



Agilent InfinityLab LC Series

1290 Infinity III Fluorescence Detector

User Manual



Notices

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Agilent Technologies
Hewlett-Packard-Strasse 8
76337 Waldbronn, Germany

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In This Book

This manual covers the following Agilent InfinityLab LC Series module:

- Agilent 1290 Infinity III Fluorescence Detector (G7123B)



1 Introduction

This chapter gives an introduction to the module and an instrument overview.

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Product Description of the 1290 Infinity III Fluorescence Detector (G7123B)

The Agilent 1290 Infinity III Fluorescence Detector is a low noise, highly sensitive fluorescence detector that introduces minimal peak dispersion and has been specifically designed for UHPLC applications. Fast switching of both excitation and emission wavelengths is possible, and the detector offers spectral data in either the excitation or emission dimensions for ensuring optimal performance.

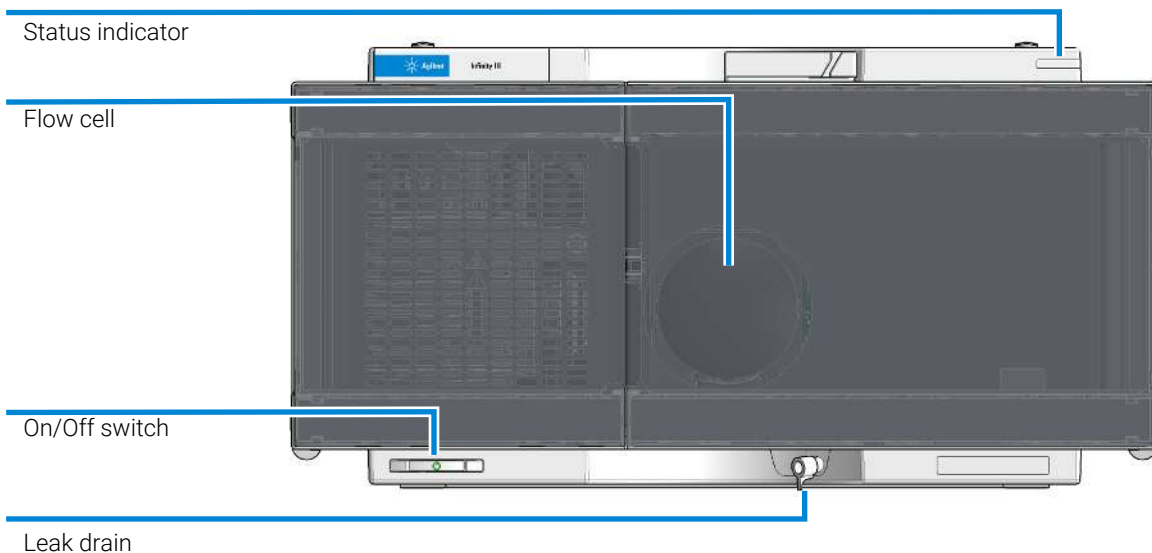


Figure 1: Overview of the G7123B Detector

Features of the 1290 Infinity III Fluorescence Detector (G7123B)

- Excellent sensitivity (Raman vs. signal noise > 2500 S/N and Raman vs. dark noise > 30000 S/N)
- Fast data rates (up to 160 Hz) and fast wavelengths switching (< 250 ms)
- Low-dispersion flow cell design (2 μ L or 13 μ L), ideal for UHPLC separations
- Excellent wavelength precision (\pm 0.2 nm) and novel calibration procedure to ensure wavelength accuracy (\pm 3.0 nm)
- Multichannel operation (up to 5 consecutive chromatograms) with a maximum data rate of 5 Hz
- Long lamp lifetime (permissible 3000 hours, guaranteed 1400 hours)
- Intuitive User Interface, Automated Workflows, Predictive Maintenance & Assisted Troubleshooting (with the InfinityLab Assist)
- Leak detection and Early Maintenance Feedback come as standard

Operating Principle

How the Detector Operates

Luminescence Detection

Luminescence, the emission of light, occurs when molecules change from an excited state to their ground state. Molecules can be excited by different forms of energy, each with its own excitation process. For example, when the excitation energy is light, the process is called *photoluminescence*.

In basic cases, the emission of light is the reverse of absorption, see [Figure 2](#) on page 10. With sodium vapor, for example, the absorption and emission spectra are a single line at the same wavelength. The absorption and emission spectra of organic molecules in solution produce bands instead of lines.

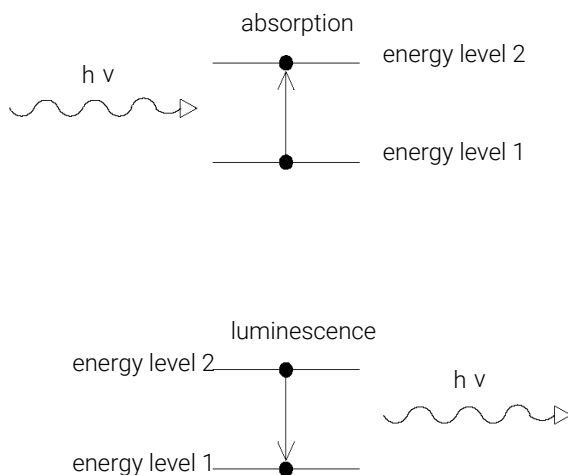


Figure 2: Absorption of Light Versus Emission of Light

When a more complex molecule transforms from its ground energy state into an excited state, the absorbed energy is distributed into various vibrational and rotational sub-levels. When this same molecule returns to the ground state, this vibrational and rotational energy is first lost by relaxation without any radiation. Then the molecule transforms from this energy level to one of the vibrational and

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rotational sub-levels of its ground state, emitting light, see [Figure 3](#) on page 11. The characteristic maxima of absorption for a substance is its λ_{EX} , and for emission its λ_{EM} .

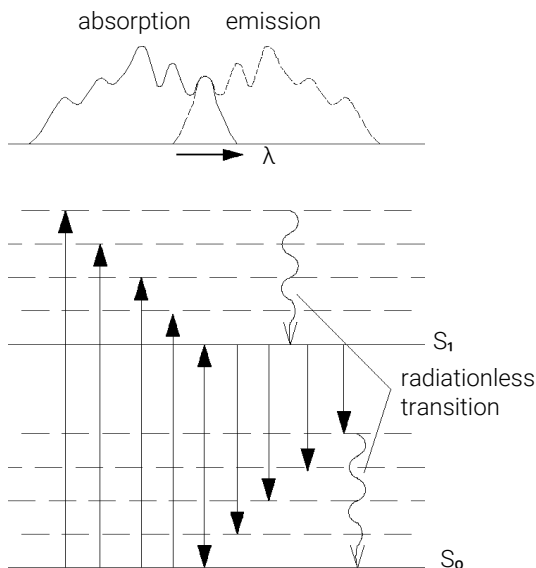


Figure 3: Relationship of Excitation and Emission Wavelengths

Photoluminescence is the collective name for two phenomena, *fluorescence* and *phosphorescence*, which differ from each other in one characteristic way – the delay of emission after excitation. If a molecule emits light 10^{-9} to 10^{-5} seconds after it was illuminated then the process was fluorescence. If a molecule emits light longer than 10^{-3} seconds after illumination then the process was phosphorescence.

Phosphorescence is a longer process because one of the electrons involved in the excitation changes its spin, during a collision with a molecule of solvent, for example. The excited molecule is now in a so-called triplet state, T, see [Figure 4](#) on page 12.

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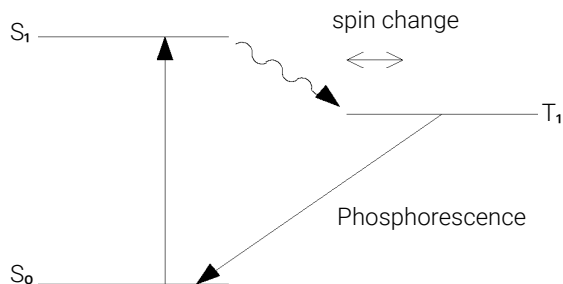


Figure 4: Phosphorescence Energy Transitions

The molecule must change its spin back again before it can return to its ground state. Since the chance of colliding with another molecule with the necessary spin for change is slight, the molecule remains in its triplet state for some time. During the second spin change the molecule loses more energy by relaxing without radiation. The light which is emitted during phosphorescence therefore has less energy and is at a longer wavelength than fluorescence.

Formula:

$$E = \frac{hc}{\lambda}$$

E	Energy
h	Planck's constant
λ	Wavelength
c	speed of light

Raman Effect

The Raman effect arises when the incident light excites molecules in the sample which subsequently scatter the light. While most of this scattered light is at the same wavelength as the incident light, some is scattered at a different wavelength. This inelastically scattered light is called Raman scatter. It results from the molecule changing its molecular motions.

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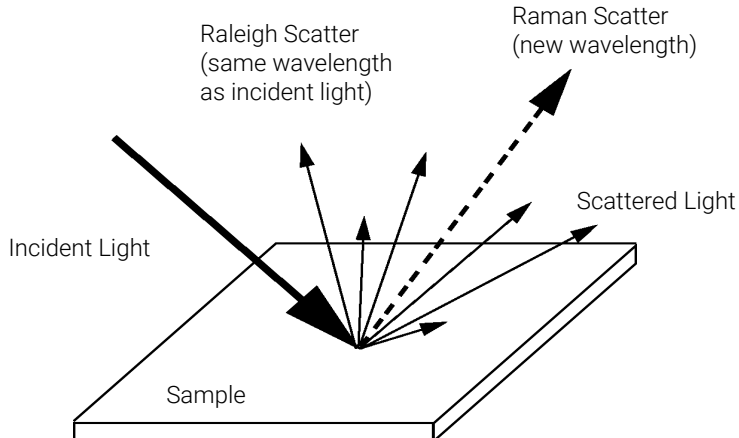


Figure 5: Raman

The energy difference between the incident light (E_i) and the Raman scattered light (E_s) is equal to the energy involved in changing the molecule's vibrational state (i.e. getting the molecule to vibrate, E_v). This energy difference is called the Raman shift.

$$E_v = E_i - E_s$$

Several different Raman shifted signals will often be observed; each being associated with different vibrational or rotational motions of molecules in the sample. The particular molecule and its environment will determine what Raman signals will be observed (if any).

A plot of Raman intensity versus Raman shift is a Raman spectrum.

Optical Unit

All the elements of the optical system, shown in [Figure 6](#) on page 14, including Hg-Xe lamp, excitation condenser lens, ellipsoid excitation mirror, excitation grating, flow cell, emission condenser mirror, cut-off filter, emission slit, ellipsoid emission mirror, emission grating and photo-multiplier tube are housed in the metal casting inside the detector compartment. The fluorescence detector has grating/grating optics, enabling the selection of both excitation and emission wavelengths. The flow cell can be accessed from the front of the fluorescence detector.

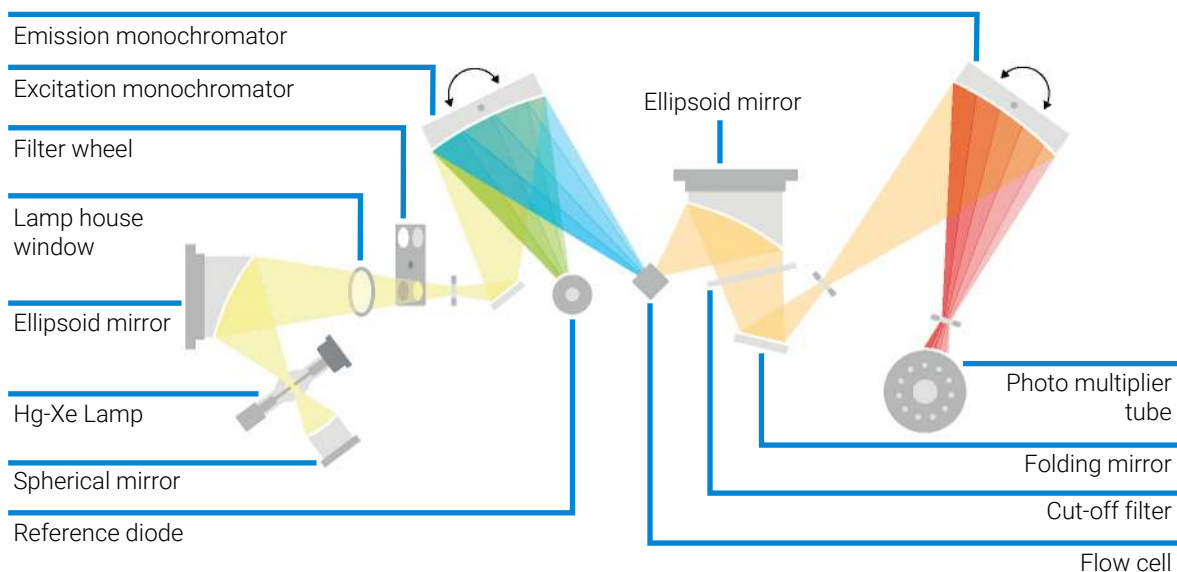


Figure 6: Optical path

The mercury-doped Hg-Xe lamp of the G7123B produces high radiant energy, especially in the UV region. In addition, there are several strongly pronounced Hg lines across the spectrum of the lamp, which make it easy to excite a fluorophore on a molecule. Distinct Hg-lines can be found at 254, 313, 365, 407, 436, 546 and 579 nm.

The Hg-Xe lamp produces a spectrum of light from 200 nm to 900 nm. The light output distribution can be expressed as a percentage in 100 nm intervals, see [Figure 7](#) on page 15. The lamp can be used for 1400 hours (on-time) and needs to be replaced then, due to safety considerations.

UV light is powerful and can cause degradation of optical components over time, especially below 250 nm is significantly higher compared to visible wavelength range.

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Relative Intensity

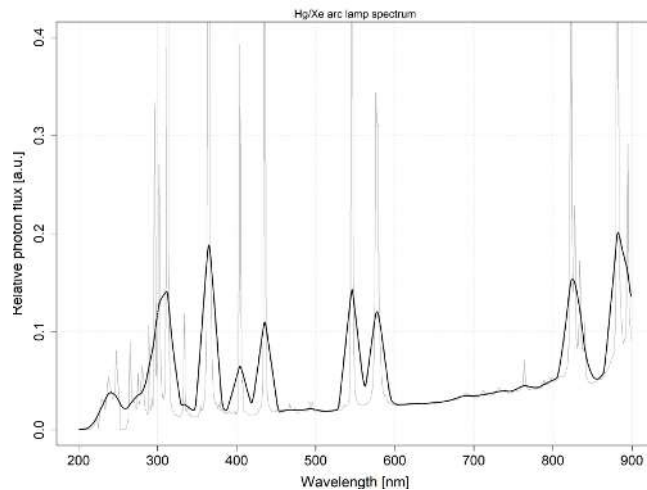


Figure 7: Lamp Energy Distribution (vendor data)

The radiation emitted by the lamp is dispersed and reflected by the excitation monochromator grating onto the cell entrance slit. The holographic concave grating is the main part of the monochromator, dispersing and reflecting the incident light. The surface contains many minute grooves, 1125 on the excitation side and 1500 on the emission side. The grating carries a blaze to show improved performance in the visible range.

The geometry of the grooves is optimized to reflect almost all of the incident light, in the 1st order and disperse it with about 70 % efficiency in the ultra-violet range. Most of the remaining 30 % of the light is reflected at zero order, with no dispersion. [Figure 8](#) on page 16 illustrates the light path at the surface of the grating.

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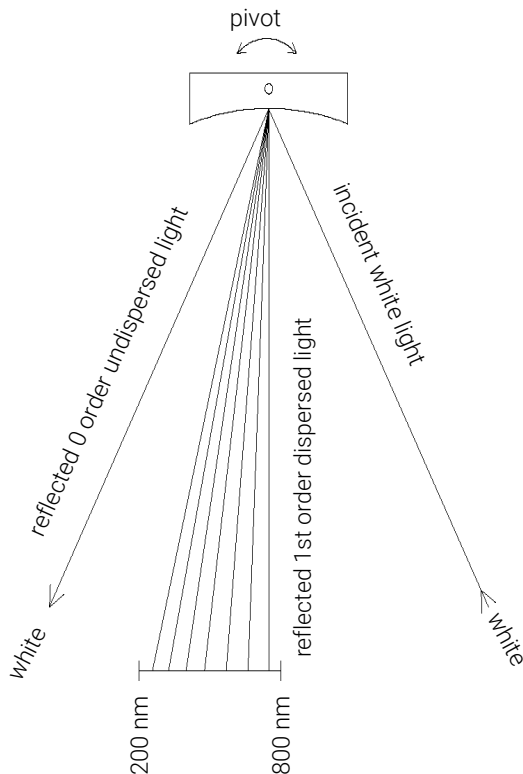


Figure 8: Dispersion of Light by a Grating

The grating is turned using a precise stepper motor, the position of the grating determining the wavelength or wavelength range of the light falling onto the flow cell. The grating can be programmed to change its position and therefore the wavelength during a run. For spectra acquisition and multi-wavelength detection, the grating performs continuous position changes.

The flow cell is a solid fused silica body with a maximum back pressure of 60 bar. Excessive back pressure will result in destruction of the cell. Operating the detector close to waste with low back pressure is recommended. In case another device (e.g. another detector, MS, fraction collector...) is installed after the Fluorescence Detector, the use of a pressure relief valve can help preventing overpressure from the Fluorescence Detector flow cell.

On the photocathode, [Figure 9](#) on page 17, incident photons generate electrons. These electrons are accelerated by an electrical field between several arc-shaped dynodes. Depending on the voltage difference between any pair of dynodes, an

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incident electron may spark-off further electrons which accelerate onto the next dynode. An avalanche effect results: finally so many electrons are generated that a current can be measured. The amplification is a function of the voltage at the dynodes and is microprocessor controlled. Amplification can be set to three levels (LOW/STANDARD/HIGH), but the majority of applications will work just fine with the STANDARD setting. With the digitized photo-multiplier signal, a very broad dynamic range can be achieved.

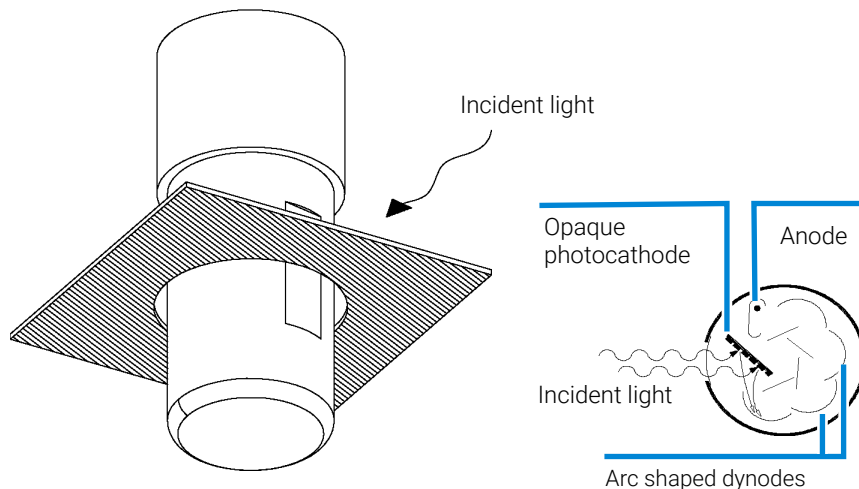


Figure 9: Photo-multiplier Tube

PMTs are designed for specific wavelength ranges. The standard PMT offers optimum sensitivity from 200 to 600 nm. In the higher wavelength range, a red-sensitive PMT can improve performance, but at the cost of a deterioration in I-to-I variation, because the factory-made EM calibration is only valid with the default PMT. Contact your Agilent representative for more details.

Reference System



A reference diode, located near the cell compensates for lamp fluctuations. It also helps with the initial calibration of the excitation monochromator. Furthermore it gets utilized in a set of tests.

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Flow Cell

The detector allows easy access to flow cells via front access. Different volumes of flow cells can be inserted using the same quick, tool-free mounting system.

p/n	Description
 G7123-60300	Flow Cell 13 μ L
 G7123-60500	Flow Cell 2 μ L

Hydraulic Path

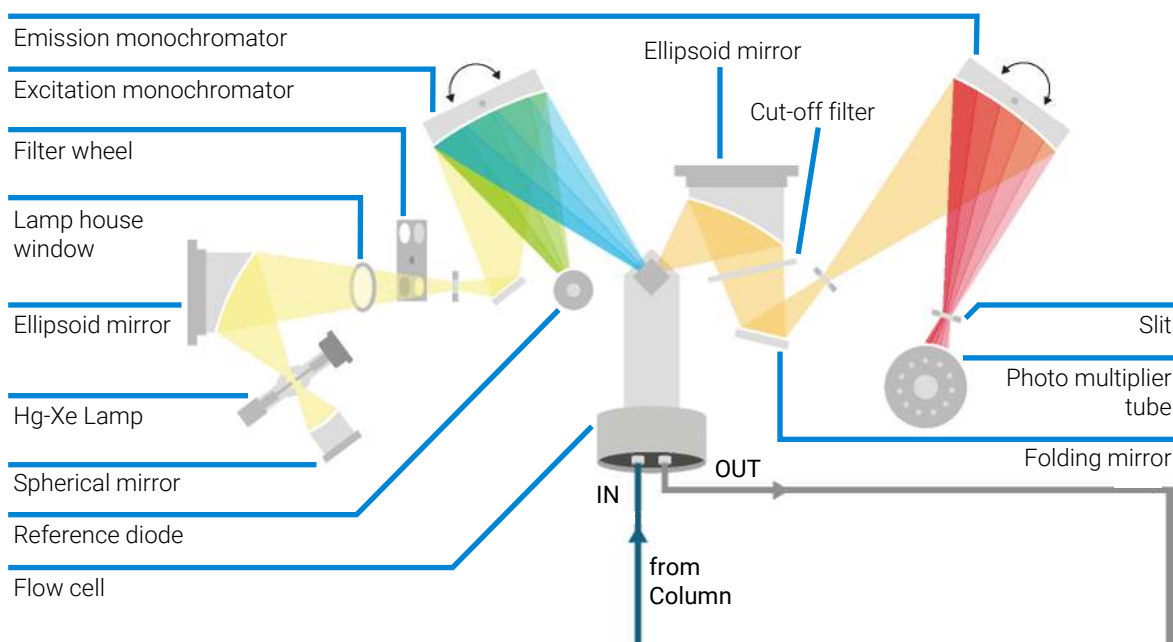


Figure 10: Hydraulic path

2

Site Requirements and Specifications

This chapter provides information on environmental requirements, physical and performance specifications.

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Site Requirements

A suitable and stable environment is important to ensure optimal performance of the module. Due to the sensitive detection parts, vibrations should be avoided, as well as temperature variations.

Power Considerations

The module power supply has wide ranging capability. It accepts any line voltage in the range described in [Specifications of the 1290 Infinity III Fluorescence Detector \(G7123B\)](#) on page 24. Consequently there is no voltage selector in the rear of the module. There are also no externally accessible fuses, because automatic electronic fuses are implemented in the power supply.

WARNING**Inaccessible power plug.**

In case of emergency it must be possible to disconnect the instrument from the power line at any time.

- Make sure the power connector of the instrument can be easily reached and unplugged.
- Provide sufficient space behind the power socket of the instrument to unplug the cable.

WARNING**Incorrect line voltage at the module**

Shock hazard or damage of your instrument can result if the devices are connected to line voltage higher than specified.

- Connect your module to the specified line voltage.

Power Cords

Country-specific power cords are available for the module. The female end of all power cords is identical. It plugs into the power-input socket at the rear. The male end of each power cord is different and designed to match the wall socket of a particular country or region.

Agilent makes sure that your instrument is shipped with the power cord that is suitable for your particular country or region.

WARNING**Unintended use of power cords**

Using power cords for unintended purposes can lead to personal injury or damage of electronic equipment.

- Never use a power cord other than the one that Agilent shipped with this instrument.
- Never use the power cords that Agilent Technologies supplies with this instrument for any other equipment.
- Never use cables other than the ones supplied by Agilent Technologies to ensure proper functionality and compliance with safety or EMC regulations.

WARNING**Absence of ground connection**

The absence of ground connection can lead to electric shock or short circuit.

- Never operate your instrumentation from a power outlet that has no ground connection.

WARNING**Electrical shock hazard**

Solvents may damage electrical cables.

- Prevent electrical cables from getting in contact with solvents.
- Exchange electrical cables after contact with solvents.

Bench Space

The module dimensions and weight (see [Specifications of the 1290 Infinity III Fluorescence Detector \(G7123B\)](#) on page 24) allow you to place the module on almost any desk or laboratory bench. It needs an additional 2.5 cm (1.0 inches) of space on either side and approximately 8 cm (3.1 inches) in the rear for air circulation and electric connections.

If the bench shall carry a complete HPLC system, make sure that the bench is designed to bear the weight of all modules.

The module should be operated in a horizontal position.

NOTE

Agilent recommends that you install the HPLC instrument in the InfinityLab Flex Bench rack. This option helps to save bench space as all modules can be placed into one single stack. It also allows to easily relocate the instrument to another lab.

Environment

Your module will work within specifications at ambient temperatures and relative humidity as described in [Specifications of the 1290 Infinity III Fluorescence Detector \(G7123B\)](#) on page 24.

Better drift performance depends on better control of the temperature fluctuations. To realize the highest performance, minimize the frequency and the amplitude of the temperature changes to below 1 °C/hour (1.8° F/hour). Turbulences around one minute or less can be ignored.

CAUTION

Condensation within the module

Condensation can damage the system electronics.

- Do not store, ship or use your module under conditions where temperature fluctuations could cause condensation within the module.
- If your module was shipped in cold weather, leave it in its box and allow it to warm slowly to room temperature to avoid condensation.

NOTE

This module is designed to operate in a typical electromagnetic environment, i.e. where RF transmitters such as mobile telephones may not be used in close proximity.

Specifications of the 1290 Infinity III Fluorescence Detector (G7123B)

Table 1: Physical specifications of the 1290 Infinity III Fluorescence Detector (G7123B)

Type	Specification	Comments
Weight	15.9 kg (35.05 lbs)	Without flow cell
Dimensions (height x width x depth)	203 x 396 x 436 mm (8.00 x 15.59 x 17.17 inches)	
Line voltage	100–240 V~, ±10%	Wide-ranging capability
Line frequency	50 or 60 Hz, ±5%	
Power consumption	25 W (idle) 240 VA; 240 W	Idle Lamp on + Multi-WL mode
Ambient operating temperature	4–40 °C (39–104 °F)	
Ambient non-operating temperature	-40–70 °C (-40–158 °F)	
Humidity	< 95% r.h. at 40 °C (104 °F)	Non-condensing
Operating altitude	Up to 3000 m (9842 ft)	
Safety standards: IEC, EN, CSA, UL	Overvoltage category II, Pollution degree 2	For indoor use only
ISM Classification	ISM Group 1 Class B	According to CISPR 11

Site Requirements and Specifications

Specifications of the 1290 Infinity III Fluorescence Detector (G7123B)

Table 2: Performance specifications of the 1290 Infinity III Fluorescence Detector (G7123B)

Type	Specification	Comments
Detection type	Fluorescence Detector	
Designed for use with Agilent InfinityLab Assist	Intuitive User Interface, Automated Workflows, Predictive Maintenance & Assisted Troubleshooting	
Single wavelength operation	Raman SNR > 2500 Raman SNR vs Dark > 30000	Raman SNR: EX: 365 nm, EM: 416 nm (height, noise) Raman SNR vs Dark: EX: 365 nm, EM: 416 nm (height) / 470 nm (noise) response time = 4.2 sec PMT = Standard
Light source	Hg-Xe arc lamp 150 W Lifetime 3000 h	Guaranteed lifetime = 1400 h, permissible 3000 h. Lamp lifetime based on intensity and operational safety.
Maximum data rate	160 Hz	
Wavelength range (Ex, Em)	Settable range 200 nm – 1200 nm and zero-order	
Spectral bandwidth (Ex, Em)	<= 20 nm	
Wavelength accuracy	+/- 3.0 nm	
Wavelength precision	+/- 0.2 nm	
Reference system	Reference diode	
Timetable programming	Wavelength (Ex, Em) PMT Gain	
Multi-channel acquisition	Up to 5 channels	Maximum data rate 5 Hz
Spectrum acquisition	Excitation and Emission spectra	Scannable range 200 nm – 800 nm Step size 1 nm - 20 nm
Flow cell volume	2 µL volume 13 µL volume	
Maximum pressure	60 bar (6 MPa)	
pH range	1.0 ... 12.5	Solvent dependent
Wetted materials	MP35N, Fused Silica, FEP	Bio compatible

Site Requirements and Specifications

Specifications of the 1290 Infinity III Fluorescence Detector (G7123B)

Type	Specification	Comments
Analog output	100 mV or 1 V full scale	BNC connector type
Instrument Control	LC & CE Drivers 3.11 or above Instrument Control Framework (ICF) 3.5 or above Lab Advisor 2.23 or above Assist Control Software 2.1 or above Instant Pilot (G4208A) with firmware B.02.26 or above	For details about supported software versions refer to the compatibility matrix of your version of the LC and CE Drivers
Communication	LAN, CAN, USB, ERI: ready, start, stop and shutdown signals	
Safety features and maintenance	Leak detection, safe leak handling, leak output signal for shutdown of the pumping system. No hazardous voltages in major maintenance areas. Extensive diagnostics, error detection and display.	
GLP features	Early maintenance feedback (EMF) for continuous tracking of instrument usage in terms of lamp burn time with pre-defined and user settable limits and feedback messages. Electronic records of maintenance and errors.	
Maintenance	Tool-free lamp exchange Tool-free flow cell exchange Tool-free lamp house window exchange	Tasks designed for safe customer handling
Housing	All materials are recyclable.	

Site Requirements and Specifications

Specifications of the 1290 Infinity III Fluorescence Detector (G7123B)

**Specification Conditions of the 1290 Infinity III
Fluorescence Detector (G7123B)**

All specification conditions refer to standard laboratory ambient conditions (+20°C, 50% r.h.).



3 Installation

The installation of the module will be done by an Agilent service representative. In this chapter, only installation of user-installable options and accessories are described.

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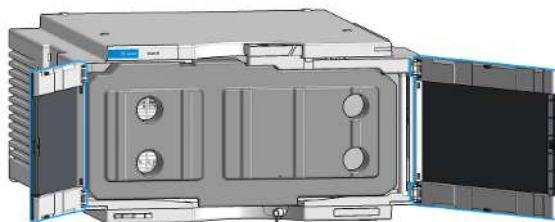
Instrument Configuration 49

Installation

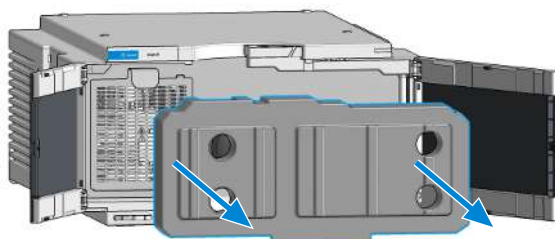
Installing the Detector

Parts required	Qty.	p/n	Description
	1	 G7123-60500	Flow Cell 2 μ L
	1	 G7123-60300	Flow Cell 13 μ L
	1	 G7123-42009	Foam Protection FLD
	1	 1401-0641	Cap-round W/FLG 60.33mm-ID Vinyl Black
	1	 0100-1259	Plug-Screw 1032- Fitting

- 1 Open the doors.



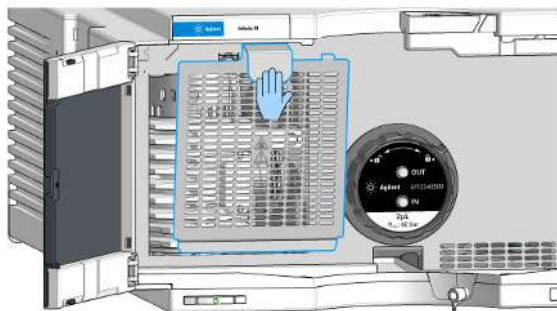
- 2 Remove the transport protection foam.



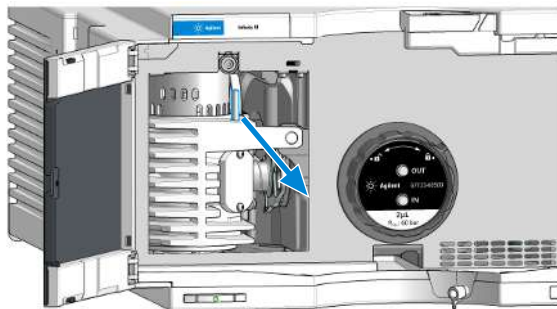
Installation

Installation

- 3 Remove the safety grid by pulling on the metal handle.



- 4 Remove the yellow transportation lock from the left side.
- 5 Pull the metal rod towards the front, so the lamp housing gets turned by 90 degrees.

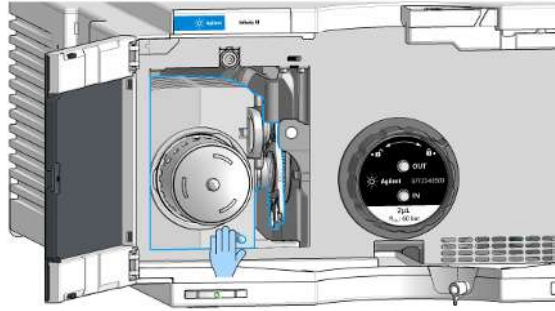


- 6 Remove the yellow transportation cap from the lamp.

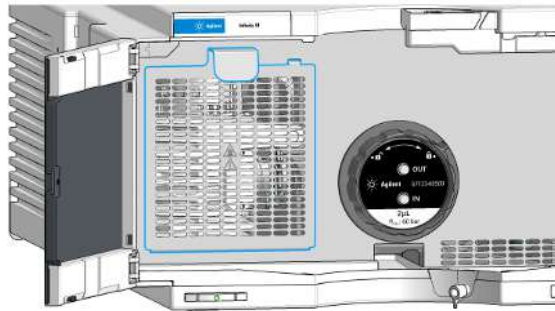
Installation

Installation

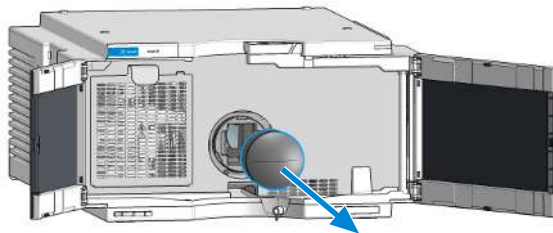
- 7 Push the metal rod on the lamp housing up-/backwards, so the lamp housing turns by 90 degrees until it comes to a stop and gets held in place by a magnet.



- 8 Re-install the safety grid. Insert at the bottom, then the top gets held in place by a magnet.



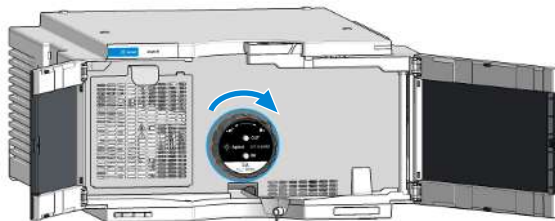
- 9 Remove the black protection cover from the cell opening.



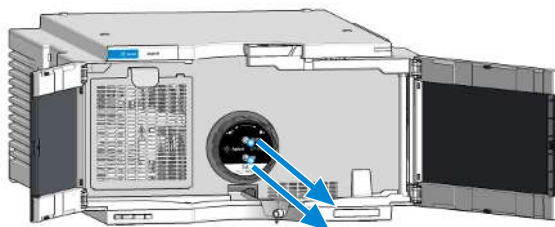
Installation

Installation

- 10** Turn the black collar of the flow cell to be installed to the unlock position, as indicated on the cell label. Then insert the flow cell into the detector until it stops. The flow cell is keyed, so it cannot be installed in a wrong way. To lock the cell, turn the black collar clockwise until stop position, also indicated by an acoustic click.



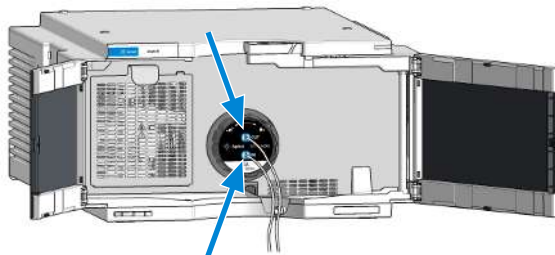
- 11** Remove the flow cell plugs.



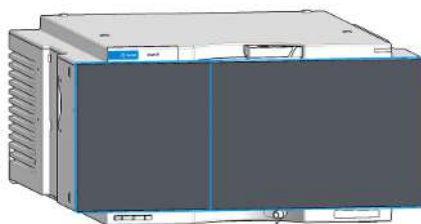
Installation

Installation

12 Install the capillaries.



13 Close the doors.



Installing Capillaries

This section provides information on how to install capillaries and fittings.

Install Capillary Connections

Capillaries and connections depend on which system is installed.

NOTE

As you move to smaller-volume, high-efficiency columns, you will want to use narrow id tubing, as opposed to the wider id tubing used for conventional HPLC instruments.

NOTE

Agilent capillaries are color-coded for quick identification, see [At-a-Glance Details About Agilent Capillaries](#) on page 230.

Table 3: Capillary connections for 1290 Infinity III systems

p/n	From	To
G7120-60007 (Bottle Head Assembly, long (1730 mm))	Solvent Bottle	Infinity III Pump
5500-1245 (Capillary ST 0.17 mm x 400 mm SI/SI)	Pump	Sampler
5500-1217 (Capillary, ST, 0.17 mm x 900 mm SI/SX)	Pump	Vialsampler with ICC
5500-1157 (Capillary ST 0.12 mm x 500 mm SL/S)	Multisampler	MCT Valve/Heat Exchanger
5500-1251 (Capillary ST 0.12 mm x 400 mm SL/SL)	Vialsampler	MCT Valve/Heat Exchanger
5500-1238 (Capillary ST 0.12 mm x 105 mm SL/SL)	Vialsampler	ICC Heat Exchanger
5500-1249 (Capillary ST 0.12 mm x 120 mm SL/SL, long socket)	ICC Heat Exchanger	Column
5500-1201 (Capillary ST 0.12 mm x 105 mm SL)	MCT Heat Exchanger	Column
5500-1191 (InfinityLab Quick Turn Capillary ST 0.12 mm x 280 mm, long socket) OR 5500-1596 (Quick Turn Capillary MP35N 0.12 mm x 280 mm)	Column/MCT Valve	Detector (DAD or 1290 FLD)
5062-8535 (Waste accessory kit (Flow Cell to waste))	VWD	Waste
5062-2462 (Tube PTFE 0.7 mm x 5 m, 1.6 mm od)	DAD or 1290 FLD	Waste
G5664-68712 (Analytical tubing kit 0.25 mm i.d. PTFE-ESD)	Detector	Fraction Collector

Table 4: Capillary connections for 1290 Infinity III Bio LC

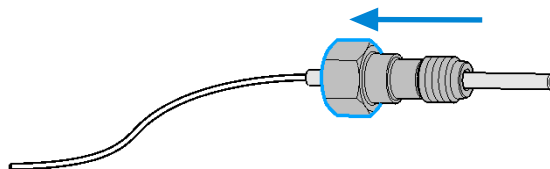
p/n	From	To
G7120-60007 (Bottle Head Assembly, long (1730 mm))	Solvent Bottle	Infinity III Pump
5500-1419 (Capillary MP35N 0.17 mm x 500 mm, SI/SI)	Pump	Multisampler
5500-1279 (Capillary MP35N 0.12 mm x 500 mm SI/SI)	Multisampler	MCT
5500-1578 (Quick Connect Capillary MP35N 0.12 mm x 105 mm)	MCT Heat Exchanger	Column
5500-1596 (Quick Turn Capillary MP35N 0.12 mm x 280 mm)	Column/MCT Valve	Detector (DAD or 1290 FLD)
5500-1598 (Quick Turn Capillary MP35N 0.12 mm x 500 mm)	Column/MCT Valve	Detector (VWD)
5062-8535 (Waste accessory kit (Flow Cell to waste))	VWD	Waste
5062-2462 (Tube PTFE 0.7 mm x 5 m, 1.6 mm od)	DAD or 1290 FLD	Waste
G5664-68712 (Analytical tubing kit 0.25 mm i.d. PTFE-ESD)	Detector	Fraction Collector

For correct installation of capillary connections it's important to choose the correct fittings, see [Syntax for Capillary Description](#) on page 230.

- 1 Select a nut that is long enough for the fitting you'll be using.



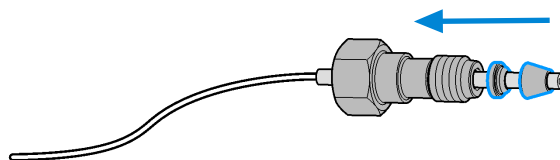
- 2 Slide the nut over the end of the tubing or capillary.



Installation

Installing Capillaries

- Carefully slide the ferrule components on after the nut and then finger-tighten the assembly while ensuring that the tubing is completely seated in the bottom of the end fitting.

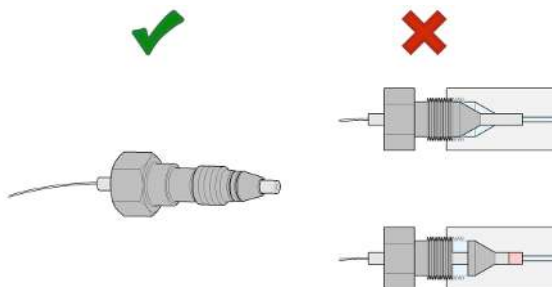


- Use a stable port installed to the module to gently tighten the fitting facing to the module. Or use the column to tighten the fitting facing to the column. This measure forces the ferrule to seat onto the tubing or capillary.

NOTE

Do not overtighten. Over-tightening will shorten the lifetime of the fitting.

- Loosen the nut and verify that the ferrule is correctly positioned on the tubing or capillary.



NOTE

The first time that the Swagelok fitting is used on a column or an injection valve, the position of the ferrule is permanently set. If changing from a column or an injection valve to another, the fitting may leak or decrease the quality of the separation by contributing to band broadening.

For Bio and Bio-Inert Systems, the Swagelok instructions do not apply.

Handling Leak and Waste

The Agilent InfinityLab LC Series has been designed for safe leak and waste handling. It is important that all security concepts are understood and instructions are carefully followed.

The solvent cabinet is designed to store a maximum volume of 8 L solvent. The maximum volume for an individual bottle stored in the solvent cabinet should not exceed 2 L. For details, see the usage guideline for the Agilent Infinity III Solvent Cabinets (a printed copy of the guideline has been shipped with the solvent cabinet, electronic copies are available on the Internet).

All leak plane outlets are situated in a consistent position so that all Infinity and Infinity II/III modules can be stacked on top of each other. Waste tubes are guided through a channel on the right hand side of the instrument, keeping the front access clear from tubes.

The leak plane provides leak management by catching all internal liquid leaks, guiding them to the leak sensor for leak detection, and passing them on to the next module below, if the leak sensor fails. The leak sensor in the leak plane stops the running system as soon as the leak detection level is reached.

Solvent and condensate is guided through the waste channel into the waste container:

- from the detector's flow cell outlet
- from the Multisampler needle wash port
- from the Sample Thermostat (condensate)
- from the pump's Seal Wash Sensor (if applicable)
- from the pump's Purge Valve or Multipurpose Valve

Installation

Handling Leak and Waste

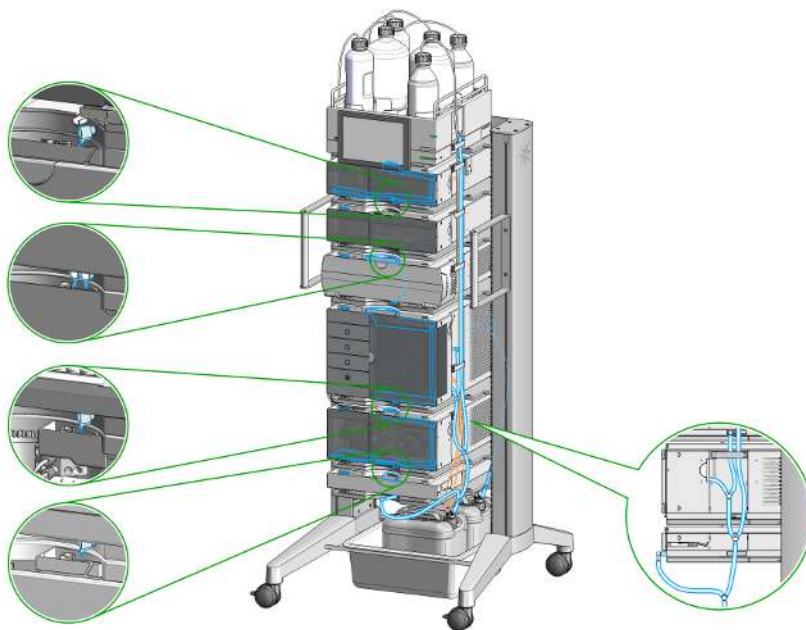


Figure 11: Infinity III Leak Waste Concept (Flex Bench installation)

Installation

Handling Leak and Waste

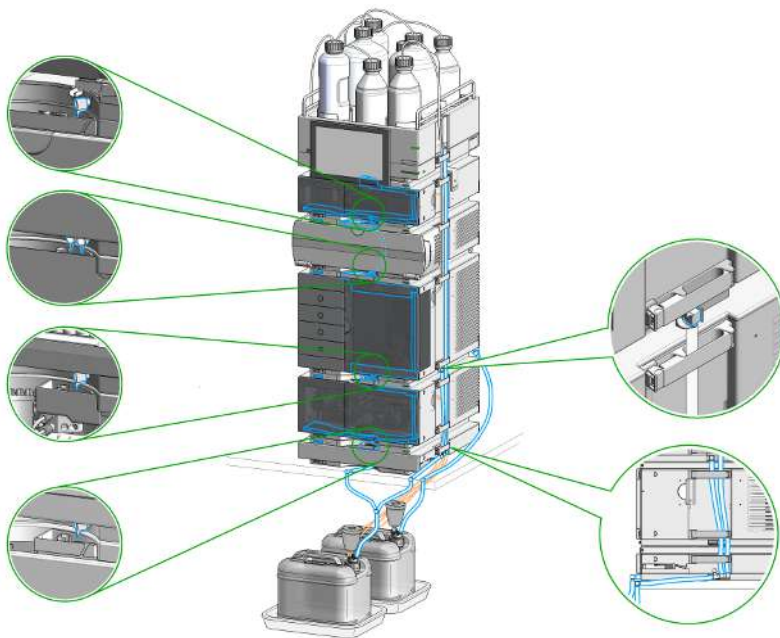


Figure 12: Infinity III Single Stack Leak Waste Concept (bench installation)

Installation

Handling Leak and Waste

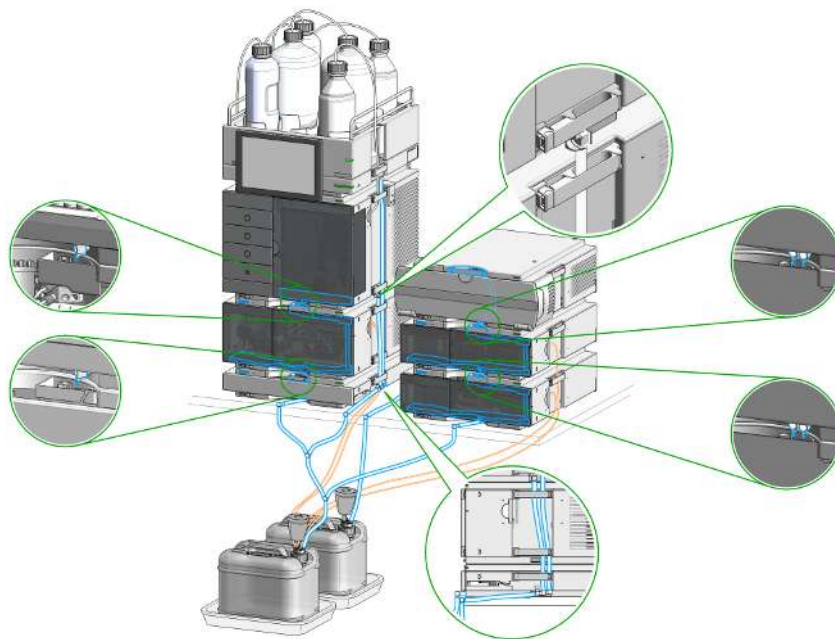


Figure 13: Infinity III Two Stack Leak Waste Concept (bench installation)

The waste tube connected to the leak plane outlet on each of the bottom instruments guides the solvent to a suitable waste container.

Drain Connectors Installation

Drain Connectors have been developed to improve leak drainage for low flow leaks of high viscosity solvents (for example, isopropanol) in Agilent InfinityLab LC Series Systems. Install these parts to modules where they are missing (usually preinstalled).

- Make sure that dripping adapters are correctly installed on each module in the LC stack, excluding lowest module.
- Remove the dripping adapter if it is appeared to be installed on the lowest module in the LC stack and connect waste tube instead.
- Consider 5004-0000 (Drain Connectors Kit) if drain adaptor is missing on some module(s).

For illustration, see [Handling Leak and Waste](#) on page 38.

Parts required

Qty.	p/n	Description
1	 5004-0000	Drain Connectors Kit

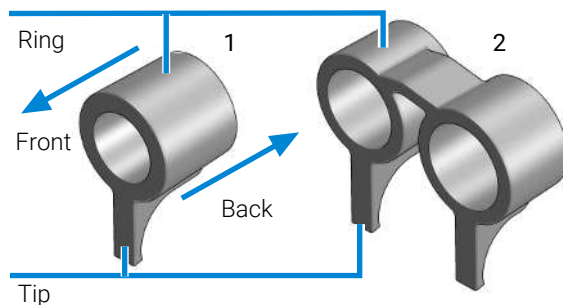


Content of Drain Connectors Kit (p/n 5004-0000)


Figure 14: Overview of Drain Connectors: Single (left) and Double (right)

#	Qty.	p/n	Description
Parts can be ordered only as a complete kit.			
1	3	 5043-1834	Single Drain Connector ID3.0-Long
2	1	 5043-1836	Double Drain Connector-Long

Installation

Handling Leak and Waste

Table 5: Compatibility of drain connectors and modules

Drain Connector Type	Compatible Module	Compatible Module Type	
Double	G7116A/B	Column Compartment	
Single	G7114A/B	Detector	
	G7115A		
	G7117A/B/C		
	G7121A/B		
	G7123B		
	G7162A/B		
	G7165A		
	G7129A/B/C		Sampler
	G7167A/B/C		
	G5668A		
	G7137A/B		
	G7157A	Degasser	
	G4767A		
	G7122A	Pump	
	G7104A/C		
	G7110B		
	G7111A/B		
	G7112B		
	G7120A		
	G7131A/C		
G7132A			
G5654A			
G4782A			

Prerequisites

- Leak drains of LC modules are clean and free of salt or solvent residuals.

NOTE

Do not install drain connectors on the bottom modules of the stack. Drain outlet of the bottom module has to be connected via waste tubing to a suitable waste container (see Leak and Waste Handling in the manual for a respective module).

Installation

Handling Leak and Waste

NOTE

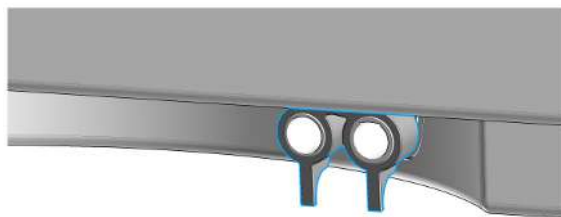
In case of incorrect installation, drain connectors cannot fully perform the intended function.

NOTE

It is not required to power off the HPLC stack to install Single and Double Drain Connectors. The installation of the connectors does not affect the analysis performed during the installation.

Install the Double Drain Connector on the leak drain of the Multicolumn Thermostat

- 1 Align the rings with the leak drain outlets of the module, press slightly with the fingers, and slide the connector along the leak drain outlets until it is aligned with the front of the leak drain.

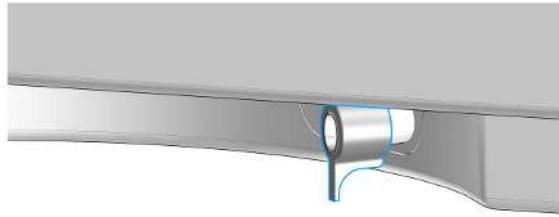


Installation

Handling Leak and Waste

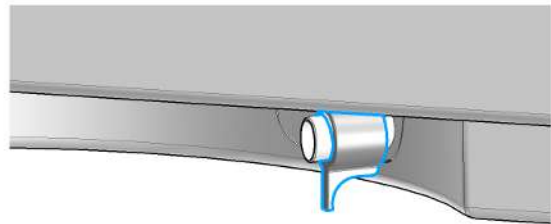
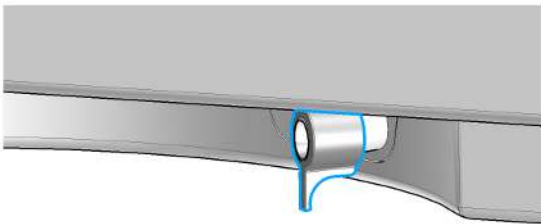
Install Single Drain Connectors on other modules in the LC stack

- 1 Align the ring with the leak drain outlet of the module, press slightly with the fingers, and slide the connector along the leak drain outlet until it is aligned with the front of the leak drain.



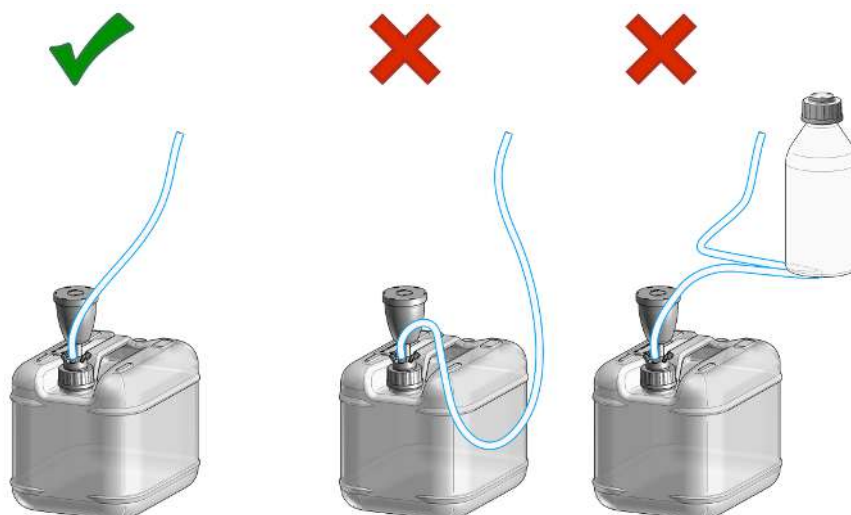
Make sure that the following requirements are covered:

- The tip of the drain connector points straight down.
- The leak drain outlets and the drain connectors are aligned properly.



Waste Concept

Agilent recommends using 5043-1221 (6 L waste can with 1 Stay Safe cap GL45 with 4 ports) for optimal and safe waste disposal. If you decide to use your own waste solution, make sure that the tubes don't immerse in the liquid.

**Waste Guidance**

NOTE

The waste drainage must go straight into the waste containers. The waste flow must not be restricted at bends or joints.

Leak Sensor**CAUTION**

Solvent incompatibility

The solvent DMF (dimethylformamide) leads to corrosion of the leak sensor. The material of the leak sensor, PVDF (polyvinylidene fluoride), is incompatible with DMF.

- Do not use DMF as mobile phase.
- Check the leak sensor regularly for corrosion.
- Do not place metal parts on the leak panel or the leak sensor.

Connecting Modules and Control Software

WARNING**Use of unsupplied cables**

Using cables not supplied by Agilent Technologies can lead to damage of the electronic components or personal injury.

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

Instrument Configuration

NOTE

If the system in use supports the InfinityLab Assist, follow the instructions provided.

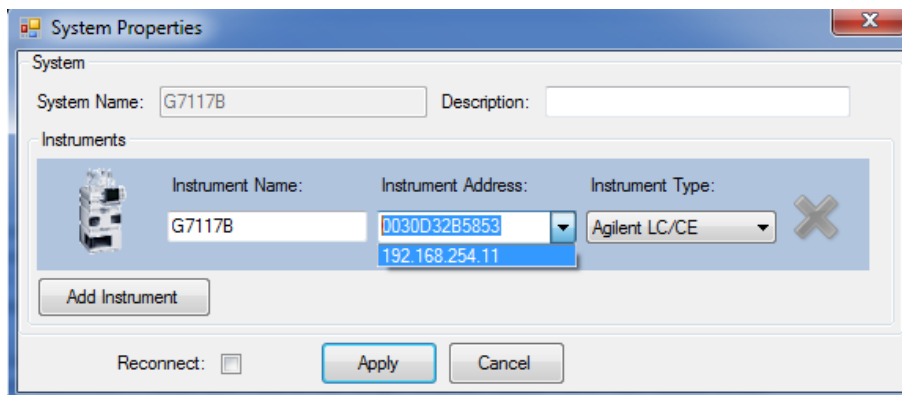
Else use LabAdvisor, or OpenLab CDS.

Example shows an instrument configuration with a Diode Array Detector in LabAdvisor.

- 1 Set the switches of the Configuration switch at the rear of the module:
 - a All switches DOWN: module uses the default IP address 192.168.254.11.



- b Switch 4 UP and others DOWN: module uses DHCP.
 - c Switch 5 UP and others DOWN: modules uses STORED address.
- 2 Enter the setup information (MAC ¹ / IP address and/or Instrument Name).



¹ MAC address can only be used in DHCP DIP-switch configuration.



4 Using the Module

This chapter provides information on how to use the module.

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Turn On/Off 51

Status Indicators 54

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The Detector User Interface 66

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Online Spectra 72

Advanced Settings 73

Time Table 73

Transporting the Detector 74

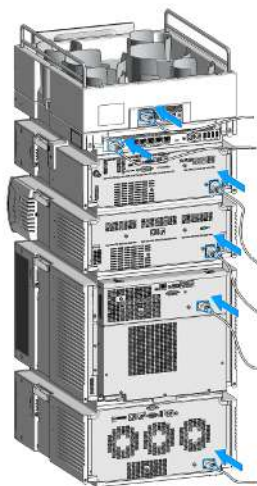
Prepare the Detector for Transportation 74

General Information

Turn On/Off

This procedure exemplarily shows an arbitrary LC stack configuration.

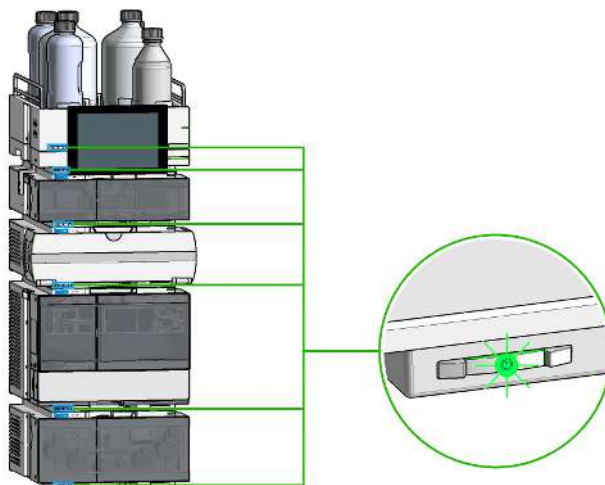
1



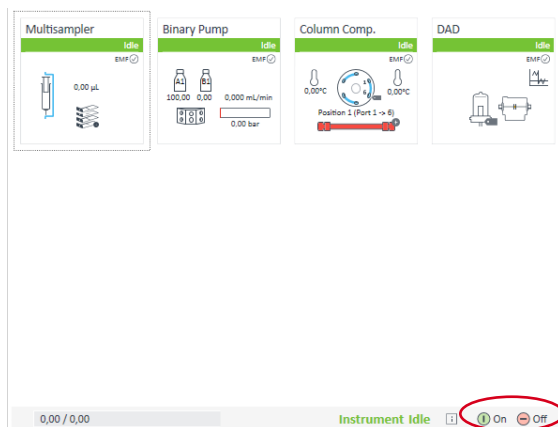
Using the Module

General Information

2 On/Off switch: On



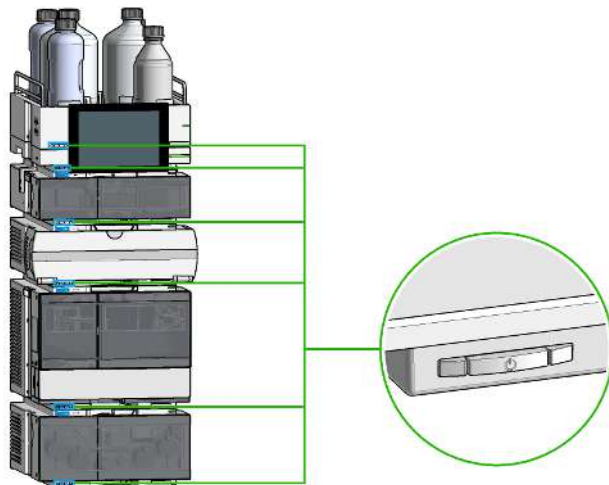
3 Turn instrument On/Off with the control software.



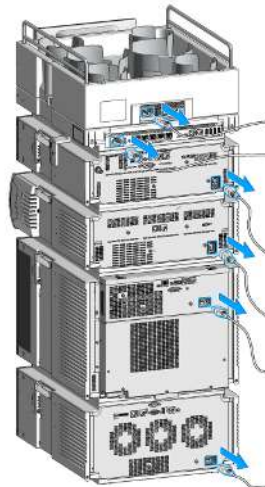
Using the Module

General Information

4 On/Off switch: Off



5



Status Indicators

The module status indicator indicates one of six possible module conditions.

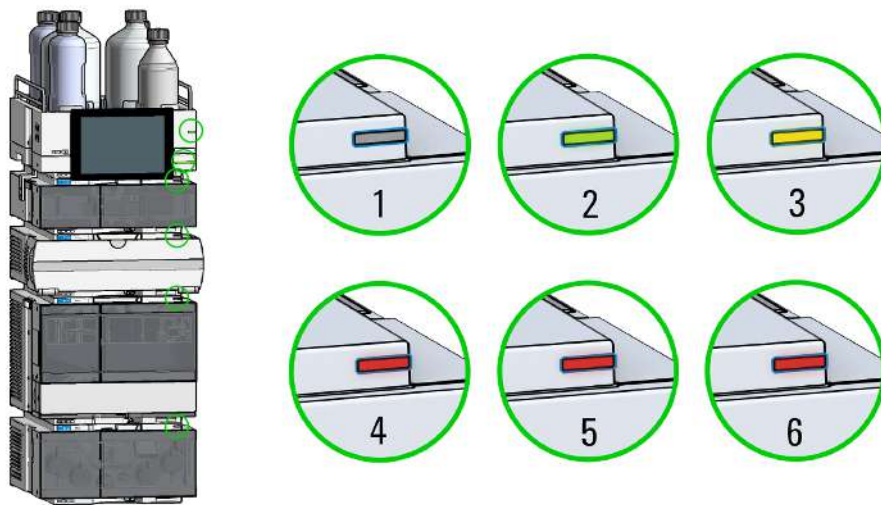


Figure 15: Arbitrary LC stack configuration (example)

1	Idle
2	Run mode
3	Not-ready. Waiting for a specific pre-run condition to be reached or completed.
4	Error mode - interrupts the analysis and requires attention (for example, a leak or defective internal components).
5	Resident mode (blinking) - for example, during update of main firmware.
6	Bootloader mode (fast blinking). Try to re-boot the module or try a cold-start. Then try a firmware update.

InfinityLab Assist Hub Status Indicator

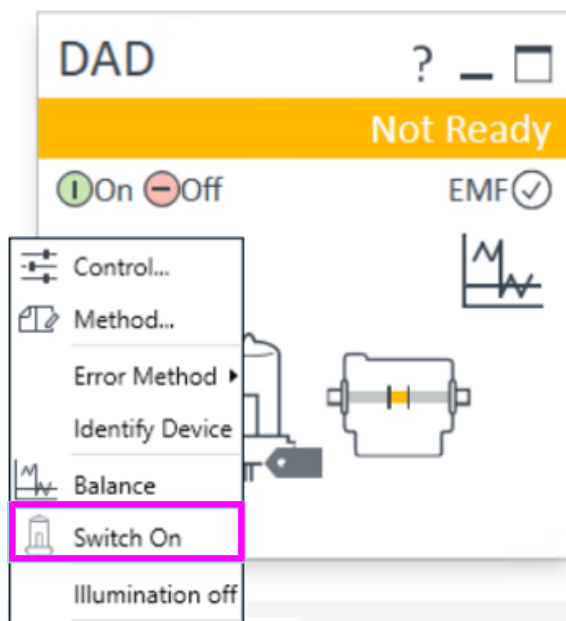
The Assist Hub status indicator displays the status of the entire system. If a module in the system is not ready (yellow), the Assist Hub status indicator also shows not ready (yellow). The same applies for the module conditions **Idle**, **Run mode**, and **Error mode**.

Preparation of the System

Prepare a Run

This procedure exemplarily shows how to prepare a run. Parameters as shown in the screenshots may vary, depending on the system installed.

- 1 Switch on the detector.

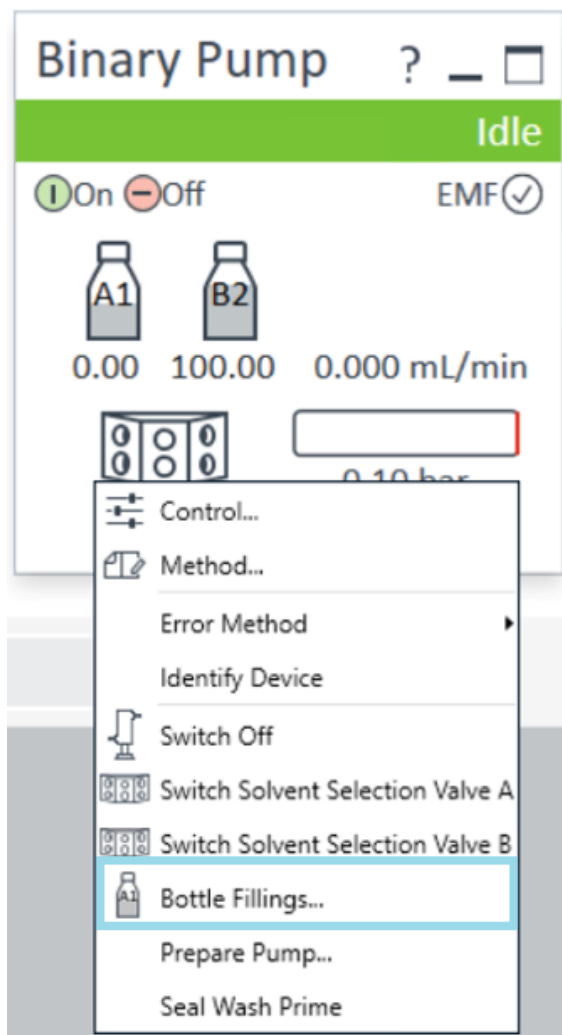


- 2 Fill the solvent bottles with adequate solvents for your application.
- 3 Place solvent tubings with bottle head assemblies into the solvent bottles.
- 4 Place solvent bottles into the solvent cabinet.

Using the Module

Preparation of the System

- 5 Solvent bottle filling dialog (in the software).



Using the Module

Preparation of the System

Solvent Bottle

Fillings

	Actual Volume	Unit	Total Volume	Unit
A1	0.22	liter	1.00	liter
A2	0.29	liter	1.00	liter
B1	0.16	liter	1.00	liter
B2	0.49	liter	1.00	liter

Actions

Prevent analysis if level falls below liter

Turn pump off if running out of solvent

Waste Bottle

Filling

Waste bottle: liter liter

Actions

Prevent analysis if level raises above liter

Turn pump off if waste volume has reached maximum limit

Ok Cancel Help

6 Purge the pump.

NOTE

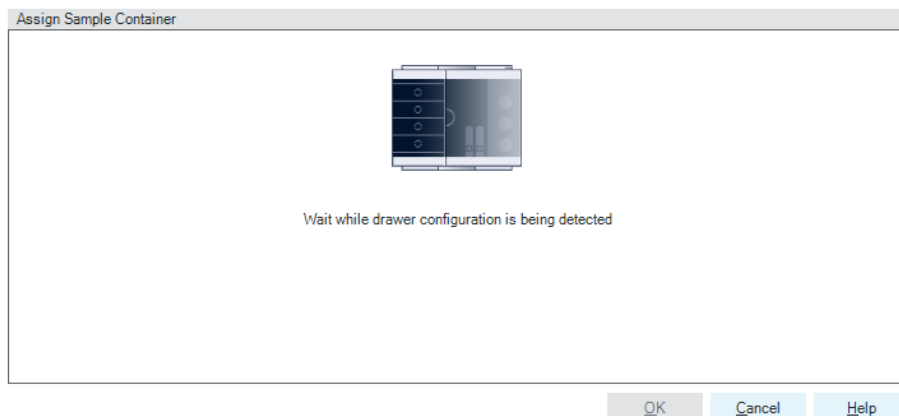
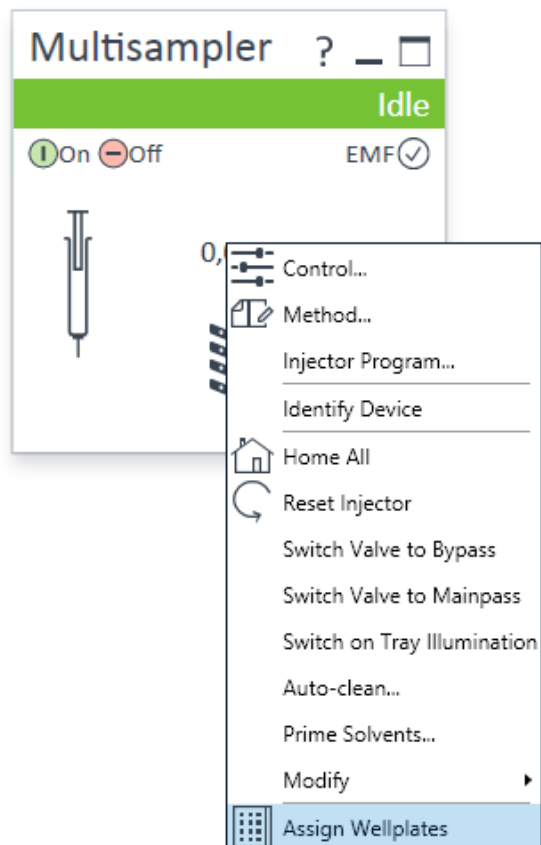
For details on priming and purging, refer to the technical note *Best Practices for Using an Agilent LC System Technical Note (InfinityLab-BestPractice-en-SD-29000194.pdf, SD-29000194)*.

7 Change solvent type if necessary.

Using the Module

Preparation of the System

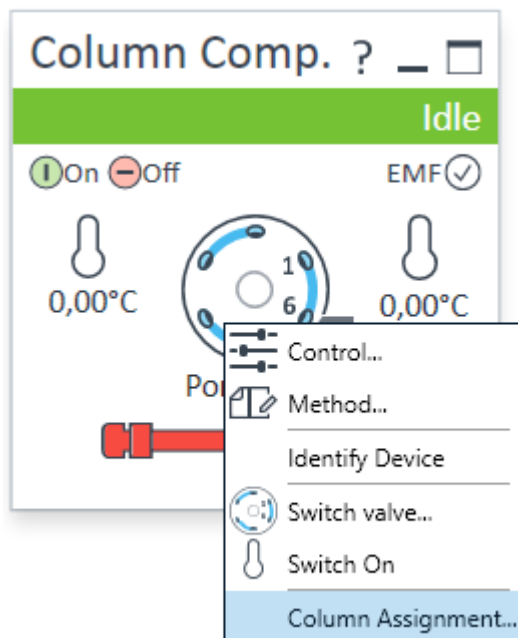
- 8 Choose the tray format of the sampler.



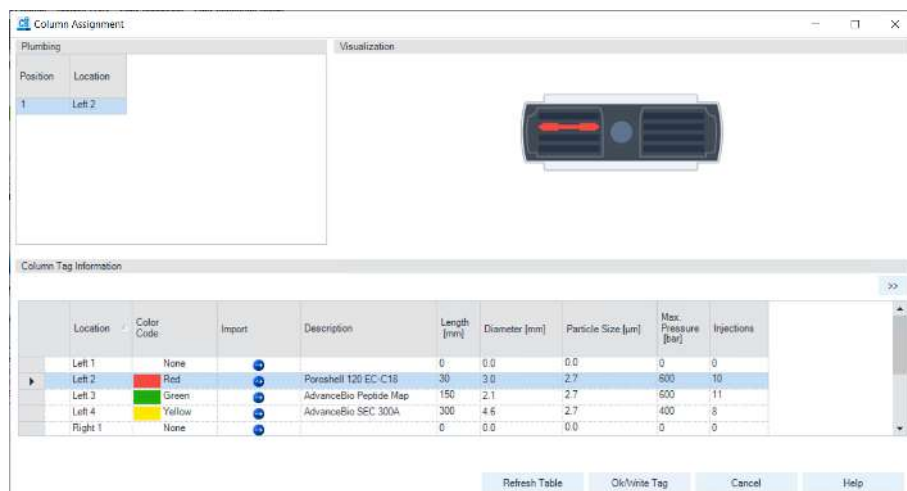
Using the Module

Preparation of the System

- 9 Add a new column.



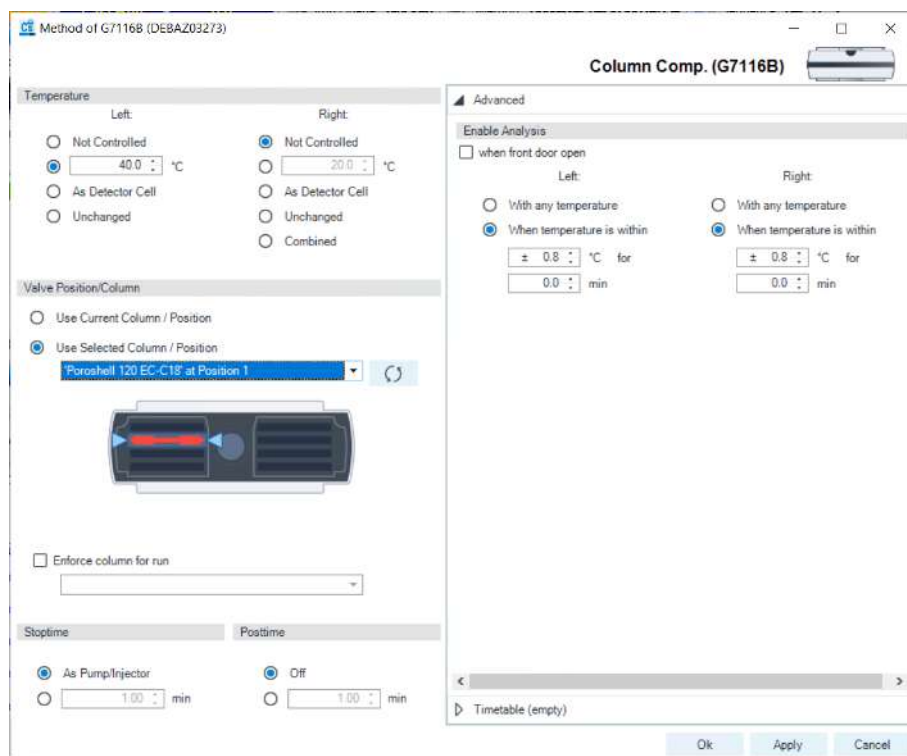
- 10 Enter the column information.



Using the Module

Preparation of the System

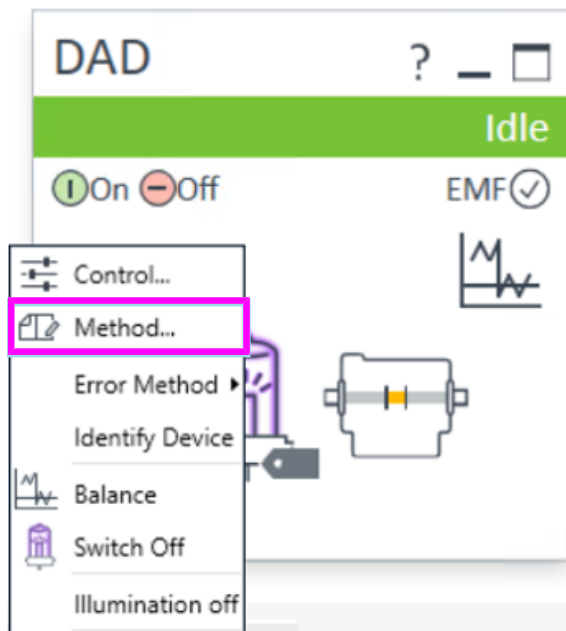
11 Select the column in the Method settings of the column compartment.



12 Set the detector parameters according to the needs of your method.

Using the Module

Preparation of the System



Prime and Purge the System

When the solvents have been exchanged or the pumping system has been turned off for a certain time (for example, overnight) oxygen will re-diffuse into the solvent channel between the solvent reservoir, vacuum degasser (when available in the system) and the pump. Solvents containing volatile ingredients will slightly lose these. Therefore priming of the pumping system is required before starting an application.

Table 6: Choice of priming solvents for different purposes

Activity	Solvent	Comments
After an installation	Isopropanol	Best solvent to flush air out of the system
When switching between reverse phase and normal phase (both times)	Isopropanol	Best solvent to flush air out of the system
After an installation	Ethanol or Methanol	Alternative to Isopropanol (second choice) if no Isopropanol is available
To clean the system when using buffers	Bidistilled water	Best solvent to re-dissolve buffer crystals
After a solvent change	Bidistilled water	Best solvent to re-dissolve buffer crystals
After the installation of normal phase seals (P/N 0905-1420)	Hexane + 5% Isopropanol	Good wetting properties

NOTE

The pump should never be used for priming empty tubings (never let the pump run dry). Use a syringe to draw enough solvent for completely filling the tubings to the pump inlet before continuing to prime with the pump.

- 1 Purge the pump with a flow rate of 3 – 5 mL/min.
- 2 Flush all tubes with at least 30 mL of solvent.
- 3 Set flow to required value of your application and close the purge valve.

NOTE

Pump for approximately 10 minutes before starting your application.

Preparing the Module

For best performance of the detector:

- After ignition, let the lamp warm-up and stabilize for at least 30 minutes. Measurements at the detection limit might require a longer equilibration time.
- For high sensitivity measurements, a stable environment is required; refer to Environment. Prevent drafts from air condition systems.
- Avoid vibrations, as well as larger temperature variations.
- Do not work with removed/open front panels/doors. When the system includes a G1316 TCC (typically located below the detector) and its front panel is removed while the TCC is set to high temperatures, the up-streaming air could influence the stability of the detector baseline.

Preparing the Module

Before You Start

Your normal LC grade solvents usually give good results most of the time. But experience shows that baseline noise can be higher (lower signal-to-noise ratio) when impurities are in the solvents.

Flush your solvent delivery system for at least 15 minutes before checking sensitivity. If your pump has multiple channels, you should also flush the channels not in use.

For optimal results refer to [Optimizing the Performance of the Module](#) on page 79.

Set Up the Detector with Agilent Open Lab

The setup of the detector is shown with Agilent OpenLab 2.8 and Driver 3.11.

NOTE

This section describes the detector settings only. For information on Agilent OpenLab or other 1200 Infinity modules refer to the corresponding documentation.

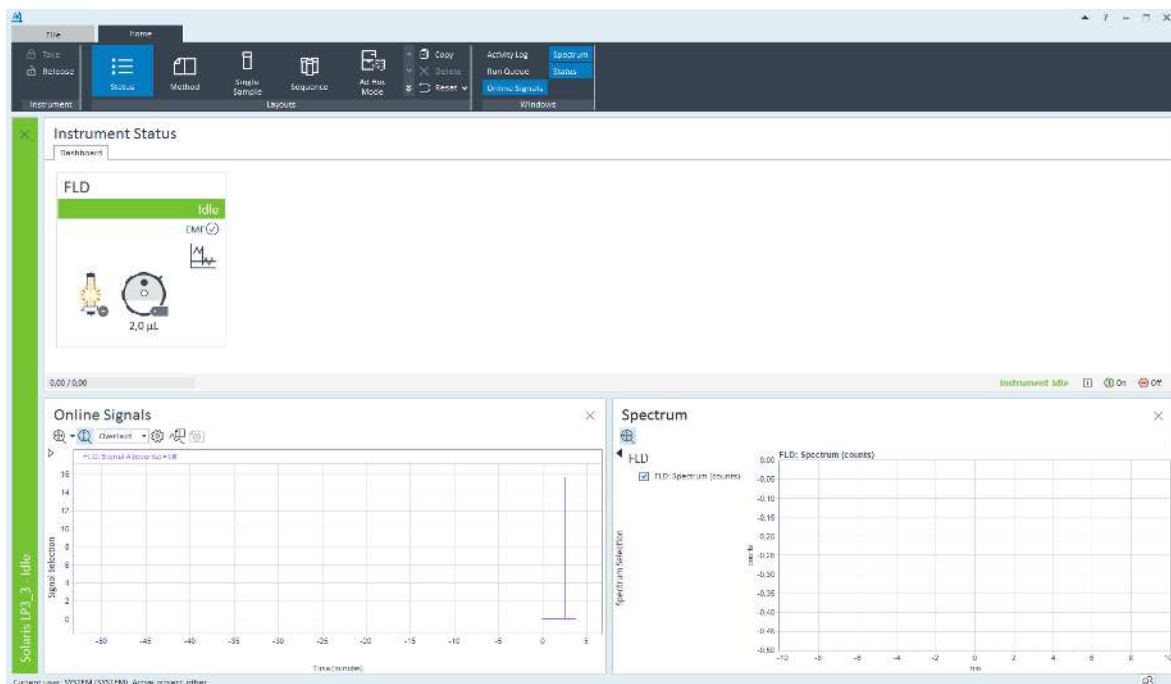
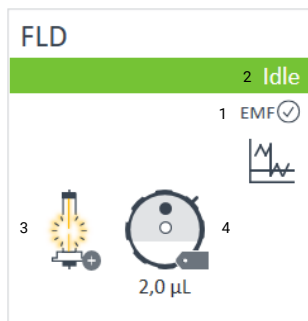


Figure 16: Agilent OpenLab Method and Run Control (just detector is shown)

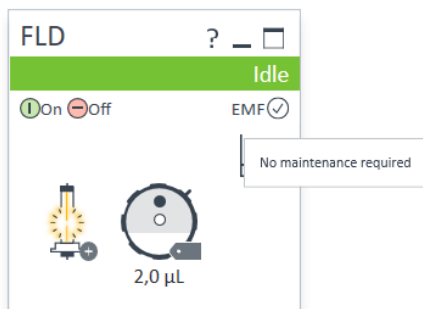
After successful load of OpenLab, you should see the module as an active item in the graphical user interface (GUI).

The Detector User Interface



Within the detector GUI, there are active areas. If you move the mouse cursor across the icons the cursor will change.

1. EMF status
2. Detector status
3. Lamp status (on/off)
4. Flow cell information

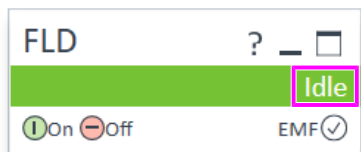


EMF Status shows Run / Ready / Error state and "Not Ready text" or "Error text"

- Offline (gray)
- Ok. No Maintenance required (green)
- EMF warning. Maintenance might be required (yellow)
- EMF warning. Maintenance required (red)

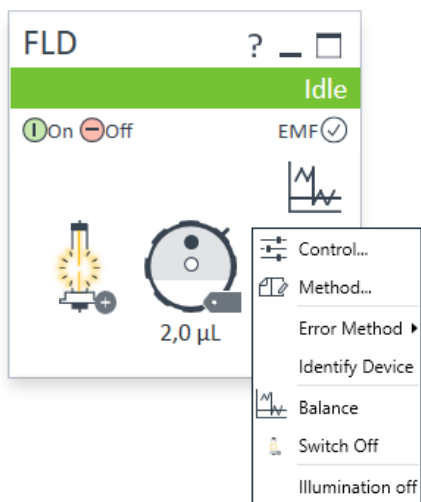
Using the Module

Preparing the Module



Module Status shows Run / Ready / Error state and "Not Ready text" or "Error text"

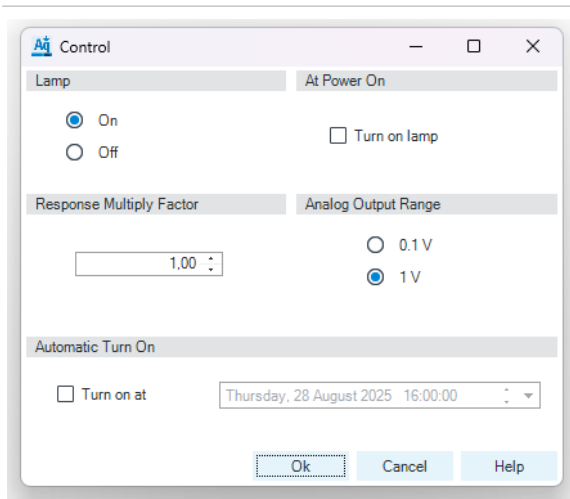
- Error (red)
- Not ready (yellow)
- Ready (green)
- Pre run, Post run (purple)
- Run (blue)
- Idle (green)
- Offline (dark gray)
- Standby (light gray)



A right-click into the Active Area will open a menu to

- Show the Control Interface (special module settings)
- Show the Method interface (similar as via menu **Instrument > Setup Instrument Method**)
- Set Error Method
- Identify Module (Status LED will blink)
- Balance: Set the Baseline to zero

Detector Control Settings



The figure shows the default settings.

- **Lamp:** can be turned ON/OFF.
- **Response Multiply Factor:** 1
- **Automatic Turn On:** automatic detector power on.
- **At Power On:** automatic lamp-on at power on.
- **Analog Output Range:** can be set to either 100 mV or 1 V full scale, for additional settings see **Analog Output** (under **Method Parameter Settings** on page 68).

Method Parameter Settings

These settings are available via **Menu > Instrument > Set up Instrument Method** or via right click into the module's active area (does not show the Instrument Curves tab).

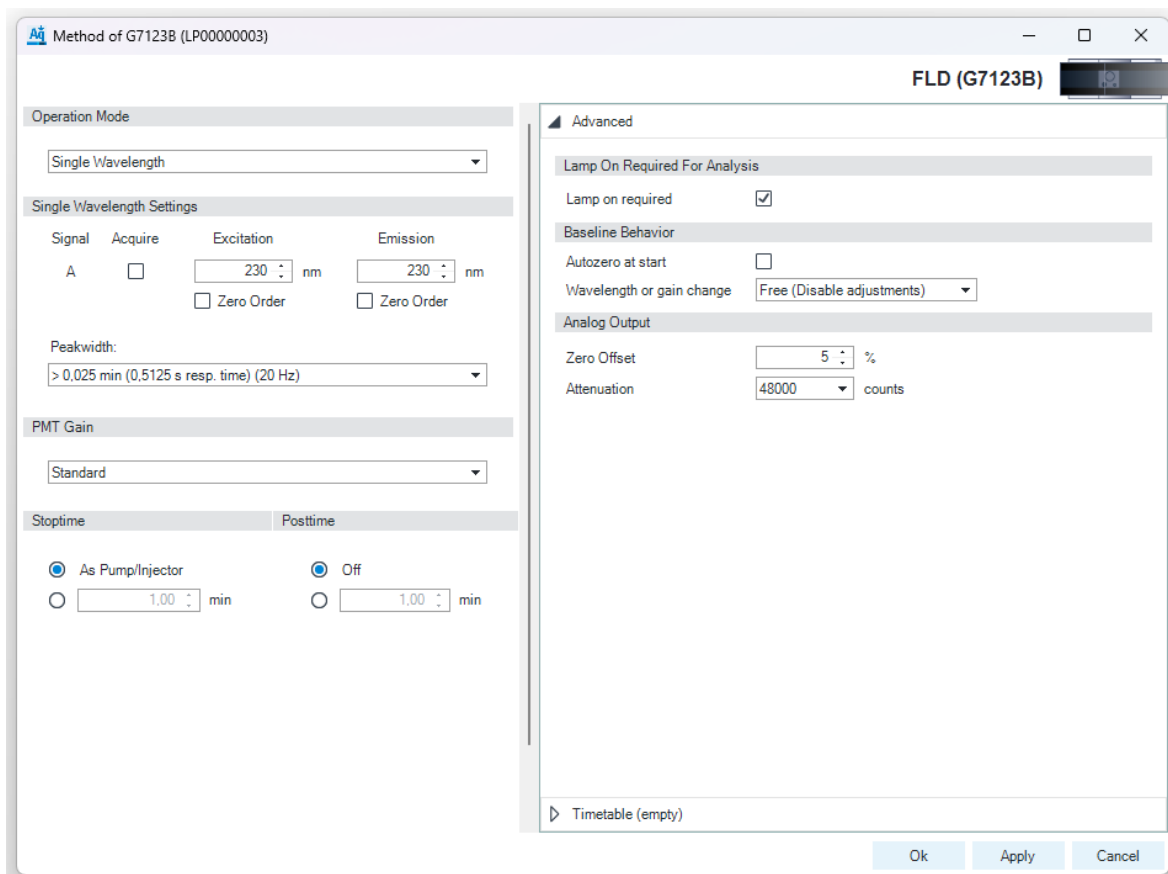


Figure 17: Method parameter settings

Single Wavelength Settings

Signal	Acquire	Excitation	Emission
A	<input checked="" type="checkbox"/>	250 nm <input type="checkbox"/> Zero Order	450 nm <input type="checkbox"/> Zero Order

Signal A

You can define the wavelengths of the excitation and emission and specify signal acquisition.

Limits (Ex and Em): 200 to 1200 nm in steps of 1 nm.

NOTE: The emission wavelength should be at least 40 nm greater than the excitation wavelength

NOTE: Additional signals B, C, D and E can be added via multi-wavelength mode.

Zero Order (Ex)

The full spectrum of light from the Hg-Xe lamp illuminates the flow cell. Each compound can absorb its characteristic wavelength of light and then emit maximum fluorescence. An increased stray light level is inherent in this setting, and this will decrease sensitivity (signal-to-noise).

Zero Order (Em)

Zero order sets the monochromator so that all light emitted from the sample will be reflected onto the detector.

NOTE: It is not possible to select both Zero Order boxes at the same time.

Acquire Signal

Mark this check box to specify that the signal is stored in the CDS during data acquisition. When the check box is cleared, the signal is not stored.

Peakwidth:

> 0.00326 min (0.06875 s resp. time) (160 Hz)
> 0.00326 min (0.06875 s resp. time) (160 Hz)
> 0.00652 min (0.125 s resp. time) (80 Hz)
PK > 0.0125 min (0.25625 s resp. time) (40 Hz)
> 0.025 min (0.5125 s resp. time) (20 Hz)
> 0.05 min (1.04375 s resp. time) (10 Hz)
> 0.1 min (2.1125 s resp. time) (5 Hz)
> 0.2 min (4.23125 s resp. time) (2.5 Hz)
St > 0.4 min (8.5 s resp. time) (1.25 Hz)

Peakwidth (Responsetime, Data Rate)

Peakwidth enables you to select the peak width (response time) for your analysis. The peak width is defined as the width of a peak, in minutes, at half the peak height. Set the peak width to the narrowest expected peak in your chromatogram. The peak width sets the optimum response time for your FLD. The peak detector ignores any peaks that are considerably narrower, or wider, than the peak width setting. The response time is the time between 10 % and 90 % of the output signal in response to an input step function.

Limits: When you set the peak width (in minutes), the corresponding response time is set automatically and the appropriate data rate for signal and spectra acquisition is selected as shown.

Stoptime	Posttime
<input checked="" type="radio"/> As Pump/Injector	<input checked="" type="radio"/> Off
<input type="radio"/> 1.00 min	<input type="radio"/> 1.00 min

Stoptime/Posttime

The **Stoptime** is the time where either the complete system stops (As Pump/Injector) or the module (if different from system stop time). The data collection is stopped at this time. A **Posttime** period can be used to allow module's items to equilibrate (e.g. after gradient change or temperature change).

Using the Module

Preparing the Module

PMT Gain

Standard

Low

Standard

High

PMT Gain is the photo-multiplier gain.

PMT Gain can be set to three levels: LOW, STANDARD and HIGH.

- STANDARD will work for the vast majority of applications
- LOW is mainly used for wavelength calibration
- HIGH might be useful for peaks close to the detection limit

Default value is STANDARD.

Operation Mode

Multi Wavelength

Multi Wavelength

Five wavelengths, excitation and emission wavelengths in your analysis.

See also Signal A.

Multi Wavelength Settings

Signal	Acquire	Excitation	Emission
A	<input checked="" type="checkbox"/>	230 nm <input type="checkbox"/> Zero Order	460 nm <input type="checkbox"/> Zero Order
B	<input checked="" type="checkbox"/>	280 nm <input type="checkbox"/> Zero Order	470 nm <input type="checkbox"/> Zero Order
C	<input type="checkbox"/>	230 nm <input type="checkbox"/> Zero Order	460 nm <input type="checkbox"/> Zero Order
D	<input type="checkbox"/>	230 nm <input type="checkbox"/> Zero Order	460 nm <input type="checkbox"/> Zero Order
E	<input type="checkbox"/>	230 nm <input type="checkbox"/> Zero Order	460 nm <input type="checkbox"/> Zero Order

Peakwidth:
< 0.1 min (1.04375 s resp. time)

Resulting Data Rate: 5.00 Hz

PMT Gain

Standard

Online Spectra

Operation Mode

Online Spectra

Online Spectra

Mode: Excitation

Ex. Scan Range: 220 nm to 380 nm

Emission WL: 460 nm

Em. Scan Range: 220 nm to 300 nm

Excitation WL: 230 nm

Peakwidth: 1.000 min

Step Size: 10 nm

Spectra per Peak: f=1.32 Hz, v=1.00, spp=76.53, nIRQs=121

Operation Mode

Online Spectra

Online Spectra

Mode: Emission

Ex. Scan Range: 220 nm to 380 nm

Emission WL: 460 nm

Em. Scan Range: 300 nm to 450 nm

Excitation WL: 230 nm

Peakwidth: 1.000 min

Step Size: 10 nm

Spectra per Peak: f=1.05 Hz, v=1.00, spp=61.25, nIRQs=153

Online Spectra

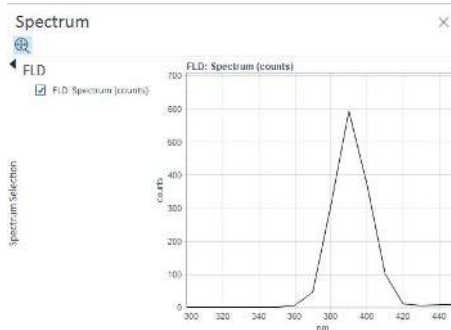
In order to acquire spectra, a mode must be selected, either **Excitation** or **Emission**. Subsequently you define the scan range for the chosen mode and a wavelength for corresponding **Emission** or **Excitation**. Once all parameters for the Online Scan have been set, the **Spectrum** panel becomes active.

Peakwidth is a user-defined value representing the expected smallest chromatographic peak (in minutes). It helps the system set the appropriate data rate and is used to calculate **Spectra per Peak**, ensuring enough spectral data points are captured for accurate analysis. The accepted range of values is 0.017 - 0.4 min (default: 0.025 minutes). **Step Size** defines the interval between each wavelength point during a spectral scan. Smaller step sizes provide higher resolution but increase acquisition time.

Values 1 to 20 nm in steps of 1 nm are allowed (default: 10 nm).

Spectra per Peak indicates how many individual spectra are collected across a chromatographic peak during a scan. It is calculated based on the selected peak width. A higher number ensures better spectral resolution and more reliable identification of analytes.

NOTE: If the calculated value is less than 10, a warning will appear: "The selected peakwidth and scan range may not provide sufficient spectral resolution for reliable spectral analysis."



Advanced Settings

Lamp On Required For Analysis Lamp on required <input checked="" type="checkbox"/>	Lamp On Required For Analysis If the Lamp on required for analysis check box is marked, but the lamp is off when the run is started, the lamp is switched on automatically.
Baseline Behavior Autozero at start <input type="checkbox"/> Wavelength or gain change <input type="text" value="Free (Disable adjustments)"/> Analog Output Zero Offset <input type="text" value="Append (Maintain baseline)"/>	Baseline Behavior Baseline behavior allows you to choose what happens to the baseline after a change in wavelength or PMT gain. <ul style="list-style-type: none"> • Append: Resets the baseline to the previous baseline position. • Offset: Resets the baseline to the baseline position at the start of the run. Note that this may not be 0 LU (Luminescence Units), depending on the analysis conditions. • Free: Makes no adjustment to the baseline position; you may see a shift in baseline position. Autozero at start: Zeroes the baseline at the start of a run.
Analog Output Zero Offset <input type="text" value="5"/> % Attenuation <input type="text" value="48000"/> counts	Analog Output The range can be set to either 100 mV or 1 V full scale, see Detector Control Settings on page 68. <ul style="list-style-type: none"> • Zero Offset: 1 – 99 % in steps of 1 % (5 % equal to 50 mV). • Attenuation: 0.195 – 1600 LU at discrete values for either 100 mV or 1 V full scale.

Time Table

Time Table ▲ Timetable (2/100 events) <table border="1"> <thead> <tr> <th>Time [min]</th> <th>Function</th> <th>Parameter</th> </tr> </thead> <tbody> <tr> <td>2.00</td> <td>Change Signal</td> <td>Signal A: Ex. Wavelength: 280 nm, Em. Wavel...</td> </tr> <tr> <td>4.00</td> <td>Change PMT Gain</td> <td>PMT Gain: High</td> </tr> </tbody> </table>	Time [min]	Function	Parameter	2.00	Change Signal	Signal A: Ex. Wavelength: 280 nm, Em. Wavel...	4.00	Change PMT Gain	PMT Gain: High	Time Table You may set up time events to change functions with their parameters over the run time. Add lines as required. Time Limits: 0.00 – 99999.00 min in steps of 0.01 min. Via the buttons in the bottom area, time table lines can be added, removed, cut copied, pasted or completely cleared. Based on the chosen function, a certain parameter can be selected.
Time [min]	Function	Parameter								
2.00	Change Signal	Signal A: Ex. Wavelength: 280 nm, Em. Wavel...								
4.00	Change PMT Gain	PMT Gain: High								




Transporting the Detector

Prepare the Detector for Transportation

When

- If the module shall be transported or shipped.

Parts required

Qty.	p/n	Description
1	 G7123-42009	Foam Protection FLD
1	 1401-0641	Cap-round W/FLG 60.33mm-ID Vinyl Black
1	 0100-1259	Plug-Screw 1032- Fitting

WARNING

UV radiation and blue light.

- Proper PPE (Personal Protective Equipment) must be used.
- Do not look directly into the light, do not place hands into the cell compartment and do not put anything into the light path.
- Never open the housing while the lamp is on.
- Turn off the lamp before changing the cell.

CAUTION

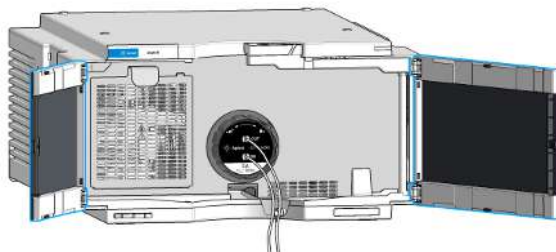
Mechanical damage

- For shipping the module, insert the Protective Foam to protect the module from mechanical damage.
- Be careful not to damage tubing or capillary connections while inserting the module in the Protective Foam.

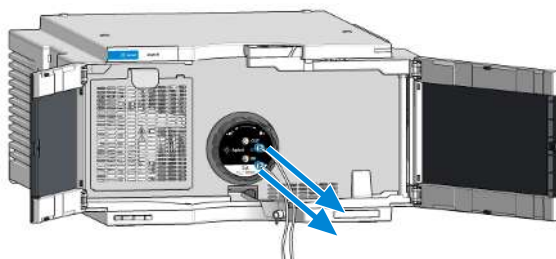
Using the Module

Transporting the Detector

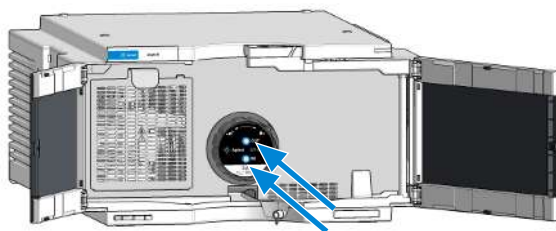
- 1 Open the doors.



- 2 Uninstall the capillaries.



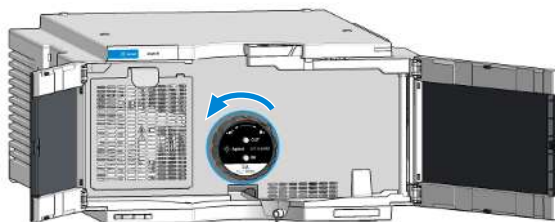
- 3 Install the flow cell plugs.



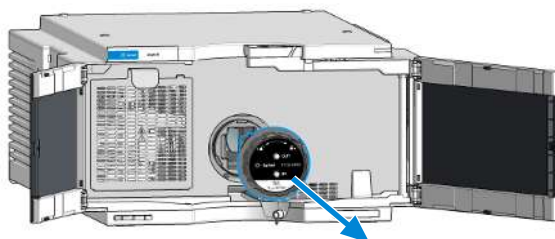
Using the Module

Transporting the Detector

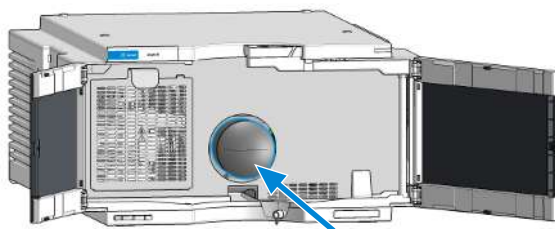
- 4 To unlock the flow cell, turn the black collar of the flow cell counter-clockwise until stop.



- 5 Remove the flow cell.



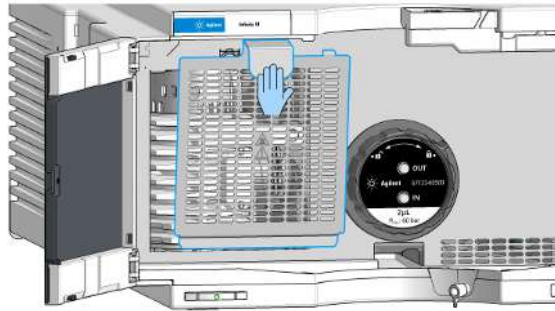
- 6 Put the black protection cover over the flow cell opening.



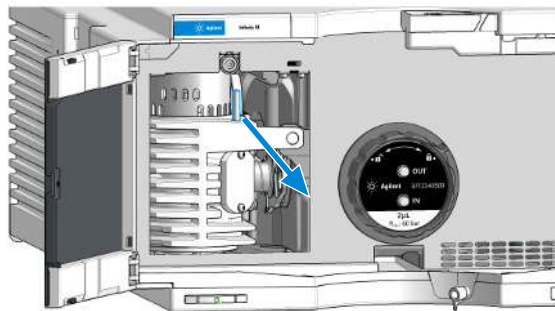
Using the Module

Transporting the Detector

- 7 Remove the safety grid by pulling on the metal handle.

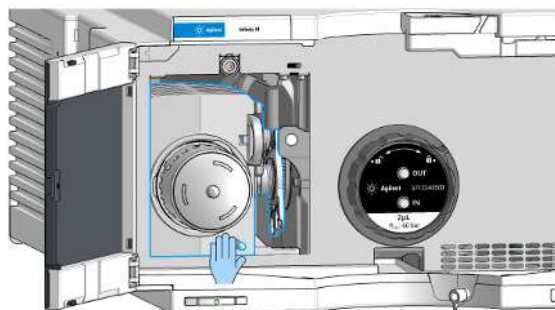


- 8 Pull the metal rod towards the front, so the lamp housing gets turned by 90 degrees.



- 9 Place the yellow transportation lock on the lamp.

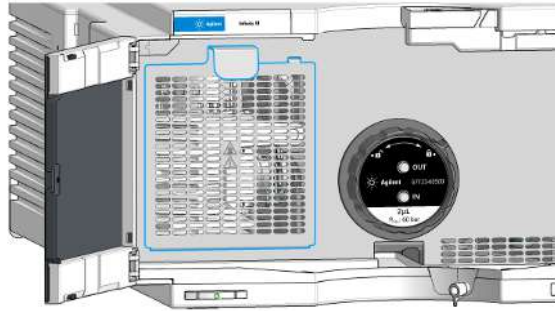
- 10 Push the metal rod on the lamp housing up-/backwards, so the lamp housing turns by 90 degrees until it comes to a stop and gets held in place by a magnet.



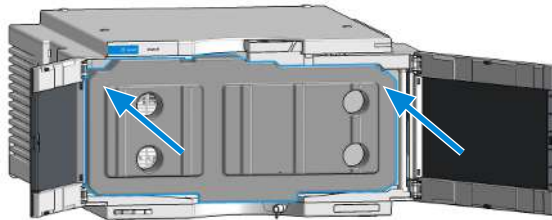
Using the Module

Transporting the Detector

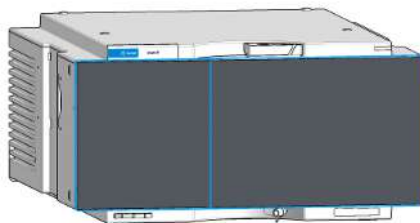
- 11 Place the yellow transportation lock on the left side.
- 12 Re-install the safety grid. Insert at the bottom, then the top gets held in place by a magnet.



- 13 Insert the protection foam.



- 14 Close the doors.





5 Optimizing the Performance of the Module

This chapter provides information on how to optimize the module.

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Step 1: Check the LC System for Impurities 80

Step 2: Optimize Limits of Detection and Selectivity 80

Step 3: Set Up Routine Methods 81

Method Development

Fluorescence detectors are used in liquid chromatography when superior limits of detection and selectivity are required. Thorough method development, including spectra acquisition, is fundamental to achieve good results. This chapter describes three different steps that can be taken with the Agilent 1290 Fluorescence Detector.

Step 1: Check the LC System for Impurities

A critical issue in trace level fluorescence detection is to have an LC system free of fluorescent contamination. Most contaminants derive from impure solvents. Running the method of choice with a blank injection first and then check the data for the height of the baseline and disturbing peaks should give an idea how clean the system is.

Step 2: Optimize Limits of Detection and Selectivity

To achieve optimum limits of detection and selectivity, analysts must find out about the fluorescent properties of the compounds of interest. Excitation and emission wavelengths can be selected for optimum limits of detection and best selectivity. In general, fluorescence spectra obtained with different instruments may show significant differences depending on the hardware and software used.

Achieving the best detection levels requires checking for the optimum excitation and emission wavelengths for all compounds. A good approach is to acquire online spectra for all compounds during a run. Two runs are sufficient for optimization.

During the first run, one wavelength is chosen for the excitation wavelength using a value found in literature or one in the low UV range (220 - 260 nm) and a spectral range for the emission side. Most fluorophores show strong absorption at these excitation wavelengths and the quantum yield is high. Excitation is sufficient for collecting emission spectra. Examining the recorded spectra will give the best wavelength for emission. With that value in mind, the method gets

modified for excitation scan with the emission value found entered as the emission wavelength. For the excitation scan range a suitable spectral range should be selected. Examining the second recorded set of spectra will give the best wavelength for excitation. With the two values found, the method should be modified for single wavelength.

For best sensitivity, due to the distinct Hg-lines of the light source, methods, which got developed on a G1321A/B/C or G7121A/B may need to be reevaluated, mainly in terms of EX wavelengths.

Step 3: Set Up Routine Methods

In routine analysis, sample matrices can have a significant influence on retention times. For reliable results, sample preparation must be thorough to avoid interferences or LC methods must be rugged enough. With difficult matrices, simultaneous multi-wavelength detection offers more reliability than timetable controlled wavelength switching. The FLD can, in addition, acquire fluorescence spectra while it records the detector signals for quantitative analysis. Therefore qualitative data are available for peak confirmation and purity checks in routine analysis.

In multi-wavelength mode, the FLD can acquire up to five different signals simultaneously. All of them can be used for quantitative analysis. Apart from complex matrices, this is advantageous when watching for impurities at additional wavelengths. It is also advantageous for reaching low limits of detection or increasing selectivity through optimum wavelength settings at any time. The number of data points acquired per signal is reduced and thus limits of detection may be higher, depending on the detector settings compared to the signal mode.



6 Diagnostics and Troubleshooting

This chapter gives an overview of the maintenance, troubleshooting, and diagnostic features available.

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InfinityLab Assist 83

Agilent Lab Advisor Software 83

HPLC Advisor 84

Maintenance and Troubleshooting Tools of the Module 85

General Information 85

Self-Test 86

Wavelength Accuracy Test 87

Wavelength Calibration 88

Lamp Intensity Scan 90

User Interfaces for Available Tests and Tools

InfinityLab Assist



InfinityLab Assist provides you with assisted troubleshooting and maintenance at your instrument.

If the system in use supports the InfinityLab Assist, follow the instructions provided. Else, the preferred solution is to use Agilent Lab Advisor Software. To find out, if your instrument is supported, check the [InfinityLab Assist User Manual](#).

If using an InfinityLab Assist, navigate to **Health > Troubleshooting** to help solve baseline, peak shape, pressure, and retention related issues.

Agilent Lab Advisor Software

The Agilent Lab Advisor Software is a standalone product that can be used side by side with a chromatographic data system. Agilent Lab Advisor helps to manage the lab for high-quality chromatographic results by providing a detailed system overview of all connected analytical instruments with instrument status, Early Maintenance Feedback counters (EMF), instrument configuration information, and diagnostic tests. With the push of a button, a detailed diagnostic report can be generated. Upon request, the user can send this report to Agilent for a significantly improved troubleshooting and repair process.

The Agilent Lab Advisor software is available in two versions:

- Lab Advisor Basic
- Lab Advisor Advanced

Lab Advisor Basic is included with every Agilent 1200 Infinity Series and Agilent InfinityLab LC Series instrument.

The Lab Advisor Advanced features can be unlocked by purchasing a license key, and include real-time monitoring of instrument actuals, all various instrument signals, and state machines. In addition, all diagnostic test results, calibration results, and acquired signal data can be uploaded to a shared network folder. The Review Client included in Lab Advisor Advanced makes it possible to load and

Diagnostics and Troubleshooting

User Interfaces for Available Tests and Tools

examine the uploaded data no matter on which instrument it was generated. This makes Data Sharing an ideal tool for internal support groups and users who want to track the instrument history of their analytical systems.

The optional Agilent Maintenance Wizard Add-on provides an easy-to-use, step-by-step multimedia guide for performing preventive maintenance on Agilent 1200 Infinity LC Series instrument.

The tests and diagnostic features that are provided by the Agilent Lab Advisor software may differ from the descriptions in this manual. For details, refer to the Agilent Lab Advisor software help files.

HPLC Advisor



Avoid the time and frustration of searching for answers to your HPLC questions in many locations. Get the tools and information you need conveniently in the palm of your hand with HPLC Advisor. This one comprehensive app provides answers for any HPLC, regardless of brand and model. HPLC Advisor also works offline. Get the HPLC Advisor app for iOS and Android. More information under [Agilent InfinityLab HPLC Advisor](#).

If using the HPLC Advisor App, check **Troubleshooting** to find information how to solve baseline, peak shape, pressure, retention related issues.

Maintenance and Troubleshooting Tools of the Module

All tests in the following section are described based on Agilent LabAdvisor Software B.02.06 or above. Other user interfaces may not provide any test or just a few.

- For an overview on available interfaces, see [User Interfaces for Available Tests and Tools](#) on page 83.
- For details on the use of the interface refer to the interface documentation.

General Information

Conditions of Detector

Tests can be performed usually 30 minutes after the Hg-Xe lamp has been turned on. Some tests require longer equilibration time.

Failing a Test

If a test fails, flush the flow cell with fresh, clean water. If the test fails again, then start with proposed actions mentioned in the details of the tests.

Self-Test

After switch-on, the module carries out a set of tests automatically: a grating motor drive test, an optical filter test and a main data path test. The module will be in a **Not Ready** state during this testing.

Wavelength Accuracy Test




The Wavelength Accuracy Test utilizes the same procedure as the Wavelength Calibration, see [Wavelength Calibration](#) on page 88.

The Wavelength Accuracy Test does not calibrate on the results found. Instead, the deviation to the existing values in nm gets displayed.

When

- On request

Parts required

Qty.	p/n	Description
1	 G7123-60500	Flow Cell 2 μ L
1	 G7123-60300	Flow Cell 13 μ L
1	 0100-1259	Plug-Screw 1032- Fitting

Prerequisites

- Lamp must be on for at least 30 mins.
- Flow rate needs to be set to 0.25 ml/min (using water).

- 1 Run the Wavelength Accuracy Test with the Agilent Lab Advisor (for further information see Online-Help of user interface).

Wavelength Calibration

The wavelength calibration function verifies and corrects spectral accuracy using water Raman scattering. The system excites water in the flow cell with Hg-Xe lamp emission lines, generating Raman peaks at predictable wavelengths for calibration reference.

How It Works

The calibration uses four wavelength pairs across the detector range for enhanced precision:

- 312.9/350.1 nm
- 365.0/416.7 nm
- 404.7/469.2 nm
- 435.8/511.6 nm

The system uses Raman excitation maxima as reference values for the excitation monochromator (defined by the Hg-Xe emission line positions), while the corresponding Raman emission maxima calibrate the emission monochromator (shifted by $\sim 3400 \text{ cm}^{-1}$ ²). The system measures the Raman signal around each peak and uses 2D Gaussian fitting to determine precise peak positions. These measured positions are compared to reference values for verification or used to calculate new calibration factors.

Key Benefits

- **Simple operation:** Uses standard HPLC-grade water.
- **Reliable reference:** Based on fundamental physical constants—atomic emission lines and Raman shift.
- **Representative measurement:** Signal comes from the same flow cell volume as the sample, eliminating calibration errors from localized light scattering.
- **Complete coverage:** Fast calibration of both excitation and emission wavelengths simultaneously.




2 Room temperature water recommended for optimal accuracy ($\pm 0.5 \text{ nm}$ temperature sensitivity over the range of 5-45°C)

When

The detector gets calibrated at installation. Under normal operating conditions it should not require recalibration. However, it is advisable to recalibrate:

- After maintenance (replacement of lamp house window or Hg-Xe lamp).
- After changing the flow cell.
- After exchange of the optical unit or main board.
- After significant environmental condition changes (temperature, humidity).
- At a regular interval, at least once per year (for example, prior to an Operational Qualification/Performance Verification procedure).
- When chromatographic results indicate the detector may require recalibration.

Parts required

Qty.	p/n	Description
1	 G7123-60500	Flow Cell 2 µL
1	 G7123-60300	Flow Cell 13 µL
1	 0100-1259	Plug-Screw 1032- Fitting

Prerequisites

- Lamp must be on for at least 30 mins
 - Flow rate needs to be set to 0.25 mL/min (using water)
- 1 Run the Wavelength Calibration with the Agilent Lab Advisor (for further information see Online-Help of user interface).

Lamp Intensity Scan

The intensity scan results in a spectrum of the currently installed lamp via the reference diode (200 to 1200 nm in 1 nm steps). The scan is displayed in a graphic window. There is no further evaluation of the test.

When

- The scan should be run after a lamp or lamp housing window exchange (in both cases, the detector needs to be calibrated first) or when the detector performance should be evaluated.

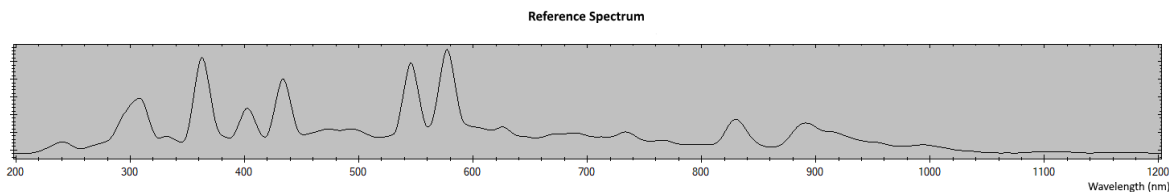
Prerequisites

- Flush the flow cell with fresh, clean water.
- Ensure that the detector is in a ready state.

If not lit already, the test ignites the lamp and waits for three minutes. The scan starts afterwards.

Evaluating the Lamp Intensity Scan

To evaluate performance, compare the scan to the reference spectrum. However, do not base the evaluation solely on the scan results. Also consider other relevant chromatographic values, such as the signal-to-noise ratio.



NOTE

The profile can vary from instrument to instrument. It depends on the age of the lamp and the content of the flow cell (use fresh water).

7

Error Information

This chapter describes the meaning of error messages, and provides information on probable causes and suggested actions how to recover from error conditions.

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- Remote Timeout 96
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What Are Error Messages

Error messages are displayed in the user interface when an electronic, mechanical, or hydraulic (flow path) failure occurs that requires attention before the analysis can be continued (for example, repair, or exchange of consumables is necessary). In the event of such a failure, the red status indicator at the front of the module is switched on, and an entry is written into the module logbook.

If an error occurs outside a method run, other modules will not be informed about this error. If it occurs within a method run, all connected modules will get a notification, all LEDs get red and the run will be stopped. Depending on the module type, this stop is implemented differently. For example, for a pump, the flow will be stopped for safety reasons. For a detector, the lamp will stay on in order to avoid equilibration time. Depending on the error type, the next run can only be started if the error has been resolved, for example liquid from a leak has been dried. Errors for presumably single time events can be recovered by switching on the system in the user interface.

Special handling is done in case of a leak. As a leak is a potential safety issue and may have occurred at a different module from where it has been observed, a leak always causes a shutdown of all modules, even outside a method run.

In all cases, error propagation is done via the CAN bus or via an APG/ERI remote cable (see documentation for the APG/ERI interface).

If using the InfinityLab Assist, instrument errors will generate a notification. To view the probable causes and recommended actions for this error, click on **Help** button displayed on the notification.

General Error Messages

General error messages are generic to all Agilent series HPLC modules and may show up on other modules as well.

Timeout

Error ID: 62

The timeout threshold was exceeded.

Probable cause	Suggested actions
1 The analysis was completed successfully, and the timeout function switched off the module as requested.	• Check the logbook for the occurrence and source of a not-ready condition. Restart the analysis where required.
2 A not-ready condition was present during a sequence or multiple-injection run for a period longer than the timeout threshold.	• Check the logbook for the occurrence and source of a not-ready condition. Restart the analysis where required.

Shutdown

Error ID: 63

An external instrument has generated a shutdown signal on the remote line.

Probable cause	Suggested actions
1 Leak detected in an external instrument with a remote connection to the system.	• Fix the leak in the external instrument before restarting the module.
2 Shut-down in an external instrument with a remote connection to the system.	• Check external instruments for a shut-down condition.
3 The degasser failed to generate sufficient vacuum for solvent degassing.	• Check the external vacuum degasser module (if installed) for an error condition. Refer to the Service Manual for the degasser or the pump that has the degasser built-in.

Remote Timeout

Error ID: 70

A not-ready condition is still present on the remote input. When an analysis is started, the system expects all not-ready conditions (for example, a not-ready condition during detector balance) to switch to run conditions within one minute of starting the analysis. If a not-ready condition is still present on the remote line after one minute the error message is generated.

Probable cause	Suggested actions
1 Not-ready condition in one of the instruments connected to the remote line.	• Ensure the instrument showing the not-ready condition is installed correctly, and is set up correctly for analysis.
2 Defective remote cable.	• Exchange the remote cable.
3 Defective components in the instrument showing the not-ready condition.	• Check the instrument for defects (refer to the instrument's documentation).

Lost CAN Partner

Error ID: 71

During an analysis, the internal synchronization or communication between one or more of the modules in the system has failed.

The system processors continually monitor the system configuration. If one or more of the modules is no longer recognized as being connected to the system, the error message is generated.

Probable cause		Suggested actions
1	CAN cable disconnected.	<ul style="list-style-type: none">• Ensure all the CAN cables are connected correctly.• Ensure all CAN cables are installed correctly.
2	Defective CAN cable.	<ul style="list-style-type: none">• Exchange the CAN cable.
3	Defective mainboard in another module.	<ul style="list-style-type: none">• Switch off the system. Restart the system, and determine which module or modules are not recognized by the system.

Leak

Error ID: 64

A leak was detected in the module.

The signals from the two temperature sensors (leak sensor and board-mounted temperature-compensation sensor) are used by the leak algorithm to determine whether a leak is present. When a leak occurs, the leak sensor is cooled by the solvent. This changes the resistance of the leak sensor which is sensed by the leak sensor circuit on the mainboard.

Probable cause		Suggested actions
1	Loose fittings.	<ul style="list-style-type: none">• Ensure all fittings are tight.
2	Broken capillary.	<ul style="list-style-type: none">• Exchange defective capillaries.

Compensation Sensor Open

Error ID: 81

The ambient-compensation sensor (NTC) on the on/off switch board in the module has failed (open circuit).

The resistance across the temperature compensation sensor (NTC) on the on/off switch board is dependent on ambient temperature. The change in resistance is used by the leak circuit to compensate for ambient temperature changes. If the resistance across the sensor increases above the upper limit, the error message is generated.

Probable cause	Suggested actions
1 Loose connection between the on/off switch board and the mainboard.	• Please contact your Agilent service representative.
2 Defective on/off switch assembly.	• Please contact your Agilent service representative.

Compensation Sensor Short

Error ID: 80

The ambient-compensation sensor (NTC) on the on/off switch board in the module has failed (open circuit).

The resistance across the temperature compensation sensor (NTC) on the on/off switch board is dependent on ambient temperature. The change in resistance is used by the leak circuit to compensate for ambient temperature changes. If the resistance across the sensor increases above the upper limit, the error message is generated.

Probable cause	Suggested actions
1 Loose connection between the on/off switch board and the mainboard.	• Please contact your Agilent service representative.
2 Defective on/off switch assembly.	• Please contact your Agilent service representative.

Detector Error Messages

Grating Motor Error

Error ID: 30005

Probable cause		Suggested actions
1	One of the grating motors has failed.	<ul style="list-style-type: none">• Check for additional EE 30067 - 30070 errors.• Please contact your Agilent service representative.

Optical Filter Light Barrier Not Detected During Startup

Error ID: 30031

Probable cause	Suggested actions
1 Light barrier of optical filter not connected.	• Please contact your Agilent service representative.

Optical Filter Light Barrier Alignment Failed

Error ID: 30033

Probable cause	Suggested actions
1 Optical filter stepper blocked or damaged.	• Please contact your Agilent service representative.
2 Optical filter not moving or light barrier search failed.	• Power-cycle module. If problem recurs, contact your Agilent service representative.

Optical Filter Core Alignment Missing

Error ID: 30034

Probable cause	Suggested actions
1 Optical alignment of filter is missing.	• Please contact your Agilent service representative.

Optical Filter Light Barrier Check Failed

Error ID: 30036

Probable cause	Suggested actions
1 Light barrier alignment lost/corrupt.	• Please contact your Agilent service representative.
2 Current light barrier position not valid.	• Power-cycle module. Open and close safety grid. If problem recurs, contact your Agilent service representative.

Optical Filter Light Barrier Check Failed Due Precision Loss

Error ID: 30038

Probable cause	Suggested actions
1 Optical alignment of filter not good enough.	• Please contact your Agilent service representative.

ADC Data Error

Error ID: 30048

Probable cause		Suggested actions
1	Main ADC lost data packages.	<ul style="list-style-type: none">• Please contact your Agilent service representative.

Frontend Board Missing or Corrupt

Error ID: 30049

Probable cause	Suggested actions
1 Frontend board missing/ disconnected.	• Please contact your Agilent service representative.

Motor Interrupt Error

Error ID: 30050

Parameter 0: Excitation motor interrupt error.

Parameter 1: Emission motor interrupt error.

Probable cause	Suggested actions
1 A motor has reacted in an unexpected way.	• Please power cycle the instrument, if the error persists, contact your Agilent service representative.

Lamp Ignition Failed

Error ID: 30051

Probable cause	Suggested actions
1 Ignition failed because the lamp has a problem.	• Check the position of the lamp inside the lamp housing and make sure it is positioned correctly. Try to reignite the lamp. Change the lamp if unsuccessful.
2 The detector cannot ignite the lamp.	• Please contact your Agilent service representative.

Lamp Off

Error ID: 30052

The lamp was shut down to prevent harm to user or instrument.

Parameter 0: Lamp off due to lamp fan error.

Parameter 1: Lamp off due to lamp door opened.

Parameter 2: Lamp off due to missing cell.

Parameter 3: Maximum burn time exceeded, lamp exchange required.

Probable cause		Suggested actions
1	Lamp fan error.	<ul style="list-style-type: none">• Please contact your Agilent service representative.
2	Lamp door opened.	<ul style="list-style-type: none">• Close safety grid.
3	Cell not connected.	<ul style="list-style-type: none">• Insert cell and lock in place.
4	Max burn time exceeded.	<ul style="list-style-type: none">• Follow the Replace the Hg-Xe Lamp procedure and register a new lamp.

Lamp Error

Error ID: 30053

The lamp was shut down due to a critical lamp condition.

Parameter 0: High lamp temperature detected.

Parameter 1: Lamp voltage/current issue detected.

Probable cause	Suggested actions
1 Over temperature, lamp was shut down because of too high temperature.	• Check lab conditions. If problem recurs, contact your Agilent service representative.
2 Abnormal voltage/current, lamp was shut down caused by surveillance or lamp failed cause of unknown reason.	• Exchange lamp. If problem recurs, contact your Agilent service representative.

Cell EEPROM Error

Error ID: 30055

Cell tag (EEPROM) cannot be read.

Probable cause		Suggested actions
1	Damaged cell or cell connector.	<ul style="list-style-type: none">• Exchange cell. If problem recurs, contact your Agilent service representative.

Optic EEPROM is in Error State

Error ID: 30061

Probable cause	Suggested actions
1 Optic EEPROM is in error state.	• Please contact your Agilent service representative.

Intensity Calibration Missing

Error ID: 30062

Probable cause	Suggested actions
1 Intensity calibration is missing.	• Please contact your Agilent service representative.

Multiple Intensity Calibrations Found

Error ID: 30063

Probable cause	Suggested actions
1 Mismatch of optical calibration data.	• Please contact your Agilent service representative.

Grating Motor Not Detected

Error ID: 30067

Parameter 0: Excitation motor not detected.

Parameter 1: Emission motor not detected.

Probable cause	Suggested actions
1 Grating motor not detected. EX = 0 EM = 1	• Please contact your Agilent service representative.

ADC for Motor Current Measurement Failed

Error ID: 30068

Parameter 0: Excitation ADC for motor current measurement failed.

Parameter 1: Emission ADC for motor current measurement failed.

Probable cause	Suggested actions
1 ADC for current measurement on mainboard defective. EX = 0 EM = 1	• Please contact your Agilent service representative.

Initial Motor Movement Failed

Error ID: 30069

Parameter 0: Excitation motor init movement failed.

Parameter 1: Emission motor init movement failed.

Probable cause		Suggested actions
1	Motor encoder reading incorrect or missing.	<ul style="list-style-type: none">• Please contact your Agilent service representative.
2	Motor cannot move.	<ul style="list-style-type: none">• Please contact your Agilent service representative.
3	Motor driver on the mainboard defect.	<ul style="list-style-type: none">• Please contact your Agilent service representative.

Grating Motor Overcurrent

Error ID: 30070

Parameter 0: Excitation motor overcurrent.

Parameter 1: Emission motor overcurrent.

Probable cause	Suggested actions
1 Mainboard or BLDC defective. EX = 0 EM = 1	• Please contact your Agilent service representative.

Self Test Failed

Error ID: 30091

Probable cause	Suggested actions
1 The self test has failed.	• Power-cycle module. If problem recurs, contact your Agilent service representative.



8 Maintenance

This chapter provides general information on maintenance of the module.

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Introduction to Maintenance

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

Safety Information Related to Maintenance

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**Fire and damage to the module****Wrong fuses**

- Make sure that only fuses with the required rated current and of the specified type (super-fast, fast, time delay etc) are used for replacement.
- The use of repaired fuses and the short-circuiting of fuse-holders must be avoided.

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.

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**Sharp metal edges**

Sharp-edged parts of the equipment may cause injuries.

- To prevent personal injury, be careful when getting in contact with sharp metal areas.

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.
-

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 module that can be carried out without opening the main cover.

Table 7: Overview of maintenance

Procedure	Typical Frequency	Notes
Cleaning of module	If required.	
Hg-Xe lamp exchange	If noise and/or drift exceeds your application limits or lamp does not ignite. Also if light intensity has dropped significantly and replacing the lamp house window did not help.	A wavelength calibration and a lamp intensity check should be performed after replacement.
Flow cell exchange	If leaking or if intensity drops due to contaminated flow cell.	A wavelength calibration should be performed after replacement, if the installed cell is different to the previously installed one and has never been calibrated on this system before.
Leak sensor drying	If leak has occurred.	Check for leaks.
Leak handling System replacement	If broken or corroded.	Check for leaks.
Replacement of lamp house window	Usually during PM or if light intensity has dropped to a level where chromatographic applications are affected.	A wavelength calibration should be performed after replacement.

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. Avoid using organic solvents for cleaning purposes. They can cause damage to plastic parts.

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.**

NOTE


A solution of 70 % isopropanol and 30 % water might be used if the surface of the module needs to be disinfected.

Remove and Install Doors

When

- The instrument doors or the hinges are broken.

Tools required

Qty.	p/n	Description
1	 5023-3138	Reversible Screwdriver + Blade 1,0 x 5,5

Parts required
(Infinity III)

Qty.	p/n	Description
1	 5004-3200	Door Kit Infinity III 200mm

Parts required
(Infinity II)

Qty.	p/n	Description
1	 5004-0200	Door Kit Infinity II 200mm

Prerequisites

- Finish any pending acquisition job.

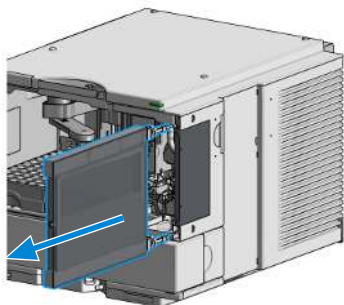
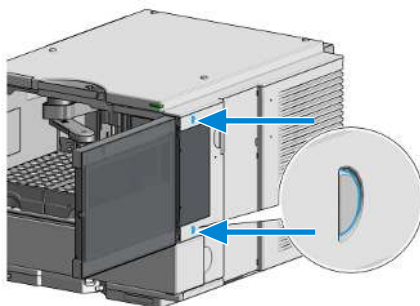
NOTE

The figures shown in this procedure exemplarily show the Infinity III Vialsampler module. The principle of how to remove and/or install doors works in the same way for all Infinity III modules.

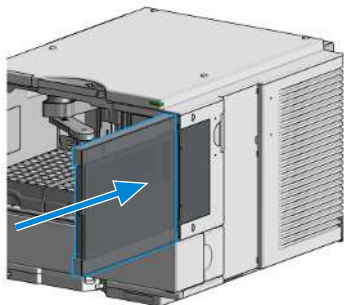
Maintenance

Remove and Install Doors

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

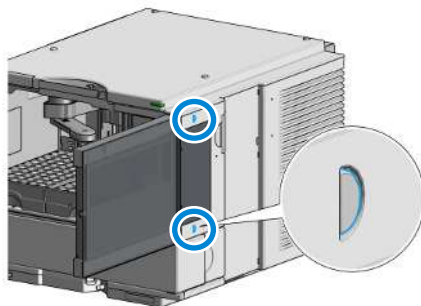


- 2 For the Installation of the front door, insert the hinges into their guides and push the door in until the release buttons click into their final position.



Maintenance

Remove and Install Doors



Replace the Hg-Xe Lamp

When

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

Parts required

Qty.	p/n	Description
1	 G7123-60200	Hg-Xenon Lamp

Prerequisites

- Turn off the lamp.
- Power off the module.

WARNING

Risk of fire and injury from hot surface.

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

- Wait for lamp to cool down to room temperature.
- Do not place hot lamp on inflammable materials.
- Never open housing while lamp is on.

WARNING

Injury from glass cuts or mercury poisoning.

The lamp is under high pressure and might burst if not handled with care. The lamp contains mercury (Hg) which might spill if the lamp breaks.

- Always consult your company's Environment, Health and Safety (EHS) department to confirm how to proceed at your location, in compliance with applicable local mercury regulations before using the equipment.
- Familiarize yourself with the dangers of Hg. The lamp should only be used by people familiar with the properties of such lamps.
- Proper Personal Protective Equipment (PPE) must be used when handling the lamp. This should include a face shield, long-sleeved lab coat, and gloves. Contact your local EHS team to clarify which PPE is considered appropriate.
- Do not touch the lamp bulb with bare hands or otherwise it could contaminate the surface. This may cause it to weaken and break upon use.
- Do not attempt to replace the lamp unless the Optical Unit has cooled down to room temperature.
- Be careful not to drop the lamp, subject it to impact, apply excessive force, or scratch it. These actions may cause it to rupture.
- Only transport the lamp in the original packaging.
- Do not attempt operation of the lamp until it is installed in the instrument.
- Observe ozone precautions. As ozone is generated when the lamp is turned on, provide adequate ventilation.

WARNING

Injury from glass cuts or mercury poisoning.

Glass from a broken lamp might cause injury and liquid mercury can cause poisoning over prolonged exposure.

- Follow all local laboratory and legislative procedures. Ensure good ventilation of the room.
- If mercury is spilled, remove it with adhesive tape or paper.
- Put all waste in a container for disposal and seal it tightly.
- Entrust a licensed industrial waste disposal firm with the disposal of the waste.
- Ensure the packaging is clearly labeled to indicate that it contains mercury.

WARNING

Injury from hot surface, glass cuts or mercury poisoning.

In case a lamp breaks when installed in the detector, evaporated mercury can cause poisoning. Hot glass shards from a broken lamp might cause burns or injury.

- If a lamp breaks during detector operation, leave the room, ensure ventilation and let the detector cool down to room temperature.
- Seek medical advice in case of direct exposure to mercury vapor.
- If a lamp is broken inside the optical unit, immediately reseal the Optical Unit and keep it closed.
- Have the optical unit professionally removed and exchanged, call Agilent for advice. It must be packaged appropriately and disposed of in accordance with company and local regulations.
- Put all waste in a container for disposal and seal it tightly.
- Entrust a licensed industrial waste disposal firm with the disposal of the waste.
- Ensure the packaging is clearly labeled to indicate that the Optical Unit contains mercury.

NOTE

The Hg-Xenon Lamp (G7123-60200) shall only be used as a light source for the Agilent G7123B Fluorescence Detector.

NOTE

Maximum safe daily UV/blue light energy dose at a distance of 50 cm (according to IEC 62471) is reached after 8 hours if detector is operated with opened lamp service door.

NOTE

The used lamp is different to the Xe flash lamp, which is used in G7121A/B Fluorescence Detectors.

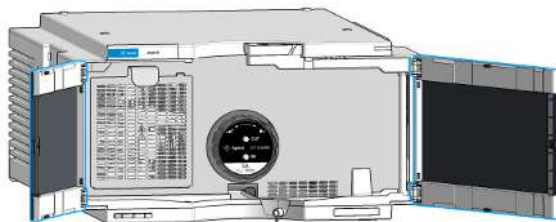
NOTE

The lamp house cover includes a magnet.

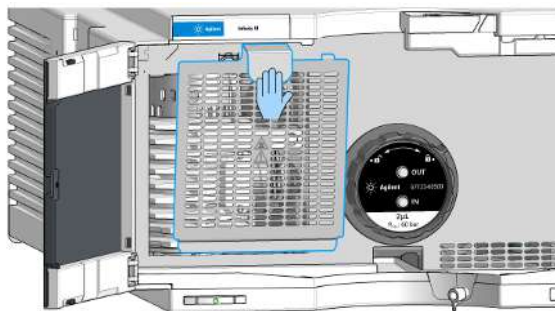
Maintenance

Replace the Hg-Xe Lamp

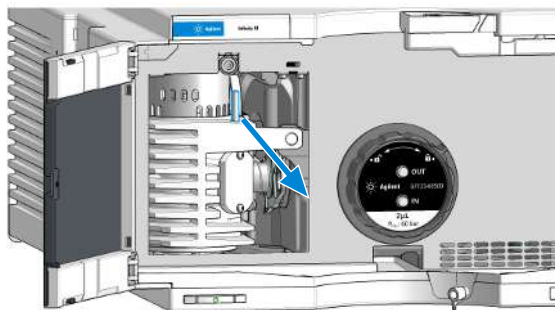
- 1 Open the doors.



- 2 Remove the safety grid by pulling on the metal handle.



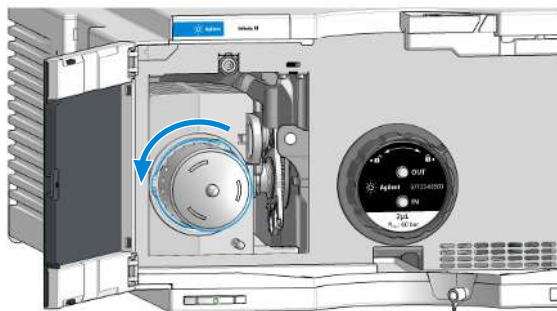
- 3 Pull the metal rod towards the front, so the lamp housing gets turned by 90 degrees.



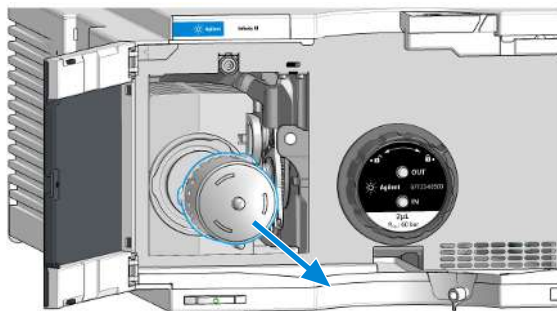
Maintenance

Replace the Hg-Xe Lamp

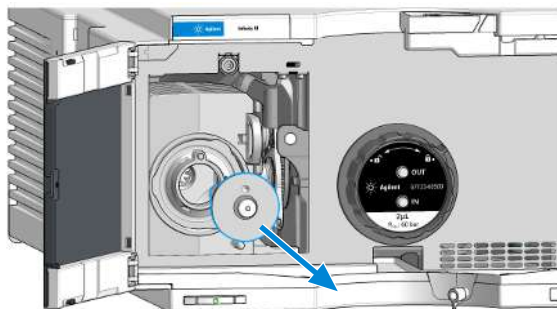
- 4 Press on the lamp cap and turn it counterclockwise until it comes to a stop.



- 5 Take off the lamp cap.



- 6 Carefully pull out the Hg-Xe lamp.



- 7 Place the old lamp in the original packaging immediately after exchange.

Maintenance

Replace the Hg-Xe Lamp

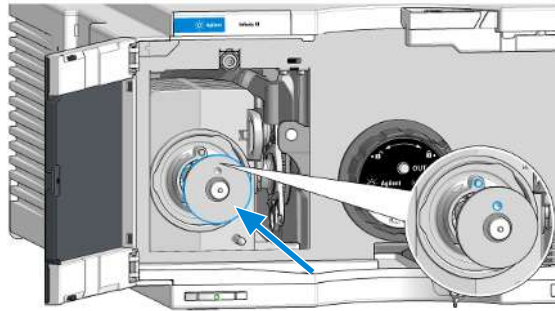
- Carefully insert the new lamp and make sure the notch on the lamp ceramics matches the metal pin on the lamp housing. The position of the notch is indicated on the lamp ceramics.

WARNING

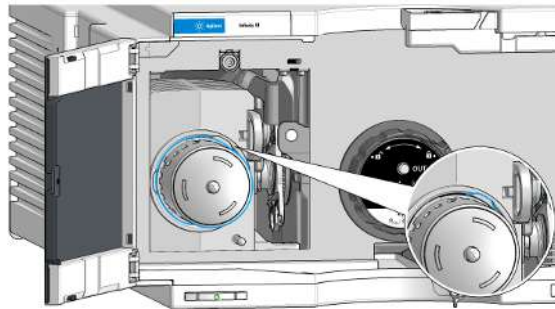
Injury from glass cuts or mercury poisoning.

Do not use lamps with a runtime over 3000 hours.

- For safety reasons, do not reinstall already used lamps.
- Only install new, unused lamps.



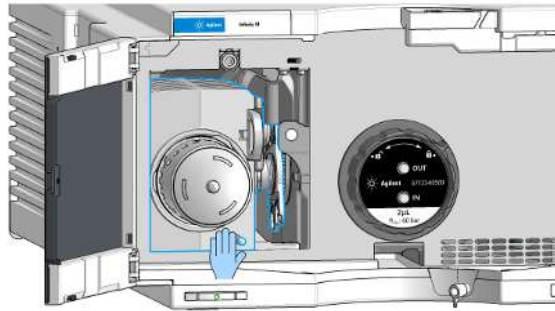
- Install the lamp cap. Pay attention to the position of the metal flaps and the notches. Push in, then turn the lamp cap clockwise until it comes to a stop.



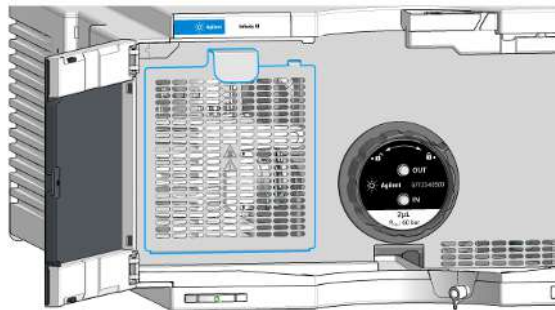
Maintenance

Replace the Hg-Xe Lamp

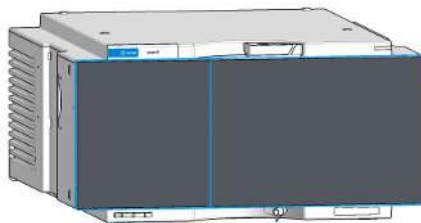
- 10 Push the metal rod on the lamp housing up-/backwards, so the lamp housing turns by 90 degrees until it comes to a stop and gets held in place by a magnet.



- 11 Re-install the safety grid. Insert at the bottom, then the top gets held in place by a magnet.



- 12 Close the doors.



- 13 Power on the module.

Maintenance**Replace the Hg-Xe Lamp**




- 14** Perform the Replace the Hg-Xe Lamp procedure in Lab Advisor.
- 15** Ignite the lamp.
- 16** Install 5022-2159 (Restriction capillary, SST 0.12 mm ID, 2 m long) .
- 17** Flush the system with fresh, clean water.
- 18** Perform a wavelength calibration.
- 19** Run a Lamp Intensity Check.

Replace the Flow Cell

When

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

Parts required

Qty.	p/n	Description
1	 G7123-60500	Flow Cell 2 μ L
1	 G7123-60300	Flow Cell 13 μ L
1	 0100-1259	Plug-Screw 1032- Fitting

Prerequisites

- Turn off the lamp.
- Turn off the pump.

WARNING

UV radiation and blue light.

- Proper PPE (Personal Protective Equipment) must be used.
- Do not look directly into the light, do not place hands into the cell compartment and do not put anything into the light path.
- Never open the housing while the lamp is on.
- Turn off the lamp before changing the cell.

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.

NOTE

Maximum safe daily UV/blue light energy dose at a distance of 50 cm (according to IEC 62471) is reached after 8 hours if detector is operated with opened lamp service door.

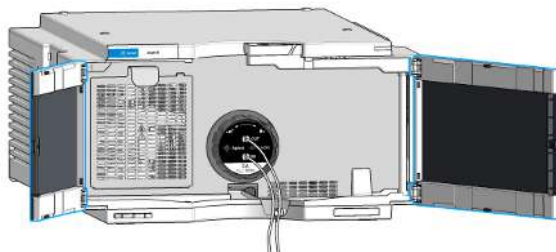
NOTE

Use PEEK finger-tight fittings on the cell. Avoid use of wrenches on an installed cell.

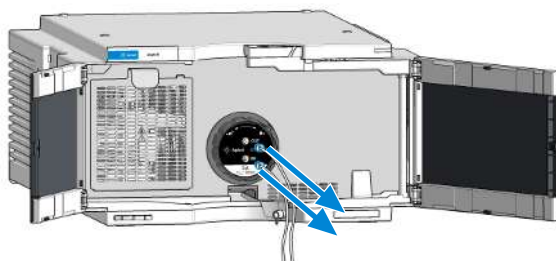
Maintenance

Replace the Flow Cell

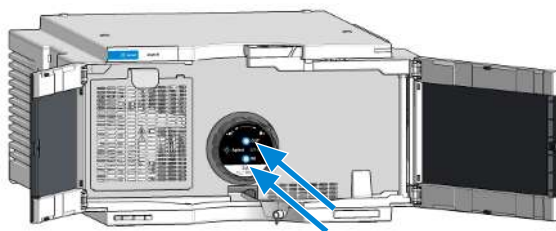
- 1 Open the doors.



- 2 Uninstall the capillaries.



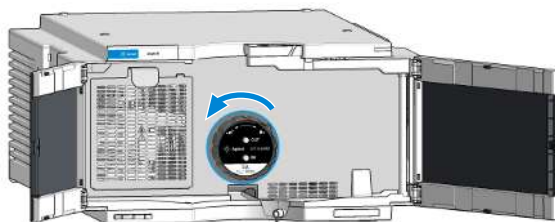
- 3 Install the flow cell plugs.



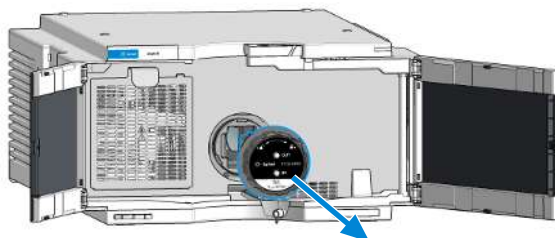
Maintenance

Replace the Flow Cell

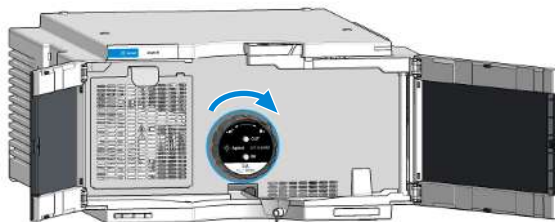
- 4 To unlock the flow cell, turn the black collar of the flow cell counter-clockwise until stop.



- 5 Remove the flow cell.



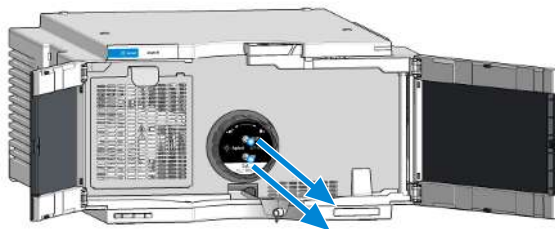
- 6 Turn the black collar of the flow cell to be installed to the unlock position, as indicated on the cell label. Then insert the flow cell into the detector until it stops. The flow cell is keyed, so it cannot be installed in a wrong way. To lock the cell, turn the black collar clockwise until stop position, also indicated by an acoustic click.



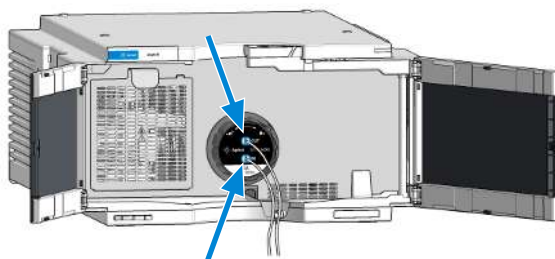
Maintenance

Replace the Flow Cell

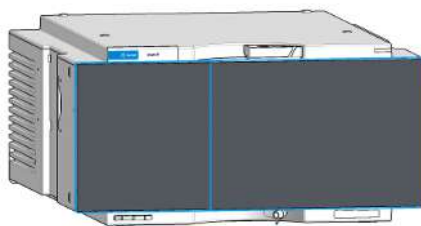
- 7 Remove the flow cell plugs.



- 8 Install the capillaries.



- 9 Close the doors.



- 10 Turn on the pump.

Maintenance**Replace the Flow Cell**

11 Ignite the lamp.

12 If the installed cell is different to the previously installed one and has never been calibrated on this system before, perform a wavelength calibration (use fresh, clean water).

Replace the Lamp House Window

When

- Low counts on Lamp Intensity Check or increased noise.

Parts required

Qty.	p/n	Description
1	 G7123-60060	Window Slider-Assembly

Prerequisites

- Turn off the lamp.
- Power off the module.

WARNING

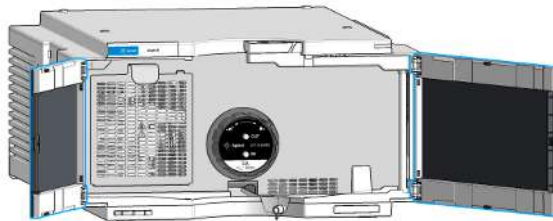
The lamp housing can be hot.

- Allow sufficient time to cool down.

NOTE

Maximum safe daily UV/blue light energy dose at a distance of 50 cm (according to IEC 62471) is reached after 8 hours if detector is operated with opened lamp service door.

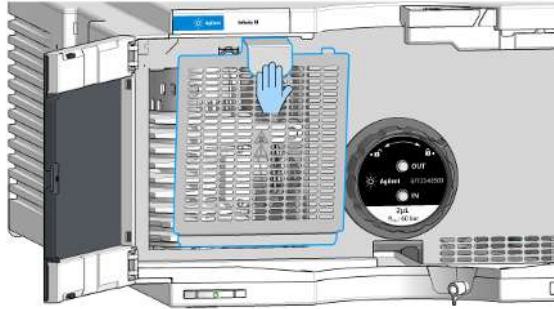
- 1 Open the doors.



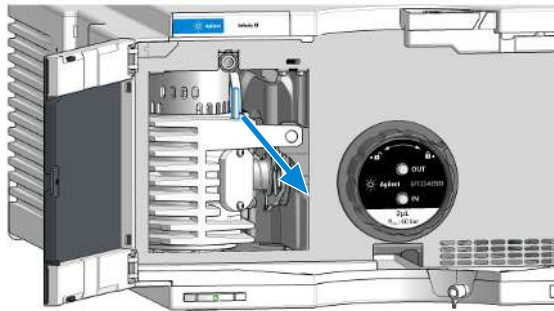
Maintenance

Replace the Lamp House Window

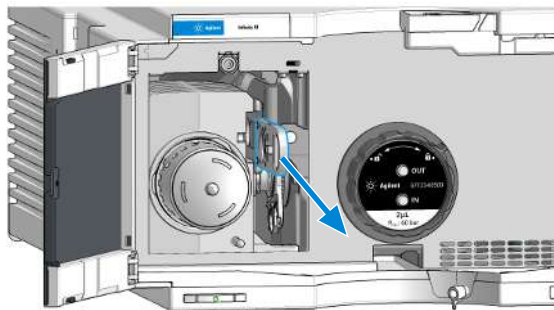
- 2 Remove the safety grid by pulling on the metal handle.



- 3 Pull the metal rod towards the front, so the lamp housing gets turned by 90 degrees.



- 4 Remove the window holder by pulling the handle of the window holder towards you.



WARNING

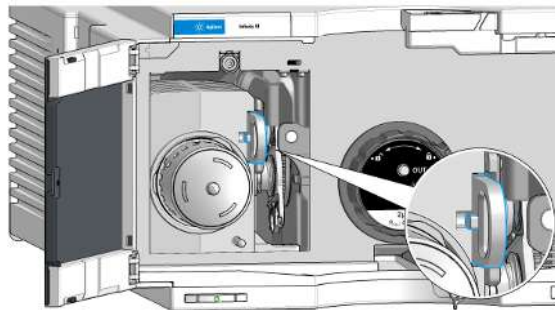
UV radiation and blue light.

- Proper PPE (Personal Protective Equipment) must be used.
- Do not look directly into the light, do not place hands into the cell compartment and do not put anything into the light path.
- Never open the housing while the lamp is on.
- Turn off the lamp before changing the cell.

5 Take the new window holder.

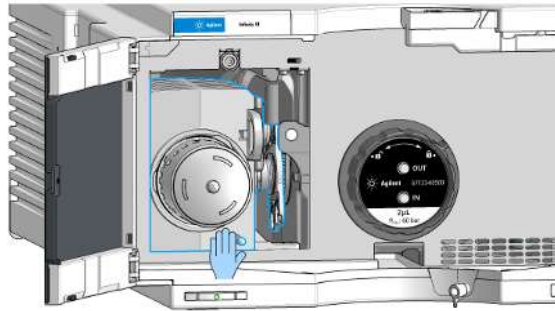


6 Fully insert the new window holder into the lamp housing until it clicks in. Pay attention to the orientation of the index key on the window holder and the notch on the lamp housing.

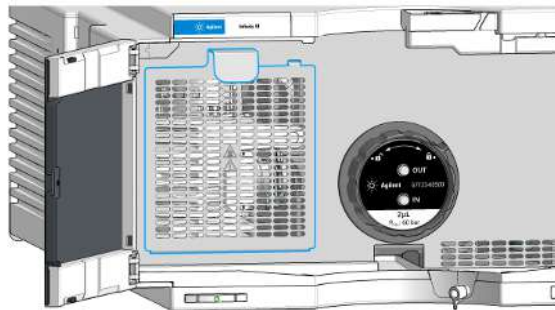


Maintenance**Replace the Lamp House Window**

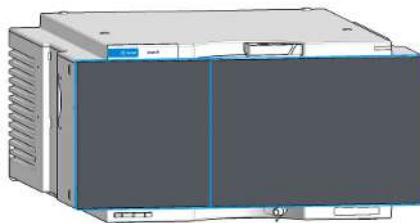
- 7 Push the metal rod on the lamp housing up-/backwards, so the lamp housing turns by 90 degrees until it comes to a stop and gets held in place by a magnet.



- 8 Re-install the safety grid. Insert at the bottom, then the top gets held in place by a magnet.



- 9 Close the doors.



- 10 Power on the module.

Maintenance**Replace the Lamp House Window**

- 11 Ignite the lamp.
- 12 Install 5022-2159 (Restriction capillary, SST 0.12 mm ID, 2 m long) .
- 13 Flush the system with fresh, clean water.
- 14 Perform a wavelength calibration.
- 15 Run a Lamp Intensity Check.

Storage of the Flow Cell

NOTE

Never leave the flow cell sitting in water or buffer for more than one day.

- 1 Flush the flow cell with fresh, clean water first, then with iso- propanol or methanol and insert the plugs into the cell inlet and outlet.
- 2 Remove the flow cell from the detector.
- 3 Install another cell or cover the insert with the black protective cover.
- 4 Store the flow cell in the foam-padded box provided with the flow cell.

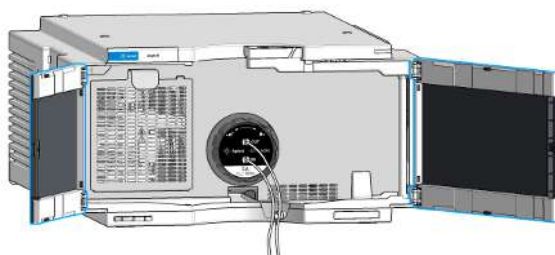
Correcting Leaks

When • If leak has occurred.

Tools required	Qty.	p/n	Description
	1		Tissue

Prerequisites • Turn the pump off.

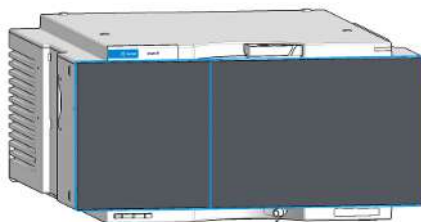
1 Open the doors.





2 Use tissue to dry the leak sensor area.

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

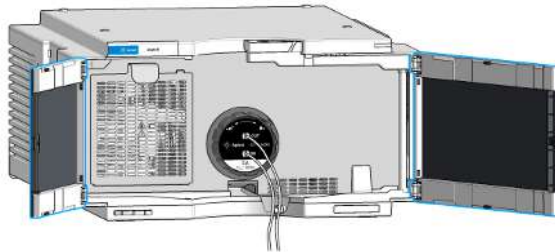
4 Close the doors.



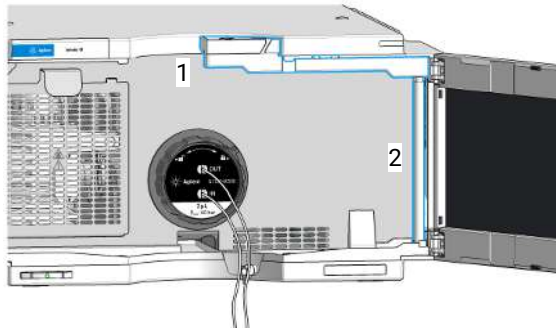
Replace Leak Handling System Parts

Parts required	Qty.	p/n	Description
	1	 5043-0856	Leak Adapter
	1	 5063-6527	Tubing, Silicon Rubber, 1.2 m, ID/OD 6 mm/9 mm approximately 85 mm required

- 1 Open the doors.



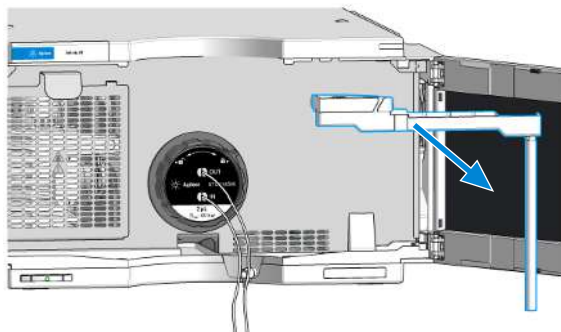
- 2 Locate the Leak Adapter (1) and Tubing (2).



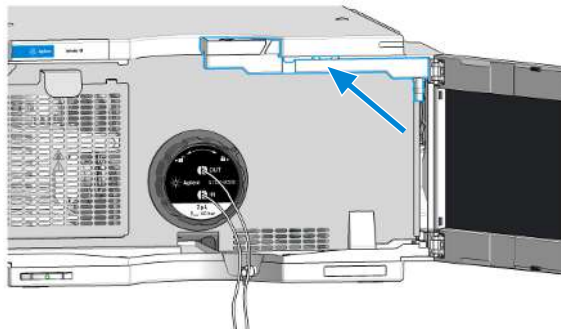
Maintenance

Replace Leak Handling System Parts

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

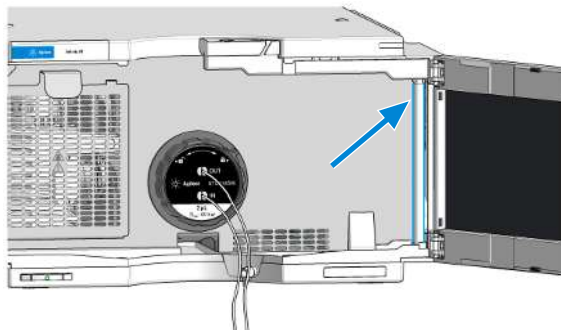


- 4 Install the Leak Adapter by pressing it into the Main Cover.

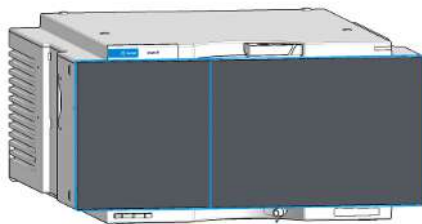


Maintenance**Replace Leak Handling System Parts**

- 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

Install a newer firmware

- It fixes known problems of older versions, or
- It introduces new features, or
- It ensures keeping all systems at the same (validated) revision

When

Install an older firmware

- It ensures keeping all systems at the same (validated) revision, or
- It ensures compatibility after adding a new module to the system, or
- A third-party control software requires a special version

Software required

- Agilent Lab Advisor software

Tools required

Qty.	p/n	Description
1		Firmware, tools and documentation from Agilent web site

Prerequisites

- For further information about minimum firmware requirements, firmware compatibilities and emulation for backward compatibility with specific software environments, please check the latest Firmware Bulletin.

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.
<https://www.agilent.com/en-us/firmwareDownload?whid=69761>
- 2 For loading the firmware into the module follow the instructions in the documentation.

Information from Module's Assemblies

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.



9 Parts and Materials for Maintenance

This chapter provides information on parts and materials for maintenance.

Overview of Maintenance Parts 157

Accessory Kit (G7123-68005) 159

Overview of Maintenance Parts

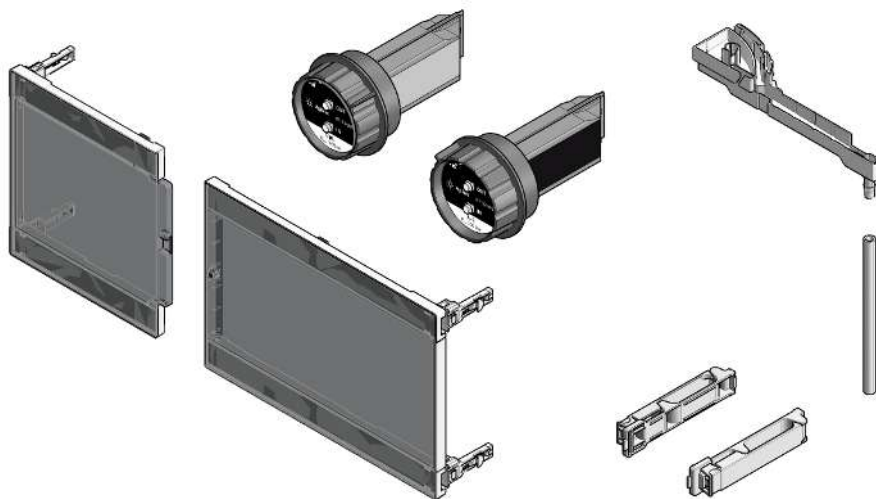












Figure 18: Maintenance Parts

Qty.	p/n	Description
1	 5043-0856	Leak Adapter
1	 5063-6527	Tubing, Silicon Rubber, 1.2 m, ID/OD 6 mm/9 mm
1	 5062-8535	Waste accessory kit (Flow Cell to waste)
1	 5043-1013	Tubing Clip
1	 5360-0019	Door 200mm left Infinity III (only orderable as part of 5004-3200 Door Kit Infinity III 200mm)
1	 5360-0020	Door 200mm right Infinity III (only orderable as part of 5004-3200 Door Kit Infinity III 200mm)
1	 G7123-60200	Hg-Xenon Lamp
1	 G7123-60500	Flow Cell 2 μ L
1	 G7123-60300	Flow Cell 13 μ L
1	 G7123-60060	Window Slider-Assembly

Parts and Materials for Maintenance

Overview of Maintenance Parts







Qty.	p/n	Description
1	 G7123-42009	Foam Protection FLD
1	 1401-0641	Cap-round W/FLG 60.33mm-ID Vinyl Black
1	 0100-1259	Plug-Screw 1032- Fitting

For cables, see [Identifying Cables](#) on page 160.

NOTE

The Hg-Xenon Lamp (G7123-60200) shall only be used as a light source for the Agilent G7123B Fluorescence Detector.

Accessory Kit (G7123-68005)

p/n	Description
 0100-1516	Finger-tight fitting PEEK, 2/pk
 5062-2462	Tube PTFE 0.7 mm x 5 m, 1.6 mm od see item 4 in
 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
 5500-1596	Quick Turn Capillary MP35N 0.12 mm x 280 mm



10 Identifying Cables

This chapter provides information on cables used with the modules.

Cable Overview 161

Analog Cables 163

Remote Cables 165

BCD Cables 169

CAN/LAN Cables 171

RS-232 Cables 172

USB 173

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
5188-8059	ERI-Extension-Cable 1.2 m
5061-3378	Remote Cable to 35900 A/D converter
01046-60201	Agilent module to general purpose
5188-8057	Fraction Collection ERI remote Y-cable

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)

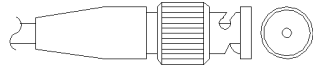
RS-232 cables

p/n	Description
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 is 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 +

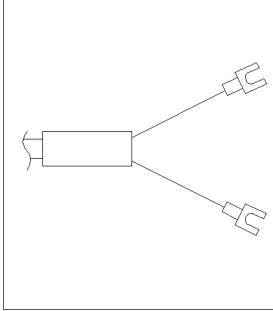
Agilent Module to BNC Connector

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

Identifying Cables

Analog Cables

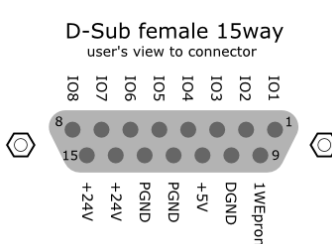
Agilent Module to General Purpose

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 (D-Sub 15 pin male - open end)
- 5188-8044 ERI to ERI (D_Sub 15 pin male - male)
- 5188-8059 ERI-Extension-Cable 1.2 m (D-Sub15 pin male / female)

p/n 5188-8029	pin	Color code	Enhanced Remote	Classic Remote	Active (TTL)
 <p>D-Sub female 15way user's view to connector</p> <p>108 107 106 105 104 103 102 101 8 15 9</p> <p>+24V +24V PGND PGND +5V DGND 1WEprom</p>	1	white	IO1	START REQUEST	Low
	2	brown	IO2	STOP	Low
	3	green	IO3	READY	High
	4	yellow	IO4	PEAK DETECT	Low
	5	grey	IO5	POWER ON	High
	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				

NOTE

Configuration is different with old firmware revisions.
The configuration for IO4 and IO5 is swapped for modules with firmware lower than D.07.10.


NOTE

Peak Detection is used for LCMS systems connected with the Fraction Collection Remote Y-Cable (5188-8057).

Identifying Cables

Remote Cables

- 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		

Identifying Cables

Remote Cables

- 5188-8057 ERI to APG and RJ45 (Connector D_Subminiature 15 pin (ERI), Connector D_Subminiature 9 pin (APG), Connector plug Cat5e (RJ45))

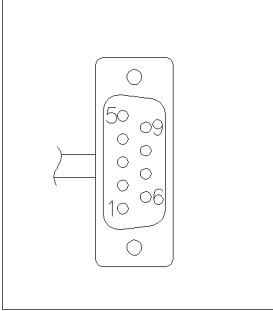
Table 8: 5188-8057 ERI to APG and RJ45

p/n 5188-8057	Pin (ERI)	Signal	Pin (APG)	Active (TTL)	Pin (RJ45)
	10	GND	1		5
	1	Start Request	9	High	
	2	Stop	8	High	
	3	Ready	7	High	
	4	Fraction Trigger	5	High	4
	5	Power on	6	High	
	6	Shut Down	4	High	
	7	Start	3	High	
	8	Prepare	2	High	
	Ground	Cable Shielding	NC		

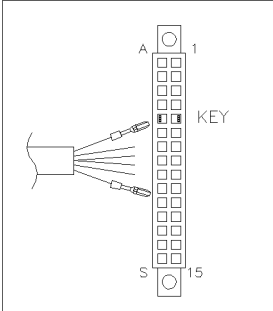


One end of these cables provides an Agilent Technologies APG (Auxiliary Port Group) remote connector to be connected to Agilent modules. The other end depends on the instrument to be connected to.

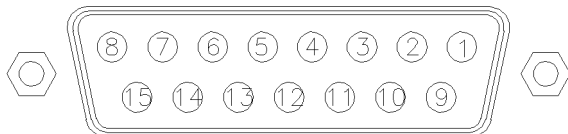
Agilent Module to Agilent 35900 A/D Converters

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

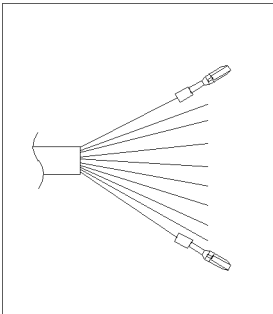
p/n 01046-60201	Wire Color	Pin Agilent module	Signal Name	Active (TTL)
	White	1	Digital ground	
	Brown	2	Prepare run	Low
	Gray	3	Start	Low
	Blue	4	Shut down	Low
	Pink	5	Not connected	
	Yellow	6	Power on	High
	Red	7	Ready	High
	Green	8	Stop	Low
	Black	9	Start request	Low

BCD Cables

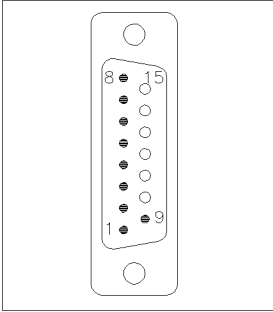


One end of these cables provides a 15-pin BCD connector to be connected to the Agilent modules. The other end depends on the instrument to be connected to

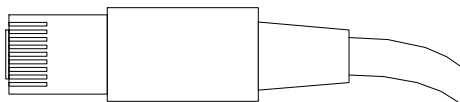
Agilent Module to General Purpose

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)

RS-232 Cables

p/n	Description
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 is 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

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)

11

Hardware Information

This chapter describes the module in more detail on hardware and electronics.

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Firmware Description 175

Electrical Connections 178

Interfaces 180

Overview Interfaces 183

Instrument Layout 192

Early Maintenance Feedback (EMF) 193

Module-Specific Hardware Information 194

Setting the 6-bit Configuration Switch 194

General Hardware Information

This section provides detailed hardware information on firmware that is valid for this module.

Firmware Description

The firmware of the instrument consists of two independent sections:

- a non-instrument specific section, called *resident system*
- an instrument specific section, called *main system*

Resident System

This resident section of the firmware is identical for all Agilent 1100/1200/1220/1260/1290 series modules. Its properties are:

- the complete communication capabilities (CAN, LAN, USB and RS- 232)
- memory management
- ability to update the firmware of the 'main system'

Main System

Its properties are:

- the complete communication capabilities (CAN, LAN, USB and RS- 232)
- memory management
- ability to update the firmware of the 'resident system'

In addition the main system comprises the instrument functions that are divided into common functions like

- run synchronization through APG/ERI remote,
- error handling,
- diagnostic functions,

Hardware Information

General Hardware Information

- or module specific functions like
 - internal events such as lamp control, filter movements,
 - raw data collection and conversion to absorbance.

Firmware Updates

Firmware updates can be done with the Agilent Lab Advisor software with files on the hard disk (latest version should be used).

Required tools, firmware and documentation are available from the Agilent web: <https://www.agilent.com/en-us/firmwareDownload?whid=69761>

The file naming conventions are:

PPPP_RVVV_XXX.dlb, where

- PPPP is the product number, for example, 1315B for the G1315B DAD,
- R the firmware revision, for example, A for G1315B or B for the G1315C DAD,
- VVV is the revision number, for example 650 is revision 6.50,
- XXX is the build number of the firmware.

For instructions on firmware updates refer to section *Replacing Firmware* in chapter *Maintenance* or use the documentation provided with the *Firmware Update Tools*.

NOTE

Update of main system can be done in the resident system only. Update of the resident system can be done in the main system only.
Main and resident firmware must be from the same set.

Hardware Information

General Hardware Information

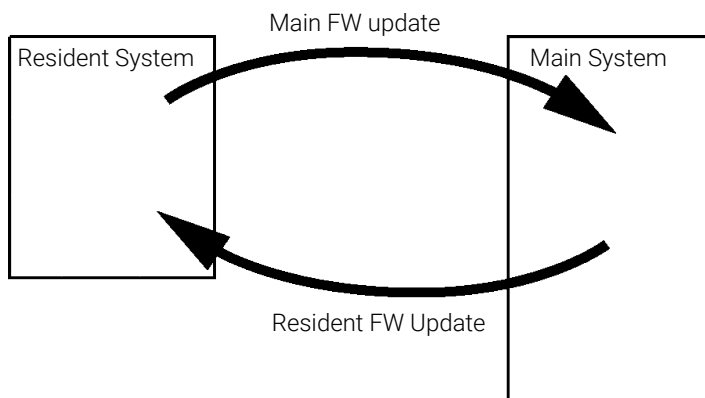


Figure 19: Firmware update mechanism

For further information about minimum firmware requirements, firmware compatibilities and emulation for backward compatibility with specific software environments, please check the latest Firmware Bulletin.

The firmware update tools, firmware and documentation are available from the Agilent web.

- <https://www.agilent.com/en-us/firmwareDownload?whid=69761>

Electrical Connections

- The CAN bus is a serial bus with high-speed data transfer. The two connectors for the CAN bus are used for internal module data transfer and synchronization.
- One analog output provides signals for integrators or data handling systems.
- The ERI connector may be used in combination with other analytical instruments from Agilent Technologies if you want to use features such as start, stop, common shut down, prepare, and so on.
- With the appropriate software, the LAN connector may be used to control the module from a computer through a LAN connection. This connector is activated and can be configured with the configuration switch.
- The USB connector may be used for service related workflows.
- The power input socket accepts a line voltage of 100 – 240 VAC \pm 10 % with a line frequency of 50 or 60 Hz. Maximum power consumption varies by module. There is no voltage selector on your module because the power supply has wide-ranging capability. There are no externally accessible fuses because automatic electronic fuses are implemented in the power supply.

WARNING

**Electric shock due to insufficient insulation of connected instruments
Personal injury or damage to the instrument**

- **Any other instruments connected to this instrument shall be approved to a suitable safety standard and must include reinforced insulation from the mains.**

NOTE

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

Rear View of the Module



Figure 20: Rear view of detector (example shows a G7114A/B VWD) – electrical connections and label

Serial Number Information

The serial number information on the instrument labels provide the following information:

CCXZZ00000	Format
CC	Country of manufacturing <ul style="list-style-type: none"> • DE = Germany • JP = Japan • CN = China • RO = Romania
X	Alphabetic character A-Z (used by manufacturing)
ZZ	Alpha-numeric code 0-9, A-Z, where each combination unambiguously denotes a module (there can be more than one code for the same module)
00000	Serial number

Interfaces

The Agilent InfinityLab LC Series modules provide the following interfaces:

Table 9: Agilent InfinityLab LC Series interfaces

Module	CAN	USB	LAN (on-board)	RS-232	Analog	APG (A) / ERI (E)	Special
Pumps							
G7104A/C	2	No	Yes	Yes	1	A	
G7110B	2	Yes	Yes	No	No	E	
G7111A/B, G5654A	2	Yes	Yes	No	No	E	
G7112B	2	Yes	Yes	No	No	E	
G7120A, G7132A	2	No	Yes	Yes	1	A	
G7161A/B	2	Yes	Yes	No	No	E	
Samplers							
G7129A/B/C	2	Yes	Yes	No	No	E	
G7167A/B/C, G7137A/B, G5668A, G3167A/B	2	Yes	Yes	No	No	E	
G7157A	2	Yes	Yes	No	No	E	
Detectors							
G7114A/B	2	Yes	Yes	No	1	E	
G7115A	2	Yes	Yes	No	1	E	
G7117A/B/C	2	Yes	Yes	No	1	E	
G7121A/B	2	Yes	Yes	No	1	E	
G7123B	2	Yes	Yes	No	1	E	
G7162A/B	2	Yes	Yes	No	1	E	
G7165A	2	Yes	Yes	No	1	E	
Fraction Collectors							
G7158B	2	Yes	Yes	No	No	E	
G7159B	2	Yes	Yes	No	No	E	

Module	CAN	USB	LAN (on-board)	RS-232	Analog	APG (A) / ERI (E)	Special
G7166A	2	No	No	No	No	No	Requires a host module with on-board LAN with minimum FW B.06.40 or C.06.40, or with additional G1369C LAN Card
G1364E/F, G5664B	2	Yes	Yes	No	No	E	THERMOSTAT for G1330B
Others							
G1170A	2	No	No	No	No	No	Requires a host module with on-board LAN or with additional G1369C LAN Card.
G7116A/B	2	No	No	No	No	No	Requires a host module with on-board LAN or with additional G1369C LAN Card.
G7122A	No	No	No	Yes	No	A	
G7170B	2	No	No	No	No	No	Requires a host module with on-board LAN with minimum FW B.06.40 or C.06.40, or with additional G1369C LAN Card
G7175A	2	No	No	No	No	No	Requires a host module with on-board LAN or with additional G1369C LAN Card.

NOTE

LAN connection is made between at least one of the Agilent modules and the Control PC.

- If an Assist Hub is installed, connect the laboratory (or Control PC) LAN to the Lab LAN port of the Assist Hub.
- If an Assist Hub is installed, connect additional LAN connections from the detectors and pumps to the Module LAN ports of the Assist Hub.
- If an Assist Hub is NOT installed and a detector is installed, connect the LAN to this detector.
- If an Assist Hub is NOT installed and there are multiple detectors with spectral capabilities, consider using additional LAN connections for each detector.

Hardware Information

General Hardware Information

- CAN connectors as interface to other modules
- LAN connector as interface to the control software
- RS-232C as interface to a computer
- USB (Universal Series Bus) for service workflows
- REMOTE connector as interface to other Agilent products
- Analog output connector for signal output

Overview Interfaces

CAN

The CAN is inter-module communication interface. It is a 2-wire serial bus system supporting high speed data communication and real-time requirement.

LAN

The modules have either an interface slot for a LAN card (e.g. Agilent G1369B/C LAN Interface) or they have an on-board LAN interface (e.g. detectors G1315C/D DAD and G1365C/D MWD). This interface allows the control of the module/system via a PC with the appropriate control software. Some modules have neither on-board LAN nor an interface slot for a LAN card (e.g. G1170A Valve Drive or G4227A Flexible Cube). These are hosted modules and require a Host module with firmware B.06.40 or later or with additional G1369C LAN Card.

NOTE

LAN connection is made between at least one of the Agilent modules and the Control PC.

- If an Assist Hub is installed, connect the laboratory (or Control PC) LAN to the Lab LAN port of the Assist Hub.
- If an Assist Hub is installed, connect additional LAN connections from the detectors and pumps to the Module LAN ports of the Assist Hub.
- If an Assist Hub is NOT installed and a detector is installed, connect the LAN to this detector.
- If an Assist Hub is NOT installed and there are multiple detectors with spectral capabilities, consider using additional LAN connections for each detector.

RS-232C (Serial)

NOTE

There is no configuration possible on main boards with on-board LAN. These are pre-configured for 19200 baud, 8 data bit with no parity and one start bit and one stop bit are always used (not selectable).

The RS-232C is designed as DCE (data communication equipment) with a 9-pin male SUB-D type connector. The pins are defined as:

Table 10: RS-232C Connection Table

Pin	Direction	Function
1	In	DCD
2	In	RxD
3	Out	TxD
4	Out	DTR
5		Ground
6	In	DSR
7	Out	RTS
8	In	CTS
9	In	RI

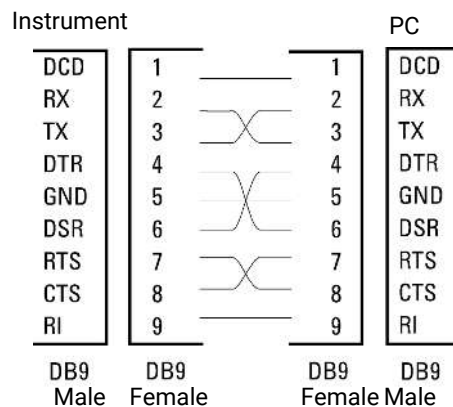


Figure 21: RS-232 Cable

Analog Signal Output

The analog signal output can be distributed to a recording device. For details refer to the description of the module's mainboard.

APG Remote

The APG Remote connector may be used in combination with other analytical instruments from Agilent Technologies if you want to use features as common shut down, prepare, and so on.

Remote control allows easy connection between single instruments or systems to ensure coordinated analysis with simple coupling requirements.

The subminiature D connector is used. The module provides one remote connector which is inputs/outputs (wired- or technique).

To provide maximum safety within a distributed analysis system, one line is dedicated to **SHUT DOWN** the system's critical parts in case any module detects a serious problem. To detect whether all participating modules are switched on or properly powered, one line is defined to summarize the **POWER ON** state of all connected modules. Control of analysis is maintained by signal readiness **READY** for next analysis, followed by **START** of run and optional **STOP** of run triggered on the respective lines. In addition **PREPARE** and **START REQUEST** may be issued. The signal levels are defined as:

- standard TTL levels (0 V is logic true, + 5.0 V is false),
- fan-out is 10 ,
- input load is 2.2 kOhm against + 5.0 V, and
- output are open collector type, inputs/outputs (wired- or technique).

NOTE

All common TTL circuits operate with a 5 V power supply. A TTL signal is defined as "low" or L when between 0 V and 0.8 V and "high" or H when between 2.0 V and 5.0 V (with respect to the ground terminal).

Table 11: Remote Signal Distribution

Pin	Signal	Description
1	DGND	Digital ground
2	PREPARE	(L) Request to prepare for analysis (for example, calibration, detector lamp on). Receiver is any module performing pre-analysis activities.

Hardware Information

General Hardware Information

Pin	Signal	Description
3	START	(L) Request to start run / timetable. Receiver is any module performing run-time controlled activities.
4	SHUT DOWN	(L) System has serious problem (for example, leak: stops pump). Receiver is any module capable to reduce safety risk.
5		Not used
6	POWER ON	(H) All modules connected to system are switched on. Receiver is any module relying on operation of others.
7	READY	(H) System is ready for next analysis. Receiver is any sequence controller.
8	STOP	(L) Request to reach system ready state as soon as possible (for example, stop run, abort or finish and stop injection). Receiver is any module performing run-time controlled activities.
9	START REQUEST	(L) Request to start injection cycle (for example, by start key on any module). Receiver is the autosampler.

ERI (Enhanced Remote Interface)

ERI replaces the AGP Remote Interface that is used in the HP 1090/1040/1050/1100 HPLC systems and Agilent 1100/1200/1200 Infinity HPLC modules. All new InfinityLab LC Series products using the communication board use ERI. This interface is already used in the Agilent Universal Interface Box 2 (UIB2)

Remote (ERI)

The ERI (Enhanced Remote Interface) connector may be used in combination with other analytical instruments from Agilent Technologies if you want to use features as common shut down, prepare, and so on.

It allows easy connection between single instruments or systems to ensure coordinated analysis with simple coupling requirements.

The subminiature D connector is used. The module provides one remote connector which is inputs/outputs (wired- or technique).

To provide maximum safety within a distributed analysis system, one line is dedicated to **SHUT DOWN** the system's critical parts in case any module detects a serious problem. To detect whether all participating modules are switched on or properly powered, one line is defined to summarize the **POWER ON** state of all connected modules. Control of analysis is maintained by signal readiness **READY** for next analysis, followed by **START** of run and optional **STOP** of run triggered on the respective lines. In addition **PREPARE** and **START REQUEST** may be issued. The signal levels are defined as:

- standard TTL levels (0 V is logic true, + 5.0 V is false),
- fan-out is 10,
- input load is 2.2 kOhm against + 5.0 V, and
- output are open collector type, inputs/outputs (wired- or technique).

NOTE

All common TTL circuits operate with a 5 V power supply. A TTL signal is defined as "low" or L when between 0 V and 0.8 V and "high" or H when between 2.0 V and 5.0 V (with respect to the ground terminal).

Table 12: ERI signal distribution

Pin	Signal	Description
1	START REQUEST	(L) Request to start injection cycle (for example, by start key on any module). Receiver is the autosampler.
2	STOP	(L) Request to reach system ready state as soon as possible (for example, stop run, abort or finish and stop injection). Receiver is any module performing run-time controlled activities.
3	READY	(H) System is ready for next analysis. Receiver is any sequence controller.
4	POWER ON	(H) All modules connected to system are switched on. Receiver is any module relying on operation of others.
5		Not used
6	SHUT DOWN	(L) System has serious problem (for example, leak: stops pump). Receiver is any module capable to reduce safety risk.
7	START	(L) Request to start run / timetable. Receiver is any module performing run-time controlled activities.
8	PREPARE	(L) Request to prepare for analysis (for example, calibration, detector lamp on). Receiver is any module performing pre-analysis activities.

ERI Description

The ERI interface contains eight individual programmable input/output pins. In addition, it provides 24 V power and 5 V power and a serial data line to detect and recognize further add-ons that could be connected to this interface. This way the interface can support various additional devices like sensors, triggers (in and out) and small controllers, etc.

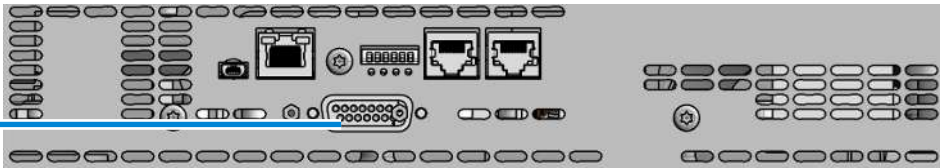


Figure 22: Location of the ERI interface

Hardware Information

General Hardware Information

	Pin	Enhanced Remote
<p>D-Sub female 15way user's view to connector</p> <p>IO1 IO2 IO3 IO4 IO5 IO6 IO7 IO8 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15</p> <p>1WEprom DGND +5V PGND +24V +24V</p>	1	IO 1 (START REQUEST)
	2	IO 2 (STOP)
	3	IO 3 (READY)
	4	IO 4 (POWER ON)
	5	IO 5 (NOT USED)
	6	IO 6 (SHUT DOWN)
	7	IO 7 (START)
	8	IO 8 (PREPARE)
	9	1 wire DATA
	10	DGND
	11	+5 V ERI out
	12	PGND
	13	PGND
	14	+24 V ERI out
	15	+24 V ERI out

IO (Input/Output) Lines

- Eight generic bi-directional channels (input or output).
- Same as the APG Remote.
- Devices like valves, relays, ADCs, DACs, controllers can be supported/controlled.

1-Wire Data (Future Use)

This serial line can be used to read out an EPROM or write into an EPROM of a connected ERI-device. The firmware can detect the connected type of device automatically and update information in the device (if required).

5V Distribution (Future Use)

- Available directly after turning on the hosting module (assures that the firmware can detect certain basic functionality of the device).

Hardware Information

General Hardware Information

- For digital circuits or similar.
- Provides 500 mA maximum.
- Short-circuit proof with automatic switch off (by firmware).

24V Distribution (Future Use)

- Available by firmware command (defined turn on/off).
- For devices that need higher power
 - Class 0: 0.5 A maximum (12 W)
 - Class 1: 1.0 A maximum (24 W)
 - Class 2: 2.0 A maximum (48 W)
- Class depends on hosting module's internal power overhead.
- If a connected device requires more power the firmware detects this (overcurrent detection) and provides the information to the user interface.
- Fuse used for safety protection (on board).
- Short circuit will be detected through hardware.

Hardware Information

General Hardware Information

USB (Universal Serial Bus)

The USB replaced the RS-232 and is used for service workflows, only.

For the InfinityLab Assist, the USB connector supports USB storage media of type exFAT, FAT32, EXT4. It can be used to perform software updates, data storage, back up, or Import/Export of Tasks & Settings.

Special Interfaces

There is no special interface for this module.

Instrument Layout

The industrial design of the module incorporates several innovative features. It uses Agilent's E-PAC concept for the packaging of electronics and mechanical assemblies. This concept is based upon the use of expanded polypropylene (EPP) layers of foam plastic spacers in which the mechanical and electronic boards components of the module are placed. This pack is then housed in a metal inner cabinet which is enclosed by a plastic external cabinet. The advantages of this packaging technology are:

- virtual elimination of fixing screws, bolts or ties, reducing the number of components and increasing the speed of assembly/disassembly,
- the plastic layers have air channels molded into them so that cooling air can be guided exactly to the required locations,
- the plastic layers help cushion the electronic and mechanical parts from physical shock, and
- the metal inner cabinet shields the internal electronics from electromagnetic interference and also helps to reduce or eliminate radio frequency emissions from the instrument itself.

Early Maintenance Feedback (EMF)

Maintenance requires the exchange of components that are subject to wear or stress. Ideally, the frequency at which components are exchanged should be based on the intensity of use of the module and the analytical conditions, and not on a predefined time interval. The early maintenance feedback (EMF) feature monitors the use of specific components in the instrument, and provides feedback when the user-selectable limits have been exceeded. The visual feedback in the user interface provides an indication that maintenance procedures should be scheduled.

EMF Counters

EMF counters increment with use and can be assigned a maximum limit which provides visual feedback in the user interface when the limit is exceeded. Some counters can be reset to zero after the required maintenance procedure.

The detector provides the following EMF counters:

- Hg-Xe lamp On-Time
- Number of Hg-Xe lamp ignitions

Using the EMF Counters

The user-settable **EMF** limits for the **EMF Counters** enable the early maintenance feedback to be adapted to specific user requirements. The useful maintenance cycle is dependent on the requirements for use. Therefore, the definition of the maximum limits needs to be determined based on the specific operating conditions of the instrument.

Setting the EMF Limits

The setting of the **EMF** limits must be optimized over one or two maintenance cycles. Initially the default **EMF** limits should be set. When instrument performance indicates maintenance is necessary, take note of the values displayed by the **EMF counters**. Enter these values (or values slightly less than the displayed values) as **EMF** limits, and then reset the **EMF counters** to zero. The next time the **EMF counters** exceed the new **EMF** limits, the **EMF** flag will be displayed, providing a reminder that maintenance needs to be scheduled.

Module-Specific Hardware Information

Setting the 6-bit Configuration Switch

The communication board provides the 6-bit configuration switch and is located at the rear of the module. Switch settings provide configuration parameters for LAN and instrument specific initialization procedures.

All modules with communication board:

- Default is ALL switches DOWN (best settings).
 - Default IP address for LAN 192.168.254.11
- For specific LAN modes switches 4-5 must be set as required.
- For boot resident/cold start modes switches 1+2 or 6 must be UP.

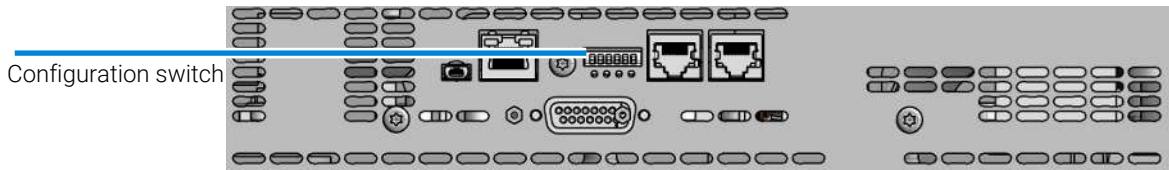


Figure 23: Location of configuration switch

Hardware Information

Module-Specific Hardware Information

Table 13: 6-bit configuration switch

SW1	SW2	SW3	SW4	SW5	SW6	Mode	Init Mode
0	0	0	0	0	0	COM	Use Default IP Address (192.168.254.11, Subnet mask: 255.255.255.0)
0	0	0	0	1	0	COM	Use Stored IP Address
0	0	0	1	0	0	COM	USE DHCP to request IP Address (Host name will be the MAC address)
1	0	0	0	0	0	Test	Boot Main System/Keep Data
1	1	0	0	0	0	Test	Boot Resident System/Keep Data
1	0	0	0	0	1	Test	Boot Main System/Revert to Default Data
1	1	0	0	0	1	Test	Boot Resident System/Revert to Default Data

Legend:

0 (switch down), 1 (switch up), SW (switch)

Special Settings

Boot-Resident/Main

Firmware update procedures may require this mode in case of firmware loading errors (main/resident firmware part).

If you use the following switch settings and power the instrument up again, the instrument firmware stays in the resident/main mode. In resident mode, it is not operable as a module. It only uses basic functions of the operating system for example, for communication. In this mode the main firmware can be loaded (using update utilities).

Forced Cold Start

A forced cold start can be used to bring the module into a defined mode with default parameter settings.

Hardware Information

Module-Specific Hardware Information

- Boot Main System / Revert to Default Data
The instrument will boot to main mode and changes to the module's default parameter. May be also required to load resident firmware into the module.
- Boot Resident System / Revert to Default Data
The instrument will boot to resident mode and changes to the module's default parameter. May be also required to load main firmware into the module.

CAUTION

Loss of data

Forced cold start erases all methods and data stored in the non-volatile memory. Exceptions are calibration settings, diagnosis and repair log books which will not be erased.

- Save your methods and data before executing a forced cold start.

12

LAN Configuration

This chapter provides information on connecting the module to the control software.

What You Have to Do First 198

TCP/IP Parameter Configuration 200

Configuration Switch and Mode Selection 201

Dynamic Host Configuration Protocol (DHCP) 208

General Information (DHCP) 208

Setup (DHCP) 209

Manual Configuration 211

With the Instant Pilot (G4208A) 212

PC and User Interface Software Setup 213

PC Setup for Local Configuration 213

What You Have to Do First

The module has an on-board LAN communication interface.

NOTE

This chapter is generic and may show figures that differ from your module. The functionality is the same.

- 1 Note the MAC (Media Access Control) address for further reference. The MAC or hardware address of the LAN interfaces is a world wide unique identifier. No other network device will have the same hardware address. The MAC address can be found on a label at the rear of the module (see [Figure 25](#) on page 199, or [Figure 26](#) on page 199).

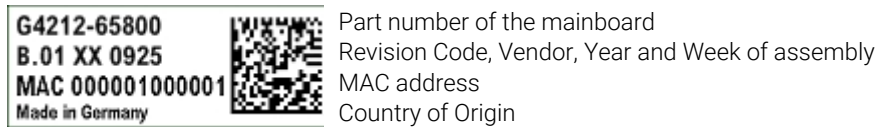


Figure 24: MAC label (example)

- 2 Connect the instrument's LAN interface to

LAN Configuration

What You Have to Do First

- the PC network card using a crossover network cable (point-to-point) or
- a hub or switch using a standard LAN cable.

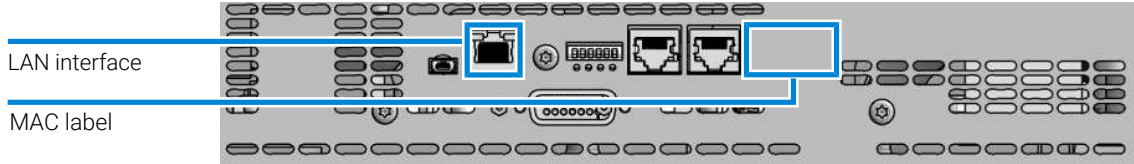


Figure 25: Location of LAN interfaces and MAC label (board with 6-bit configuration switch)

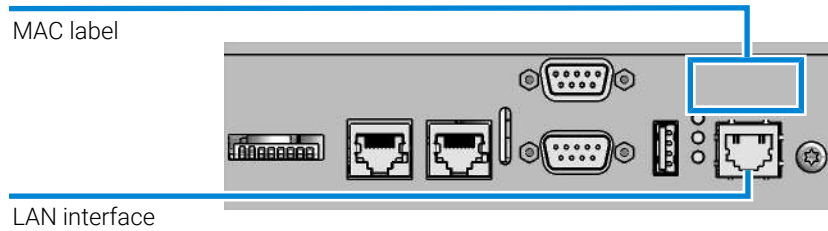


Figure 26: Location of LAN interfaces and MAC label (board with 8-bit configuration switch)

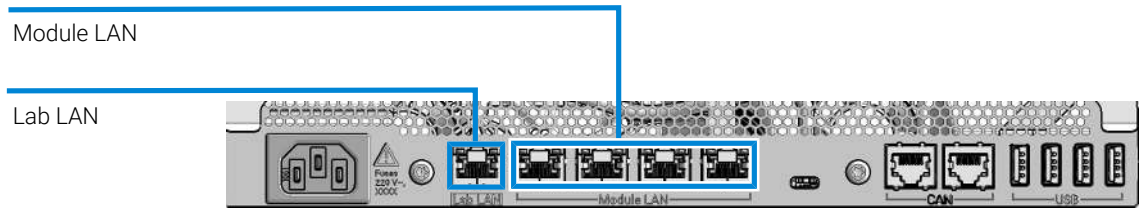


Figure 27: Location of LAN interfaces (InfinityLab Assist Hub)

TCP/IP Parameter Configuration

To operate properly in a network environment, the LAN interface must be configured with valid TCP/IP network parameters. These parameters are:

- IP address
- Subnet Mask
- Default Gateway

The TCP/IP parameters can be configured by the following methods:

- by automatically requesting the parameters from a network-based DHCP Server (using the so-called Dynamic Host Configuration Protocol). This mode requires a LAN-onboard Module or a G1369C LAN Interface card, see [Setup \(DHCP\)](#) on page 209
- by manually setting the parameters using the Local Controller

The LAN interface differentiates between several initialization modes. The initialization mode (short form 'init mode') defines how to determine the active TCP/IP parameters after power-on. The parameters may be derived non-volatile memory or initialized with known default values. The initialization mode is selected by the configuration switch, see on page 203.

Configuration Switch and Mode Selection

The module is shipped with all switches (SW) set to OFF.

NOTE

To perform any LAN configuration, SW1 and SW2 must be set to OFF.

Configuration Switch (8-Bit)

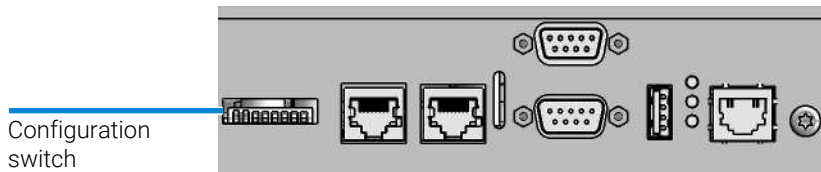


Figure 28: Location of configuration switch (8-bit) at the rear of the module

LAN Configuration

Configuration Switch and Mode Selection

Table 14: Overview of 8-bit configuration switch settings

SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 7	SW 8	Mode	Init Mode
0	0	0	x	x	x	x	x	Link config	Speed and duplex mode determined by autonegotiation ¹
0	0	1	0	0	x	x	x	Link config	10 MBit, half-duplex ¹
0	0	1	0	1	x	x	x	Link config	10 MBit, full-duplex ¹
0	0	1	1	0	x	x	x	Link config	100 MBit, half-duplex ¹
0	0	1	1	1	x	x	x	Link config	100 MBit, full-duplex ¹
0	0	x	x	x	0	1	0	Init Mode Selection	Using stored
0	0	x	x	x	1	0	0	Init Mode Selection	USE DHCP to request IP Address (Host name will be the MAC address) ²
0	0	x	x	x	0	1	1	Init Mode Selection	Use Default IP Address (192.168.254.11, Subnet mask: 255.255.255.0)
1	1	1	0	0	0	0	0	Test	Boot Resident System
1	1	0	0	0	0	0	1	Test	Revert to Default Data (Coldstart)

¹ The LAN interface supports 10 or 100 Mbps operation in full- or half-duplex modes. In most cases, full-duplex is supported when the connecting network device - such as a network switch or hub - supports IEEE 802.3u auto-negotiation specifications.

When connecting to network devices that do not support auto-negotiation, the LAN interface will configure itself for 10- or 100-Mbps half-duplex operation.

For example, when connected to a non-negotiating 10-Mbps hub, the LAN interface will be automatically set to operate at 10-Mbps half-duplex.

If the module is not able to connect to the network through auto-negotiation, you can manually set the link operating mode using link configuration switches on the module.

² Requires firmware B.06.40 or above. Modules without LAN on board, see G1369C LAN Interface Card



Legend:

- SW = switch
- 0 = off (SW down)
- 1 = on (SW up)
- x = optional setting

Configuration Switch (6-Bit)

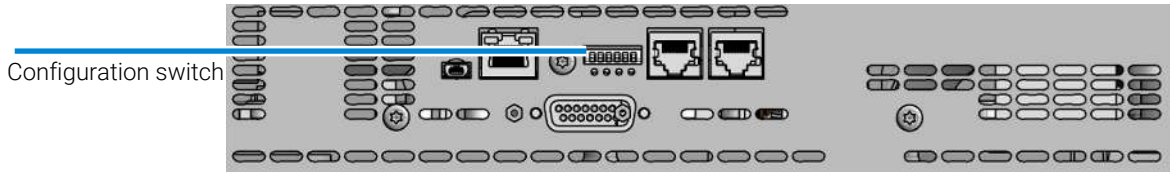


Figure 29: Location of configuration switch (6-bit) at the rear of the module

Table 15: Overview of 6-bit configuration switch settings

SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 7	SW 8	Mode	Init Mode
0	0	0	0	0	0	-	-	COM	Use Default IP Address (192.168.254.11, Subnet mask: 255.255.255.0)
0	0	0	0	1	0	-	-	COM	Use Stored IP Address
0	0	0	1	0	0	-	-	COM	USE DHCP to request IP Address (Host name will be the MAC address)
1	0	0	0	0	0	-	-	Test	Boot Main System/Keep Data
1	1	0	0	0	0	-	-	Test	Boot Resident System/Keep Data
1	0	0	0	0	1	-	-	Test	Boot Main System/Revert to Default Data
1	1	0	0	0	1	-	-	Test	Boot Resident System/Revert to Default Data



- Legend:**
- SW = switch
 - - = not available
 - 0 = off (SW down)
 - 1 = on (SW up)

Configuration Switch (2-Bit)

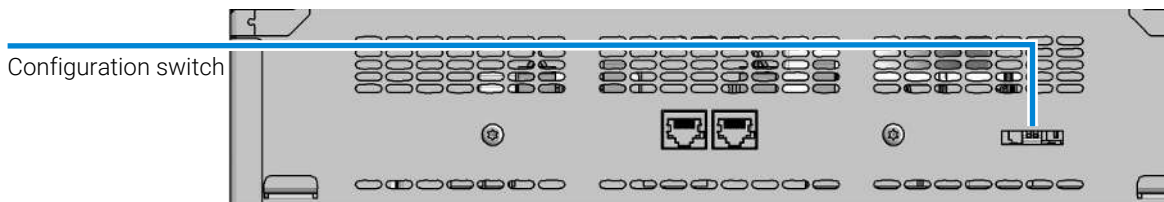


Figure 30: Location of configuration switch (2-bit) (G7116A/B) at the rear of the module

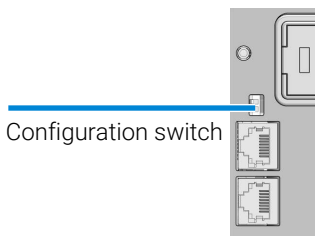


Figure 31: Location of configuration switch (2-bit) (G1170A, G7166A, G7170B) at the rear of the module

Table 16: Overview of 2-bit configuration switch settings (G1170A, G7116A/B, G7166A, G7170B)

SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 7	SW 8	Mode	Init Mode
0	0	-	-	-	-	-	-	COM	Default
0	1	-	-	-	-	-	-	Test	Coldstart
1	0	-	-	-	-	-	-	Test	Boot resident
1	1	-	-	-	-	-	-	Not supported	Not supported

Legend:

- SW = switch
- - = not available
- **G7116A/B:**
 - 0 = off (SW up)
 - 1 = on (SW down)
- **G1170A, G7166A, G7170B:**
 - 0 = off (SW right)
 - 1 = on (SW left)

Configuration Switch (1-Bit)

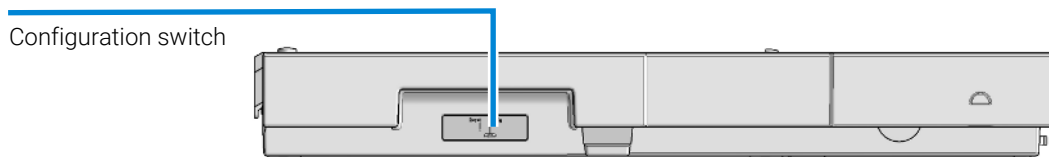


Figure 32: Location of configuration switch (InfinityLab Assist Hub) at the side of the module

Table 17: Overview of 1-bit configuration switch settings (G7180A)

SW 1	SW 2	SW 3	SW 4	SW 5	SW 6	SW 7	SW 8	Mode	Init Mode
0	-	-	-	-	-	-	-	Not supported	Configure the IP address (by using specific data or automatically with DHCP server)
1	-	-	-	-	-	-	-	Not supported	Configure default IP address (192.168.254.11)

Legend:

- SW = switch
- - = not available
- 0 = off (SW front = right)
- 1 = on (SW back = left)

Using Stored

When initialization mode **Using Stored** is selected, the parameters are taken from the non-volatile memory of the module. The TCP/IP connection will be established using these parameters. The parameters were configured previously by one of the described methods.

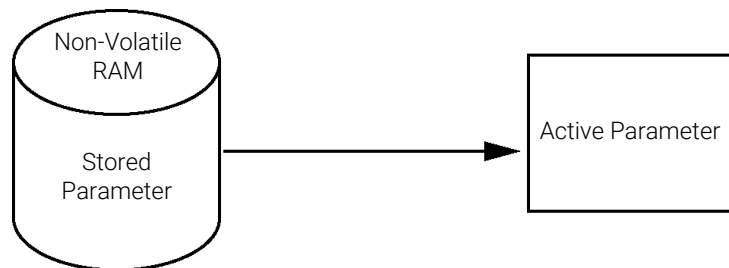


Figure 33: Using Stored (principle)

Using Default

When **Using Default** is selected, the factory default parameters are taken instead. These parameters enable a TCP/IP connection to the LAN interface without further configuration, see [Table 18 Using default parameters](#) on page 206.

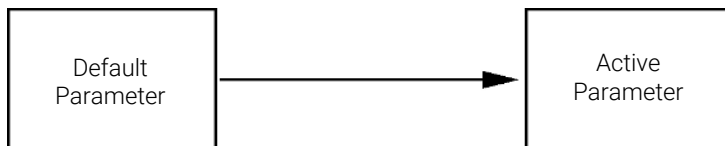


Figure 34: Using Default (principle)

NOTE

Using the default address in your local area network may result in network problems. Take care and change it to a valid address immediately.

Table 18: Using default parameters

IP address:	192.168.254.11
Subnet Mask:	255.255.255.0
Default Gateway	not specified

LAN Configuration

Configuration Switch and Mode Selection

Since the default IP address is a so-called local address, it will not be routed by any network device. Thus, the PC and the module must reside in the same subnet.

The user may open a Telnet session using the default IP address and change the parameters stored in the non-volatile memory of the module. He may then close the session, select the initialization mode Using Stored, power-on again and establish the TCP/IP connection using the new parameters.

When the module is wired to the PC directly (e.g. using a cross-over cable or a local hub), separated from the local area network, the user may simply keep the default parameters to establish the TCP/IP connection.

NOTE

In the **Using Default** mode, the parameters stored in the memory of the module are not cleared automatically. If not changed by the user, they are still available, when switching back to the mode Using Stored.

Dynamic Host Configuration Protocol (DHCP)

General Information (DHCP)

The Dynamic Host Configuration Protocol (DHCP) is an auto configuration protocol used on IP networks. The DHCP functionality is available on all Agilent HPLC modules with on-board LAN Interface or LAN Interface Card G1369C, and "B"-firmware (B.06.40 or above) or modules with "D"-firmware. All modules should use latest firmware from the same set.

When the initialization mode "DHCP" is selected, the card tries to download the parameters from a DHCP Server. The parameters obtained become the active parameters immediately. They are not stored to the non-volatile memory of the card.

Besides requesting the network parameters, the card also submits its hostname to the DHCP Server. The hostname equals the MAC address of the card, e.g. *0030d3177321*. It is the DHCP server's responsibility to forward the hostname/address information to the Domain Name Server. The card does not offer any services for hostname resolution (e.g. NetBIOS).

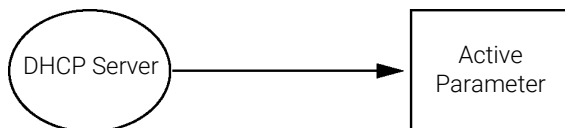


Figure 35: DHCP (principle)

NOTE

- It may take some time until the DHCP server has updated the DNS server with the hostname information.
- It may be necessary to fully qualify the hostname with the DNS suffix, e.g. *0030d3177321.country.company.com*.
- The DHCP server may reject the hostname proposed by the card and assign a name following local naming conventions.

Setup (DHCP)

The DHCP functionality is available on all Agilent HPLC modules with on-board LAN Interface or LAN Interface Card G1369C, and "B"-firmware (B.06.40 or above) or modules with "D"-firmware. All modules should use latest firmware from the same set.

- 1 Note the MAC address of the LAN interface (provided with G1369C LAN Interface Card or mainboard). This MAC address is on a label on the card or at the rear of the mainboard, for example, *0030d3177321*.

On the Local Controller the MAC address can be found under **Details** in the LAN section.

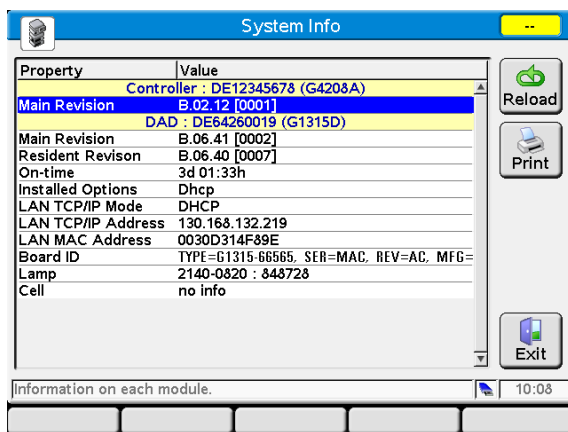


Figure 36: LAN setting on Instant Pilot

- 2 Set the configuration switch to DHCP either on the G1369C LAN Interface Card or the mainboard of above mentioned modules.

Table 19: G1369C LAN Interface Card (configuration switch on the card)

SW 4	SW 5	SW 6	SW 7	SW 8	Initialization Mode
ON	OFF	OFF	OFF	OFF	DHCP

- 3 Turn on the module that hosts the LAN interface.
- 4 Configure your Control Software (e.g. OpenLAB CDS ChemStation Edition, Lab Advisor) and use MAC address as host name, e.g. *0030d3177321*.

LAN Configuration**Dynamic Host Configuration Protocol (DHCP)**

The LC system should become visible in the control software (see Note in section **General Information (DHCP)** on page 208).

Manual Configuration

Manual configuration only alters the set of parameters stored in the non-volatile memory of the module. It never affects the currently active parameters. Therefore, manual configuration can be done at any time. A power cycle is mandatory to make the stored parameters become the active parameters, given that the initialization mode selection switches are allowing it.

With the Instant Pilot (G4208A)

To configure the TCP/IP parameters before connecting the module to the network, the Instant Pilot (G4208A) can be used.

- 1 From the Welcome screen press the **More** button.
- 2 Select **Configure**.
- 3 Press the module button of the module that hosts the LAN interface (usually the detector).
- 4 Scroll down to the LAN settings.

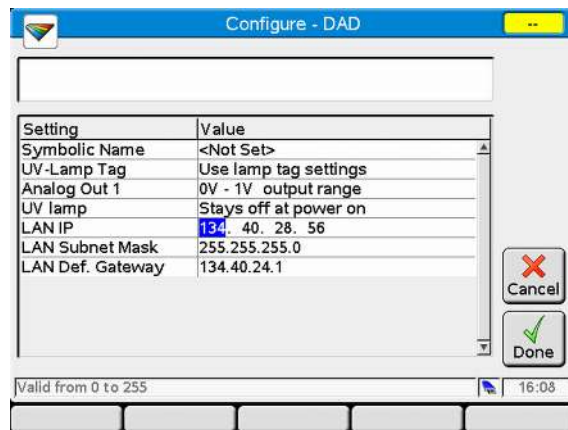


Figure 37: Instant Pilot - LAN configuration (edit mode)

- 5 Press the **Edit** button (only visible if not in Edit mode), perform the required changes and press the **Done** button.
- 6 Leave the screen by clicking **Exit**.

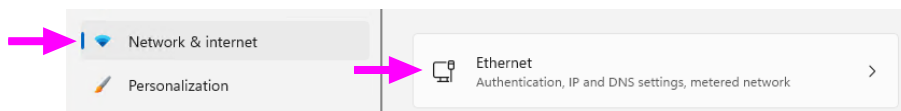
PC and User Interface Software Setup

PC Setup for Local Configuration

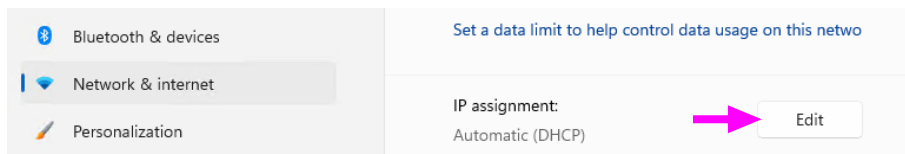
This procedure describes the change of the TCP/IP settings on your PC to match the module's default parameters in a local configuration (see [Table 18 Using default parameters](#) on page 206).

The individual steps may vary depending on the operating system. Below you can find the steps to set up a static IP address in Windows 11.

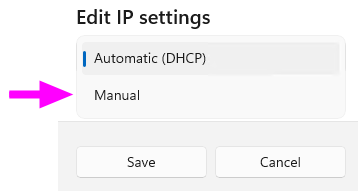
- 1 Navigate to the settings on your PC (Windows **Start** menu > **Settings**).
- 2 Under **Network and internet**, select **Ethernet**.



- 3 In section **IP assignment**, click **Edit**.



- 4 To edit the IP settings, select **Manual** from the drop-down list.



LAN Configuration

PC and User Interface Software Setup

- 5 Enable (toggle) the IPv4 connection and enter the following IP address settings:

Edit IP settings

Manual

IPv4

On

IP address

192.168.254.10

Subnet mask

255.255.255.0

Gateway

Preferred DNS

Preferred DNS encryption

Unencrypted only

Alternate DNS

Save Cancel

- 6 Save your configuration settings.

13

Appendix

This chapter provides additional information on safety, legal and web.

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General 216

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General Safety Information

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Agilent Technologies assumes no liability for the customer's failure to comply with these requirements.

WARNING

Ensure the proper usage of the equipment.

The protection provided by the equipment may be impaired.

- **The operator of this instrument is advised to use the equipment in a manner as specified in this manual.**

Safety Standards

This is a Safety Class I instrument (provided with terminal for protective earthing) and has been manufactured and tested according to international safety standards.

General

Do not use this product in any manner not specified by the manufacturer. The protective features of this product may be impaired if it is used in a manner not specified in the operation instructions.

Before Applying Power

WARNING

Wrong voltage range, frequency or cabling

Personal injury or damage to the instrument

- Verify that the voltage range and frequency of your power distribution matches to the power specification of the individual instrument.
- Never use cables other than the ones supplied by Agilent Technologies to ensure proper functionality and compliance with safety or EMC regulations.
- Make all connections to the unit before applying power.

WARNING

Use of unsupplied cables

Using cables not supplied by Agilent Technologies can lead to damage of the electronic components or personal injury.

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

NOTE

Note the instrument's external markings described under [Safety Symbols](#) on page 222.

Ground the Instrument

WARNING

Missing electrical ground

Electrical shock

- If your product is provided with a grounding type power plug, the instrument chassis and cover must be connected to an electrical ground to minimize shock hazard.
- The ground pin must be firmly connected to an electrical ground (safety ground) terminal at the power outlet. Any interruption of the protective (grounding) conductor or disconnection of the protective earth terminal will cause a potential shock hazard that could result in personal injury.

Do Not Operate in an Explosive Atmosphere

WARNING

Presence of flammable gases or fumes

Explosion hazard

- Do not operate the instrument in the presence of flammable gases or fumes.
-

Do Not Remove the Instrument Cover

WARNING

Instrument covers removed

Electrical shock

- Do not remove the instrument cover.
 - Only Agilent authorized personnel are allowed to remove instrument covers. Always disconnect the power cables and any external circuits before removing the instrument cover.
-

Do Not Modify the Instrument

Do not install substitute parts or perform any unauthorized modification to the product. Return the product to an Agilent Sales and Service Office for service and repair to ensure that safety features are maintained.

In Case of Damage

WARNING

Damage to the module

Personal injury (for example electrical shock, intoxication)

- Instruments that appear damaged or defective should be made inoperative and secured against unintended operation until they can be repaired by qualified service personnel.
-

Solvent Information

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.
- Do not use solvents with an auto-ignition temperature below 200 °C (392 °F). Do not use solvents with a boiling point below 56 °C (133 °F).
- Avoid high vapor concentrations. Keep the solvent temperature at least 40 °C (72 °F) below the boiling point of the solvent used. This includes the solvent temperature in the sample compartment. For the solvents methanol and ethanol keep the solvent temperature at least 25 °C (45 °F) below the boiling point.
- Do not operate the instrument in an explosive atmosphere.
- Do not use solvents of ignition Class IIC according IEC 60079-20-1 (for example, carbon disulfide).
- Reduce the volume of substances to the minimum required for the analysis.
- Do not use bottles that exceed the maximum permissible volume (2.5 L).
- Ground the waste container.
- Regularly check the filling level of the waste container. The residual free volume in the waste container must be large enough to collect the waste liquid.
- To achieve maximal safety, regularly check the tubing for correct installation.

NOTE

For details, see the usage guideline for the solvent cabinet. A printed copy of the guideline has been shipped with the solvent cabinet, electronic copies are available in the InfinityLab LC Series User Documentation or via the Internet.

Recommendations on the Use of Solvents

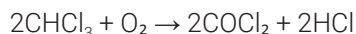
Observe the following recommendations on the use of solvents.

- Brown glass ware can avoid growth of algae.

Appendix

General Safety Information

- Small particles can permanently block capillaries and valves. Therefore, always filter solvents through 0.22 µm filters.
- Avoid or minimize the use of solvents that may corrode parts in the flow path. Consider specifications for the pH range given for different materials such as flow cells, valve materials etc. and recommendations in subsequent sections.
- Avoid the use of the following steel-corrosive solvents:
 - solutions of alkali halides and their respective acids (for example, lithium iodide, potassium chloride, and so on),
 - high concentrations of inorganic acids like sulfuric acid and nitric acid, especially at higher temperatures (if your chromatography method allows, replace by phosphoric acid or phosphate buffer which are less corrosive against stainless steel),
 - halogenated solvents or mixtures which form radicals and/or acids, for example:



This reaction, in which stainless steel probably acts as a catalyst, occurs quickly with dried chloroform if the drying process removes the stabilizing alcohol,

- chromatographic grade ethers, which can contain peroxides (for example, THF, dioxane, diisopropyl ether) should be filtered through dry aluminium oxide which adsorbs the peroxides,
 - solvents containing strong complexing agents (e.g. EDTA),
 - mixtures of carbon tetrachloride with 2-propanol or THF.
- Avoid the use of dimethyl formamide (DMF). Polyvinylidene fluoride (PVDF), which is used in leak sensors, is not resistant to DMF.

Magnets

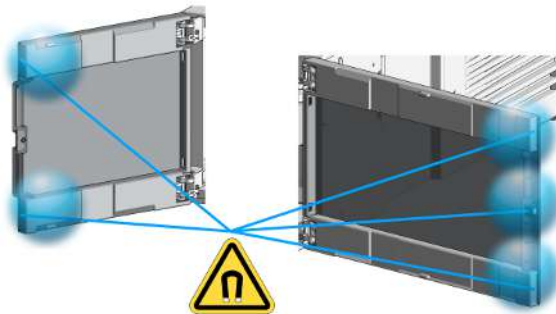


Figure 38: Magnets in doors of pumps, autosamplers, detectors, and fraction collectors

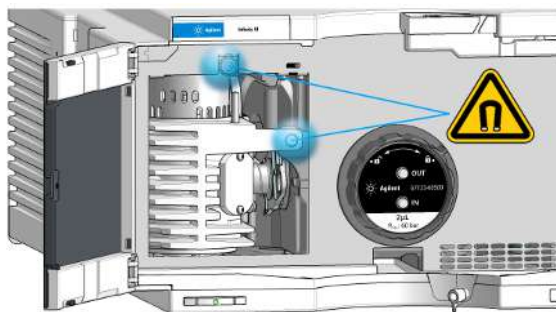













Figure 39: Magnets in optical unit/lamp housing and sheet metal kit of the module.

Safety Symbols

Table 20: Symbols

	The apparatus is marked with this symbol when the user shall refer to the instruction manual in order to protect risk of harm to the operator and to protect the apparatus against damage.
	Indicates dangerous voltages.
	Indicates a protected ground terminal.
	The apparatus is marked with this symbol when hot surfaces are available and the user should not touch it when heated up.
	Indicates flammable material used. Consult the InfinityLab LC Series User Documentation / User Manual before attempting to install or service this equipment. Follow all safety precautions.
	Confirms that a manufactured product complies with all applicable European Community directives. The European Declaration of Conformity is available at: http://regulations.corporate.agilent.com/DoC/search.htm
	Manufacturing date.
	Product Number
	Serial Number
	Power symbol indicates On/Off. The apparatus is not completely disconnected from the mains supply when the on/off switch is in the Off position
	Pacemaker Magnets could affect the functioning of pacemakers and implanted heart defibrillators. A pacemaker could switch into test mode and cause illness. A heart defibrillator may stop working. If you wear these devices keep at least 55 mm distance to magnets. Warn others who wear these devices from getting too close to magnets.

Appendix

General Safety Information



Magnetic field

Magnets produce a far-reaching, strong magnetic field. They could damage TVs and laptops, computer hard drives, credit and ATM cards, data storage media, mechanical watches, hearing aids and speakers. Keep magnets at least 25 mm away from devices and objects that could be damaged by strong magnetic fields.



Indicates a pinching or crushing hazard



Indicates a piercing or cutting hazard.



UV radiation hazard

WARNING

A WARNING

alerts you to situations that could cause physical injury or death.

- Do not proceed beyond a warning until you have fully understood and met the indicated conditions.
-

CAUTION

A CAUTION

alerts you to situations that could cause loss of data, or damage of equipment.

- Do not proceed beyond a caution until you have fully understood and met the indicated conditions.
-

Material Information

This section provides detailed information about materials used in the HPLC system and general information about solvent/material compatibility.

General Information About Solvent/Material Compatibility

Materials in the flow path are carefully selected based on Agilent's experiences in developing highest-quality instruments for HPLC analysis over several decades. These materials exhibit excellent robustness under typical HPLC conditions. For any special condition, please consult the material information section or contact Agilent.

Disclaimer

Subsequent data was collected from external resources and is meant as a reference. Agilent cannot guarantee the correctness and completeness of such information. Data is based on compatibility libraries, which are not specific for estimating the long-term life time under specific but highly variable conditions of UHPLC systems, solvents, solvent mixtures, and samples. Information also cannot be generalized due to catalytic effects of impurities like metal ions, complexing agents, oxygen etc. Apart from pure chemical corrosion, other effects like electro corrosion, electrostatic charging (especially for nonconductive organic solvents), swelling of polymer parts etc. need to be considered. Most data available refers to room temperature (typically 20 – 25 °C, 68 – 77 °F). If corrosion is possible, it usually accelerates at higher temperatures. If in doubt, please consult technical literature on chemical compatibility of materials.

MP35N

MP35N is a nonmagnetic, nickel-cobalt-chromium-molybdenum alloy demonstrating excellent corrosion resistance (for example, against nitric and sulfuric acids, sodium hydroxide, and seawater) over a wide range of concentrations and temperatures. In addition, this alloy shows exceptional

resistance to high-temperature oxidation. Due to excellent chemical resistance and toughness, the alloy is used in diverse applications: dental products, medical devices, nonmagnetic electrical components, chemical and food processing equipment, marine equipment. Treatment of MP35N alloy samples with 10 % NaCl in HCl (pH 2.0) does not reveal any detectable corrosion. MP35N also demonstrates excellent corrosion resistance in a humid environment. Although the influence of a broad variety of solvents and conditions has been tested, users should keep in mind that multiple factors can affect corrosion rates, such as temperature, concentration, pH, impurities, stress, surface finish, and dissimilar metal contacts.

Polyphenylene Sulfide (PPS)

Polyphenylene sulfide has outstanding stability even at elevated temperatures. It is resistant to dilute solutions of most inorganic acids, but it can be attacked by some organic compounds and oxidizing reagents. Nonoxidizing inorganic acids, such as sulfuric acid and phosphoric acid, have little effect on polyphenylene sulfide, but at high concentrations and temperatures, they can still cause material damage. Nonoxidizing organic chemicals generally have little effect on polyphenylene sulfide stability, but amines, aromatic compounds, and halogenated compounds may cause some swelling and softening over extended periods of time at elevated temperatures. Strong oxidizing acids, such as nitric acid (> 0.1 %), hydrogen halides (> 0.1 %), peroxy acids (> 1 %), or chlorosulfuric acid degrade polyphenylene sulfide. It is not recommended to use polyphenylene sulfide with oxidizing material, such as sodium hypochlorite and hydrogen peroxide. However, under mild environmental conditions, at low concentrations and for short exposure times, polyphenylene sulfide can withstand these chemicals, for example, as ingredients of common disinfectant solutions.

PEEK

PEEK (Polyether-Ether Ketones) combines excellent properties regarding biocompatibility, chemical resistance, mechanical and thermal stability. PEEK is therefore the material of choice for UHPLC and biochemical instrumentation.

It is stable in the specified pH range (for the Bio-Inert LC system: pH 1 – 13 , see bio-inert module manuals for details), and inert to many common solvents.

There are still some known incompatibilities with chemicals such as chloroform, methylene chloride, THF, DMSO, strong acids (nitric acid > 10 %, sulfuric acid > 10 %, sulfonic acids, trichloroacetic acid), halogens or aqueous halogen solutions, phenol and derivatives (cresols, salicylic acid, and so on).

When used above room temperature, PEEK is sensitive to bases and various organic solvents, which can cause it to swell. Under such conditions, normal PEEK capillaries are sensitive to high pressure. Therefore, Agilent uses stainless steel clad PEEK capillaries in bio-inert systems. The use of stainless steel clad PEEK capillaries keeps the flow path free of steel and ensures pressure stability up to 600 bar. If in doubt, consult the available literature about the chemical compatibility of PEEK.

Polyimide

Agilent uses semi-crystalline polyimide for rotor seals in valves and needle seats in autosamplers. One supplier of polyimide is DuPont, which brands polyimide as Vespel, which is also used by Agilent.

Polyimide is stable in a pH range between 1 and 10 and in most organic solvents. It is incompatible with concentrated mineral acids (e.g. sulphuric acid), glacial acetic acid, DMSO and THF. It is also degraded by nucleophilic substances like ammonia (e.g. ammonium salts in basic conditions) or acetates.

Polyethylene (PE)

Agilent uses UHMW (ultra-high molecular weight)-PE/PTFE blends for yellow piston and wash seals, which are used in 1290 pumps, the G7104C and for normal phase applications in 1260 pumps.

Polyethylene has a good stability for most common inorganic solvents including acids and bases in a pH range of 1 to 12.5. It is compatible with many organic solvents used in chromatographic systems like methanol, acetonitrile and isopropanol. It has limited stability with aliphatic, aromatic and halogenated hydrocarbons, THF, phenol and derivatives, concentrated acids and bases. For normal phase applications, the maximum pressure should be limited to 200 bar.

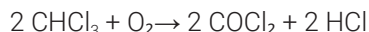
Tantalum (Ta)

Tantalum is inert to most common HPLC solvents and almost all acids except fluoric acid and acids with free sulfur trioxide. It can be corroded by strong bases (e.g. hydroxide solutions > 10 %, diethylamine). It is not recommended for the use with fluoric acid and fluorides.

Stainless Steel (SST)

Stainless steel is inert against many common solvents. It is stable in the presence of acids and bases in a pH range of 1 to 12.5. It can be corroded by acids below pH 2.3. It can also corrode in following solvents:

- Solutions of alkali halides, their respective acids (for example, lithium iodide, potassium chloride) and aqueous solutions of halogens.
- High concentrations of inorganic acids like nitric acid, sulfuric acid, and organic solvents especially at higher temperatures (replace, if your chromatography method allows, by phosphoric acid or phosphate buffer, which are less corrosive against stainless steel).
- Halogenated solvents or mixtures, which form radicals and/or acids, for example:



This reaction, in which stainless steel probably acts as a catalyst, occurs quickly with dried chloroform if the drying process removes the stabilizing alcohol.

- Chromatographic grade ethers, which can contain peroxides (for example, THF, dioxane, diisopropyl ether). Such ethers should be filtered through dry aluminum oxide, which adsorbs the peroxides.
- Solutions of organic acids (acetic acid, formic acid, and so on) in organic solvents. For example, a 1 % solution of acetic acid in methanol will attack steel.
- Solutions containing strong complexing agents (for example, EDTA, ethylenediaminetetraacetic acid).
- Mixtures of carbon tetrachloride with isopropanol or THF.

Titanium (Ti)

Titanium is highly resistant to oxidizing acids (for example, nitric, perchloric and hypochlorous acid) over a wide range of concentrations and temperatures. This is due to a thin oxide layer on the surface, which is stabilized by oxidizing compounds. Non-oxidizing acids (for example, hydrochloric, sulfuric and phosphoric acid) can cause slight corrosion, which increases with acid concentration and temperature. For example, the corrosion rate with 3 % HCl (about pH 0.1) at room temperature is about 13 $\mu\text{m}/\text{year}$. At room temperature, titanium is resistant to concentrations of about 5 % sulfuric acid (about pH 0.3). Addition of nitric acid to hydrochloric or sulfuric acids significantly reduces corrosion rates. Titanium is sensitive to acidic metal chlorides like FeCl_3 or CuCl_2 .

Appendix

Material Information

Titanium is subject to corrosion in anhydrous methanol, which can be avoided by adding a small amount of water (about 3 %). Slight corrosion is possible with ammonia > 10 %.

Diamond-Like Carbon (DLC)

Diamond-Like Carbon is inert to almost all common acids, bases, and solvents. There are no documented incompatibilities for HPLC applications.

Fused Silica and Quartz (SiO₂)

Fused silica is used in Max Light Cartridges. Quartz is used for classical flow cell windows. It is inert against all common solvents and acids except hydrofluoric acid and acidic solvents containing fluorides. It is corroded by strong bases and should not be used above pH 12 at room temperature. The corrosion of flow cell windows can negatively affect measurement results. For a pH greater than 12, the use of flow cells with sapphire windows is recommended.

Gold

Gold is inert to all common HPLC solvents, acids, and bases within the specified pH range. It can be corroded by complexing cyanides and concentrated acids like aqua regia.

Zirconium Oxide (ZrO₂)

Zirconium Oxide is inert to almost all common acids, bases, and solvents. There are no documented incompatibilities for HPLC applications.

Platinum/Iridium

Platinum/Iridium is inert to almost all common acids, bases, and solvents. There are no documented incompatibilities for HPLC applications.

Fluorinated Polymers (PTFE, PFA, FEP, FFKM, PVDF)

Fluorinated polymers like PTFE (polytetrafluorethylene), PFA (perfluoroalkoxy), and FEP (fluorinated ethylene propylene) are inert to almost all common acids, bases, and solvents. FFKM is perfluorinated rubber, which is also resistant to most chemicals. As an elastomer, it may swell in some organic solvents like halogenated hydrocarbons.

TFE/PDD copolymer tubings, which are used in all Agilent degassers except G1322A/G7122A, are not compatible with fluorinated solvents like Freon, Fluorinert, or Vertrel. They have limited life time in the presence of hexafluoroisopropanol (HFIP). To ensure the longest possible life with HFIP, it is best to dedicate a particular chamber to this solvent, not to switch solvents, and not to let dry out the chamber. For optimizing the life of the pressure sensor, do not leave HFIP in the chamber when the unit is off.

Prolonged exposure to hexafluoroisopropanol (HFIP) may reduce the lifespan of parts that come into contact with it. To ensure the longest possible lifespan of these parts, fittings must be leak-free. If a leak occurs, clean the surface as soon as possible.

The tubing of the leak sensor is made of PVDF (polyvinylidene fluoride), which is incompatible with the solvent DMF (dimethylformamide).

Sapphire, Ruby, and Al₂O₃-Based Ceramics

Sapphire, ruby, and ceramics based on aluminum oxide Al₂O₃ are inert to almost all common acids, bases, and solvents. There are no documented incompatibilities for HPLC applications.


At-a-Glance Details About Agilent Capillaries

The following section provides useful information about Agilent capillaries and its characteristics.

Syntax for capillary description

Type - Material - Capillary dimensions - Fitting Left/Fitting right

Table 21: Example for a capillary description












Code provided with the part	Meaing of the code
Color code: 	Material of the product is MP35N, the inner diameter is 0.20 or 0.25 mm
Capillary	The part is a connection capillary
MP35N	Material of the part is MP35N
0.25 x 80 mm	The part has an inner diameter of 0.25 mm and a length of 80 mm
SI/SI	Left fitting: Swagelok + 1.6 mm Port id, Intermediate Right fitting: Swagelok + 1.6 mm Port id, Intermediate

To get an overview of the code in use, see

- Color: [Table 22 Color-coding key for Agilent capillary tubing](#) on page 231
- Type: [Table 23 Type \(gives some indication on the primary function, like a loop or a connection capillary\)](#) on page 231
- Material: [Table 24 Material \(indicates which raw material is used for the capillary\)](#) on page 232
- Dimension: [Table 25 Capillary dimensions \(indicates inner diameter \(id\), length, and volume of the capillary\)](#) on page 232
- Fittings: [Table 26 Fitting left/fitting right \(indicates which fitting is used on both ends of the capillary\)](#) on page 233

Color Coding Guide

Table 22: Color-coding key for Agilent capillary tubing

Internal diameter in mm		Color code
0.015		 Orange
0.025		 Yellow
0.05		 Beige
0.075		 Black
0.075	MP35N	 Black with orange stripe
0.1		 Purple
0.12		 Red
0.12	MP35N	 Red with orange stripe
0.17		 Green
0.17	MP35N	 Green with orange stripe
0.20 /0.25		 Blue
0.20 /0.25	MP35N	 Blue with orange stripe
0.3		 Grey
0.50		Bone White

NOTE

As you move to smaller-volume, high efficiency columns, you'll want to use narrow id tubing, as opposed to the wider id tubing used for conventional HPLC instruments.

Abbreviation Guide for Type

Table 23: Type (gives some indication on the primary function, like a loop or a connection capillary)

Key	Description
Capillary	Connection capillaries
Loop	Loop capillaries
Seat	Autosampler needle seats

Appendix

At-a-Glance Details About Agilent Capillaries

Key	Description
Tube	Tubing
Heat exchanger	Heat exchanger

Abbreviation Guide for Material

Table 24: Material (indicates which raw material is used for the capillary)

Key	Description
ST	Stainless steel
Ti	Titanium
PK	PEEK
FS/PK	PEEK-coated fused silica ¹
PK/ST	Stainless steel-coated PEEK ²
PFFE	PTFE
FS	Fused silica
MP35N	Nickel-cobalt-chromium-molybdenum alloy

¹ Fused silica in contact with solvent

² Stainless steel-coated PEEK

Abbreviation Guide for Capillary Dimensions

Table 25: Capillary dimensions (indicates inner diameter (id), length, and volume of the capillary)

Description
id (mm) x Length (mm)
Volume (μL)

Abbreviation Guide for Fitting Left/Fitting Right

Table 26: Fitting left/fitting right (indicates which fitting is used on both ends of the capillary)

Key	Description
W	Swagelok + 0.8 mm Port id
S	Swagelok + 1.6 mm Port id
M	Metric M4 + 0.8 mm Port id
E	Metric M3 + 1.6 mm Port id
U	Swagelok union
L	Long
X	Extra long
H	Long head
G	Small head SW 4
N	Small head SW 5
F	Finger-tight
V	1200 bar
B	Bio
P	PEEK
I	Intermediate

Waste Electrical and Electronic Equipment (WEEE) Directive

This product complies with the European WEEE Directive marking requirements. The affixed label indicates that you must not discard this electrical/electronic product in domestic household waste.



NOTE

Do not dispose of in domestic household waste
To return unwanted products, contact your local Agilent office, or see <https://www.agilent.com> for more information.

Disposal of Hg-Xe Lamps



Lamps are filled with high pressure (approx. 1 MPa at room temperature) xenon gas (xenon gas and mercury in mercury-xenon lamps). When disposing of the used lamp, take appropriate measures in compliance with applicable regulations regarding waste disposal and correctly dispose of it yourself, or entrust disposal to a licensed industrial waste disposal company.

In any case, be sure to comply with the regulations in your country, state, region or province to ensure the used lamp is disposed of legally and correctly.

North America Only:
Hg - lamp CONTAINS MERCURY
Manage in Accord with Disposal Laws
See: or 1-866-636-4579

Radio Interference

Cables supplied by Agilent Technologies are screened to provide optimized protection against radio interference. All cables are in compliance with safety or EMC regulations.

Test and Measurement

If test and measurement equipment is operated with unscreened cables, or used for measurements on open set-ups, the user has to assure that under operating conditions the radio interference limits are still met within the premises.

Korea:

- <https://www.rra.go.kr/selform/ATi-29LCG7123B>

Sound Emission

Sound Pressure

Sound pressure $L_p < 55$ dB(A) according to DIN EN ISO 7779

Schalldruckpegel

Schalldruckpegel $L_p < 55$ dB(A) nach DIN EN ISO 7779

Agilent Technologies on Internet

For the latest information on products and services visit our worldwide web site on the Internet at:

<https://www.agilent.com>

In This Book

This manual contains technical reference information about the Agilent 1290 Infinity III Fluorescence Detector (G7123B).

The manual describes the following:

- introduction,
- site requirements and specifications,
- installation,
- using the module,
- optimizing performance,
- troubleshooting and diagnostics,
- error information,
- maintenance,
- parts and materials,
- hardware information,
- LAN configuration,
- safety and related information.

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