9 Maintenance

This chapter describes the maintenance of the detector.

Introduction to Maintenance

The module is designed for easy maintenance. Maintenance can be done from the front with module in place in the system stack.

NOTE

There are no serviceable parts inside.

Do not open the module.

Cautions and Warnings

WARNING

Toxic, flammable and hazardous solvents, samples and reagents

The handling of solvents, samples and reagents can hold health and safety risks.

➔ When working with these substances observe appropriate safety procedures (for example by wearing goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet supplied by the vendor, and follow good laboratory practice.

➔ The volume of substances should be reduced to the minimum required for the analysis.

➔ Do not operate the instrument in an explosive atmosphere.

WARNING

Eye damage by detector light

Eye damage may result from directly viewing the UV-light produced by the lamp of the optical system used in this product.

➔ Always turn the lamp of the optical system off before removing it.

WARNING

Electrical shock

Repair work at the module can lead to personal injuries, e.g. shock hazard, when the cover is opened.

➔ Do not remove the cover of the module.

➔ Only certified persons are authorized to carry out repairs inside the module.

WARNING

Personal injury or damage to the product

Agilent is not responsible for any damages caused, in whole or in part, by improper use of the products, unauthorized alterations, adjustments or modifications to the products, failure to comply with procedures in Agilent product user guides, or use of the products in violation of applicable laws, rules or regulations.

➔ Use your Agilent products only in the manner described in the Agilent product user guides.

CAUTION

Safety standards for external equipment

➔ If you connect external equipment to the instrument, make sure that you only use accessory units tested and approved according to the safety standards appropriate for the type of external equipment.

Overview of Maintenance

The following pages describe maintenance (simple repairs) of the detector that can be carried out without opening the main cover.

Table 19 Overview of Maintenance

Procedure	Typical Frequency	Notes
Cleaning of module	If required.	
Deuterium lamp or tungsten lamp exchange	If noise and/or drift exceeds your application limits or lamp does not ignite.	An intensity test should be performed after replacement.
Flow cell exchange	If application requires a different flow cell type.	A holmium or wavelength calibration test should be performed after replacement.
Flow cell parts Cleaning or exchange	If leaking or if intensity drops due to contaminated flow cell windows.	A pressure tightness test should be done after repair.
Holmium oxide filter Cleaning or exchange	If contaminated.	A holmium or wavelength calibration test should be performed after replacement.
Leak sensor drying	If leak has occurred.	Check for leaks.
Leak handling System replacement	If broken or corroded.	Check for leaks.

Cleaning the Module

The module case should be kept clean. Cleaning should be done with a soft cloth slightly dampened with water or a solution of water and mild detergent. Do not use an excessively damp cloth allowing liquid to drip into the module.

WARNING

Liquid dripping into the electronic compartment of your module can cause shock hazard and damage the module

➔ Do not use an excessively damp cloth during cleaning.

➔ Drain all solvent lines before opening any connections in the flow path.

Exchanging a Lamp

When If noise or drift exceeds application limits or lamp does not ignite

Tools required

Description
Screwdriver, Pozidriv #1 PT3

Parts required

#	p/n	Description
1	2140-0820	Longlife Deuterium lamp “C“ (with black cover and RFID tag)
1	G1103-60001	Tungsten lamp

Preparations Turn the lamp(s) off.

WARNING

Eye damage by detector light

Eye damage may result from directly viewing the light produced by the deuterium lamp used in this product.

➔ Always turn the deuterium lamp off before removing it.

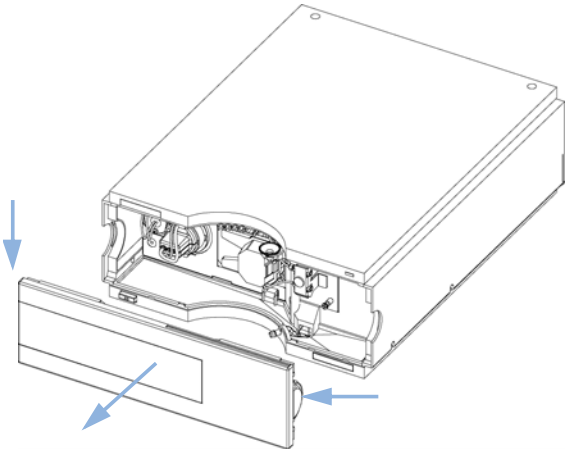
WARNING

Injury by touching hot lamp

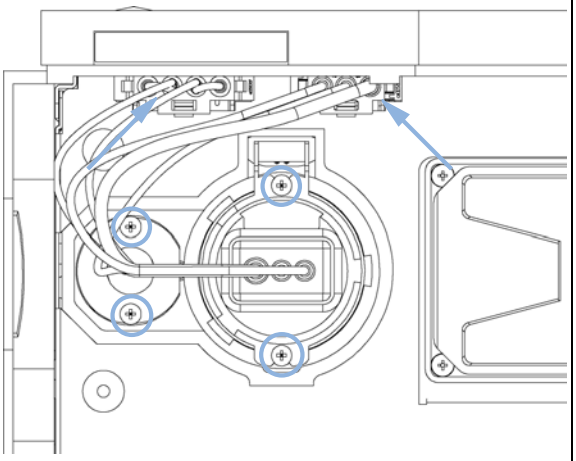
If the detector has been in use, the lamp may be hot.

➔ If so, wait for lamp to cool down.

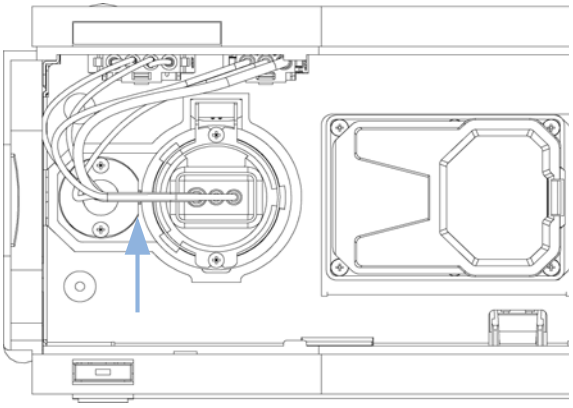
1 Press the release buttons and remove the front cover to gain access to the flow cell area.



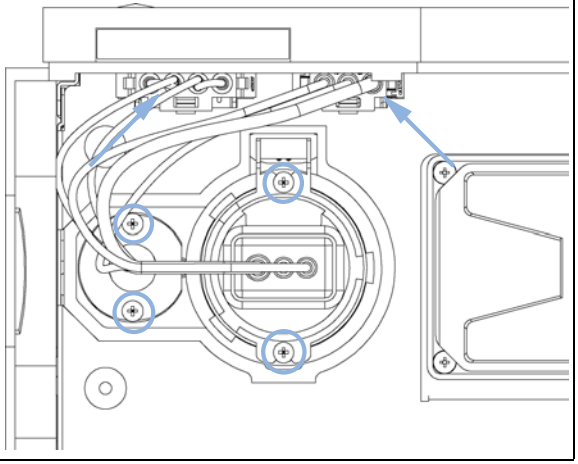
2 Disconnect lamp from the connector, unscrew the Vis-lamp (left) and/or UV-lamp (right) and remove the lamp. Do not touch the glass bulb with your fingers.



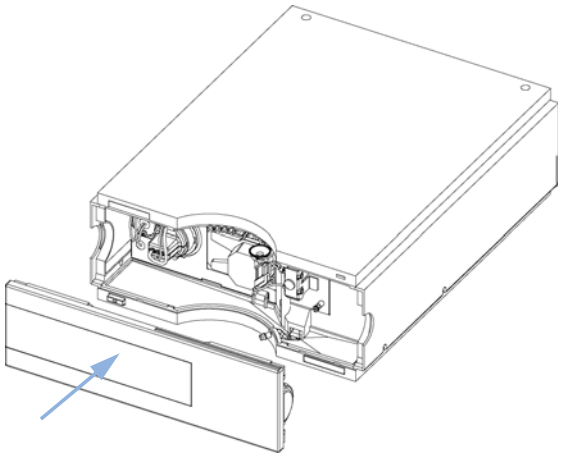
3 When replacing the Vis-lamp, assure that the Vis-lamp is inserted as shown (flat edge towards the deuterium lamp).



4 Insert the lamp. Fix the screws and reconnect the lamp to connector.



5 Replace the front cover.



Next Steps:

6 Reset the lamp counter as described in the user interface documentation (lamps with I.D. tag cannot be reset).

7 Turn the lamp on and give the lamp 10 minutes to warm up.

8 Perform a "Wavelength Verification and Calibration" on page 160 or a "Holmium Oxide Test" on page 151 to check the correct positioning of the UV-lamp.

9 Perform an "Intensity Test" on page 148.

Exchanging a Flow Cell

For bio-inert modules use bio-inert parts only!

When

If an application needs a different type of flow cell or the flow cell needs repair.

Tools required

	p/n	Description
		Wrench, 1/4 inch for capillary connections
OR	5043-0915	Fitting mounting tool for bio-inert capillaries

Parts required

#	p/n	Description
1	G1315-60022	Standard flow cell, 10 mm, 13 µL, 120 bar (12 MPa)
1	G1315-60025	Semi-micro flow cell, 6 mm, 5 µL, 120 bar (12 MPa)
1	G1315-60024	Micro flow cell, 3 mm, 2 µL, 120 bar (12 MPa)
1	G1315-60015	High pressure flow cell, 6 mm, 1.7 µL, 400 bar (40 MPa)
1		Nano flow cell, refer to "Nano Flow Cell - Replacing or Cleaning" on page 192
1	G5615-60022	Standard flow cell bio-inert, 10 mm, 13 µL, 120 bar (12 MPa) for MWD/DAD, includes Capillary Kit Flow Cells BIO (p/n G5615-68755)

Preparations

Turn the lamp(s) off.

Remove the front cover.

CAUTION

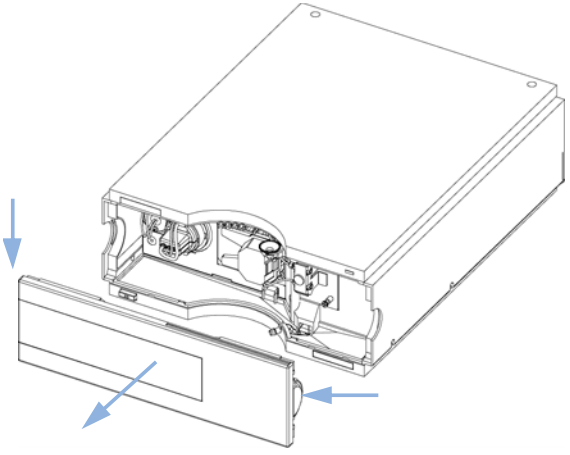
Sample degradation and contamination of the instrument

Metal parts in the flow path can interact with the bio-molecules in the sample leading to sample degradation and contamination.

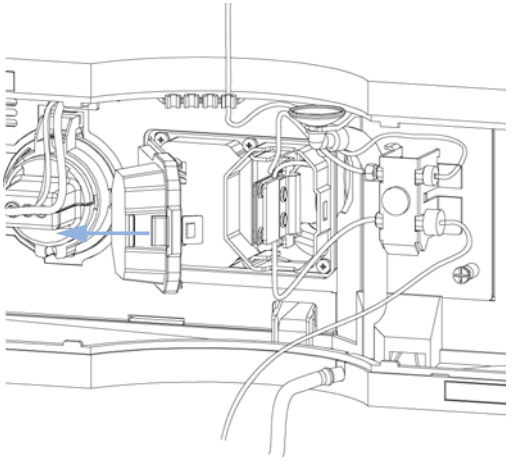
➔ For bio-inert applications, always use dedicated bio-inert parts, which can be identified by the bio-inert symbol or other markers described in this manual.

➔ Do not mix bio-inert and non-inert modules or parts in a bio-inert system.

1 Press the release buttons and remove the front cover to gain access to the flow cell area.



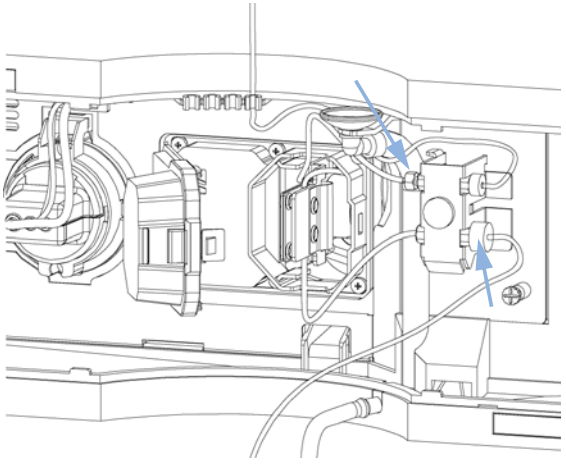
2 Open the flow cell cover.



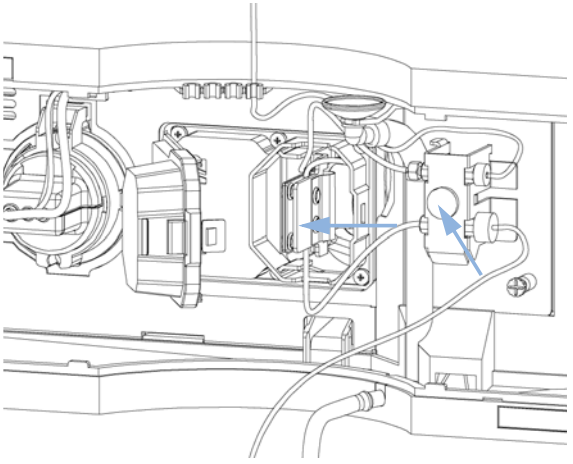
NOTE

Depending on the system setup, the inlet capillary might be routed directly from the module above or below to the cell and not to the capillary holder.

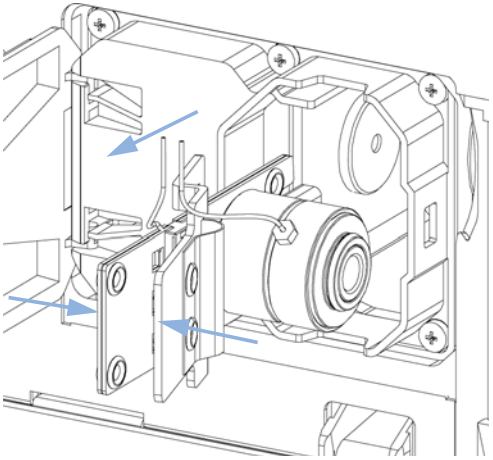
3 Disconnect the flow cell inlet capillary (top) and the waste tubing (bottom) from the unions.



4 Loosen the thumb screw and remove the flow cell outlet capillary (bottom) with the union.



5 Remove the flow cell while pressing the flow cell holder.

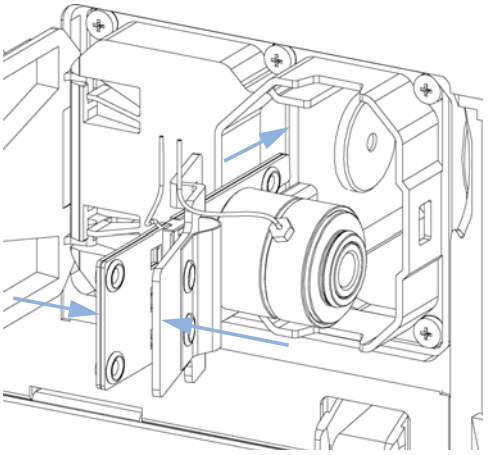


NOTE

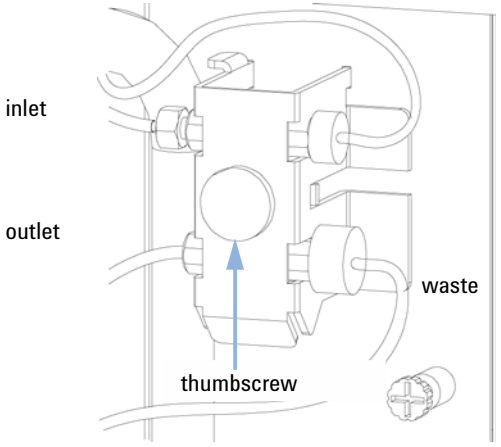
The label attached to the flow cell provides information on part number, path length, volume and maximum pressure.

If you want to replace flow cell parts, "Maintenance of Standard, Semi-Micro or Micro Flow Cell" on page 176 or "Maintenance of High Pressure Flow Cell" on page 180.

6 Insert the flow cell while pressing the flow cell holder.



7 Insert the flow cell capillaries into the union holder (top is inlet, bottom is outlet). Tighten the thumb screw and Reconnect the waste tubing (bottom) to the union.



NOTE

To check for leaks, establish a flow and observe the flow cell (outside of the cell compartment) and all capillary connections.

Next Steps:

8 Perform a "Wavelength Verification and Calibration" on page 160 or a "Holmium Oxide Test" on page 151 to check the correct positioning of the flow cell.

9 Replace the front cover.

Maintenance of Standard, Semi-Micro or Micro Flow Cell

For bio-inert modules use bio-inert parts only!

When If the flow cell needs repair due to leaks or contaminations (reduced light throughput)

Tools required	**p/n**	**Description**
		Wrench, 1/4 inch for capillary connections
OR	5043-0915	Fitting mounting tool for bio-inert capillaries
		Hexagonal key, 4 mm (supplied in HPLC Tool-Kit)
		Toothpick

Parts required	**Description**
	For parts, see "Standard Flow Cell" on page 208, "Semi-Micro Flow Cell Parts" on page 212, "Micro Flow Cell" on page 214.

Preparations

Turn the flow off.

Remove the front cover.

Remove the flow cell, see "Exchanging a Flow Cell" on page 172.

NOTE The gaskets used in the standard and semi-micro/micro flow cell are different.

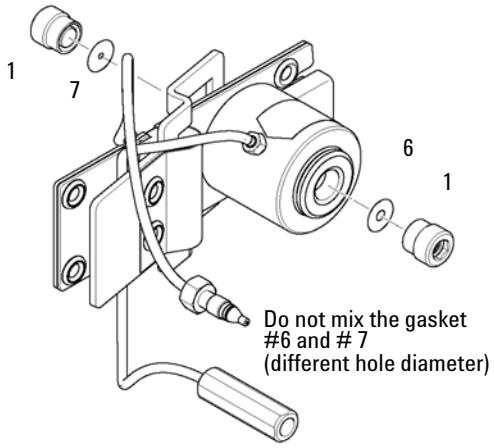
CAUTION Sample degradation and contamination of the instrument

Metal parts in the flow path can interact with the bio-molecules in the sample leading to sample degradation and contamination.

➔ For bio-inert applications, always use dedicated bio-inert parts, which can be identified by the bio-inert symbol or other markers described in this manual.

➔ Do not mix bio-inert and non-inert modules or parts in a bio-inert system.

1 Use a 4 mm hex key to unscrew the window assembly [1] and remove the gasket [2] from the cell body.



NOTE

Carefully take one of the gaskets (#6 back or # 7 front) and insert it into the cell body.

Do not mix the gasket #6 and # 7.

Gasket # 7 has the smaller hole and must be on the light entrance side.

Verify that the gasket is positioned flat on the bottom and the light path is not blocked.

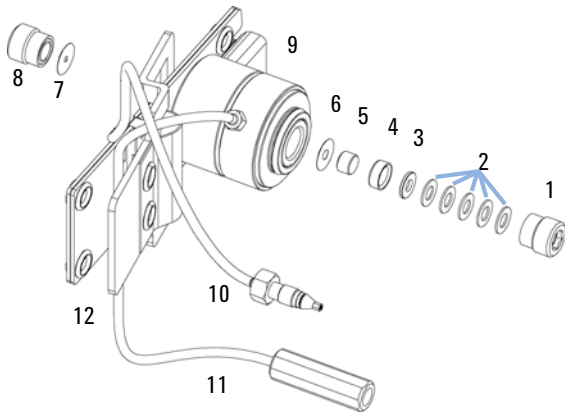
If you removed all individual parts from the window assembly refer to the figures in "Standard Flow Cell" on page 208 for the correct orientation of the parts.

2 Use a tooth pick to remove the quartz window from the window assembly.

NOTE

If the washers fall out of the window assembly, they must be inserted in the correct order with the PTFE ring to prevent any leaks from the flow cell window.

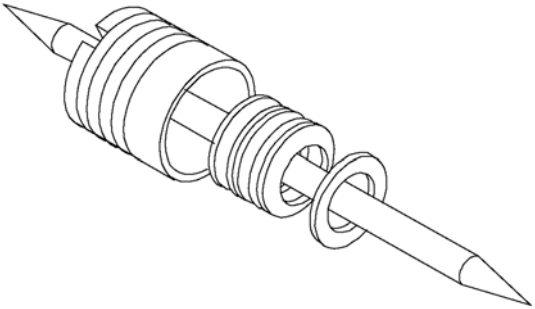
3 Orientation of Flow Cell Parts ("Standard Flow Cell" on page 208)



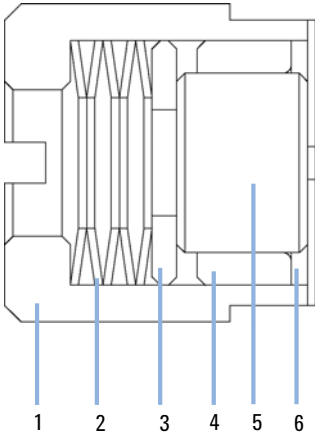
NOTE

Gaskets # 6 and #7 have different hole diameters.

4 Assemble the washers and the window assembly in correct order.

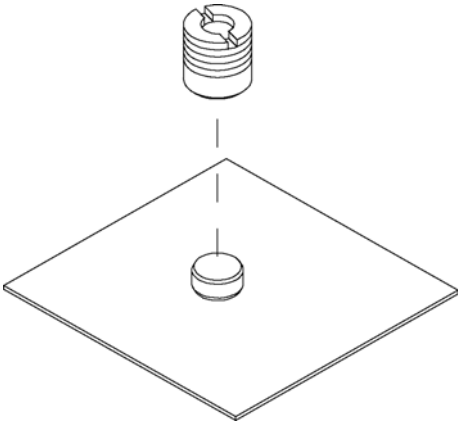


5 Correct orientation of spring washers [2] is required.

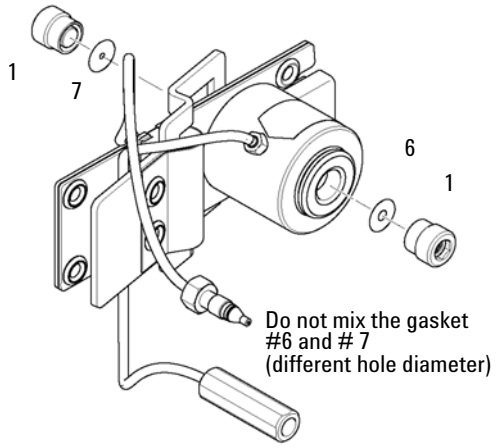


6 Press the PTFE ring into the window assembly.

7 Press the window assembly onto the new or cleaned quartz window.



8 Insert the window assembly [1] into the cell body.



Next Steps:

9 Using a 4-mm hex key, tighten the window screw hand tight plus a quarter turn.

10 Reconnect the capillaries, see "Exchanging a Flow Cell" on page 172.

11 Perform a leak test.

12 Insert the flow cell.

13 Replace the front cover

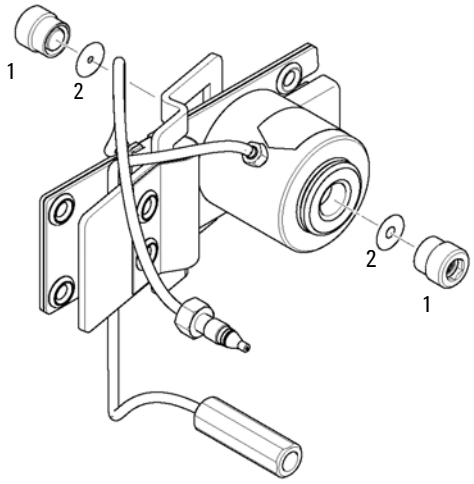
14 Perform a "Wavelength Verification and Calibration" on page 160 or a "Holmium Oxide Test" on page 151 to check the correct positioning of the flow cell.

Maintenance of High Pressure Flow Cell

When	If the flow cell needs repair due to leaks or contaminations (reduced light throughput)
Tools required	**Description** 1/4 inch wrench for capillary connections hexagonal key 4 mm Tooth picks
Parts required	**Description** For parts see "High Pressure Flow Cell" on page 224
Preparations	• Turn the flow off. • Remove the front cover. • Remove the flow cell, see "Exchanging a Flow Cell" on page 172.

NOTE All descriptions in this procedure are based on the default orientation of the cell (as it is manufactured). The heat exchanger/capillary and the cell body can be fixed mirror symmetrically to have both capillaries routed to the bottom or to the top (depending on the routing of the capillaries to the column).

1 Use a 4 mm hex key to unscrew the window assembly [1] and remove the gasket [2] from the cell body.

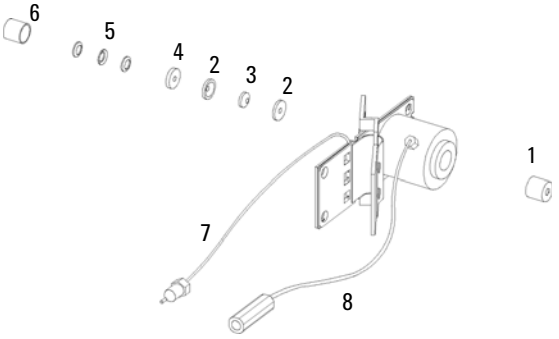


If you want to replace the gasket only, continue with step 8, "Maintenance of Standard, Semi-Micro or Micro Flow Cell" on page 176.

2 Use a tooth pick to remove the quartz window from the window assembly.

NOTE

If the washers fall out of the window assembly, they must be inserted in the correct order with the PTFE ring to prevent any leaks from the flow cell window.



3 Follow the procedure "Maintenance of Standard, Semi-Micro or Micro Flow Cell" on page 176 for reassembling.

Replacing Capillaries on a Standard Flow Cell

For bio-inert modules use bio-inert parts only!

When If the capillary is blocked

Tools required	**p/n**	**Description**
		Wrench, 1/4 inch for capillary connections
OR	5043-0915	Fitting mounting tool for bio-inert capillaries
		Wrench, 4 mm (for capillary connections)
		Screwdriver, Pozidriv #1 PT3

Parts required	**Description**
	For parts see "Standard Flow Cell" on page 208.

Preparations

Turn the lamp(s) off.

Remove the front cover.

Remove the flow cell, see "Exchanging a Flow Cell" on page 172.

NOTE All descriptions in this procedure are based on the default orientation of the cell (as it is manufactured). The heat exchanger/capillary and the cell body can be fixed mirror symmetrically to have both capillaries routed to the bottom or to the top (depending on the routing of the capillaries to the column).

NOTE The fittings at the flow cell body are special types for low dead volumes and not compatible with other fittings.

When retightening the fittings, make sure that they are carefully tightened (handtight plus 1/4 turn with a wrench). Otherwise damage of the flow cell body or blockage may result.

CAUTION

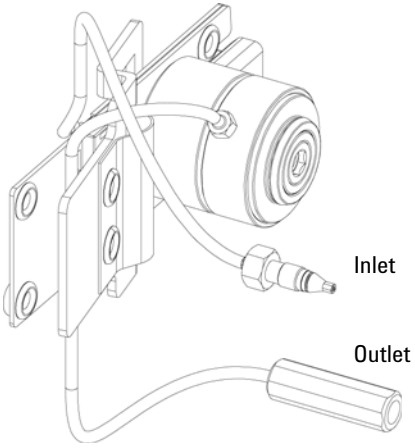
Sample degradation and contamination of the instrument

Metal parts in the flow path can interact with the bio-molecules in the sample leading to sample degradation and contamination.

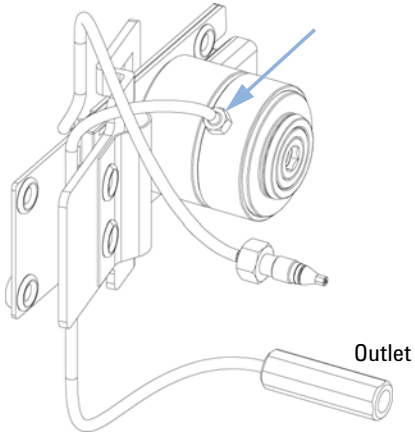
➔ For bio-inert applications, always use dedicated bio-inert parts, which can be identified by the bio-inert symbol or other markers described in this manual.

➔ Do not mix bio-inert and non-inert modules or parts in a bio-inert system.

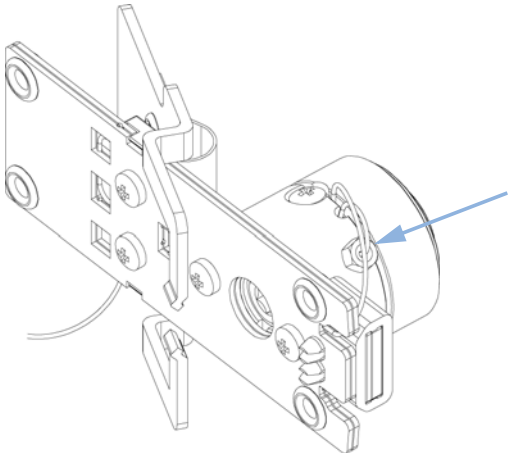
1 Identify the inlet and outlet capillaries. To replace the inlet capillary, continue with step *"To replace the inlet capillary, use a 4-mm wrench for the fitting."*



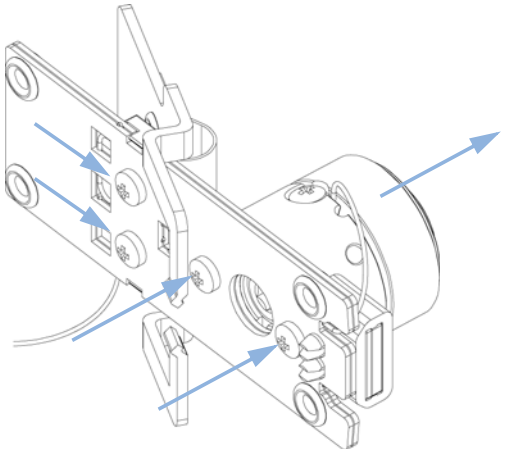
2 After replacing the outlet capillary, fix it handtight first. Then do a 1/4 turn with a 4-mm wrench.



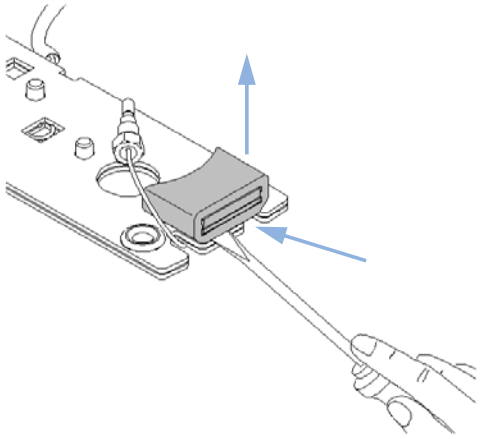
3 To replace the inlet capillary, use a 4-mm wrench for the fitting.



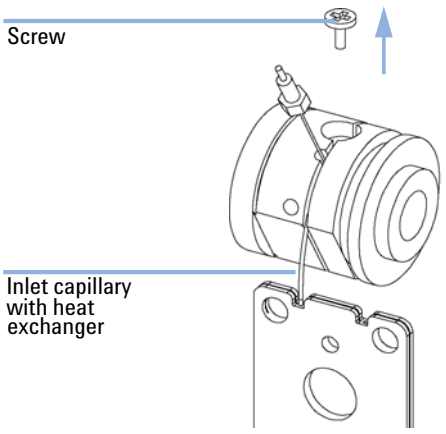
4 Unscrew the cell body from the heat exchanger and the heat exchanger from the clamp unit.



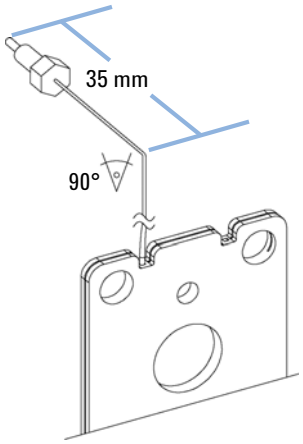
5 Use a small flat screw driver to carefully lift off the I.D. tag. Shown is the default orientation. See Note at the beginning of this section.



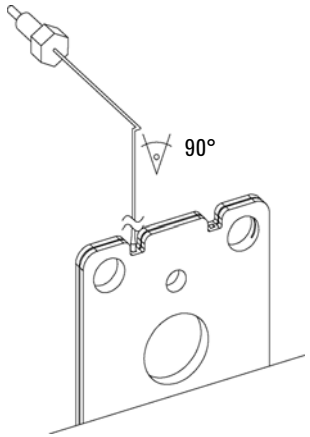
6 Unscrew the fixing screw and unwrap the inlet capillary from the grove in the flow cell body.



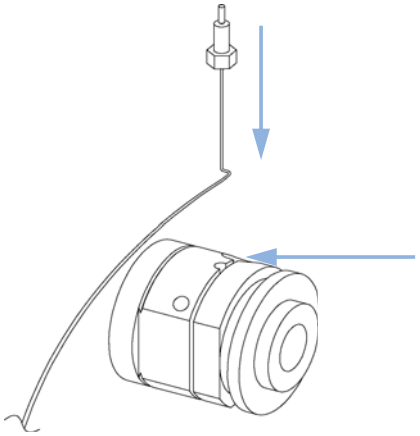
7 Take the new inlet capillary and bend it 90° about 35 mm from its end.



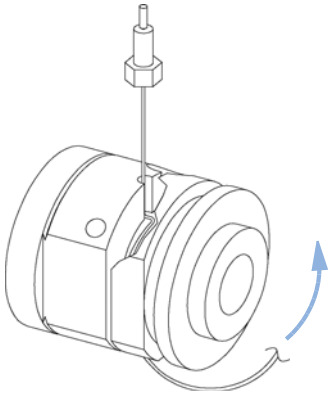
8 Bend the capillary again by 90° as shown below.



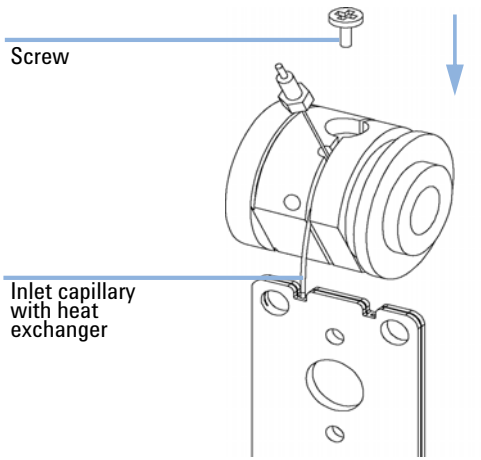
9 Insert the capillary into the hole between fixing screw and the inlet fitting.



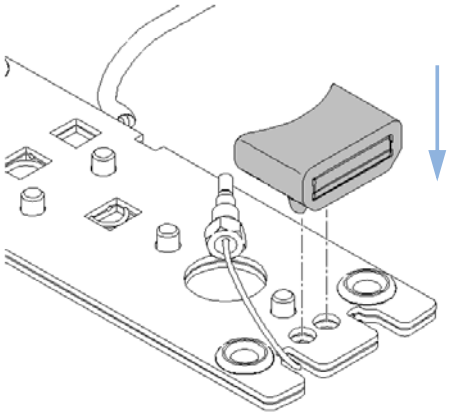
10 The capillary lays in the grove and should be tied around the body (in the grove) 5 times.



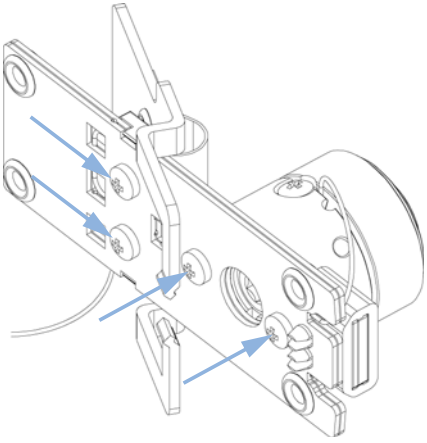
11 Insert the fixing screw, so that the capillary cannot leave the grove.



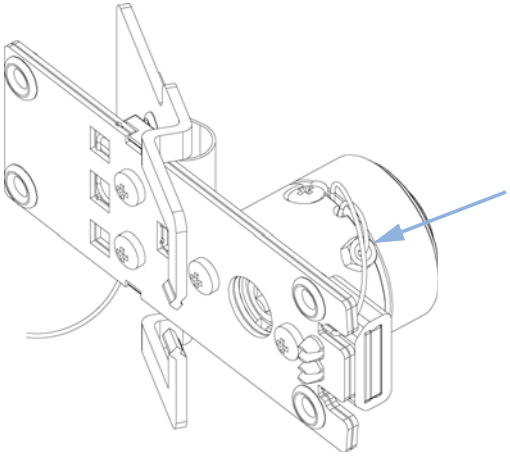
12 Carefully insert the I.D. tag into the new heat exchanger. Shown is the default orientation. See Note at the beginning of this section.



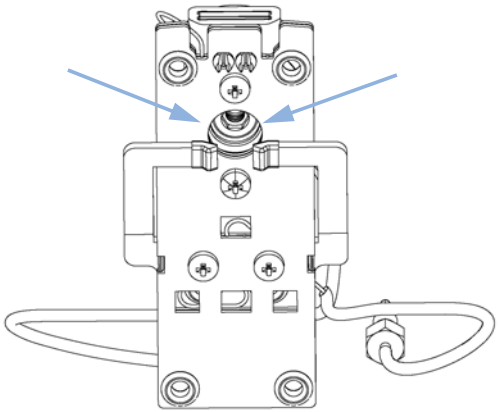
13 Fix the heat exchanger to the clamp unit and the flow cell body to the heat exchanger.



14 Fix the inlet capillary to the flow cell body handtight first. Then do a 1/4 turn with a 4-mm wrench.



15 Check for a centered holder vs. hole. If required adjust with the holder screws.



Next Steps:

16 Reconnect the capillaries, see "Exchanging a Flow Cell" on page 172.

17 Perform a leak test.

18 Insert the flow cell.

19 Replace the front cover.

20 Perform a "Wavelength Verification and Calibration" on page 160 or a "Holmium Oxide Test" on page 151 to check the correct positioning of the flow cell.

Replacing Capillaries on a Semi-Micro and Micro Flow Cell

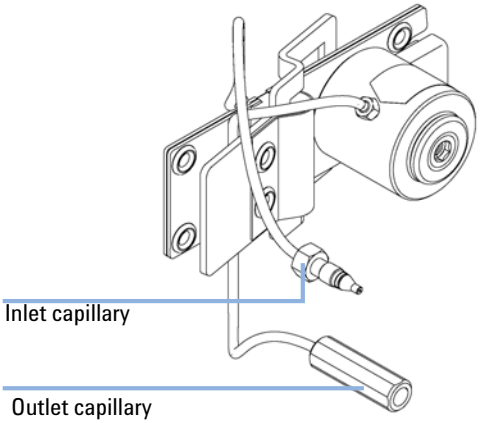
When	If the capillary is blocked
Tools required	**Description** Wrench, 1/4 inch for capillary connections Wrench, 4 mm (for capillary connections) Screwdriver, Pozidriv #1 PT3
Parts required	**Description** For parts see "Semi-Micro Flow Cell Parts" on page 212 or "Micro Flow Cell" on page 214.
Preparations	Turn the lamp(s) off. Remove the front cover. Remove the flow cell, "Exchanging a Flow Cell" on page 172.

NOTE All descriptions in this procedure are based on the default orientation of the cell (as it is manufactured). The heat exchanger/capillary and the cell body can be fixed mirror symmetrically to have both capillaries routed to the bottom or to the top (depending on the routing of the capillaries to the column).

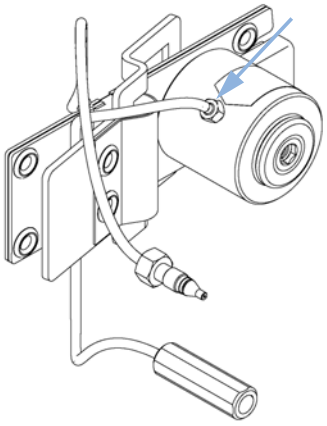
NOTE The fittings at the flow cell body are special types for low dead volumes and not compatible with other fittings.

When retightening the fittings, make sure that they are carefully tightened (handtight plus 1/4 turn with a wrench). Otherwise damage of the flow cell body or blockage may result.

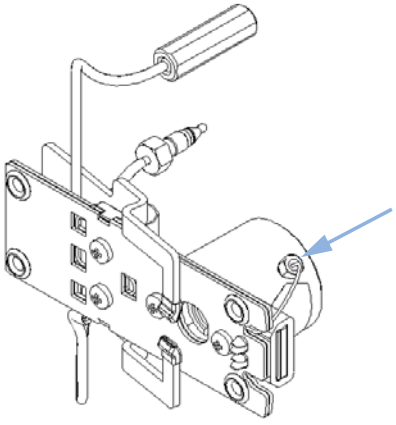
1 Identify the inlet and outlet capillaries.



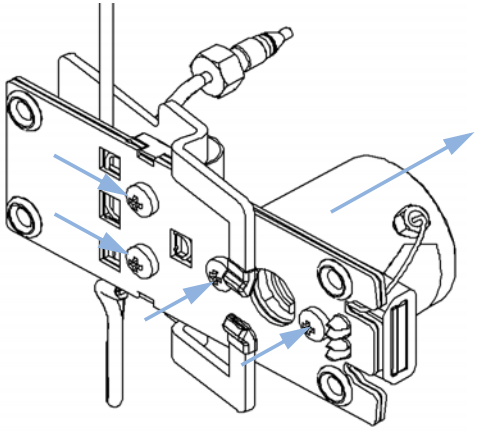
2 After replacing the outlet capillary, fix it handtight first. Then do a 1/4 turn with a 4-mm wrench.



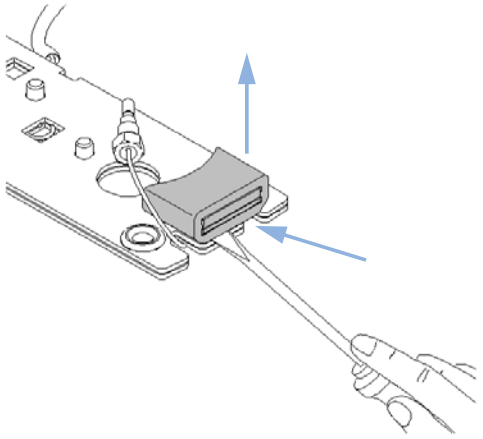
3 To replace the inlet capillary, use a 4-mm wrench for the fitting.



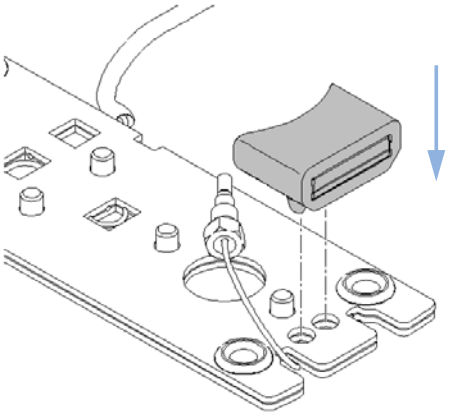
4 Unscrew the cell body from the heat exchanger and the heat exchanger from the clamp unit.



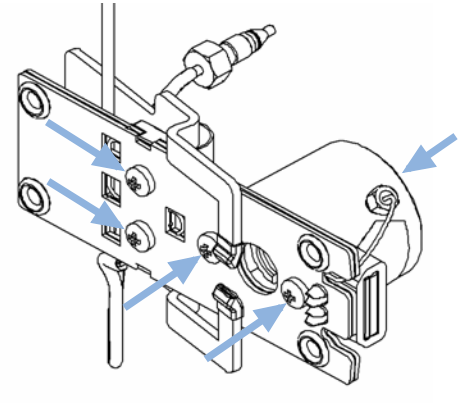
5 Use a small flat screw driver to carefully lift off the I.D. tag. Shown is the default orientation. See Note at the beginning of this section.



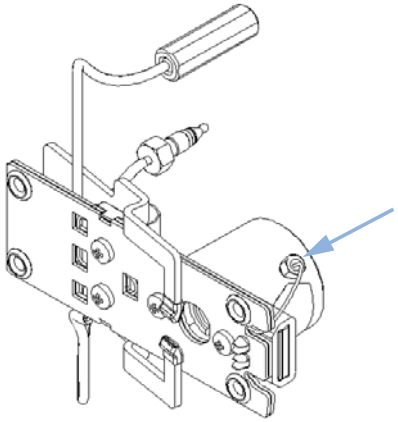
6 Carefully insert the I.D. tag into the new heat exchanger. Shown is the default orientation. See Note at the beginning of this section.



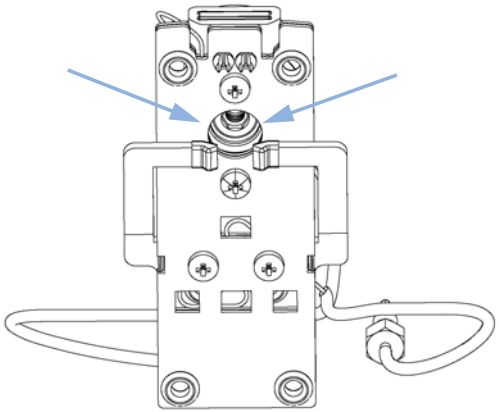
7 Fix the new heat exchanger to the clamp unit and the heat exchanger to the cell body.



8 Fix the inlet capillary to the flow cell body handtight first. Then do a 1/4 turn with a 4-mm wrench.



9 Check for a centered holder vs. hole. If required adjust with the holder screws.



Next Steps:

10 Reconnect the capillaries, see "Exchanging a Flow Cell" on page 172.

11 Perform a leak test.

12 Insert the flow cell.

13 Replace the front cover.

14 Perform a "Wavelength Verification and Calibration" on page 160 or a "Holmium Oxide Test" on page 151 to check the correct positioning of the flow cell.

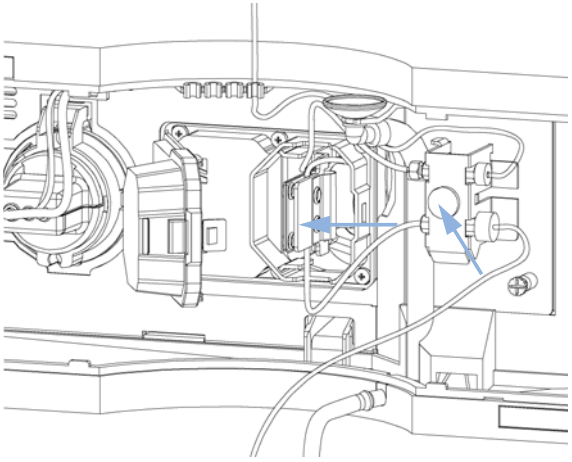
Nano Flow Cell - Replacing or Cleaning

When	If parts are contaminated or leaky.
Tools required	**Description** Screwdriver, Pozidriv #1 PT3 Wrench, 1/4 inch for capillary connections
Parts required	**Description** For parts identification refer to "Nano Flow Cells" on page 220 (80 nL and 500 nL).
Preparations	Turn the lamp(s) off. Remove the front cover. Remove the flow cell, see "Exchanging a Flow Cell" on page 172.

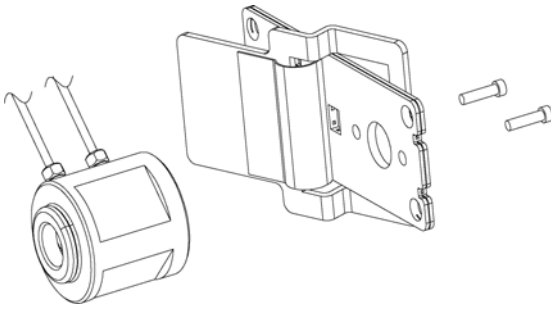
NOTE For details refer to the technical note that comes with the nano-flow cell kit.

NOTE The quartz block can be cleaned with alcohol. DO NOT touch the inlet and outlet windows at the quartz block.

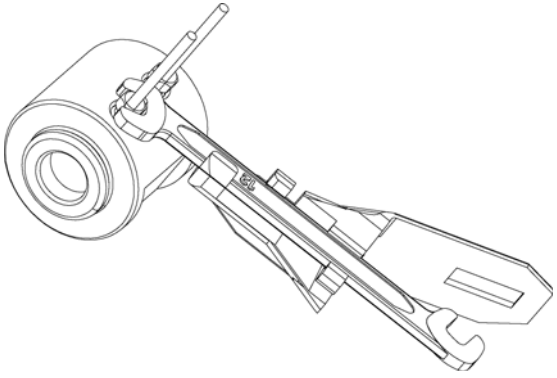
1 Disconnect the capillaries from the capillary holder and remove the flow cell.



2 Unscrew the cell body from the holder.

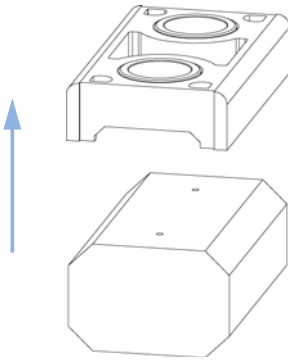


3 Unscrew the capillaries from the flow cell. DO NOT use the adapter at this time!

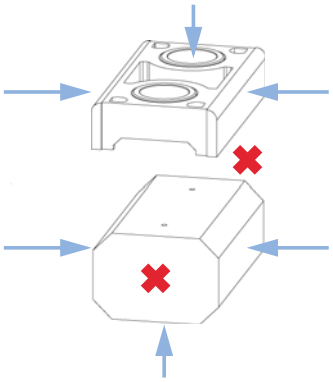


4 Using for example a toothpick, press on the plastic part and slide the quartz body out of the cell housing.

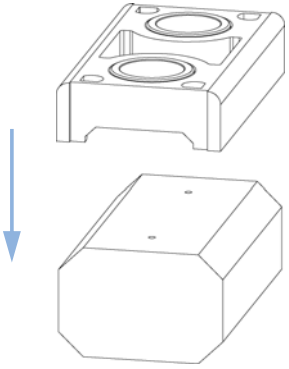
5 The quartz body and the cell seal assembly can be separated for cleaning purpose.



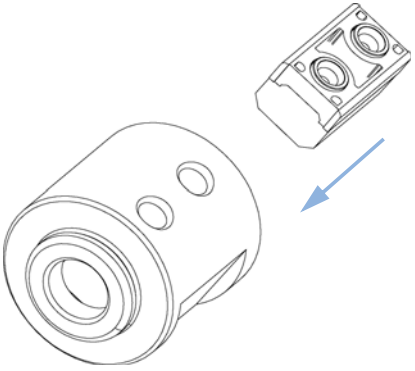
6 This figure shows the correct holding of the quartz body and the cell seal assembly.



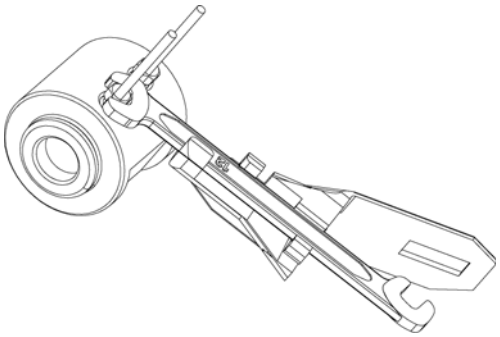
7 Replace the cell seal assembly onto the quartz body. Always use a new seal assembly to exclude damage during disassembling.



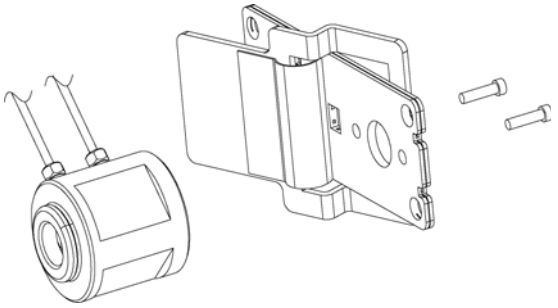
8 Slide the quartz body completely into the cell body to the front stop (use for example a toothpick).



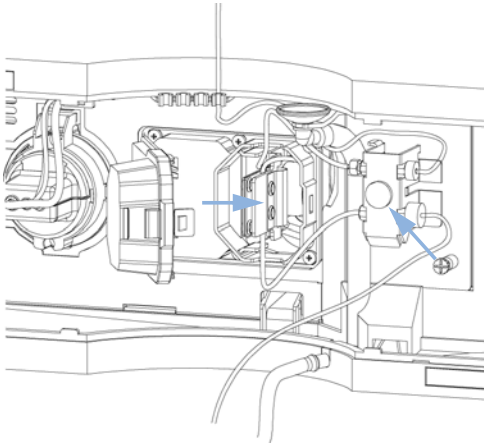
9 Insert the flow cell capillaries and tighten them fingertight. Use the wrench and torque adapter as described on Figure 60 on page 196 and tighten the fittings alternately.



10 Reassemble the flow cell body to the holder.



11 Re-install the flow cell and connect the capillaries to the union holder.



Next Steps:

12 Perform a leak test with the flow cell outside of the detector.

13 If no leak is observed, install the flow cell and you are ready to work.

14 Make sure that the flow cell assembly is inserted correctly and fits perfectly in the optical unit (especially when PEEK capillaries are used).

NOTE The cell body can be fitted in two positions to allow the capillaries routed upwards or downwards (depending on where the column is located). Route the capillaries directly column (inlet) and waste assembly (outlet).

NOTE With the instrument accessory kit comes a 4-mm wrench and with the Sealing Kit a special adapter. Both together work as a torque wrench with pre-defined torque (maximum allowed torque for the cell fittings is 0.7 Nm). It can be used to tight the capillary fittings at the flow cell body. The wrench has to be plugged into the adapter as shown in Figure 60 on page 196.

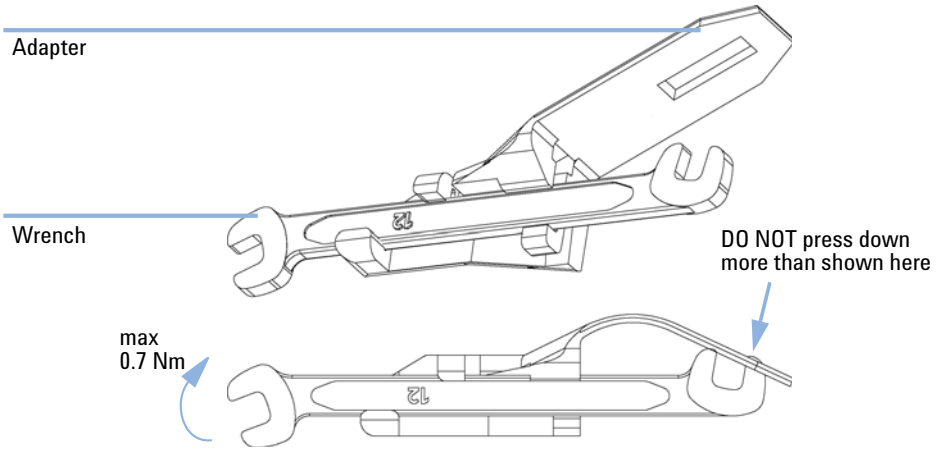


Figure 60 Wrench plus Torque Adapter

Cleaning or Exchanging the Holmium Oxide Filter

When

If holmium oxide filter is contaminated

Tools required

Description
Screwdriver, Pozidriv #1 PT3
Screwdriver, flat blade
Wrench, 1/4 inch for capillary connections
Pair of tweezers

Parts required

#	p/n	Description
1	79880-22711	Holmium oxide filter

Preparations

Turn the lamp(s) off.

Remove the front cover.

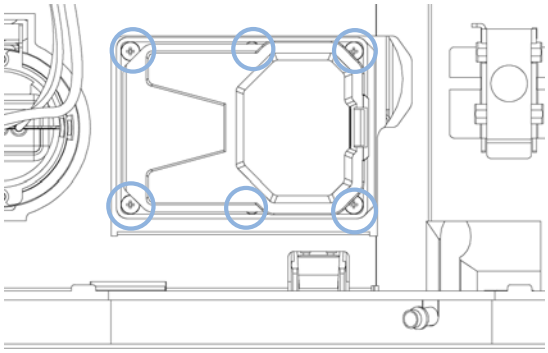
Remove the flow cell, see "Exchanging a Flow Cell" on page 172.

NOTE

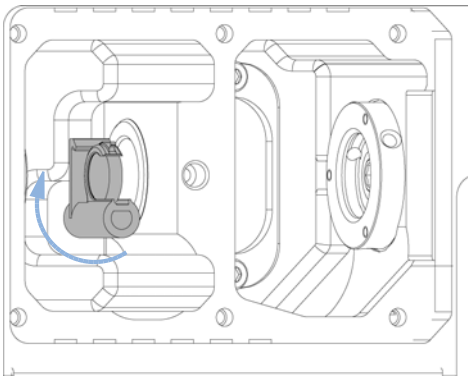
See also "Declaration of Conformity for HOX2 Filter" on page 301.

The glass tends to build a film on its surface even under normal environmental conditions. This is a phenomenon, which can be found also on the surface of several other glasses and has something to do with the composition of the glass. There is no indication, that the film has an influence on the measurement. Even in the case of a thick film, which scatters the light remarkably, no shift of the peak positions is to be expected. A slight change in the absorbance might be possible. Other components within the light path (lenses, windows, ...) are also changing their behavior over the time.

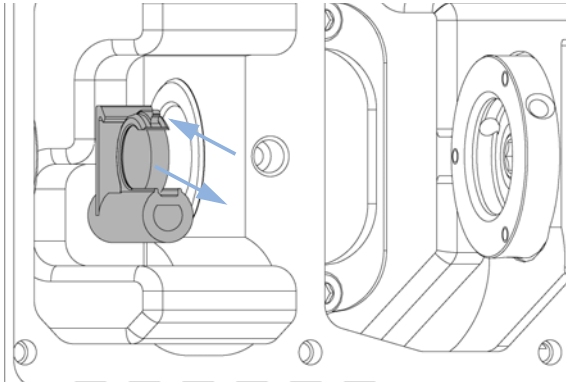
1 Unscrew the six screws and remove the flow cell cover.



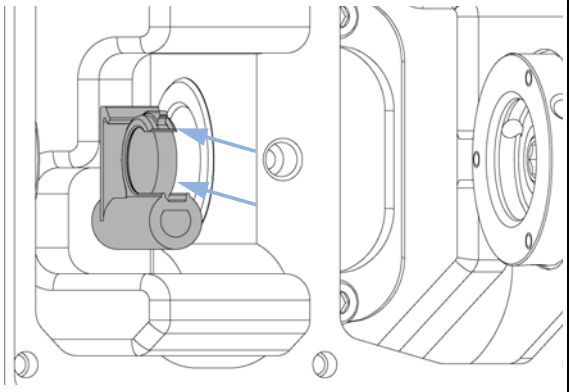
2 If not already in this position, move the filter up.



3 While releasing the holder with a screw driver (at the top), carefully remove the holmium oxide filter.



4 While releasing the holder with a screw driver, carefully insert the holmium oxide filter.

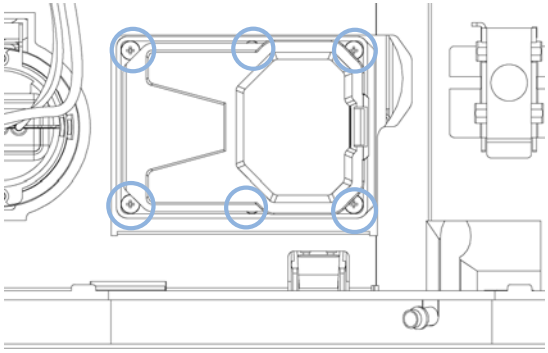


NOTE

Do not scratch the holmium oxide filter.

The holmium oxide filter can be cleaned with alcohol and a lint-free cloth.

5 Replace the flow cell cover and fix the six screws.



Next Steps:

6 Perform a holmium oxide test, see "Holmium Oxide Test" on page 151 to check the proper function of the holmium oxide filter.

7 Insert the flow cell, see "Exchanging a Flow Cell" on page 172.

8 Replace the front cover.

9 Turn on the flow.

Correcting Leaks

When If a leakage has occurred in the flow cell area or at the heat exchanger or at the capillary connections

Tools required

p/n	Description
	Tissue
	Wrench, 1/4 inch for capillary connections
5043-0915	Fitting mounting tool for bio-inert capillaries

Preparations Remove the front cover.

1 Use tissue to dry the leak sensor area and the leak pan.

2 Observe the capillary connections and the flow cell area for leaks and correct, if required.

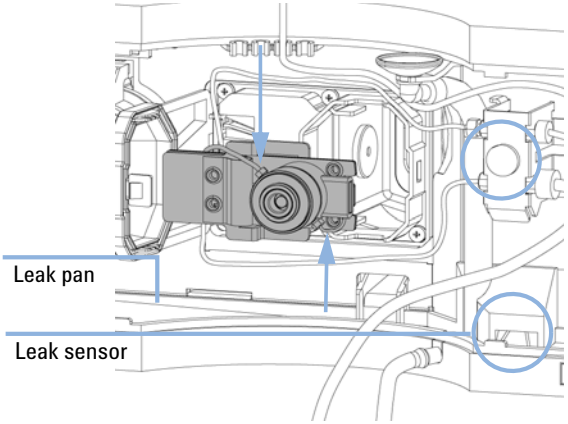


Figure 61 Observing for Leaks

3 Replace the front cover.

Replacing Leak Handling System Parts

When If the parts are corroded or broken

Tools required None

Parts required

#	p/n	Description
1	5041-8388	Leak funnel
1	5041-8389	Leak funnel holder
1	5062-2463	Corrugated tubing, PP, 6.5 mm id, 5 m

Preparations Remove the front cover.

1 Pull the leak funnel out of the leak funnel holder.
2 Pull out the leak funnel with the tubing.
3 Insert the leak funnel with the tubing in its position.
4 Insert the leak funnel into the leak funnel holder.

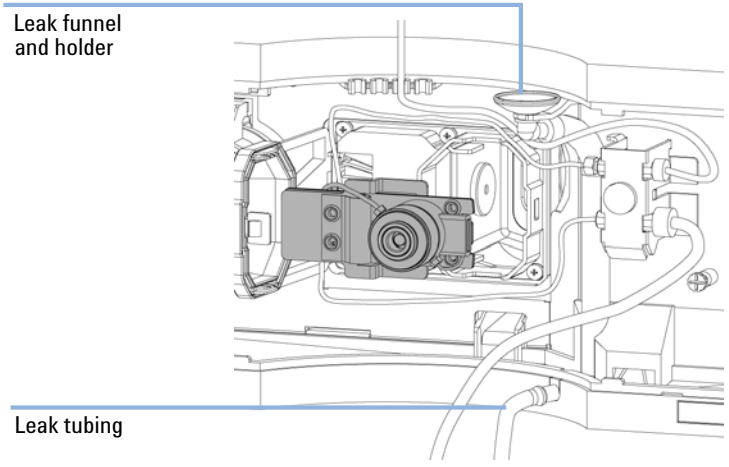


Figure 62 Replacing Leak Handling System Parts

5 Replace the front cover.

Replacing the CompactFlash Card (G1315C/G1365C only)

When	If defective		
Tools required	None		
Parts required	**#**	**p/n**	**Description**
	1	01100-68700	CompactFlash Card Kit
Preparations	Turn the detector OFF and have access to the rear of the detector.		

NOTE The G1315C and G1365C is equipped with a CompactFlash card. This CompactFlash card is required for the operation of the detector (data buffering). DO NOT use other types of CompactFlash cards. Only CompactFlash cards supplied with the detector or as replacement with above part number are tested with the detector.

1 Remove the CompactFlash card by pulling it out of its slot in the rear of the detector.

2 Install the new CompactFlash card into the slot.

3 Turn the detector ON.

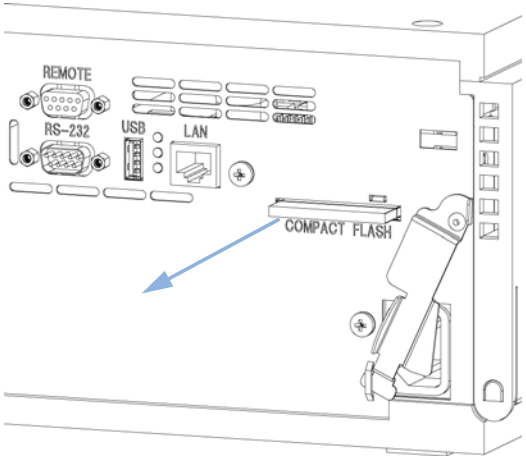


Figure 63 Replacing CompactFlash card

Replacing the Module's Firmware

When

The installation of newer firmware might be necessary
- if a newer version solves problems of older versions or
- to keep all systems on the same (validated) revision.

The installation of older firmware might be necessary
- to keep all systems on the same (validated) revision or
- if a new module with newer firmware is added to a system or
- if third party control software requires a special version.

Tools required

	Description
	LAN/RS-232 Firmware Update Tool
OR	Agilent Lab Advisor software
OR	Instant Pilot G4208A (only if supported by module)

Parts required

#	**Description**
1	Firmware, tools and documentation from Agilent web site

Preparations

Read update documentation provided with the Firmware Update Tool.

To upgrade/downgrade the module's firmware carry out the following steps:

1 Download the required module firmware, the latest LAN/RS-232 FW Update Tool and the documentation from the Agilent web.
   - http://www.chem.agilent.com/_layouts/agilent/downloadFirmware.aspx?whid=69761

2 For loading the firmware into the module follow the instructions in the documentation.

Module Specific Information

Table 20 Module Specific Information (G1315C/D and G1365C/D)

	G1315C DAD VL+ / G1365C MWD	G1315D DAD / G1365D MWD
Initial firmware (main and resident)	B.01.02	B.01.04
Compatibility with 1260/1290 Infinity modules	When using the G1315C/D and G1365C/D in a system, all other modules must have firmware revision A.06.xx or B.06.xx or above (main and resident) from the same revision set (e.g. A.06.30/B.06.30).	
Compatibility with 1100/1200 series modules	When using the G1315C/D and G1365C/D in a system, all other modules must have firmware revision A.06.xx or B.01.02 or above (main and resident). Otherwise the communication will not work.	
Compatibility with VSA Optical	Introduced 08/2012. Firmware B.06.51, B.06.43 or B.06.26 or later (depends on the used firmware set). Earlier revisions are not compatible with the VSA Optical. These revisions are the required versions for the new VSA Optical Unit and Main Boards.	
Conversion to / emulation of G1315B or G1365B	Not possible due to different hardware and electronic platform.	

10
Parts for Maintenance

This chapter provides information on parts for maintenance.

Overview of Maintenance Parts

Item	p/n	Description
1	5065-9982	Plastics kit (includes base, top, left and right sides)
2	G4208-67001	Instant Pilot G4208A (requires firmware B.02.08 or above)
3		Flow cells with ID tag
4	G1315-87311	Capillary ST 0.17 mm x 380 mm S/S
5	5022-6515	Union ZDV
6	G1315-68707	Flow cell door (seal included)
	5022-2112	Screw cover
7	79880-22711	Holmium oxide filter
8	2140-0820	Longlife Deuterium lamp “C“ (with black cover and RFID tag)
9	G1103-60001	Tungsten lamp
10	5041-8388	Leak funnel
11	5041-8389	Leak funnel
12	5041-8387	Tube clip
13	5062-2463	Corrugated tubing, PP, 6.5 mm id, 5 m
14	5062-2462	Tube PTFE 0.8 mm x 2 m, re-order 5 m
	5181-1516	CAN cable, Agilent module to module, 0.5 m
	5181-1519	CAN cable, Agilent module to module, 1 m
	G1369C or G1369-60012	Interface board (LAN)
	5023-0203	Cross-over network cable, shielded, 3 m (for point to point connection)
	5023-0202	Twisted pair network cable, shielded, 7 m (for point to point connection)
	01046-60105	Analog cable (BNC to general purpose, spade lugs)
	G1351-68701	Interface board (BCD) with external contacts and BCD outputs
	01100-68700	CompactFlash Card Kit

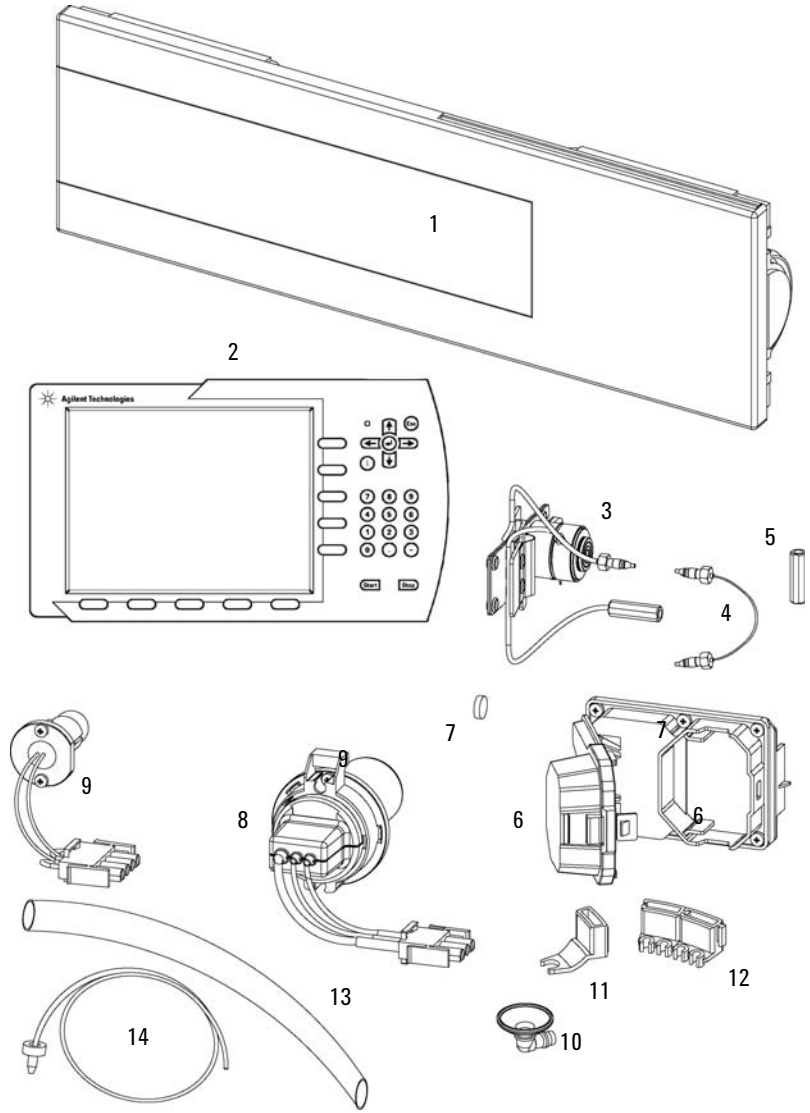


Figure 64 Maintenance Parts

Standard Flow Cell

Item	p/n	Description
	G1315-60022	Standard flow cell, 10 mm, 13 µL, 120 bar (12 MPa)
1	79883-22402	Window screw
2	5062-8553	Washer kit (10/pk)
3	79883-28801	Compression washer
4	79883-22301	Window holder
5	1000-0488	Quartz window
6	G1315-68711	Gasket BACK (PTFE), 2.3 mm hole, outlet side (12/pk)
7	G1315-68710	Gasket FRONT (PTFE), 1.3 mm hole, inlet side (12/pk)
8		Window assembly (comprises window screw, spring washers, compression washer, window holder and quartz window)
	G1315-87331	Capillary IN (0.17 mm, 590 mm lg) including heat exchanger
10	G1315-87302	Capillary OUT (0.17 mm, 200 mm lg)
11	G1315-84910	Clamp unit
	0515-1056	Screw M 2.5, 4 mm lg for cell body/clamp
	5022-2184	Union ZDV
	G1315-68712	Cell repair kit STD includes window screw kit, 4 mm hexagonal wrench and seal kit
	79883-68703	Window screw kit, includes 2 quartz windows, 2 compression washers, 2 window holders, 2 window screws and 10 washers

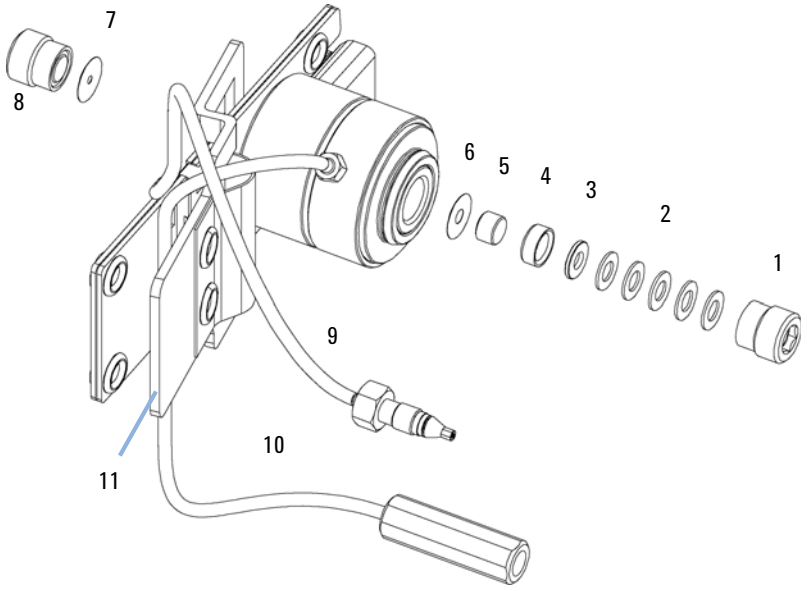


Figure 65 Standard Flow Cell Parts

NOTE Gaskets # 6 and #7 have different hole diameters.

1 - window screw
2 - spring washers
3 - compression washer
4 - window holder
5 - quartz window
6 - Gasket

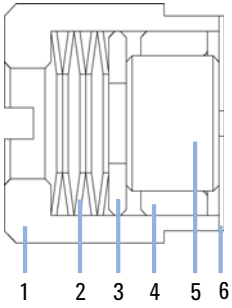


Figure 66 Orientation of Spring Washers

Standard Flow Cell Bio-inert

Item	p/n	Description
	G5615-60022	Standard flow cell bio-inert, 10 mm, 13 µL, 120 bar (12 MPa) for MWD/DAD, includes Capillary Kit Flow Cells BIO (p/n G5615-68755)
	G5615-68755	Capillary Kit Flow Cells BIO includes Capillary PK 0.18 mm x 1.5 m and PEEK Fittings 10/PK (p/n 5063-6591)
1	79883-22402	Window screw
2	5062-8553	Washer kit (10/pk)
3	79883-28801	Compression washer
4	79883-22301	Window holder
5	5190-0921	Sapphire window
6	G1315-68711	Gasket BACK (PTFE), 2.3 mm hole, outlet side (12/pk)
7	G1315-68710	Gasket FRONT (PTFE), 1.3 mm hole, inlet side (12/pk)
8		Window assembly (comprises window screw, spring washers, compression washer, window holder and quartz window)
9	G5615-87331	Capillary In (0.17 mm, 590 mm lg), including heat exchanger)
10	G5615-87302	Capillary Out (0.17 mm, 200 mm lg)
11	G1315-84910	Clamp unit
	0515-1056	Screw M 2.5, 4 mm lg for cell body/clamp
	5022-2184	Union ZDV
	G1315-68712	Cell repair kit STD includes window screw kit, 4 mm hexagonal wrench and seal kit
	G5615-68703	Window screw kit bio-inert, includes 2 sapphire windows, 2 compression washers, 2 window holders, 2 window screws and 10 spring washers
	5067-5695	UHP-FF Fitting

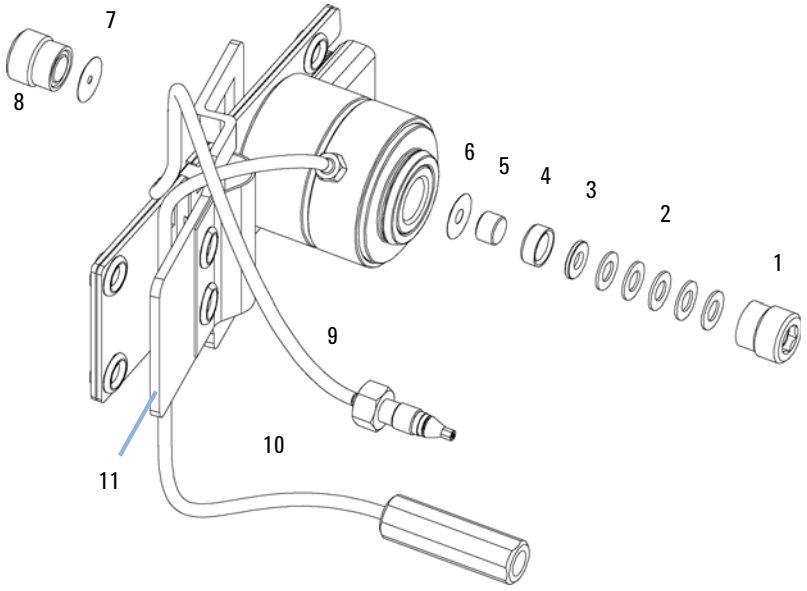


Figure 67 Standard Flow Cell Bio-inert

1 - window screw
2 - spring washers
3 - compression washer
4 - window holder
5 - quartz window
6 - Gasket

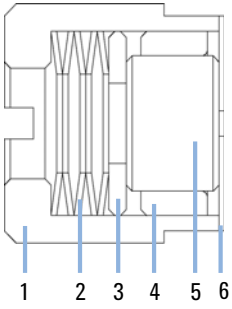


Figure 68 Orientation of Spring Washers

Semi-Micro Flow Cell Parts

Item	p/n	Description
	G1315-60025	Semi-micro flow cell, 6 mm, 5 µL, 120 bar (12 MPa)
1	79883-22402	Window screw
2	5062-8553	Washer kit (10/pk)
3	79883-28801	Compression washer
4	79883-22301	Window holder
5	1000-0488	Quartz window
6	79883-68702	Gasket BACK (PTFE), 1.8 mm hole, outlet side (12/pk)
7	G1315-68710	Gasket FRONT (PTFE), 1.3 mm hole, inlet side (12/pk)
8		Window assembly (comprises window screw, spring washers, compression washer, window holder and quartz window)
9	G1315-87319	Capillary IN (0.17 mm, 310 mm lg) including heat exchanger
10	G1315-87306	Capillary OUT (0.12 mm, 200 mm lg)
10	G1315-87302	Capillary OUT (0.17 mm, 200 mm lg)
11	G1315-84910	Clamp unit
	0515-1056	Screw M 2.5, 4 mm lg for cell body/clamp
	5022-2184	Union ZDV
	G1315-68713	Cell repair kit semi-micro, includes window screw kit, Gasket Kit BACK, Gasket Kit FRONT and 4 mm hexagonal wrench
	79883-68703	Window screw kit, includes 2 quartz windows, 2 compression washers, 2 window holders, 2 window screws and 10 washers

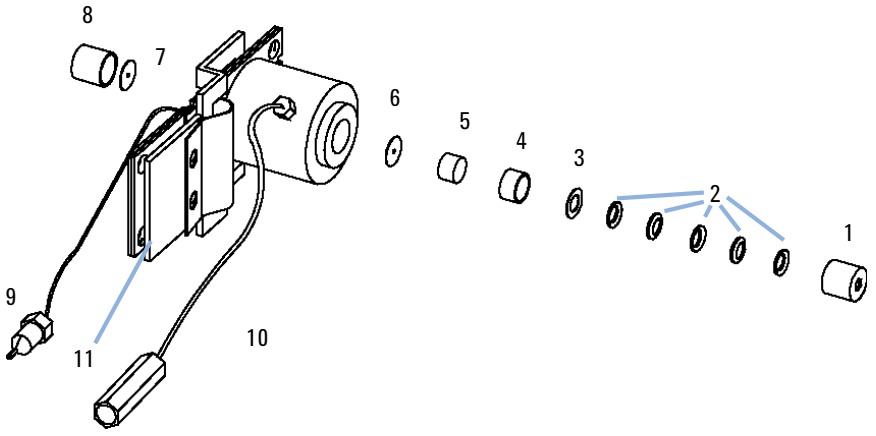


Figure 69 Semi-Micro Flow Cell Parts

NOTE Gaskets # 6 and #7 have different hole diameters.

1 - window screw
2 - spring washers
3 - compression washer
4 - window holder
5 - quartz window
6 - Gasket

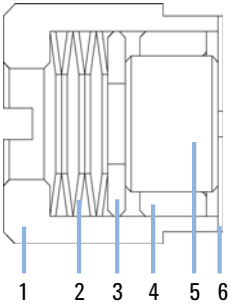


Figure 70 Orientation of Spring Washers

Micro Flow Cell

Item	p/n	Description
	G1315-60024	Micro flow cell, 3 mm, 2 µL, 120 bar (12 MPa)
1	79883-22402	Window screw
2	5062-8553	Washer kit (10/pk)
3	79883-28801	Compression washer
4	79883-22301	Window holder
5	1000-0488	Quartz window
6	79883-68702	Gasket BACK (PTFE), 1.8 mm hole, outlet side (12/pk)
7	G1315-68710	Gasket FRONT (PTFE), 1.3 mm hole, inlet side (12/pk)
8		Window assembly (comprises window screw, spring washers, compression washer, window holder and quartz window)
9	G1315-87339	DAD Heat Exchanger Capillary 310 mm, 0.12 mm i.d.
10	G1315-87306	Capillary OUT (0.12 mm, 200 mm lg)
10	G1315-87302	Capillary OUT (0.17 mm, 200 mm lg)
11	G1315-84910	Clamp unit
	0515-1056	Screw M 2.5, 4 mm lg for cell body/clamp
	5022-2184	Union ZDV
	G1315-68713	Cell repair kit semi-micro, includes window screw kit, Gasket Kit BACK, Gasket Kit FRONT and 4 mm hexagonal wrench
	79883-68703	Window screw kit, includes 2 quartz windows, 2 compression washers, 2 window holders, 2 window screws and 10 washers

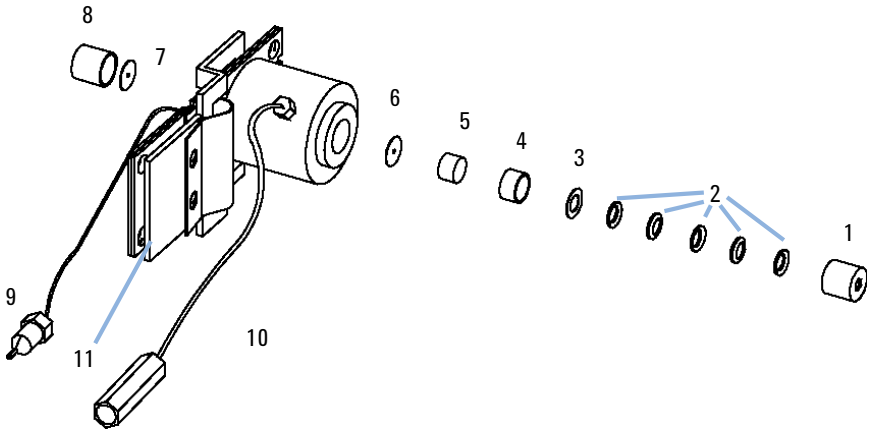


Figure 71 Micro Flow Cell Parts

NOTE Gaskets # 6 and #7 have different hole diameters.

1 - window screw
2 - spring washers
3 - compression washer
4 - window holder
5 - quartz window
6 - Gasket

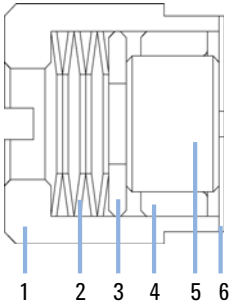


Figure 72 Orientation of Spring Washers

Prep Flow Cell - SST

NOTE For more details on the Preparative Flow Cells refer to the technical note that comes with the flow cells.

Item	p/n	Description
	G1315-60016	Prep flow cell SST - 3 mm, 120 bar (12 MPa)
1	79883-22402	Window screw
2	5062-8553	Washer kit (10/pk)
3	79883-28801	Compression washer
4	79883-22301	Window holder
5	1000-0488	Quartz window
6	G1315-68711	Gasket BACK (PTFE), 2.3 mm hole, outlet side (12/pk)
7	G1315-68710	Gasket FRONT (PTFE), 1.3 mm hole, inlet side (12/pk)
8		Window assembly (comprises window screw, spring washers, compression washer, window holder and quartz window)
	79883-68703	Window screw kit, includes 2 quartz windows, 2 compression washers, 2 window holders, 2 window screws and 10 washers
	G1315-68712	Cell repair kit STD includes window screw kit, 4 mm hexagonal wrench and seal kit
9	G1315-87305	Capillary SST, 250 mm length, 0.5 mm i.d., o.D. 0.9 mm with fittings for flow cell assembled
9a	5062-2418	1/16” fittings and ferrules 10/pk
10	G1315-27706	Cell body
11	G1315-84901	Clamp unit
12	G1315-84902	Handle for Clamp unit
13	0515-1056	Screw M 2.5, 4 mm lg for cell body/clamp

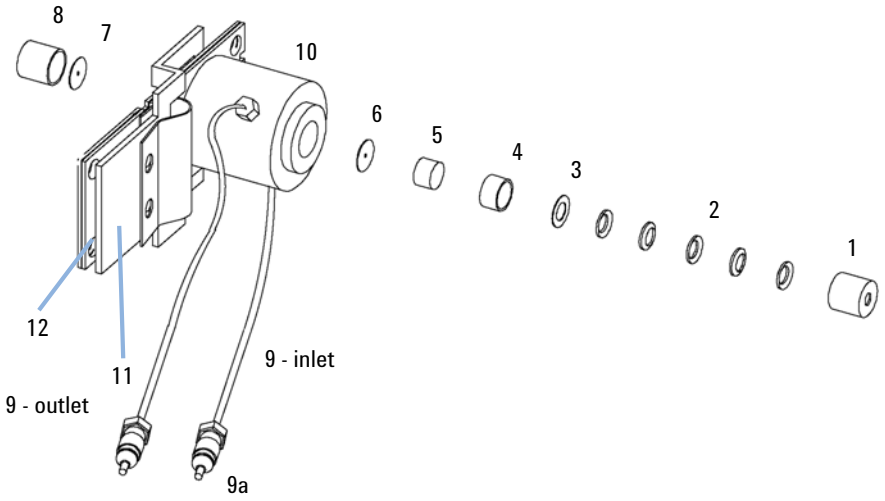


Figure 73 Prep Flow Cell - SST Parts

NOTE Gaskets # 6 and #7 have different hole diameters.

1 - window screw
2 - spring washers
3 - compression washer
4 - window holder
5 - quartz window
6 - Gasket

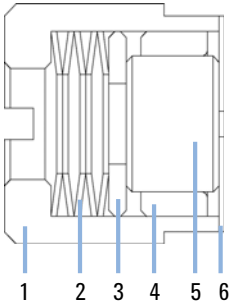


Figure 74 Orientation of Spring Washers

Prep Flow Cell - Quartz

NOTE For more details on the Preparative Flow Cells refer to the technical note that comes with the flow cells.

Item	p/n	Description
	G1315-60017	Prep flow cell quartz, 0.3 mm, 20 bar (2 MPa)
	G1315-60018	Prep flow cell quartz, 0.06 mm (2 MPa)
1	G1315-67301	PTFE tubing 2 m length, 0.8 mm i.d., o.D. 1.6 mm
	G1315-67302	PTFE tubing 80 cm length, 0.5 mm i.d., o.D. 1.6 mm
2	0100-1516	Fitting male PEEK, 2/pk
3	G1315-27705	Cell housing
4	G1315-84901	Clamp unit
5	G1315-84902	Handle for Clamp unit
6	0515-1056	Screw M 2.5, 4 mm lg for cell body/clamp
7	G1315-80004	Quartz body - Prep Cell 0.3 mm
7	G1315-80003	Quartz body - Prep Cell 0.06 mm

NOTE The flow cell comes with two tubings 0.8 mm i.d. and one 0.5 mm i.d. so that the combination at the flow cell could be either 0.8/0.8 or 0.5/0.8 (inlet/outlet).

Standard is 0.8/0.8. Depending on the system pressure (<30 mL/min) or bandbroadening, the inlet tubing might be changed to 0.5 mm.

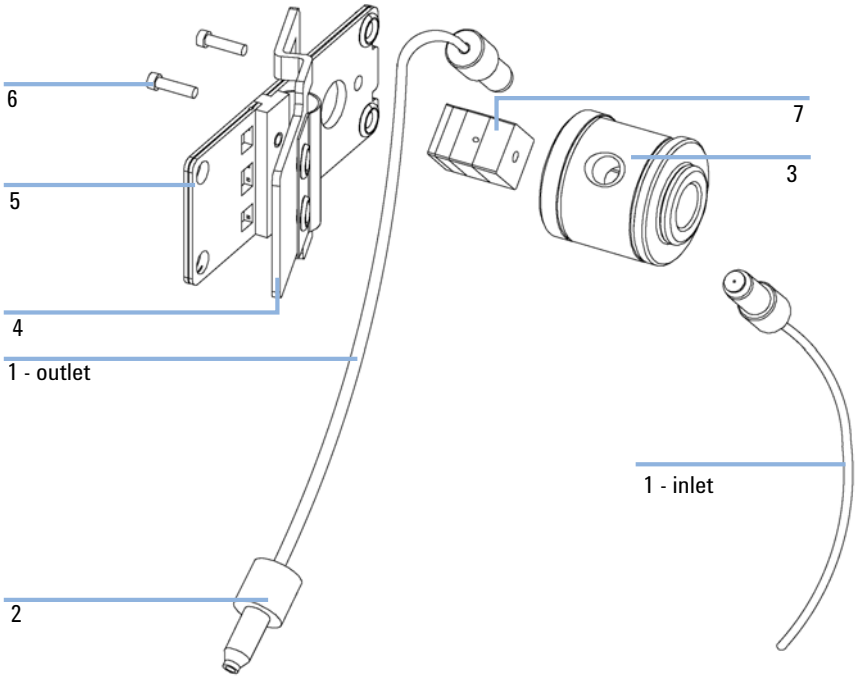


Figure 75 Prep Flow Cell - Quartz Parts

Nano Flow Cells

The following kits are available:

Table 21 Nano-flow cell kits

Part number	Comments
Semi-nano flow cell kit, 10 mm, 500 nL, 5 MPa (G1315-68724)	completely assembled (includes items 1, 2, 3, 4, 10, 11, 12, 13, 14, 15, and 16)
Nano flow cell kit, 6 mm, 80 nL, 5 MPa (G1315-68716)	completely assembled (includes items 1, 2, 3, 4, 10, 11, 12, 13, 14, 15, and 16)

Figure 76 on page 221 shows all parts delivered with the nano-flow cell kits.

Generic parts for both nano-flow cells:

Item	p/n	Description
3	5063-6593	Fitting Screw (for 4 mm wrench)
4		Cell ferrules are factory installed
5	5065-4422	PEEK fitting 1/32"
7	5063-6592	Litetouch ferrules LT-100, (1/32" Ferrule and SS lock ring)
8	5022-2146	Union Adjustment Tool
9	5022-2184	Union ZDV
10	G1315-45003	Torque adapter
14	G1315-84902	Handle for Clamp unit
15	G1315-84910	Clamp unit
16	0515-1056	Screw M 2.5, 4 mm lg for cell body/clamp
17	8710-1534	Wrench, 4 mm both ends, open end

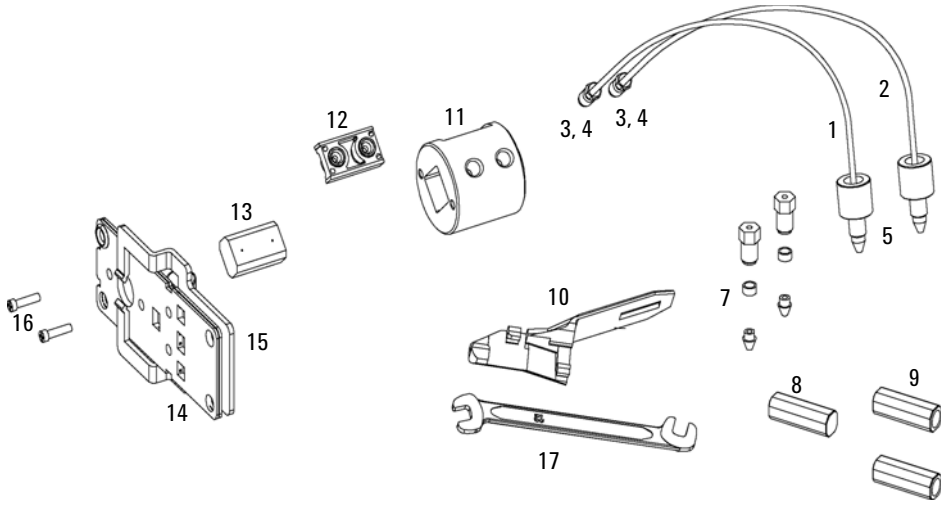


Figure 76 Content of kits

Specific parts for the semi-nano flow cell

Item	p/n	Description
	G1315-68724	Semi-nano flow cell kit, 10 mm, 500 nL, 5 MPa
1	G1315-87333	PEEK coated fused silica capillary Inlet (100 µm) pre-mounted to cell, includes Inlet capillary, 300 mm long, 100 µm i.d. with pre-fixed ferrules (#4) and fittings (#3), plus one PEEK Fitting FT (#5)
2	G1315-87338	PEEK coated fused silica capillary Outlet (100 µm) pre-mounted to cell, includes Outlet capillary, 120 mm long, 100 µm i.d. with pre-fixed ferrules (#4) and fitting (#3), plus one PEEK Fitting FT (#5)
1	G1315-87323	PEEK coated fused silica capillary Inlet (50 µm) alternative, includes Inlet capillary, 400 mm long, 50 µm i.d. with pre-fixed ferrules (#4) and fittings (#3), plus one PEEK Fitting FT (#5)
2	G1315-87328	PEEK coated fused silica capillary Outlet (50 µm), alternative, includes Outlet capillary, 120 mm long, 50 µm i.d. with pre-fixed ferrules (#4) and fitting (#3), plus one PEEK Fitting FT (#5)
11	G1315-27703	Cell Housing (500 nL)
12	G1315-87101	Cell Seal Assembly (500 nL)
13	G1315-80001	Quartz Body (500 nL)
	G1315-68715	Sealing Kit

Specific parts for the nano flow cell

Item	p/n	Description
	G1315-68716	Nano flow cell kit, 6 mm, 80 nL, 5 MPa
1	G1315-87323	PEEK coated fused silica capillary Inlet (50 µm) alternative, includes Inlet capillary, 400 mm long, 50 µm i.d. with pre-fixed ferrules (#4) and fittings (#3), plus one PEEK Fitting FT (#5)
2	G1315-87328	PEEK coated fused silica capillary Outlet (50 µm), alternative, includes Outlet capillary, 120 mm long, 50 µm i.d. with pre-fixed ferrules (#4) and fitting (#3), plus one PEEK Fitting FT (#5)
1	G1315-87313	PEEK coated fused silica capillary Inlet (25 µm) alternative, includes Inlet capillary, 200 mm long, 25 µm i.d. with pre-fixed ferrules (#4) and fittings (#3), plus one PEEK Fitting FT (#5)
2	G1315-87318	PEEK coated fused silica capillary Outlet (25 µm) alternative, includes Outlet capillary, 600 mm long, 25 µm i.d. with pre-fixed ferrules (#4) and fitting (#3), plus one PEEK Fitting FT (#5)
	G1315-27704	Cell Housing (80 nL)
	G1315-42301	Cell Seal Assembly (80 nL)
	G1315-80002	Quartz Body (80 nL)
	G1315-68725	Sealing Kit 80 nL cell

High Pressure Flow Cell

Item	p/n	Description
	G1315-60015	High pressure flow cell, 6 mm, 1.7 µL, 400 bar (40 MPa)
1		Window assembly, comprises items 2, 3, 4, 5 and 6
2	79883-27101	Seal ring
3	1000-0953	Quartz window
4	79883-28802	Compression washer
5	5062-8553	Washer kit (10/pk)
6	79883-22404	Window screw
7	G1315-87325	Capillary IN (0.12 mm, 290 mm lg) including heat exchanger
8	G1315-87306	Capillary OUT (0.12 mm, 200 mm lg)
9	G1315-84901	Clamp unit
	0515-1056	Screw M 2.5, 4 mm lg for cell body/clamp
	G1315-87312	Capillary ST 0.12 mm x 150 mm S/S
	G1315-87311	Capillary ST 0.17 mm x 380 mm S/S
	79883-68700	High pressure cell repair kit (includes 1 quartz window, 1 compression washer, 5 spring washers, 2 seal rings)

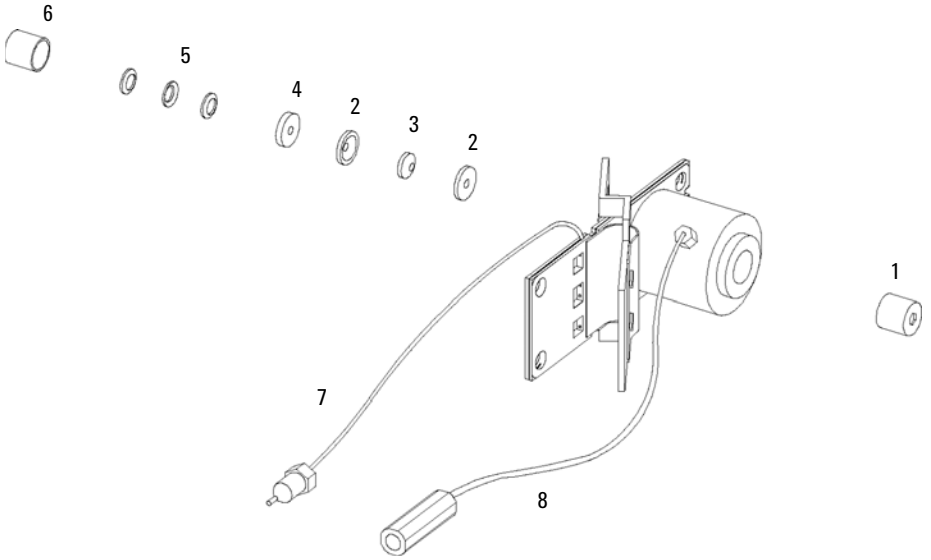


Figure 77 High pressure flow cell - parts

Accessory Kits

Accessory kit (G1315-68755) contains some accessories and tools needed for installation and repair of the module.

Item	p/n	Description
	5063-6527	Tubing assembly, i.d. 6 mm, o.d. 9 mm, 1.2 m (to waste)
1	5062-2462	Tube PTFE 0.8 mm x 2 m, re-order 5 m
2	0100-1516	Fitting male PEEK, 2/pk
3	G1315-87311	Capillary ST 0.17 mm x 380 mm S/S
4	5180-4108	Ferrule front 1/16" SST, qty=2, re-order pack of 10
5	5180-4114	Ferrule back 1/16" SST, qty=2, re-order pack of 10
6	5061-3303	Fitting 1/16" SST, qty=2, re-order pack of 10
	G1315-87303	Capillary SST column — detector 150 mm lg, 0.17 mm i.d.
	5181-1516	CAN cable, Agilent module to module, 0.5 m

Items 4, 5 and 6 are included in kit 5062-2418 1/16" Fittings and Ferrules (front/back) 10/PK.

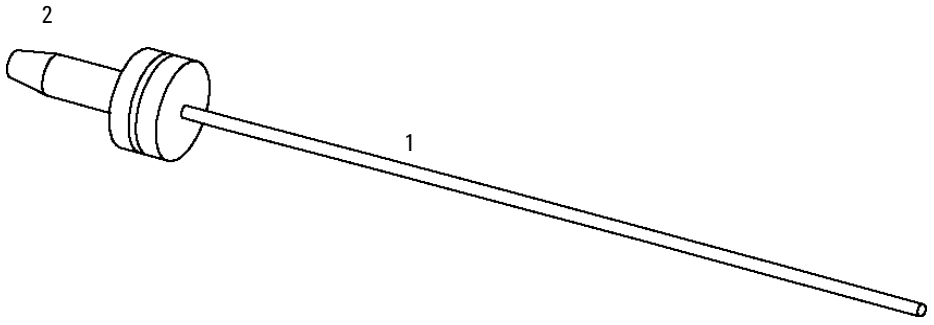


Figure 78 Waste Tubing Parts

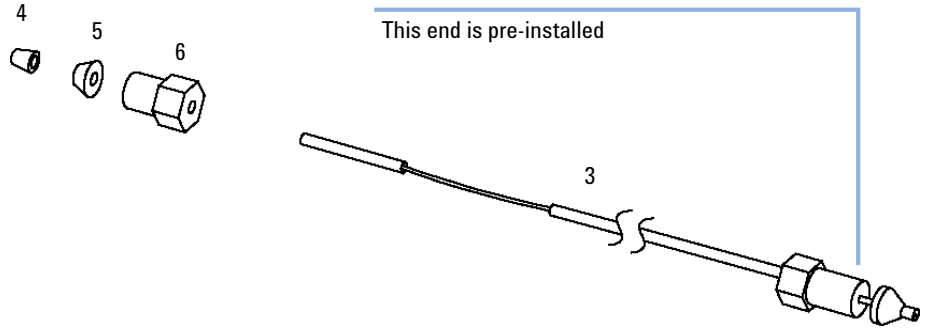


Figure 79 Inlet Capillary (Column-Detector) Parts

11
Identifying Cables

This chapter provides information on cables used with the Agilent 1200 Infinity Series modules.

Cable Overview

NOTE Never use cables other than the ones supplied by Agilent Technologies to ensure proper functionality and compliance with safety or EMC regulations.

Analog cables

p/n	Description
35900-60750	Agilent module to 3394/6 integrators
35900-60750	Agilent 35900A A/D converter
01046-60105	Analog cable (BNC to general purpose, spade lugs)

Remote cables

p/n	Description
03394-60600	Agilent module to 3396A Series I integrators
	3396 Series II / 3395A integrator, see details in section "Remote Cables" on page 234
03396-61010	Agilent module to 3396 Series III / 3395B integrators
5061-3378	Remote Cable
01046-60201	Agilent module to general purpose

BCD cables

p/n	Description
03396-60560	Agilent module to 3396 integrators
G1351-81600	Agilent module to general purpose

CAN cables

p/n	Description
5181-1516	CAN cable, Agilent module to module, 0.5 m
5181-1519	CAN cable, Agilent module to module, 1 m

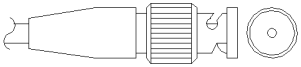
LAN cables

p/n	Description
5023-0203	Cross-over network cable, shielded, 3 m (for point to point connection)
5023-0202	Twisted pair network cable, shielded, 7 m (for point to point connection)

RS-232 cables

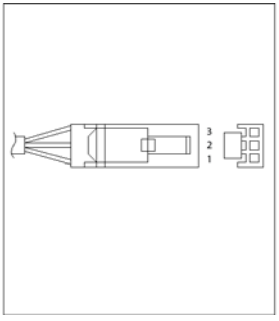
p/n	Description
G1530-60600	RS-232 cable, 2 m
RS232-61601	RS-232 cable, 2.5 m Instrument to PC, 9-to-9 pin (female). This cable has special pin-out, and is not compatible with connecting printers and plotters. It's also called "Null Modem Cable" with full handshaking where the wiring is made between pins 1-1, 2-3, 3-2, 4-6, 5-5, 6-4, 7-8, 8-7, 9-9.
5181-1561	RS-232 cable, 8 m

Analog Cables

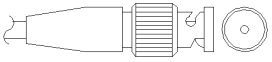


One end of these cables provides a BNC connector to be connected to Agilent modules. The other end depends on the instrument to which connection is being made.

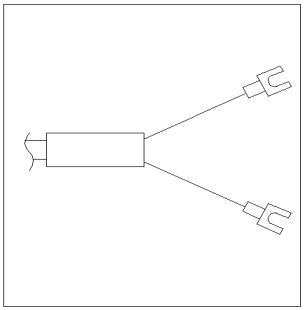
Agilent Module to 3394/6 Integrators

p/n 35900-60750	Pin 3394/6	Pin Agilent module	Signal Name
	1		Not connected
	2	Shield	Analog -
	3	Center	Analog +

Agilent Module to BNC Connector

p/n 8120-1840	Pin BNC	Pin Agilent module	Signal Name
	Shield	Shield	Analog -
	Center	Center	Analog +

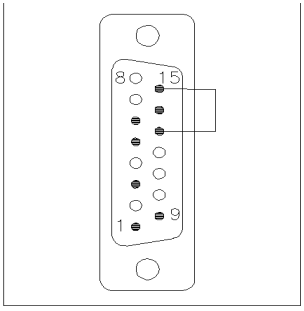
Agilent Module to General Purpose

p/n 01046-60105	Pin	Pin Agilent module	Signal Name
	1		Not connected
	2	Black	Analog -
	3	Red	Analog +

Remote Cables

One end of these cables provides a Agilent Technologies APG (Analytical Products Group) remote connector to be connected to Agilent modules. The other end depends on the instrument to be connected to.

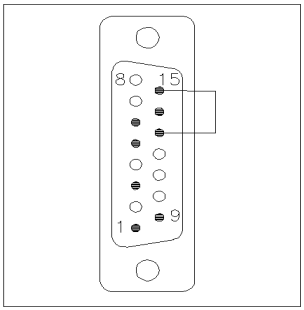
Agilent Module to 3396A Integrators

p/n 03394-60600	Pin 3396A	Pin Agilent module	Signal Name	Active (TTL)
	9	1 - White	Digital ground	
	NC	2 - Brown	Prepare run	Low
	3	3 - Gray	Start	Low
	NC	4 - Blue	Shut down	Low
	NC	5 - Pink	Not connected	
	NC	6 - Yellow	Power on	High
	5,14	7 - Red	Ready	High
	1	8 - Green	Stop	Low
	NC	9 - Black	Start request	Low
	13, 15		Not connected	

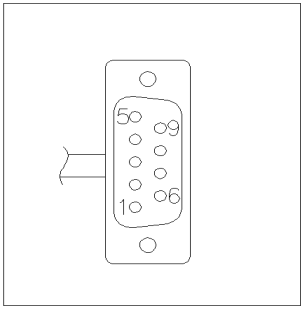
Agilent Module to 3396 Series II / 3395A Integrators

Use the cable Agilent module to 3396A Series I integrators (03394-60600) and cut pin #5 on the integrator side. Otherwise the integrator prints START; not ready.

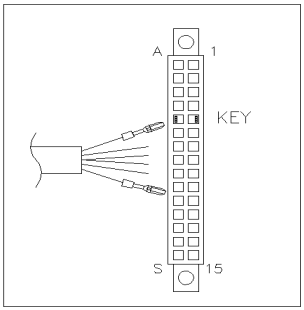
Agilent Module to 3396 Series III / 3395B Integrators

p/n 03396-61010	Pin 33XX	Pin Agilent module	Signal Name	Active (TTL)
	9	1 - White	Digital ground	
	NC	2 - Brown	Prepare run	Low
	3	3 - Gray	Start	Low
	NC	4 - Blue	Shut down	Low
	NC	5 - Pink	Not connected	
	NC	6 - Yellow	Power on	High
	14	7 - Red	Ready	High
	4	8 - Green	Stop	Low
	NC	9 - Black	Start request	Low
	13, 15		Not connected	

Agilent Module to Agilent 35900 A/D Converters

p/n 5061-3378	Pin 35900 A/D	Pin Agilent module	Signal Name	Active (TTL)
	1 - White	1 - White	Digital ground	
	2 - Brown	2 - Brown	Prepare run	Low
	3 - Gray	3 - Gray	Start	Low
	4 - Blue	4 - Blue	Shut down	Low
	5 - Pink	5 - Pink	Not connected	
	6 - Yellow	6 - Yellow	Power on	High
	7 - Red	7 - Red	Ready	High
	8 - Green	8 - Green	Stop	Low
	9 - Black	9 - Black	Start request	Low

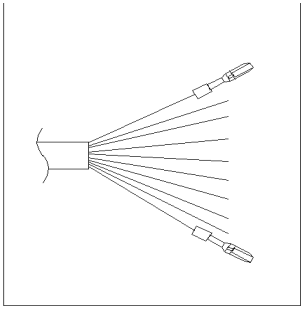
Agilent Module to General Purpose

p/n 01046-60201	Wire Color	Pin Agilent module	Signal Name	Active (TTL)
	White	1	Digital ground	
	Brown	2	Prepare run	Low
	Gray	3	Start	Low
	Blue	4	Shut down	Low
	Pink	5	Not connected	
	Yellow	6	Power on	High
	Red	7	Ready	High
	Green	8	Stop	Low
	Black	9	Start request	Low

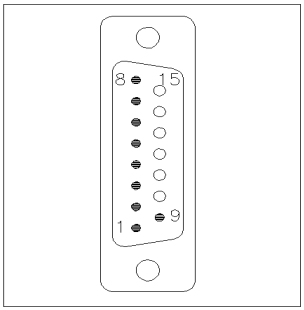
BCD Cables

One end of these cables provides a 15-pin BCD connector to be connected to the Agilent modules. The other end depends on the instrument to be connected to

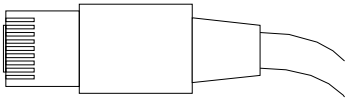
Agilent Module to General Purpose

p/n G1351-81600	Wire Color	Pin Agilent module	Signal Name	BCD Digit
	Green	1	BCD 5	20
	Violet	2	BCD 7	80
	Blue	3	BCD 6	40
	Yellow	4	BCD 4	10
	Black	5	BCD 0	1
	Orange	6	BCD 3	8
	Red	7	BCD 2	4
	Brown	8	BCD 1	2
	Gray	9	Digital ground	Gray
	Gray/pink	10	BCD 11	800
	Red/blue	11	BCD 10	400
	White/green	12	BCD 9	200
	Brown/green	13	BCD 8	100
	not connected	14		
	not connected	15	+ 5 V	Low

Agilent Module to 3396 Integrators

p/n 03396-60560	Pin 3396	Pin Agilent module	Signal Name	BCD Digit
	1	1	BCD 5	20
	2	2	BCD 7	80
	3	3	BCD 6	40
	4	4	BCD 4	10
	5	5	BCD0	1
	6	6	BCD 3	8
	7	7	BCD 2	4
	8	8	BCD 1	2
	9	9	Digital ground	
	NC	15	+ 5 V	Low

CAN/LAN Cables



Both ends of this cable provide a modular plug to be connected to Agilent modules CAN or LAN connectors.

CAN Cables

p/n	Description
5181-1516	CAN cable, Agilent module to module, 0.5 m
5181-1519	CAN cable, Agilent module to module, 1 m

LAN Cables

p/n	Description
5023-0203	Cross-over network cable, shielded, 3 m (for point to point connection)
5023-0202	Twisted pair network cable, shielded, 7 m (for point to point connection)

Agilent 1200 module to PC

p/n	Description
G1530-60600	RS-232 cable, 2 m
RS232-61601	RS-232 cable, 2.5 m Instrument to PC, 9-to-9 pin (female). This cable has special pin-out, and is not compatible with connecting printers and plotters. It's also called "Null Modem Cable" with full handshaking where the wiring is made between pins 1-1, 2-3, 3-2, 4-6, 5-5, 6-4, 7-8, 8-7, 9-9.
5181-1561	RS-232 cable, 8 m