9 Maintenance

This chapter describes the maintenance of the module.

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.

Warnings and Cautions

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 18 Overview of Maintenance

Procedure	Typical Frequency	Notes
Cleaning of module	If required	
Deuterium lamp exchange	If noise and/or drift exceeds your application limits or lamp does not ignite.	A wavelength calibration test and an intensity test should be performed after replacement.
Flow cell exchange	If leaking or if intensity drops due to contaminated flow cell.	A 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

To keep the module case clean, use a soft cloth slightly dampened with water, or a solution of water and mild detergent.

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.

Remove and Install Doors

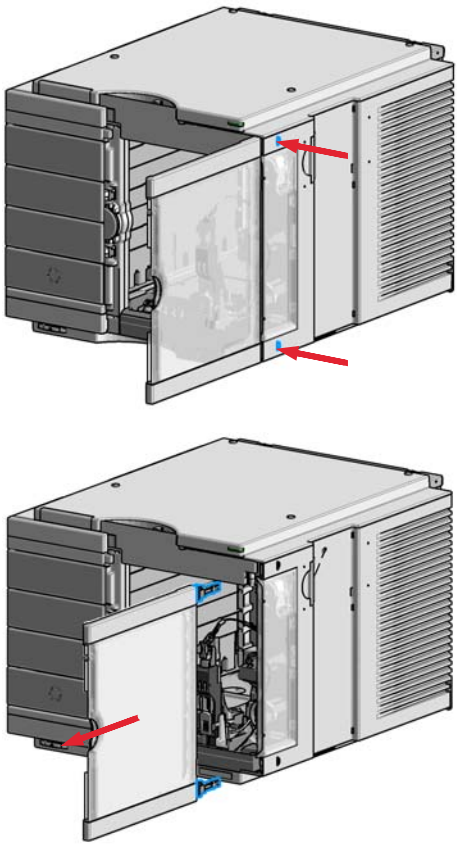
Parts required	p/n	Description
	5067-5737	Door left
	5067-5736	Door right

NOTE

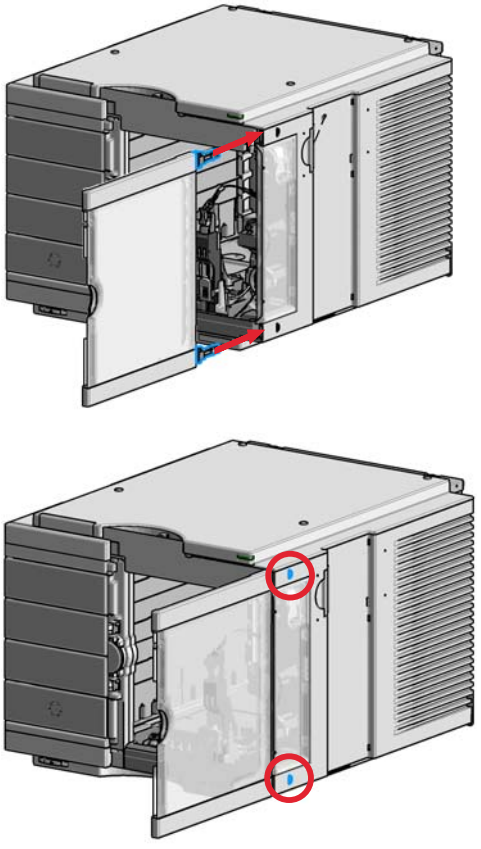
The figures shown in this procedure exemplarily show the Infinity II Multisampler module.

The principle of how to remove and/or install doors works in the same way for all Infinity II modules.

1 Press the release buttons and pull the front door out.



2 For the Installation of the front door. Insert the hinges into their guides and move the door in until the release buttons click into their final position.



Replace the Deuterium Lamp

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

Tools required

Description
Screwdriver POZI 1 PT3

Parts required

#	p/n	Description
1	5190-0917	Long-life Deuterium lamp (8-pin) with RFID tag

Preparations Turn the lamp off.

WARNING

Injury by touching hot lamp

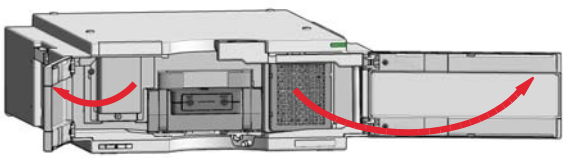
If the detector has been in use, the lamp may be hot.

➔ If so, wait for lamp to cool down.

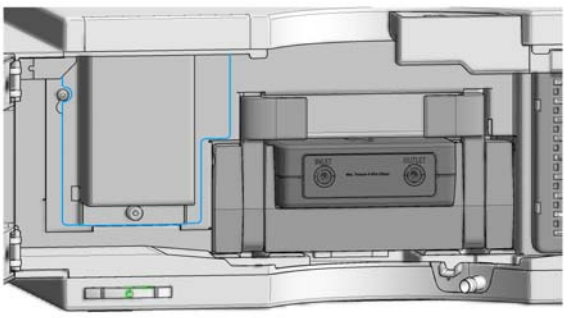
NOTE

The lamp house cover includes a magnet.

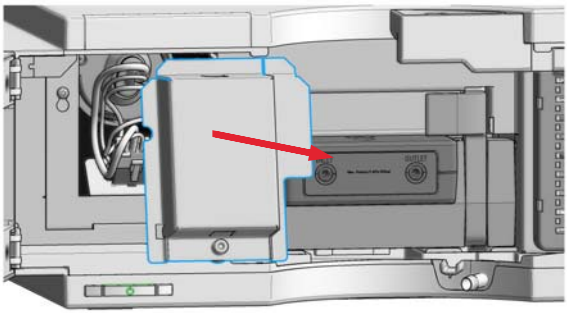
1 Open the doors.



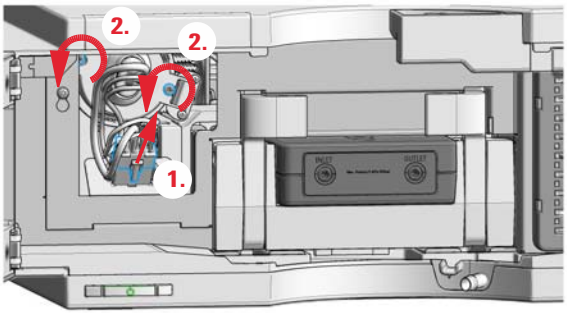
2 Locate the lamp cover.



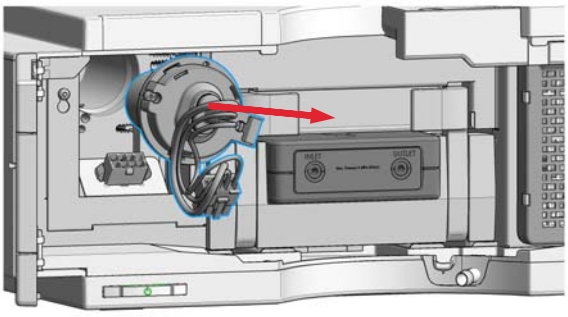
3 Grab the lamp cover and pull it off (it is fixed by a magnet in the bottom of the cover).



4 Unplug the lamp connector (1.) and unscrew the two lamp screws (2.) (Pozidriv).



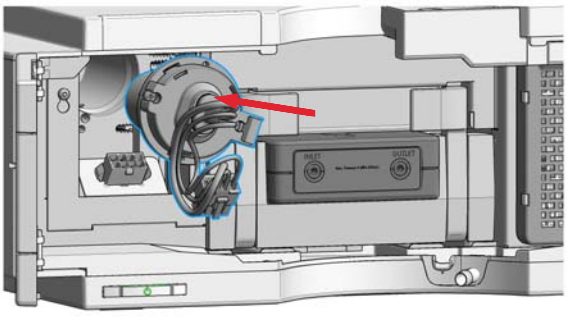
5 Remove the lamp and place it on a clean place.



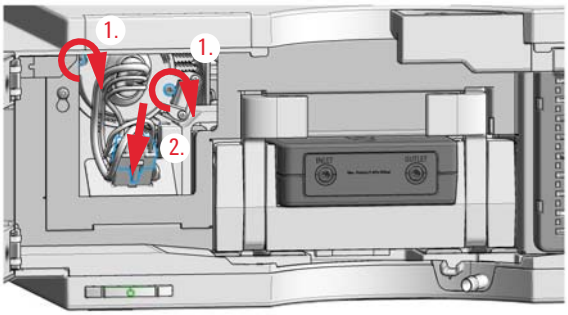
NOTE

Do not touch the glass bulb with your fingers. It may reduce the light output.

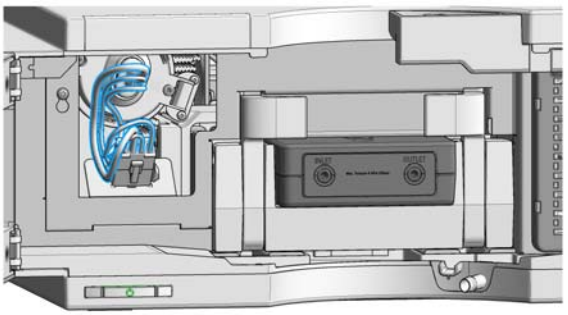
6 Insert the lamp (RFID tag on the right side).



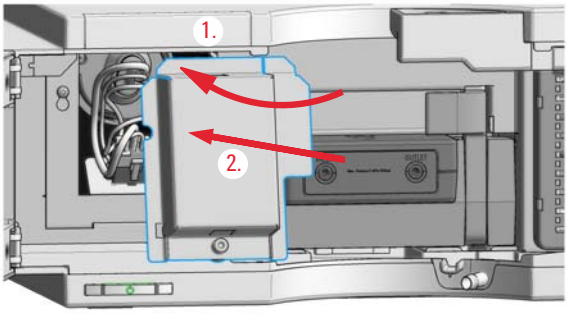
7 Fix the lamp screws (1.) and reconnect the lamp connector (2.).



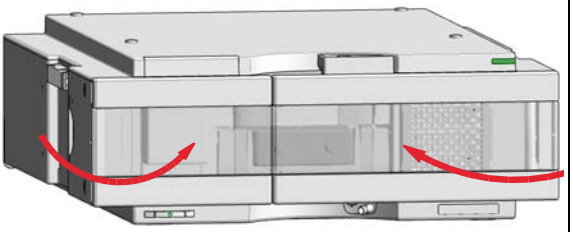
8 Place the lamp cable in the lamp cover.



9 Slide the lamp cover into the top position of the metal front (1.) and press the lamp cover completely in until it clicks (2.).



10 Close the doors.



11 Perform a Wavelength Re-calibration after lamp warm-up.

Replace the Max-Light Cartridge Cell

When If leaking or if intensity drops due to contaminated flow cell.

Tools required

Description
Wrench, 1/4 inch for capillary connections

Parts required

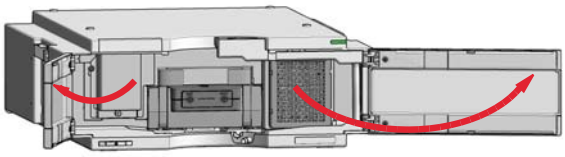
p/n	Description
G4212-60008	Max-Light Cartridge Cell (10 mm, V(σ) 1.0 µL)
G4212-60007	Max-Light Cartridge Cell (60 mm, V(σ) 4.0 µL)
G4212-60011	Max-Light Cartridge Test Cell
G4212-60032	HDR Max-Light Cartridge Cell (3.7 mm, V(σ) 0.4 µL)
G4212-60038	ULD Max-Light Cartridge Cell (10 mm, V(σ) 0.6 µL)

Preparations Turn the pump off.

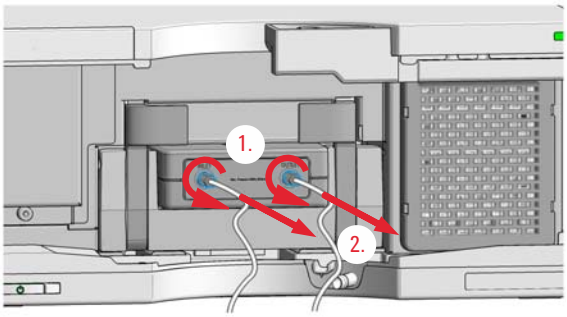
NOTE The flow cell is shipped with a filling of isopropanol. This is to avoid breakage due to subambient conditions. In case the flow cell is not used for some time (stored), then flush the flow cell with iso-propanol.

Remove the Max-Light Cartridge Cell

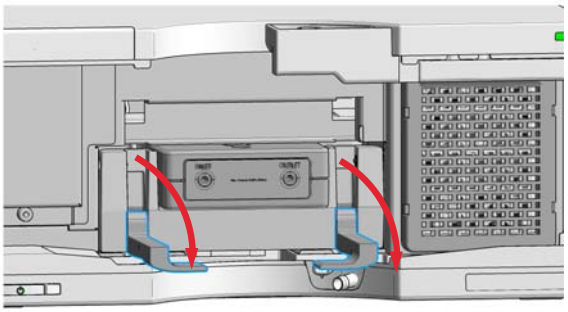
1 Open the doors.



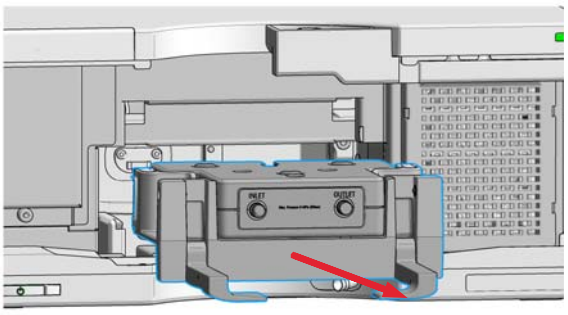
2 Disconnect the capillaries from the flow cell cartridge.



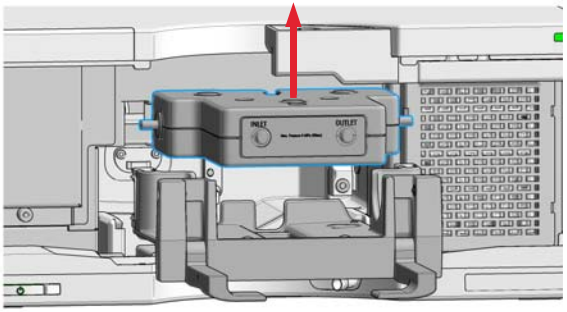
3 Flip the cartridge lever towards the front (down).



4 Pull the cartridge holder completely out.

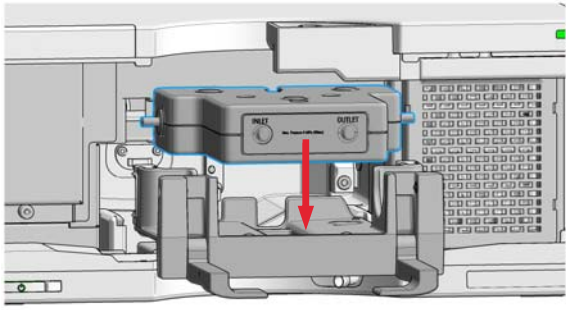


5 Remove the flow cell cartridge.

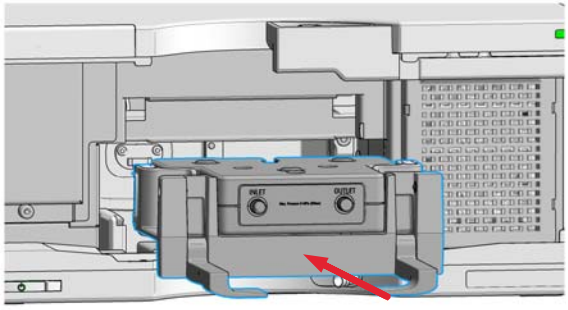


Install the Max-Light Cartridge Cell

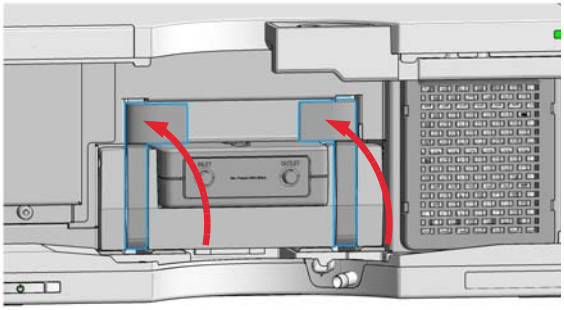
1 Insert the flow cell cartridge.



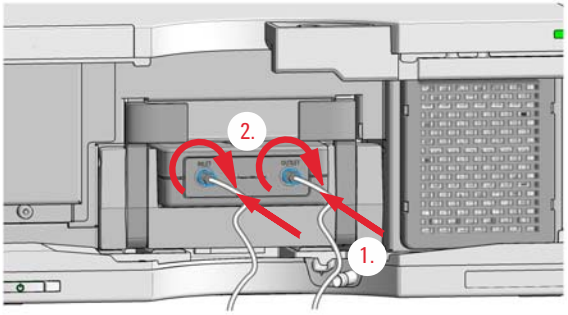
2 Slide the cartridge holder completely into the detector.



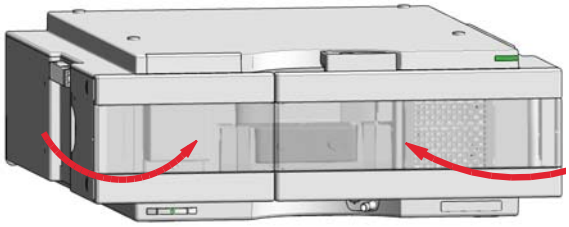
3 Lift the cartridge lever up into the final position.



4 Reconnect the capillaries.



5 Close the doors.



6 Perform a **Cell Test** and a **Wavelength Verification Test**.

Clean the Max-Light Cartridge Cell

When	Low counts on Intensity Test or Cell Test (failed tests)	
Tools required	**p/n**	**Description**
		Alcohol (Iso-propanol or Ethanol)
		Lens tissue or Q-tips ®
	5190-0530	Cell cleaning solvent

1 Flush the flow cell with the alcohol for some time.

2 Remove the cell from the cartridge holder (see "Replace the Max-Light Cartridge Cell" on page 167).

3 Carefully clean the light inlet and outlet of the cell using lens tissue or Q-tips® with alcohol.

NOTE If Q-tips® are used, ensure that no cotton fluff remains at the inlet or outlet.

NOTE Do not touch the light inlet and outlet of the cell with your fingers. This will add a layer of contamination on the window and reduce the light throughput.

4 Flush the flow cell with water and repeat the Intensity Test and or Cell Test.

5 If the cleaning with the alcohol did not improve the results, the flow cell might be cleaned with cleaning fluid (PN 5190-0530). Use a concentration of 0.5 – 2 v/v % (cleaning fluid/water). Use a syringe to fill the flow cell with cleaning fluid.

The following cleaning protocols are recommended:

- Maximum 3 hours at 25 – 30 °C or
- 30 – 40 min at 30 – 35 °C.

NOTE The optimal concentration depends on the water quality, the contamination, the temperature, and other factors. The use of demineralized water may improve the cleaning characteristics.

6 Repeat step 4 on page 170.

7 If tests fail again, the flow cell might be replaced if the chromatographic performace cannot be accepted.

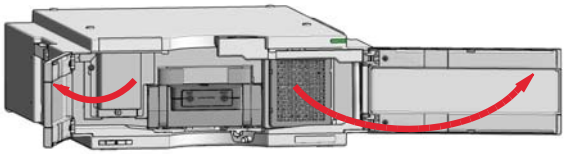
Storage of Max-Light Cartridge Cell

1. Flush the Max- Light Cartridge Flow Cell with iso- propanol or methanol and insert the plugs into the cell inlet and outlet (see "Replace the Max-Light Cartridge Cell" on page 167).
2. Remove the Max-Light Cartridge Cell from the cartridge holder of the detector.
3. Replace the black hoods, that secure the cell light inlet and outlet.
4. Store the Max-Light Cartridge Cell in plastic case provided with the Max-Light Cartridge Flow Cell.

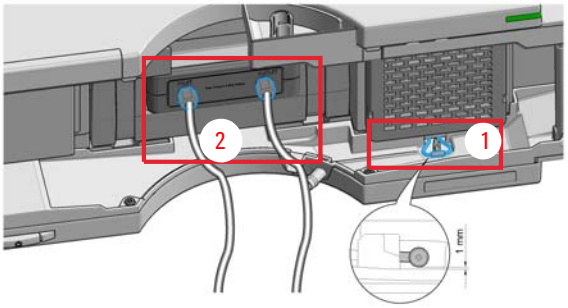
Correcting Leaks

When	If leak has occurred.
Tools required	**Description** Tissue
Preparations	Turn the pump off.

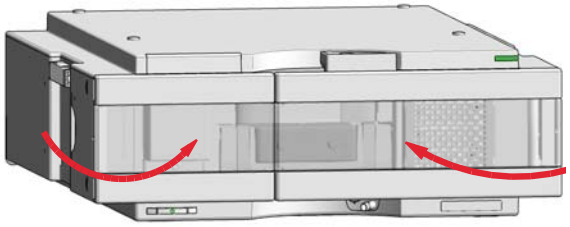
1 Open the doors.



2 Use tissue to dry the leak sensor area (1). Observe the capillary connections and the flow cell area (2) for leaks and correct, if required.



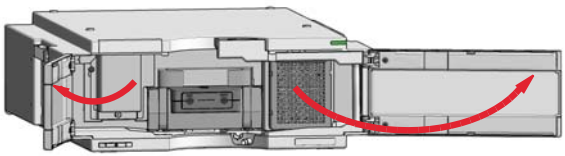
3 Close the doors.



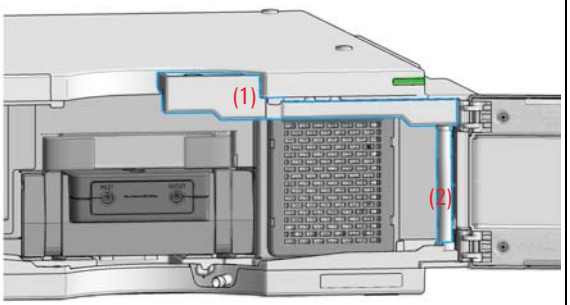
Replace Leak Handling System Parts

Parts required	p/n	Description
	5043-0856	Leak Adapter
	5063-6527	Tubing assembly, i.d. 6 mm, o.d. 9 mm, 1.2 m (to waste) approximately 85 mm required

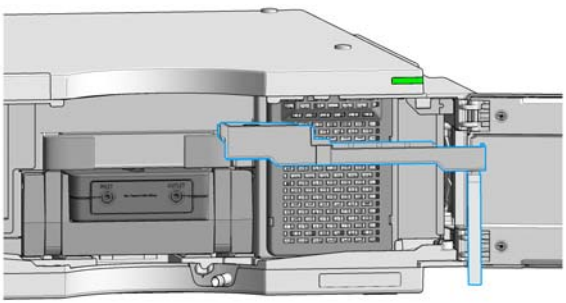
1 Open the doors.



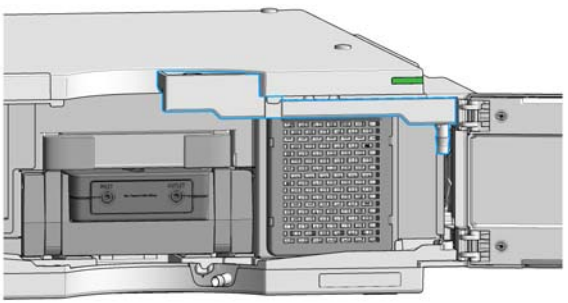
2 Locate the Leak Adapter (1) and Tubing (2).

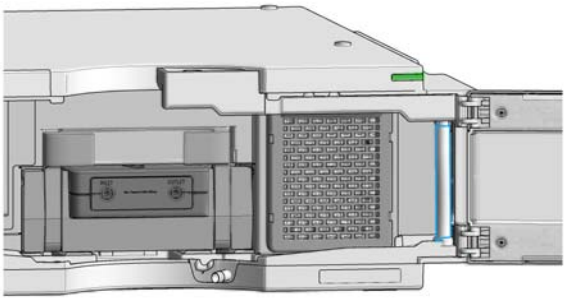
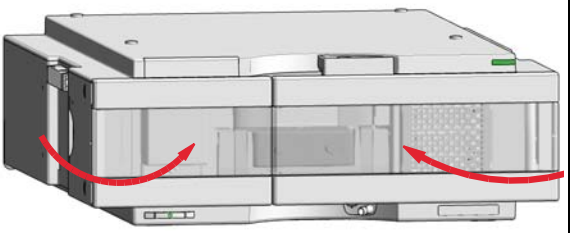


3 Press the Leak Adapter down and remove it together with the tubing.



4 Install the Leak Adapter by pressing it into the Main Cover.



5 Insert the Tubing (approximately 85 mm required for replacement) between Leak Adapter outlet and Leak Panel. 	**6** Close the doors. 

Replace the Module 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
	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 FW Update Tool and the documentation from the Agilent web.
http://www.agilent.com/en-us/firmwareDownload?whid=69761

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

Module Specific Information

Table 19 Module Specific Information (G7117A/G7117B/G7117C)

	G7117B 1290 DAD	G7117A 1290 DAD FS	G7117C 1260 DAD HS
Initial firmware (main and resident)	D.06.70		D.07.01
Compatibility with 1100/1200/1260/ 1290 series modules	When using the detector in a system, all other modules must have firmware from set 6.50 (latest version) or later (main and resident). Otherwise the communication will not work.		
Conversion to / emulation	G4212A, G4212B, G7117A	G4212B	G4212B

Information from Module's Assemblies

Lamp and Flow Cell RFID Tag

The detector is equipped with a UV lamp and flow cell identification system using RFID (radio frequency identification) tags attached to the assemblies and RFID tag readers at the optical unit. The table below lists all parameters stored in the RFID tag.

Table 20 RFID Tag Data

Lamp information	Flow cell information
• product number	• product number
• serial number	• serial number
• production date	• production date
• accumulated UV on time (in hours)	• nominal path length of the cell (in mm)
• actual UV lamp on time (in hours)	• cell volume (σ) in µL
• number of ignitions	• maximum pressure (in bar)
• date of last intensity test	• date of last cell test

NOTE The pressure value is always displayed in bar, even if the user interface uses other units, e.g. PSI.

Serial Number and Firmware Revision

The user interface provides module specific information that is stored in the main board. These are for example the serial number, firmware revision.

10
Parts and Materials for Maintenance

This chapter provides information on parts for maintenance.

Overview of Maintenance Parts

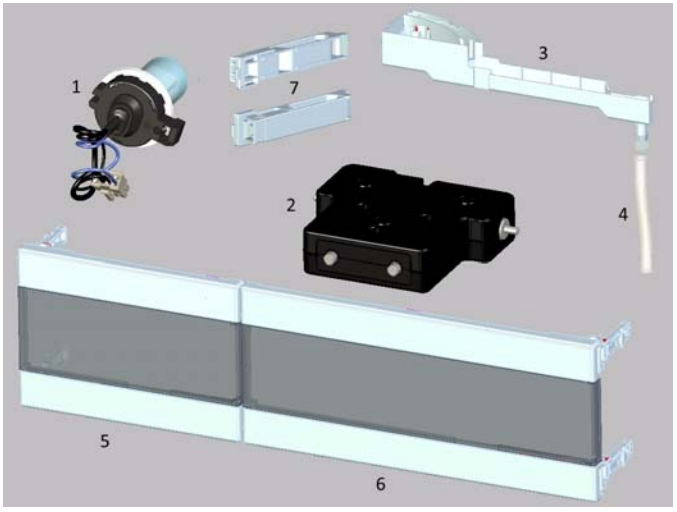


Figure 52 Overview of maintenance parts

Item	p/n	Description
1	5190-0917	Long-life Deuterium lamp (8-pin) with RFID tag
2	G4212-60008	Max-Light Cartridge Cell (10 mm, V(σ) 1.0 µL)
OR 2	G4212-60007	Max-Light Cartridge Cell (60 mm, V(σ) 4.0 µL)
OR 2	G4212-60011	Max-Light Cartridge Test Cell
OR 2	G4212-60032	HDR Max-Light Cartridge Cell (3.7 mm, V(σ) 0.4 µL)
OR 2	G4212-60038	ULD Max-Light Cartridge Cell (10 mm, V(σ) 0.6 µL)
3	5043-0856	Leak Adapter
4	5063-6527	Tubing assembly, i.d. 6 mm, o.d. 9 mm, 1.2 m (to waste) for Waste and Leak Adapter (ca. 85 mm required)
	5062-8535	Waste accessory kit (Flow Cell to waste)
5	5067-5737	Door left
6	5067-5736	Door right
7	5043-1013	Tubing Clip

For cables, see “Cable Overview” on page 184.

Accessory Kit

G7117-68755 Accessory Kit

p/n	Description
5062-8535	Waste accessory kit
5063-6527	Tubing assembly, i.d. 6 mm, o.d. 9 mm, 1.2 m (to waste) see item 4 in Figure 52 on page 180
5181-1516	CAN cable, Agilent module to module, 0.5 m
5500-1155	Tube Connector, 90 degree, ID 6.4
5043-1013	Tubing Clip see item 7 in Figure 52 on page 180
5500-1191	Capillary ST 0.12 mm x 280 mm, long socket

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 35900A A/D converter
01046-60105	Analog cable (BNC to general purpose, spade lugs)

Remote cables

p/n	Description
5188-8029	ERI to general purpose
5188-8044	Remote Cable ERI – ERI
5188-8045	Remote Cable APG – ERI
5061-3378	Remote Cable to 35900 A/D converter
01046-60201	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)

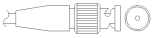
RS-232 cables (not for FUSION board)

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

USB cables

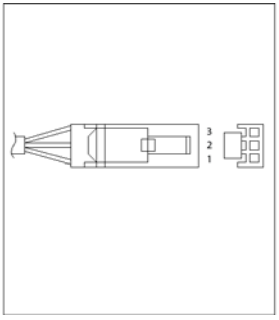
p/n	Description
5188-8050	USB A M-USB Mini B 3 m (PC-Module)
5188-8049	USB A F-USB Mini B M OTG (Module to Flash Drive)

Analog Cables

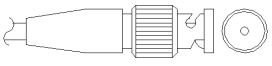


One end of these cables provides a BNC connector to be connected to Agilent modules. The other end depends on the instrument to which connection is being made.

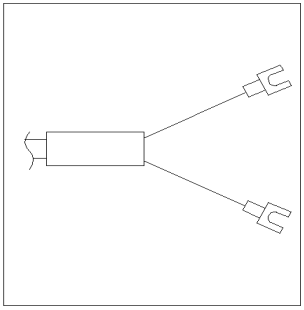
Agilent Module to 35900 A/D converters

p/n 35900-60750	35900	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 +

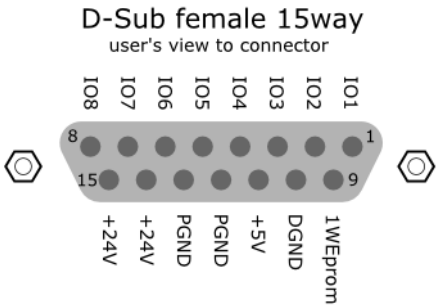
Agilent Module to General Purpose

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

Remote Cables

ERI (Enhanced Remote Interface)

5188-8029 ERI to general purpose

p/n 5188-8029	pin	Color code	Enhanced Remote	Classic Remote	Active (TTL)
	1	white	IO1	START REQUEST	Low
	2	brown	IO2	STOP	Low
	3	green	IO3	READY	High
	4	yellow	IO4	POWER ON	High
	5	grey	IO5	NOT USED	
	6	pink	IO6	SHUT DOWN	Low
	7	blue	IO7	START	Low
	8	red	IO8	PREPARE	Low
	9	black	1wire DATA		
	10	violet	DGND		
	11	grey-pink	+5V ERI out		
	12	red-blue	PGND		
	13	white-green	PGND		
	14	brown-green	+24V ERI out		
	15	white-yellow	+24V ERI out		
	NC	yellow-brown			

5188-8044 ERI to ERI (Connector D_Subminiature 15 pin)

Table 21 5188-8044 ERI to ERI

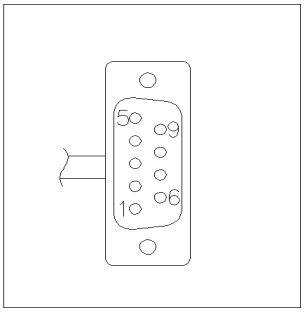
p/n 5188-8044	Pin (ERI)	Signal	Pin (ERI)	Active (TTL)
	10	GND	10	
	1	Start Request	1	Low
	2	Stop	2	Low
	3	Ready	3	High
	5	Power on	5	High
	4	Future	4	
	6	Shut Down	6	Low
	7	Start	7	Low
	8	Prepare	8	Low
	Ground	Cable Shielding	NC	

5188-8045 ERI to APG (Connector D_Subminiature 15 pin (ERI), Connector D_Subminiature 9 pin (APG))

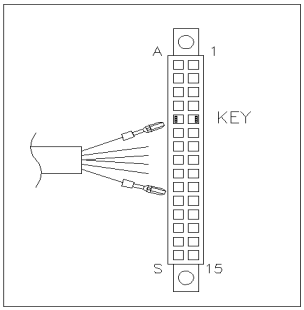
p/n 5188-8045	Pin (ERI)	Signal	Pin (APG)	Active (TTL)
	10	GND	1	
	1	Start Request	9	Low
	2	Stop	8	Low
	3	Ready	7	High
	5	Power on	6	High
	4	Future	5	
	6	Shut Down	4	Low
	7	Start	3	Low
	8	Prepare	2	Low
	Ground	Cable Shielding	NC	

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.

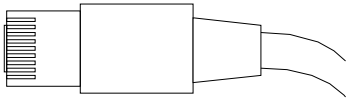
Agilent Module to Agilent 35900 A/D Converters

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

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)

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

USB Cables

To connect a USB Flash Drive use a USB OTG cable with Mini-B plug and A socket.

p/n	Description
5188-8050	USB A M-USB Mini B 3 m (PC-Module)
5188-8049	USB A F-USB Mini B M OTG (Module to Flash Drive)