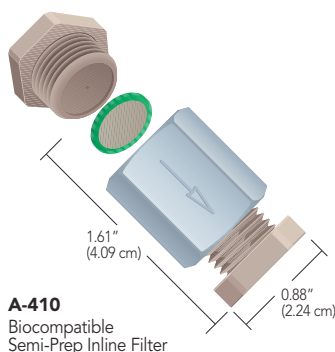
- ▶ Designed for high-flow applications
- ▶ Economical protection for larger columns and injections
- ▶ SFC and HPLC compatible



## Biocompatible Semi-Prep Inline Filters

- ▶ Versions for 1/16", 1/8", 3/16", 1/4", and 5/16" OD tubing
- ▶ 100% PEEK flow path

Biocompatible Semi-Prep Filters consist of a stainless steel body, two PEEK end fittings, and a separate PEEK frit. These filters are ideal for many higher flow analytical, semi-prep and preparative applications. Best of all, if the filter becomes clogged, simply unscrew the assembly, remove the frit and replace it. The frits are interchangeable.



Part No.	Description	Porosity	Threads	Includes	Swept Volume*	Pressure Rating	Qty.
<b>BIOCOMPATIBLE INLINE FILTERS</b>							
★ A-430	Biocompatible Filter Assembly	2 µm	10-32 Coned	(1) A-429	7.1 µL	6,000 psi (414 bar)	ea.
A-431	Biocompatible Filter Assembly	0.5 µm	10-32 Coned	(1) A-428	5.9 µL	6,000 psi (414 bar)	ea.
A-428x	PEEK Filter End Fittings, Black PEEK body, 10-pk	0.5 µm	10-32 Coned	—	5.7 µL	N/A	10-pk
★ A-429x	PEEK Filter End Fittings, Natural PEEK body, 10-pk	2 µm	10-32 Coned	—	6.9 µL	N/A	10-pk
<b>SEMI-PREP INLINE FILTERS</b>							
★ A-330	Semi-Prep Filter Assembly	10 µm	10-32 Coned	(1) A-331	223 µL	7,500 psi (517 bar)	ea.
A-360	Semi-Prep Filter Assembly	10 µm	5/16-24 Flat Bottom	(1) A-331	235 µL	3,500 psi (207 bar)	ea.
A-331x	Stainless Steel Frits, Natural ETFE ring	10 µm	N/A	N/A	142 µL	N/A	10-pk
A-332x	Stainless Steel Frits, Natural ETFE ring	2 µm	N/A	N/A	122 µL	N/A	10-pk
A-337x	Stainless Steel Frits, Natural ETFE ring	20 µm	N/A	N/A	152 µL	N/A	10-pk
<b>ISO-PREP FILTERS</b>							
1020-05	21.2 mm Filter Holder	0.5 µm	10-32 Coned	(1) 7031-05	203 µL	8,000 psi (552 bar)	ea.
1020-20	21.2 mm Filter Holder	2 µm	10-32 Coned	(1) 7031-20	196 µL	8,000 psi (552 bar)	ea.
7031-05	21.2 mm Replacement Filter	0.5 µm	N/A	N/A	122 µL	8,000 psi (552 bar)	ea.
7031-20	21.2 mm Replacement Filter	2 µm	N/A	N/A	115 µL	8,000 psi (552 bar)	ea.
<b>BIOCOMPATIBLE SEMI-PREP INLINE FILTERS</b>							
★ A-410	Biocompatible Filter Assembly	2 µm	10-32 Coned	(1) OC-802	89 µL	6,000 psi (414 bar)	ea.
A-411	Biocompatible Filter Assembly	10 µm	10-32 Coned	(1) OC-803	103 µL	6,000 psi (414 bar)	ea.
A-510	Biocompatible Filter Assembly	5 µm	5/16-24 Flat Bottom	(1) OC-805	89 µL	500 psi (34 bar)	ea.
OC-802	PEEK Frit, Green PCTFE ring	2 µm	N/A	N/A	46 µL	N/A	ea.
OC-803	PEEK Frit, Natural PCTFE ring	10 µm	N/A	N/A	57 µL	N/A	ea.
OC-805	PEEK Frit, Natural PCTFE ring	5 µm	N/A	N/A	50 µL	N/A	ea.

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

## Mini MicroFilters

- ▶ Total volume as low as 10 nL
- ▶ Conductive version for CEC and mass spectrometry applications
- ▶ Three styles available: direct connect 1/32" OD or 360 µm OD tubing and a variety of capillary sizes using MicroTight® tubing sleeves (70–520 µm)

Upchurch Scientific® Inline Mini MicroFilter Assemblies filter effectively with internal volumes low enough to ensure reliable chromatographic results — even at nanoliter per minute flow rates! Internal volumes of these encapsulated filters are as low as 85 nL with the micro-screen and 10 nL to 22 nL with the frit disc option.

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

### APPLICATION NOTE

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

### Increase the Life of Your Column

Why use a Precolumn Filter when there is a frit at the head of the column itself? Changing the column frit is extremely difficult to do without disturbing the column packing. A Precolumn Filter provides relatively inexpensive insurance against column damage, and changing its frit is easy. A Precolumn Filter placed between the sample injection valve and the HPLC column protects the column from particles originating in the sample and from pump and valve seal wear.



**M-530**  
Mini MicroFilter  
Assembly



**M-534**  
Conductive Mini  
MicroFilter Assembly

### SPECIFICATIONS & DETAILS

Because of the size-specific nature of the ferrules included with each Mini MicroFilter assembly, please note that these ferrules are not interchangeable with other MicroFerrules for different tubing sizes.

### Filter Capsule Color Identification



### What's the Difference Between Precolumn & Inline Filters?

You may have noticed that the bodies of Precolumn and Inline Filters look similar, and as such, you may have wondered what the differences are. Because Precolumn Filters, by definition, are typically placed in a volume-sensitive area immediately preceding the column, these filters usually feature smaller thru-holes and smaller frit diameters. In contrast, Inline Filters are often placed where the internal volume is not as critical and where longer life and less fluid restriction is more important.

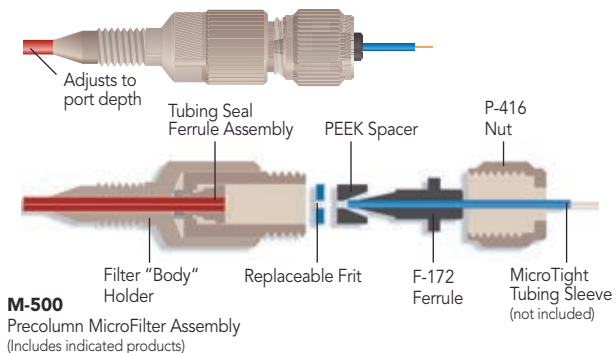
Part No.	Description	Porosity	Frit Type	For use with Tubing	Includes	Swept Volume	Pressure Rating
<b>MINI MICROFILTER ASSEMBLY</b>							
M-530	Mini MicroFilter Assembly	2 µm	SST Screen	MicroTight tubing sleeves	(5) M-122, (2) F-172, (2) P-416	85 nL	4,000 psi (276 bar)
M-531	Mini MicroFilter Assembly	1 µm	SST Screen	MicroTight tubing sleeves	(5) M-121, (2) F-172, (2) P-416	85 nL	4,000 psi (276 bar)
M-532	Mini MicroFilter Assembly	2 µm	SST Screen	360 µm OD	(5) M-124, (2) F-152, (2) P-416BLK	85 nL	4,000 psi (276 bar)
M-537	Mini MicroFilter Assembly	1 µm	SST Frit	360 µm OD	(5) M-125, (2) F-152, (2) P-416BLK	10 nL	4,000 psi (276 bar)
★ M-538	Mini MicroFilter Assembly	1 µm	Ti Frit	360 µm OD	(5) M-126, (2) F-152, (2) P-416BLK	10 nL	4,000 psi (276 bar)
M-543	Mini MicroFilter Assembly	1 µm	SST Screen	1/32" (790 µm) OD	(5) M-131, (2) F-112, (2) P-416	97 nL	4,000 psi (276 bar)
M-547	Mini MicroFilter Assembly	1 µm	SST Frit	1/32" (790 µm) OD	(5) M-133, (2) F-112, (2) P-416	22 nL	4,000 psi (276 bar)
M-548	Mini MicroFilter Assembly	1 µm	Ti Frit	1/32" (790 µm) OD	(5) M-134, (2) F-112, (2) P-416	22 nL	4,000 psi (276 bar)
M-534	Conductive Mini MicroFilter Assembly	1 µm	SST Frit	360 µm OD	(5) M-128, (2) F-152, (2) P-416BLK	10 nL	4,000 psi (276 bar)
<b>REPLACEMENT MINI MICROFILTER CAPSULES</b>							
Part No.	Description	Porosity	Frit Type	For Use With	Material	Swept Volume	Qty.
M-121	Filter Capsule	1 µm	SST Screen	M-530 and M-531	PEEK	85 nL	2-pk
M-122	Filter Capsule	2 µm	SST Screen	M-530 and M-531	PEEK	85 nL	2-pk
M-124	Filter Capsule	2 µm	SST Screen	M-532	PEEK	85 nL	2-pk
M-125	NanoFilter Capsule	1 µm	SST Frit	M-537 and M-538	PEEK	10 nL	2-pk
★ M-126	NanoFilter Capsule	1 µm	Ti Frit	M-537 and M-538	PEEK	10 nL	2-pk
M-131	Filter Capsule	1 µm	SST Screen	M-543	PEEK	85 nL	2-pk
M-132	Filter Capsule	2 µm	SST Screen	M-543	PEEK	85 nL	2-pk
M-133	NanoFilter Capsule	1 µm	SST Frit	M-547 and M-548	PEEK	10 nL	2-pk
M-134	NanoFilter Capsule	1 µm	Ti Frit	M-547 and M-548	PEEK	10 nL	2-pk
M-128	Conductive NanoFilter Capsule	1 µm	SST Frit	M-534	SST/PEEK	10 nL	2-pk

SST = Stainless Steel; Ti = Titanium

## Precolumn MicroFilters

- ▶ Direct connects to columns with 10-32 threads
- ▶ Total void volume of 0.5 µL
- ▶ Two versions: direct connect 1/16" OD tubing or use MicroTight® tubing sleeves for 70–520 µm OD capillary tubing

The Precolumn MicroFilters directly connect into your microbore or analytical column. Total theoretical void volume is only 0.5 µL (includes frit volume) and the PEEK tubing used in the assembly of these units has a 0.005" (125 µm) ID, virtually eliminating any mixing of the sample with the mobile phase.

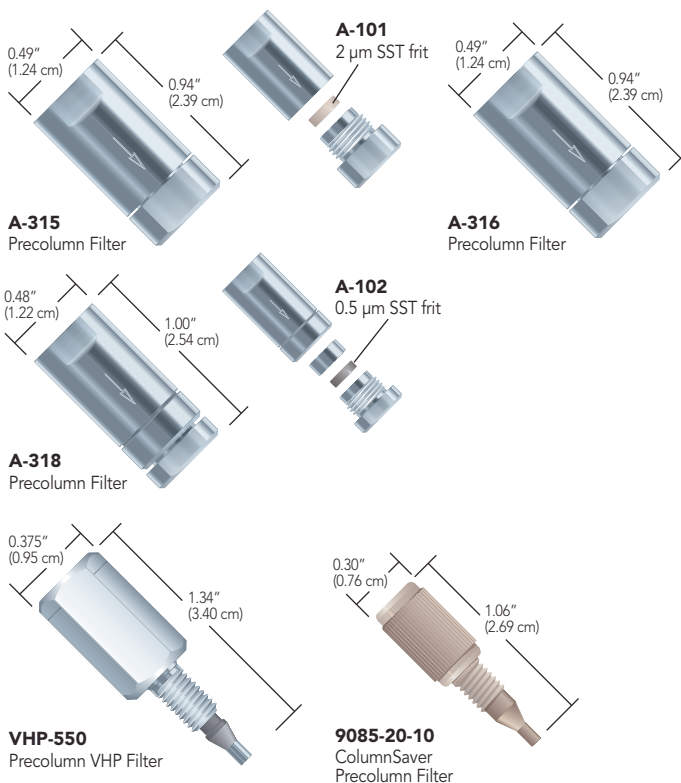


## Standard Precolumn Filters

- ▶ Economical protection for analytical columns in HPLC and UHPLC
- ▶ Traditional versions connect tubing on both sides
- ▶ Direct-connect versions attach to the inlet port of most standard columns
- ▶ All versions feature 10-32 coned ports for 1/16" OD tubing

These are designed to protect columns by filtering out particulate matter originating from the sample or from rotor seal wear.

- ▶ Assemblies that begin with the letter "A" are traditional versions for standard HPLC
- ▶ Assemblies that begin with "VHP" are direct-connect versions for UHPLC applications
- ▶ Versions that begin with "9085" are direct-connect for standard HPLC and must be used with polymer fittings



Part No.	Description	Porosity	For Tubing Size	Threads	Includes	Swept Volume*	Pressure Rating	Qty.
<b>PRECOLUMN MICROFILTER ASSEMBLIES</b>								
M-500	Precolumn MicroFilter Assembly, SST Frit	0.5 µm	MicroTight Tubing Sleeve	10-32 Coned	(5) C-425, (1) F-172, (1) P-416	0.5 µL	4,000 psi (276 bar)	ea.
M-510	Precolumn MicroFilter Assembly, PEEK Frit	0.5 µm	MicroTight Tubing Sleeve	10-32 Coned	(5) A-735, (1) F-172, (1) P-416	0.5 µL	4,000 psi (276 bar)	ea.
M-550	Precolumn MicroFilter Assembly, SST Frit	0.5 µm	1/16" OD	10-32 Coned	(5) C-425, (1) F-132, (1) P-416	0.5 µL	4,000 psi (276 bar)	ea.
★ M-560	Precolumn MicroFilter Assembly, PEEK Frit	0.5 µm	1/16" OD	10-32 Coned	(5) A-735, (1) F-132, (1) P-416	0.5 µL	4,000 psi (276 bar)	ea.
<b>REPLACEMENT PRECOLUMN MICROFILTER FRITS (FRIT DIAMETER X FRIT THICKNESS X OVERALL DIAMETER)</b>								
★ A-735x	PEEK Frits, 0.045" x 0.031" x 0.192"	0.5 µm	N/A	N/A	N/A	216 nL	N/A	10-pk
★ C-420x	SST Frits, 0.038" x 0.028" x 0.192"	2 µm	N/A	N/A	N/A	101 nL	N/A	10-pk
C-425x	SST Frits, 0.038" x 0.028" x 0.192"	0.5 µm	N/A	N/A	N/A	101 nL	N/A	10-pk
<b>PRECOLUMN FILTERS</b>								
★ A-315	Solvent Filter Assembly	2 µm	1/16" OD	10-32 Coned	(1) A-101	1.4 µL	6,000 psi (414 bar)	ea.
★ A-316	Solvent Filter Assembly	0.5 µm	1/16" OD	10-32 Coned	(1) A-102	1.3 µL	6,000 psi (414 bar)	ea.
★ A-318	Solvent Filter Assembly	0.5 µm	1/16" OD	10-32 Coned	(1) A-102	0.84 µL	6,000 psi (414 bar)	ea.
A-101x	Replacement Frits, Stainless Steel, 10-pk	2 µm	N/A	—	—	0.74 µL	N/A	10-pk
A-102x	Replacement Frits, Stainless Steel, 10-pk	0.5 µm	N/A	—	—	0.61 µL	N/A	10-pk
VHP-550	Precolumn VHP Filter	0.5 µm	1/16" OD	10-32 Coned	(5) VHP-551	1.9 µL	20,000 psi (1,380 bar)	ea.
VHP-555	Precolumn VHP Filter	0.2 µm	1/16" OD	10-32 Coned	(5) VHP-556	1.8 µL	20,000 psi (1,380 bar)	ea.
VHP-551x	Replacement Precolumn VHP Frit Assembly	0.5 µm	N/A	N/A	N/A	1.9 µL	N/A	10-pk
VHP-556x	Replacement Precolumn VHP Frit Assembly	0.2 µm	N/A	N/A	N/A	1.8 µL	N/A	10-pk
9085-05-10	ColumnSaver Precolumn Filter, with SST frit	0.5 µm	1/16" OD	10-32 Coned	N/A	3.1 µL	6,000 psi (414 bar)	10-pk
9085-20-10	ColumnSaver Precolumn Filter, with SST frit	2 µm	1/16" OD	10-32 Coned	N/A	3.1 µL	6,000 psi (414 bar)	10-pk

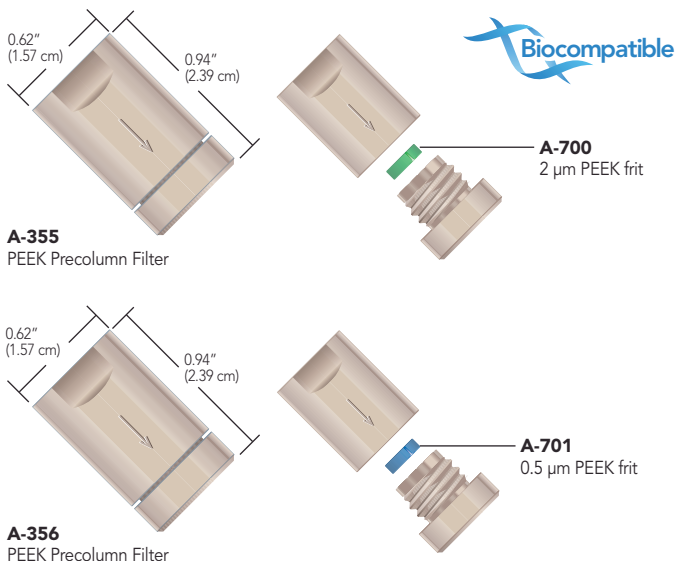
SST = Stainless Steel

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

## 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.

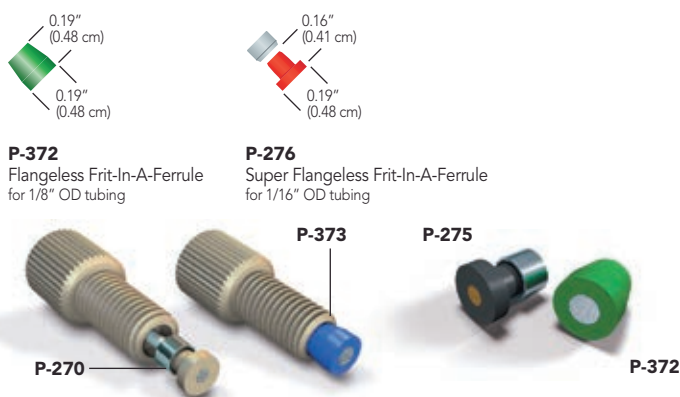


## Frit-In-A-Ferrule™

- ▶ 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.



## Disposable Sample Filters

- ▶ Excellent system protection
- ▶ Ultra-low hold-up volume
- ▶ 0.5 µm and 2 µm porosity

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.



**B-100 and B-101**  
Disposable Sample Filters

Part No.	Description	Porosity	Threads	Includes	Swept Volume*	Pressure Rating		
<b>BIOCOMPATIBLE PRECOLUMN FILTERS</b>								
★ A-355	Solvent Filter Assembly, Biocompatible	2 µm	10-32 Coned	(1) A-700	1.4 µL	5,000 psi (345 bar)		
★ A-356	Solvent Filter Assembly, Biocompatible	0.5 µm	10-32 Coned	(1) A-701	1.3 µL	5,000 psi (345 bar)		
A-700	Replacement Frit, PEEK Polymer, ea.	2 µm	—	—	0.74 µL	N/A		
A-701	Replacement Frit, PEEK Polymer, ea.	0.5 µm	—	—	0.61 µL	N/A		
<b>FRIT-IN-A-FERRULE FOR 1/16" OD TUBING</b>								
Part No.	Description	Porosity	Frit Material	Frit Diameter	Frit Thickness	Swept Volume	Maximum Pressure	Qty.
P-270x	Super Flangeless, Natural PEEK, SST lock ring	2 µm	SST	0.062"	0.062"	0.74 µL	2,500 psi (172 bar)	10-pk
P-272x	Flangeless, Green PCTFE	2 µm	SST	0.062"	0.062"	0.74 µL	2,000 psi (138 bar)	10-pk
P-273x	Flangeless, Blue PCTFE	0.5 µm	SST	0.062"	0.062"	0.61 µL	2,000 psi (138 bar)	10-pk
P-274x	Super Flangeless, Natural PEEK, SST lock ring	2 µm	PEEK	0.046"	0.030"	0.20 µL	2,500 psi (172 bar)	10-pk
★ P-275x	Super Flangeless, Black PEEK, SST lock ring	0.5 µm	PEEK	0.046"	0.030"	0.16 µL	2,500 psi (172 bar)	10-pk
P-276	Super Flangeless, Red ETFE, SST lock ring	10 µm	SST	0.062"	0.062"	0.90 µL	2,500 psi (172 bar)	ea.
<b>FRIT-IN-A-FERRULE FOR 1/8" OD TUBING</b>								
★ P-372x	Flangeless, Green PCTFE	2 µm	SST	0.094"	0.062"	1.69 µL	500 psi (34 bar)	10-pk
P-373x	Flangeless, Blue PCTFE	0.5 µm	SST	0.094"	0.062"	1.41 µL	500 psi (34 bar)	10-pk
P-374x	Super Flangeless**, Natural PEEK, SST lock ring	2 µm	PEEK	0.094"	0.042"	1.15 µL	2,500 psi (172 bar)	10-pk
<b>DISPOSABLE HPLC SAMPLE FILTERS</b>								
B-100	Disposable Filters	2 µm	SST	0.125"	0.031"	15.8 µL	N/A	100-pk
★ B-101	Disposable Filters	0.5 µm	SST	0.125"	0.031"	15.6 µL	N/A	100-pk

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

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

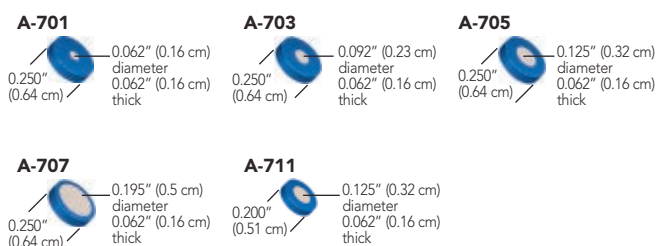
## PEEK Frits

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

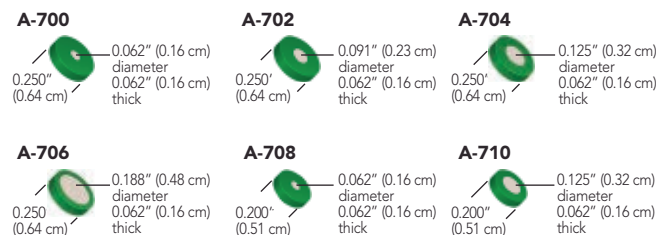
Patented Upchurch Scientific® PEEK Frits offer exceptionally uniform porosity. This property ensures longer filtration life and consistent frit-to-frit swept volumes. The PEEK polymer frit discs are biocompatible and inert to most solvents, making them well-suited for bioanalytical applications. PEEK's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

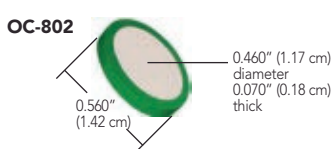
### 0.5 µm PEEK Frits



### 2 µm PEEK Frits



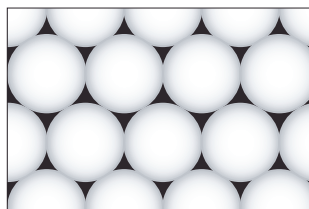
### 2 µm Semi-Prep PEEK Frits



## 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).

Part No.	Porosity	Disc Diameter	Disc Thickness	Ring OD	Ring Material	Frit Volume	Qty.
<b>PEEK FRITS</b>							
★ A-700	2 µm	0.062" (0.16 cm)	0.062" (0.16 cm)	0.250" (0.64 cm)	PCTFE	0.7 µL	ea.
★ A-701	0.5 µm	0.062" (0.16 cm)	0.062" (0.16 cm)	0.250" (0.64 cm)	PCTFE	0.6 µL	ea.
A-702	2 µm	0.091" (0.23 cm)	0.062" (0.16 cm)	0.250" (0.64 cm)	PCTFE	1.7 µL	ea.
A-703	0.5 µm	0.092" (0.23 cm)	0.062" (0.16 cm)	0.250" (0.64 cm)	PCTFE	1.4 µL	ea.
A-704	2 µm	0.125" (0.32 cm)	0.062" (0.16 cm)	0.250" (0.64 cm)	PCTFE	3.0 µL	ea.
A-705	0.5 µm	0.125" (0.32 cm)	0.062" (0.16 cm)	0.250" (0.64 cm)	PCTFE	2.4 µL	ea.
★ A-706	2 µm	0.188" (0.48 cm)	0.062" (0.16 cm)	0.250" (0.64 cm)	PCTFE	7.1 µL	ea.
★ A-707	0.5 µm	0.195" (0.5 cm)	0.062" (0.16 cm)	0.250" (0.64 cm)	PCTFE	6.1 µL	ea.
A-708	2 µm	0.062" (0.16 cm)	0.062" (0.16 cm)	0.200" (0.51 cm)	PCTFE	0.7 µL	ea.
A-710	2 µm	0.125" (0.32 cm)	0.062" (0.16 cm)	0.200" (0.51 cm)	PCTFE	3.0 µL	ea.
A-711	0.5 µm	0.125" (0.32 cm)	0.062" (0.16 cm)	0.200" (0.51 cm)	PCTFE	2.5 µL	ea.
<b>SEMI-PREP PEEK FRITS</b>							
★ OC-802	2 µm	0.460" (1.17 cm)	0.070" (0.18 cm)	0.560" (1.42 cm)	PCTFE	46.4 µL	ea.

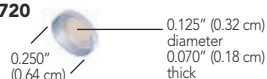
## PEEK Frits (cont.)

### 5 µm and 10 µm PEEK Frits

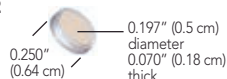
**A-715-02**



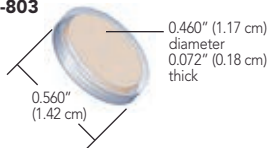
**A-720**



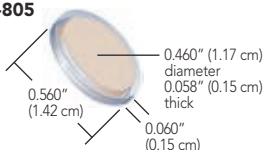
**A-722**



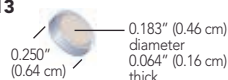
**OC-803**



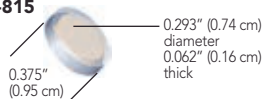
**OC-805**



**OC-813**



**OC-815**



### NOTE

- ▶ The thickness dimension in the part drawings and the pricing tables represents the thickness of the frit disc not the frit ring. Frit rings are often slightly thicker to ensure a proper seal. When tightened into a filter holder the ring compresses to nearly match the thickness of the frit disc.
- ▶ The manufacturing process may cause some slight color variance in our PEEK frits. This does not affect their quality or performance. Frit dimensions are approximate. Actual batch-to-batch frit dimensions may vary slightly.

## RELATED PRODUCTS

Any 0.247" to 0.254" diameter frit (including polymer ring) can be used with the Standard HPLC Inline Solvent Filters on page 160 and the Standard Precolumn Filters on page 163.

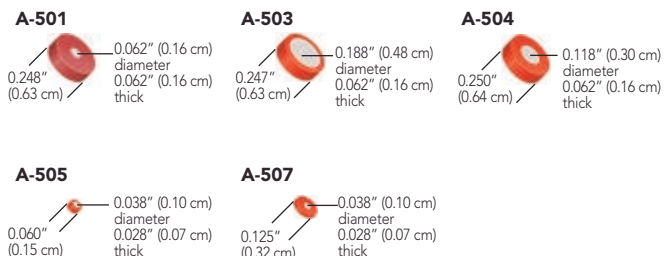
Part No.	Porosity	Disc Diameter	Disc Thickness	Ring OD	Ring Material	Frit Volume	Qty.
<b>SEMI-PREP PEEK FRITS</b>							
<b>A-715-02</b>	10 µm	0.740" (1.88 cm)	0.072" (0.18 cm)	N/A	N/A	142.1 µL	ea.
★ <b>A-720</b>	10 µm	0.125" (0.32 cm)	0.070" (0.18 cm)	0.250" (0.64 cm)	PCTFE	4.2 µL	ea.
★ <b>A-722</b>	10 µm	0.197" (0.5 cm)	0.070" (0.18 cm)	0.250" (0.64 cm)	PCTFE	9.9 µL	ea.
<b>OC-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-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.

## Titanium Frits

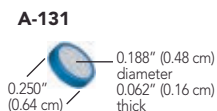
- ▶ Excellent alternative to stainless steel
- ▶ PEEK or PCTFE polymer rings

Titanium is a biocompatible alternative to stainless steel. Our 0.2  $\mu\text{m}$ , 0.5  $\mu\text{m}$ , and 2  $\mu\text{m}$  porosity titanium frits are surrounded by PEEK or PCTFE polymer rings for enhanced sealing. The dimensions of most of these frits make them suitable replacement frits for most Upchurch Scientific® standard inline and precolumn filters.

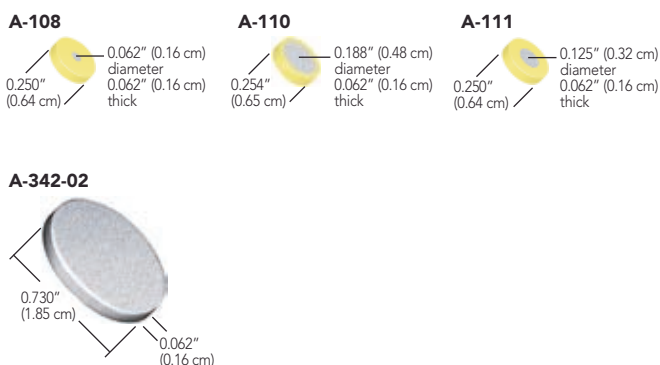
### 0.2 $\mu\text{m}$ Titanium Frits



### 0.5 $\mu\text{m}$ Titanium Frit



### 2 $\mu\text{m}$ Titanium Frits



## NOTE

- ▶ While all of the frits listed in this chapter are capable of withstanding high pressures (> 5,000 psi or 345 bar), the actual pressure holding capability of each frit is usually dependent on the filter body in which it is placed.

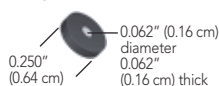
Part No.	Porosity	Disc Diameter	Disc Thickness	Ring OD	Ring Material	Frit Volume	Qty.
<b>TITANIUM FRITS</b>							
<b>A-108x</b>	2 $\mu\text{m}$	0.062" (0.16 cm)	0.062" (0.16 cm)	0.250" (0.64 cm)	PCTFE	0.7 $\mu\text{L}$	10-pk
<b>A-110x</b>	2 $\mu\text{m}$	0.188" (0.48 cm)	0.062" (0.16 cm)	0.254" (0.65 cm)	PCTFE	7.1 $\mu\text{L}$	10-pk
<b>A-111</b>	2 $\mu\text{m}$	0.125" (0.32 cm)	0.062" (0.16 cm)	0.250" (0.64 cm)	PCTFE	2.7 $\mu\text{L}$	ea.
<b>A-131</b>	0.5 $\mu\text{m}$	0.188" (0.48 cm)	0.062" (0.16 cm)	0.250" (0.64 cm)	PCTFE	5.6 $\mu\text{L}$	ea.
<b>A-342-02</b>	2 $\mu\text{m}$	0.730" (1.85 cm)	0.062" (0.16 cm)	N/A	N/A	93.6 $\mu\text{L}$	ea.
<b>A-501</b>	0.2 $\mu\text{m}$	0.062" (0.16 cm)	0.062" (0.16 cm)	0.248" (0.63 cm)	PEEK	0.6 $\mu\text{L}$	ea.
<b>A-503</b>	0.2 $\mu\text{m}$	0.188" (0.48 cm)	0.062" (0.16 cm)	0.247" (0.63 cm)	PCTFE	5.1 $\mu\text{L}$	ea.
<b>A-504</b>	0.2 $\mu\text{m}$	0.118" (0.30 cm)	0.062" (0.16 cm)	0.250" (0.64 cm)	PCTFE	2 $\mu\text{L}$	ea.
<b>A-505</b>	0.2 $\mu\text{m}$	0.038" (0.10 cm)	0.028" (0.07 cm)	0.060" (0.15 cm)	PCTFE	0.1 $\mu\text{L}$	ea.
<b>A-507</b>	0.2 $\mu\text{m}$	0.038" (0.10 cm)	0.028" (0.07 cm)	0.125" (0.32 cm)	PCTFE	0.1 $\mu\text{L}$	ea.

## Stainless Steel Frits

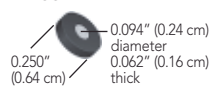
Upchurch Scientific® Analytical-scale 316 Stainless Steel Frits are available in 0.5 µm or 2 µm porosity—the most common HPLC filtration ratings. Each frit includes a PCTFE or PEEK polymer sealing ring. Many of the frits shown have the common 0.250" (0.64 cm) and 0.254" (0.64 cm) ODs, which allow them to be used in many of the Precolumn and Inline Filters found starting on page 160. Choose the larger diameter faces and/or larger porosity frits for faster flow rates. Choose frits with a smaller diameter face and/or smaller porosity for applications sensitive to extra flow path volume.

### 0.5 µm Stainless Steel Frits

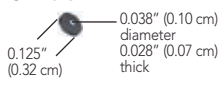
A-102



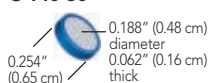
A-103



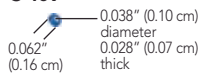
C-128-31



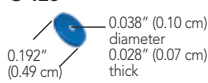
C-140-30



C-409

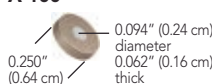


C-425

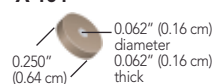


### 2 µm Stainless Steel Frits

A-100



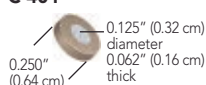
A-101



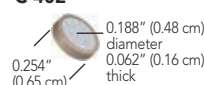
A-420



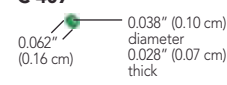
C-401



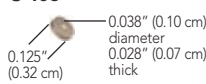
C-402



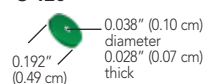
C-407



C-408



C-420



## APPLICATION NOTE

### To Clean Or Not To Clean?

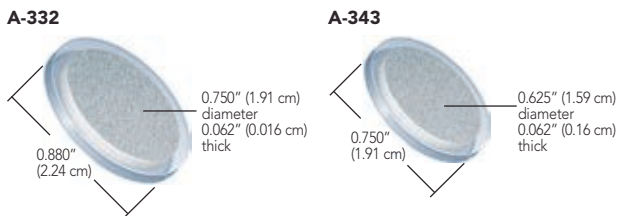
It is rarely worth the time and effort to clean frits, given the relatively low cost of replacements. Furthermore, cleaning may leave some debris embedded in the frit pores. If the washed frit is accidentally returned to your instrument in a reverse orientation, any remaining debris could be flushed 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.

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

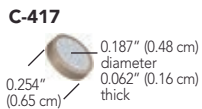
## Stainless Steel Semi-Prep Frits

Many of these frits come complete with a PCTFE, ETFE, or PTFE sealing ring. Choose from 2  $\mu\text{m}$ , 5  $\mu\text{m}$ , 10  $\mu\text{m}$ , and 20  $\mu\text{m}$  filtration porosities and a range of diameters to match your intended flow rate and filtration requirements.

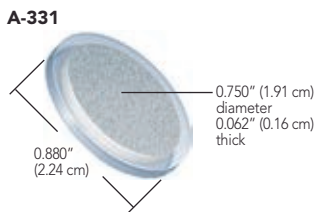
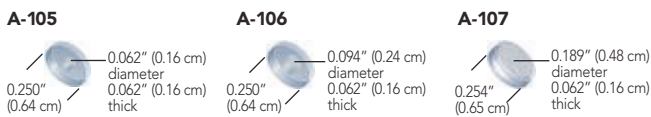
### 2 $\mu\text{m}$ Semi-Prep Stainless Steel Frits



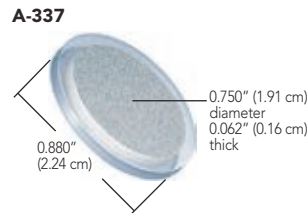
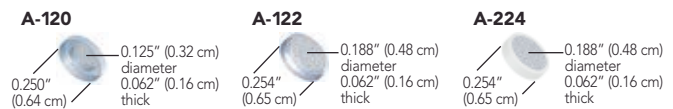
### 5 $\mu\text{m}$ Semi-Prep Stainless Steel Frits



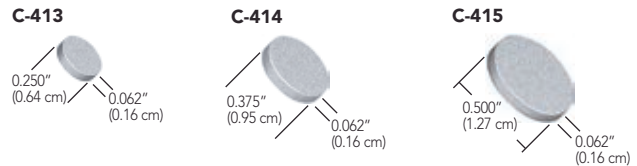
### 10 $\mu\text{m}$ Semi-Prep Stainless Steel Frits



### 20 $\mu\text{m}$ Semi-Prep Stainless Steel Frits



### Stainless Steel Frit Discs



### 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 $\mu\text{m}$	0.062" (0.16 cm)	0.062" (0.16 cm)	0.250" (0.64 cm)	PCTFE	0.9 $\mu\text{L}$	10-pk
A-106x	10 $\mu\text{m}$	0.094" (0.24 cm)	0.062" (0.16 cm)	0.250" (0.64 cm)	PCTFE	2.0 $\mu\text{L}$	10-pk
A-107x	10 $\mu\text{m}$	0.189" (0.48 cm)	0.062" (0.16 cm)	0.254" (0.65 cm)	PCTFE	9.1 $\mu\text{L}$	10-pk
A-120x	20 $\mu\text{m}$	0.125" (0.32 cm)	0.062" (0.16 cm)	0.250" (0.64 cm)	PCTFE	3.7 $\mu\text{L}$	10-pk
A-122x	20 $\mu\text{m}$	0.188" (0.48 cm)	0.062" (0.16 cm)	0.254" (0.65 cm)	PCTFE	9.7 $\mu\text{L}$	10-pk
A-224	20 $\mu\text{m}$	0.188" (0.48 cm)	0.062" (0.16 cm)	0.254" (0.65 cm)	PTFE	9.7 $\mu\text{L}$	ea.
★ A-331x	10 $\mu\text{m}$	0.750" (1.91 cm)	0.062" (0.16 cm)	0.880" (2.24 cm)	ETFE	141.9 $\mu\text{L}$	10-pk
★ A-332x	2 $\mu\text{m}$	0.750" (1.91 cm)	0.062" (0.16 cm)	0.880" (2.24 cm)	ETFE	141.9 $\mu\text{L}$	10-pk
A-337x	20 $\mu\text{m}$	0.750" (1.91 cm)	0.062" (0.16 cm)	0.880" (2.24 cm)	ETFE	152 $\mu\text{L}$	10-pk
A-343	2 $\mu\text{m}$	0.625" (1.59 cm)	0.062" (0.16 cm)	0.750" (1.91 cm)	PCTFE	112.6 $\mu\text{L}$	ea.
C-417	5 $\mu\text{m}$	0.187" (0.48 cm)	0.062" (0.16 cm)	0.254" (0.65 cm)	PEEK	7.2 $\mu\text{L}$	ea.
<b>STAINLESS STEEL FRIT DISCS (NO POLYMER RINGS)</b>							
A-337-02	20 $\mu\text{m}$	0.750" (1.91 cm)	0.062" (0.16 cm)	N/A	N/A	134.7 $\mu\text{L}$	ea.
C-412	5 $\mu\text{m}$	0.250" (0.64 cm)	0.062" (0.16 cm)	N/A	N/A	13 $\mu\text{L}$	ea.
C-413	10 $\mu\text{m}$	0.250" (0.64 cm)	0.062" (0.16 cm)	N/A	N/A	14 $\mu\text{L}$	ea.
C-414	2 $\mu\text{m}$	0.375" (0.95 cm)	0.062" (0.16 cm)	N/A	N/A	26.9 $\mu\text{L}$	ea.
C-415	2 $\mu\text{m}$	0.500" (1.27 cm)	0.062" (0.16 cm)	N/A	N/A	47.9 $\mu\text{L}$	ea.

## Iso-Prep™ Guard

- ▶ 21.2 mm and 30 mm ID column protection
- ▶ Improves plate count and symmetry
- ▶ New anti-rotation feature aids guard holder assembly



Iso-Prep Guard is a guard cartridge system designed to protect valuable prep columns. It offers superior column protection for adsorptive samples and a proven sample distribution mechanism via a precision machined holder. Iso-Prep Guard is ideal for protecting prep columns with no degradation of peak shape or plate count.

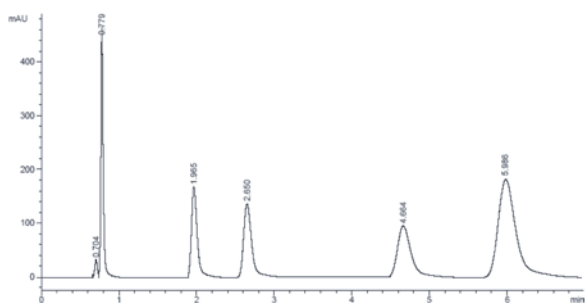
The high-performance guard protects columns in two ways. First, it acts as a filter, trapping particles in the frits. Second, when the guard cartridge is packed with the same material as the prep column, it removes compounds that irreversibly adsorb to the packing material.

## APPLICATION NOTE

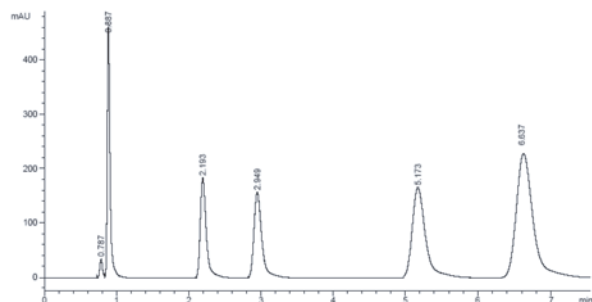
### Low Pressure Drop

- ▶ 60:40 Acetonitrile:Water
- ▶ 50 mL/min
- ▶ Kromasil 10  $\mu$ m C18
- ▶ Backpressure: 100 psi

### 10 $\mu$ 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

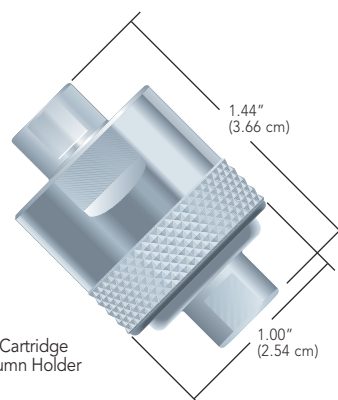
The internal volume of this Upchurch Scientific® semi-prep guard column is just 780  $\mu$ L, which only requires approximately 1.50 g of packing material — ideally the same material used in your semi-prep column. The C-1000 Holder will hold to high pressures, and is specially treated to prevent galling.\* 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

### Part No. Description

#### ISO-PREP GUARD ORDERING INFORMATION

<b>9197-P</b>	Iso-Prep Guard Holder
<b>9197-P-AR</b>	Iso-Prep Guard Holder, 21.2mm, Anti Rotation
<b>9197-20</b>	Iso-Prep Guard Cartridge, 21.2 mm x 1 cm, 1 Frit
<b>8056-MOD</b>	Iso-Prep Guard, 21.2 mm Frit, 2 $\mu$ m
<b>9197-S</b>	Iso-Prep Guard Finishing Tool
<b>9196-P</b>	Iso-Prep Guard Holder, 30 mm
<b>9196-P-AR</b>	Iso-Prep Guard Holder, 30 mm, Anti Rotation
<b>9196-20</b>	Iso-Prep Guard Cartridge, 30 mm x 1 cm, 2 $\mu$ m Frit
<b>8083-MOD</b>	Iso-Prep Guard, 30 mm Frit, 2 $\mu$ m
<b>9196-S</b>	Iso-Prep Guard Finishing Tool, 30 mm

#### SEMI-PREP GUARD COLUMN

##### 10 mm ID x 1 cm

<b>C-1000</b>	Semi-Prep Cartridge Guard Column Holder
<b>C-1035</b>	Semi-Prep Cartridge

#### REPLACEABLE CARTRIDGE GUARD COLUMN FRIT CAPS

<b>C-1030</b>	Threaded Frit Cap with 2 $\mu$ m Stainless Steel Frit
<b>C-1031</b>	Threaded Frit Cap with 2 $\mu$ m 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.

## SPECIFICATIONS & DETAILS

Packing Material Specifications: The cartridges on this page are packed with 5 µm or 10 µm base-deactivated 80 Å spherical silica.

### Part No. Description

#### CARTRIDGE GUARD COLUMN KITS

**C-281** 2.0 mm ID C18 Cartridges (6-pk) with (1) C-270 Assembly

**C-751** 4.3 mm ID C18 Cartridges (6-pk) with (1) C-270 Assembly

#### GUARD COLUMN CARTRIDGE HOLDERS, BIOCOMPATIBLE

**C-270** High Pressure, Stainless Steel, with (2) F-200 Fittings

#### GUARD COLUMN CARTRIDGES, BIOCOMPATIBLE

##### 2.0 mm ID x 1 cm, 10 µm Silica

**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

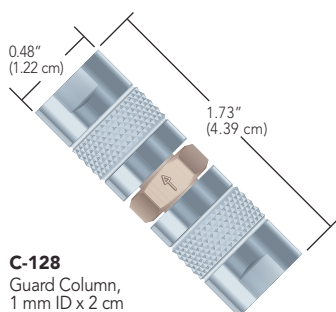
**C-764** Cyano Phase CN 10-pk

## 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  $\mu$ L 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  $\mu$ m frits included with this guard column can be changed in minutes. Optional 2  $\mu$ m frits may be purchased separately (C-408).



**C-128**  
Guard Column,  
1 mm ID x 2 cm

## APPLICATION NOTE

### Signs Indicating the Guard Column Needs to be Changed

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

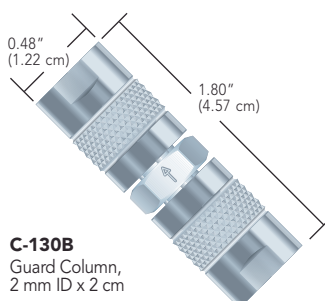
Part No.	Description	Includes
<b>MICROBORE GUARD COLUMNS</b>		
<b>1.0 mm ID x 2 cm Unpacked</b>		
C-128	Guard Column	(2) C-128-31
C-128-20	Packing Funnel	
C-128-31	0.5 $\mu$ m Stainless Steel Replacement Frit	
C-408	2 $\mu$ m Stainless Steel Replacement Frit	
C-128-40	Slurry Packing Adapter	
C-128-50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

## 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  $\mu$ m frits are easy to change, prolonging the life of the guard column. With only 62  $\mu$ L packing volume per guard column, a 3 g bottle of packing material will pack about 30 guard columns.

For convenience, we offer the C-135B kit with two unpacked guard columns and a ten pack of frits. With two guard columns, there is always a back-up available to help eliminate downtime.



**C-130B**  
Guard Column,  
2 mm ID x 2 cm

## Analytical Guard Column Kit

For complete convenience, try the Upchurch Scientific guard column kit with packing material. This kit contains 10 replacement frits, a packing funnel and 3 g of C18 reversed phase.



## 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.

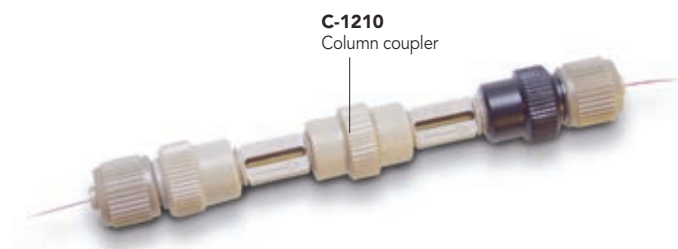
## Capillary Sample Trap Columns

- ▶ 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.

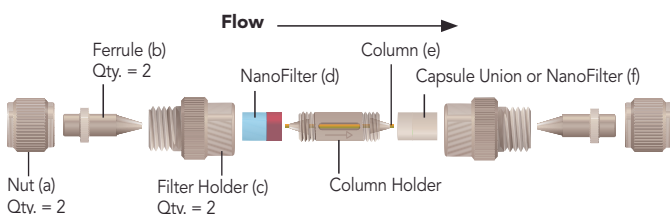
*Please Note: Reversing flow in these columns can result in loss of packing material. For more information regarding the proper setup involving these Sample Trap Columns, please contact your local distributor or IDEX Health & Science customer service.*



**C-1210**  
Column coupler

### Components Chart

Please refer to the drawing and part numbers below when ordering replacement components:



Column Assembly	Nuts (a)	Ferrules (b)	Filter Holder Color(c)	NanoFilter (d)	Column (e)	Capsule Union or NanoFilter (f)
C-1200	P-416	F-152	Tan	M-125 (SST)	C-1250 (C18)	M-124NF (no frit)
C-1300	P-416BLK	F-152	Tan	M-126 (Ti)	C-1250 (C18)	M-124NF (no frit)
C-1500	P-416	F-152	Tan	M-125 (SST)	FS-1000-25 (unpacked)	M-125 (SST)
C-1600	P-416BLK	F-152	Tan	M-126 (Ti)	FS-1000-25 (unpacked)	M-126 (Ti)

All nuts, ferrules, and column holders are made of PEEK polymer. Filter holders are made of PEEK polymer (non-conductive) or stainless steel (conductive). NanoFilter Capsule bodies are made of PEEK polymer (non-conductive) or stainless steel and PEEK (conductive). See page 162 for NanoFilter Capsule color coding. Abbreviation Key: SST = stainless steel; Ti = titanium; SCX = Strong Cation Exchange



### □ SPECIFICATIONS & DETAILS

- ▶ Packing material specifications: C18, high carbon load, 5 µm/300A spherical silica and SCX, 5 µm 85A material.
- ▶ Maximum sample loading capacity of 0.1 µg and capillary bed volume of 0.19 µL or less.

### 🔗 RELATED PRODUCTS

- ▶ Use the P-116 MicroFerrule Plug on page 18 to plug a Sample Trap Column for storage.
- ▶ Find 360 µm OD PEEK polymer and fused silica tubing on page 67.

Part No.	Description	Frit Material	Includes
<b>CAPILLARY SAMPLE TRAP COLUMNS 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-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>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.