



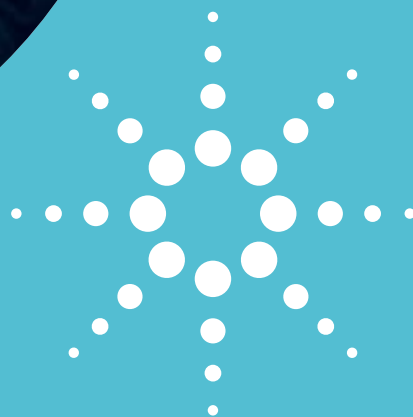
Learn essential HPLC maintenance tips



Ensure trouble-free operation of your lab



Select the ultimate PerfectFit HPLC supplies



## Maintaining Your Agilent 1100 Series HPLC System

Optimize performance and maximize efficiency in your lab.



Agilent Technologies



## Maintaining Your Agilent 1100 Series HPLC System

Optimize performance and maximize efficiency in your lab.

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As a customer of Agilent Technologies, the leader in chemical analysis, you have complete access to over 35 years of industry knowledge and experience. With a wide range of technical know-how and a never-ending supply of ideas, Agilent is a full resource for your lab. We can help you solve the most challenging application problems, at any time.

This is why we created Maintaining Your HPLC System. It's designed to help you keep your HPLC system running at optimal performance, and reveals how to ensure your manual injection valves, autosampler, pump, and detectors work at maximum efficiency. As a result, you'll expand your system's hours of continuous operation, decrease downtime, and increase productivity.

Inside you'll find essential information about Agilent's 1100 Series HPLC consumables and accessories. You'll discover important maintenance procedures and troubleshooting tips. Plus you'll have all the Agilent part numbers you'll need—in one easy-to-use reference guide.

"We build our HPLC systems from the ground up and provide our customers with genuine replacement parts for that 'PerfectFit' for their Agilent instruments, as well as a wide variety of columns, consumables and supplies for their chromatographic needs. We're a great resource for all types of applications—in fact, we're developing new ones every day. You might say that we are your partner in chromatography."

Ron Majors, Ph.D., Analytical Chemistry  
Writer, "Column Watch," LC/GC Magazine  
Product Marketing Specialist

## Manual Injection Valves

At Agilent Technologies, we work hard to understand and anticipate your needs—to ensure trouble-free operation of your laboratory. As industry leaders, our chemical analysis experts provide you with PerfectFit supplies and services designed for consistent results and optimum performance from your analytical instruments. In this section, you'll find the latest developments in LC injection valve technology along with part numbers and important maintenance information.

"Our customers come to us with a wide range of challenging technical questions, even ones with answers that are not readily available. It may take some detective work, but in the end we find the best solutions, expanding our knowledge and skills in the process."

Hai-Bin Wan, Ph.D., Analytical Chemistry  
Technical Assist Chemist

Agilent offers innovative and high quality valves from Rheodyne with patented Make-Before-Break (MBB) technology that provides uninterrupted flow when switching between LOAD and INJECT positions. MBB greatly reduces transient pressure shocks and is beneficial for flow sensitive detectors, and MBB extends the lifetime of the columns.



Dual mode injectors can use both the partial-filling and the complete-filling mode for loading the sample loop. They are variable volume injectors because they allow the loading of different sample volumes. These dual mode injectors, also called front-loading injectors, have a needle port for loading built into the handle. This unique injection port design allows the tip of the needle to connect directly to the sample loop for no sample loss during loading.

The reproducibility of manual sample injectors depends on operator skill, syringe precision and the loading method. Partial-filling method is typically reproducible to 1.0% relative standard deviation (RSD). Complete-filling method is reproducible to 0.1% RSD for loops  $\geq 5 \mu\text{l}$ .

## ● Series 7725i and 9725i Analytical Injection Valves

The stainless steel (SS) 7725i and PEEK 9725i valves are the latest development and most popular injection valve for analytical HPLC. They have a 20  $\mu\text{l}$  loop installed and loops are available from 5  $\mu\text{l}$  to 5 ml (10 ml for PEEK) in stainless steel or PEEK.

- Make-Before-Break architecture allows switching without flow interruption.
- Wide 30° port angles offer easier access to fittings.
- Built in position sensing switch provides the chromatograph with a reproducible start signal.



## Series 3725i-038 and 3725i Preparative Injection Valves



The series 3725i-038 (stainless steel) and 3725i (PEEK) are the most suitable manual valves to use with large sample volumes, high flow rates and preparative columns sized 1.0-10 cm in diameter.

The ports accommodate 1/8" (3.2 mm) OD tubing and 1/16" (1.6 mm) OD tubing can be used with an adapter. The 1.0 mm diameter passages allow flow rates up to 800 ml/min with virtually no pressure drop. These versatile injection valves allow both partial-filling method and complete-filling method with high reproducibility.

- Sample range 10 µl to 20 ml (10 ml loop is installed).
- Flow range is 10 to 800 ml/min.
- Make-Before-Break architecture allows switching without flow interruption.
- Built-in position sensing switch provides the chromatograph with a reproducible start signal.

## Manual Injection Valves

Description	Part No.
7725i valve, SS, position sensing	5063-6502*
9725i valve, PEEK, position sensing	0101-1253
3725i-038 prep valve, SS, position sensing	0101-1232
3725i prep valve, PEEK, position sensing	0101-1231

\*The 5063-6502 valve has a ring stand mounting bracket already pre-mounted.

## RheBuild Kits

RheBuild kits include all individual parts, tools, and instructions to completely refurbish specific valves to ensure high performance and long lifetime.

### RheBuild Kits

Used with Rheodyne Series	Part No.
7725 Series	0101-1254
7750-020 Injection valve (2-groove rotor seal)	0101-1257
7750-030 Switching valve (3-groove rotor seal)	0101-1258



## Replacement Rotor Seals and Stators

### Vespel Rotor Seals (Operating up to pH 10)

Agilent LC	Rheodyne Series	Agilent Valves Part No.	Rotor Seal Part No.
1100 Manual injector	Series 7125, 7725	5063-6502	0101-0623
1100 Autosampler	7750-020	0101-0921	0100-1853
1100 Column switching valve	7750-030	0101-0920	0100-1855
1100 $\mu$ -Autosampler	7800E-200	0101-1050	0100-2088
1100 Micro column $\mu$ -switching valve	7800E-300	0101-1051	0100-2087

### Tefzel Rotor Seals (Operating pH 1-14)

Agilent LC	Rheodyne Series	Agilent Valves Part No.	Rotor Seal Part No.
1100 Manual injector	7125, 7125-081, 7725	5063-6502	0101-0620
1100 Autosampler	7750-020	0101-0921	0100-1849
1100 Column switching valve	7750-030	0101-0920	0100-1854

### PEEK Rotor Seal (Operating up to pH 14)

Used with Rheodyne Series	Part No.
3725, 3725-038	0101-1233
7125, 7725, 9725	0101-1255
7010, 7000, 7040	0101-1256

★ **Note:**  
Peak doubling can be a symptom that it is time to replace the injector rotor.

## ● ● ● ● ● Replacement Rotor Seals and Stators

### ● Stator Face Assemblies

Agilent LC	Rheodyne series	Agilent Valves Part No.	Stator Face Part No.
1050 Manual injector	7125	0101-0607	0101-0624
1100 Manual injector	7725	5063-6502	0100-1859
1100 Autosampler 1100 Switching valve	7750-020, 7750-030	0101-0921	0100-1851

### ● Stators

Agilent LC	Rheodyne Series	Agilent Valves Part No.	Stator Face Part No.
1100 Manual injector	7725	5063-6502	0100-1860
1100 Autosampler 1100 Column switching valve	7750-020, 7750-030	0101-0921 0101-0920	0100-1850
1100 $\mu$ -autosampler 1100 $\mu$ -switching valve	7800E-020, 7800E-030	0101-1050	0100-2089

## ● ● ● ● ● Sample Loops



Stainless steel and PEEK sample loops are factory-cut and finished to the highest quality. The stainless steel loop ends have a square cut and are burr-free for a flush connection to the valve and are supplied with unswaged fittings. The flexible PEEK loop ends are provided with a clean and straight cut for low dead volume connection.



## Sample Loops • • • • •

### ● Stainless Steel Sample Loops

The size designations of the loops are nominal. The actual volumes can differ from the theoretical designations because of the  $\pm 0.025$  mm (0.001") tolerance of the metal tubing bore.

Accuracy of large metal loops (1.0 mm, 0.040" bore) is about  $\pm 5\%$ , intermediate loops (0.5 mm, 0.020" bore)  $\pm 10\%$ , and small loops (0.2 mm, 0.007" bore)  $\pm 30\%$ . Since both standards and unknowns are usually analyzed using the same sample loop, knowledge of the actual, accurate volume is rarely needed. If the sample volume must be known, it is best to calibrate the loop in place on the valve so the flow passage in the valve is also taken into account.

Sample loops for 7725 Series and 7125 Series are not interchangeable, as the port angle for the 7725 is 30°, for the 7125 the port angle is 20°.



#### Stainless Steel Loops for 7125 and 7010 Injectors

Description	I.D.	Part No.
5 $\mu$ l sample loop	0.18 mm	1535-4860
10 $\mu$ l sample loop	0.30 mm	0101-0376
20 $\mu$ l sample loop	0.51 mm	0101-0377
50 $\mu$ l sample loop	0.51mm	0101-0378
100 $\mu$ l sample loop	0.51 mm	0101-0379
200 $\mu$ l sample loop	0.76 mm	0101-1252
500 $\mu$ l sample loop	0.76 mm	0101-1251
1 ml sample loop	0.76 mm	0101-1219
2 ml sample loop	1.00 mm	0101-1250
5 ml sample loop	1.00 mm	0101-1249

#### Stainless Steel Loops for 7725 Injectors

Description	I.D.	Part No.
5 $\mu$ l sample loop	0.18 mm	0101-1248
10 $\mu$ l sample loop	0.30 mm	0100-1923
20 $\mu$ l sample loop	0.30 mm	0100-1922
50 $\mu$ l sample loop	0.51mm	0100-1924
100 $\mu$ l sample loop	0.51 mm	0100-1921
200 $\mu$ l sample loop	0.76 mm	0101-1247
500 $\mu$ l sample loop	0.76 mm	0101-1246
1 ml sample loop	0.76 mm	0101-1245
2 ml sample loop	1.00 mm	0101-1244
5 ml sample loop	1.00 mm	0101-1243

## • • • • • Sample Loops

### ● PEEK Sample Loops

PEEK is inert to almost all organic solvents and is biocompatible. Like metal loops, the size designations of PEEK loops are nominal. The actual volumes can differ from the theoretical designations because of the  $\pm 0.05$  mm (0.002") tolerance of the tubing bore. Accuracy of large PEEK loops (0.8 mm, 0.030") is about  $\pm 14\%$ , intermediate loops (0.5 mm, 0.020")  $\pm 21\%$  and small loops (0.2 mm, 0.007")  $\pm 65\%$ .

Although PEEK is compatible with virtually all solvents, there are many factors that effect burst pressure of PEEK tubing.

Factors such as wall thickness, temperature, exposure time and concentration of organic solvents affect the durability of PEEK. Solvents such as THF, methylene chloride and DMSO cause PEEK to swell while concentrated nitric acid and sulfuric acid weaken tubing.



### PEEK Sample Loops for 9725 Injectors

Description	I.D.	Part No.
5 $\mu$ l sample loop	0.18 mm	0101-1241
10 $\mu$ l sample loop	0.25 mm	0101-1240
20 $\mu$ l sample loop	0.25 mm	0101-1239
50 $\mu$ l sample loop	0.51 mm	0101-1238
100 $\mu$ l sample loop	0.51 mm	0101-1242
200 $\mu$ l sample loop	0.51 mm	0101-1237
500 $\mu$ l sample loop	0.76 mm	0101-1236
1 ml sample loop	0.76 mm	0101-1235
2 ml sample loop	0.76 mm	0101-1234
5 ml sample loop	0.76 mm	0101-1230

### PEEK Sample Loops for 3725 Injectors

Description	I.D.	Part No.
2.0 ml sample loop	1.6 mm	0101-1229
5.0 ml sample loop	1.6 mm	0101-1228
10.0 ml sample loop	2.0 mm	0101-1227
20.0 ml sample loop	2.0 mm	0101-1226

## Autosampler Maintenance

To achieve peak performance of your Autosampler—and thus increase your lab's uptime and productivity—it is important to schedule and perform routine maintenance. In the following pages, you will find the essential Agilent consumables and accessories you need to maintain your Autosampler effectively.

Routine maintenance should include: replacing the rotor seal, checking the stator, replacing the needle and needle seat, checking finger caps, replacing the metering unit seal, cleaning the piston, cleaning the solvent waste path, checking the leak sensor, and performing a pressure test.

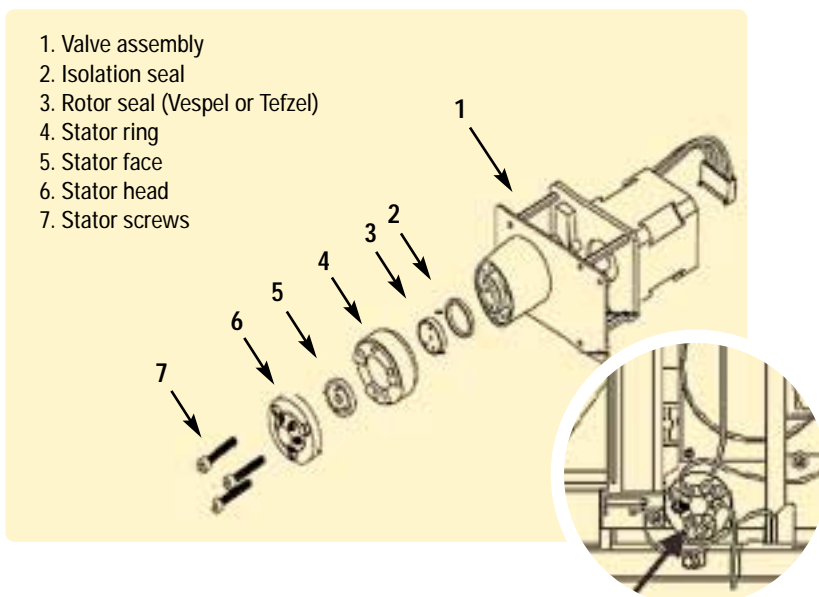
“First we ask customers what they would like to accomplish. Then we recommend the best products for their needs, and explain how to use them. People come to Agilent because they know they'll get intelligent information that will help them be more productive. How do I know? I was once an Agilent customer.”

Maureen Joseph, Ph.D., Analytical Chemistry  
Applications Chemist

Author, “New Approachs for the HPLC Seperation of  
Water-Soluble and Fat-Soluble Vitamins.”

## ● ● ● ● ● Injection Valve

### ● Injection Valve Assembly



Injection Valve

The most frequent injection valve maintenance involves replacement of the rotor seal. Indications include blockages in the rotor seal or a cross-port leak in the rotor seal. A cross-port leak can be diagnosed by noticing a drop of mobile phase coming out of the needle when the needle rises to draw sample from a vial. Cross-port leaks can be found with the pressure test as well. You may first notice a cross-port leak when you experience poor injection volume precision. Note that to remove the stator face and disassemble the valve, you will need a 9/64" Allen wrench. The rest of the screws in the autosampler require metric hexagonal keys. The 1/4" wrench is required to remove the capillaries.

Description	Part No.
Injection valve assembly (Rheodyne 7750-020)	0101-0921

#### ★ Note:

The Micro Valves of the Micro Autosampler and Micro Well Plate Autosampler have no stator face.

### ● Replacing the Rotor Seal—Part 1

To replace the rotor seal of the Standard and Well Plate autosamplers G1313A, G1327A, G1367A, follow these basic steps:

1. Remove the capillaries from the stator face. Remove the stator screws with the 9/64 inch Allen wrench.
2. Remove the stator face, stator head and stator ring.
3. Remove and replace the rotor seal. (Remove and replace isolation seal if also necessary)



★ Note:  
The grooves should face you.

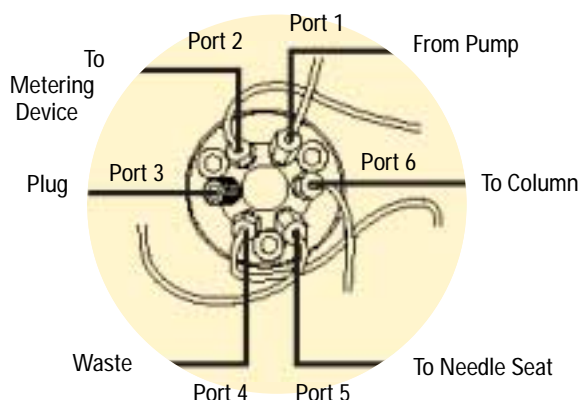
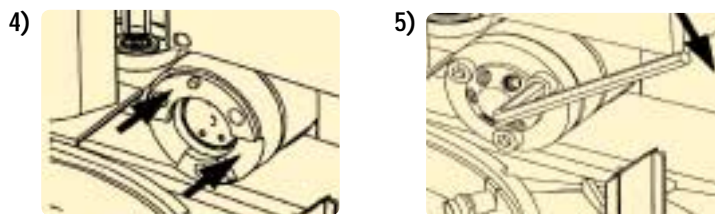


## Injection Valve ● ● ● ● ●

### ● Replacing the Rotor Seal—Part 2

4. Install the stator ring. Note the orientation.
5. Install the stator head, then the stator face. Replace the stator screws. Tighten evenly and carefully. Connect all capillaries according to the diagram.

After performing routine maintenance, it is a good idea to perform a pressure test.



### Injection valves and replacement parts for autosamplers

	Injection valve 1100 autosampler 2 grooves	Micro-Injection valve μ-1100 autosampler 2 grooves	Prep-Injection valve prep autosampler
Description	Part No.	Part No.	Part No.
Valve Part Number	0101-0921	0101-1050	0101-1267
Vespel rotor seal pH 1-10	0100-1853	0100-2088	
Tefzel rotor seal pH 1-14	0100-1849		
PEEK rotor seal and stator face pH 1-14			0101-1268
Stator face assy	0100-1851	N/A	0101-1268
Stator	0100-1850	0100-2089	0100-2195
Isolation seal	0100-1852	0100-1852	0100-1852
Stator screw	1535-4857	1535-4857	1535-4857

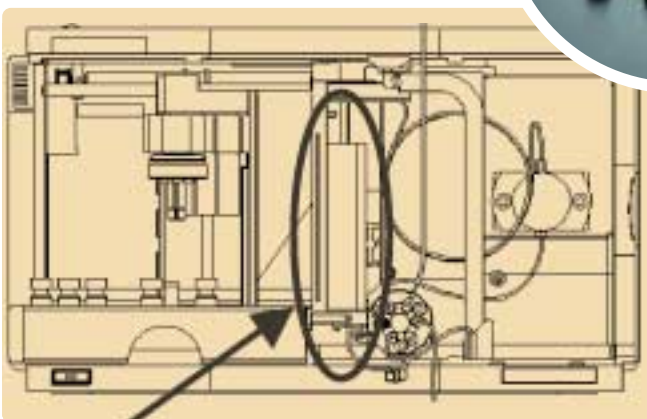
## Needle/Needle Seat

### Exchanging the Needle/Needle Seat of G1313A, G1329A, G1389A and G2260A

(See manual for G1367A and G1377A)

The needle should be replaced when it becomes bent, burred or blunt. The needle seat should be replaced when it is leaking or plugged. Evidence of leaking can be seen when a trail of buffer crystals is found on the needle seat. Make certain that you keep an extra needle seat capillary assembly on hand. This unique part may be ordered by contacting your Agilent representative.

The needle seat can become blocked if the sample contains particulates as this is the first restriction that the sample experiences. You may try to backflush the needle seat capillary if this occurs.



Needle/Needle Seat

### Exchanging the Needle—Part 1

Tools: Wrench 1/4 inch  
Hexagonal key 2.5 mm

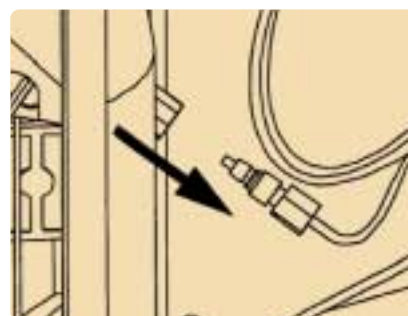
Before beginning this procedure:

- Select "Change Needle" in the maintenance function.
- When the needle is positioned approximately 15 mm over the needle seat, remove the front cover.



1)

Select "Needle down" until the set screw is visible.



2)

- Remove the sample loop.
- Loosen the set screw of the needle and remove it.



## Needle/Needle Seat ● ● ● ● ●

● **Exchanging the Needle—Part 2**

(See manual for well-plate autosampler)

When installing the new needle, make certain that you do not strip the setscrew. You may have to bend the needle slightly to ensure needle seat alignment.



3)

- Move the needle arm to the lowest point with "Needle down" function.
- Install the new needle.
- Align the needle above the needle-seat.
- Reconnect the sample loop.



4)

Situate the needle approximately 2 mm above the seat using "Needle up."

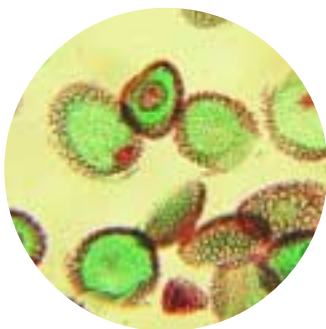


5)

Ensure the needle is aligned with the seat.



## Needle/Needle Seat

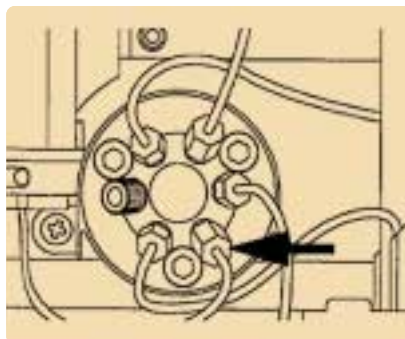


### Exchanging the Needle Seat

(See manual for well-plate autosampler)

Before beginning this procedure:

- Select "Change Needle" in the maintenance function.
- When the needle is positioned approximately 15 mm over the needle-seat, remove the front cover.



1)

Disconnect the seat capillary from the injection valve (port 5).



2)

Use a small flat screwdriver to ease out the needle seat.



3)

- Insert the new needle-seat assembly.
- Press the seat firmly into position.
- Connect the seat-capillary fitting to port 5 of the injection valve.



4)

Use the "Needle down" button to position the needle above the seat. Ensure the needle is aligned with the seat.

Connect the seat-capillary fitting to port 5 of the injection valve.

Upon completion install the front cover and select "END" in the maintenance function.

## Needle/Needle Seat ●●●●●

### ● Needles and needle seat assemblies for the 1100 Series Autosamplers

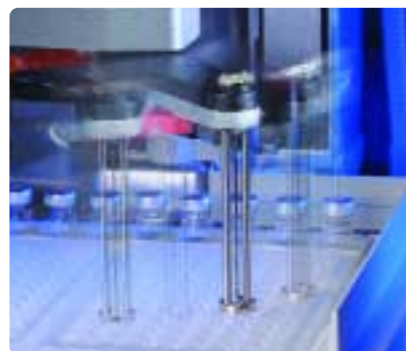
Agilent autosampler:	Needle assembly Description	Part No.	Compatible with needle seat: Description	Part No.
G1313A/27A/87A	Needle assy for standard autosampler	G1313-87201	Standard needle seat, 0.17 mm id capillary, 2.3 µl	G1313-87101
			Standard needle seat, 0.12 mm id capillary, 1.2 µl	G1313-87103
G1313A/27A/87A	Needle assy for 900 µl metering head	G1313-87202	Standard needle seat, 0.17 mm id capillary, 2.3 µl	G1313-87101
G1389A	Needle assy for µ-LC autosampler	G1329-80001	µ-LC needle seat, 0.10 mm id, 1.2 µl	G1329-87101
			µ-LC needle seat, 0.05 mm id, 0.3 µl	G1329-87103
G1367A	Needle assy well plate autosampler	G1367-87200	Needle seat, well plate autosampler, 100 µl	G1367-87101
G1377A	Needle assy well plate autosampler	G1377-87201	Needle seat, µ-well plate autosampler (without cap)	G1377-87101
			Seat capillary, 0.10 mm id	G1375-87317
			Seat capillary, 0.05 mm id	G1375-87300

## Autosampler Parts and Supplies ●●●●●

### ● G1313A,G1327A Standard Autosampler

Description	Part No.
Maintenance Kit Includes: 1 rotor seal (Vespel), 1 needle, 1 needle seat, 2 metering seals, 15 finger caps	G1313-68709
Autosampler Accessory Kit Includes: 2 hex keys, 1 wrench, tubing, 1 label halftray, wrist strap, 15 fingers caps and capillary	G1313-68705
Autosampler Accessories	
100 position tray for 2 ml vials	G1313-44500
100 position tray for 2 ml vials for G1329A	G1329-60001
40 position tray for 2 ml vials	G1313-44502
15 position tray for 6 ml vials	G1313-44503
External tray, 17 position (disposal position)	G1313-60004
Disposal tube for external vial tray	G1313-27302
Waste tubing, 5 m, 6.5 mm id, corrugated polypropylene	5062-2463
Needle Arm Kit Includes: needle clamp, 2 clamp screws	G1313-68713
Finger caps (pack of 15)	5063-6506

The 1100 System was designed for added flexibility in your lab; Agilent offers a variety of supplies for the 1100 System that allow you to match your sample with ease.



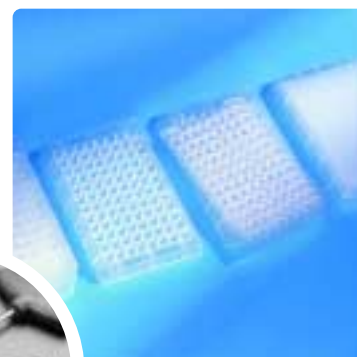
## Autosampler Parts and Supplies

### G1387A 1100 Series Micro Autosampler

Description	Part No.
Accessory kit for $\mu$ -LC auto sampler	G1329-68715
6 fittings, 2 plugs, PEEK, for $\mu$ -LC valves	5065-4410
Sapphire plunger assembly, 2 mm	5064-8293
Plunger seal, 2 mm	5022-2175
Seal support assembly	G1377-60002

### G1367A 1100 Series Well Plate Autosampler

Description	Part No.
Accessory kit for well plate sampler	G1367-68705
Loop capillary, 100 $\mu$ l	G1367-87300
Peristaltic pump	5065-4445
Tray for well plate sampler	G1367-60001
<b>Well Plates for Well Plate Autosampler</b>	
96 well plates, 0.5 ml, PP, 120/pk	5042-1385
96 well plates, 0.5 ml, PP, 10/pk	5042-1386
96 deep well plates, 1 ml, PP, 50/pk	5042-6454
384 well plates, PP, 30/pk	5042-1388
96 well plates with glass inserts, caps and septa pre-assembled, 0.35 ml	5065-4402
Closing mats for 96 well plates, 50/pk	5042-1389



### G1377A 1100 Series Micro Well Plate Autosampler

Description	Part No.
Loop capillary, 8 $\mu$ l	G1375-87315
Loop capillary, 40 $\mu$ l	G1377-87300
SS capillary, 0.25 mm id, 12 cm long, connecting Rheodyne valve – waste	G1377-87301

## Pump Maintenance

The Agilent 1100 Series family of HPLC modules has several different pump units to choose from: isocratic, binary, quaternary, capillary and preparative. The 1100 was designed for ease of use—all pump parts to be maintained can be accessed from the front by simply removing the front cover. Scheduled routine maintenance of these pumps is recommended to achieve maximum uptime.

**1100 Pump routine maintenance includes:**

- Replacing the seals and pistons
- Replacing the PTFE frit
- Replacing the cartridge on the AIV
- Cleaning the outlet ball valve
- Cleaning or replacing the solvent inlet frits

You may perform all maintenance at once, or perform maintenance on an as-needed basis. Some parts may need replacing more than others depending upon your application and solvent preparation procedures. This section provides instructions for pump maintenance procedures along with part numbers and ordering information to help you save time.

“Solving problems requires understanding a customer’s needs as well as the technical aspects of their work. I know that my answers and suggestions will directly affect their success. Ultimately, the #1 goal is to help our customers with their challenges.”

John R. Palmer, B.S., Chemistry  
Author, Development and Validation of Analytical  
Methods in Pharmaceutical and Biomedical  
Research  
Chromatography Specialist

## Pump Maintenance Parts

Description	Part No.
<b>Maintenance Kit for standard pumps</b>	G1311-68710
Includes: outlet cap (1), PTFE frits (10), piston seals (4), gold seal, outlet (1), cartridge for active inlet valve (1), inlet filter (2)	
PTFE frit (pack of 5)	01018-22707
Outlet gold seal	5001-3707
Outlet cap (4/pk)	5062-2485
Replacement purge valve	G1311-60009



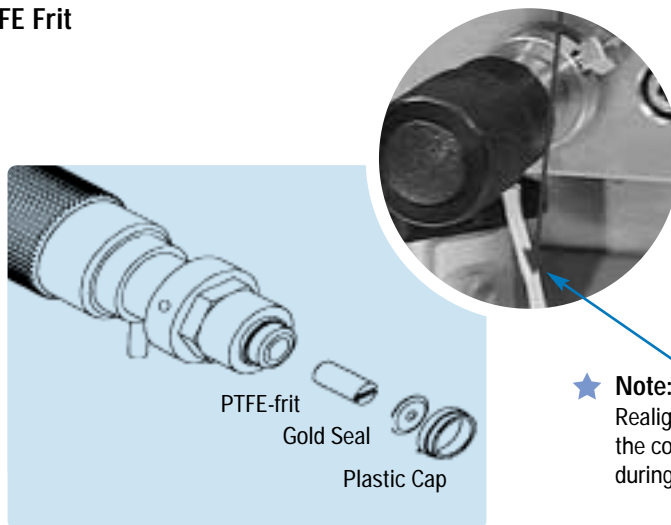
## Purge Valve

### Purge Valve – Exchanging the PTFE Frit

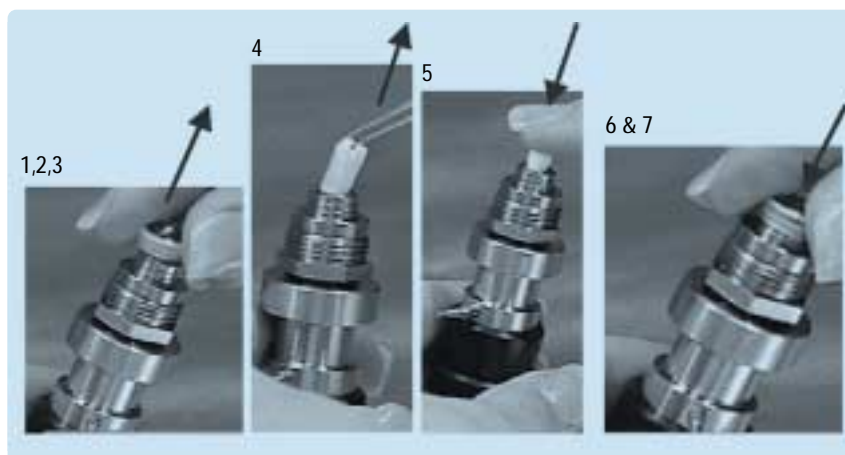
The purge valve is common to the 1100 standard pump modules. The valve has a gold seal held in place with a plastic cap. Small leaks can occur here and the gold seal will need to be replaced after these valves have been removed a couple of times.

When replacing the frit, remember that the cutout in the frit goes on top so that more surface area will be provided on the side facing the solvent flow.

1. Remove capillary and waste tube.
2. Unscrew the valve using a 14 mm wrench.
3. Remove the plastic cap and the gold seal.
4. Take out the frit (tweezers).
5. Install a new frit.
6. Replace the gold seal and the plastic cap.
7. Install the valve.



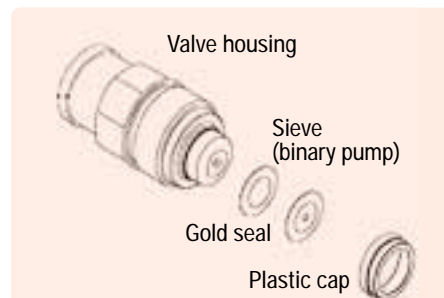
★ **Note:**  
Realign the waste tube in the correct orientation during installation.



## Outlet Ball Valve ● ● ● ● ●

### ● Cleaning or Exchanging the Outlet Ball Valve

The outlet ball valve is changed as part of a regular maintenance routine or when it is internally leaking. Typically, if the pressure ripple is unstable you should run a leak test to determine if the outlet ball valve needs to be replaced.



1. Remove the capillary from the valve.
2. Remove the valve using a 14 mm wrench.
3. Clean the ball valve in the ultrasonic bath or replace the ball valve.
  - a. Take off the plastic cap and gold seal.
  - b. Replace the ball valve.
  - c. Replace the gold seal and cap.
4. Reinstall.

★ **Note:**  
The outlet ball valve of the binary pump has an additional sieve (5063-6505)

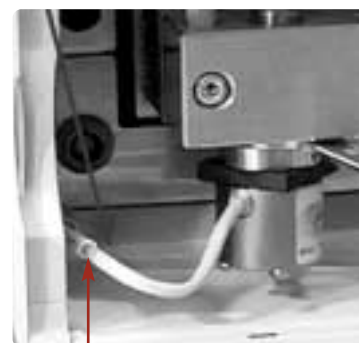
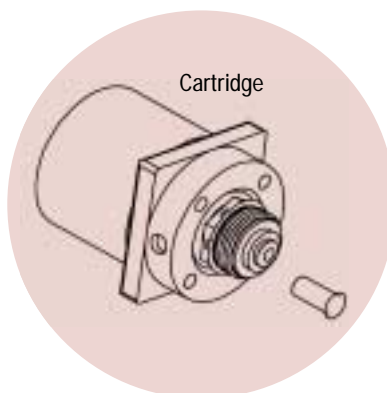
Description	Part No.
Outlet ball valve (quaternary, isocratic)	G1311-60012
Outlet ball valve (binary)	G1312-60012
Gold seal	5001-3707
Cap	5062-2485
Binary pump SS sieve (10/pk)	5063-6505

## Active Inlet Valve (AIV) ● ● ● ● ●

### ● Replacing the cartridge of the AIV (All pumps except G1361A preparative pump)

The active inlet valve needs to be serviced in cases where the pressure ripple is unstable and the leak test verifies problems with the active inlet valve due to internal leaking. The active inlet valve contains a cartridge that is exchanged.

1. Remove the AIV using a 14 mm wrench.
2. Change the cartridge .
3. Reinstall the AIV.



★ **Note:**  
Properly position the AIV cable when you reinstall the valve.

Description	Part No.
Cartridge	5062-8562
Active Inlet Valve	G1312-60010



## ● ● ● ● ● Seals and Pistons



Agilent pistons are made from a high purity, mono-crystalline sapphire for maximum durability. The angle at which they are cut during the cutting process used in manufacturing the pistons makes them the hardest in the world with the longest lifetime. Precision and alignment in the stainless steel holder minimizes the wear of piston and seal. As industry leaders in chromatography, our analysis experts provide you with PerfectFit supplies and services to help you get the most from your investment and the best possible results from your analytical work.

Ceramic is often proposed as an alternative material. However, ceramic is a sintered, polycrystalline material, and can be manufactured at less cost than sapphire, but the production process can lead to undesired batch-to-batch variations.

The design of the piston seal allows it to fit absolutely tight, and at the same time be flexible enough to nestle around the piston as well as the pump body. It also has to adapt to a high dynamic flow and pressure range. A spring-loaded seal can best achieve this. The springs are made of the same high quality stainless steel as the rest of the instrument. Agilent's proprietary polymer blend is a joint development with our vendor, combining their experience of polymeric chemistry with the knowledge of our hardware requirements plus our application experience.

The combination of piston and seal has been extensively tested under temperature stress, with all common HPLC solvents, highly demanding applications, in-house and by our customers in many instruments to guarantee the PerfectFit and achieve outstanding performance from your instrumentation.



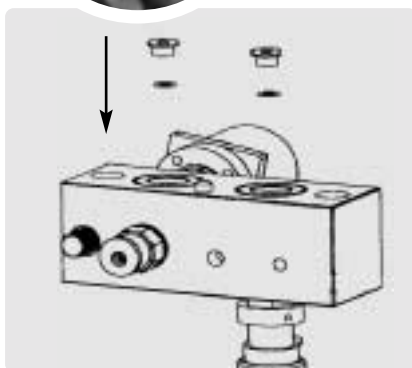
## Seals and Pistons

### Changing the Pump Seals

(All pumps except G1361A preparative pump)

The pump seals should be replaced when there are leaks on the bottom of the pump head, when retention times are unstable, or when the pressure ripple is unstable. Disassemble the pump head and remove the two seals with a piston. Clean the seal areas by flushing with solvent and wiping with a lint free cloth.

The seal wear-in procedure is required for standard seals. It involves flushing the seals while they are in place with isopropanol at high pressure. See the pump manual for details.



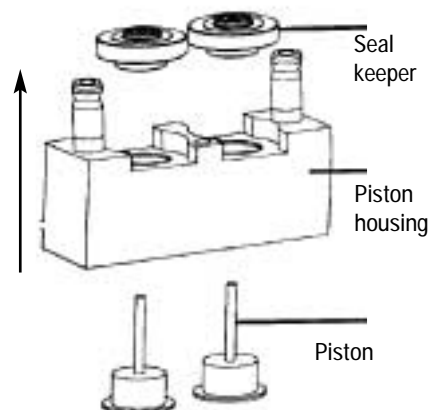
1. Remove the old seals.
2. Clean the pump chambers.
3. Insert new seals.
4. Reassemble the pump head.
5. Perform seal wear-in procedure for standard seals (5063-6589).

### Changing and Inspecting the Sapphire Pistons

(All pumps except G1361A preparative pump)

Each time the seals are replaced, the pistons should be examined. Examine the pistons for scratches. The scratches will cause small leaks and can damage the seals. Clean off any residue particularly buffers. You can clean pistons with alcohol and a lint free cloth or with toothpaste and a toothbrush, then rinse in alcohol and HPLC grade water.

1. Disassemble the pump head assembly.
2. Check the piston surface and remove any deposits or layers with alcohol or toothpaste.
3. Replace the pistons if scratched.
4. Reassemble the pump head.
5. Check to make certain there are not any fractures in the springs.
6. Put in the pistons.



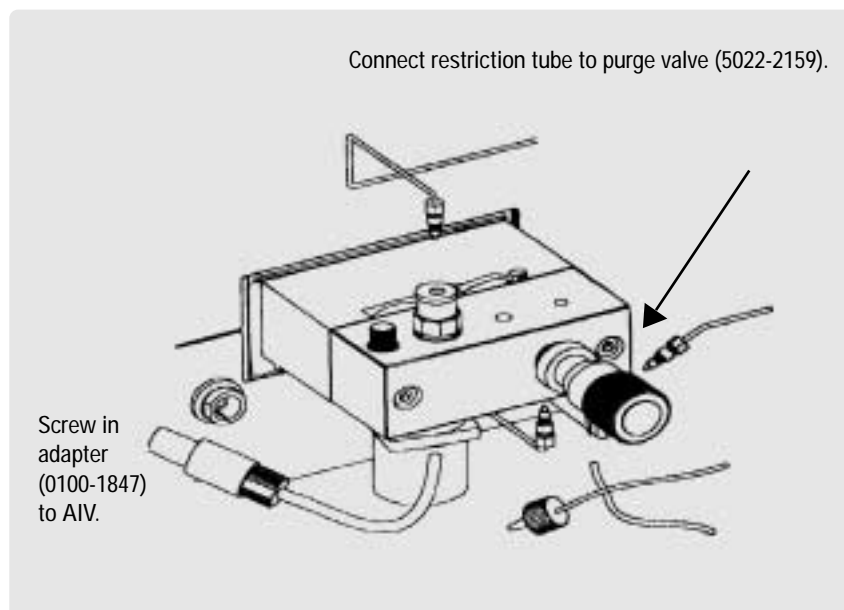
Description	Part No.
Sapphire piston	5063-6586
Piston Seal, (Reversed Phase) (pack of 2)	5063-6589
Piston Seals, polyethylene (Normal Phase) (pack of 2)	0905-1420

## ● ● ● ● ● Seals and Pistons

### ● Seal Wear-In Procedure

After you have replaced the standard seals, Agilent recommends performing the seal wear-in procedure. This procedure requires isopropanol, an adapter, and a restriction capillary. Do not perform the procedure when installing the normal phase seals. Follow the instructions below:

1. Place a bottle with 100 ml of isopropanol in the solvent cabinet and place the tubing (including bottle head assembly) of the pump head that is supposed to be worn-in into the bottle.
2. Screw the adapter (0100-1847) to the AIV and connect the inlet tube from the bottle head directly to it.
3. Connect the restriction capillary (5022-2159) to the purge valve. Insert its other end into a waste container.
4. Open the purge valve and purge the system for 5 minutes with isopropanol at a flow rate of 2 ml/min.
5. Close the purge valve, set the flow to a rate adequate to achieve a pressure of 350 bar. Pump 15 minutes at this pressure to wear in the seals. The pressure can be monitored at your analog output signal, with the handheld controller, Chemstation or any other controlling device connected to your pump.
6. Turn OFF the pump, slowly open the purge valve to release the pressure from the system, disconnect the restriction capillary and reconnect the outlet capillary at the purge valve and the connecting tube from solvent selection valve (if installed) to the AIV.
7. Rinse your system with the solvent used for your next application.

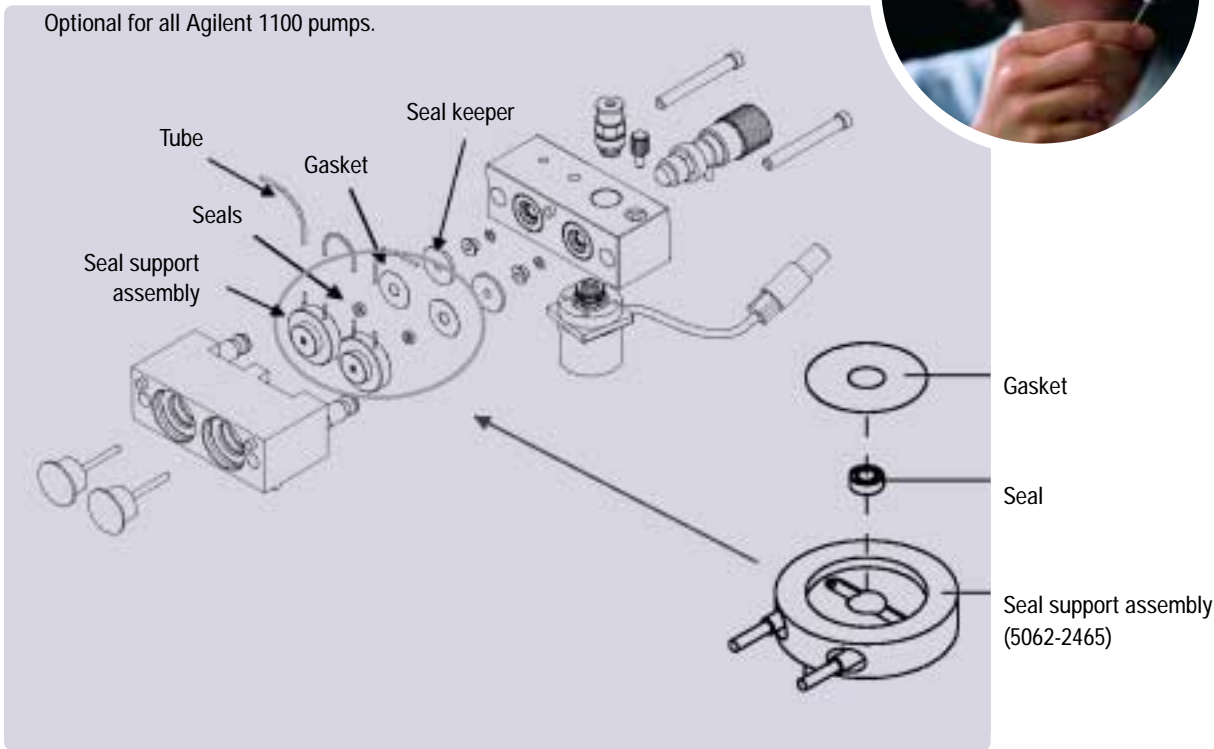


#### Note:

This procedure is required for standard seals only (5063-6589), but it will definitely damage the normal phase application seals (0905-1420).

Pump Head

Pump Head with Seal Wash Kit  
(Used with standard and Capillary Pump)



Concentrated buffer solutions will reduce the lifetime of the seals and pistons in your 1100 Series pump. The seal wash option helps to increase seal lifetime by flushing the backside of the seal with a wash solvent.

The seal wash option can be installed to protect your pistons and seals from the routine use of highly concentrated buffer solutions (100 mm).

Description	Part No.
<b>Seal Wash Option Kit</b>	01018-68722
Includes: 2 film washer, 4m flex tubing, 2 pump seals, 1 flow regulator, 2 support rings, 2 support ring assemblies, 5ml luer lock syringe, tool, knife, abrasive paper	
Seal support assembly	5001-3739
Seal keeper	5001-3743
Wash seal	0905-1175
Insert tool for wash seal	01018-23702
Wash seal gasket (pack of 6)	5062-2484

## Parts and Supplies



Description	Part No.
<b>Capillary Pump G1376A 1100 Series</b>	
Accessory kit for capillary pump	G1376-68705
Filter assembly with 0.5 µm pore size filter	5064-8273
Replacement frits 0.5 µm for 5064-8273, 10/pk	5022-2185
Torque adapter	G1315-45003
Bottle head assembly with tubing and filter	G1376-60003
Solvent inlet filter (SST)	01018-60025

Description	Part No.
<b>G1361A 1100 Series Preparative Pump</b>	
O-ring, Viton, 30 mm	0905-1516
Glass filter, solvent inlet 40 µm pore size	3150-0944
SS filter assembly in PEEK ring, 2 µm pore size	5022-2192
Bottle, clear, 2L, 2 inlets	5065-4421
Bottle, amber, 2L	9301-6341
Bottle, clear, 2L	9301-6342
Bottle head assembly	G1361-60002
Sapphire plunger	G1361-22402
Frit adapter	G1361-23204
Peristaltic pump use with 1100 Series LC	5065-4445
Valve assembly inlet/outlet	G1361-60012
SS capillary 0.6 x 173 mm outlet valve 1 - multi assembly, male/female	G1361-67300
SS capillary 0.6 x 178 mm outlet valve 2 - multi assembly, male/female	G1361-67301
SS capillary 0.6 x 400 mm EMPV to next module, male/female	G1361-67302
SS capillary 0.5 x 160 mm EMPV to multi assembly, male/female	G1361-67303
SS capillary 0.6 x 111 mm union to EMPV, male/female	G1361-67304
SS capillary 0.6 x 40 mm union to mixer, male/female	G1361-67305
SS capillary 0.6 x 367 mm EMPV1 to union, male/female	G1361-67306

## Parts and Supplies ● ● ● ● ●

Description	Part No.
<b>Pump Accessories</b>	
Bottle head assembly with filter for F29/32 tapered inlet bottle	G1312-68706
Solvent reservoir, 1 liter, F29/32	9301-0656
Bottle head assembly, screw bottle, with drawing tube and filter	G1311-60003
Solvent reservoir, screw bottle	9301-1420
Solvent reservoir, screw bottle, 1 liter, with cap	9301-1421
Solvent reservoir, 1-1 screw top bottle, amber (for use with bottle head assembly)	9301-1450
Solvent mixer	G1312-87330
Capillary, damper to purge valve (to bypass binary pump mixer)	G1312-67301

## Solvent Inlet Filters ● ● ● ● ●



Unfiltered solvents or microbial growth in the solvent bottle will reduce the lifetime of the solvent inlet filter and will influence the pump performance. For instance, blocked solvent inlet filters will cause erroneous mobile phase compositions. In addition, if the filters are blocked and the pump keeps working but cannot draw in solvent, the pump will begin drawing in air. The result will be periodic baseline disturbances. You should remember to clean or replace the solvent inlet filters on a regular basis, perhaps every 3 months. The glass solvent inlet filters cannot be sonicated as they may shatter. The stainless steel solvent inlet filters can be sonicated in isopropanol.

### ● Cleaning or Replacing the Solvent Inlet Filters and Leak Sensor

1. Take off the solvent inlet filters.
2. Replace the glass frit filters or soak them in concentrated nitric acid (35%) for one hour. Flush well or column damage will occur.
3. Install the solvent filters.

## ● ● ● ● ● Solvent Inlet Filters and Leak Sensor

### ● Solvent Inlet Filters for Standard Pumps



#### Description

Frit adapter, 3 mm PTFE (4/pk)  
 Glass filter, Solvent inlet  
 Tubing Kit, from degasser to pump  
 Includes: 30 cm pieces of tubing with pre-mounted screws and bushings (4/pk)

#### Part No.

5062-8517  
 5041-2168  
 G1322-67300

### ● Mobile Phase

Contamination of solvents, especially of aqueous buffer solutions is a common problem in HPLC. Aqueous media are good growth environments for microbes that can clog your HPLC and contribute to background.

To test if the solvent inlet filter is blocked, disconnect the solvent inlet tube at the end away from the filter and bottle head assembly. If the line has been filled with solvent, it will drip freely out of the tube if the filter is in good condition. If the solvent

filter is blocked, no solvent or very little solvent will drip out of the solvent tube. Use appropriate safety precautions. The solvent inlet filter may be cleaned by soaking it in a beaker with concentrated nitric acid. Be absolutely certain to flush the filter with water before reinstalling it. It is much easier to simply replace the filter. Sonication is not recommended as glass particles may break off inducing blockages.



The following precautions are recommended:

- If possible, use sterile solvent bottles.
- Filter solvents through sterile filters (< 1µm).
- Replace the solvents every two days.
- Avoid exposure to direct sunlight or use brown glass bottles.



### ● Mobile Phase Clean-up

An added benefit to the process of filtering the mobile phase is that the mobile phase is also degassed for those people who do not have an on-line degasser installed with their system. Degassing of the solvents also prevents the formation of spurious peaks within the detector due to solvent outgassing at the low-pressure end of the chromatograph.

- Degas eluents as particulates are removed.
- Eliminate spurious peaks caused by outgassing in detectors.
- Eliminate pump downtime caused by air locks and particulates in check valves.
- Decrease piston wear; increase column life.
- Filter safety into plastic-coated or heavy-walled solvent reservoirs.

## Solvent Inlet Filters and Leak Sensor ●●●●●

### ● Solvent Filter/Degasser

Description	Part No.
<b>Filter Degasser Assembly</b> Includes: 40-in. long, 1/4-in. od Teflon tubing, 10 filter membranes, and a 1-liter plastic coated graduated solvent reservoir	3150-0507
<b>Filter Degasser Assembly Without Solvent Reservoir</b> Includes: 40-in. long, 1/4-in. od Teflon tubing, 10 filter membranes	3150-0508
<b>Solvent Filtration Kit</b> Includes: 250 ml glass reservoir, tapered funnel base with PTFE coated sieve, tapered top, 1000 ml flask and clamp	3150-0577
<b>Cellulose Filter Membranes</b> 47 mm, pore size 0.45 $\mu$ m (pack of 100)	3150-0576
<b>Nylon Filter Membranes</b> 47 mm, pore size 0.45 $\mu$ m (pack of 100)	9301-0895
<b>Teflon Filter Membranes</b> 47 mm, pore size 2 $\mu$ m (pack of 10)	3150-0509



3150-0577

### ● Vacuum Degasser

Description	Part No.
<b>G1322A 1100 Series</b> Online Degasser Accessory Kit Includes: 8 screws, 8 bushings, 4 markers, tubing, syringe, adapter	G1322-68705
Glass filter, solvent inlet	5041-2168

### ● Micro Vacuum Degasser

Description	Part No.
<b>G1379A 1100 Series</b> Dual-channel micro degasser vacuum chamber	G1379-60001
Vacuum tube set	G1379-67300
Mounting tool for degasser screws	0100-1710



## ● ● ● ● ● In-Line Filters

Increased column back pressure and loss of efficiency in HPLC are often caused by contamination of the column inlet frits. Blockage of microbore columns is a particular problem because of the small diameter of the inlet frit.

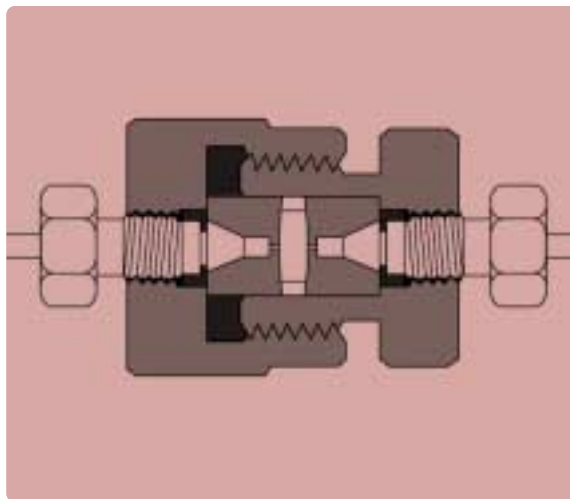
The use of the appropriate filters in the LC system will prevent blockage. Agilent offers two types of high-pressure filter kits for use with any HPLC system:

### Low volume column inlet filter

This filter is positioned immediately before the LC column. In this position, particles from the sample and the injection system are also removed. To minimize external bandspreading, a low volume filter is necessary but this limits the filtration capacity. The Agilent filter, with a frit diameter of only 2.1 mm and tapered inserts, is an ideal compromise. The column inlet filter can be used with any microbore, highspeed, or standard analytical column.

### ● HPLC In-line Filter

Description	Part No.
<b>Low-dispersion column inlet filter</b> Includes: two 2.1 mm frits, 2 µm connecting capillary Replacement frits 2.1 mm, 2 µm (10/pk)	01090-68702 280959-904
<b>Universal solvent filter</b> Includes: two 4.8 mm frits, 2 µm connecting capillary Replacement frits 4.8 mm, 2 µm (2/pk)	01090-68703 01090-27609



### Universal solvent filter

This filter is installed between the LC pump and the injector for the removal of particles from the solvent before reaching the injector. The filter's position in the system allows a high capacity filter to be used. The filter assembly consists of a 4.8 mm frit, two inserts and a two-piece holder. The frit is placed between the tapered edges of the inserts in such a way that the solvent is always evenly distributed over the whole surface of the filtering frit. This provides efficient filtration and extends the lifetime of the frit.

# Capillary Connectors • • • • •

## • Capillary Connectors for 1100 Series Modules

For convenience, Agilent color codes steel capillary tubing by ID. • 0.12 mm = Red • 0.17 mm = Green • 0.25 mm = Blue

From	To	Length (cm)	ID (mm)	Material	Part No.
Pump	Autosampler	60	0.17	SS	G1312-67305
		13	0.25	SS	01090-87308
		32	0.25	SS	79835-87638
	Thermostated Autosampler Manual Valve	50	0.17	SS	G1328-87600
		90	0.17	SS	G1329-87300
	Universal (not swaged)	70	0.25	SS	01018-67305
		70	0.25	Ta	01019-67305
Autosampler	Column	18	0.12	Flexible SS	G1313-87304
		28	0.12	Flexible SS	01090-87610
		75	0.12	SS	01090-87611
		18	0.17	Flexible SS	G1313-87305
		28	0.17	Flexible SS	01090-87304
		60	0.17	SS	01048-87302
		75	0.17	SS	01090-87305
Manual Valve	Column	50	0.17	SS	G1328-87600
Column Compartment	Column	7	0.12	SS	G1316-87303
		7	0.17	SS	G1316-87300
Column	DAD	38	0.12	SS	G1315-87312
		38	0.17	SS	G1315-87311
	VWD	40	0.17	PEEK	5062-8522
	Universal	10.5	0.12	SS	5021-1820
		15	0.12	SS	5021-1821
		28	0.12	SS	5021-1822
		40	0.12	SS	5021-1823
		7	0.12	SS	G1316-87303
		10.5	0.17	SS	5021-1816
		15	0.17	SS	5021-1817
		28	0.17	SS	5021-1818
		40	0.17	SS	5021-1819
		7	0.17	SS	G1316-87300
DAD	Outlet	50	0.25+	PTFE	0890-1713
VWD	Outlet	48	0.25	PEEK	5062-8535
	find use	35	0.12	Flexible SS	79841-87609
	10 per pack	10	0.17	Rigid SS	5061-3361
	10 per pack	20	0.17	Rigid SS	5061-3362

## Capillary Connectors






### Connecting Capillaries for the 1100 Series Capillary LC System

From	To	Fitting	Length (cm)	I.D. (µm)	Material	Part No.
<b>Generic Connecting Capillaries for Cap-LC System</b>						
SSV	AIV				T	G1311-67304
Piston 1	Piston 2	A/A			SS	G1312-67300
Pump	Restriction capillary	A/A			SS	G1312-67302
Mixing capillary	Damper	A/A			SS	G1312-67304
Damper	Mixer	A/A	13	250	SS	01090-87308
Mixer	Filter	A/A	13	250	SS	01090-87308
Filter	EMPV	A/A	28	170	SS	G1375-87400
Needle seat	Injection valve	-/C	15	100	PFS	G1329-87101
<b>PEEK Coated Fused Silica Capillaries for Use With 20 µl/min Flow Range</b>						
EMPV	Flowsensor	B/B	22	50	PFS	G1375-87301
Flowsensor	Injection valve	B/C	55	50	PFS	G1375-87310
Injection valve	Metering device	B/C	20	50	PFS	G1375-87302
Metering device	Needle	B/B	110	100	PFS	G1375-87303
Injection valve	Column	C/D	50	50	PFS	G1375-87304
Injection valve	Waste	C/-	5	100	PFS	G1375-87307
Column	Detector	D/E	40	50	PFS	G1315-68703
Detector	Waste	E/-	70	75	PFS	G1315-68708
µ-switching valve	Column	C/D	28	50	PFS	G1375-87309
<b>PEEK Coated Fused Silica Capillaries for Use With 100 µl/min Flow Range</b>						
EMPV	Flowsensor	B/B	22	100	PFS	G1375-87305
Flowsensor	Injection valve	B/C	55	100	PFS	G1375-87306
Injection valve	Metering device	B/C	20	100	PFS	G1375-87312
Metering device	Needle	B/B	110	100	PFS	G1375-87303
Injection valve	Column	C/D	50	75	PFS	G1375-87311
Injection valve	Waste	C/-	5	100	PFS	G1375-87307
Column	Detector	D/E	40	75	PFS	G1375-87308
Detector	Waste	E/-	70	75	PFS	G1315-68708
µ-switching valve	Column	C/D	28	50	PFS	G1375-87309
Capillaries come with fittings as listed above						
Materials: T=Teflon, SS=Stainless Steel, PFS=PEEK Coated Fused Silica						
Color codes for PEEK coated fused silica capillaries: 50µm=green, 75µm=blue, 100µm=black						

# Capillary Connectors

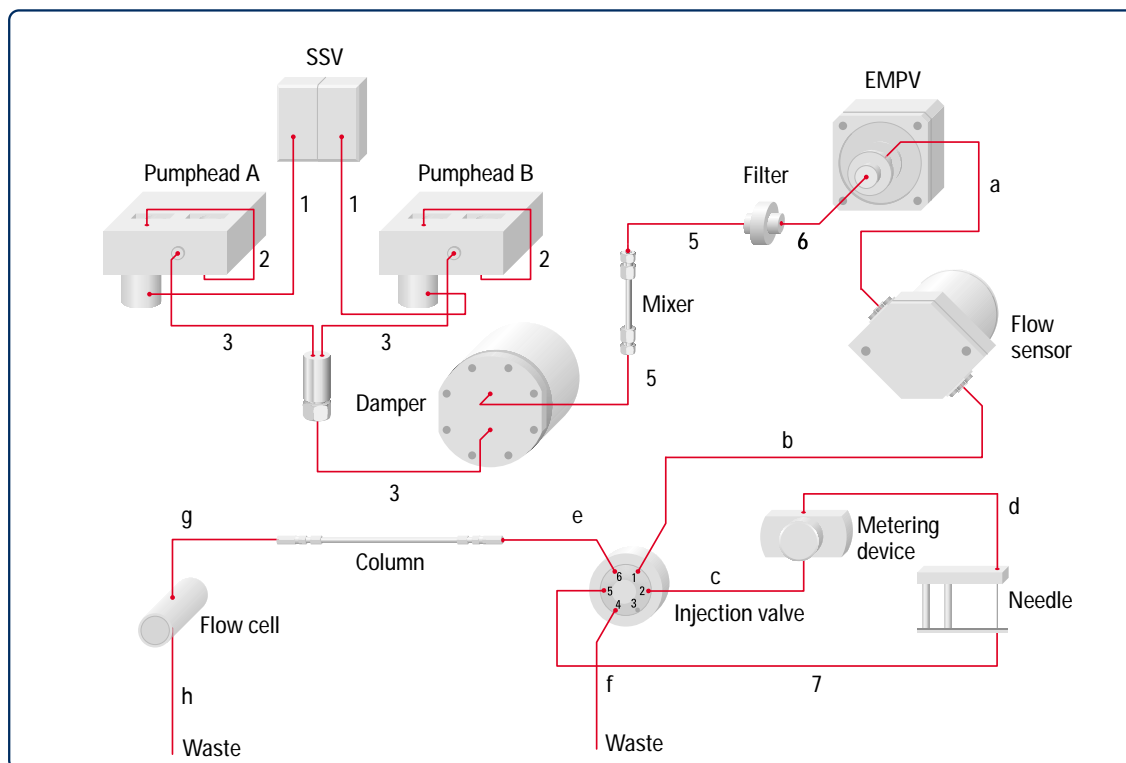
## Connecting Capillaries for the 1100 Series Capillary LC System

### Replacement Fittings and Ferrules

Description	Type	Part No.	
1/16" fittings, front and back ferrules 10/pk	A	5062-2418	
M4/16" fittings 10/pk	B	5063-6593	
1/32" ferrule and SS lock ring, 10/pk	B	5065-4423	
6 Fittings, 2 plugs, PEEK for μ-valves	C	5065-4410	
Double winged nuts and 1/32" ferrules, 10/pk	D	5065-4422	

We do not recommend exchanging the "E" type fitting.

### Capillary LC Flow Path



## Detectors

To increase the productivity of your HPLC System, it is important to perform regular maintenance on your variable wavelength, diode array and multiple wavelength detectors. Without routine scheduled maintenance, there may be a marked decrease in performance and functionality.

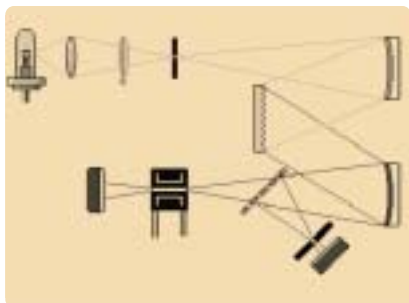
There is a wide range of Agilent flow cells available to fit every type of detector—compatibility is very important. In the pages to come, you'll find out how to choose the right flow cell for your application, how to disassemble, clean, and install it, how to change the deuterium lamp—and more.

As always, you'll discover all the maintenance tips, techniques, Agilent parts and part numbers you need to keep your detectors operating at maximum efficiency.

"It's about finding solutions to analytical problems, even under severe time constraints. It's about understanding the customer's environment completely—then providing the highest quality products and deepest application knowledge to work within that environment."

Friedrich Mandel, Ph.D., Physical Chemistry  
Senior Application Chemist Mass Spectrometry

## Variable Wavelength Detector ●●●●●



Here are some important VWD routine maintenance procedures:

- Check the waste outlet.
- Clean the leak sensor.
- Execute wavelength calibration.
- Perform intensity test.
- Check the photocurrent.
- Clean the cell windows or replace cell if necessary.

You should verify the function of the variable wavelength detector on a routine basis. This process is the largest part of variable wavelength detector (VWD) maintenance. There are built-in tests to help you determine wavelength calibration and lamp intensity. In addition, the flow cell windows will need to be cleaned or changed when they become dirty. The lamp will have to be replaced when the lamp intensity has diminished more than is tolerable for your application.

A critical parameter of the VWD is backpressure on the cell. Make certain that you use the appropriate capillary from the detector flow cell to waste. The capillary has the part number 5062-8535.

## Changing the Deuterium Lamp ●●●●●

Replace the deuterium lamp if the baseline noise and/or drift exceed your application limits or if the lamp does not light. To replace the lamp, turn the lamp off and allow it to cool for at least five minutes. Remove the front cover. Unscrew the lamp cover and remove it. Disconnect and replace the lamp. Replace the lamp cover and the front cover. Turn the lamp on and allow it to warm up for more than 10 minutes. Perform a detector calibration to check the wavelength accuracy of the detector.



Front access to lamp and flow cell.

### VWD Replacement Parts ●

Description	Part No.
G1314A VW Detector Accessory Kit Includes: waste accessory, 1 hex key, 2 wrenches, tubing and wrist strap	G1314-68705
Deuterium lamp	G1314-60100
Outlet tubing, Teflon/Peek	5062-8535

## Flow Cells

### Selecting the Optimal Flow Cell

There are four flow cell options for the variable wavelength detector. Use the chart below to select the appropriate flow cell for your application. If more than one selection is appropriate, use the larger flow cell to get the best detection limit.

Flow cells with longer path lengths provide better signal detection. However, when increasing the path length, you also increase the cell volume. This increase causes more peak dispersion.

VWD Flow Cell Selection Table

Typical Column Length	Typical Peak Width	Recommended Flow Cell				
<= 5 cm	0.025	Micro Flow Cell				High-Pressure Flow Cell  For Pressure Above 100 bar
10 cm	0.05		Semimicro Flow Cell			
20 cm	0.1			Standard Flow Cell		
>= 40 cm	0.2					
Typical Flow Rate		0.05-0.2 mL/min	0.2-0.4 mL/min	0.4-0.8 mL/min	1-2 mL/min	0.05-5 mL/min
Internal Column Diameter		1.0 mm	2.1 mm	3.0 mm	4.6 mm	





## Flow Cell Maintenance

### Disassembling and Cleaning the Cell

To clean or replace the flow cell windows, perform the following steps. Remove both capillaries from the flow cell. Unscrew the cell screws and remove the flow cell. Open the cell using a 4 mm hexagonal key. Remove the conical springs and gaskets with tweezers. Do not remove the flow cell windows with tweezers if they will be reused. The tweezers will scratch their fragile surface. You can remove the cell windows with tape. You may clean the cell windows with ethanol. Some have had success cleaning the cell windows with contact lens cleaners (particularly those working with proteins). You may opt to replace the windows instead of cleaning them.



Disassembling the cell

- Remove both capillaries.
- Unscrew the cell screws.
- Take out the detector cell.

Cell screws



Disassembling the cell windows.

- Open the cell using a 4 mm hexagonal key.
- Remove the conical springs and the gasket with tweezers.
- Remove the cell windows with the help of a scotch tape.
- Clean the cell body with ethanol
- Clean the cell windows with a cotton stick and ethanol.
- Assure that no deposits are on the window or cell body

### Assembling Cell Windows and Cell



Carefully reassemble the flow cell. The order and placement of the conical springs is critical to the tightness. Install the conical spring ring with its conical side to the cell window.

Reassembling the cell windows

1. Insert Gasket #2.
2. Install the cell window.
3. Insert Gasket #1.
4. Insert the SST ring.
5. Install the conical springs.
6. Carefully tighten the cell screw.

The white gaskets can be differentiated by assessing the size of the holes. The hole of gasket 1 is smaller. The cell repair kit includes the required cell windows (pack of 2) and the gaskets.

## Flow Cell Maintenance

### Installing the Detector Cell

Before returning the flow cell to the instrument module, install the capillaries and check for leaks. Once you are convinced the cell is leak free, install the flow cell into the instrument. You should perform a zero-order and wavelength calibration after the cell has been returned to the module. The flow cell is part of the optics and has been moved since the last testing.



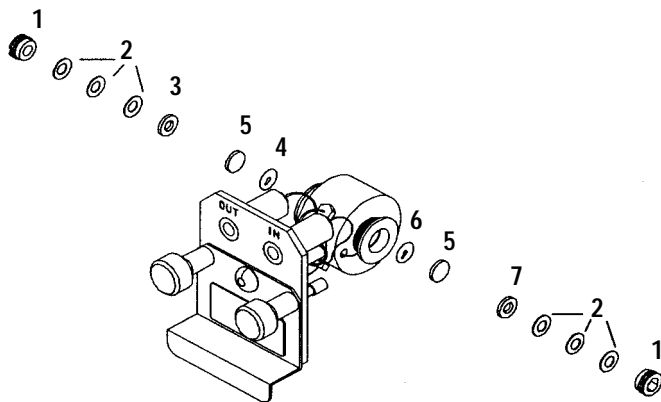
Installing the detector cell

1. Connect the capillaries.
2. Switch on the pump and check the cell for leaks.
3. Install the cell into the optical system.
4. Screw down the cell.

Recommended tests after cell installation: Zero-order calibration and Wavelength calibration.

### Standard Flow Cell Replacement Parts (new design)

There are two designs of the Standard Flow Cell. The cell screw of the new design G1314-60086 is painted black.



Standard Flow Cell

1. Cell screw
2. Conical spring
3. Ring #1 PEEK
4. Gasket #1 KAPTON
5. Quartz window
6. Gasket #2 KAPTON
7. Ring #2 PEEK

#### Description

#### Part No.

Standard flow cell, 10 mm, 14  $\mu$ l, 40 bar  
(new design)

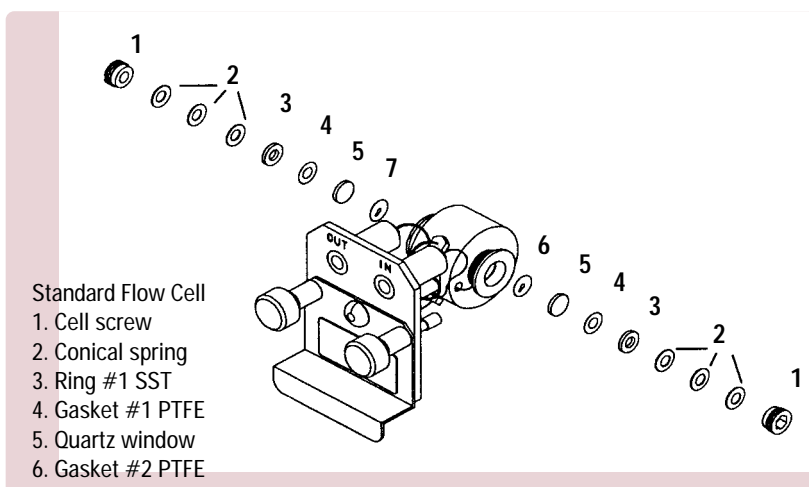
G1314-60086

Standard Flow Cell Kit  
Includes: 2 windows, 2 gaskets #1, 2 gaskets #2

G1314-65061

# Flow Cells for 1100 Series Variable Wavelength Detector (VWD)

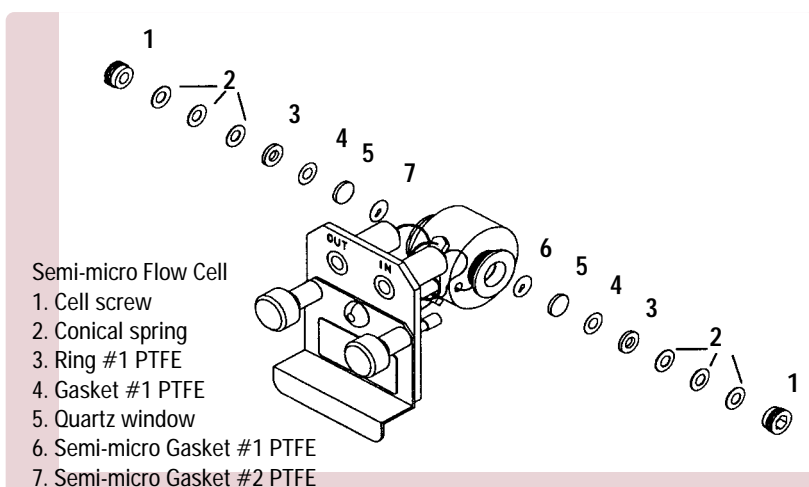
## Standard Flow Cell Replacement Parts (old design)



The following diagrams illustrate the standard and high-pressure flow cells. Each flow cell includes two quartz windows and gaskets. The high-pressure flow cell has two PEEK rings. The semi-micro and micro flow cells are similar to the standard flow cell.

Description	Part No.
Standard flow cell, 10 mm, 14 $\mu$ l, 40 bar (No longer available. Order G1314-60086.)	G1314-60080
Standard Flow Cell Kit Includes: 2 windows, 2 gaskets #1, 2 gaskets #2	G1314-65050

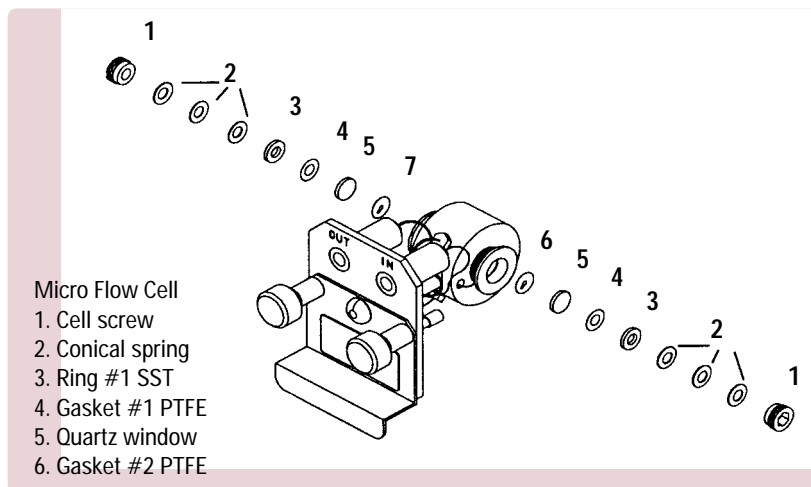
## Semi-micro Flow Cell Replacement Parts



To achieve maximum functionality of your flow cells, Agilent Repair Kits contain all the parts you need to perform proper maintenance.

Description	Part No.
Semi-micro flow cell assembly, 6 mm, 5 $\mu$ l, 40 bar	G1314-60083
Semi-micro flow cell assembly, 6 mm, 5 $\mu$ l, 40 bar Kit Includes: 2 windows, 4 gaskets: 2 standard #1, 1 semi-micro #1, 1 semi-micro #2	G1314-65056

## Micro Flow Cell ●



## Description

## Part No.

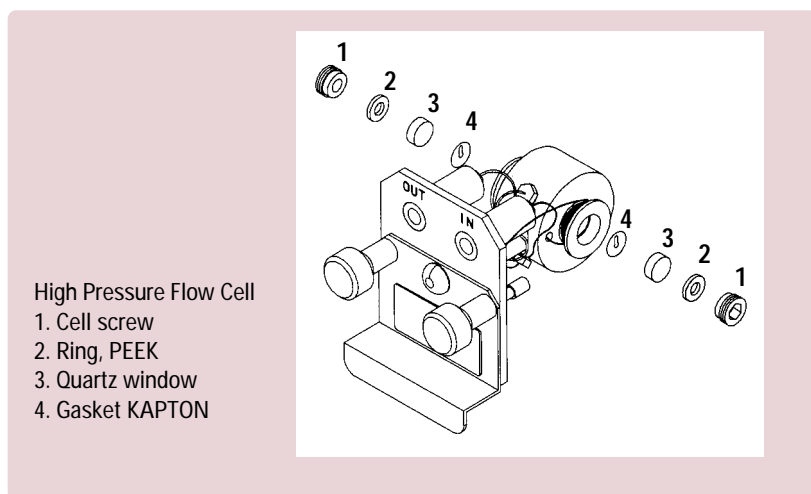
Micro Flow Cell, 5 mm, 1  $\mu$ l, 40 bar

G1314-60081

Micro Flow Cell Kit: Includes 2 windows,  
2 gaskets #1, 2 gaskets #2

G1314-65052

## High Pressure Flow Cell Replacement Parts ●



For a complete listing of individual components of flow cell, please refer to your Agilent Consumables and Accessories catalog. (Publication number 5988-4785EN.)

## Description

## Part No.

High pressure Flow Cell, 10 mm, 14  $\mu$ l, 400 bar

G1314-60082

High pressure Flow Cell Kit: Includes 2 windows,  
2 gaskets #1, 2 gaskets #2

G1314-65054

## Diode Array Detector (DAD), Multiple Wavelength Detector (MWD)



There are built-in tests to verify the performance of your diode array. The intensity test and detector cell test can help you determine when maintenance is necessary. Maintenance includes exchanging the lamp and cleaning or replacing the flow cells when necessary.

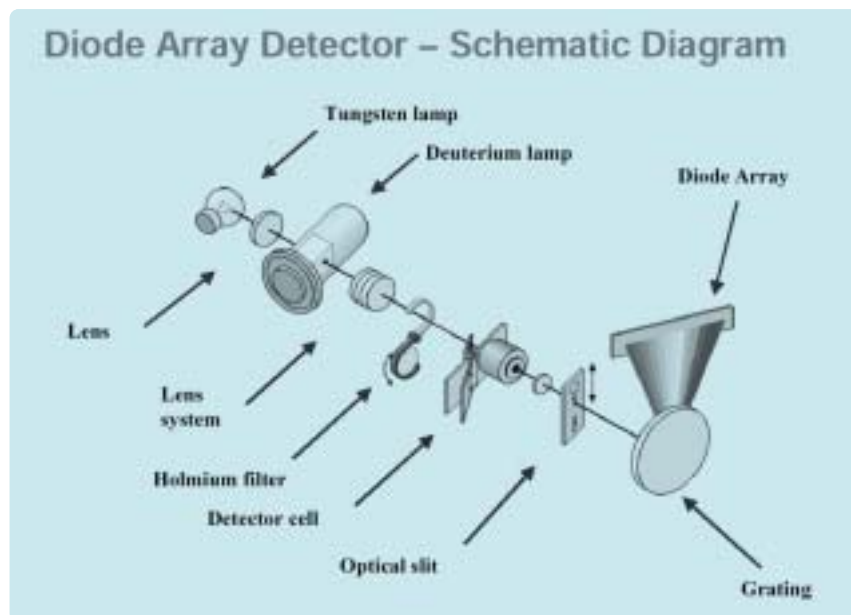
The wavelength calibration will ensure wavelength accuracy. On a regular basis, you should also check the leak sensor function and the positioning of the waste tube.

### DAD Routine Procedures and Maintenance

- Clean the leak sensors.
- Check the waste tube.
- Exchange the lamp.
- Clean the flow cell.
- Wavelength calibration.
- Intensity test.
- Detector cell test.
- Dark current and filter test.

Achieve optimal performance with the innovative design of the Agilent 1100 series DAD lamp.

- Lifetime over 2000 hours.
- Precise alignment.
- Thermal stability.
- Easier to handle during installation and removal.



## Diode Array Detector (DAD), Multiple Wavelength Detector (MWD)

### Exchanging the Lamp

If the lamp does not ignite or if the noise and drift are interfering with your application, you should change the lamp. If the detector has been in use, turn it off and allow it to cool before proceeding.

1. Remove the front cover.
2. Disconnect the electrical connection and unscrew the lamp to remove from the DAD.
3. Replace with a new lamp. Do not touch the glass surface with your hands.
4. Tighten the screws and reconnect the lamp to its electrical connection.
5. Replace the front cover.
6. Reset the lamp counter and turn on the lamp. Allow it to warm up for 10 – 20 minutes.



Step 1: Remove the lamp by unscrewing both screws and unplugging it.



Step 2: Install the lamp into the housing (auto-aligning) and screw snugly.

Deuterium lamp 5181-1530

### Diode-Array Detector (DAD) Parts and Supplies

Description	Part No.
Deuterium lamp, long life	5181-1530
Deuterium lamp	2140-0590
Tungsten lamp	G1103-60001

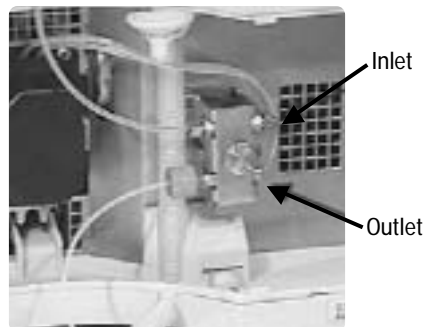
### Selecting the Optimal Flow Cell

Typical Column Length	Typical Peak Width	Recommended Flow Cell				
<= 5 cm	0.025	500 nL Flow Cell				High-Pressure Flow Cell
10 cm	0.05		Semimicro Flow Cell			
20 cm	0.1			Standard Flow Cell		
>= 40 cm	0.2					
Typical Flow Rate		0.01-0.2 mL/min	0.2-0.4 mL/min	0.4-0.8 mL/min	1-2 mL/min	0.05-5 mL/min
Internal Column Diameter		0.3-1 mm	2.1 mm	3.0 mm	4.6 mm	



## Diode Array Detector (DAD), Multiple Wavelength Detector (MWD)

### Flow Cell Maintenance



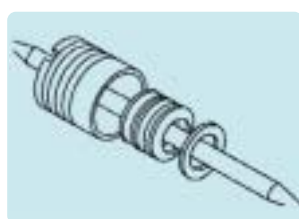
Step 1: Remove the capillaries



Step 2: Take out the cell



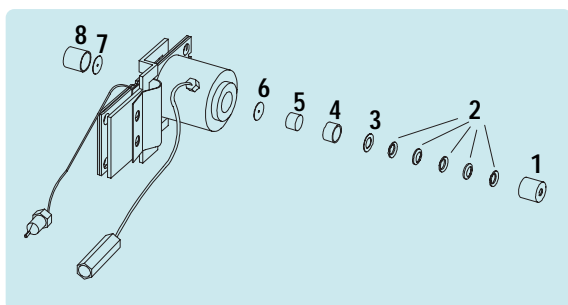
Step 3: Remove the cell screw and  
remove the gasket



By using a toothpick you can put the spring washers in the correct order on the screw.

- A decrease in detector performance or unusual noise levels, may mean you have dirty flow cell windows.
- Clean and reassemble one side of the flow cell before beginning the other side to prevent mixing the front and rear gaskets which have different hole diameters.
- When you clean or replace flow cell windows, if the washers fall out of the window assembly, they must be inserted in the correct order with Teflon ring to prevent any leaks from the flow cell window.
- Clean the cell body with water or isopropanol.
- After opening the cell you should always use a new gasket.

### Standard Flow Cell or Semi-Micro Flow Cell



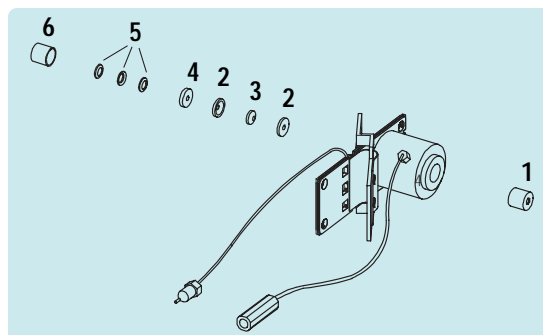
1. Window screw
2. Spring washers
3. Compression washer
4. Window holder
5. Quartz window
- 6/7. Seals
8. Window assembly

1. Window assembly
2. Seal ring
3. Quartz window
4. Compression washer
5. Spring washers
6. Window screw

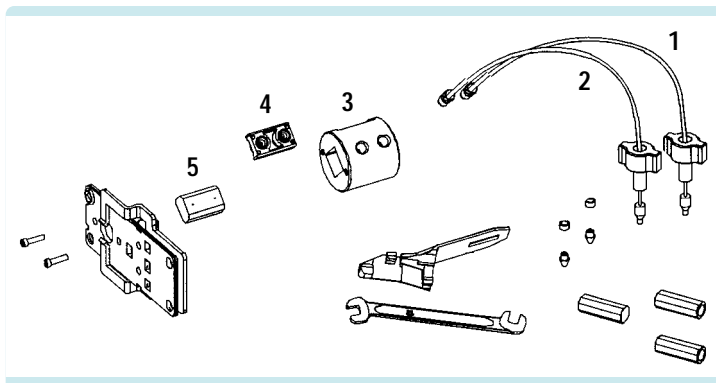
### Choosing the Detector Cell

Seven flow cells are available for use with the diode array. Select the flow cell based upon your application

### Micro High Pressure Flow Cell



## DAD/MWD



## 500 nL Flow Cell Replacement Parts

1. Capillary Inlet Kit
2. Capillary Outlet Kit
3. Cell housing
4. Cell seal
5. Quartz cell body

Description	Part No.
<b>Standard flow cell, 10 mm, 13 <math>\mu</math>l, 120 bar</b>	G1315-60012
Standard Flow Cell Repair Kit	G1315-68712
Includes: 12 front seals, 12 back seals, window screw kit and hex key 6mm	
<b>Semi-micro flow cell, 6 mm, 8 <math>\mu</math>l, 120 bar</b>	G1315-60011
Semi-micro Cell Repair Kit	G1315-68713
Includes: 12 front seals, 12 back seals, window screw kit and hex key 6mm	
Window Screw Kit for the standard and semi-micro Includes: 2 quartz windows, 2 compression washers, 2 window holders, 2 window screws and 10 spring washers	79883-68703
<b>Micro high pressure cell, 6 mm, 1.7 <math>\mu</math>l, 400 bar</b>	G1315-60015
Micro High Pressure Cell Repair Kit	79883-68700
Includes: 1 quartz window, 5 springs, washers, 2 seal rings	
<b>500 nL flow cell, 10 mm, 500 nL, 50 bar</b>	G1315-68714
500 nL Cell Sealing Kit	G1315-68715
Includes: torque adapter, 2 cell seal assemblies, 5 litetouch front and back ferrules	

## Selecting the Optimal Preparative Flow Cell

Operating Range	Recommended DAD/MWD Flow Cell		
Low concentration, linear range of detector response	10 mm STD	3 mm Prep	0.3 mm Prep
High Column Load	10 mm STD	3 mm Prep	0.3 mm Prep
Overloaded Column	3 mm Prep	0.3 mm Prep	
		0.06 mm Prep	
Typical Flow Rate	1-10 ml/min	10-30 ml/min	30-100 ml/min

## Prep Flow Cells

Description	Part No.
Prep Flow Cell-SST, 3 mm, 120 bar	G1315-60016
Prep Flow Cell Quartz, 0.3 mm, 20 bar	G1315-60017
Prep Flow Cell Quartz, 0.06 mm, 20 bar	G1315-60018

## General Supplies

Agilent offers a wide range of supplies for operation and maintenance of LC systems. These products have been carefully designed or selected by Agilent to work with your Agilent instruments for maximum performance and uptime—it's the PerfectFit for all of your LC needs.

Visit the Agilent web site at [www.agilent.com/chem](http://www.agilent.com/chem) to find a full selection of Agilent LC columns and access to our new chromatogram database.

"As an application supervisor, I'm known for using the phrase 'Don't hesitate to challenge.' It means never look for the easiest, safest route—you might miss something along the way. Do whatever it takes to be helpful and find the most effective answers."

Hiroki Kumagai, Ph.D.  
Author, Ion Chromatographic Separation of Rare-Earth Elements using a Nitrilotriacetate Type Chelating Resin as the Stationary Phase  
Manager

## ● ● ● ● ● LC Tubing



### What is the Function

PEEK or stainless steel tubing or capillary tubing creates the sample flow path through your LC system, from autosampler or manual injection valve, through the column to the detector. The ideal tubing provides an inert surface, tight and leak free connections, and zero dead volumes.

### Why Replace

Periodically inspect your system for

- Leaking or loose fittings.
- Pinched or constricted tubing.
- Application changes.

### How to Minimize Problems

- Select the most narrow diameter and shortest length tubing your application and system allow to prevent peak dispersion or loss of resolution.
- Smaller id tubing (0.12 mm) is recommended for narrowbore or microbore applications.
- Use color code tubing or track identifiers to facilitate maintenance and troubleshooting.

### Stainless Steel Tubing

- Precisely measured and pre-cut for a perfect fit in Agilent LCs.
- Universal lengths.
- Agilent 1100 capillary tubing with color coding to distinguish internal diameters.

### PEEK Tubing

- Flexible and easy to cut to desired lengths.
- Color-coded for easy tracking.
- Accepts both stainless and PEEK fittings.
- 1/16" OD.

### Fittings

To ensure leak-free connections, use the manufactured recommended style fittings with columns, valves, and unions. Peak shape and resolution may be lost by mixing fittings.

- Different column fitting requirements (Zorbax columns use standard Swagelok fittings).
- Agilent 1100 modules use standard Swagelok fittings.
- Rheodyne injection valves require Rheodyne fittings.

### ★ Note:

All fittings in the 1100 HPLC are Swagelok compatible, EXCEPT the ports on model 7725i Rheodyne valve.

# LC Tubing ● ● ● ● ●

## ● PEEK Tubing

Description	I.D. 0.02 in (0.5 mm) orange Part No.	I.D. 0.01 in (0.25 mm) blue Part No.	I.D. 0.007 in (0.18 mm) yellow Part No.	I.D. 0.005 in (0.13 mm) red Part No.
Tubing 1/16" od, 1.5 m	0890-1761	0890-1762	0890-1763	0890-1915
Tubing 1/16" od, 5 m		5042-6463	5042-6462	5042-6461

Description	Part No.
Cutter for plastic tubing	8710-1930
Replacement blades for tubing cutter (5/pk)	8710-1931



## ● Fittings

Description	Part No.	
PEEK RheFlex 2-piece fittings, 5/pk	0100-1631	
PEEK RheFlex 2-piece fittings, colored, 10/pk	0100-2175	
ChromTrac identifiers, 20/pk 2 black, 2 white, 2 green, 2 gray, 4 yellow, 4 red, 4 blue	0350-1402	
1/16" SS fittings, front and back ferrules, 10/pk	5062-2418	
1/16" SS long fittings, front and back ferrules, 10/pk	5065-4454	
1/16" SS male fittings, 10/pk	5061-3303	
1/16" SS front ferrules, 10/pk	5180-4108	
1/16" SS back ferrules, 10/pk	5180-4114	
Zero dead-volume fitting with front and back ferrules	0100-0900	
Finger-tight PEEK fittings, 1/16" (10/pk)	5063-6591	
Finger-tight PEEK long fittings, 1/16" (10/pk)	5062-8541	
Finger-tight PEEK fittings, 10/pk 1/16", yellow, blue, black, green, red, 2 each	5065-4426	

## ● ● ● ● LC Tubing

### ● Universal Connecting Capillaries

- Made of flexible stainless steel (0.6 mm OD) with 1/16 " fittings for both ends.

- Pre-swaged fittings are assembled according to Swagelok specifications.

Non-swaged capillaries include fittings, but not assembled.

I.D. (mm)	Length (mm)	Connection A	Connection B	Part No.
0.25	130	pre-swaged	pre-swaged	01090-87308
0.25	160	pre-swaged	pre-swaged	G1313-87301
0.25	320	pre-swaged	pre-swaged	79835-87638
0.25	700	pre-swaged	non-swaged	01018-67305
0.17	90	non-swaged	non-swaged	G1316-87300
0.17	130	pre-swaged	non-swaged	01090-87305
0.17	180	pre-swaged	pre-swaged	G1313-87305
0.17	280	pre-swaged	non-swaged	01090-87304
0.17	380	pre-swaged	non-swaged	G1315-87311
0.17	500	non-swaged	non-swaged	G1328-87600
0.17	600	pre-swaged	non-swaged	G1312-67305
0.17	800	pre-swaged	non-swaged	01048-87302
0.17	900	pre-swaged	non-swaged	G1329-87300
0.12	35	pre-swaged	pre-swaged	79841-87609*
0.12	70	non-swaged	non-swaged	G1316-87303
0.12	105	pre-swaged	non-swaged	01090-87611
0.12	150	pre-swaged	non-swaged	G1315-87312
0.12	180	pre-swaged	pre-swaged	G1313-87304
0.12	280	pre-swaged	non-swaged	01090-87610
0.12	880	pre-swaged	non-swaged	01040-87602*

\*made of 1.58 mm od tubing

### ● Rigid Capillary Tubing (Stainless Steel, 10/pk)

- Squarely cut, pre-cleaned and ready to use.

- Use with SS fittings and ferrules (5062-2418) or PEEK fittings (0100-1516).

Length (mm)	I.D. (mm)	Connection	Part No.
100	0.17	No fittings	5061-3361
200	0.17	No fittings	5061-3362



## Connectors

## Connecting Capillaries

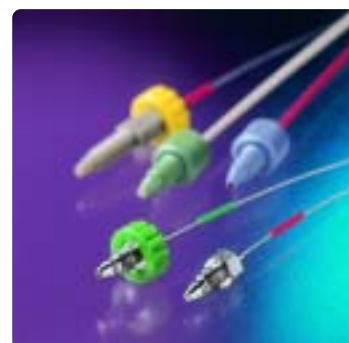
## Flexible Stainless Steel Capillaries Without Fittings

I. D. (mm)	Length 105 mm Part No.	Length 150 mm Part No.	Length 280 mm Part No.	Length 400 mm Part No.
0.17 (green)	5021-1816	5021-1817	5021-1818	5021-1819
0.12 (red)	5021-1820	5021-1821	5021-1822	5021-1823

Use these capillaries with SS fittings and ferrules 5062-2418 (10/pk) or PEEK fingertight fittings 0100-1516.

## Capillary Kits With Flexible Stainless Steel Capillaries and 1/16" Male Fittings

Description	Part No.
Capillary Kit contains 0.12 mm ID capillaries: 3 ea 105 mm long, 1 ea 150 mm long, 1 ea 280 mm long plus fittings	5061-3304
Capillary Kit contains preswaged 0.12 mm id capillaries: 3 ea 70 mm long, 1 ea 35 mm long 1 ea 280 mm long,	5061-3315



## Vials and Caps

### Standard Vials

Description	Volume (ml)	100/pk Part No.	1000/pk Part No.	100/pk (silanized) Part No.
Crimp clear glass top vials	2	5181-3375	5183-4491	5183-4494
Crimp clear glass top vials, write-on spot	2	5182-0543	5183-4492	5183-4495
Crimp amber glass top vials, write-on spot	2	5181-3376	5183-4493	5183-4496
Crimp polypropylene wide opening top	1	5182-0567		
Crimp polypropylene wide opening top	0.3		9301-0978	
Snap clear glass top vials	2	5182-0544	5183-4504	5183-4507
Snap clear glass top vials, write-on spot	2	5182-0546	5183-4505	5183-4508
Snap amber glass top vials, write-on spot	2	5182-0545	5183-4506	5183-4509
Screw clear glass top vials	2	5182-0714	5183-2067	5183-2070
Screw clear glass top vials, write-on spot	2	5182-0715	5183-2068	5183-2071
Screw amber glass top vials, write-on spot	2	5182-0716	5183-2069	5183-2072

### 6-ml Vials and Caps for Use With 1100 Series LC

Description	Volume (ml)	Cap size (mm)	Part No.
Clear glass crimp cap vials (100/pk)	6	20	9301-1419
PTFE/silicone crimp caps for 6-ml vials (100/pk)		20	9301-1425
Clear glass screw cap vials (100/pk)	6	16	9301-1377
Screw caps for 6-ml vials (100/pk)		16	9301-1379
PTFE/silicone septa for 6-ml vials (100/pk)		16	9301-1378

### Microvials

Description	Quantity	Volume (ml)	Cap size (mm)	Part No.
Crimp cap microvials with fixed inserts	100	0.2	11	9301-1388
Microvial inserts (use with narrow neck vials)	500	0.1		9301-1387

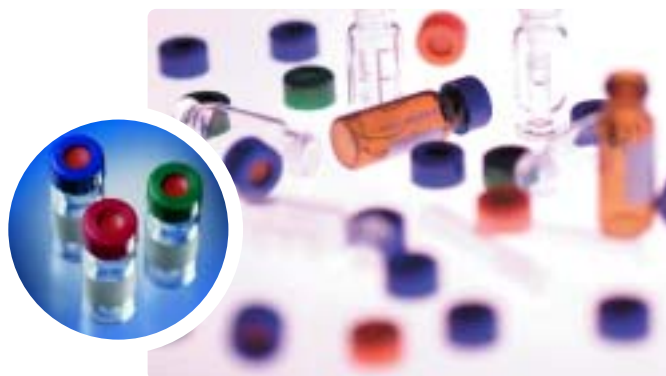
## Vials and Caps

### Caps

Description	Part No.
<b>Crimp (100/pk) (Clear PTFE/red rubber septa)</b>	
Silver aluminum caps	5181-1210
Silver aluminum caps (1000/pk)	5183-4498
Aluminum caps	Blue 5181-1215/Green 5181-1216/Red 5181-1217
<b>Screw (100/pk) (Clear PTFE/red rubber septa)</b>	
Polypropylene caps	Blue 5182-0717/Green 5182-0718/Red 5182-0719
<b>Snap (100/pk) (Clear PTFE/red rubber septa)</b>	
Clear polypropylene caps	5182-0550
Polypropylene caps	Blue 5182-3458/Green 5182-3457/Red 5182-3459
<b>Screw (100/pk) (Clear PTFE/silicone septa)</b>	
Polypropylene caps	Blue 5182-0720/Green 5182-0721/Red 5182-0722

### Vial Kits

Description	Part No.
2 ml vial kit Includes: 100 (2 ml) vials, 100 crimp caps, 1 (11 mm) crimper	01078-68705
Clear crimp top vials, silver aluminium crimp caps, PTFE/red rubber septa in 6 drawer storage box (500/pk)	5181-3400
Amber crimp top vials with write on spot, silver aluminium crimp caps, PTFE/red rubber septa in 6 drawer storage box (500/pk)	5181-8801



## ● ● ● ● ● Crimpers and Decappers

### ● Electronic Crimper

Agilent Technologies' electronic crimper for 2 mL crimp-top auto-sampler vials features:

- Electronic, motor-driven crimping for reproducible crimps.
- Hand-held, push-button operation.
- Electronic adjustment of the crimp force.
- The ability to crimp vials directly in common autosampler trays.
- The ability to crimp hundreds of vials with a single battery charge.
- Well-known rechargeable battery technology from Black & Decker, using the VersaPak Gold Nickel Metal Hydride battery.
- Ergonomic design to minimize wrist fatigue often encountered with manual crimpers.



Description	Part No.
Electronic crimper–11mm, complete with one VersaPak Gold rechargeable battery and charger Recommended for 2ml, 12 x 32mm crimp top autosampler vials.	5183-4763
Electronic decapper–11mm, complete with one VersaPak Gold rechargeable battery and charger Recommended for 2mL, 12 x 32mm crimp top autosampler vials.	5184-3567
Electronic crimper–20mm, complete with one VersaPak Gold rechargeable battery and charger Recommended for 20mm headspace or serum vials.	5184-3572
Electronic decapper–20mm, complete with one VersaPak Gold rechargeable battery and charger Recommended for 20mm headspace or serum vials.	5184-3573
Black & Decker® VersaPak® Gold NiMH rechargeable battery	5183-4799

## Sample Preparation Solutions • • • • •

Agilent Technologies provides several sample preparation product lines that can help you to solve some of those challenging sample preparation problems. All of Agilent's sample preparation products are manufactured under a quality program that conforms to ISO-9000 to ensure that these products meet the consistency and uniformity that you require in your everyday work.



SPE Cartridges

96-Well Fixed Plate

### Sample Filtration

Membrane sample filters are used to clarify any samples that need further analysis or use where particulate matter may cause a problem. They are most often used for the filtration of HPLC samples to prevent damage to the injection valve or to the HPLC column inlet. Agilent provides a range of standard and economy syringe filters conveniently housed in inert polymeric housings for easy use and disposal. (Ask for publication number 5980-0566E.)

### Solid-Phase Extraction

Solid-Phase Extraction (SPE) is a technique for the cleanup and concentration of analytes from various matrices. SPE improves and simplifies separations, increases chromatography column lifetime, and improves detection limits.

Agilent Technologies covers the full range of modern SPE requirements—cartridges, 96-well plates and accessories. ZORBAX SPE and AccuBOND® are SPE product families. Whatever your SPE requirements, think Agilent first. (Ask for publication number 5988-2685EN.)

### Combinatorial Chemistry Scavengers

These products resemble SPE products except that they have chemical functionality that permits these solid phases to react with and remove undesirable reaction by-products and excess reactants from chemical reactions and combinatorial compound library syntheses. Agilent provides a large number of scavengers that will remove just about any interference encountered. (Ask for publication number 5968-7313E.)

## Econofilters

### Econofilter Membrane Syringe Filters

Membrane syringe filters are recommended to clarify any samples that need further analysis or use where particulate matter in the sample solution may cause a problem. Most often they are used for small volume HPLC samples. The membrane filters are contained in an inert polymeric housing and no glue or binders are used in their construction to ensure that no extractables are present. The housing is designed to ensure that the sample is spread over the whole surface of the membrane so that maximum membrane capacity is used. Syringe filters are ready-to-use and are quite convenient. Merely attach the Luer-tipped syringe filled with the sample solution to the housing and pushes sample through the pre-cleaned filters.

Description	Part No.
Econofilter Regenerated Cellulose 25-mm/0.20-micron, 200/PK	5185-5830
Econofilter Regenerated Cellulose 25-mm/0.45 micron, 200/PK	5185-5831
Econofilter Nylon 25-mm/0.20-micron, 200/PK	5185-5832
Econofilter Nylon 25-mm/45-micron, 200/PK	5185-5833
Econofilter PTFE 25-mm/0.20-micron, 200/PK	5185-5834
Econofilter PTFE 25-mm/0.45-micron, 200/PK	5185-5835

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