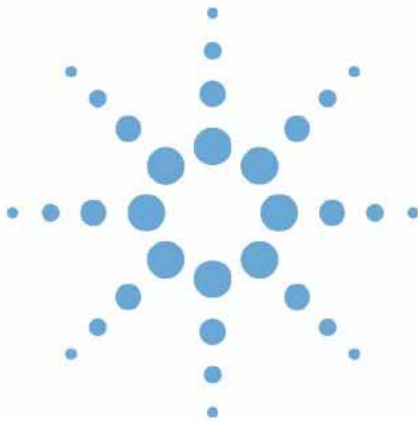




Agilent 1100 Series Diode Array and Multiple Wavelength Detector SL



User Manual



Agilent Technologies

Notices

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Manual Structure

The **Service Manual G1315-90110** (English) contains the complete information about the Agilent 1100 Series Diode Array and Multiple Wavelength Detector SL. It is available as Adobe Reader file (PDF) only.

The **User Manual G1315-90010** (English) and its localized versions contain a subset of the Service Manual and is shipped with the detector in printed matter.

All manuals will be also on the **Product CD G1315-60030** (localized versions when available) as Adobe Reader file (PDF). This CD is shipped with the detector.

Latest versions of the manuals can be obtained from the Agilent web.

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In This Manual...

This manual contains information for using and servicing your Diode Array and Multiple Wavelength Detector SL.

1 Site Requirements and Specifications

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

2 Installing the Detector

This chapter provides information on unpacking, checking on completeness, stack considerations and installation of the detector.

3 LAN Configuration

This chapter provides information on connecting the detector to the Agilent ChemStation PC.

4 Using the Detector

This chapter provides information on how to set up the detector for an analysis and explains the basic settings.

5 How to optimize the Detector

This chapter provides information on how to optimize the detector.

6 Troubleshooting and Diagnostics

This chapter gives an overview about the troubleshooting and diagnostic features.

7 Maintenance and Repair

This chapter provides general information on repairing the detector.

9 Maintenance

This chapter describes the maintenance of the detector.

10 Parts and Materials for Maintenance

This chapter provides information on parts for maintenance.

11 Control Module Screens

This chapter provides an overview on the control module screens.

Annex A Appendix

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

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1 Site Requirements and Specifications

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



Site Requirements

A suitable environment is important to ensure optimal performance of the detector.

Power Consideration

The detector power supply has wide ranging capabilities and accepts any line voltage in the range mentioned in Table 1. Consequently, there is no voltage selector in the rear of the detector. There are also no externally accessible fuses, because automatic electronic fuses are implemented in the power supply.

WARNING

To disconnect the detector from line, unplug the power cord. The power supply still uses some power, even if the power switch on the front panel is turned off.

WARNING

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

CAUTION

Make sure to have easy access to the power cable of the instrument, in order to disconnect the instrument from line.

Power Cords

Different power cords are offered as options with the detector. The female end of all power cords is identical. It plugs into the power-input socket at the rear of the detector. The male end of each power cord is different and designed to match the wall socket of a particular country or region.

WARNING

Never operate your instrumentation from a power outlet that has no ground connection. Never use a power cord other than the Agilent Technologies power cord designed for your region.

WARNING

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

Bench Space

The detector dimensions and weight (see Table 1) allows you to place the detector 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 should carry a Agilent 1100 Series system, make sure that the bench is designed to bear the weight of all modules.

The detector should be operated in a horizontal position.

Environment

Your detector will work within the specifications at ambient temperatures and relative humidity described in Table 1.

ASTM drift tests require a temperature change below 2 °C/hour (3.6 °F/hour) over one hour period. Our published drift specification (refer also to “[Performance Specifications](#)” on page 16) is based on these conditions. Larger ambient temperature changes will result in larger drift.

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

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

1 Site Requirements and Specifications

NOTE

The G1315C DAD and G1365C MWD are designed to operate in a typical electromagnetic environment (EN61326-1) where RF transmitters, such as mobile phones, should not be used in close proximity.

Physical Specifications

Table 1 Physical Specifications

Type	Specification	Comments
Weight	11.5 kg (26 lbs)	
Dimensions (width × depth × height)	345 × 435 × 140 mm (13.5 × 17 × 5.5 inches)	
Line voltage	100 – 240 VAC, ± 10 %	Wide-ranging capability
Line frequency	50 or 60 Hz ± 5 %	
Power consumption (G1315C/G1365C)	160 VA / 546 BTU/hour	Maximum
Ambient operating temperature	0 – 55 °C (32 – 131 °F)	
Ambient non-operating temperature	-40 – 70 °C (-4 – 158 °F)	
Humidity	< 95%, at 25 – 40 °C (77 – 104 °F)	Non-condensing
Operating altitude	Up to 2000 m (6500 ft)	
Non-operating altitude	Up to 4600 m (14950 ft)	For storing the detector
Safety standards: IEC, CSA, UL, EN	Installation category II, pollution degree 2	

Performance Specifications

Table 2 Performance Specifications Agilent 1100 Series DAD and MWD

Type	Specification	Comments
Detection type	1024-element photodiode array	
Light source	Deuterium and tungsten lamps	The UV-lamp is equipped with I.D. tag that holds lamp typical information.
Wavelength range	190 – 950 nm	
Short term noise (ASTM) Single and Multi-Wavelength	$\pm 1 \times 10^{-5}$ AU at 254 and 750 nm	See note on page 17
Drift	2×10^{-3} AU/hr at 254 nm	See note on page 17
Linear absorbance range	> 2 AU (upper limit)	See note on page 17
Wavelength accuracy	± 1 nm	Self-calibration with deuterium lines, verification with holmium oxide filter
Wavelength bunching	1 – 400 nm	Programmable in steps of 1 nm
Slit width	1, 2, 4, 8, 16 nm	Programmable slit
Diode width	< 1 nm	
Flow cells	Standard: 13 μ l volume, 10 mm cell path length and 120 bar (1760 psi) pressure maximum Semi-Micro: 5 μ l volume, 6 mm cell path length and 120 bar (1760 psi) pressure maximum High pressure: 1.7 μ l volume, 6 mm cell path length and 400 bar (5880 psi) pressure maximum 500 nano: 0.5 μ l volume, 10 mm cell path length and 50 bar (725 psi) pressure maximum 80 nano: 0.5 μ l volume, 10 mm cell path length and 50 bar (725 psi) pressure maximum	See “ Optimization Overview ” on page 89 All flow cells are equipped with I.D. tags that hold cell typical information.
Control and data evaluation	Agilent ChemStation for LC (32-bit)	Revision B.01.03 or above

Table 2 Performance Specifications Agilent 1100 Series DAD and MWD, continued

Type	Specification	Comments
Analog outputs	Recorder/integrator: 100 mV or 1 V, output range 0.001 – 2 AU, two outputs	
Communications	Controller-area network (CAN), RS-232C, APG Remote: ready, start, stop and shut-down signals, LAN	
Safety and maintenance	Extensive diagnostics, error detection and display (through control module and ChemStation), leak detection, safe leak handling, leak output signal for shutdown of pumping system. Low voltages in major maintenance areas.	
GLP features	Early maintenance feedback (EMF) for continuous tracking of instrument usage in terms of lamp burn time with user-settable limits and feedback messages. Electronic records of maintenance and errors. Verification of wavelength accuracy with built-in holmium oxide filter.	
Housing	All materials recyclable.	

NOTE

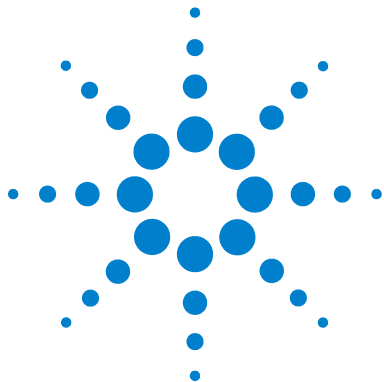
ASTM: “Standard Practice for Variable Wavelength Photometric Detectors Used in Liquid Chromatography”.

Reference conditions: cell path length 10 mm, response time 2 s, flow 1 ml/min LC-grade Methanol, slit width 4 nm.

Linearity measured with caffeine at 265 nm.

For environmental conditions refer to “[Environment](#)” on page 13.

1 Site Requirements and Specifications



2 Installing the Detector

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This chapter provides information on unpacking, checking on completeness, stack considerations and installation of the detector.



Unpacking the Detector

Damaged Packaging

If the delivery packaging shows signs of external damage, please call your Agilent Technologies sales and service office immediately. Inform your service representative that the detector may have been damaged during shipment.

CAUTION

If there are signs of damage, please do not attempt to install the detector.

Delivery Checklist

Ensure all parts and materials have been delivered with the detector. The delivery checklist is shown below. Please report missing or damaged parts to your local Agilent Technologies sales and service office.

Table 3 Detector Checklist

Description	Quantity
Detector	1
CompactFlash Card	1 (installed)
Power cable	1
CAN cable	1
Cross-over network cable	1
Twisted pair network cable	1
Flow cell	As ordered
User Manual	1
Product CD (includes User and Service Manual)	1
Accessory kit (see Table 4 on page 21)	1

Detector Accessory Kit Contents

Table 4 Accessory Kit Contents (Part Number G1315-68705)

Description	Part Number	Quantity
Teflon Tubing flexible i.d. 0.8 mm (flow cell to waste), re-order 5 m	5062-2462	2 m
Corrugated tubing (to waste), re-order 5 m	5062-2463	1.2 m
Fitting male PEEK	0100-1516	2
Capillary column-detector 380 mm long, 0.17 mm i.d. includes:	G1315-87311	1
Ferrule front 1/16" SST, re-order pack of 10	5180-4108 *	2
Ferrule back 1/16" SST, re-order pack of 10	5180-4114 *	2
Fitting 1/16" SST, re-order pack of 10	5061-3303 *	2
CAN cable	5181-1516	1
Wrench open end 1/4 – 5/16 inch	8710-0510	1
Wrench open end 4 mm	8710-1534	1
Hex key 4 mm, 15 cm long, T-handle	8710-2392	1
Hex key 1.5 mm, 10 cm long, straight-handle	8710-2393	1
ESD wrist strap	9300-1408	1

* or kit 5062-2418 1/16" Fittings and Ferrules (front/back) 10/PK

Optimizing the Stack Configuration

If your detector is part of a complete Agilent 1100 Series system, you can ensure optimum performance by installing the following configuration. This configuration optimizes the system flow path, ensuring minimum delay volume.

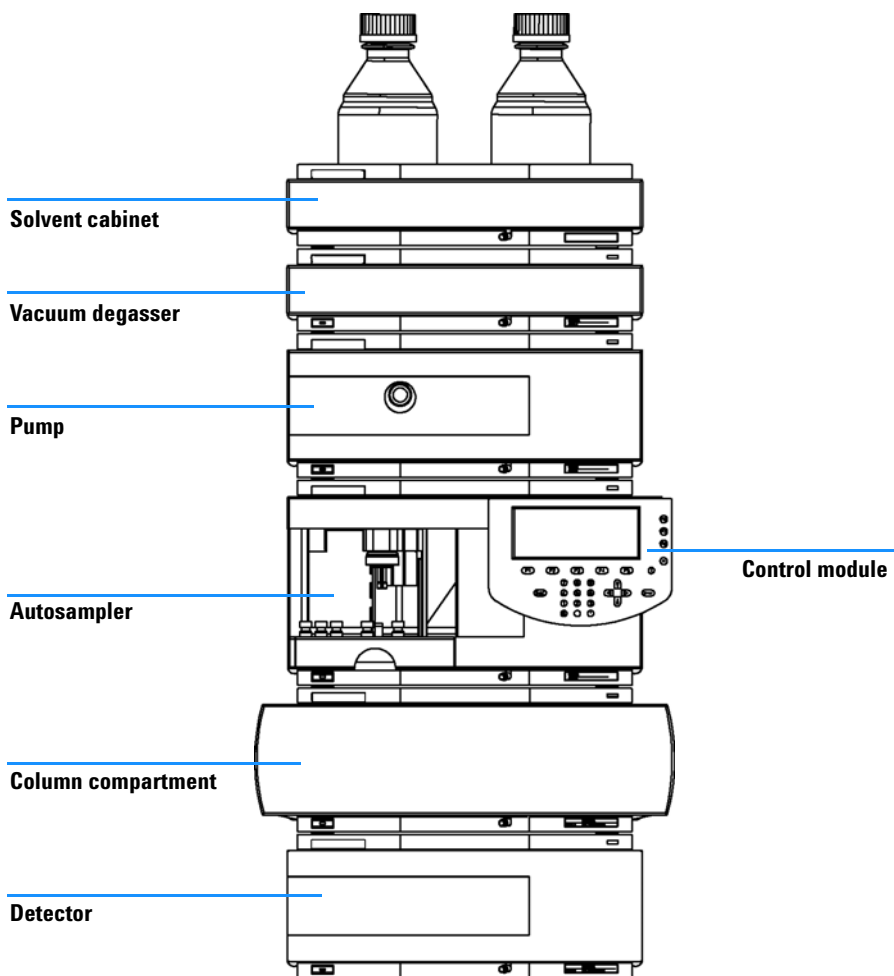


Figure 1 Recommended Stack Configuration (Front View)

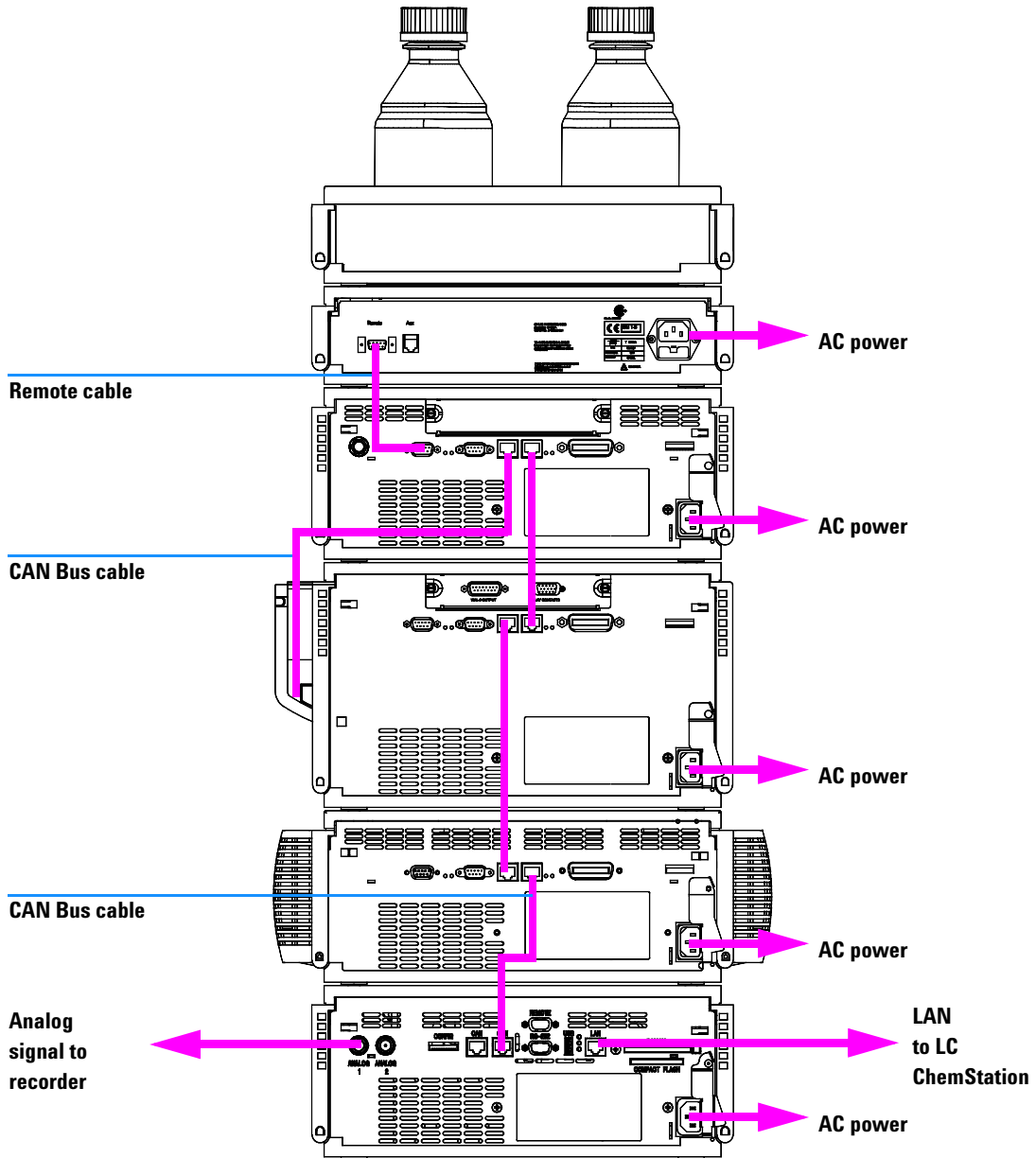


Figure 2 Recommended Stack Configuration (Rear View)

Installing the Detector

Preparations	Locate bench space Provide power connections Unpack the detector
Parts required	<ul style="list-style-type: none">• Detector• Power cord• LAN cable (cross-over or twisted pair network cable)• for other cables see below and section “Cable Overview” in the Service Manual.• ChemStation (B.01.03) and/or Control Module G1323B (B.04.01)• Other 1100 modules must have firmware A.06.xx

NOTE

Before adding a G1315C DAD or G1365C MWD into an existing 1100 system assure that the existing 1100 modules have been updated to firmware revision A.06.xx. Otherwise the ChemStation B.01.03 or later will not recognize the 1100 modules.

NOTE

Assure that the CompactFlash Card is installed in the rear of the detector (required for operation).

- 1 Note the MAC address of the LAN interface (rear of the module, under the configuration switch, see [Figure 3](#) on page 25). It's required for [“LAN Configuration”](#) on page 31.
- 2 Place the detector in the stack or on the bench in a horizontal position.
- 3 Ensure the line power switch at the front of the detector is OFF.
- 4 Connect the power cable to the power connector at the rear of the detector.
- 5 Connect the CAN cable to other Agilent 1100 Series modules.
- 6 Connect the LAN cable (e.g. from a Agilent ChemStation as controller) to the G1315C/G1365C LAN connector.

NOTE

In multi-detector configurations the LAN of the G1315C DAD or G1365C MWD must be used due to its higher data load.

- 7 Connect the analog cable(s) (optional).
- 8 Connect the APG remote cable (optional) for non-Agilent 1100 Series instruments.
- 9 Turn on power by pushing the button at the lower left hand side of the detector. The status LED should be green.

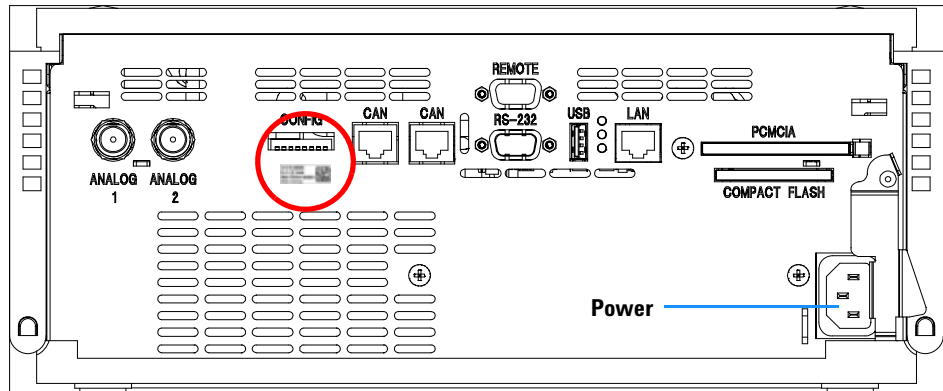


Figure 3 Rear View of Detector

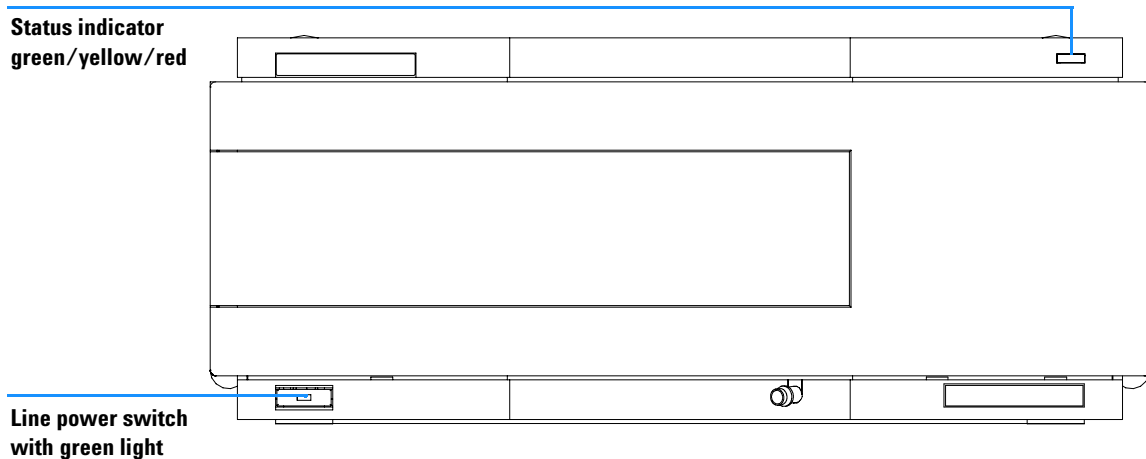


Figure 4 Front View of Detector

2 Installing the Detector

NOTE

The detector is turned on when the line power switch is pressed and the green indicator lamp is illuminated. The detector is turned off when the line power switch is protruding and the green light is off.

WARNING

To disconnect the detector from line, unplug the power cord. The power supply still uses some power, even if the power switch at the front panel is turned off.

NOTE

The detector was shipped with default configuration settings. To change these settings see [“Configuration Switches”](#) on page 34.

Flow Connections to the Detector

Preparations	Detector is installed in the LC system.
Parts required	Other modules Parts from accessory kit, see " Detector Accessory Kit Contents " on page 21. Two wrenches 1/4 – 5/16 inch for capillary connections

WARNING

When working with solvents please observe appropriate safety procedures (for example, goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet supplied by the solvent vendor, especially when toxic or hazardous solvents are used.

NOTE

The flow cell is shipped with a filling of isopropanol (also recommended when the instrument and/or flow cell is shipped to another location). This is to avoid breakage due to subambient conditions.

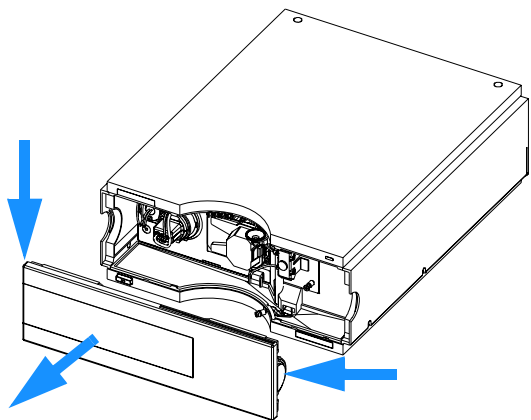
NOTE

The detector should be operated with the front cover in place to protect the flow cell area against strong drafts from the outside and to cover the deuterium lamp.

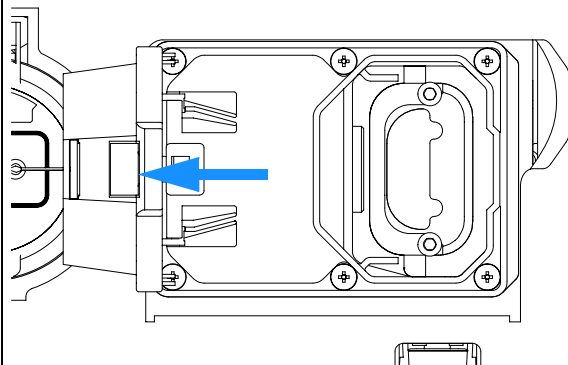
Some types of the Agilent deuterium lamps show a light ring during operation. This is not harmful, refer to "[UV-Radiation](#)" on page 204.

2 Installing the Detector

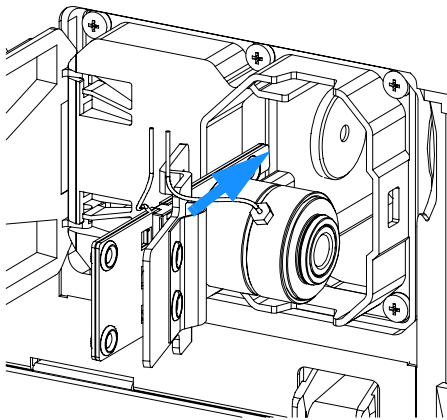
1 Press the release buttons and remove the front cover to gain access to the flow cell area.



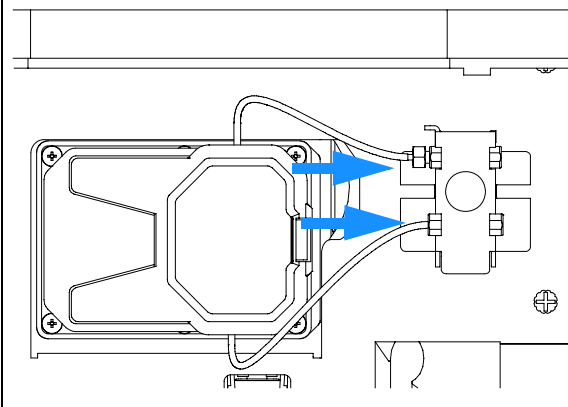
2 Press the release button and open the flow cell door.



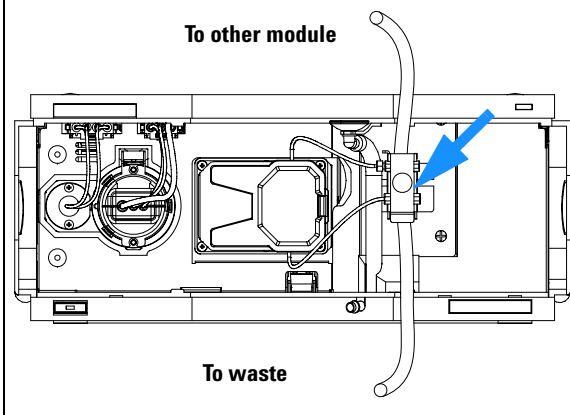
3 Insert the flow cell.



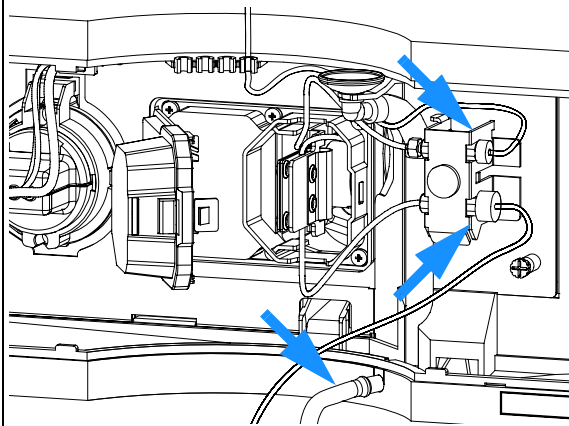
4 Connect the flow cell capillaries to the capillary holder (top is inlet, bottom is outlet).



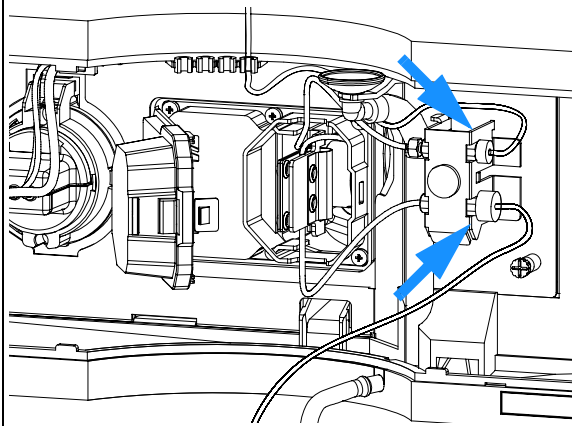
5 If another Agilent 1100 Series module is positioned on top of the detector, route the tubing assembly waste from the accessory kit behind the capillary holder and connect the top end to the other module's waste outlet.



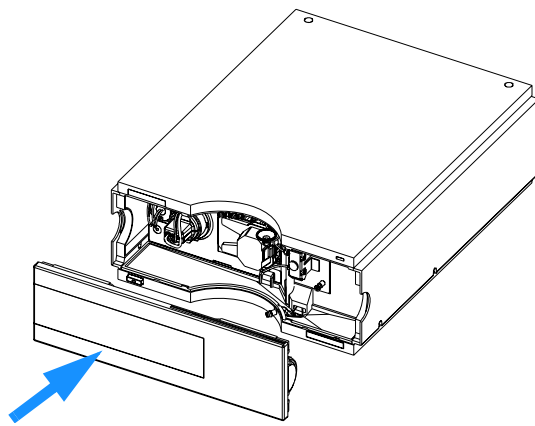
6 Connect the capillary from the column to the capillary holder (top). Connect the teflon waste tubing to the flow cell outlet fitting (bottom) and the corrugated waste tubing to the leak outlet.



7 Remove the flow cell and establish a flow and observe for leaks.



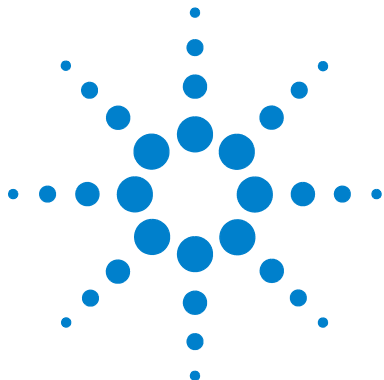
8 Insert the flow cell, close the cover and replace the front cover.



The installation of the detector is complete now.

Setting up the LAN access

Please follow the instructions in “[LAN Configuration](#)” on page 31



3 LAN Configuration

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This chapter provides information on connecting the detector to the Agilent ChemStation PC.



What you have to do first

The G1315C DAD and G1365C MWD have an on-board LAN communication interface.

- 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 detector underneath the configuration switch (see [Figure 6](#)).



Part number of the detector main board
Revision Code, Vendor, Year and Week of assembly
MAC address
Country of Origin

Figure 5 MAC-Label

- 2 Connect the instrument's LAN interface (see [Figure 6](#)) to
 - a the PC network card using a crossover network cable (point-to-point) or
 - b a hub or switch using a standard LAN cable.

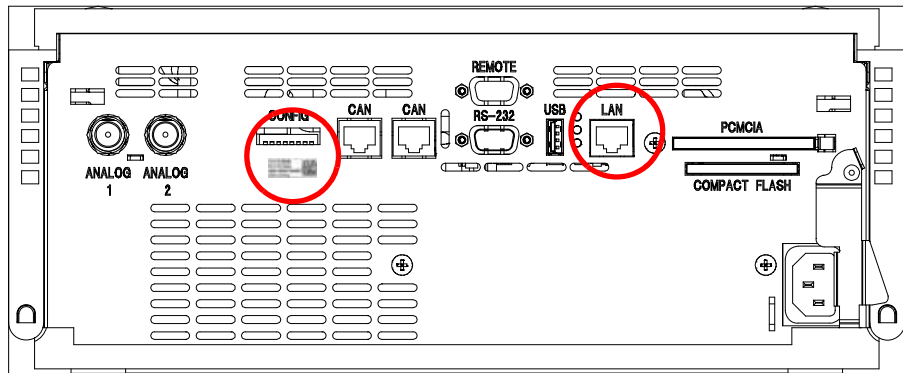


Figure 6 Location of LAN interface and MAC label

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 BOOTP Server (using the so-called Bootstrap Protocol)
- by manually setting the parameters using Telnet
- by manually setting the parameters using the Handheld Controller (G1323B)

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 from a Bootp cycle, non-volatile memory or initialized with known default values. The initialization mode is selected by the configuration switch, see [Figure 7](#) on page 34.

Configuration Switches

The configuration switch can be accessed at the rear of the detector, see [Figure 7](#).

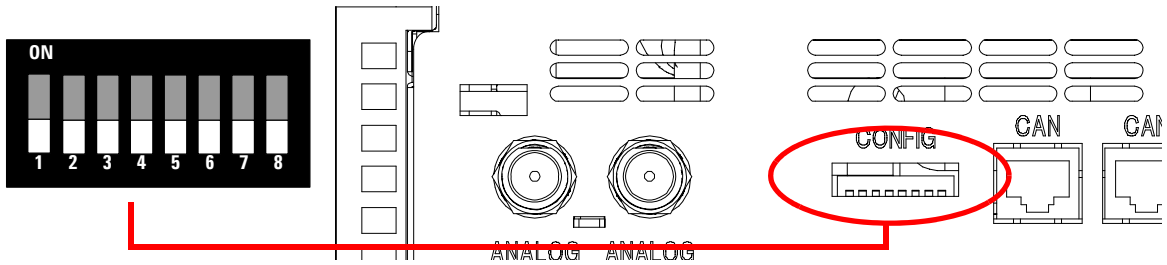


Figure 7 Location of Configuration Switches

The detector is shipped with all switches set to OFF, as shown above.

NOTE

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

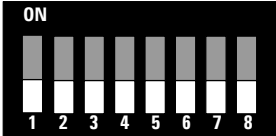
Table 5 Factory Default Settings

Initialization ('Init') Mode	Bootp, all switches down. For details see " Bootp " on page 35
Link Configuration	speed and duplex mode determined by auto-negotiation, for details see " Link configuration selection " on page 39

Initialization mode selection

The following initialization (init) modes are selectable:

Table 6 Initialization Mode Switches

	SW 6	SW 7	SW 8	Init Mode
	OFF	OFF	OFF	Bootp
	OFF	OFF	ON	Bootp & Store
	OFF	ON	OFF	Using Stored
	OFF	ON	ON	Using Default

Bootp

When the initialization mode “Bootp” is selected, the detector tries to download the parameters from a Bootp Server. The parameters obtained become the active parameters immediately. They are not stored to the non-volatile memory of the detector. Therefore, the parameters are lost with the next power cycle of the detector.

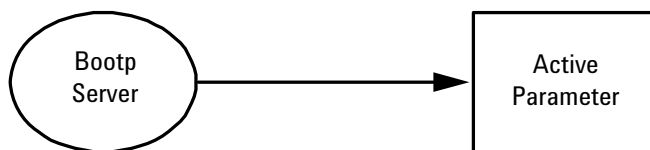


Figure 8 Bootp (Principle)

Bootp & Store

When “Bootp & Store” is selected, the parameters obtained from a Bootp Server become the active parameters immediately. In addition, they are stored to the non-volatile memory of the detector. Thus, after a power cycle they are still available. This enables a kind of “bootp once” configuration of the detector.

Example: The user may not want to have a Bootp Server be active in his network all the time. But on the other side, he may not have any other configuration method than Bootp. In this case he starts the Bootp Server temporarily, powers on the detector using the initialization mode “Bootp & Store”, waits for the Bootp cycle to be completed, closes the Bootp Server and powers off the detector. Then he selects the initialization mode “Using Stored” and powers on the detector again. From now on, he is able to establish the TCP/IP connection to the detector with the parameters obtained in that single Bootp cycle.

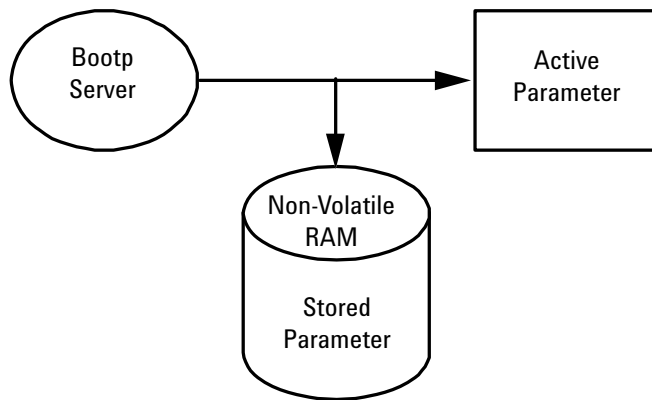


Figure 9 Bootp & Store (Principle)

NOTE

Use the initialization mode “Bootp & Store” carefully, because writing to the non-volatile memory takes time. Therefore, when the detector shall obtain its parameters from a Bootp Server every time it is powered on, the recommended initialization mode is “Bootp”!

Using Stored

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

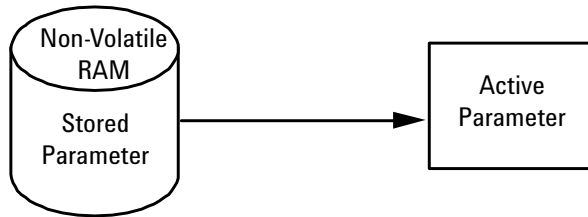


Figure 10 Using Stored (Principle)

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 7](#).

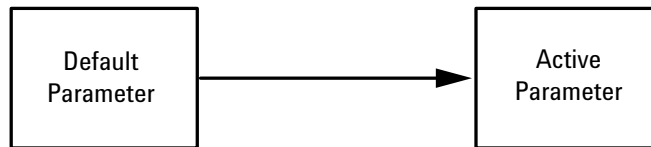


Figure 11 Using Default (Principle)

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 7 Using Default Parameters

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

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 detector must reside in the same subnet.

3 LAN Configuration

The user may open a Telnet session using the default IP address and change the parameters stored in the non-volatile memory of the detector. 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 detector 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 detector are not cleared automatically. If not changed by the user, they are still available, when switching back to the mode “Using Stored”.

Link configuration selection

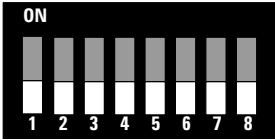
The LAN interface supports 10 or 100 Mbps operation in full- or half-duplex modes. In most cases, full-duplex is supported when the connecting network device - such as a network switch or hub - supports IEEE 802.3u auto-negotiation specifications.

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 detector 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 detector.

Table 8 Link Configuration Switches

	SW 3	SW 4	SW 5	Link Configuration
	OFF	-	-	speed and duplex mode determined by auto-negotiation
	ON	OFF	OFF	manually set to 10 Mbps, half-duplex
	ON	OFF	ON	manually set to 10 Mbps, full-duplex
	ON	ON	OFF	manually set to 100 Mbps, half-duplex
	ON	ON	ON	manually set to 100 Mbps, full-duplex

Automatic configuration with Bootp

When automatic configuration with Bootp is selected and the LAN interface is powered on, it broadcasts a BOOTP (Bootstrap Protocol) request that contains its MAC (hardware) address. A BOOTP server daemon searches its database for a matching MAC address, and if successful, sends the corresponding configuration parameters to the detector as a BOOTP reply. These parameters become the active TCP/IP parameters immediately and the TCP/IP connection can be established.

Configuring the Agilent Bootp service program

NOTE

All examples shown in this chapter will not work in your environment. You need your own IP-, Subnet-Mask- and Gateway addresses.

NOTE

Assure that the detector configuration switch is set properly. The setting should be either **Bootp** or **Bootp & Store**, see [Table 6](#) on page 35.

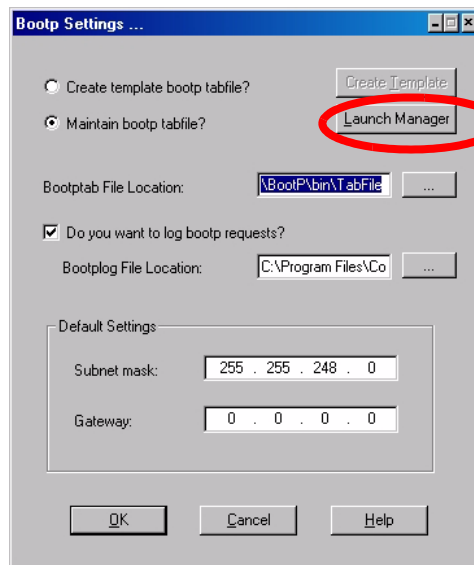
NOTE

Assure that the detector connected to the network is powered off.

NOTE

If the Agilent Bootp Service program is not already installed on your PC, then install it from your Agilent ChemStation CD-ROM, located in folder \Bootp. The screens refer to version B.01.0x

- 1 The Agilent Bootp Service is placed in the start-up group and automatically is started during the boot process of the PC.
- 2 Open the Bootp Settings window (Figure 12) and enter the default settings for your setup.



location of LogFile and TabFile

Figure 12 Bootp Service Settings

- 3 Launch the Manager. It will open the Bootp Manager screen, see Figure 13. This shows all network hardware that has been added (initially empty).

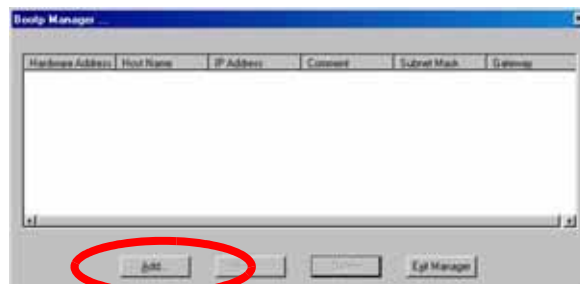
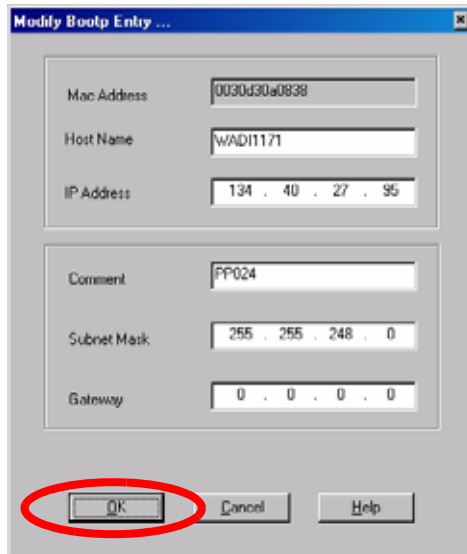


Figure 13 Bootp Manager

3 LAN Configuration

4 Select Add to enter the enter the module specific information, see [Figure 14](#):

- MAC address (from label on the instrument)
- host name
- IP address
- comment (instrument name / location)
- subnet mask (if different)
- gateway (if required)



The image shows a dialog box titled "Modify Bootp Entry ...". It contains several input fields for configuring a bootp entry. The fields are: Mac Address (0030d30a0838), Host Name (wAD11171), IP Address (134 . 40 . 27 . 95), Comment (PP024), Subnet Mask (255 . 255 . 248 . 0), and Gateway (0 . 0 . 0 . 0). At the bottom of the dialog, there are three buttons: "OK", "Cancel", and "Help". The "OK" button is circled in red.

Figure 14 Boot Manager - Enter your parameter

- 5 Press OK. The parameter are added to the Bootp Manager, see Figure 14 and added to the TabFile, see Figure 12 on page 41:.

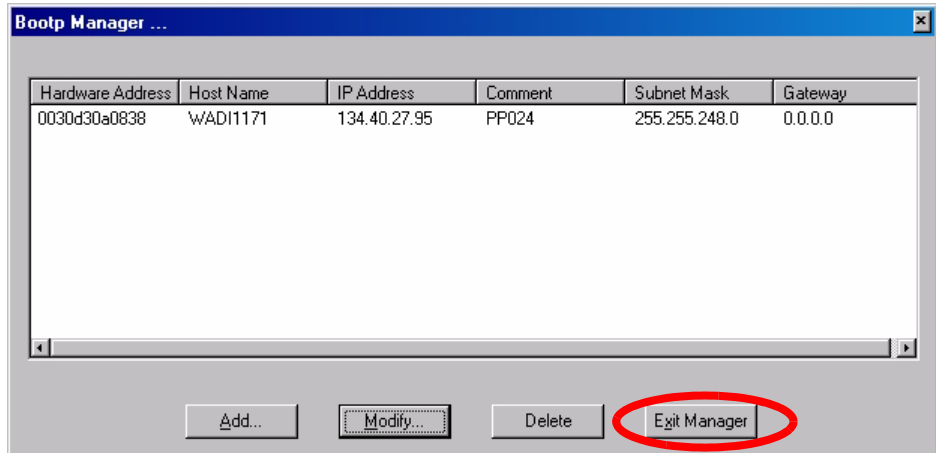


Figure 15 Bootp Manager - check your entries

- 6 Press Exit Manager and OK to exit the Agilent Bootp Service.
- 7 Now turn on the module with the detector, wait about 30-60 seconds and view the LogFile, see Figure 16. It should display the request from the detector with the hardware (MAC) address.

```
02/03/05 16:33:56 PM
Status: BOOTP Request received at outer most layer
Status: BOOTP Request received from hardware address: 0030D30A0838
Status: found 134.40.27.95 WADI1171:
Status: Host IP Address is: 134.40.29.56
Status: Reply to BOOTP Request has been sent
Status: BOOTP Request finished processing at outer most layer
```

Figure 16 LogFile - the detector has received the parameter

3 LAN Configuration

NOTE

When using this **Bootp** mode, the parameters are not written into the non-volatile memory of the detector. If you delete this Bootp Configuration, the Bootp Manager will show up as shown in [Figure 13](#) on page 41 (**Bootp** mode).

If you want to store your parameters permanently on the detector (for use without the Agilent Bootp service), refer to “[Storing the settings permanently with Bootp](#)” on page 45.

Storing the settings permanently with Bootp

If you want to change parameters of the detector using the Bootp follow the instructions below.

- 1 Turn off the detector.
- 2 Change the detector's settings of the Configuration Switch to **"Bootp & Store"** mode, see [Table 6](#) on page 35.
- 3 Start the Agilent Bootp Service and open its window.
- 4 If required, modify the parameters for the detector according to your needs using the existing configuration.
- 5 Press *OK* to exit the Bootp Manager.
- 6 Now turn on the detector and view the Bootp Server window. After some time the Agilent Bootp Service will display the request from the LAN interface. The parameters are now stored permanently in the non-volatile memory of the detector.
- 7 Close the Agilent Bootp Service and turn off the detector.
- 8 Change the settings of the detector's Configuration Switch to **"Using Stored"** mode, see [Table 6](#) on page 35.
- 9 Power cycle the detector. The detector can be accessed now via LAN without the Agilent Bootp Service, refer to ["PC and Agilent ChemStation Setup"](#) on page 54.

Manual Configuration

Manual configuration only alters the set of parameters stored in the non-volatile memory of the detector. 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.

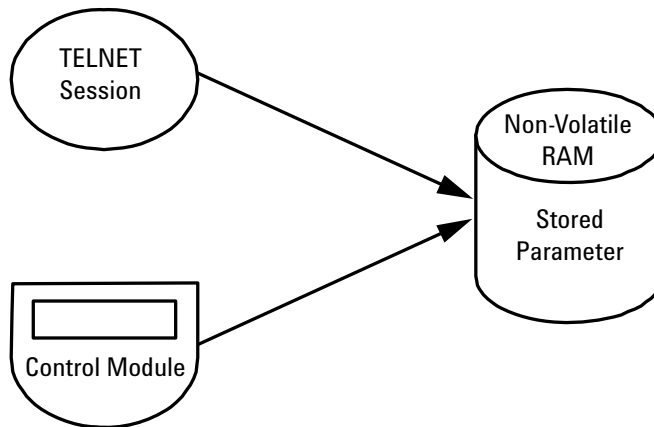


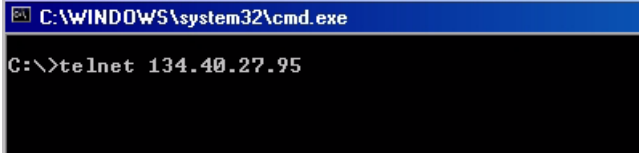
Figure 17 Manual Configuration (Principle)

With Telnet

Whenever a TCP/IP connection to the detector is possible (TCP/IP parameters set by any method), the parameters may be altered by opening a Telnet session.

- 1 Open the system (DOS) prompt window by clicking on Windows START button and select “Run...”. Type “cmd” and press OK.
- 2 Type the following at the system (DOS) prompt:

```
c:\>telnet <IP address> or
c:\>telnet <host name>
```

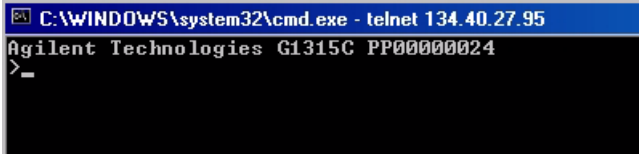


```
C:\WINDOWS\system32\cmd.exe
C:\>telnet 134.40.27.95
```

Figure 18 Telnet - Starting a session

where <IP address> may be the assigned address from a Bootp cycle, a configuration session with the Handheld Controller (G1323B), or the default IP address (see “[Configuration Switches](#)” on page 34).

When the connection was established successfully, the detector responds with the following:



```
C:\WINDOWS\system32\cmd.exe - telnet 134.40.27.95
Agilent Technologies G1315C PP00000024
>_-
```

Figure 19 A connection to the module is made

3 Type ? and press enter to see the available commands.

```

C:\WINDOWS\system32\cmd.exe - telnet 134.40.27.95
Agilent Technologies G1315C PP00000024
>?
command syntax          description
-----
?                        display help info
/                        display current LAN settings
ip <x.x.x.x>             set IP Address
sm <x.x.x.x>             set Subnet Mask
gw <x.x.x.x>             set Default Gateway
exit                    exit shell
>
  
```

Figure 20 Telnet Commands

Table 9 Telnet Commands

Value	Description
?	displays syntax and descriptions of commands
/	displays current LAN settings
ip <x.x.x.x>	sets new ip address
sm <x.x.x.x>	sets new subnet mask
gw <x.x.x.x>	sets new default gateway
exit	exits shell and saves all changes

4 To change a parameter follows the style:

parameter value

for example: ip 134.40.27.230

then press [Enter], where parameter refers to the configuration parameter you are defining, and value refers to the definitions you are assigning to that parameter. Each parameter entry is followed by a carriage return.

- 5 Use the “/” and press Enter to list the current settings.

<pre>C:\WINDOWS\system32\cmd.exe - telnet 134.40.27.95 >/ LAN Status Page ----- MAC Address : 0030D30A0838 ----- Init Mode : Using Stored ----- TCP/IP Properties - active - IP Address : 134.40.27.95 Subnet Mask : 255.255.248.0 Def. Gateway : 134.40.24.1 ----- TCP/IP Status : Ready ----- Controllers : no connections >_</pre>	<p>information about the LAN interface MAC address, initialization mode</p> <p>Initialization mode is Using Stored</p> <p>active TCP/IP settings</p> <p>TCP/IP status - here ready</p> <p>connected to PC with controller software (e.g. Agilent ChemStation), here not connected</p>
---	---

Figure 21 Telnet - Current settings in “Using Stored” mode

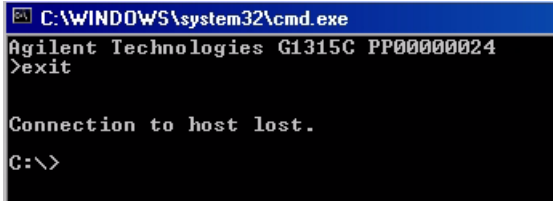
- 6 Change the IP address (in this example 134.40.27.99) and type “/” to list current settings.

<pre>C:\WINDOWS\system32\cmd.exe - telnet 134.40.27.95 >ip 134.40.27.99 >/ LAN Status Page ----- MAC Address : 0030D30A0838 ----- Init Mode : Using Stored ----- TCP/IP Properties - active - IP Address : 134.40.27.95 Subnet Mask : 255.255.248.0 Def. Gateway : 134.40.24.1 - stored - IP Address : 134.40.27.99 Subnet Mask : 255.255.248.0 Def. Gateway : 134.40.24.1 ----- TCP/IP Status : Ready ----- Controllers : no connections >_</pre>	<p>change of IP setting to</p> <p>Initialization mode is Using Stored</p> <p>active TCP/IP settings</p> <p>stored TCP/IP settings in non-volatile memory</p> <p>connected to PC with controller software (e.g. Agilent ChemStation), here not connected</p>
---	---

Figure 22 Telnet - Change IP settings

3 LAN Configuration

- 7 When you have finished typing the configuration parameters, type:
`exit` and press [Enter] to exit with storing parameters.



```
C:\WINDOWS\system32\cmd.exe
Agilent Technologies G1315C PP00000024
>exit

Connection to host lost.

C:\>
```

Figure 23 Closing the Telnet Session

NOTE

If the Initialization Mode Switch is changed now to “Using Stored” mode, the instrument will take the stored settings when the module is re-booted. In the example above it would be 134.40.27.99.

With Handheld Controller (G1323B)

To configure the TCP/IP parameters before connecting the detector to the network, the Handheld Controller (G1323B with firmware B.04.01 or above) can be used.

- 1 Press F5 “Views”, select “System” and press the “Enter” key.
- 2 Press F2 “Configure”, select the module where the LAN cable is installed and press the “Enter” key (Figure 24).

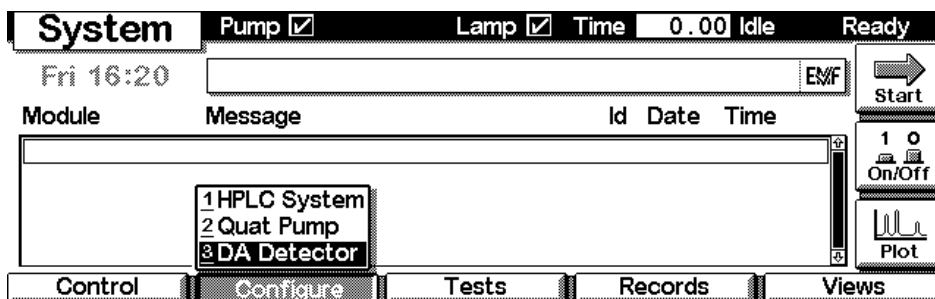


Figure 24 Select module

- 3 Press F1 “LAN” (Figure 25).

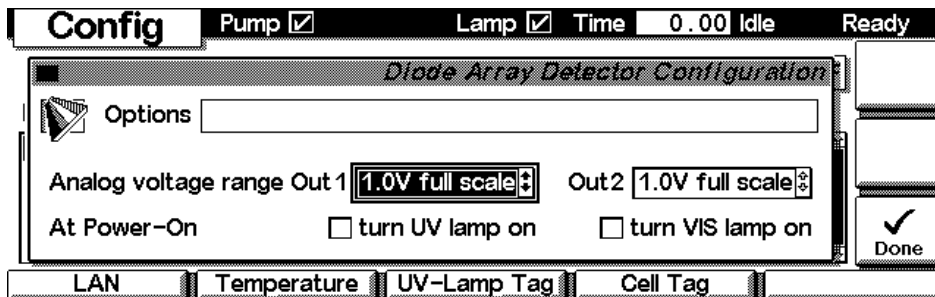


Figure 25 Select LAN

3 LAN Configuration

- 4 After the Handheld Controller was reading out the LAN interface you will get an overview of the LAN settings (LAN Status Page). The information corresponds to the information in [Figure 21](#) on page 49.

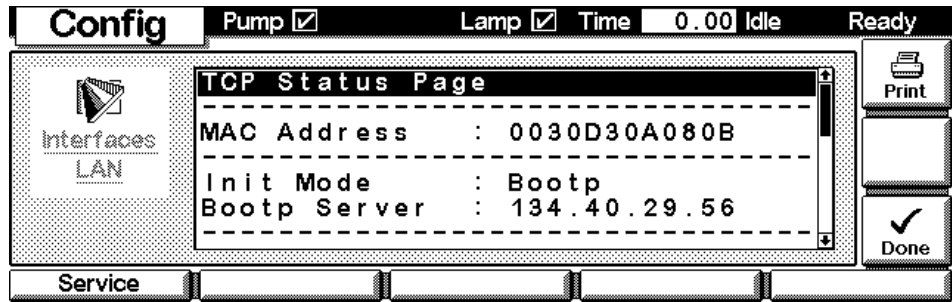


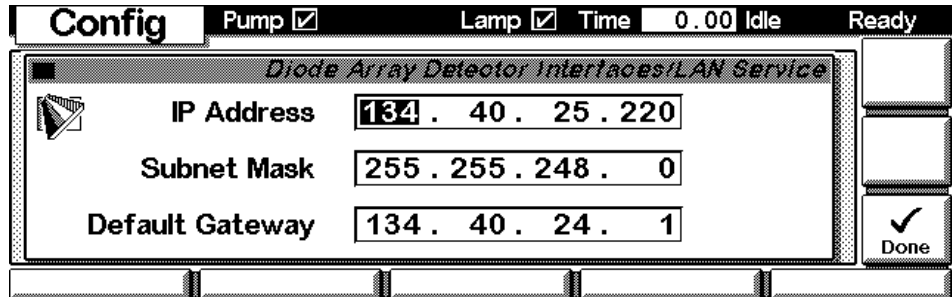
Figure 26 Diode Array and Multiple Wavelength Detector SL Status Page

In [Figure 27](#) on page 52 the complete listing is shown. For explanations refer to [Figure 21](#) on page 49.

```
LAN Status Page
-----
MAC Address   : 0030d30A080B
-----
Init Mode    : Bootp
Bootp Server : 134.40.29.56
-----
TCP/IP Properties
- active -
IP Address   : 134.40.25.220
Subnet Mask  : 255.255.248.0
Def. Gateway : 0.0.0.0
- stored -
IP Address   : 134.40.25.220
Subnet Mask  : 255.255.248.0
Def. Gateway : 134.40.24.1
-----
TCP/IP Status : Ready
-----
Controllers   : no connections
```

Figure 27 LAN interface Status Page (complete)

- 5 To change the TCP/IP settings, press F1 “Service”.



- 6 Move to the parameter you want to change, enter the new value and press “Enter”.
- 7 If you completed your changes, press “Done” to leave the Service section.
- 8 Press F6 “Done” and restart the module by pressing “OK”.

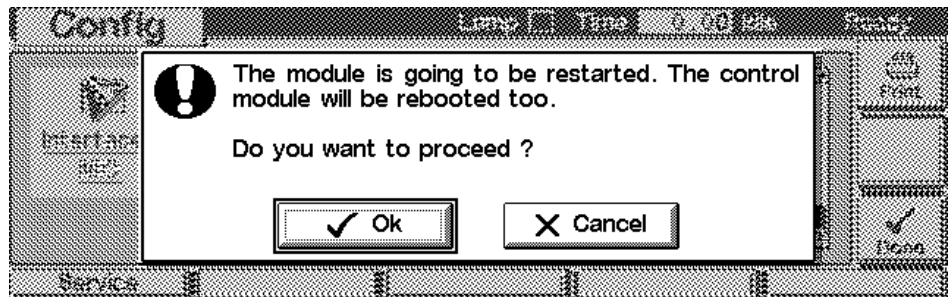
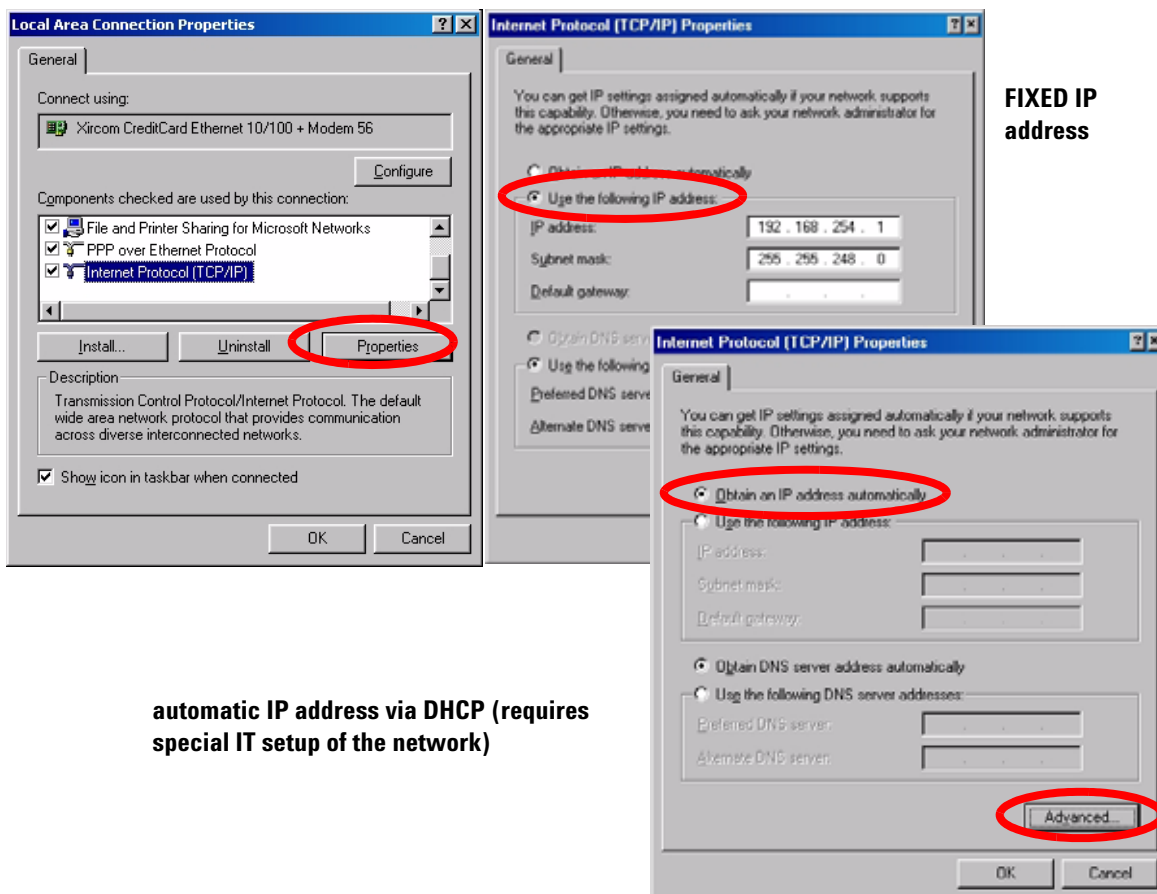


Figure 28 Re-boot screen

PC and Agilent ChemStation Setup

PC Setup for Local Configuration

This procedure describes the change of the TCP/IP settings on your PC to match the detector’s default parameters in a local configuration (see also “Using Default” on page 37).



automatic IP address via DHCP (requires special IT setup of the network)

Figure 29 Changing the TCP/IP settings of the PC

Agilent ChemStation Setup

- 1 Start the Configuration Editor of the Agilent ChemStation.

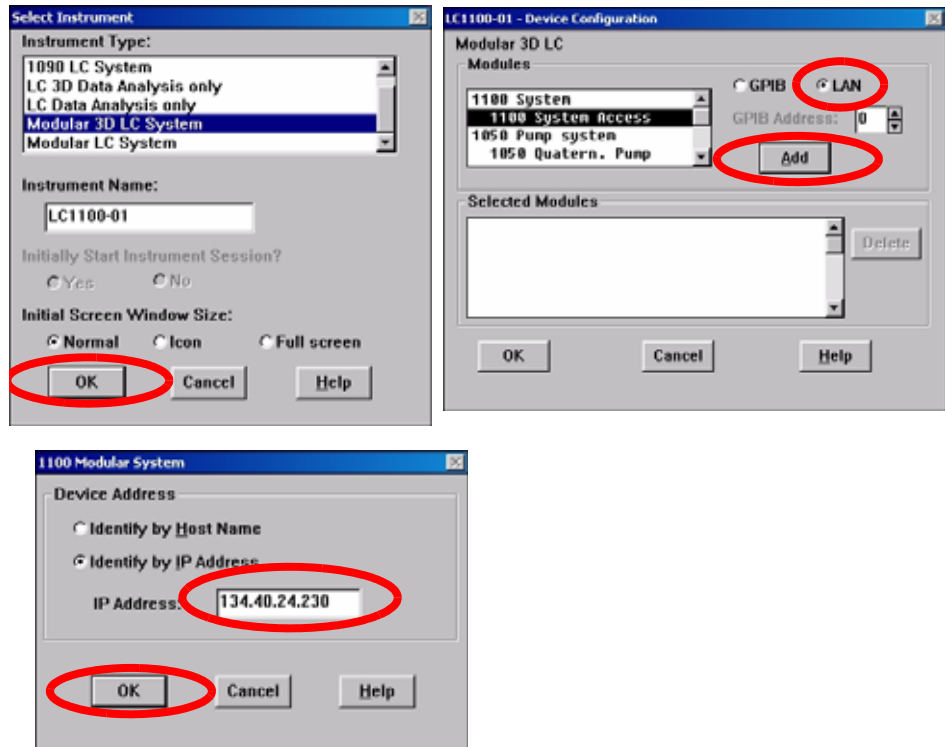


Figure 30 Changing the TCP/IP settings of the Agilent ChemStation

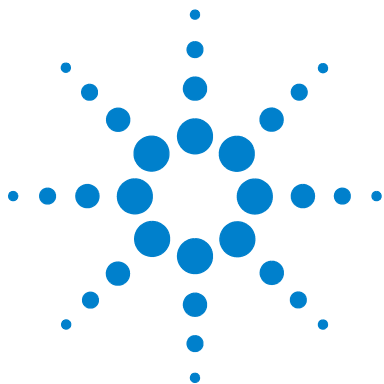
- 2 Add a TCP/IP connection to communicate with the detector. Use the IP address of the detector.

NOTE

If using a corporate LAN, IP addresses need to be supplied by the responsible IT department. Also the LAN needs to be able to handle additional traffic.

Save the configuration, close the Configuration Editor and start the Agilent ChemStation.

3 LAN Configuration



4 Using the Detector

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This chapter provides information on how to set up the detector for an analysis and explains the basic settings.



Setting up an Analysis

This chapter can be used for

- preparing the system,
- to learn the set up of an HPLC analysis and
- to use it as an instrument check to demonstrate that all modules of the system are correctly installed and connected. It is not a test of the instrument performance.
- Learn about special settings

Before Using the System

Solvent Information

Observe recommendations on the use of solvents in chapter “Solvents” in the pump’s reference manual.

Priming and Purging 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 10 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** Open the purge valve of your pump (by turning it counterclockwise) and set flow rate to 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.
- Pump for approximately 10 minutes before starting your application.

Requirements and Conditions

What You Will Need

Table 11 lists the items you need to have for the set up of the analysis. Some of these are optional (not required for the basic system).

Table 11 What you will need

1100 system	Pump (plus degassing)
	Autosampler
	Detector, standard flow cell installed
	Agilent ChemStation (B.01.03 and above) or Control Module (B.04.01 and above) (optional for basic operation)
	System should be correctly set up for LAN communication with the Agilent ChemStation
Column:	Zorbax Eclipse XDB-C18, 4.6 x 150 mm, 5 μ m Part No. 993967-902 or Part No. 5063-6600
Standard:	Part No. 01080-68704 0.15 wt.% dimethylphthalate, 0.15 wt.% diethylphthalate, 0.01 wt.% biphenyl, 0.03 wt.% o-terphenyl in methanol

Conditions

A single injection of the isocratic test standard is made under the conditions given in Table 12:

Table 12 Conditions

Flow:	1.5 ml/minute
Stoptime:	8 minutes
Solvent:	100% (30% water/70% Acetonitrile)
Temperature	Ambient
Wavelength:	sample 254 nm (4 nm bandwidth) reference 360 nm (100 nm bandwidth)
Injection Volume	1 μ l

Typical Chromatogram

A typical chromatogram for this analysis is shown in [Figure 31](#). The exact profile of the chromatogram will depend on the chromatographic conditions. Variations in solvent quality, column packing, standard concentration and column temperature will all have a potential effect on peak retention and response.

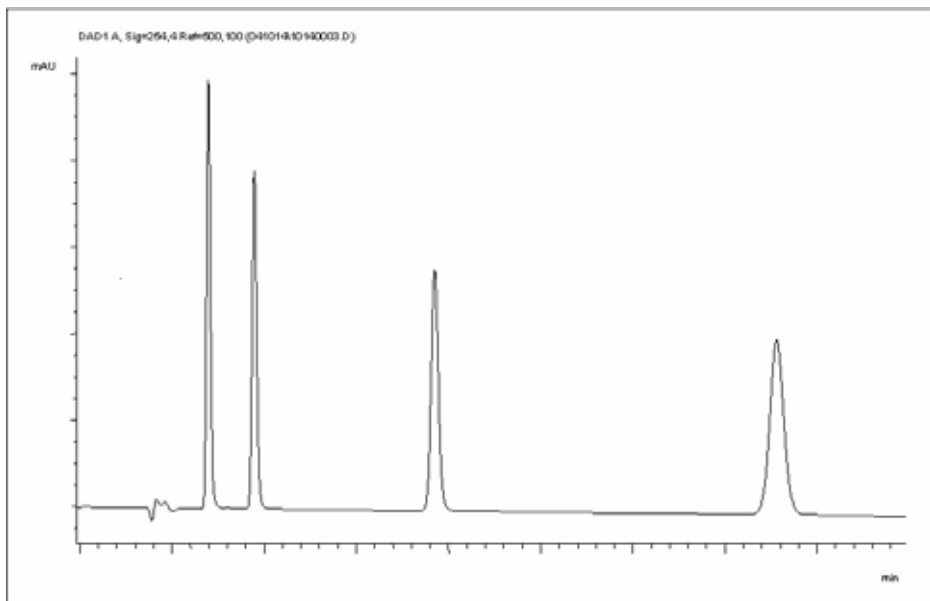


Figure 31 Typical Chromatogram with UV-detector

Optimization of the System

The settings used for this analysis are specific for this purpose. For other applications the system can be optimized in various ways. Please refer to the section [“Optimizing the Detector”](#) on page 84 or *“Optimizing”* in the your *module’s Reference Manual*.

Preparing the HPLC System

- 1 Turn on the Agilent ChemStation PC and the monitor.
- 2 Turn on the 1100 series HPLC modules.
- 3 Start the Agilent ChemStation software. If the pump, autosampler and detector are found, the ChemStation screen should look like shown in Figure 32.

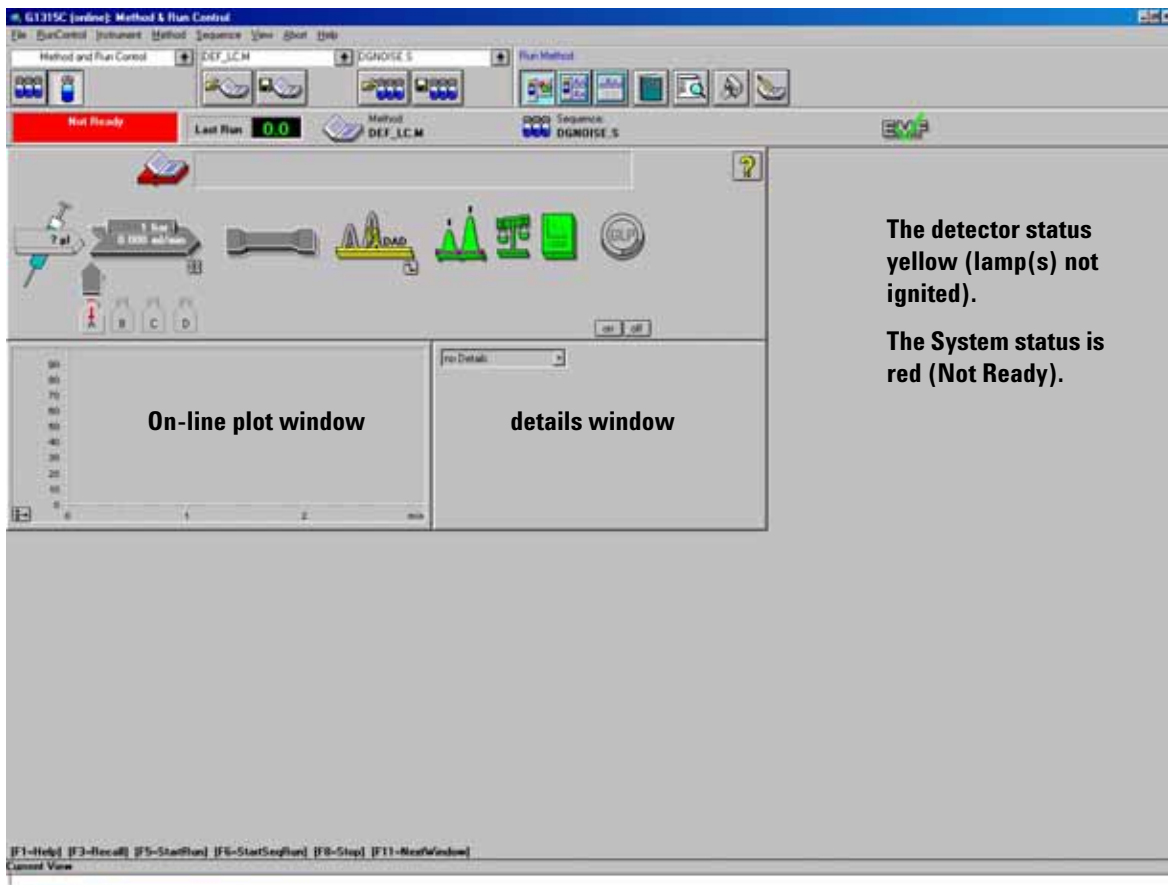


Figure 32 Initial ChemStation screen

4 Using the Detector

- 4 Turn on the detector lamp, pump and autosampler by clicking the *System On* button or the buttons below the module icons on the graphical user interface (GUI). After some seconds, the pump and detector module will turn to green

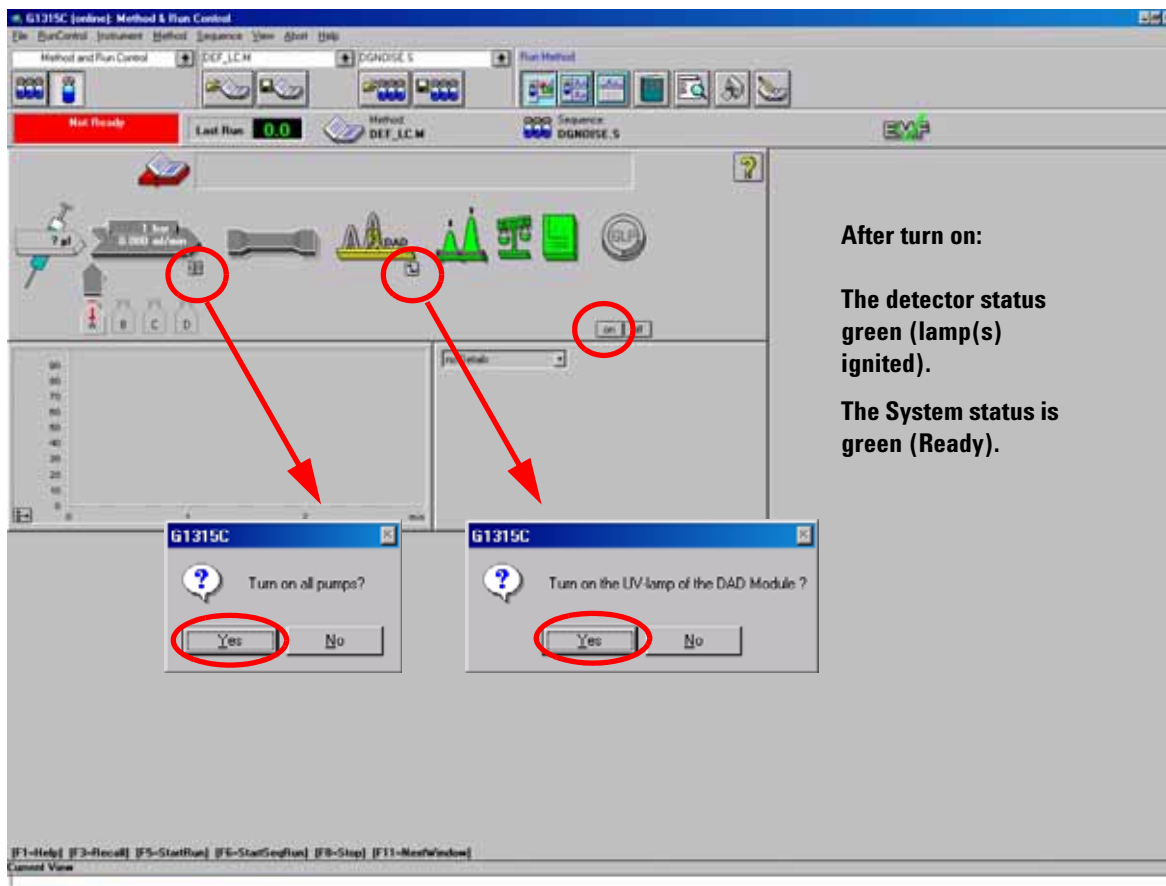


Figure 33 Turning on the HPLC Module

- 5 Purge the pump. For more information see “[Priming and Purging the System](#)” on page 58.

- 6 Allow the detector to warm up of at least 60 minutes to provide a stable baseline (see example in [Figure 34](#) and [Table 13](#)).

NOTE

For reproducible chromatography, the detector and lamp should be on for at least one hour. Otherwise the detector baseline may still drift (depending on the environment). See also section “Wander / Drift Problems Due to Temperature Changes” in the Service Manual.

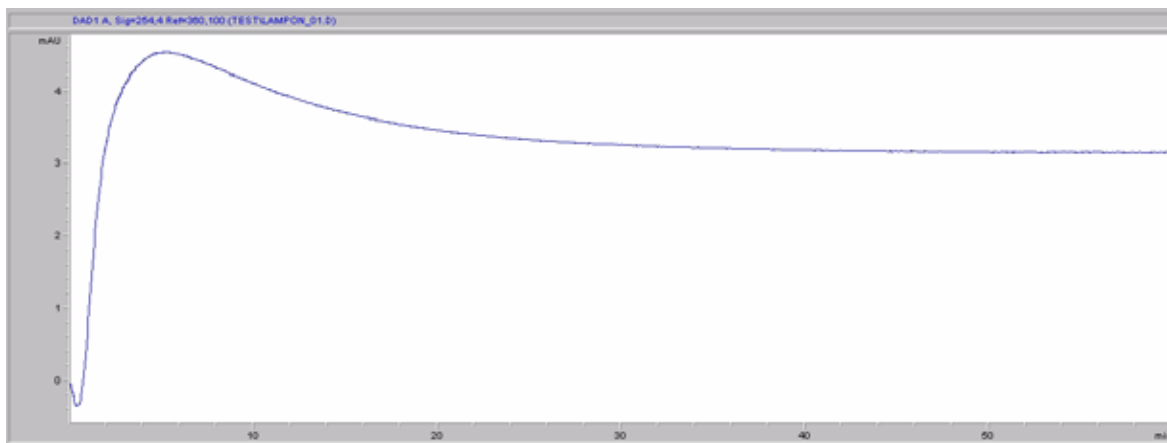


Figure 34 Stabilization of Baseline (both lamps turned on at the same time)

Table 13 Baseline drift after lamp turn on (example from [Figure 34](#))

Time [minutes]	Drift [mAU/hr]
17 - 20	2.6
27 - 30	0.8
37 - 40	0.4
47 - 50	0.2
57 - 60	< 0.2

4 Using the Detector

- 7 For the isocratic pump, fill the solvent bottle with the mixture of HPLC-grade bi-distilled water (30 %) and acetonitrile (70 %). For binary- and quaternary pumps you can use separate bottles.
- 8 Click on the *Load Method* button and select DEF_LC.M and press *OK*. The default LC method parameters are transferred into the 1100 modules.

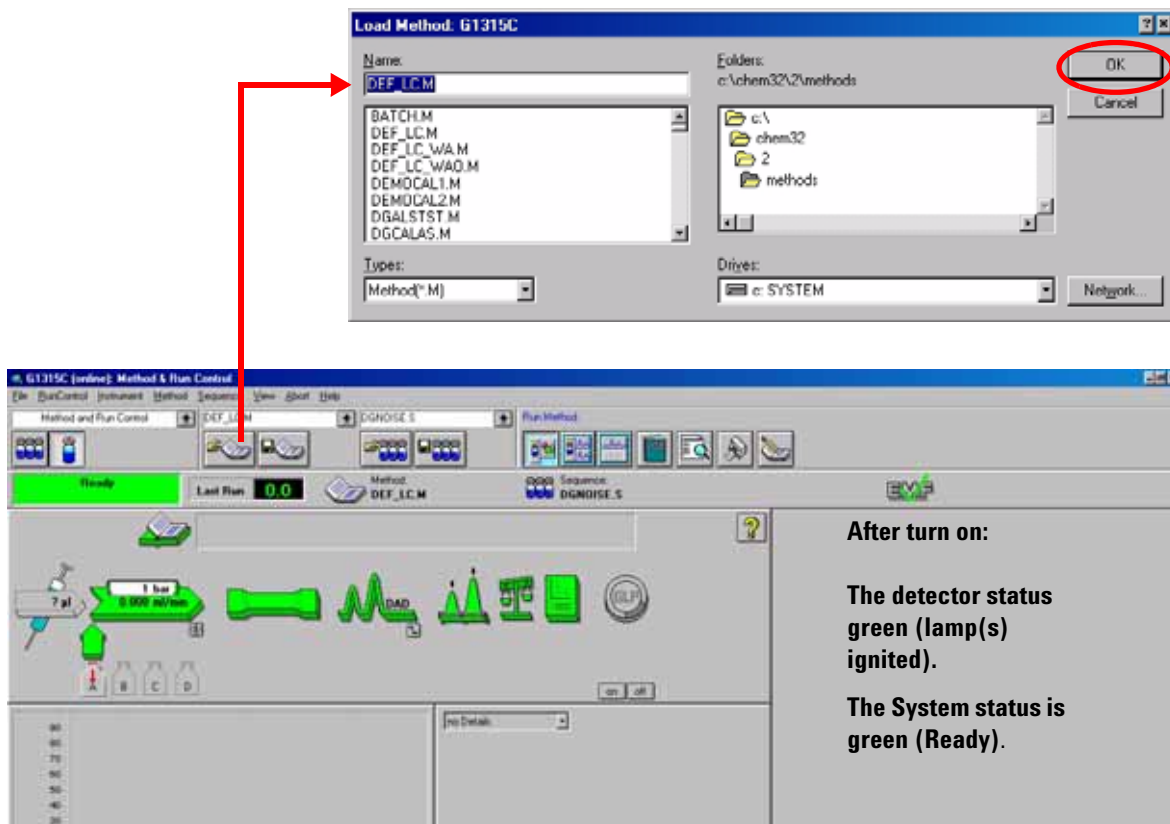


Figure 35 Loading Default LC Method

- Click on the module icons (Figure 36) and open the *Setup* of these modules. Figure 37 on page 68 shows the detector settings (do not change the detector parameters at this time).

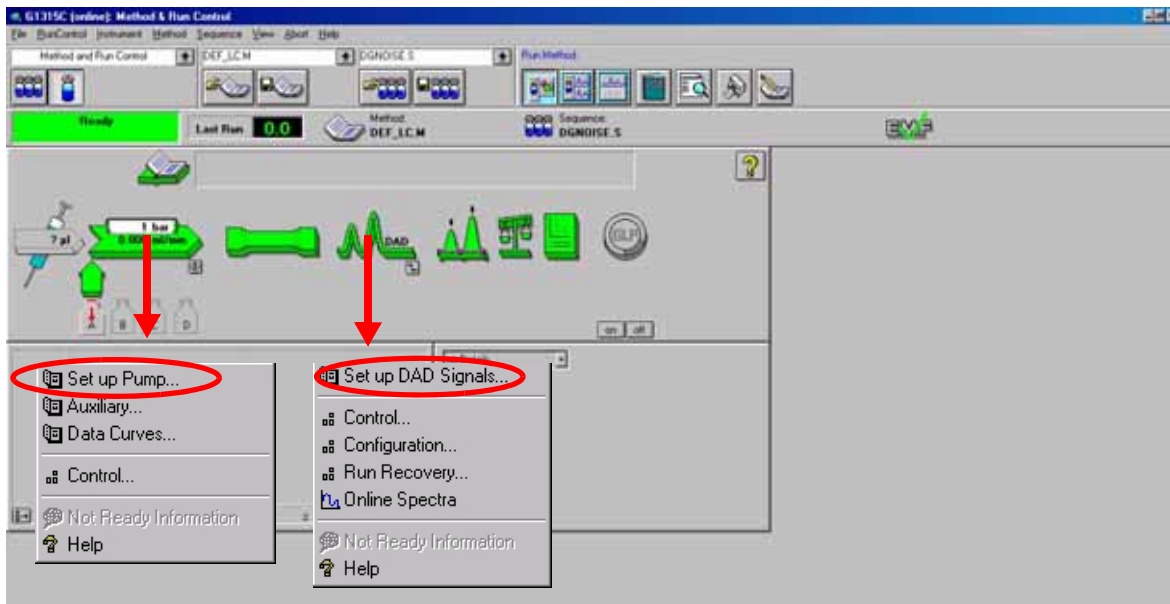


Figure 36 Open the module menu

- Enter the pump parameters mentioned under “[Conditions](#)” on page 61.

4 Using the Detector

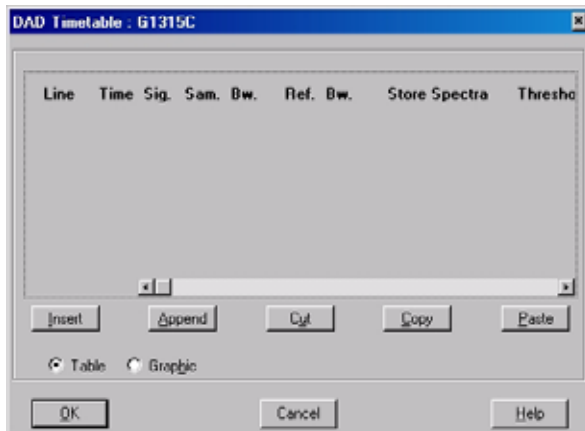
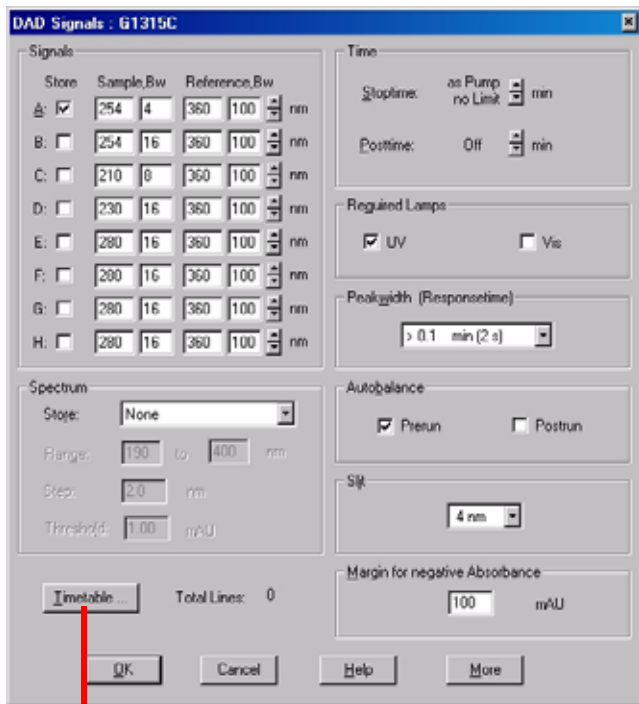



Figure 37 Detector parameter (default)

- up to 8 signals (A to H) with individual wavelength settings can be selected.
- spectrum settings, see [page 80](#).
- stop and post time can be set (if required)
- depending on the application, the lamps can be selected (one or both).
- peak width depends on the peaks in the chromatogram, see [page 82](#).
- autobalance to zero absorbance (on the analog output plus offset) at begin and/or end of run.
- mechanical slit width can be changed for further optimization, see [page 83](#).
- margin for negative absorbance, see [page 84](#).
- Under More additional diagnostic signals can be added for troubleshooting purpose, see section “*Diagnostic Signals*” in the Service Manual.
- time table for programmable actions during the run.
NOTE: The Agilent G1315C DAD and G1365C MWD time table can contain a maximum of 60 rows.

- 11 Pump the water/acetonitrile (30/70 %) mobile phase through the column for 10 minutes for equilibration.
- 12 Click the button  and select *Change...* to open the Signal Plot information. Select the *Pump: Pressure* and the *DAD A: Signal 254,4* as signals. Change the Y-range for the DAD to 1 mAU and the offset to 20% and the pressure offset to 50%. The X-axis range should be 15 minutes. Press *OK* to exit this screen.

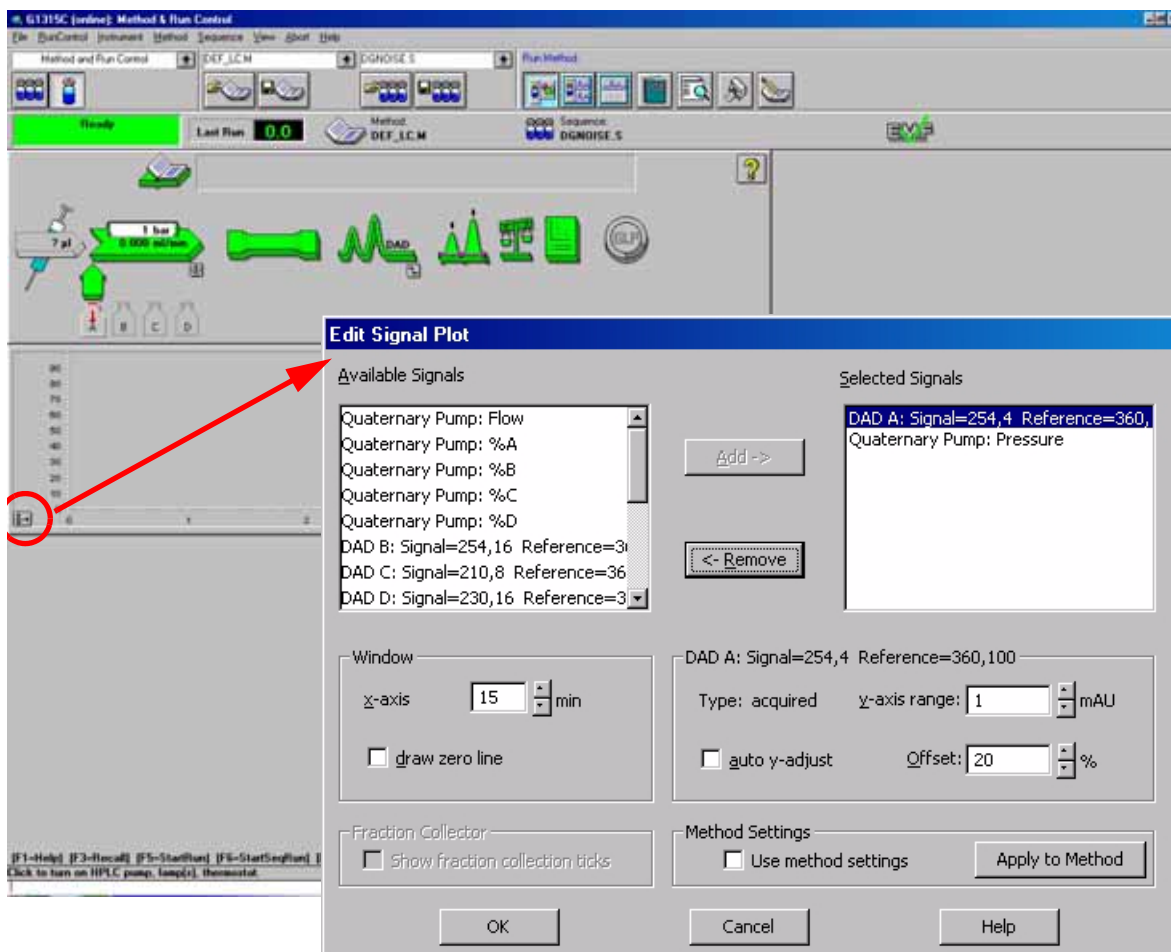


Figure 38 Edit Signal Plot Window

4 Using the Detector

The Online Plot (Figure 39 on page 70) shows both, the pump pressure and the detector absorbance signals. Pressing *Adjust* the signals can be reset to the offset value and *Balance* would do a balance on the detector.

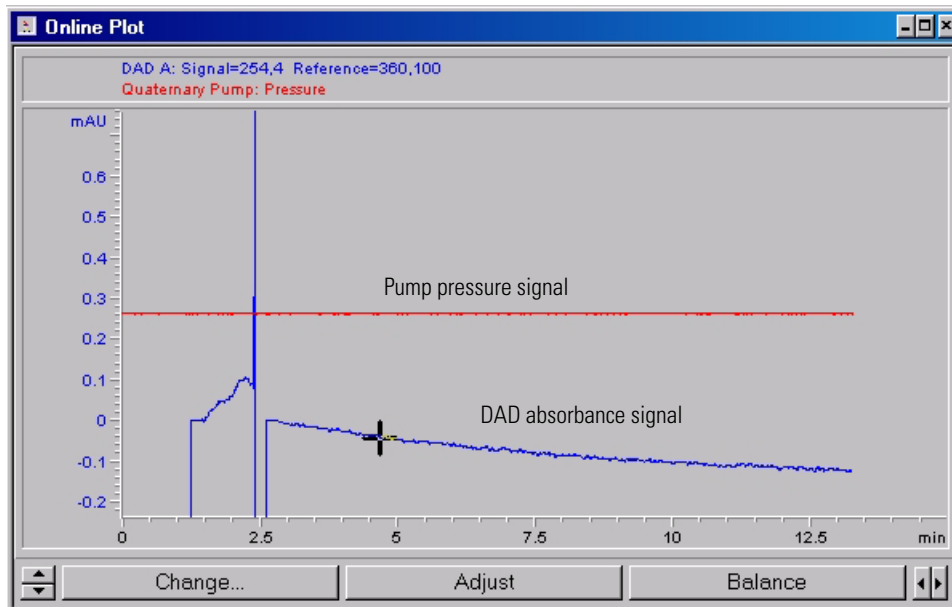


Figure 39 Online Plot Window

13 If both baselines are stable, set the Y-range for the detector signal to 100 mAU.

NOTE

If you start with a new UV-lamp for the first time, the lamp may show initial drift for some time (burn-in effect).

- 14 Select the menu item *RunControl* -> *Sample Info* and enter information about this application (Figure 40 on page 71). Press *OK* to leave this screen.

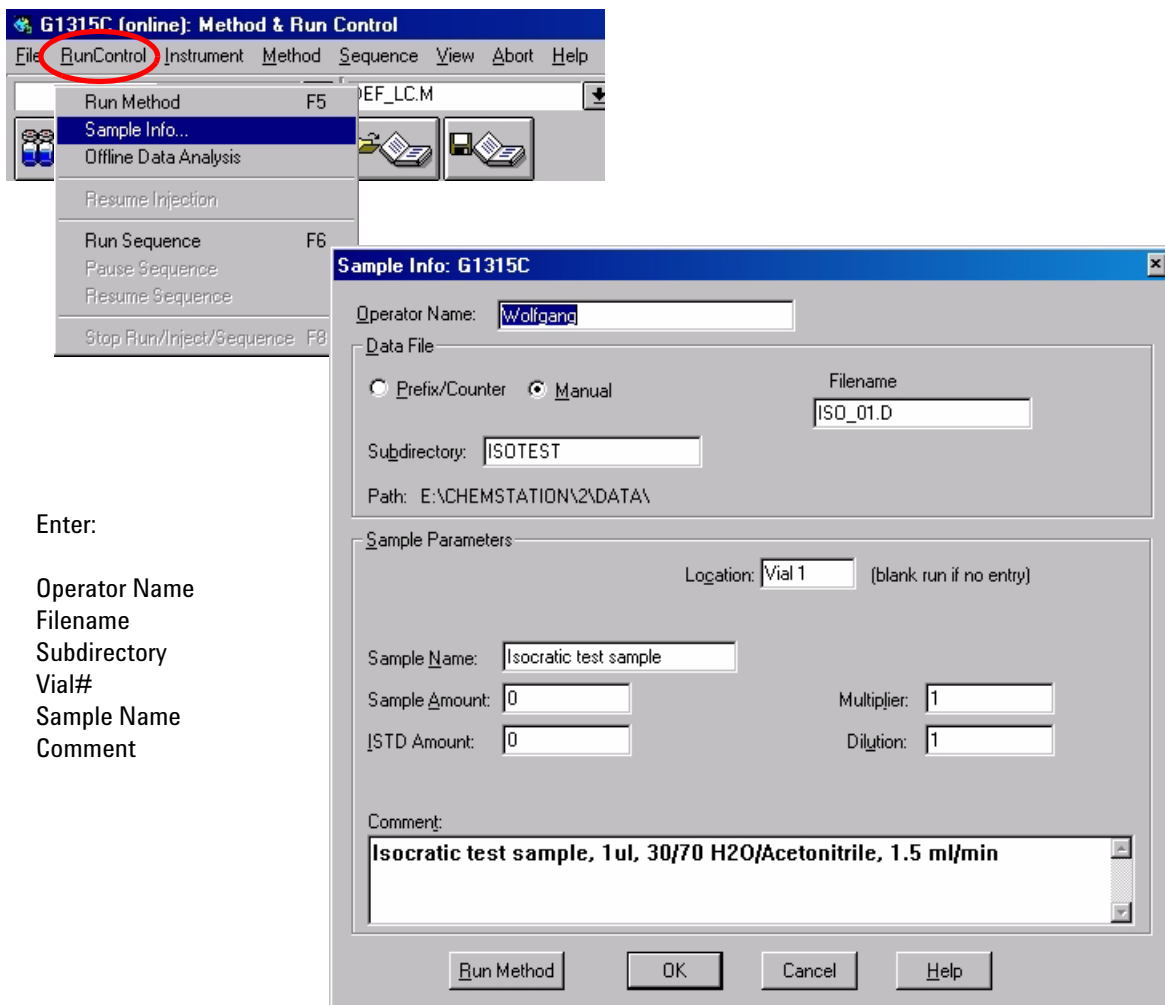


Figure 40 Sample Information

- 15 Fill the content of an isocratic standard sample ampoule into a vial and seal the vial with a cap and place the vial into autosampler tray (position #1).

Running the Sample and Verifying the Results

- 1 To start a run select the menu item *RunControl* -> *Run Method*.
- 2 This will start the 1100 modules and the online plot on the Agilent ChemStation will show the resulting chromatogram.

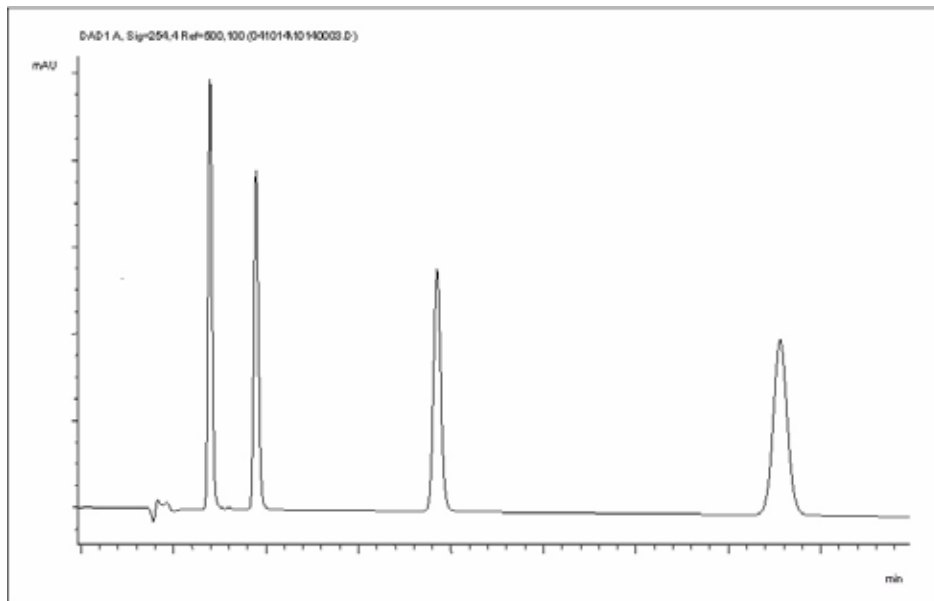


Figure 41 Chromatogram with Isocratic Test Sample

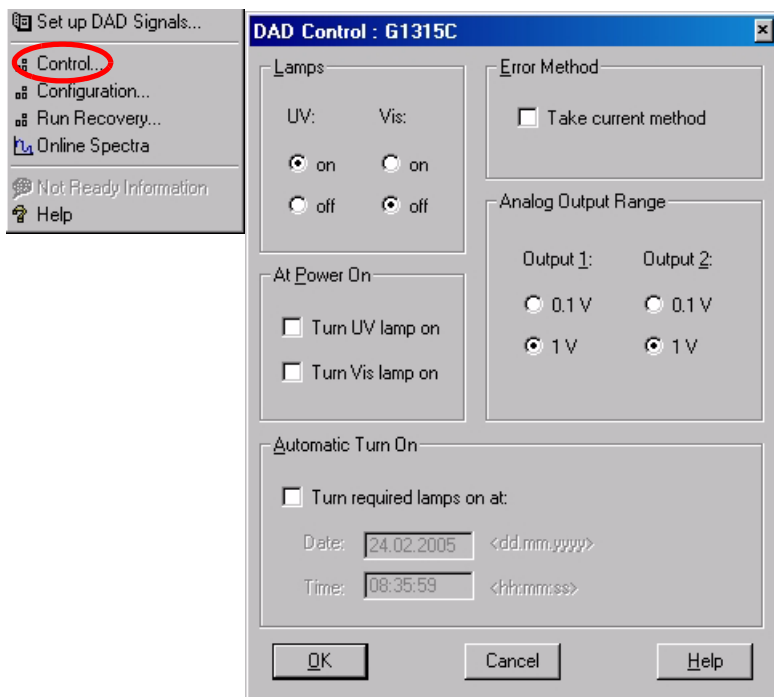
NOTE

Information about using the Data Analysis functions can be obtained from the *Using your ChemStation* manual supplied with your system.

Special Settings of the Detector

In this chapter special settings of the G1315C DAD and G1365C MWD are described (based on the Agilent ChemStation B.01.03).

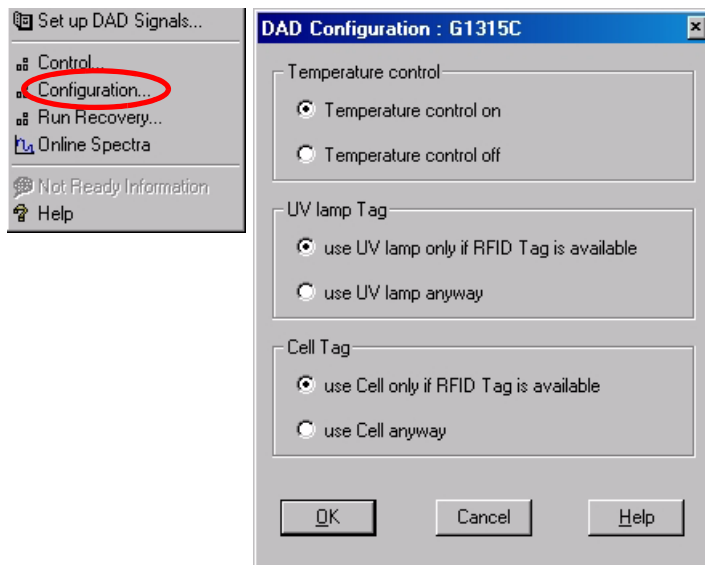
Control Settings



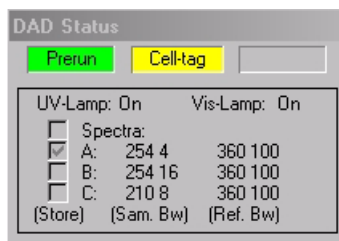
- **Lamps:** turn on and off of UV- and Vis lamp.
- **At Power On:** automatic lamp-on at power on.
- **Error Method:** take error method or current method (in case of an error).
- **Analog Output Range:** can be set to either 100 mV or 1 V full scale, see also “[Analog Output Settings](#)” on page 79.
- **Automatic Turn On:** lamps can be programmed (detector must be on for this).
- **Help:** online help.

Figure 42 Detector control settings

Configuration Settings



- **Temperature Control:** the optical unit is kept on constant temperature and improves the baseline stability in unstable environments. See also note below.
- **UV lamp tag:** for Agilent lamps with I.D. tags. If no I.D. tag lamp is used, detector icon will become grey (lamp tag not ready) and analysis is disabled.
- **Cell tag:** for Agilent flow cells with I.D. tags. If no I.D. tag cell is used, detector icon will become grey (cell tag not ready) and analysis is disabled.
- **Help:** online help.



The detector status shows “Cell-tag” in yellow in case the flow cell with the I.D. tag is not inserted. The detector icon is gray and the system is not ready.

Figure 43 Detector configuration settings

NOTE

If the flow cell temperature is critical for your chromatography, you may set the Temperature Control to off. This will lower the optical unit and flow cell temperature by some degree C. For more details see “[Principle of Temperature Control](#)” in the Service Manual.

Online Spectra

- 1 To view the online spectra during the run select *Online Spectra*.

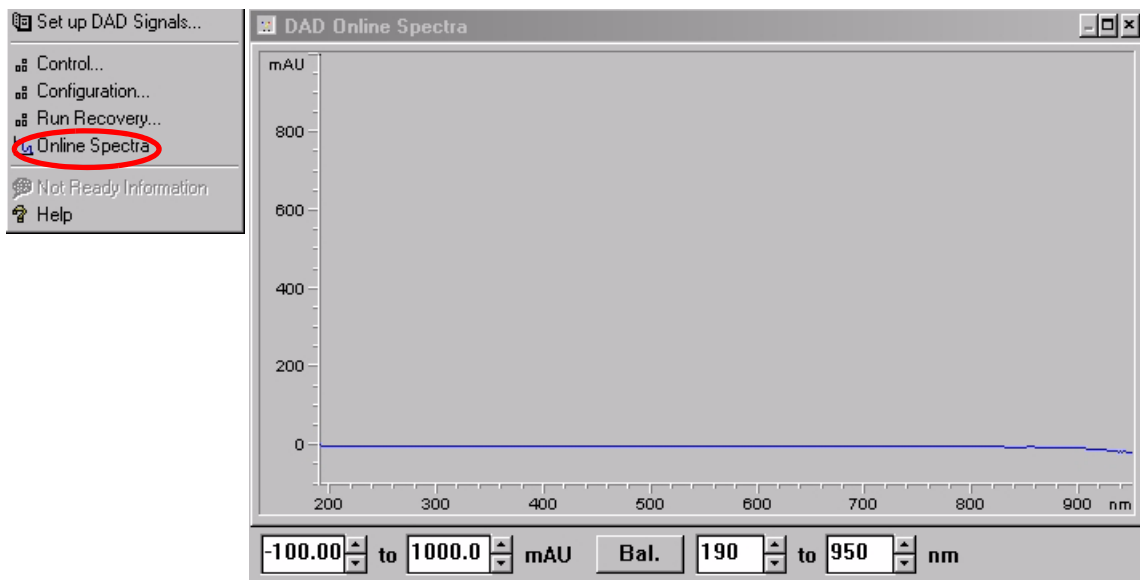


Figure 44 Online Spectra Window

- 2 Change the absorbance and wavelength range according your needs.

Run Recovery Settings

CAUTION

For this recovery mode the CompactFlash Card must be in the detector. The detector's local memory is too small to store the data.

The detector supports run buffering, which means that an amount of run data (*.uv and *.ch files) is stored in a storage medium (CompactFlash Card) in the detector until either it is overwritten or the detector undergoes a power cycle.

If there is a temporary network failure or the PC is not able to constantly take the data, the stored data is transferred to the ChemStation automatically when the network connection is restored or the PC can take the data, so that no loss of data occurs.

If there is a permanent network failure, the Run Recovery dialog box (Figure 45 on page 78) allows you to restore the stored data to the data directory. From there you can copy the files to the directory where the files are corrupted or not complete.

NOTE

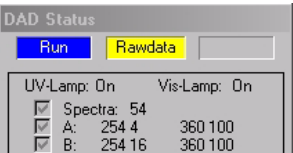
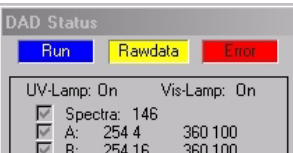
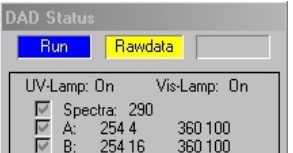
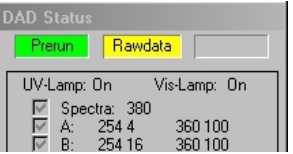
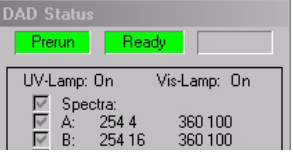
On very large recovery files it may take a long time to restore it to the Agilent ChemStation. A sequence will be stopped in case of a network problem.

NOTE

When during recovery an error "Method/Sequence stopped" appears, the instrument logbook shows an entry "No Run data available in device". In this case refer to "No Run Data Available In Device" in the Service Manual.

Automated Run Recovery in case of temporary communication failures

Table 14 Automated Run Recovery in case of temporary communication failures

Situation	Reaction	On ChemStation
<ul style="list-style-type: none"> All OK 	<ul style="list-style-type: none"> Run in progress - Data Analysis Run / Rawdata Elapsed run time is running Spectra counter is running Data are stored on PC and on card 	
<ul style="list-style-type: none"> LAN breaks 	<ul style="list-style-type: none"> Run in progress - Data Analysis Run / Rawdata Error Power Fail Elapsed run time stops Spectra counter stops Data continues to be stored on card 	
<ul style="list-style-type: none"> LAN recovers 	<ul style="list-style-type: none"> Run in progress - Data Analysis Run / Rawdata Error Power Fail cleared Elapsed run time continues at actual time Spectra counter continues Data continues to be stored on PC and on card ChemStation tries already to add missing data (depends on the data load). 	
<ul style="list-style-type: none"> Stop time elapsed 	<ul style="list-style-type: none"> Run in progress - Data Analysis Prerun / Rawdata Elapsed run time stops Spectra counter continues ChemStation continues to ads missing data 	
<ul style="list-style-type: none"> Run ends 	<ul style="list-style-type: none"> Ready Run finished Prerun / Ready 	

NOTE

If the detector status window is not opened, you will realize only the Power Fail error and the long Run In Progress information until the data is recovered from disk.

Manual Run Recovery in case of permanent communication failures

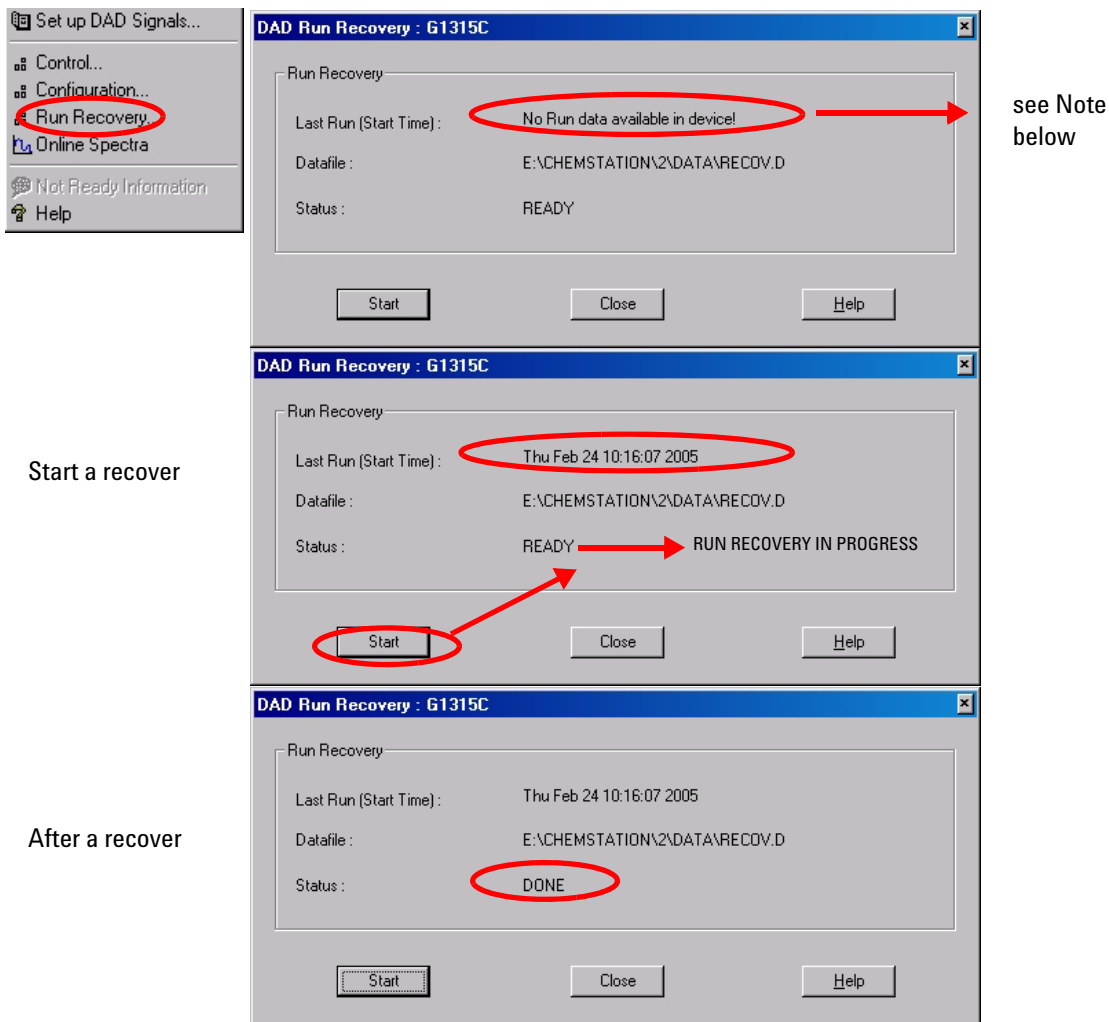


Figure 45 Manual Run Recovery in case of permanent communication failures

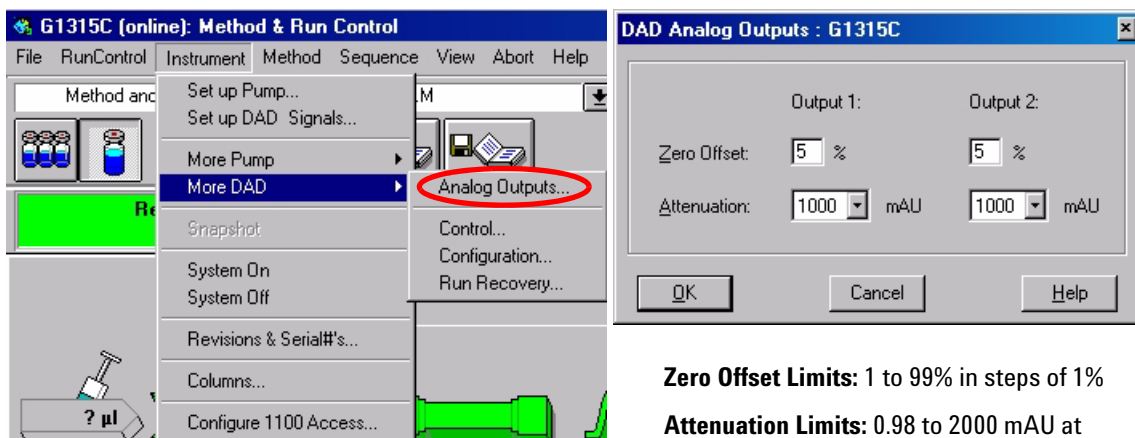
NOTE

When during recovery an error “Method/Sequence stopped” appears, the instrument logbook shows an entry “No Run data available in device”. In this case refer to “No Run Data Available In Device” in the Service Manual.

Analog Output Settings

To change the Output Range of the analog outputs see “Control Settings” on page 73.

- 1 To change the offset and the attenuation select *Analog Outputs*.
- 2 Change the ranges for absorbance and wavelength according your needs.



Zero Offset Limits: 1 to 99% in steps of 1%

Attenuation Limits: 0.98 to 2000 mAU at discrete values for either 100 mV or 1 V full scale.

Figure 46 Online Spectra Window

- 3 Change the values if required.

Spectrum Settings

To change the Spectra settings open.

- 1 To change the Spectra settings select *Setup Detector Signals*.
- 2 In the section Spectrum click on the drop-down list.
- 3 Change the Range, Step width and Threshold according to your needs.

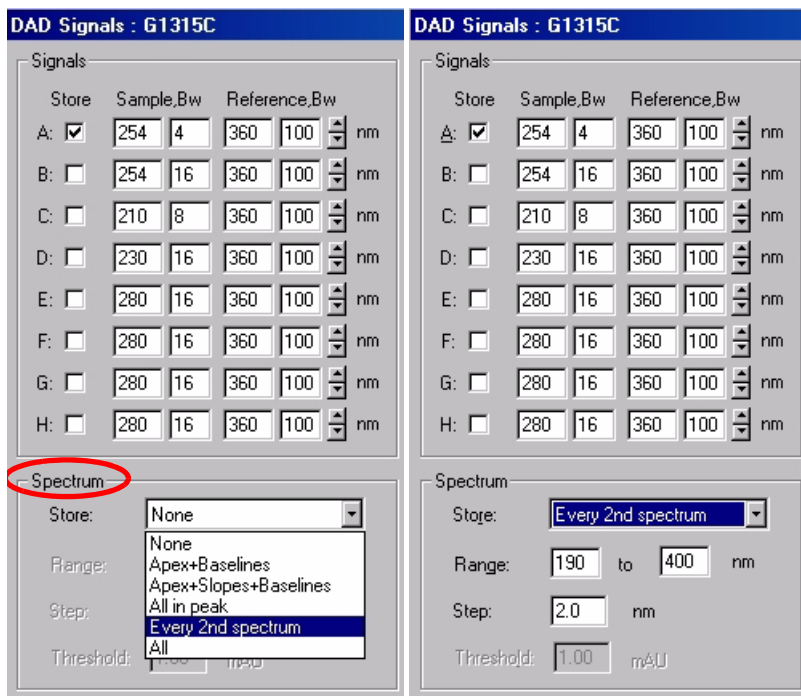


Table 15 on page 81 shows the possible parameters.

Figure 47 Spectra Window

Table 15 Spectrum Settings

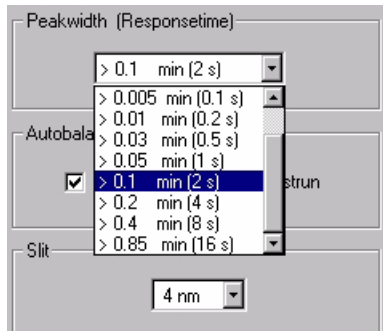
Store	Defines at which points on “signal A” spectra will be taken and saved. Signal A is used to control the “peak controlled spectra acquisition”; the other signals have no influence on spectra acquisition.
None	No spectra are taken.
Apex + Baselines	Spectra are taken at the apex and baselines of the peak.
Apex + Slopes + Baselines	Spectra are taken at the apex, baselines, upslope, and downslope of the peak.
All in Peak	All spectra within the peak are taken.
NOTE	The three spectra acquisition types mentioned above are also referred to as peak-controlled spectra acquisition. The peak detection is done by the detector firmware based on the threshold and peakwidth parameters you set for the DAD. If you want to use peak-controlled spectra storage, make sure that you set these parameters to recognize all the peaks of interest. The integration algorithm also includes peak detection based on the threshold and peakwidth parameters set in the integration events.
Every 2nd spectrum	Spectra are taken continuously as for All, but only every second spectrum is stored; other spectra are discarded. This reduces the amount of data storage necessary.
All	Spectra are taken continuously depending on the setting of the Peakwidth. Eight spectra are acquired per Peakwidth. The acquisition time for one spectrum is slightly less than the Peakwidth divided by 8, that is, greater than or equal to 0.01s and less than or equal to 2.55s.
NOTE	If there are no peaks in Signal A, there are no spectra. You cannot process spectra present in other signals.
Range	Range defines the wavelength range for spectral storage. Limits: 190 to 950 nm in steps of 1 nm for both low and high values. The high value must be greater than the low value by at least 2 nm.
Step	Step defines the wavelength resolution for spectral storage. Limits: 0.10 to 100.00 nm in steps of 0.1 nm.
Threshold:	The threshold is the height in mAU of the smallest expected peak. The peak detector ignores any peaks which are lower than the threshold value and does not save spectra. Limits: 0.001 to 1000.00 mAU in steps of 0.001 mAU. Usable for modes Apex + Baselines, Apex + Slopes + Baselines and All in Peak

Peakwidth Settings

NOTE

- Do not use peak width shorter than necessary
- Do not use 0.025 sec response time (no filtering/high noise and no need (actually ultra-fast LC doesn't deliver peaks < 0.0025 min / < 0.15 sec))

- 1 To change the Peakwidth settings select *Setup Detector Signals*.
- 2 In the section Peakwidth (Responsetime) click on the drop-down list.
- 3 Change the Peakwidth according to your needs.



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 detector. 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. When the All spectrum storage option is selected, then spectra are acquired continuously depending on the setting of the peak width. The time specified by the peak width is used as a factor in the acquisition of spectra. The acquisition time for one spectrum is slightly less than the peak width divided by 8, that is the acquisition time is between 0.0125 seconds (80Hz) and 3.2 seconds.

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 in [Table 16](#) on page 83.

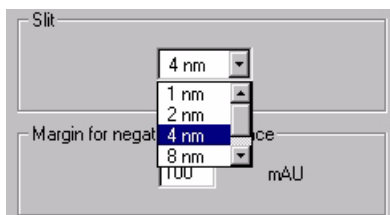
Figure 48 Peakwidth Setting

Table 16 Peak Width — Response Time — Data Rate

Peak Width (min)	Response Time (sec)	Data Rate (Hz)
<0.0025	0.025	80
>0.0025	0.05	80
>0.005	0.1	40
>0.01	0.2	20
>0.03	0.5	10
>0.05	1.0	5
>0.10	2.0	2.5
>0.20	4.0	1.25
>0.40	8.0	0.62
>0.85	16.0	0.31

Slit Settings

- 1 To change the Slit settings select *Setup Detector Signals*.
- 2 In the section Slit click on the drop-down list.
- 3 Change the Peakwidth according to your needs.



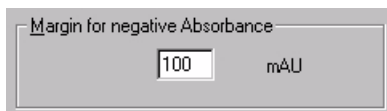
The Slit group allows you to select the optical bandwidth of the detector; the narrower the slit, the smaller the optical bandwidth of the instrument, but the lower its sensitivity. The smaller the optical bandwidth the higher the spectral resolution.

To set the slit width, display the drop-down list and select an appropriate slit width from the list.

Figure 49 Slit Settings

Margin for Negative Absorbance Settings

- 1 To change the settings select *Setup Detector Signals*.
- 2 In the section Margin for Negative Absorbance change the value according to your needs.



Use this field to modify the detector's signal handling to increase the margin for negative absorbance. Use this option if, for example, your solvent gradient produces a decreasing baseline absorbance, and for GPC analyses.

Limits: 100 to 4000 mAU.

Figure 50 Margin for Negative Absorbance

NOTE

The higher the value the greater the baseline noise. Set this value only if you expect negative absorbance greater than -100 mAU.

Optimizing the Detector

Additional theoretical information can be found in chapter [“How to optimize the Detector”](#) on page 87:

Special Setups with Multiple DAD/MWDs

Two detectors of same type (e.g. G1315C and G1315C)

If you have two G1315C DADs or G1365C MWD in the same system then you can rearrange the order in the menu *Instrument - Configure 1100 Access* to assign a specific detector as detector 1 and 2.

NOTE

The diagnostics, tests and OQ/PV should be done with only one detector configured.

Two detectors of similar type (e.g. G1315C and G1315A/B)

If you have similar detectors in the same system, the G1315C will be automatically always detector 2 while the G1315A/B is detector 1 independent from its location in the stack. This cannot be changed.

4 Using the Detector



5 How to optimize the Detector

Optimizing the Detector Performance	88
Optimization Overview	89
Optimizing for Sensitivity, Selectivity, Linearity and Dispersion	91
Optimizing Selectivity	102

This chapter provides information on how to optimize the detector.



Optimizing the Detector Performance

The detector has a variety of parameters that can be used to optimize performance. Depending on whether signal or spectral data need to be optimized, different settings are recommended. The following sections describe optimization for:

- signal sensitivity, selectivity and linearity,
- spectral sensitivity and resolution (DAD only), and
- disk space required for storing data.

NOTE

The information in this chapter should be seen as a basic introduction to diode array detector technics. Some of these technics may not be available in the instrument firmware or the user interfaces (Control Module and/or Agilent Chemstation).

How to Get the Best Detector Performance

The information below will guide you on how to get the best detector performance. Follow these rules as a start for new applications. It gives rules-of-thumb for optimizing detector parameters.

Optimization Overview

Table 17 Optimization Overview

Parameter	Impact
1 Selection of flow cell <ul style="list-style-type: none"> Choose flow cell according to used column, see Figure 51. 	<ul style="list-style-type: none"> peak resolution versus sensitivity
2 Connection of flow cell <ul style="list-style-type: none"> For flow rates from 0.5 ml/min connect column using the zero-dead-volume fittings of the detector. For small column i.d. (e.g 1 mm) the inlet capillary of the micro flow cell can be connected directly to the column. 	<ul style="list-style-type: none"> chromatographic resolution
3 Setting the peak width (response time) <ul style="list-style-type: none"> Use peak width according Figure 51 as starting point. Set the peak-width close to the width of a narrow peak of interest in your chromatogram. 	<ul style="list-style-type: none"> peak resolution versus sensitivity versus disk space
4 Setting wavelength and bandwidth <ul style="list-style-type: none"> Sample wavelength: <ul style="list-style-type: none"> Never miss a peak by the use of a browser wavelength like 250 nm with 100 nm bandwidth. Select specific wavelength with reduced bandwidth if you need selectivity, e.g. 250,10 nm and 360,100 nm as reference wavelength. Set the sample wavelength to a peak or valley in the spectrum to get best linearity for high concentrations. Reference wavelength: <ul style="list-style-type: none"> Select the reference wavelength with broad bandwidth (30...100 nm) wavelength range where your analytes have little or no absorbance (e.g. sample at 254 nm, reference at 320 nm). 	<ul style="list-style-type: none"> sensitivity versus selectivity sensitivity versus linearity baseline drift due to RI effects.

5 How to optimize the Detector

Table 17 Optimization Overview, continued

Parameter	Impact
5 Setting the slit width <ul style="list-style-type: none"> Use 4 nm slit for normal applications. Use narrow slit (e.g. 1 nm) if your analytes have narrow absorbance bands and for high concentrations. Use a wide slit (e.g. 16 nm) to detect very low concentrations. Optimizing spectral acquisition (DAD only) Select spectra acquisition mode according to your needs (see “Spectrum Settings” on page 81). Set the spectral wavelength range (for colorless samples 190...400 nm is sufficient). Set step to 4 nm for normal use; set small step (and slit width) if high resolution of spectra with fine structure is wanted. 	<ul style="list-style-type: none"> spectral resolution, sensitivity and linearity.

Typical column length	Typical peak width	Recommended flow cell				
T ≤ 5 cm	0.025 min	Nano flow cell				
10 cm	0.05 min		Semi-micro flow cell			High pressure flow cell for pressures above 100 bar
20 cm	0.1 min			Standard flow cell		
≥ 40 cm	0.2 min					
	Typical flow rate	0.01 ... 0.2 ml/min	0.2 ... 0.4 ml/min	0.4 ... 0.4 ml/min	1 ... 2 ml/min	
	Internal column diameter	0.5 ... 1 mm	2.1 mm	3.0 mm	4.6 mm	

Figure 51 Choosing a Flow Cell

Optimizing for Sensitivity, Selectivity, Linearity and Dispersion

Flow Cell Path Length

Lambert-Beer's law shows a linear relationship between the flow cell path length and absorbance.

$$\text{Absorbance} = -\log T = \log \frac{I_0}{I} = \epsilon \cdot C \cdot d$$

where

T is the transmission, defined as the quotient of the intensity of the transmitted light I divided by the intensity of the incident light, I_0 ,

ϵ is the extinction coefficient, which is a characteristic of a given substance under a precisely-defined set of conditions of wavelength, solvent, temperature and other parameters,

C is the concentration of the absorbing species (usually in g/l or mg/l), and d is the path length of the cell used for the measurement.

Therefore, flow cells with longer path lengths yield higher signals. Although noise usually increases little with increasing path length, there is a gain in signal-to-noise ratio. For example, in [Figure 52](#) the noise increased by less than 10 % but a 70 % increase in signal intensity was achieved by increasing the path length from 6 mm to 10 mm.

When increasing the path length, the cell volume usually increases – in our example from 5 – 13 μl . Typically, this causes more peak dispersion. As [Figure 52](#) demonstrates, this did not affect the resolution in the gradient separation in our example.

As a rule-of-thumb the flow cell volume should be about 1/3 of the peak volume at half height. To determine the volume of your peaks, take the peak width as reported in the integration results multiply it by the flow rate and divide it by 3).

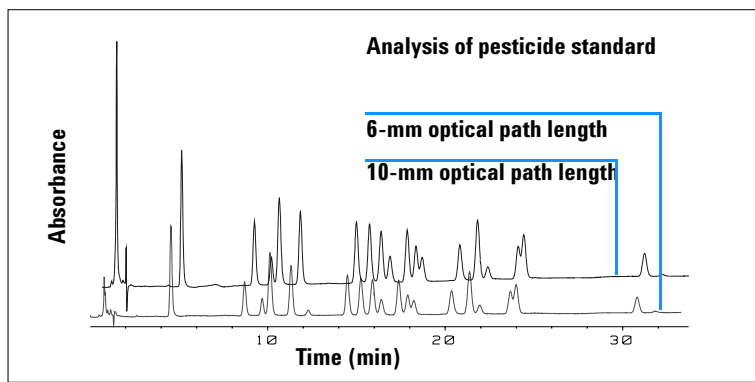


Figure 52 Influence of Cell Path Length on Signal Height

Traditionally LC analysis with UV detectors is based on comparing measurements with internal or external standards. To check photometric accuracy of the Agilent 1100 DAD/MWD it is necessary to have more precise information on path lengths of the flow cells.

The correct response is:

expected response * correction factor

Please find below the details of the Agilent 1100 DAD/MWD flow cells:

Table 18 Correction factors for Agilent 1100 DAD/MWD flow cells

Flow cell type	Cell volume	Part number	Path length (nominal)	Path length (actual)	Correction factor
Standard flow cell	13 μ l	G1315-60022	10 mm	9.80 \pm 0.07 mm	10/9.8
Semi-micro flow cell	5 μ l	G1315-60011	6 mm	5.80 \pm 0.07 mm	6/5.8
500 Nanoliter flow cell kit	0.5 μ l	G1315-68724	10 mm	10.00 \pm 0.02 mm	10/10
80 Nanoliter flow cell kit	0.08 μ l	G1315-68716	6 mm	6.00 \pm 0.02 mm	6/6
High Pressure flow cell	1.7 μ l	G1315-60015	6 mm	5.75 \pm 0.07 mm	6/5.75

Peak width (response time)

Response time describes how fast the detector signal follows a sudden change of absorbance in the flow cell. The detector uses digital filters to adapt response time to the width of the peaks in your chromatogram. These filters do not affect peak area nor peak symmetry. When set correctly, such filters reduce baseline noise significantly (see [Figure 53](#)), but reduce peak height only slightly. In addition, these filters reduce the data rate to allow optimum integration and display of your peaks and to minimize disk space required to store chromatograms and spectra.

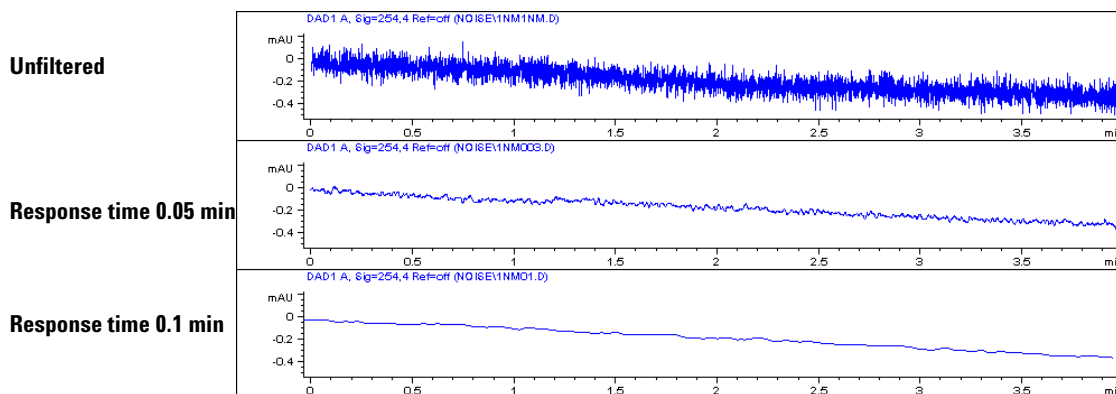


Figure 53 Influence of Response Time on Signal and Noise

[Figure 19](#) lists the filter choices of the detector. To get optimum results, set peak width as close as possible to a narrow peak of interest in your chromatogram. Response time will be approximately $1/3$ of the peak width, resulting in less than 5 % peak-height reduction and less than 5 % additional peak dispersion. Decreasing the peak width setting in the detector will result in less than 5 % gain in peak height but baseline noise will increase by a factor of 1.4 for a factor of 2 response-time reduction. Increasing peak width (response time) by factor of two from the recommended setting (over-filtering) will reduce peak height by about 20 % and reduce baseline noise by a factor of 1.4. This gives you the best possible signal-to-noise ratio, but may affect peak resolution.

Table 19 Peak Width — Response Time — Data Rate

Peak Width [minutes]	Response Time [seconds]	Data Rate [Hz]
<0.0025	0.025	80
>0.0025	0.05	80
>0.005	0.1	40
>0.01	0.2	20
>0.03	0.5	10
>0.05	1.0	5
>0.10	2.0	2.5
>0.20	4.0	1.25
>0.40	8.0	0.62
>0.85	16.0	0.31

Sample and Reference Wavelength and Bandwidth

The detector measures absorbance simultaneously at wavelengths from 190 to 950 nm. Two lamps provide good sensitivity over the whole wavelength range. The deuterium discharge lamp provides the energy for the UV range (190 to 400 nm) and the tungsten lamp emits light from 400 to 950 nm for the visible and short wave near infrared.

If you know little about the analytes in your sample, use both lamps and store all spectra over the full wavelength range. This provides full information but fills up your disk space rather quickly. Spectra can be used to check a peak's purity and identity. Spectral information is also useful to optimize wavelength settings for your chromatographic signal.

The detector can compute and store at run time up to 8 signals with these properties:

- sample wavelength, the center of a wavelength band with the width of sample bandwidth (BW), and optionally
- reference wavelength, the center of a wavelength band with the width of reference bandwidth.

The signals comprises a series of data points over time, with the average absorbance in the sample wavelength band minus the average absorbance of the reference wavelength band.

Signal A in the detector default method is set to sample 250,100, reference 360,100, that is, the average absorbance from 200 – 300 nm minus the average absorbance from 300 – 400 nm. As all analytes show higher absorbance at 200 – 300 nm than at 300 – 400 nm, this signal will show you virtually every compound which can be detected by UV absorbance.

Many compounds show absorbance bands in the spectrum. **Figure 54** shows the spectrum of anisic acid as an example.

To optimize for lowest possible detectable concentrations of anisic acid, set the sample wavelength to the peak of the absorbance band (that is, 252 nm) and the sample bandwidth to the width of the absorbance band (that is, 30 nm). A reference of 360,100 is adequate. Anisic acid does not absorb in this range.

If you work with high concentrations, you may get better linearity above 1.5 AU by setting the sample wavelength to a valley in the spectrum, like 225 nm for anisic acid.

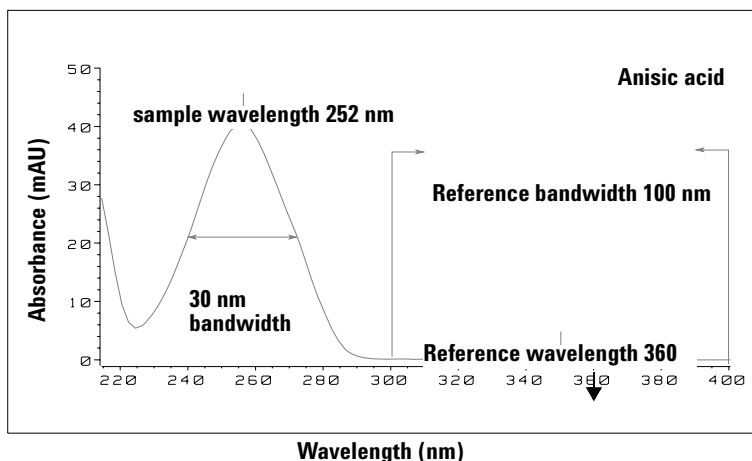


Figure 54 Optimization of Wavelength Setting

A wide bandwidth has the advantage of reducing noise by averaging over a wavelength range – compared to a 4 nm bandwidth, the baseline noise is reduced by a factor of approximately 2.5, whereas the signal is about 75 % of a 4-nm wide band. The signal-to-noise ratio for a 30 nm bandwidth is twice that for a 4-nm bandwidth in our example.

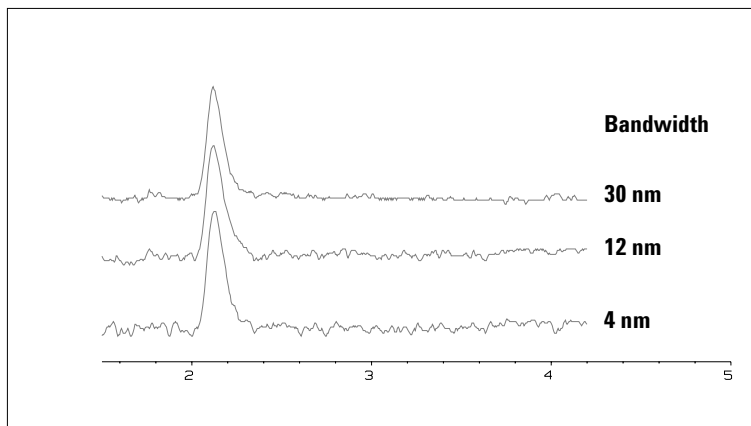


Figure 55 Influence of Bandwidth on Signal and Noise

Because the detector averages absorbance values that are calculated for each wavelength, using a wide bandwidth does not negatively impact linearity.

The use of a reference wavelength is highly recommended to further reduce baseline drift and wander induced by room temperature fluctuations or refractive index changes during a gradient.

An example of the reduction of baseline drifts is shown in [Figure 56](#) for PTH-amino acids. Without a reference wavelength, the chromatogram drifts downwards due to refractive index changes induced by the gradient. This is almost completely eliminated by using a reference wavelength. With this technique, PTH-amino acids can be quantified in the low picomole range even in a gradient analysis.

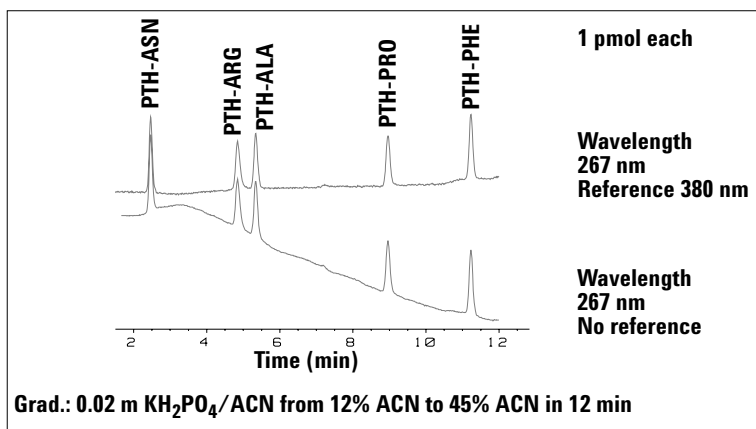


Figure 56 Gradient Analysis of PTH-Amino Acids (1 pmol each), with and without Reference

Slit Width

The detector has a variable slit at the entrance of the spectrograph. This is an effective tool to adapt the detector to changing demand of different analytical problems.

A narrow slit provides spectral resolution for analytes with very fine structures in the absorbance spectrum. An example of such a spectrum is benzene. The five main absorbance bands (fingers) are only 2.5 nm wide and just 6 nm apart from each other.

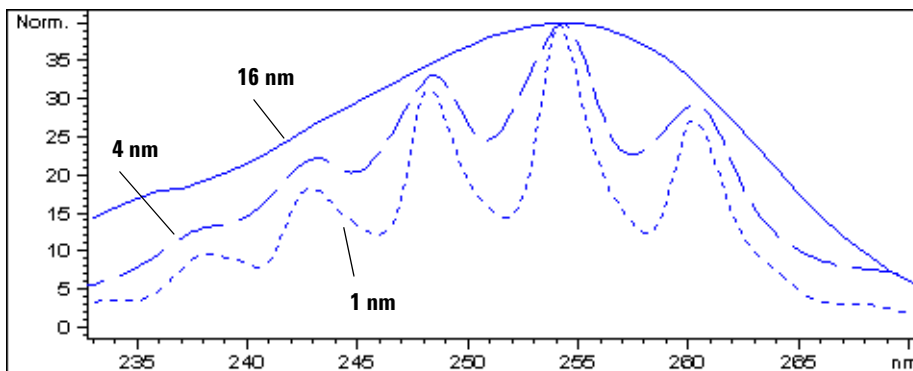


Figure 57 Benzene at 1, 4 and 16 nm slit width

A wide slit uses more of the light shining through the flow cell. This gives lower baseline noise as shown in [Figure 58](#).

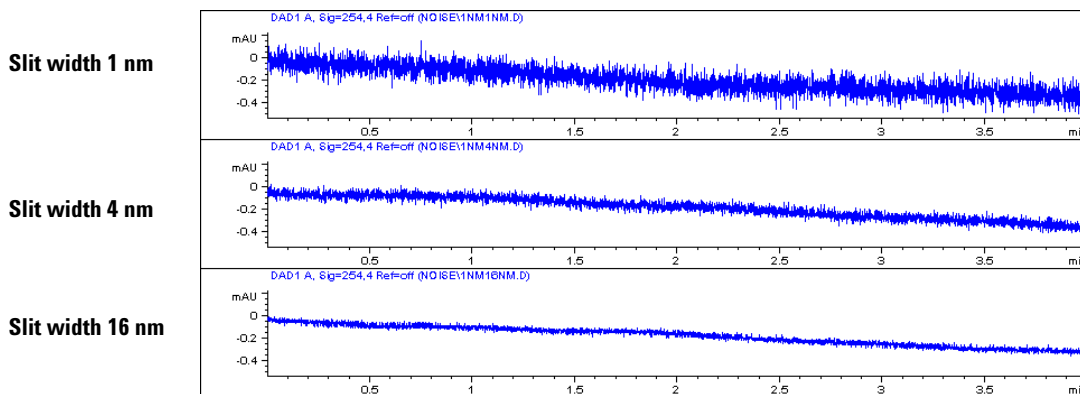


Figure 58 Influence of the Slit Width on Baseline Noise

However, with a wider slit, the spectrograph’s optical resolution (its ability to distinguish between different wavelengths) diminishes. Any photodiode receives light within a range of wavelength determined by the slit width. This explains why the fine spectral structure of benzene disappears when using a 16-nm wide slit.

Furthermore, the absorbance is no longer strictly linear with concentration for wavelengths at a steep slope of a compound's spectrum.

Substances with fine structures and steep slopes like benzene are very rare.

In most cases the width of absorbance bands in the spectrum is more like 30 nm as with anisic acid (see [Figure 54](#)).

In most situations, a slit width of 4 nm will give the best results.

Use a narrow slit (1 or 2 nm) if you want to identify compounds with fine spectral structures or if you need to quantify at high concentrations (> 1000 mAU) with a wavelength at the slope of the spectrum. Signals with a wide bandwidth can be used to reduce baseline noise. Because (digital) bandwidth is computed as average of absorbance, there is no impact on linearity.

Use a wide (8 or 16 nm) slit when your sample contains very small concentrations. Always use signals with bandwidth at least as wide as the slit width.

Optimizing Spectral Acquisition (DAD only)

Storage of all spectra consumes a lot of disk space. It is very useful to have all spectra available during optimization of a method or when analyzing unique samples. However when running many samples of the same type, the large size of data files with all spectra may become a burden. The detector provides functions to reduce the amount of data, yet retaining the relevant spectral information.

For spectra options see “[Spectrum Settings](#)” on page 81.

Range

Only the wavelength range where the compounds in your sample absorb contains information that is useful for purity checks and library searches. Reducing the spectrum storage range saves disk space.

Step

Most substances have broad absorbance bands. Display of spectra, peak purity and library search works best if a spectrum contains 5 to 10 data points per width of the absorbance bands. For anisic acid (the example used before) a step of 4 nm would be sufficient. However a step of 2 nm gives a more optimal display of the spectrum.

Threshold

Sets the peak detector. Only spectra from peaks higher than threshold will be stored when a peak-controlled storage mode is selected.

Margin for Negative Absorbance

The detector adjusts its gain during *balance* such that the baseline may drift slightly negative (about -100 mAU). In some special case, for example, when gradient with absorbing solvents are used, the baseline may drift to more negative values.

Only for such cases, increase the margin for negative absorbance to avoid overflow of the analog-to-digital converter.

Optimizing Selectivity

Quantifying Coeluting Peaks by Peak Suppression

In chromatography, two compounds may often elute together. A conventional dual-signal detector can only detect and quantify both compounds independently from each other if their spectra do not overlap. However, in most cases this is highly unlikely.

With a dual-channel detector based on diode-array technology, quantifying two compounds is possible even when both compounds absorb over the whole wavelength range. The procedure is called peak suppression or signal subtraction. As an example, the analysis of hydrochlorothiazide in the presence of caffeine is described. If hydrochlorothiazide is analyzed in biological samples, there is always a risk that caffeine is present which might interfere chromatographically with hydrochlorothiazide. As the spectra in [Figure 59](#) show, hydrochlorothiazide is best detected at 222 nm, where caffeine also shows significant absorbance. It would therefore be impossible, with a conventional variable wavelength detector, to detect hydrochlorothiazide quantitatively when caffeine is present.

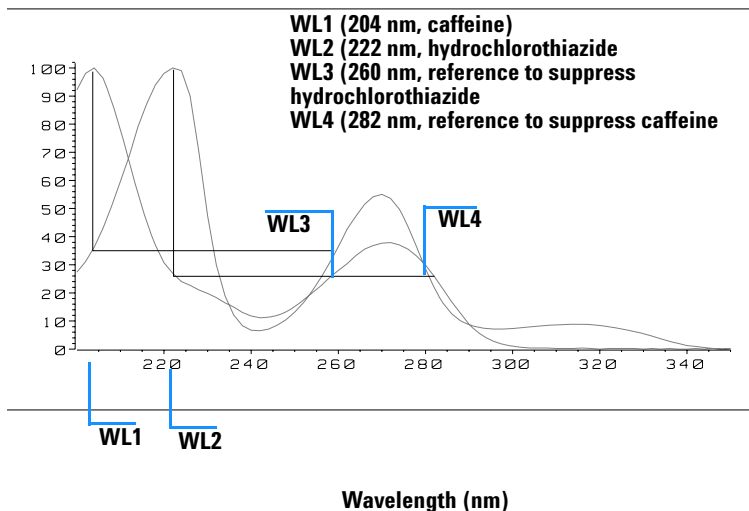


Figure 59 Wavelength Selection for Peak Suppression

With a UV-visible detector based on a diode array and the correct choice of a reference wavelength setting, quantitative detection is possible. To suppress caffeine, the reference wavelength must be set to 282 nm. At this wavelength, caffeine shows exactly the same absorbance as at 222 nm. When the absorbance values are subtracted from each other, any indication of the presence of caffeine is eliminated. In the same way, hydrochlorothiazide can be suppressed if caffeine is to be quantified. In this case the wavelength is set to 204 nm and the reference wavelength to 260 nm. [Figure 60](#) shows the chromatographic results of the peak suppression technique.

The trade-off for this procedure is a loss in sensitivity. The sample signal decreases by the absorbance at the reference wavelength relative to the signal wavelength. Sensitivity may be decreased by as much as 10–30 %.

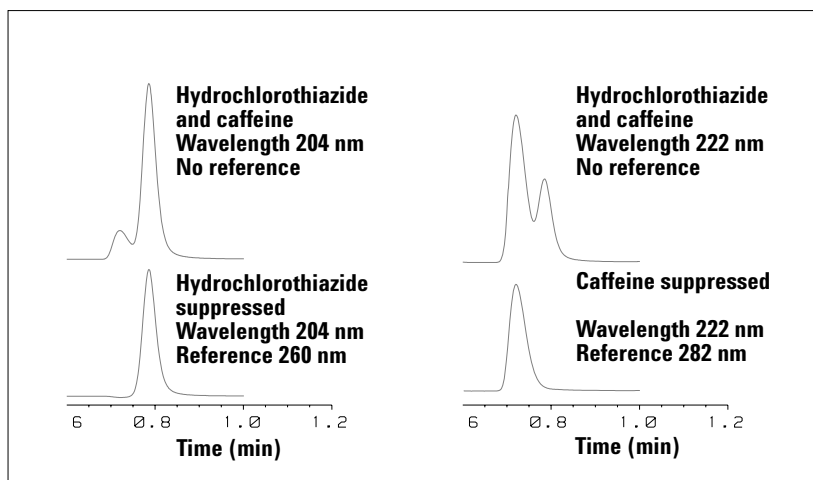


Figure 60 Peak Suppression Using Reference Wavelength

Ratio Qualifiers for Selective Detection of Compound Classes

Ratio qualifiers can be used where, in a complex sample, only one particular class needs to be analyzed – a parent drug and its metabolites in a biological sample, for example. Another example is the selective analysis of derivatives after pre or postcolumn derivatization. Specifying a signal ratio that is typical for the sample class is one way of selectively plotting only those peaks that are of interest. The signal output remains at zero so long as the ratio is out of the user-specified ratio range. When the ratio falls within the range, the signal output corresponds to the normal absorbance, giving single, clear peaks on a flat baseline. An example is shown in [Figure 61](#) and [Figure 62](#).

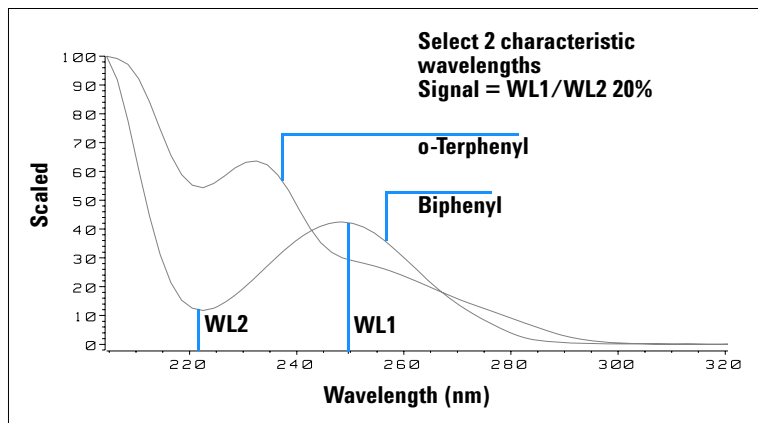


Figure 61 Wavelength Selection for Ratio Qualifiers

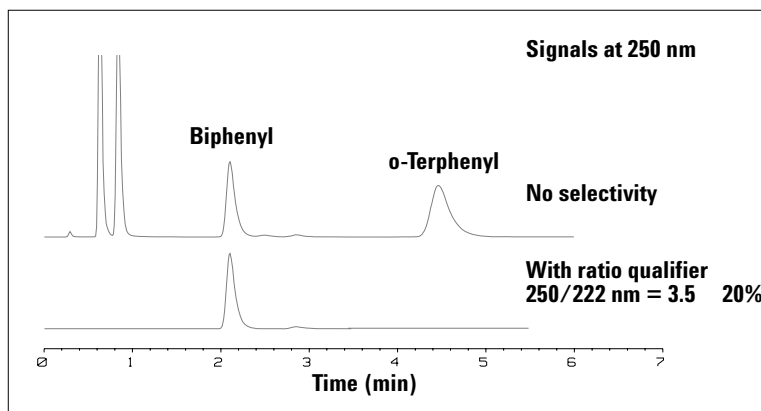


Figure 62 Selectivity by Ratio Qualifiers

In a four-component mixture, only biphenyl was recorded. The other three peaks were suppressed because they did not meet the ratio-qualifier criterion and therefore the output was set to zero. The characteristic wavelengths 249 nm (λ_1) and 224 nm (λ_2) were found from the spectra shown in [Figure 61](#).

5 How to optimize the Detector

The ratio range was set at 2 – 2.4 ($2.2 \pm 10\%$). Only when the ratio between 249 and 224 nm was within this range, is the signal plotted. Of all four peaks, only the third fulfilled the criterion (Figure 62). The others were not plotted.



6 Troubleshooting and Diagnostics

Overview of the Detector's Indicators and Test Functions 114
Status Indicators 115

This chapter gives an overview about the troubleshooting and diagnostic features.



Overview of the Detector's Indicators and Test Functions

Status Indicators

The detector is provided with two status indicators which indicate the operational state (prerun, run, and error states) of the detector. The status indicators provide a quick visual check of the operation of the detector.

Error Messages

In the event of an electronic, mechanical or hydraulic failure, the detector generates an error message in the user interface. For each message, a short description of the failure, a list of probable causes of the problem, and a list of suggested actions to fix the problem are provided (see “[Error Information](#)” in the Service Manual).

Test Functions

A series of test functions are available for troubleshooting and operational verification after exchanging internal components (see “[Test Functions](#)” in the Service Manual).

Wavelength Verification / Recalibration

Wavelength recalibration is recommended after repair of internal components, and on a regular basis to ensure correct operation of the detector. The detector uses the deuterium alpha and beta emission lines for wavelength calibration (see “[Wavelength Verification and Recalibration](#)” in the Service Manual).

Diagnostic Signals

The detector has several signals (internal temperatures, voltages and currents of lamps) that can be used for diagnosing baseline problems (see “[Diagnostic Signals](#)” in the Service Manual).

Status Indicators

Two status indicators are located on the front of the detector. The lower left indicates the power supply status, the upper right indicates the detector status.

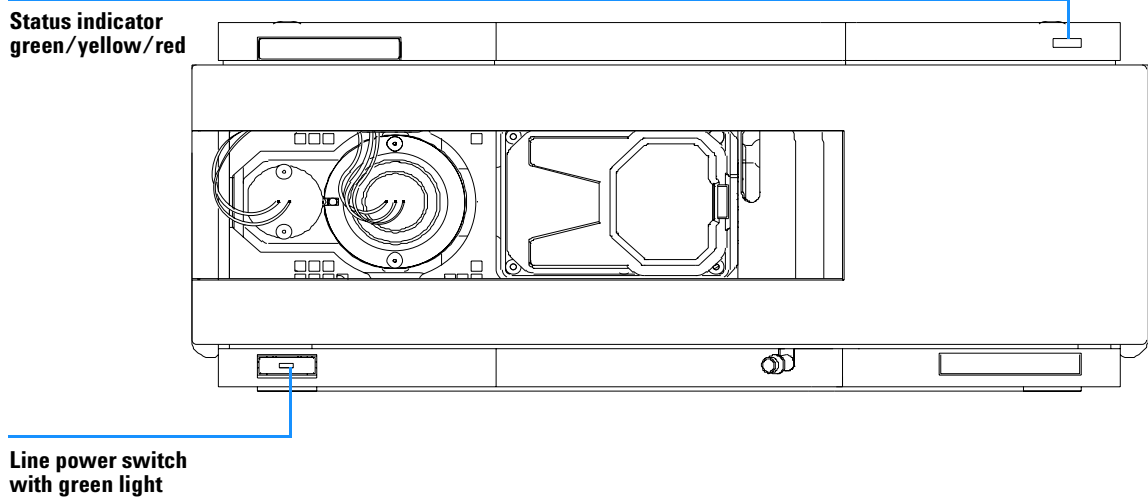


Figure 63 Location of Status Indicators

Power Supply Indicator

The power supply indicator is integrated into the main power switch. When the indicator is illuminated (*green*) the power is *ON*.

Detector Status Indicator

The detector status indicator indicates one of four possible detector conditions:

- When the status indicator is *OFF* (and power switch light is on), the detector is in a *prerun* condition, and is ready to begin an analysis.
- A *green* status indicator, indicates the detector is performing an analysis (*run* mode).
- A *yellow* indicator indicates a *not-ready* condition. The detector is in a not-ready state when it is waiting for a specific condition to be reached or completed (for example, immediately after changing a set point), or while a self-test procedure is running.
- An *error* condition is indicated when the status indicator is *red*. An error condition indicates the detector has detected an internal problem which affects correct operation of the detector. Usually, an error condition requires attention (e.g. leak, defective internal components). An error condition always interrupts the analysis.
- A *red-blinking* indicator indicates that the module is in resident mode (e.g. during update of main firmware).



7 Maintenance and Repair

Introduction to Maintenance and Repair 112

Warnings and Cautions 113

Cleaning the Detector 114

Using the ESD Strap 115

This chapter provides general information on repairing the detector.



Introduction to Maintenance and Repair

Simple Repairs - Maintenance

The detector is designed for easy repair. The most frequent repairs such as lamp change and flow cell change can be done from the front of the detector with the detector in place in the system stack. These repairs are described in “Maintenance” on page 117 (part of the *User Manual and Service Manual*).

Exchanging Internal Parts - Repair

Some repairs may require exchange of defective internal parts. Exchange of these parts requires removing the detector from the stack, removing the covers, and disassembling the detector. The security lever at the power input socket prevents that the detector cover is taken off when line power is still connected. These repairs are described in “Repairs” in the Service Manual).

Warnings and Cautions

WARNING

To prevent personal injury, the power cable must be removed from the instrument before opening the detector cover. Do not connect the power cable to the detector while the covers are removed.

WARNING

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

WARNING

When working with solvents please observe appropriate safety procedures (for example, goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet supplied by the solvent vendor, especially when toxic or hazardous solvents are used.

CAUTION

Electronic boards and components are sensitive to electrostatic discharge (ESD). In order to prevent damage always use an ESD protection (for example, the ESD wrist strap from the accessory kit) when handling electronic boards and components (see [“Using the ESD Strap”](#) on page 115).

WARNING

Eye damage may result from directly viewing the light produced by the deuterium lamp used in this product. Always turn the deuterium lamp off before removing it.



Cleaning the Detector

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

WARNING

Do not let liquid drip into the detector. It could cause shock hazard and it could damage the detector.

Using the ESD Strap

Electronic boards are sensitive to electrostatic discharge (ESD). In order to prevent damage, always use an ESD strap supplied in the standard accessory kit (see “[Accessory Kit](#)” on page 166) when handling electronic boards and components.

- 1 Unwrap the first two folds of the band and wrap the exposed adhesive side firmly around your wrist.
- 2 Unroll the rest of the band and peel the liner from the copper foil at the opposite end.
- 3 Attach the copper foil to a convenient and exposed electrical ground.

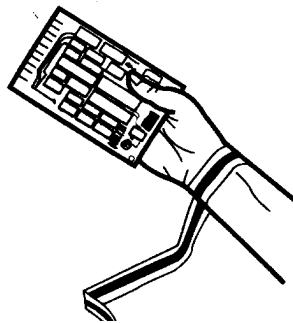
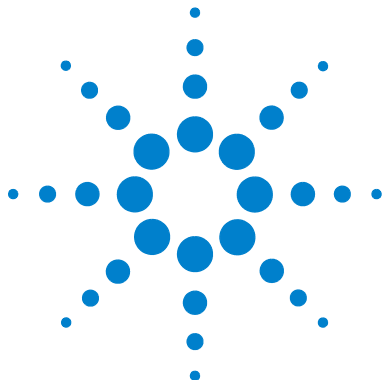


Figure 64 Using the ESD Strap

7 Maintenance and Repair



8 Maintenance

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This chapter describes the maintenance of the detector.



Overview of Maintenance

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

Table 20 Overview of Maintenance

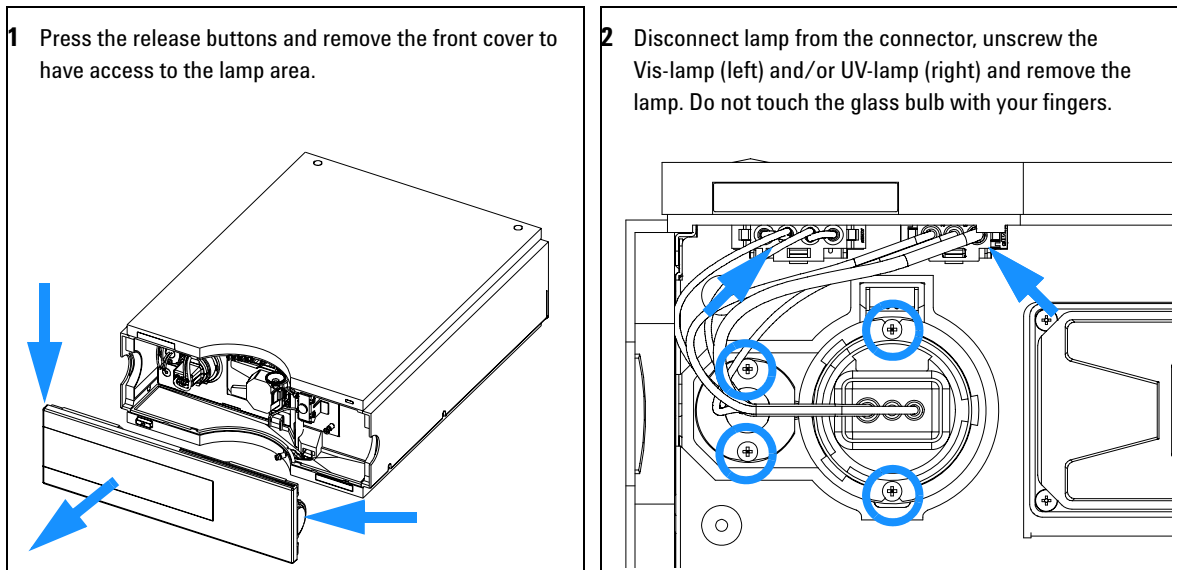
Procedure	Typical Frequency	Notes
Deuterium lamp or tungsten lamp exchange	If noise and/or drift exceeds your application limits or lamp does not ignite.	An intensity test should be performed after replacement.
Flow cell exchange	If application requires a different flow cell type.	A holmium or wavelength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

Exchanging a Lamp

When required	If noise or drift exceeds application limits or lamp does not ignite
Tools required	Screwdriver POZI 1 PT3
Parts required	Longlife Deuterium lamp "C" 2140-0820 (with black cover and I.D. tag) Tungsten lamp G1103-60001
Preparations	Turn the lamp(s) off.

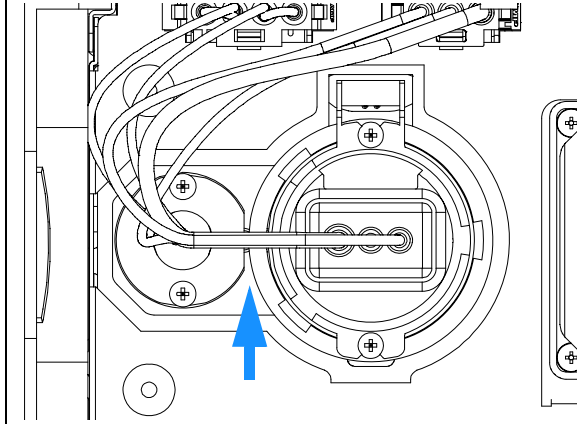
CAUTION

If the detector has been in use, the lamp may be hot. If so, wait five minutes until lamp cools down.

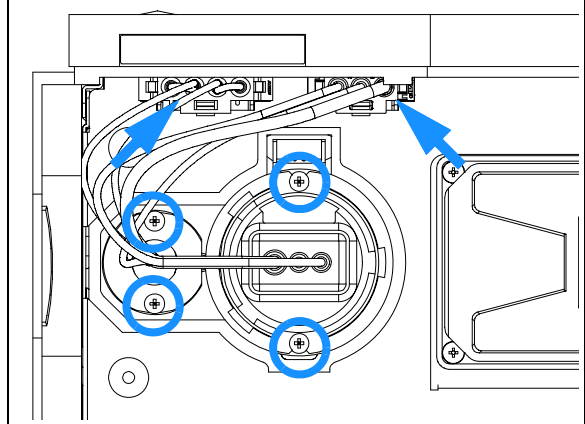


8 Maintenance

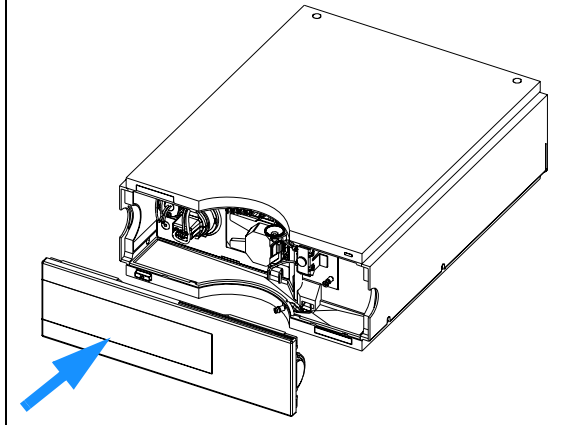
- 3** When replacing the Vis-lamp, assure that the Vis-lamp is inserted as shown (flat edge towards the deuterium lamp).



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



- 5** Replace the front cover.

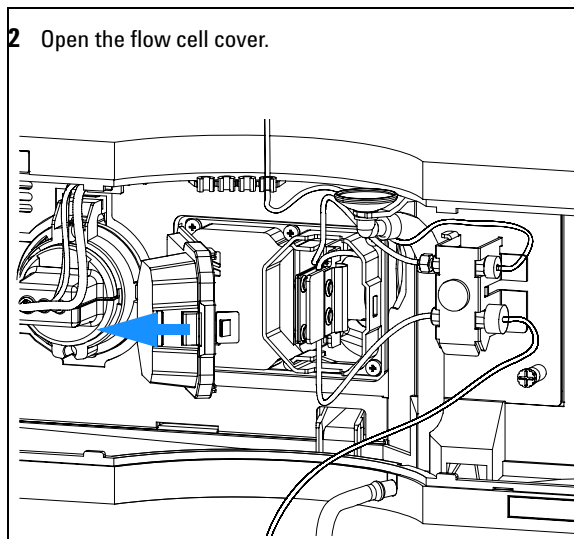
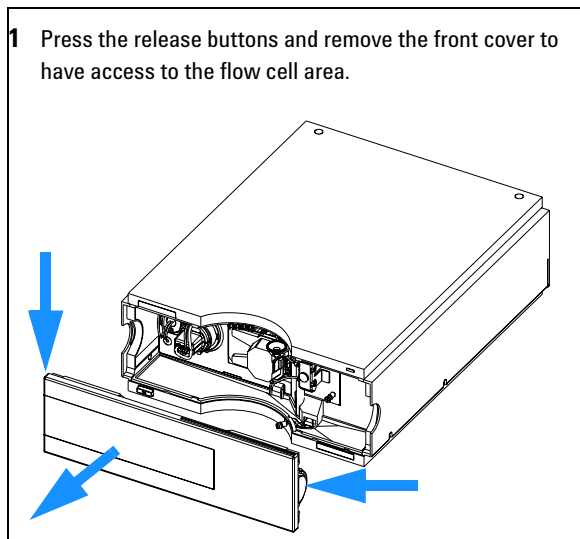


Next steps:

- 6** Reset the lamp counter as described in the user interface documentation (lamps with I.D. tag cannot be reset).
- 7** Turn the lamp on and give the lamp 10 minutes to warm up.
- 8** Perform a **“Wavelength Verification and Recalibration”** as described in the Service Manual (after UV-lamp replacement).
- 9** Perform an **“Intensity Test”** as described in the Service Manual.

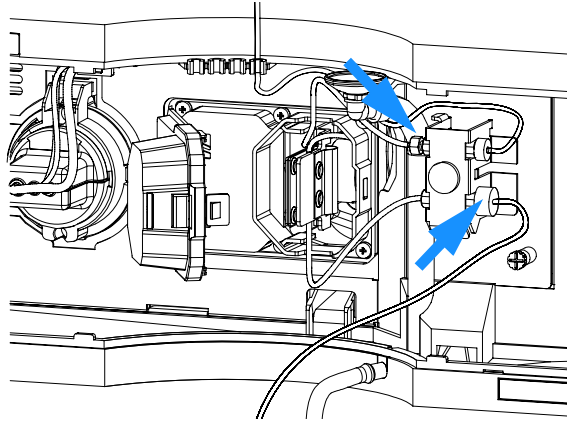
Exchanging a Flow Cell

When required	If an application needs a different type of flow cell or the flow cell needs repair.
Tools required	Two 1/4 inch wrenches for capillary connections
Parts required	Standard flow cell, 10 mm, 13 μ l, 120 bar, G1315-60022 Semi-micro flow cell, 6 mm, 5 μ l, 120 bar, G1315-60011 High pressure flow cell, 6 mm, 1.7 μ l, 400 bar, G1315-60015 Nano flow cell, refer to " Nano Flow Cell - Replacing or Cleaning " on page 139
Preparations	Turn the lamp(s) off. Remove the front cover.

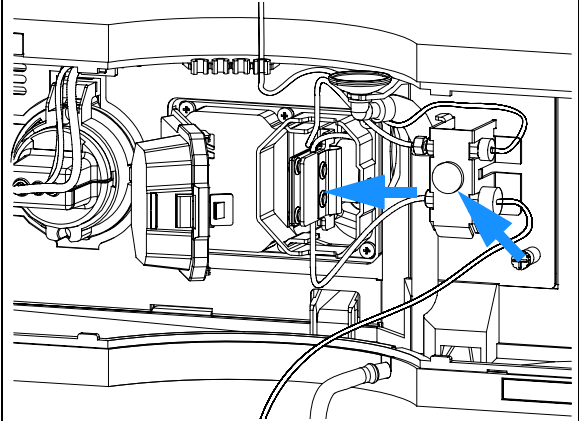


8 Maintenance

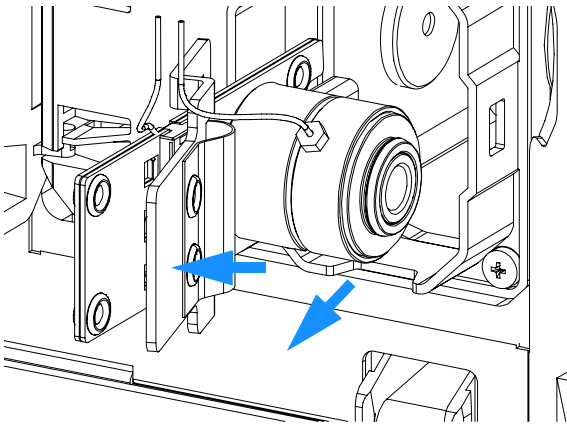
- 3** Disconnect the flow cell inlet capillary (top) and the waste tubing (bottom) from the unions.



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



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

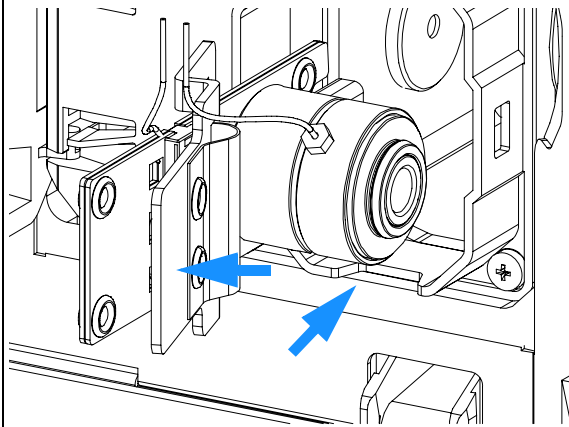


Note:

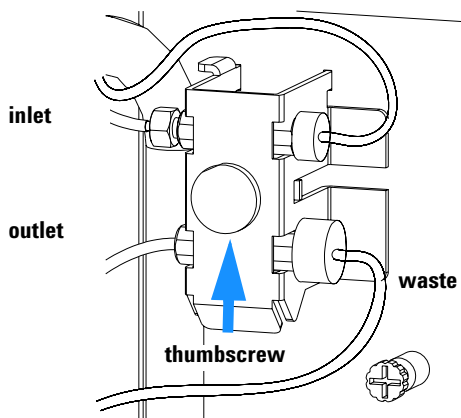
The label attached to the flow cell provides information on part number, path length and maximum pressure.

If you want to replace flow cell parts, see [“Repairing the Standard or Semi-Micro Flow Cell”](#) on page 124 or [“Repairing the Standard or Semi-Micro Flow Cell”](#) on page 124.

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



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



Note:

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

Next steps:

- 8 Perform a [“Wavelength Verification and Recalibration”](#) as described in the Service Manual to check the correct positioning of the flow cell.
- 9 Replace the front cover.

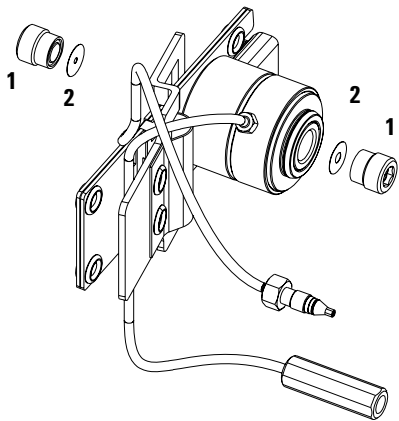
Repairing the Standard or Semi-Micro Flow Cell

When required	If the flow cell needs repair due to leaks or contaminations (reduced light throughput)
Tools required	Two 1/4 inch wrenches for capillary connections hexagonal key 4 mm Tooth picks
Parts required	For parts, see “Standard Flow Cell” on page 156 and “Semi-Micro Flow Cell” on page 158
Preparations	Turn the flow off. Remove the front cover. Remove the flow cell, see “Exchanging a Flow Cell” on page 121.

NOTE

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

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



Note:

If you want to replace the gasket only, continue with step 7.

Do not mix the gasket #6 and # 7. They are different for standard and semi-micro flow cell.

- 2** Use a tooth pick to remove the quartz window from the window assembly (push through from the screw side).

Note:

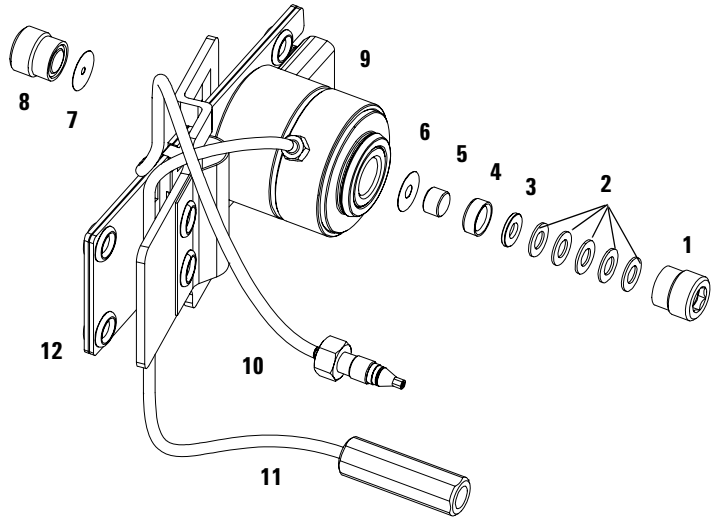
If the washers fall out of the window assembly, they must be inserted in the correct order with the Teflon® ring to prevent any leaks from the flow cell window.

Orientation of Flow Cell Parts

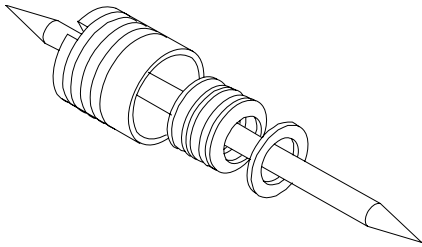
NOTE

Gaskets # 6 and #7 have different hole diameters

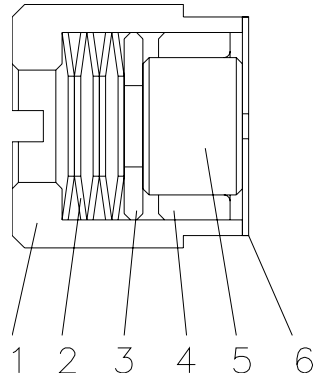
- 1 - window screw
- 2 - spring washers
- 3 - compression washer
- 4 - window holder
- 5 - quartz window
- 6 - gasket (light in)
- 7 - gasket (light out)
- 8 - window screw (contains items 2, 3, 4 and 5)
- 9 - flow cell body
- 10 - inlet capillary
- 11 - outlet capillary
- 12 - holder



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



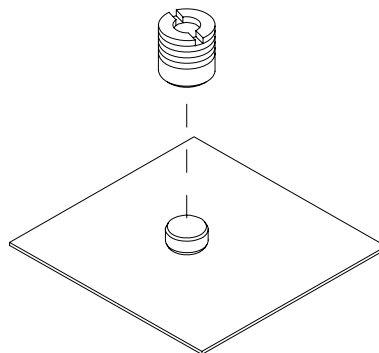
4 Correct orientation of spring washers [2] is required.



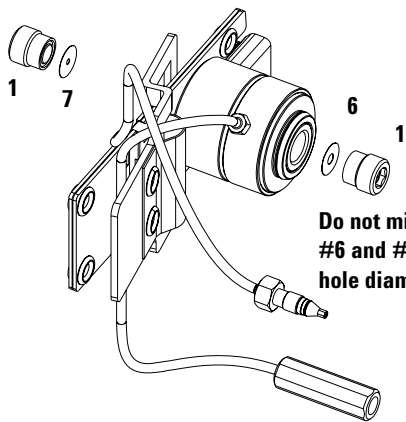
5 Press the Teflon® ring into the window assembly.



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



7 Insert a new gasket [6, 7] and the window assembly [1] into the cell body. Assure, that the gasket is on the bottom.



Do not mix the gasket #6 and #7 (different hole diameter)

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

8 Maintenance

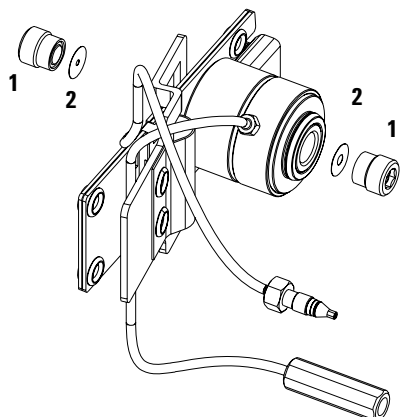
Next steps:

- 9 Reconnect the capillaries, see [“Exchanging a Flow Cell”](#) on page 121.
- 10 Perform a leak test.
- 11 Insert the flow cell.
- 12 Replace the front cover.
- 13 Perform a [“Wavelength Verification and Recalibration”](#) or a [“Holmium Oxide Test”](#) as described in the Service Manual to check the correct positioning of the flow cell.

Repairing the High Pressure Flow Cell

When required	If the flow cell needs repair due to leaks or contaminations (reduced light throughput)
Tools required	Two 1/4 inch wrenches for capillary connections hexagonal key 4 mm Tooth picks
Parts required	For parts see “ High Pressure Flow Cell ” on page 160
Preparations	Turn the flow off. Remove the front cover. Remove the flow cell, see “ Exchanging a Flow Cell ” on page 121.

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



The diagram illustrates the process of removing the window assembly and gasket from the flow cell. It shows a cylindrical flow cell body mounted on a metal frame. A window assembly, labeled [1], is attached to the front of the cell. A gasket, labeled [2], is positioned between the window assembly and the cell body. The diagram shows the window assembly being unscrewed and the gasket being removed. A 4 mm hex key is shown being used to unscrew the window assembly. The gasket is shown being removed from the cell body. The window assembly is shown being removed from the cell body. The gasket is shown being removed from the cell body. The window assembly is shown being removed from the cell body. The gasket is shown being removed from the cell body.

If you want to replace the gasket only, continue with step 7.

8 Maintenance

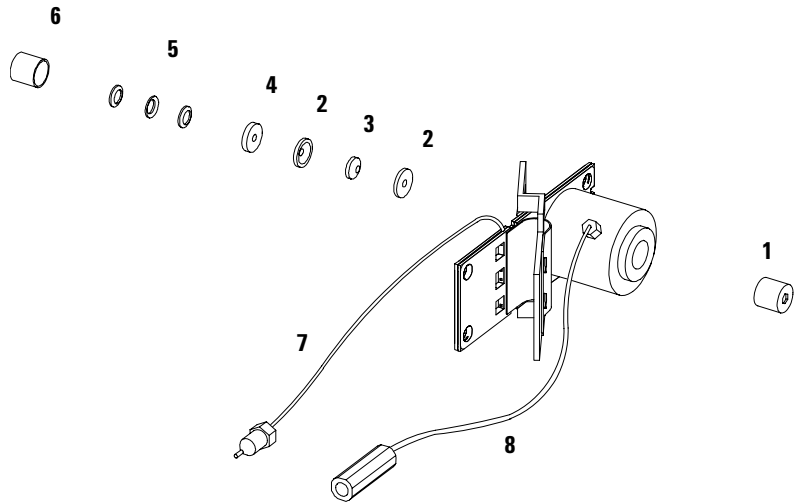
- 2 Use a tooth pick to remove the quartz window from the window assembly.

Note:

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

Orientation of Flow Cell Parts

- 1 - window assembly (contains items 2, 3, 4, 5 and 6)
- 2 - seal ring
- 3 - quartz window
- 4 - compression washer
- 5 - spring washers
- 4 - window holder
- 6 - window screw
- 7 - inlet capillary
- 8 - outlet capillary

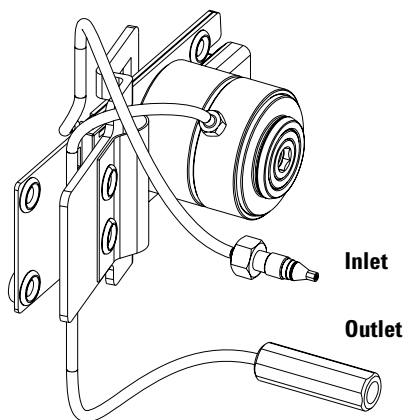


- 3 Follow the procedure [“Repairing the Standard or Semi-Micro Flow Cell”](#) on page 124 for reassembling.

Replacing Capillaries on a Standard Flow Cell

When required	If the capillary is blocked
Tools required	Two 1/4 inch wrenches for capillary connections Wrench 4 mm for capillary connections Screwdriver Pozi 1 PT3
Parts required	For parts see “Standard Flow Cell” on page 156
Preparations	Turn the lamp(s) off. Remove the front cover. Remove the flow cell, see “Exchanging a Flow Cell” on page 121.

- 1** Identify the inlet and outlet capillaries. To replace the inlet capillary, continue with step 3.



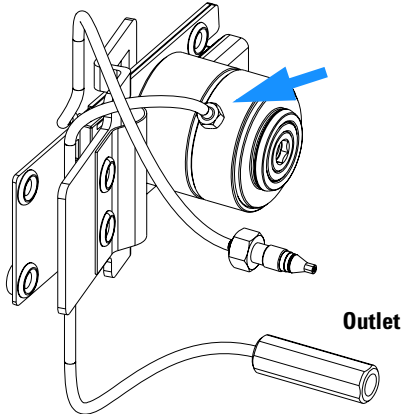
Notes

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

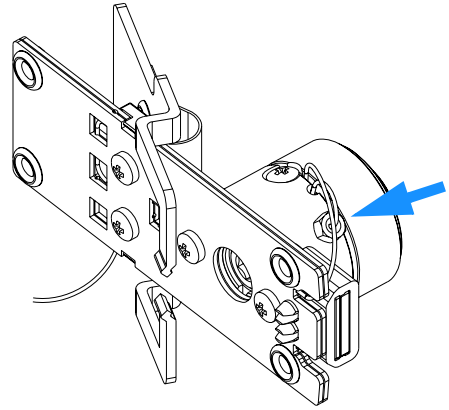
When retightening the fittings, make sure that they are carefully tightened (handtight plus 1/4 turn with a wrench). Otherwise damage of the flow cell body or blockage may result.

8 Maintenance

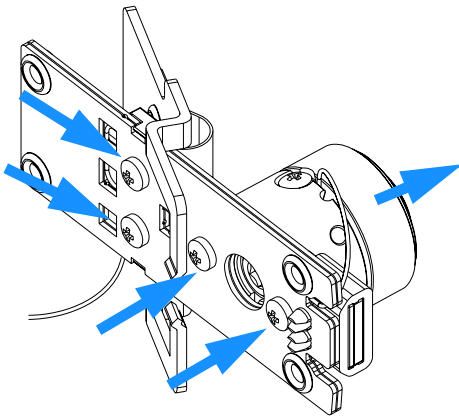
- 2** After replacing the outlet capillary, fix it handtight first. Then do a 1/4 turn with a 4-mm wrench.



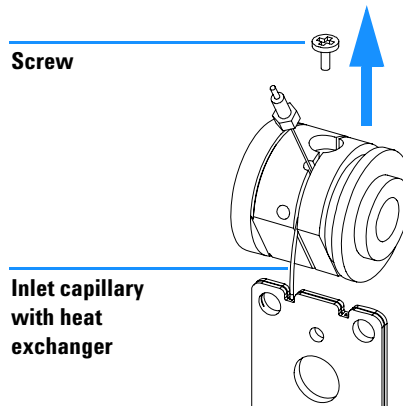
- 3** To replace the inlet capillary, use a 4-mm wrench for the fitting.



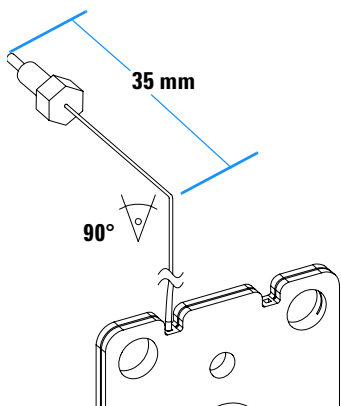
Video: Unscrew the cell body from the heat exchanger and the heat exchanger from the clamp unit.



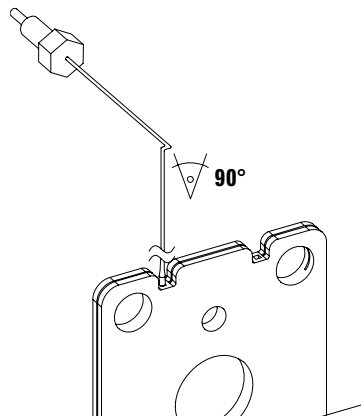
- 4** Unscrew the fixing screw and unwrap the inlet capillary from the groove in the flow cell body.



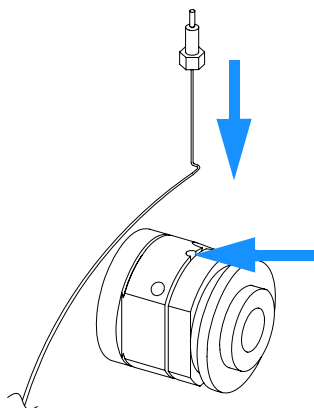
- 5** Take the new inlet capillary and bend it 90° about 35 mm from its end.



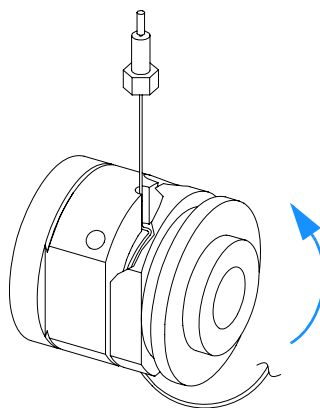
- 6** Bend the capillary again by 90° as shown below.



- 7** Insert the capillary into the hole between fixing screw and the inlet fitting.

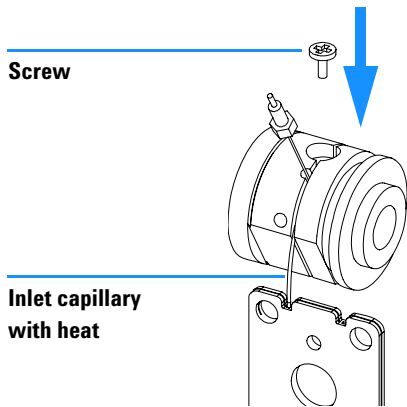


- 8** The capillary lays in the groove and should be tied around the body (in the groove) 5 times.

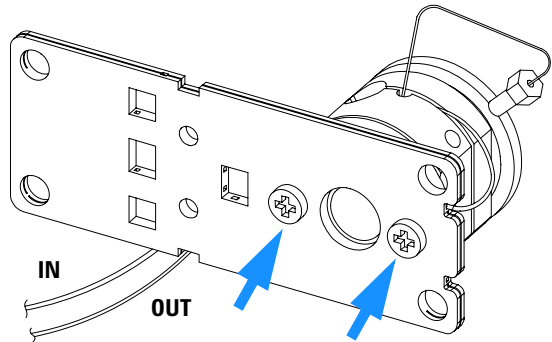


8 Maintenance

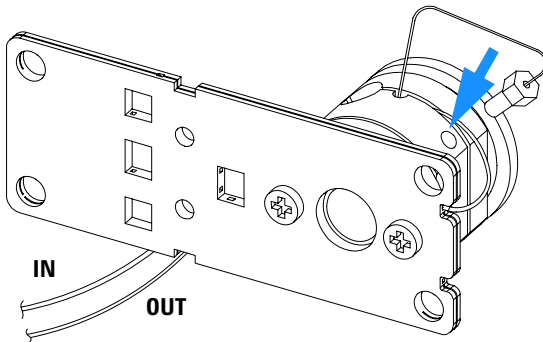
- 9** Insert the fixing screw, so that the capillary cannot leave the groove.



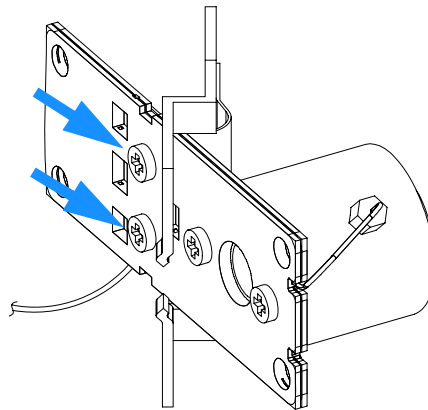
- 10** Fix the flow cell body to the heat exchanger.



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



- 12** Fix the new heat exchanger to the clamp unit.

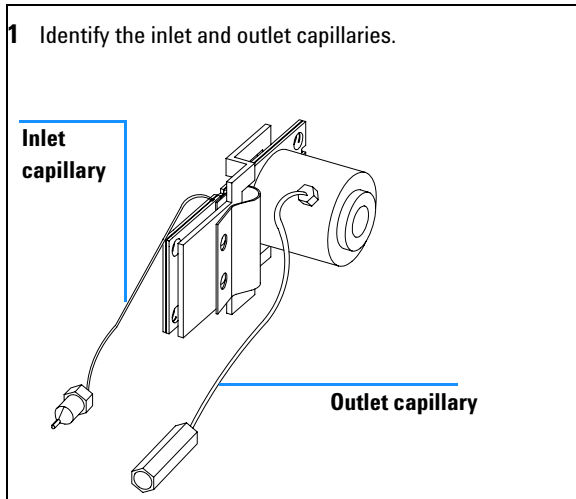


Next steps:

- 13** Reconnect the capillaries, see [“Exchanging a Flow Cell”](#) on page 121.
- 14** Perform a leak test.
- 15** Insert the flow cell.
- 16** Replace the front cover.
- 17** Perform a [“Wavelength Verification and Recalibration”](#) or [“Holmium Oxide Test”](#) as described in the Service Manual to check the correct positioning of the flow cell.

Replacing Capillaries on a Semi-Micro and High Pressure Flow Cell

When required	If the capillary is blocked
Tools required	Two 1/4 inch wrenches for capillary connections Wrench 4 mm for capillary connections Screwdriver Pozi 1 PT3
Parts required	For parts see “Semi-Micro Flow Cell” on page 158
Preparations	Turn the lamp(s) off. Remove the front cover. Remove the flow cell, see “Exchanging a Flow Cell” on page 121.

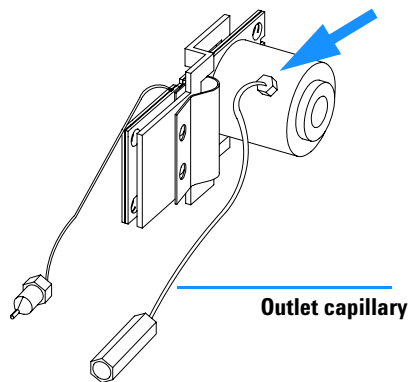


Notes

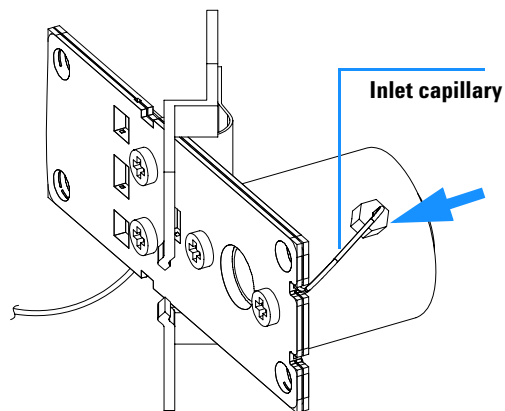
The fittings at the flow cell body are special types for low dead volumes and not compatible with other fittings.

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

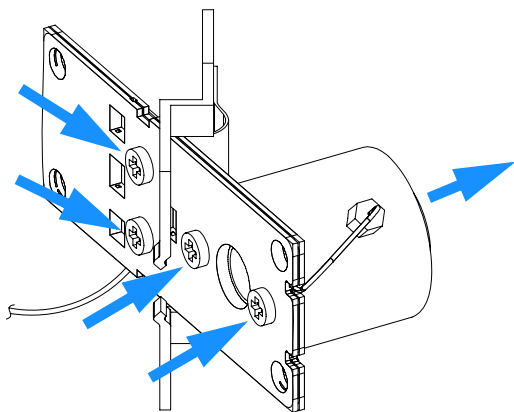
2 After replacing the outlet capillary, fix it handtight first. Then do a 1/4 turn with a 4-mm wrench.



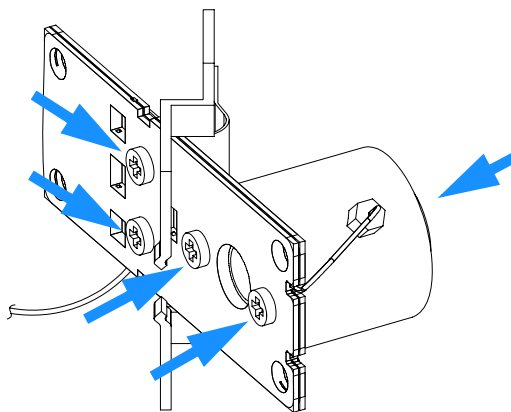
3 To replace the inlet capillary, use a 4-mm wrench for the fitting.



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

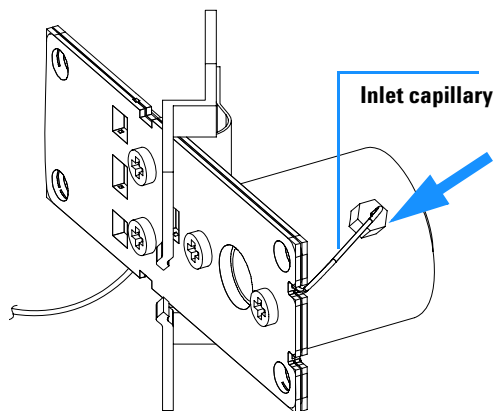


5 Fix the new heat exchanger to the clamp unit and the heat exchanger to the cell body.



8 Maintenance

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



Next steps:

- 7** Reconnect the capillaries, see “[Exchanging a Flow Cell](#)” on page 121.
- 8** Perform a leak test.
- 9** Insert the flow cell.
- 10** Replace the front cover.
- 11** Perform a “[Wavelength Verification and Recalibration](#)” or a “[Holmium Oxide Test](#)” as described in the Service Manual to check the correct positioning of the flow cell.

Nano Flow Cell - Replacing or Cleaning

When required	If parts are contaminated or leaky.
Tools required	Screwdriver POZI 1 PT3 Two 1/4 inch wrenches for capillary connections
Parts required	For parts identification refer to "Nano Flow Cells" on page 162 (80 nl and 500 nl).
Preparations	Turn the lamp(s) off. Remove the front cover. Remove the flow cell, see "Exchanging a Flow Cell" on page 121.

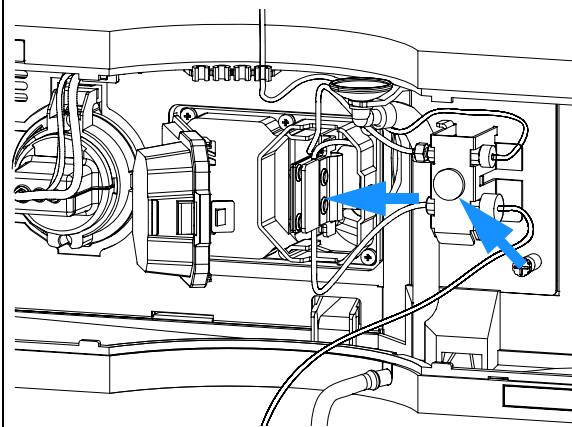
NOTE

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

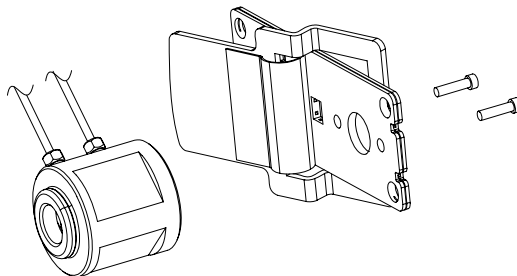
NOTE

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

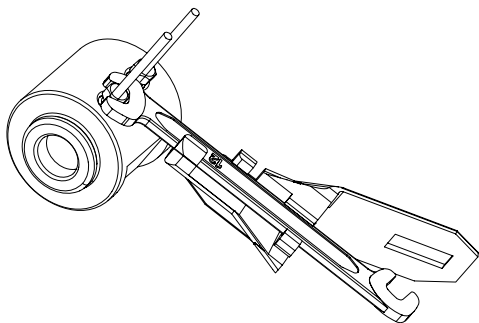
12 Disconnect the capillaries from the capillary holder and remove the flow cell.



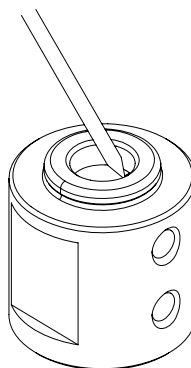
13 Unscrew the cell body from the holder.



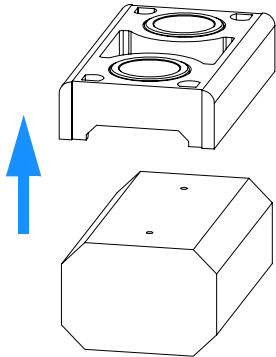
14 Unscrew the capillaries from the flow cell. DO NOT use the adapter at this time!



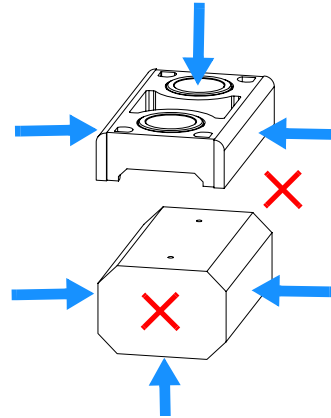
15 Using for example a toothpick, press on the plastic part and slide the quartz body out of the cell housing.



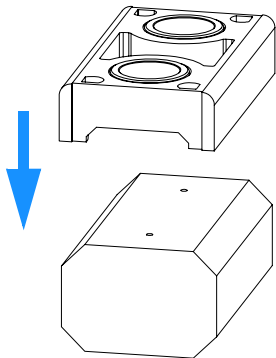
16 The quartz body and the cell seal assembly can be separated for cleaning purpose.



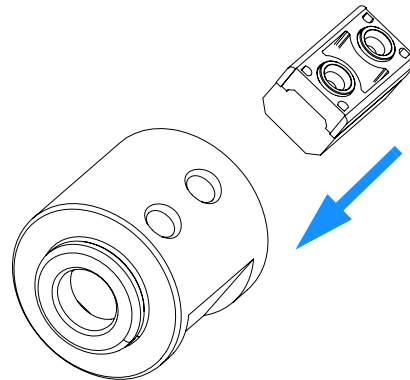
17 This figure shows the correct holding of the quartz body and the cell seal assembly.



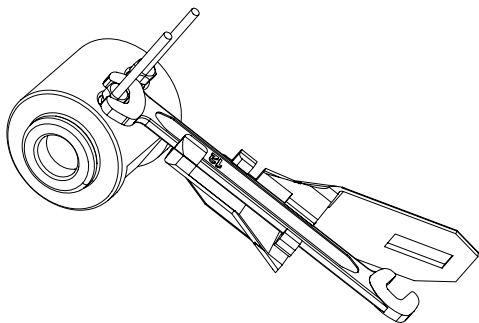
18 Replace the cell seal assembly onto the quartz body. Always use a new seal assembly to exclude damage during disassembling.



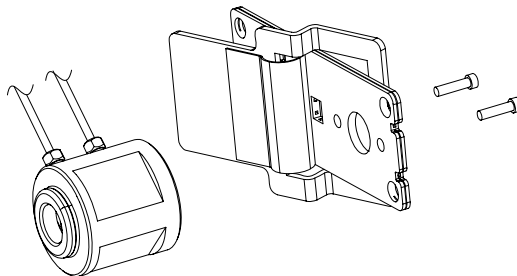
19 Slide the quartz body completely into the cell body to the front stop (use for example a toothpick).



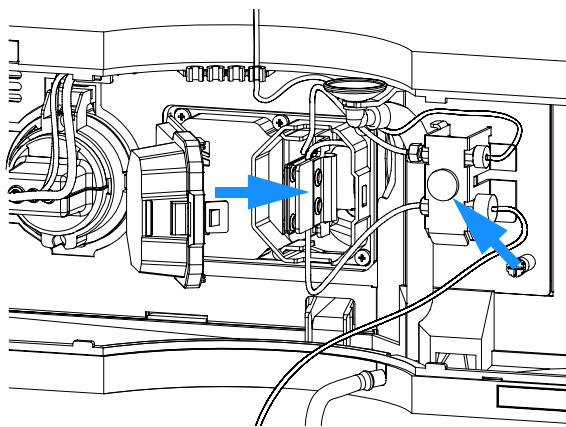
20 Insert the flow cell capillaries and tighten them fingertight. Use the wrench and torque adapter as described on page 143 and tighten the fittings alternately.



21 Reassemble the flow cell body to the holder.



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



Next Steps:

- 23** Perform a leak test with the flow cell outside of the detector.
- 24** If no leak is observed, install the flow cell and you are ready to work.
- 25** Make sure that the flow cell assembly is inserted correctly and fits perfectly in the optical unit (especially when PEEK capillaries are used).

NOTE

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

NOTE

With the instrument accessory kit comes a 4-mm wrench and with the Sealing Kit a special adapter. Both together work as a torque wrench with pre-defined torque (maximum allowed torque for the cell fittings is 0.7 Nm). It can be used to tight the capillary fittings at the flow cell body. The wrench has to be plugged into the adapter as shown in [Figure 65](#).

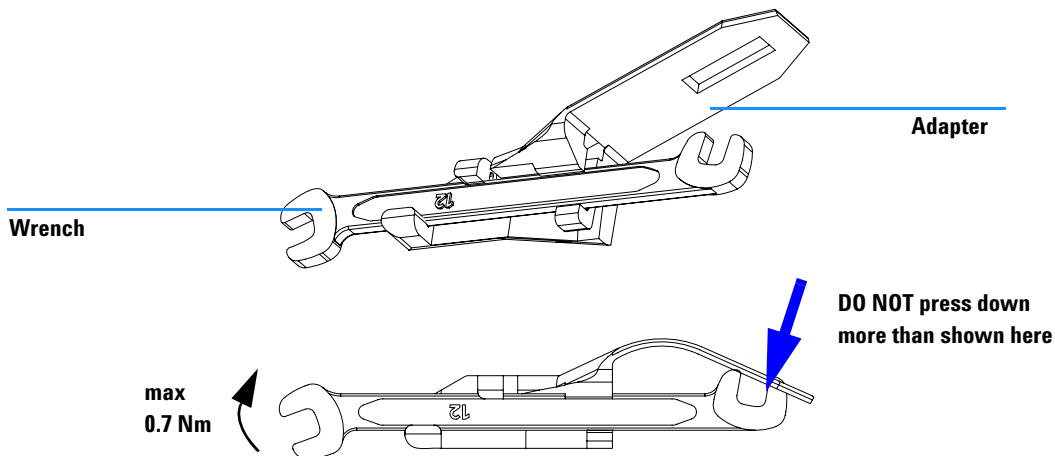


Figure 65 Wrench plus Torque Adapter

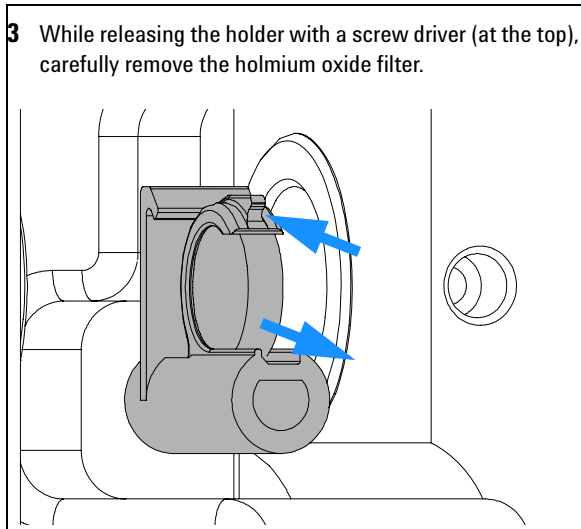
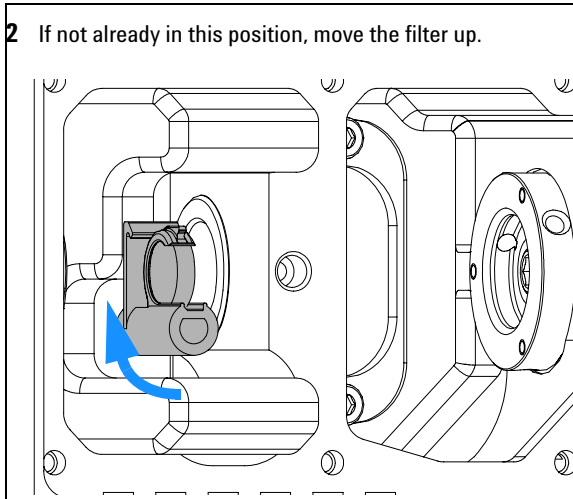
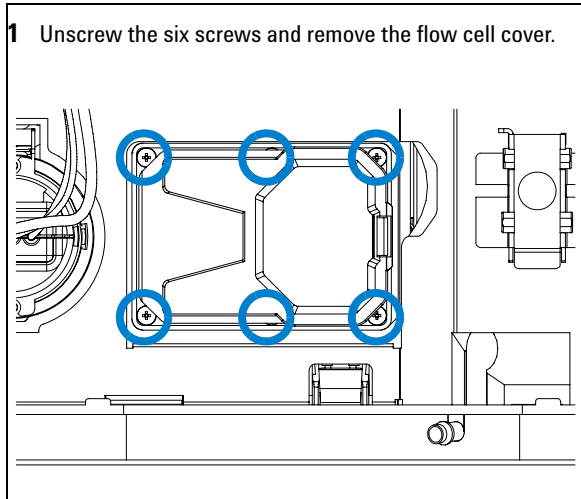
Cleaning or Exchanging the Holmium Oxide Filter

When required	If holmium oxide filter is contaminated
Tools required	Screwdriver POZI 1 PT3 Screwdriver flat blade Two 1/4 inch wrenches for capillary connections A pair of tweezers
Parts required	Holmium oxide filter 79880-22711
Preparations	Turn the lamp(s) off. Remove the front cover. Remove the flow cell, see “Exchanging a Flow Cell” on page 121.

NOTE

See also [“Declaration of Conformity for HOX2 Filter”](#) on page 207.

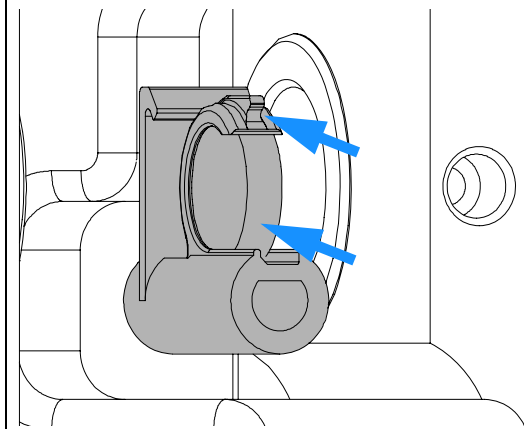
The glass tends to build a film on its surface even under normal environmental conditions. This is a phenomenon, which can be found also on the surface of several other glasses and has something to do with the composition of the glass. There is no indication, that the film has an influence on the measurement.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



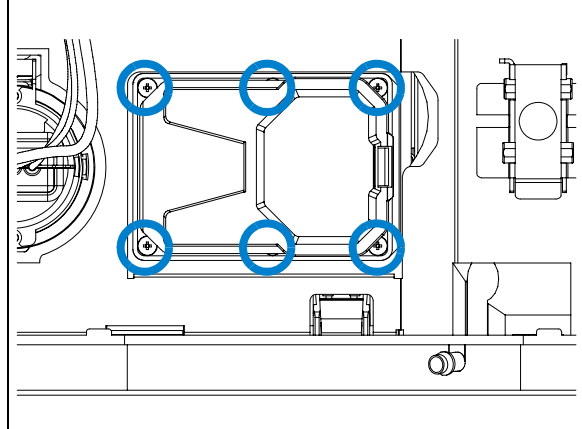
Note:
Do not scratch the holmium oxide filter.
The holmium oxide filter can be cleaned with alcohol and a lint-free cloth.

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



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



Next steps:

- 6** Perform a holmium oxide test, see “[Holmium Oxide Test](#)” as described in the Service Manual to check the proper function of the holmium oxide filter.
- 7** Insert the flow cell, see “[Exchanging a Flow Cell](#)” on page 121.
- 8** Replace the front cover.
- 9** Turn on the flow.

Correcting Leaks

When required	If a leakage has occurred in the flow cell area or at the heat exchanger or at the capillary connections
Tools required	Tissue Two 1/4 inch wrenches for capillary connections
Parts required	None
Preparations	Remove the front cover.

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

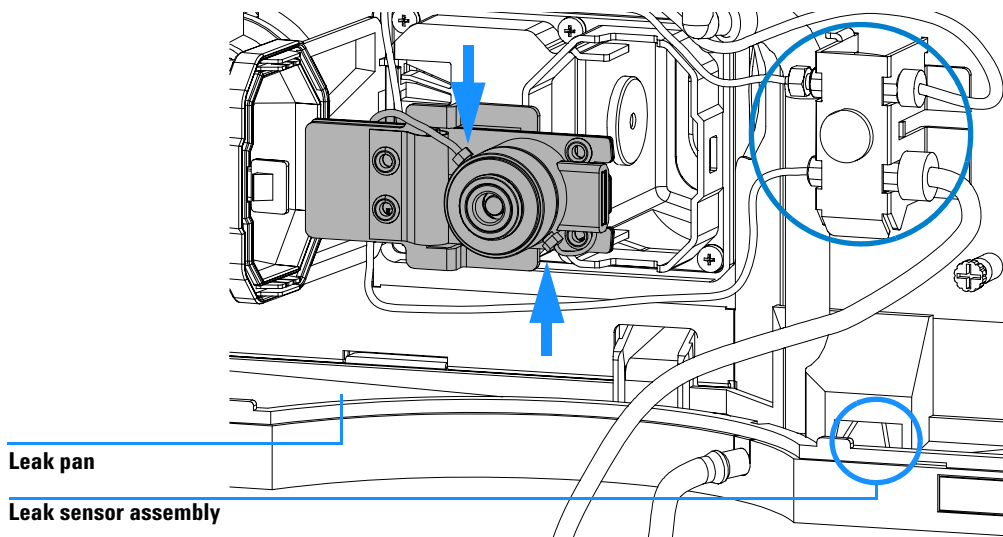


Figure 66 Observing for Leaks

- 3 Replace the front cover.

Replacing Leak Handling System Parts

When required	If the parts are corroded or broken
Tools required	None
Parts required	Leak funnel 5061-3356 Leak funnel holder 5041-8389 Leak tubing (120 mm) 0890-1711
Preparations	Remove the front cover.

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

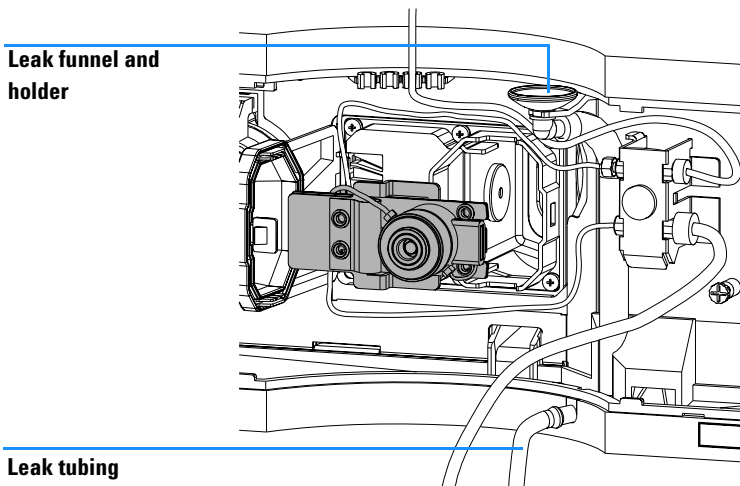


Figure 67 Replacing Leak Handling System Parts

- 5 Replace the front cover.

Replacing the CompactFlash Card

When required	If defective
Tools required	None
Parts required	CompactFlash Card Kit 01100-68700
Preparations	Turn the detector OFF and have access to the rear of the detector.

NOTE

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

- 1 Remove the CompactFlash card by pulling it out of its slot in the rear of the detector.
- 2 Install the new CompactFlash card into the slot.
- 3 Turn the detector ON.

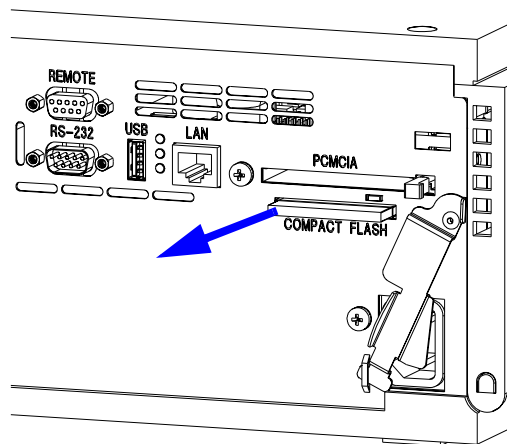


Figure 68 Replacing SanDisk CompactFlash card

Replacing the Detector's Firmware

When required	If new version solves problems of currently installed version or after exchange of the detector main board (DADM or MWDM) the version on board is older than previous installed one.
Tools required	LAN/RS-232 Firmware Update Tool
Parts required	Firmware, tools and documentation from Agilent web site
Preparations	Read update documentation provided with the Firmware Update Tool.

The installation of **older** firmware might be necessary:

- to keep all systems on the same (validated) revision, or
- if third part control software requires a special version.

To upgrade/downgrade the detector's firmware the following steps have to be performed:

- 1 Download the module's firmware, the LAN/RS-232 FW Update Tool Version 2.00 or above and the documentation from the Agilent web http://www.chem.agilent.com/scripts/cag_firmware.asp.
- 2 Load the firmware into the detector as described in the documentation.

NOTE

The initial firmware revision of the G1315C DAD and the G1365C MWD is B.01.01 (main and resident). No further downgrade is possible.

NOTE

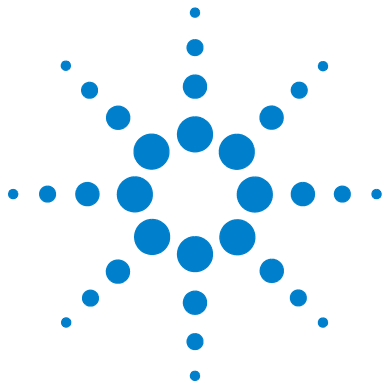
When using the G1315C DAD and the G1365C MWD in an 1100 system, all other 1100 modules must be upgraded to firmware revision 6.x or above (main and resident). Otherwise the communication will not work.

- 3 If the detector main board was replaced, perform a [“Wavelength Verification and Recalibration”](#) as described in the Service Manual to add the recalibration parameters into the board's memory.

NOTE

The wavelength recalibration should be performed after at least 10 minutes of warm-up time of the lamp.

- 4 If detector main board was replaced, re-enter the serial number information of the module through the user interface, see [“Using the Control Module G1323B”](#) or [“Using the Agilent ChemStation”](#) as described in the Service Manual.



9 Parts and Materials for Maintenance

Overview of Maintenance Parts	154
Standard Flow Cell	156
Semi-Micro Flow Cell	158
High Pressure Flow Cell	160
Nano Flow Cells	162
Accessory Kit	166

This chapter provides information on parts for maintenance.



Overview of Maintenance Parts

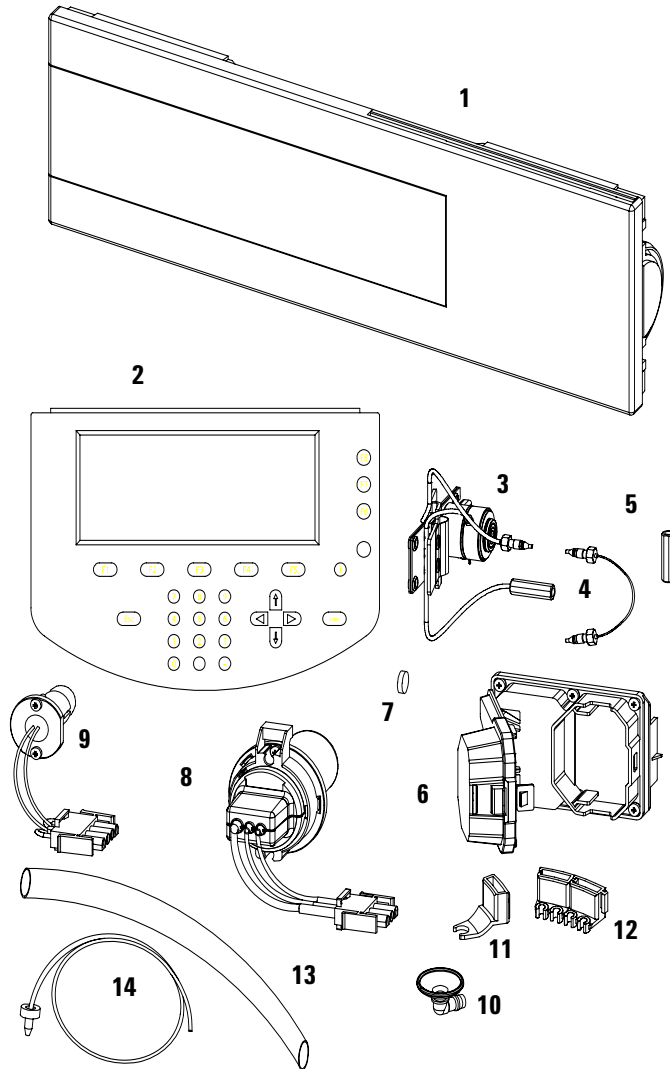


Figure 69 Maintenance Parts

Table 21 Maintenance Parts - Overview

Item	Description	Part Number
1	Front cover	5062-8582
2	Control Module G1323B (Note: The G1315C DAD and G1365C can be operated with a G1323B only. Firmware revision must be B.04.01 or above.)	G1323-67001
	CAN cable Agilent 1100 module to control module	G1323-81600
3	Flow Cells with ID tag. For details see "Standard Flow Cell" on page 156, "Semi-Micro Flow Cell" on page 158, "High Pressure Flow Cell" on page 160 or "Nano Flow Cells" on page 162	
4	Capillary column – detector 380 mm lg, 0.17 i.d., for details see "Accessory Kit" on page 166	G1315-87311
5	Zero dead volume fitting	5022-6515
6	Flow cell door (seal included) Screw special for flow cell door	G1315-68707 5022-2112
7	Holmium oxide filter	79880-22711
8	Longlife Deuterium lamp with ID tag (with black cover) ("C" version)	2140-0820
9	Tungsten lamp	G1103-60001
10	Leak funnel	5041-8388
11	Leak funnel holder	5041-8389
12	Clip	5041-8387
13	Corrugated tubing, 120 mm lg, re-order 5 m	5062-2463
14	Teflon Tubing flexible i.d. 0.8 mm (flow cell to waste), see "Accessory Kit" on page 166	5062-2462
	Cable CAN to Agilent 1100 Series modules (0.5 m)	5181-1516
	Cable CAN to Agilent 1100 Series modules (1 m)	5181-1519
	Cross-over network cable (shielded, 3 m long) for point to point connection	5023-0203
	Twisted pair network cable (shielded, 7 m long), for hub connections	5023-0202
	Analog cable (BNC to general purpose, spade lugs)	01046-60105
	CompactFlash Card Kit (Type Sandisk Ultra II)	01100-68700

Standard Flow Cell

Table 22 Standard Flow Cell Parts

Item	Description	Part Number
	Standard flow cell assembly, 10 mm, 13 μ l, maximum pressure 120 bar, with I.D. tag	G1315-60022
1	Window screw	79883-22402
2	Spring washers, pack of 10	5062-8553
3	Compression washer	79883-28801
4	Window holder	79883-22301
5	Quartz window	1000-0488
6	Gasket BACK (Teflon), 2.3 mm hole, outlet side	See kits below
7	Gasket FRONT (Teflon), 1.3 mm hole, inlet side	See kits below
8	Window assembly, comprises item 1, 2, 3, 4, 5	No part number
9	Capillary IN (0.17 mm, 590 mm lg) including heat exchanger	G1315-87321
10	Capillary OUT (0.17 mm, 200 mm lg)	G1315-87302
11	Clamp unit	G1315-84910
	Screw M 2.5, 4 mm lg for cell body/clamp	0515-1056
	Zero dead volume fitting	0100-0900
	Cell repair kit STD, includes window screw kit, 4 mm hexagonal wrench and seal kit	G1315-68712
	Seal kit BACK for STD flow cell, qty=12 of item 6	G1315-68711
	Seal kit FRONT for STD flow cell, qty=12 of item 7	G1315-68710
	Window screw kit, includes 2 quartz windows, 2 compression washers, 2 window holders, 2 window screws and 10 spring washers	79883-68703

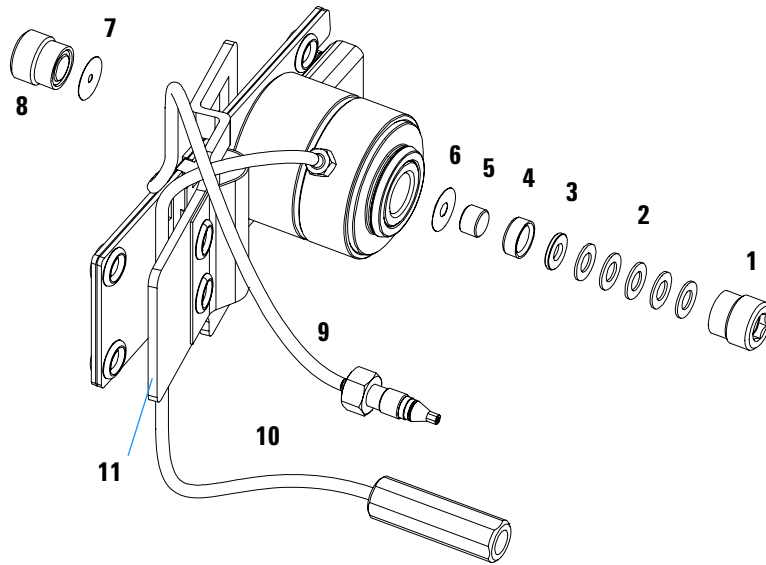


Figure 70 Standard Flow Cell Parts

NOTE

Gaskets # 6 and #7 have different hole diameters.

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

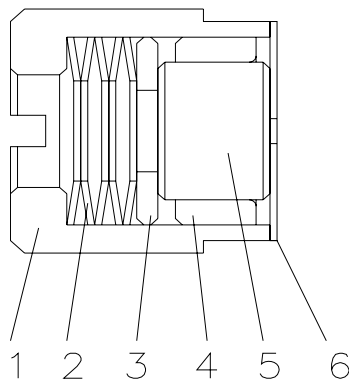


Figure 71 Orientation of Spring Washers.

Semi-Micro Flow Cell

Table 23 Semi-Micro Flow Cell Parts

Item	Description	Part Number
	Semi-micro flow cell assembly, 6 mm, 5 µl, maximum pressure 120 bar, with I.D. tag	G1315-60011
1	Window screw	79883-22402
2	Spring washers, pack of 10	5062-8553
3	Compression washer	79883-28801
4	Window holder	79883-22301
5	Quartz window	1000-0488
6	Gasket BACK (Teflon), 1.8 mm hole, outlet side	See kits below
7	Gasket FRONT (Teflon), 1.3 mm hole, inlet side	See kits below
8	Window assembly, comprises item 1, 2, 3, 4, 5	No part number
9	Capillary IN (0.12 mm, 290 mm lg) including heat exchanger	G1315-87325
10	Capillary OUT (0.12 mm, 200 mm lg)	G1315-87306
10	Capillary OUT (0.17 mm, 200 mm lg)	G1315-87302
11	Clamp unit	G1315-84901
	Screw M 2.5, 4 mm lg for cell body/clamp	0515-1056
	Zero dead volume fitting	0100-0900
	Cell repair kit semi-micro, includes window screw kit, 4 mm hexagonal wrench and seal kits	G1315-68713
	Seal kit BACK for semi-micro flow cell, qty=12 of item 6	79883-68702
	Seal kit FRONT for semi-micro flow cell, qty=12 of item 7	G1315-68710
	Window screw kit, includes 2 quartz windows, 2 compression washers, 2 window holders, 2 window screws and 10 spring washers	79883-68703

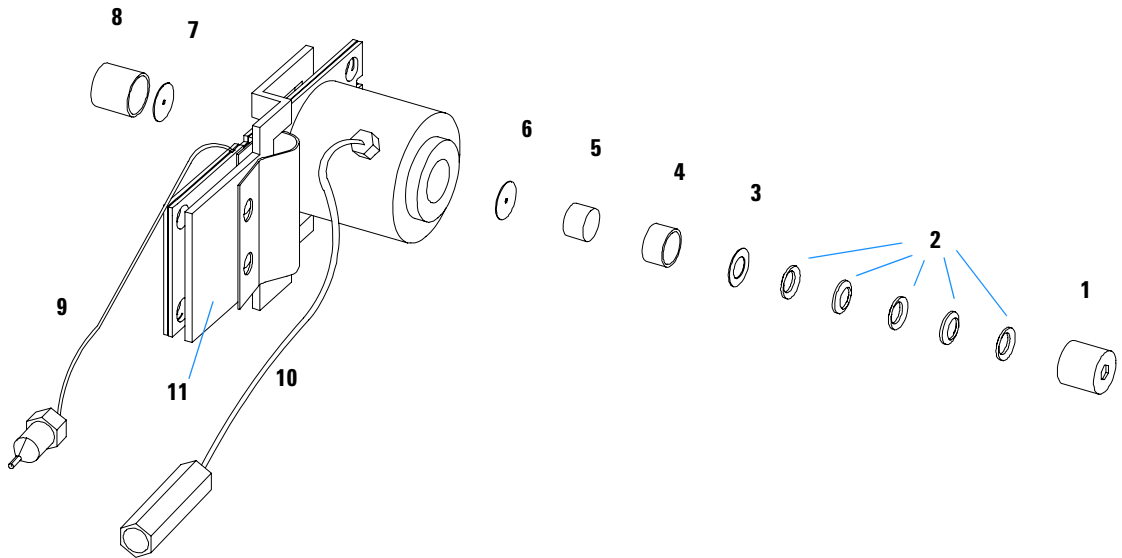


Figure 72 Semi-Micro Flow Cell Parts

NOTE

Gaskets # 6 and #7 have different hole diameters.

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

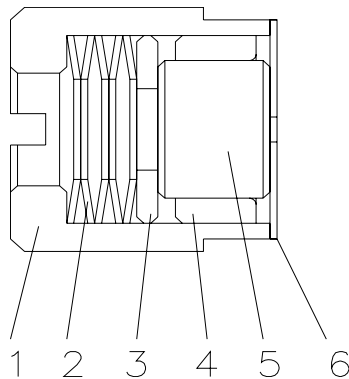


Figure 73 Orientation of Spring Washers.

High Pressure Flow Cell

Table 24 Repair Parts: Micro Flow Cell Assembly

Item	Description	Part Number
	High pressure flow cell assembly, 6 mm, 1.7 μ l, maximum pressure 400 bar, with I.D. tag	G1315-60015
1	Window assembly, comprises items 2, 3, 4, 5 and 6	
2	Seal ring	79883-27101
3	Quartz window	1000-0953
4	Compression washer	79883-28802
5	Spring washers (pack of 10)	5062-8553
6	Window screw	79883-22404
7	Capillary IN (0.12 mm, 290 mm lg) including heat exchanger	G1315-87325
8	Capillary OUT (0.12 mm, 200 mm lg)	G1315-87306
9	Clamp unit	G1315-84901
	Screw M 2.5, 4 mm lg for cell body/clamp unit	0515-1056
	Capillary (0.12 mm, 150 mm lg)	G1315-87312
	Capillary (0.17 mm, 380 mm lg)	G1315-87311
	Cell Repair Kit Agilent, includes 1 quartz window, 5 spring washers, 2 seal rings	79883-68700

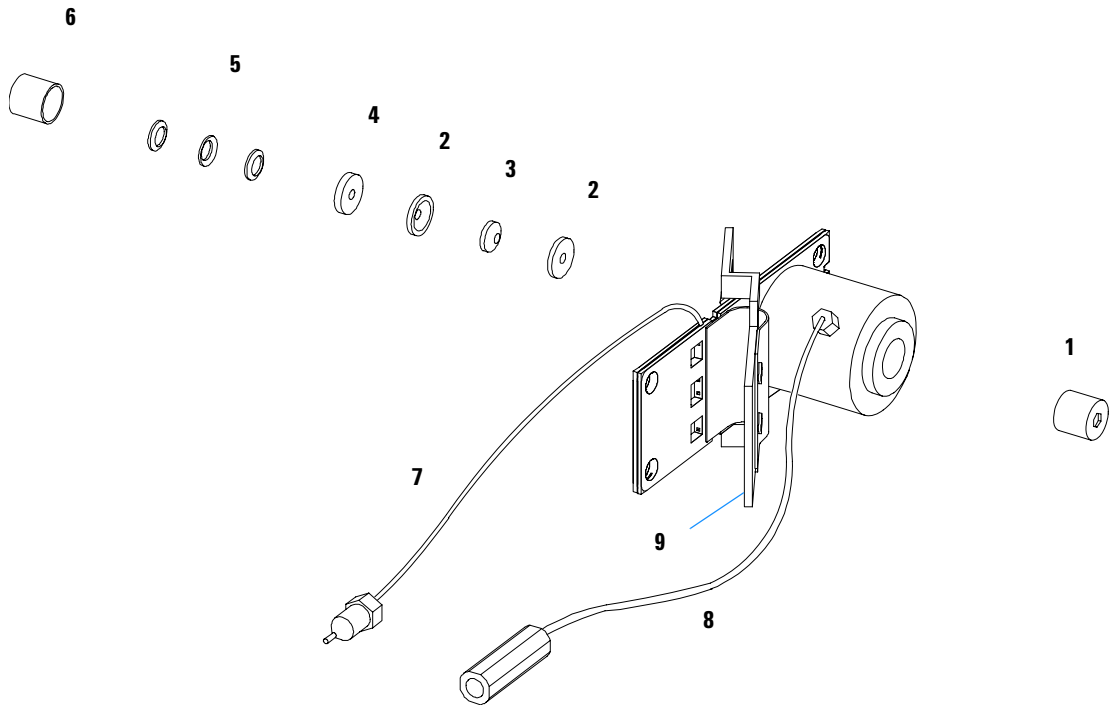


Figure 74 High Pressure Flow Cell Assembly Parts

Nano Flow Cells

The following kits are available:

Table 25 Nano-flow cell kits

Description	Part number
500 nl Flow Cell Kit includes Flow cell assembly (10 mm, 500 nl, 5 MPa) completely assembled (includes items 1, 2, 3, 4, 10, 11, 12, 13, 14, 15, and 16)	G1315-68724
80 nl Flow Cell Kit includes Flow cell assembly (10 mm, 80 nl, 5 MPa) completely assembled (includes items 1, 2, 3, 4, 10, 11, 12, 13, 14, 15, and 16)	G1315-68716

Figure 75 shows all parts delivered with the nano-flow cell kits.

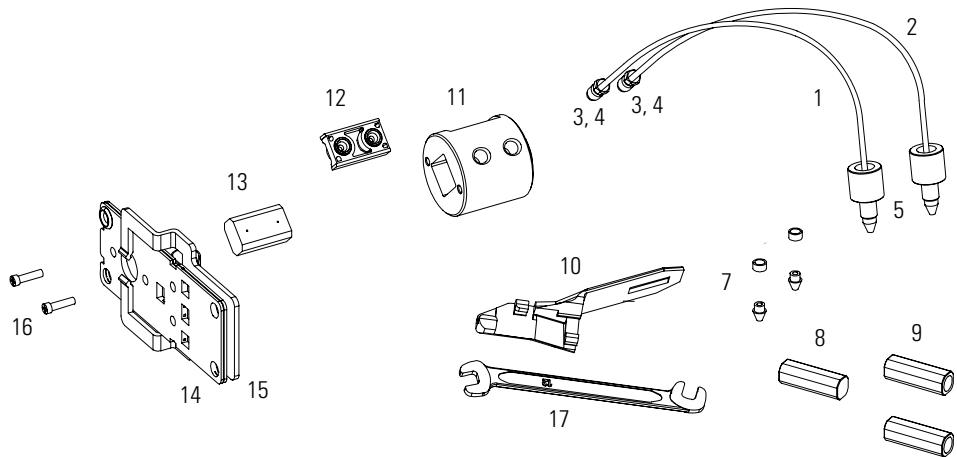


Figure 75 Content of kits

Table 26 lists the generic parts for both nano-flow cells:

Table 26 Generic Parts

Item	Description	Part Number
3	Fitting Screw (for 4 mm wrench), QTY=2 (reorder 10/pk)	5063-6593
4	Cell ferrules are factory installed	
5	PEEK fitting 1/32" (not attached to capillaries), (reorder 10/pk)	5065-4422
7	Litetouch ferrules LT-100, (1/32" Ferrule and SS lock ring), QTY=2 (reorder 10/pk)	5063-6592
8	Union Adjustment Tool, used for item #7	5022-2146
9	ZDV SS Union, no fitting, QTY=2	5022-2184
10	Torque Adapter	G1315-45003
14	Handle for clamp unit	G1315-84902
15	Clamp unit	G1315-84901
16	Screw M 2.5, 4 mm long for cell body/clamp	0515-1056
17	Wrench open end 4 mm (supplied with standard accessory kit G1315-68705 of your detector)	8710-1534

Table 27 lists the specific parts for the 500 nl flow cell.

Table 27 Specific 500 nl Flow Cell Parts

Item	Description	Part Number
	500 nl Flow Cell Kit	G1315-68724
1	PEEK coated fused silica capillary Inlet (100 μm) pre-mounted to cell , includes Inlet capillary, 300 mm long, 100 μm i.d. with pre-fixed ferrules (#4) and fittings (#3), plus one PEEK Fitting FT (#5)	G1315-87333
2	PEEK coated fused silica capillary Outlet (100 μm) pre-mounted to cell , includes Outlet capillary, 120 mm long, 100 μm i.d. with pre-fixed ferrules (#4) and fitting (#3), plus one PEEK Fitting FT (#5)	G1315-87338
1	PEEK coated fused silica capillary Inlet (50 μm) alternative , includes Inlet capillary, 400 mm long, 50 μm i.d. with pre-fixed ferrules (#4) and fittings (#3), plus one PEEK Fitting FT (#5)	G1315-87323
2	PEEK coated fused silica capillary Outlet (50 μm), alternative , includes Outlet capillary, 120 mm long, 50 μm i.d. with pre-fixed ferrules (#4) and fitting (#3), plus one PEEK Fitting FT (#5)	G1315-87328
1	PEEK coated fused silica capillary Inlet (50 μm) for earlier 500 nl version kits , includes Inlet capillary, 400 mm long, 50 μm i.d. with pre-fixed ferrules (#4) and fittings (#3), plus one PEEK Fitting FT (#5)	G1315-87323
2	PEEK coated fused silica capillary Outlet (75 μm) for earlier 500 nl version kits , includes Outlet capillary, 700 mm long, 75 μm i.d. with pre-fixed ferrules (#4) and fitting (#3), plus one PEEK Fitting FT (#5)	G1315-68708
11	Cell Housing (500 nl)	G1315-27703
12	Cell Seal Assembly (500 nl)	G1315-87101
13	Quartz Body (500 nl)	G1315-80001
	Sealing Kit, includes items #10, #12 (QTY=2) and #7 (QTY=5)	G1315-68715

Table 28 lists the specific parts for the 80 nl flow cell.

Table 28 Specific 80 nl Flow Cell Parts

Item	Description	Part Number
	80 nl Flow Cell Kit	G1315-68716
1	PEEK coated fused silica capillary Inlet (50 μ m) pre-mounted to cell , includes Inlet capillary, 400 mm long, 50 μ m i.d. with pre-fixed ferrules (#4) and fittings (#3), plus one PEEK Fitting FT (#5)	G1315-87323
2	PEEK coated fused silica capillary Outlet (50 μ m) pre-mounted to cell , includes Outlet capillary, 120 mm long, 50 μ m i.d. with pre-fixed ferrules (#4) and fitting (#3), plus one PEEK Fitting FT (#5)	G1315-87328
1	PEEK coated fused silica capillary Inlet (25 μ m) alternative , includes Inlet capillary, 200 mm long, 25 μ m i.d. with pre-fixed ferrules (#4) and fittings (#3), plus one PEEK Fitting FT (#5)	G1315-87313
2	PEEK coated fused silica capillary Outlet (25 μ m) alternative , includes Outlet capillary, 600 mm long, 25 μ m i.d. with pre-fixed ferrules (#4) and fitting (#3), plus one PEEK Fitting FT (#5)	G1315-87318
11	Cell Housing (80 nl)	G1315-27704
12	Cell Seal Assembly (80 nl)	G1315-42301
13	Quartz Body (80 nl)	G1315-80002
	Sealing Kit 80 nl cell, includes items #10, #12 (QTY=2), #7 (QTY=5) and Lite Touch Sleeves (QTY=5)	G1315-68725

Accessory Kit

This kit contains some accessories and tools needed for the installation and repair of the detector.

Table 29 Accessory Kit Parts

Item	Description	Part Number
	Accessory kit	G1315-68705
	Corrugated tubing (to waste), re-order 5 m	5062-2463
1	Teflon Tubing flexible i.d. 0.8 mm (flow cell to waste), re-order 5 m	5062-2462
2	Fitting male PEEK, Qty=1	0100-1516
3	Capillary column – detector 380 mm lg, 0.17 i.d. includes items 4, 5 and 6 (not assembled)	G1315-87311
4	Ferrule front 1/16" SST, qty=2, re-order pack of 10	5180-4108 *
5	Ferrule back 1/16" SST, qty=2, re-order pack of 10	5180-4114 *
6	Fitting 1/16" SST, qty=2, re-order pack of 10	5061-3303 *
	Hex key set 1 – 5 mm	8710-0641
	Wrench open end 1/4 – 5/16 inch	8710-0510
	Wrench open end 4 mm	8710-1534
	ESD wrist strap	9300-1408

* or kit 5062-2418 1/16" Fittings and Ferrules (front/back) 10/PK

For item number refer to [Figure 76](#) and [Figure 77](#).

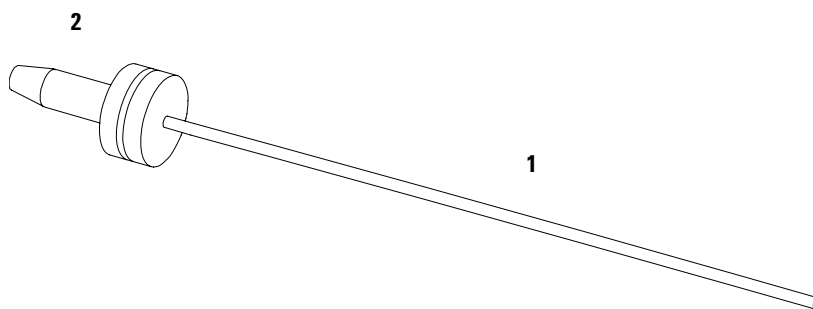


Figure 76 Waste Tubing Parts

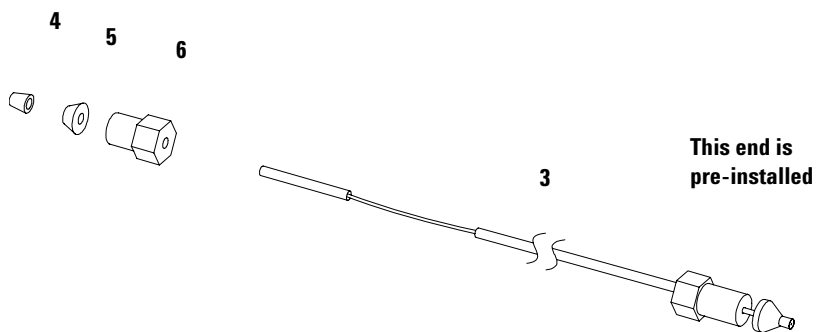
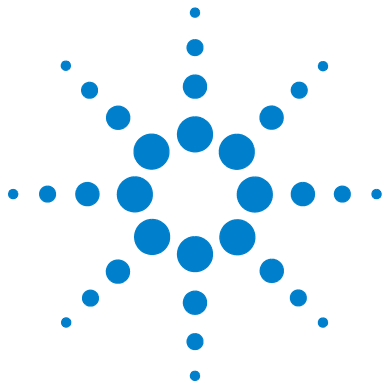


Figure 77 Inlet Capillary (Column-Detector) Parts



10 Control Module Screens

Major keys on the Agilent 1100 Control Module	170
Control Module - Unsupported Module	171
Screens available from the Analysis screen	172
Screens available from the System screen	182
Screens available from the Records screen	185
Diagnostics and Tests	192

This chapter provides an overview on the control module screens.



Major keys on the Agilent 1100 Control Module

Table 30

ESC	Return to previous screen and scroll through top layer views (Analysis, Settings)
m	Open context sensitive menus
i	Information/help
Enter	Store changed parameters or execute the choice from a pull-down menu
On/Off	Switch on lamp(s)
Start	Start a run
Plot	View the chromatogram
Views	Change between view of analysis - status - system screens

NOTE

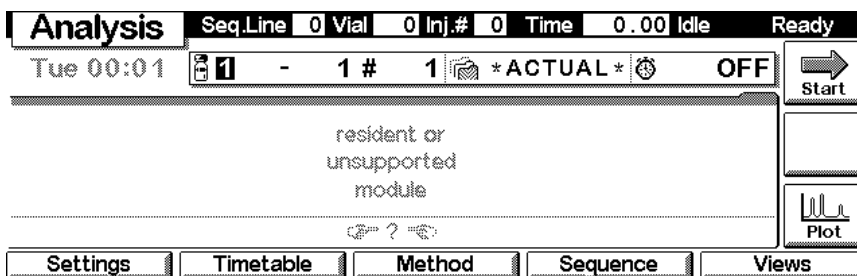
The screens shown on the next pages are based on the following firmware revisions:
Minimum G1315C DAD and G1365C MWD firmware revision B01.01.
Minimum Control Module firmware revision B.04.01 (G1323B).
Minimum LC Module firmware revision A.06.01.

NOTE

In case the control module's display seems to be frozen (hang-up due to a communication problem on the CAN bus, unplug the control module from the LC module and reconnect.

Control Module - Unsupported Module

In case the control module shows the following screen and the yellow LED on the detector is not flashing, the used firmware in the Control Module is not able to control the G1315C DAD or G1365C MWD. These detectors require firmware revision B.04.01 or above (G1323B).



Screens available from the Analysis screen

The Analysis screen

This is the wake-up screen, if the Agilent 1100 detector is the only configured Agilent 1100 module. It is used to enter the most common detector method parameters.

Analysis										Line	0	Loc.	0	Inj.#	0	Time	0.00	Idle	Ready
Wed 15:23										1	-	1	#	1	*ACTUAL*		OFF		Start
Ready																			
A		λ	BW	B		λ	BW	Peakwidth		>0.1 min (2 s)									
Sample		250	100			254	16	Slit		4 nm									
Reference		360	100			360	100												
A -5.239mAU; B -9.584mAU																			
Settings		Timetable		Method		Sequence		Views											

The **m**-key allows access to the context sensitive menu. **Setup view** leads you to add sections for additional Agilent 1100 modules. **Restart** re-boots the control module.

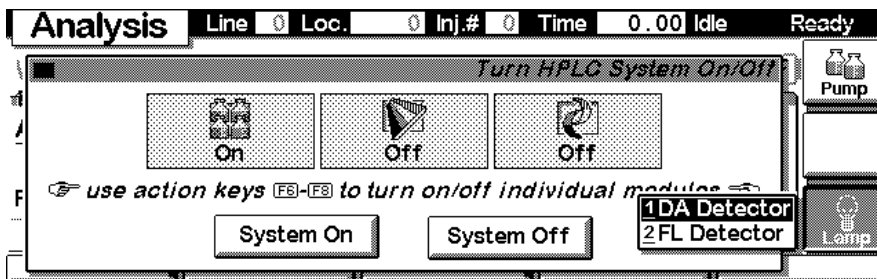
Analysis										Line	0	Loc.	0	Inj.#	0	Time	0.00	Idle	Ready
Wed 15:23										1	-	1	#	1	*ACTUAL*		OFF		Start
Ready																			
A		λ	BW	B		λ	BW	Peakwidth		>0.1 min (2 s)									
Sample		250	100			25		Slit		4 nm									
Reference		360	100			360													
A -5.106m																			
Settings		Timetable		Method		Sequence		Views											

Analysis

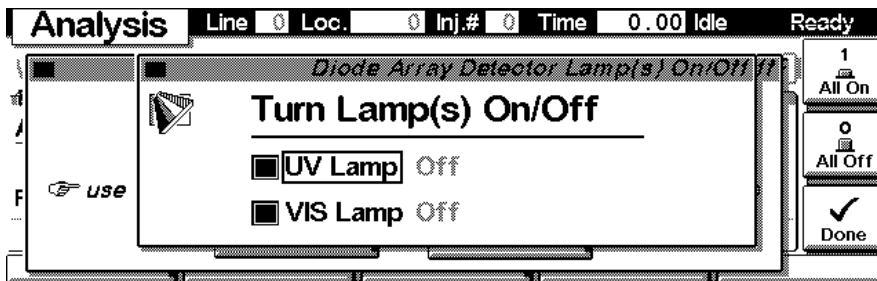
- 1 Date&Time
- 2 Print Screen
- 3 About
- 4 Setup View
- 5 Restart

Lamp ON/OFF

Use the F8 key (**On/Off**) to turn on the lamp(s). If more than one module is available, select the DAD or MWD from the pop-up menu.

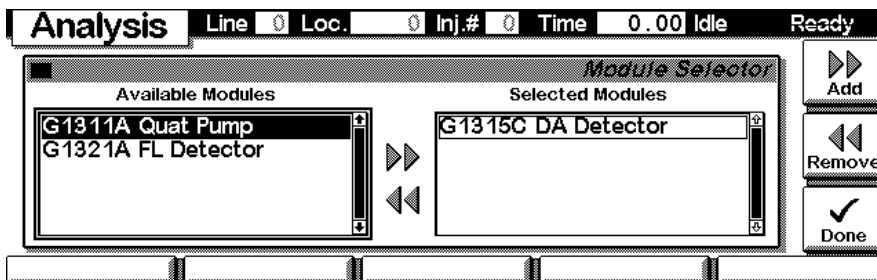


The lamp(s) can be selected individually.

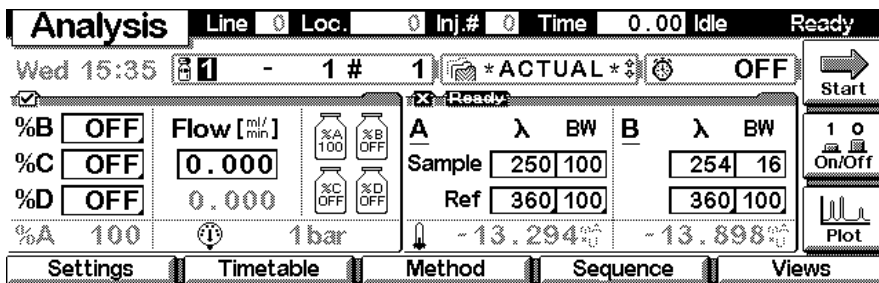


Setup View

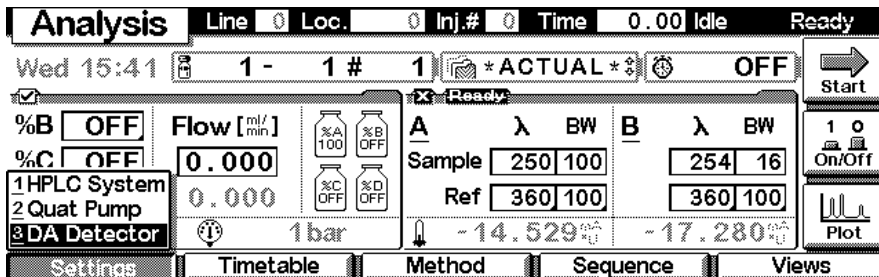
In the **Setup view**, e.g. another module can be added to the view.



Here, e.g. the pump parameters are shown on the display as well. The number of parameters on the display are restricted as additional modules are added. Maximum 4 modules are shown automatically. If more modules are in the system, you have to chose in Setup view.



With the **Settings** key you open a pull-down menu where you can select the DAD modules.



Settings

Within the **Settings** you can change the DAD or MWD parameters and with a different set of parameters available through the F1-5 keys. F7 key resets the DAD or MWD to default values. F8 opens a window to turn on the lamps.

Settings		Line	Loc.	Inj.#	Time	0.00	Idle	Ready
<i>Diode Array Detector Settings</i>								
		Sample, BW		Reference, BW				
A	250	100	360	100			-13.953 mAU	
B	254	16	360	100			-18.326 mAU	
Peakwidth (Responsetime)						>0.1 min (2 s)	Slit	4 nm
More ...		Timetable		Analog		Spectrum		Runtimes

1 On/Off

Default

Done

Use the **m**-key for the context sensitive menu. The **Status** command pulls up a monitor screen displaying signals and spectra as programmed. **Reset** will load the DAD or MWD default parameters. **Balance** brings the baseline back to set offset.

Settings		Line	Loc.	Inj.#	Time	0.00	Idle	Ready
<i>Diode Array Detector Settings</i>								
		Sample, BW		Reference, BW				
A	250	100					-14.686 mAU	
B	254	16					-18.314 mAU	
Peakwidth (Responsetime)						>	Slit	4 nm
More ...		Timetable		Analog		Spectrum		Runtimes

1 On/Off

Default

Done

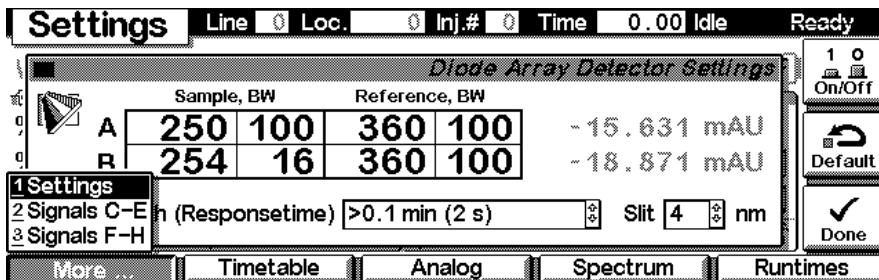
Settings

1 Balance

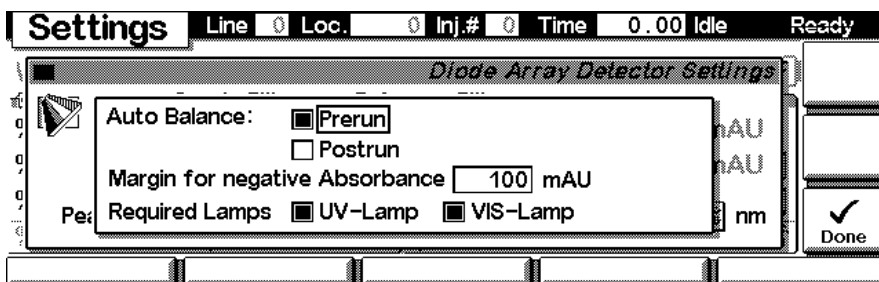
2 Status

3 Reset

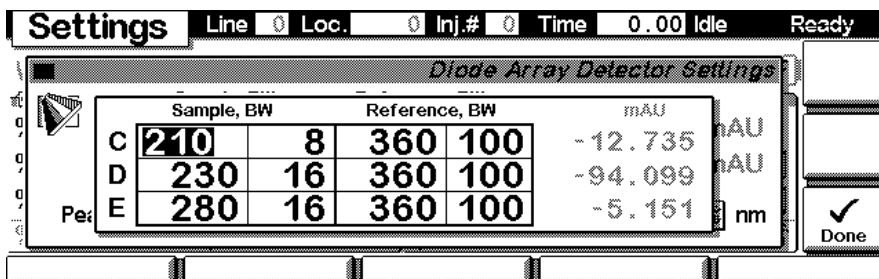
Use F1-key (**More**) opens a pull-down menu. The additional signals C-E and F-H can be accessed.



Selecting **More** and **Settings** pull down menu you can enter special DAD or MWD setpoints.




Selecting **More** and **Signals C-E** or **Signals F-H** on the pull down menu you can enter additional DAD or MWD signal parameters.




Settings - Timetable


With the F2 key (**Timetable**) you can list the timetable for the DAD or MWD. Press F7 key (**Insert**) to add entries or F6 key (**Delete**) to remove entries.


Timetable				Line	Loc.	Inj.#	Time	0.00	Idle	Ready
Time	Module	Setting	Value							
1.00	DA Detector	Signal A	250,100;360,100 nm							
2.00	DA Detector	Signal A	260,100;360,100 nm							
*** end of timetable ***										






Press the F7 key (**Insert**) to add a timetable events. Use the F6 key (**Done**) to view the entered lines of the timetable.

Timetable				Line	Loc.	Inj.#	Time	0.00	Idle	Ready
				<i>Timetable Insert</i>						
Time [min]	Module	Setting								
<input type="text" value="0.00"/>	<input type="text" value="DA Detector"/>	<input type="text" value="Signal A"/>								
 Signal			<input type="text" value="250"/>	<input type="text" value="100"/>	<input type="text" value="360"/>	<input type="text" value="100"/>	nm			
<i>fields change with setting selected</i>										







Use the **m**-key for the context sensitive menu. It gives you additional tools for the timetable.

Timetable				Line	Loc.	Inj.#	Time	0.00	Idle	Ready
Time	Module	Setting	Value							
1.00	DA Detector	Signal A	250,100;360,100 nm							
2.00	DA Detector	Signal A	260,100;360,100 nm							
*** end of timetable ***										

Timetable
1 Copy Line
2 Paste Line
3 Print Timetable





Settings - Analog

With the F3 key (**Analog**) you can change the settings for the analog outputs.

The screenshot shows the 'Settings' window with the 'Analog' tab selected. The title bar indicates 'Line 0 Loc. 0 Inj.# 0 Time 0.00 Idle Ready'. The main window is titled 'Diode Array Detector Settings'. It features two columns of settings for 'Analog Out 1' and 'Analog Out 2'. Both columns have 'Zero Offset' set to 5% and 'Attenuation' set to 1000 mAU. A 'Done' button with a checkmark is visible on the right side of the window.

Parameter	Analog Out 1	Analog Out 2
Zero Offset	5 %	5 %
Attenuation	1000 mAU	1000 mAU

Settings - Spectrum Range

FOR G1315A/B DAD: With the F4 key (**Spectrum**) you can change the settings for the spectrum acquisition.

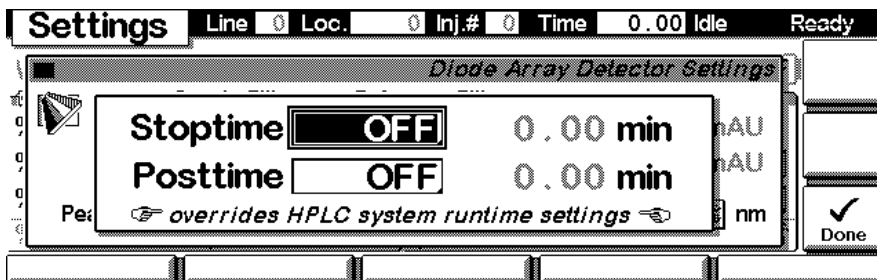
FOR G1365A/B MWD: You can change the settings for the spectrum acquisition (STOP FLOW). The spectrum is started via “[Sample, Holmium and Dark Current Spectrum](#)” on page 193.

The screenshot shows the 'Settings' window with the 'Spectrum' tab selected. The title bar indicates 'Line 0 Loc. 0 Inj.# 0 Time 0.00 Idle Ready'. The main window is titled 'Diode Array Detector Settings'. It features three settings: 'Range' set to 190 to 400 step 2.0 nm, 'Store Spectra' set to None, and 'Threshold' set to 10.0 mAU. A 'Done' button with a checkmark is visible on the right side of the window.

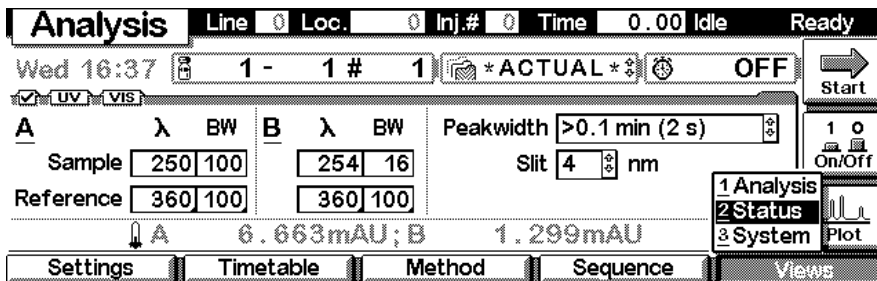
Range	190 to 400 step 2.0 nm
Store Spectra	None
Threshold	10.0 mAU

Settings - Run times

With the F5 key (**Runtimes**) you can change the stop time and the post-run time.

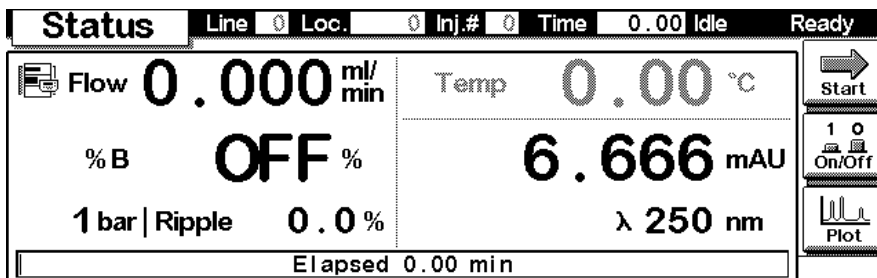


Press F5 key (**Views**) and select **Status**.



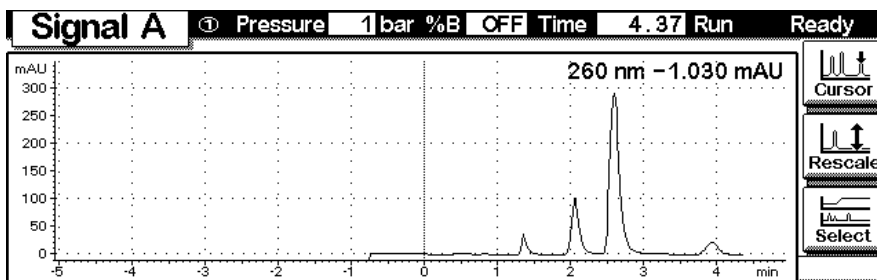
Status

This is an example if an Agilent 1100 DAD or MWD is configured standalone.

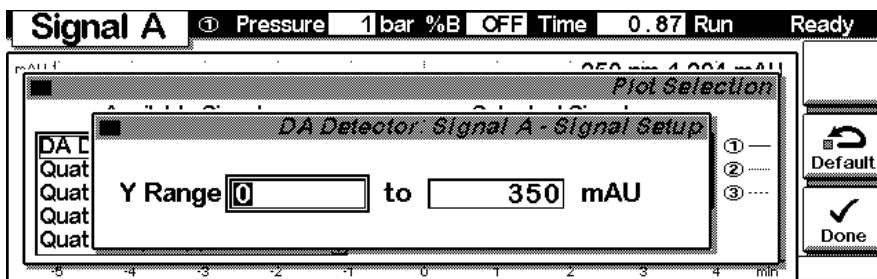
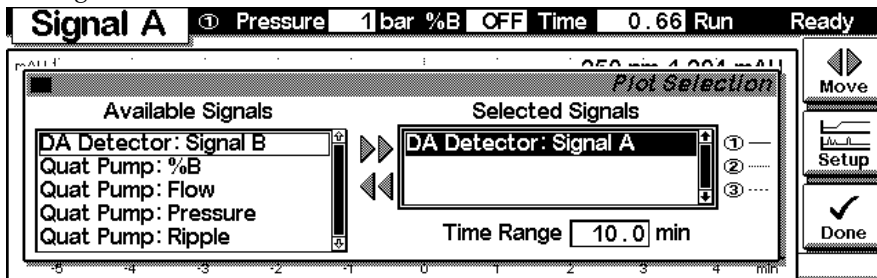


Signal plot

Press F6 key (**Plot**) to enter the plot screen (available also from the **Analysis** and **System** screen). Here you can observe the online signal(s). To add additional online signals (maximum 3), press F6 key (**Select**). If more than one signal is configured (see next), use the 1-2-3 number key to switch between the signals.



Press F6 key (**Select**). Here you can add additional online signals (maximum are 3). Additional signals could be also pressure or temperature signals from other modules. Use the Right/Left arrows to switch between Available and Selected Signals. Use the F8 key (**Move**) to enter available signals into the box for selected signals or vice versa. Press F6 key (**Setup**) to change the signal setting.



Method screens

Use ESC to return to the **Analysis** screen. Use the F3 key (**Method**) to view the parameters in a method and F8 key (**Save As**) to save the method in the module(s). The PC-Card key is only active when a PCMCIA card is inserted in the control module.

Method		Line	Loc.	Inj.#	Time	0.00	Idle	Ready
Setting	Value	TED-01						
Stoptime	60.00 min							
Posttime	OFF							
Signal A	254,4;360,100 nm							
Signal B	254,16;360,100 nm							
Signal C	210,8;360,100 nm							
Signal D	230,16;360,100 nm							
Module		PC-Card	Timetable	Edit				

Method		Line	Loc.	Inj.#	Time	0.00	Idle	Ready
Save Current Method as ...								
Name	TED-01	<input type="checkbox"/> Protected						
User Id	WA							
Comment	TEST-01							
								Done

Use F2 key (**PC-Card**) to save a method on a PCMCIA card. Use the Right/Left arrows to switch between PC-Card and Instrument window. Use the UP/Down arrows to select the method. Use the F7/F8 keys (**Copy**) to enter available signals into the box for selected signals or vice versa.

Method		Line	Loc.	Inj.#	Time	0.00	Idle	Ready
Methods on PC-Card								
*** end of method list ***								
Methods on Instrument								
TED-01 03/24/05 08:45								
*** end of method list ***								
Initialize								Delete

Screens available from the System screen

System screen

Use the Esc key to receive **Views** on the F5 key. Choose **System** from the pull-down menu. This screen shows the last activities in the system.

The System screen displays the following information:

Module	Message	Id	Date	Time
DA Detector	VIS lamp off	STATE	11/12	12:04:17
DA Detector	Lamp off	STATE	11/12	12:04:17
Controller	No analysis	STATE	11/12	12:04:17
Controller	*** Control module ready ***	INFO	01/01	00:00:20

Additional screen elements include: a status bar at the top with 'System', 'Lamp' (checkbox), 'Time 0.00', 'Idle', and 'Ready'; a message box showing 'Thu 12:52 LAMP OFF' with an 'EMF' button; a 'Start' button with a right arrow; an 'On/Off' button with a lamp icon; a 'Plot' button with a graph icon; and a bottom navigation bar with buttons for 'Control', 'Configure', 'Tests', 'Records', and 'Views'.

System - Control

Use the F1 key (**Control**) to select the DAD or MWD. Here you receive information about the not-ready conditions if needed. F2 key (**Reset**) does a re-initialization of the DAD or MWD.

The Control screen displays the following information:

The main window is titled 'DAD Control' and shows a message: 'nReady LAMP OFF' with a speaker icon.

Additional screen elements include: a status bar at the top with 'Control', 'Lamp' (checkbox), 'Time 0.00', 'Idle', and 'Ready'; an 'On/Off' button with a lamp icon; a 'Reset' button with a refresh icon; a 'Done' button with a checkmark; and a bottom navigation bar with buttons for 'Balance' and several empty buttons.

System - Configuration

Use the **Esc** key to receive **Views** on the F5 key. Choose **System** from the pull-down menu. Use the F2 key (**Configure**) to select the DAD or MWD. Here you define further special setpoints for the DAD or MWD operation.

Config Lamp Time 0.00 Idle Ready

Diode Array Detector Configuration

Options

Analog voltage range Out1 1.0V full scale Out2 1.0V full scale

At Power-On turn UV lamp on turn VIS lamp on

Done

LAN Temperature UV-Lamp Tag Cell Tag

Use the F1 key (**LAN**) to access the LAN interface settings. The TCP Status Page displays the current settings (MAC address of the LAN interface, Init Mode and the TCP/IP information). Use the F1 key (**Service**) to change the TCP/IP settings.

Config Lamp Time 0.00 Idle Ready

LAN Status Page

MAC Address : 0030D30A0838

Init Mode : Using Stored

TCP/IP Properties

Print

Done

Service

Config Lamp Time 0.00 Idle Ready

Diode Array Detector Interfaces/LAN Service

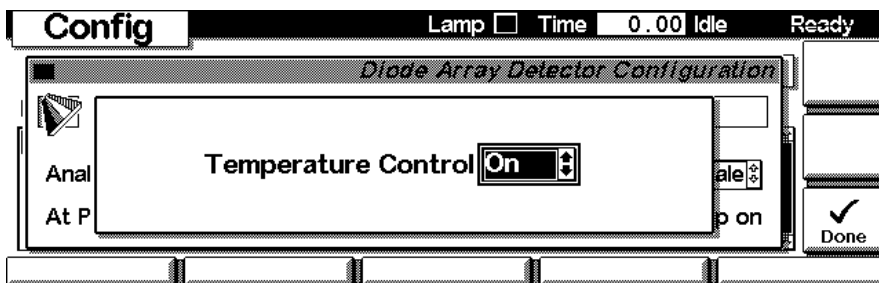
IP Address 134.40.27.95

Subnet Mask 255.255.248.0

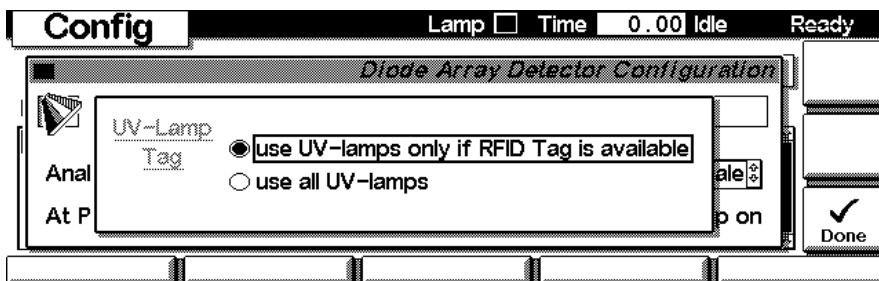
Default Gateway 134.40.24.1

Done

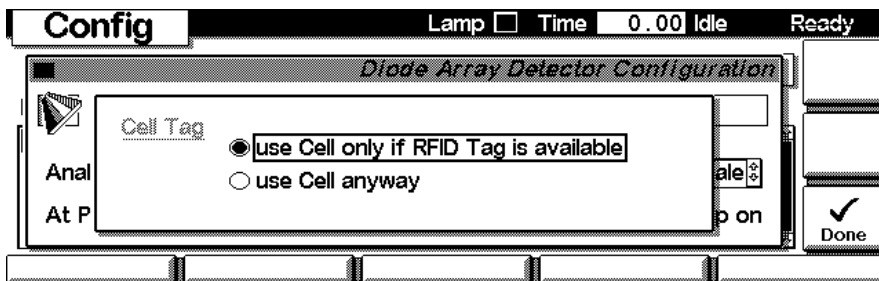
Use the F2 key (**Temperature**) to turn on/off the temperature control of the optical unit. Default is ON to keep the optical unit stable in instable environments (e.g. air conditioners).



Use the F3 key (**UV-Lamp Tag**) to configure the lamp tag reader. Use option “use all UV-lamps“ if UV-lamp has no I.D. tag.



Use the F4 key (**Cell Tag**) to configure the flow cell tag reader. Use option “use Cell anyway“ if flow cell has no I.D. tag.



Screens available from the Records screen

Records screen

Use the Esc key to receive **Views** on the F5 key. Choose **System** from the pull-down menu. Use the F4 key (**Records**) to select the DAD or MWD.

Records						Pump <input type="checkbox"/>	Lamp <input type="checkbox"/>	Time	0.00	Idle	Ready
Module	Product#	Serial#	Version	On-Time							
Controller	G1323B	DE53300111	B.04.01	0d 00:00h							
Quat Pump	G1311A	US53600106	A.06.01 [002]	0d 00:01h							
DA Detector	G1315C*	PP00000024	B.01.01 [002]	0d 00:01h							
FL Detector	G1321A	DE92001563	A.06.01 [002]	0d 00:01h							

EMF System Log Error Log Maint Log FW Update

System / Error Log

Errors are reported either into the **System Log** (F2) or **Error Log** (F3).

Records						Pump <input type="checkbox"/>	Lamp <input type="checkbox"/>	Time	0.00	Idle	Ready
Diode Array Detector System Logbook											
Message	Date	Time									
VIS lamp off	03/24/05	09:40:33									
Lamp off	03/24/05	09:40:33									
*** end of logbook ***											

Print

Records						Pump <input type="checkbox"/>	Lamp <input type="checkbox"/>	Time	0.00	Idle	Ready
Diode Array Detector Error Logbook											
Message	Date	Time									
*** no entries ***											

Print

Info Log

Use the **m**-key to receive a pop-up menu, Select **Info Log**. A list of the last events are listed. For troubleshooting reasons they can be printed or saved to a file on the PCMCIA card.

Records			Lamp <input type="checkbox"/>	Time 0.00	Idle	Ready *
<i>Diode Array Detector Info Logbook</i>						
Message	Date	Time				
Info (0x0004,214)	03/24/05	12:50:47				
Info (0x0004,214)	03/24/05	10:37:28				
Method modified	03/24/05	08:59:43				
Info (0x0004,217)	03/24/05	08:59:43				
Module method loaded	03/24/05	08:59:32				

Print

EMF (Early Maintenance Feedback)

Use the F1 key (**EMF**) to set EMF parameters. Choose menu item 1 (**Setup limits**) to select lamp-on level for the UV and Vis lamp at which you want to receive a warning.

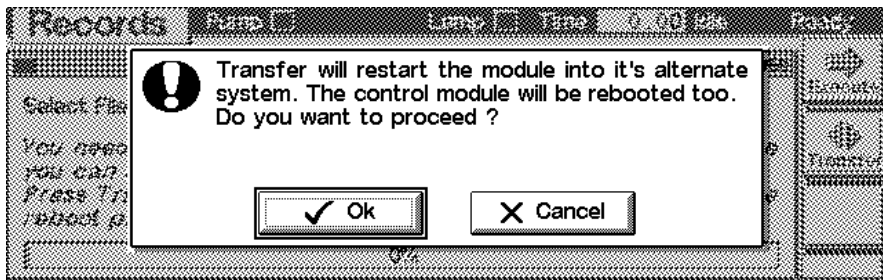
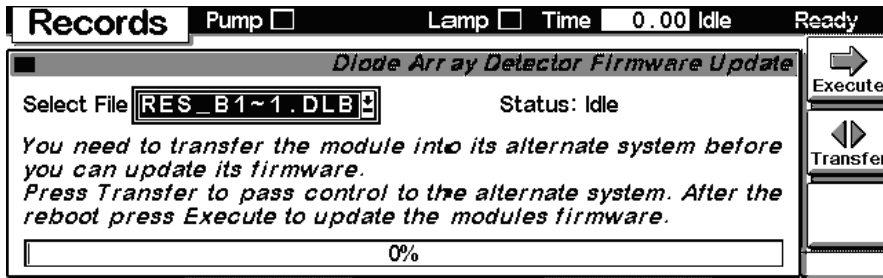
Records		Pump <input type="checkbox"/>	Lamp <input type="checkbox"/>	Time 0.00	Idle	Ready
<i>Diode Array Detector EMF Limits</i>						
	G1315C Diode Array Detector		Serial# PP00000024			
Lamp Burn Time	UV Lamp	65.8	Limit	OFF	h	<input type="button" value="Reset"/> <input checked="" type="button" value="Done"/>
No. of Ignitions	VIS Lamp	24	Limit	0.0	OFF	
				0	OFF	

If a set limit has been exceeded, a message box will pop up. This will not stop a sequence or run (information only to plan maintenance activities). If you press **Reset**, the limits will be removed. **Ignore** will continue to keep the EMF flag set.

Records		Pump <input type="checkbox"/>	Lamp <input type="checkbox"/>	Time 0.00	Idle	Ready
Module	UV lamp burn time limit exceeded					<input type="button" value="Reset"/>
Control	The burn time limit for the UV lamp has exceeded its defined limit.					
Quat Pl.	<input type="button" value="Ignore"/> <input checked="" type="button" value="Reset"/>					
DA Det.						<input checked="" type="button" value="Reset"/>
FL Det.						

Firmware Update

Use the F5 key (**FW Update**) to enter the Update section. If you want to update the resident firmware (together with specific main firmware revisions), select the a file from the PCMCIA card (res_B101_bb.dllb) and press execute. If you want to update the main firmware, press F7 key (**Transfer**) to turn the module into the resident mode (LED on module should blink).



Use the Esc key to receive **Views** on the F5 key. Choose **System** from the pull-down menu. Use the F3 key (**Records**) to select the **Generic** module. In this screen the resident firmware revision is shown.

Records						Lamp <input checked="" type="checkbox"/>	Time	0.00	Idle	Ready
Module	Product#	Serial#	Version	On-Time	EMF					
Controller	G1323B	DE91200107	B.04.01	0d 00:01h						
Generic	G1315C-R*	DE53500102	B.01.01	0d 00:00h						
FL Detector	G1321A	DE81700117	A.03.70	0d 02:01h						

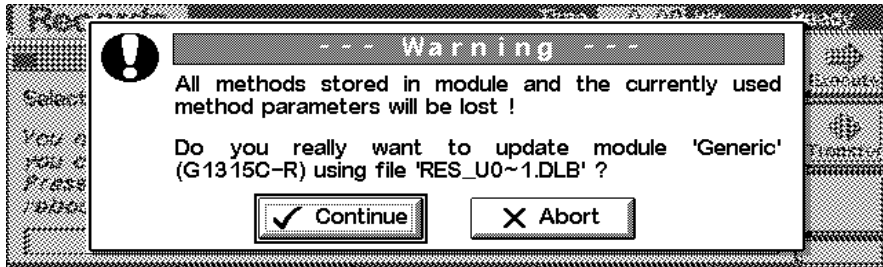
Buttons: EMF, System Log, Error Log, Maint Log, FW Update

Use the F5 key (**FW Update**) to enter the Update section. Select the file from the PCMCIA card (1315B101_bb.dlb for DAD or 1365B101_bb.dlb for MWD) and press execute. When the update has finished the update, press F7 key (**Transfer**) to return the module into the normal mode (LED on module should stay yellow).

Records		Time	0.00	Idle	Ready
<i>Generic Module Firmware Update</i>					
Select File	1315B1~1.DLB	Status: Idle			
<p><i>You need to transfer the module into its alternate system before you can update its firmware.</i></p> <p><i>Press Transfer to pass control to the alternate system. After the reboot press Execute to update the modules firmware.</i></p>					
0%					

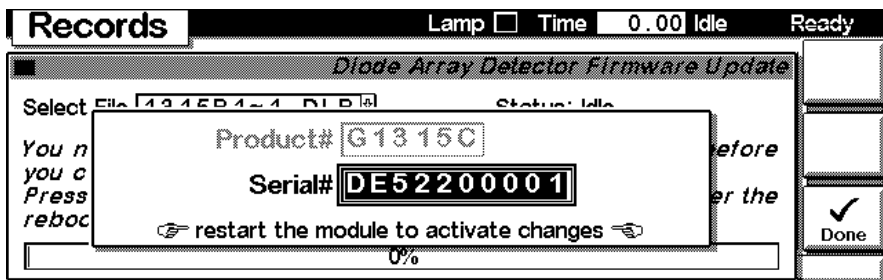
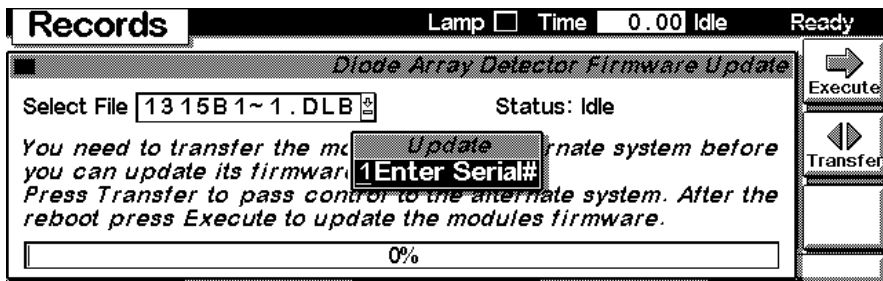
Buttons: Execute, Transfer

If you have not saved your methods, please do it before continuing. Otherwise they will be overwritten during the update process.



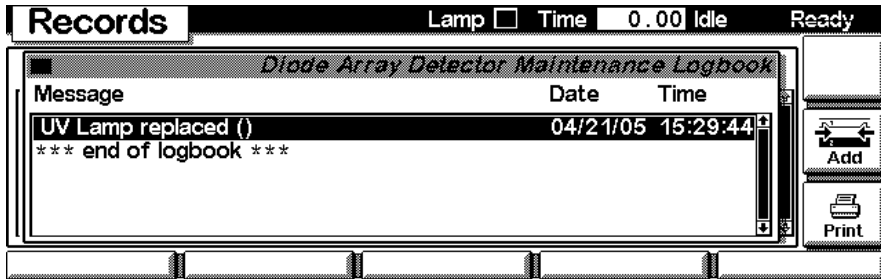
Changing the serial number

In case the serial number of the module has to be added, use the **m**-key to open the menu **Enter Serial#**. Press Done and reboot the detector to make the new serial number active.

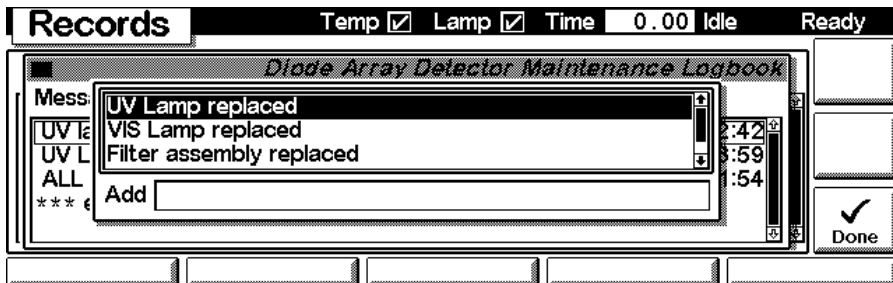


Maintenance activities

Use the F4 key (**Maint log**) to view and edit the maintenance logbook.



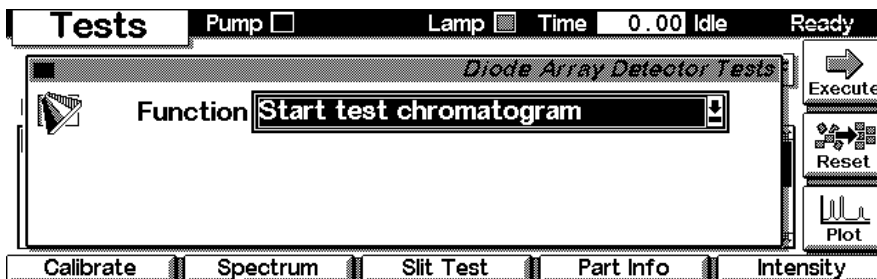
Use the F7 key (**Add**) to add new maintenance activities. If an activity is not listed, you can type the activity into the line “Add” using the control modules key pad.



Diagnostics and Tests

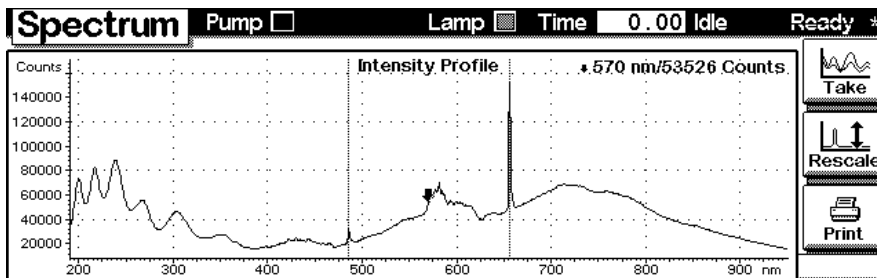
Tests screen

From the System screen use the F3 key (**Tests**) to select the DAD or MWD. Several tests are available to test the detector. Additional tests are listed in the function box. Refer to “[Test Functions](#)” in the Service Manual for more information on the tests.



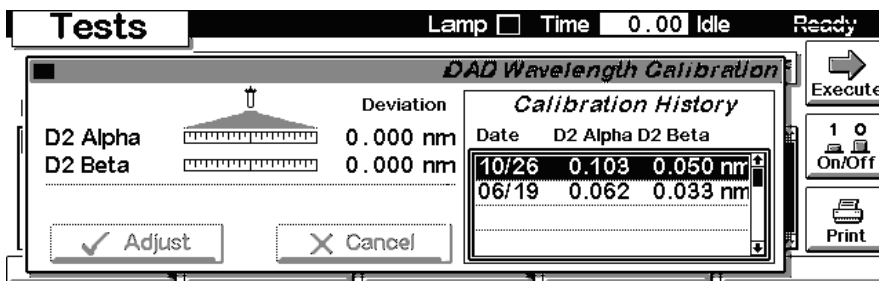
Intensity Test

Use the F5 key (**Intensity**) to get the instrument profile (example with UV and Vis lamp on). To redo the test press key F8 (**Take**).



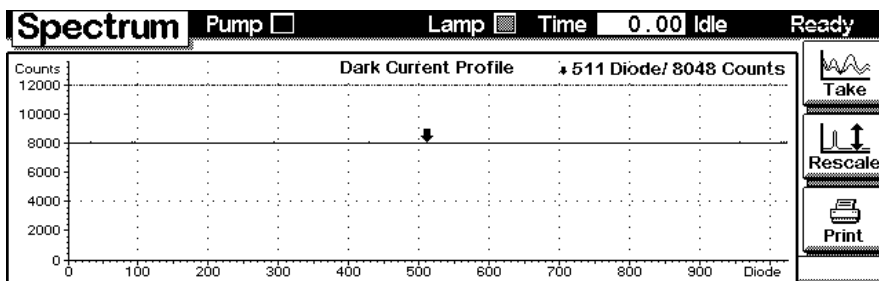
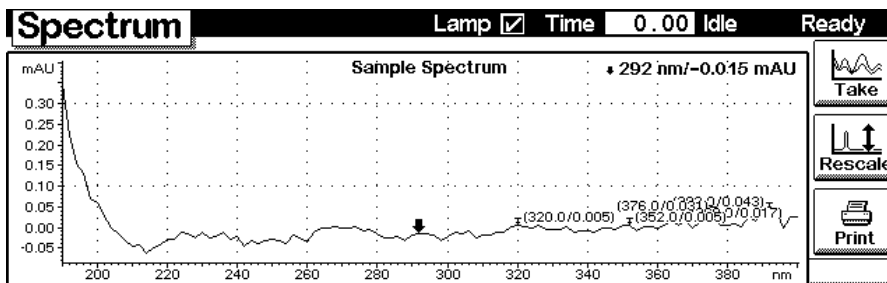
Wavelength Calibration

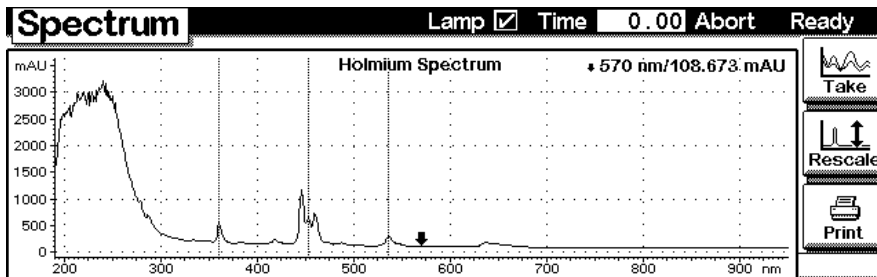
Use the F1 key (**Calibrate**) and then F8 key (**Execute**) to start the detector wavelength calibration (with water in the flow cell or cell removed). If a deviation is found, press **Adjust**.



Sample, Holmium and Dark Current Spectrum

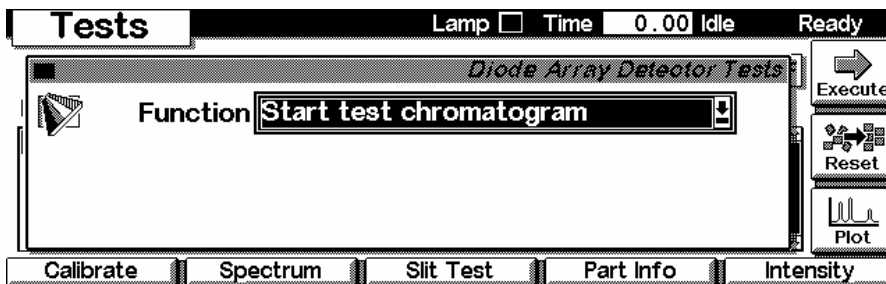
Use the F2 key (**Spectrum**) to take a spectrum (sample, dark current or holmium). Use the Left/Right arrow to move the cursor within the spectrum to find the wavelength of interest.



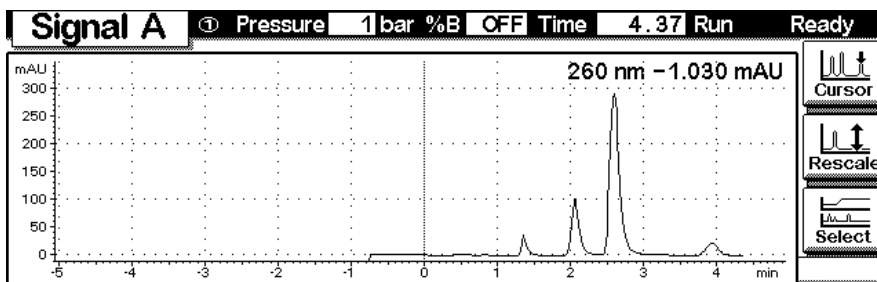


Built-in Test Chromatogram (Simulation)

To start the built-in test chromatogram, use the F8 key (**Execute**) to enable the simulation. Select **Start** to start a run (all modules in the Agilent 1100 system must be in ready state).

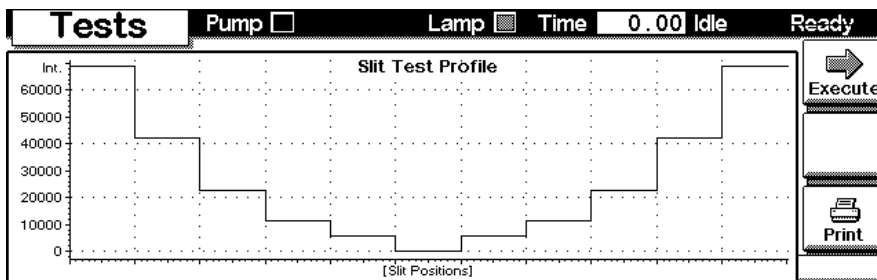


Use the F6 key (**Plot**) to view the signal. A simulated chromatogram (4 peaks) will repeat until the run is stopped. The signal is also available on the analog output. A change of the peak width will change the retention times.



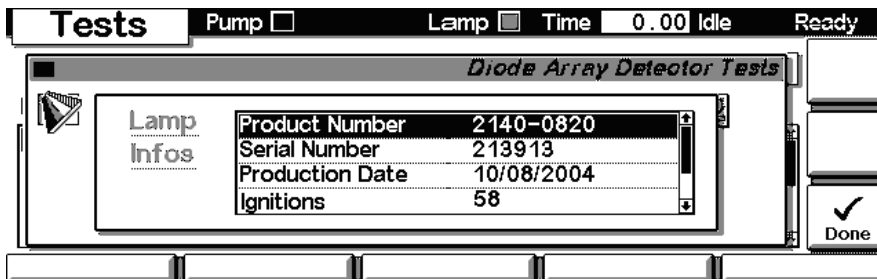
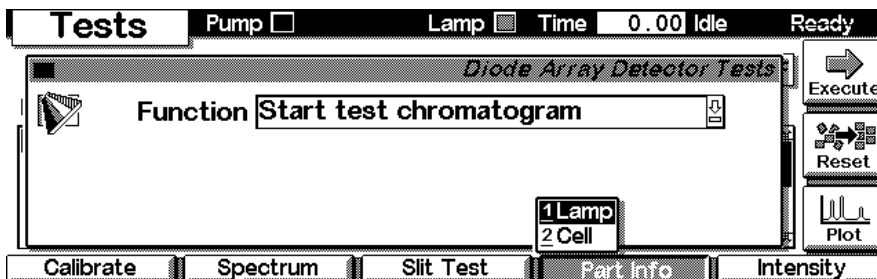
Slit Test

Use the F3 key (**Slit Test**) to test the movement of the electromechanical slit assembly.

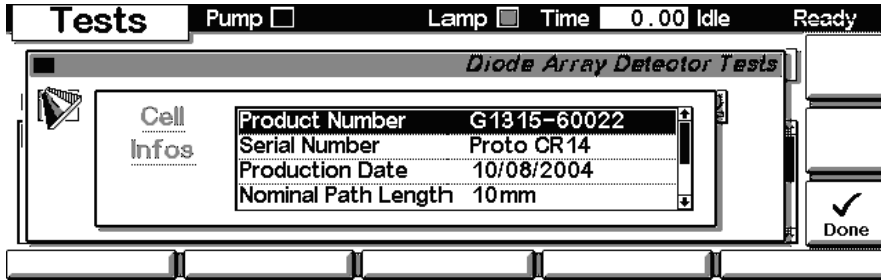


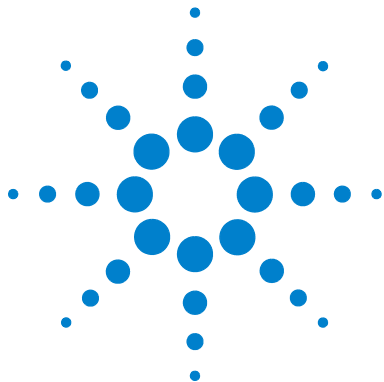
Part Info

Use the F4 key (**Part Info**) to display the ID tag information of the UV-lamp assembly or the flow cell assembly (for lamps/cells with ID tag only).



10 Control Module Screens





11 Appendix

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



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. Aligent Technologies assumes no liability for the customer's failure to comply with these requirements.

General

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

This instrument is designed and certified as a general purpose laboratory instrument for research and routine application only. It is not certified for in-vitro or medical applications.

Operation

Before applying power, comply with the installation section. Additionally the following must be observed.

Do not remove instrument covers when operating. Before the instrument is switched on, all protective earth terminals, extension cords, auto-transformers, and devices connected to it must be connected to a protective earth via a ground socket. Any interruption of the protective earth grounding will cause a potential shock hazard that could result in serious personal injury. Whenever it is likely that the protection has been impaired, the instrument must be made inoperative and be secured against any intended operation.

Make sure that only fuses with the required rated current and of the specified type (normal blow, time delay, and so on) are used for replacement. The use of repaired fuses and the short-circuiting of fuseholders must be avoided.

CAUTION

The operator of this instrument is advised that if the equipment is used in a manner not specified in this manual, the protection provided by the equipment may be impaired.

Some adjustments described in the manual, are made with power supplied to the instrument, and protective covers removed. Energy available at many points may, if contacted, result in personal injury.

Any adjustment, maintenance, and repair of the opened instrument under voltage should be avoided as much as possible. When inevitable, this should be carried out by a skilled person who is aware of the hazard involved. Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present. Do not replace components with power cable connected.

Do not operate the instrument in the presence of flammable gases or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.

Do not install substitute parts or make any unauthorized modification to the instrument.





Capacitors inside the instrument may still be charged, even though the instrument has been disconnected from its source of supply. Dangerous voltages, capable of causing serious personal injury, are present in this instrument. Use extreme caution when handling, testing and adjusting.

When working with solvents please observe appropriate safety procedures (e.g. goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet by the solvent vendor, especially when toxic or hazardous solvents are used.

Safety Symbols

Table 31 shows safety symbols used on the instrument and in the manuals.

Table 31 Safety Symbols

Symbol	Description
	The apparatus is marked with this symbol when the user should 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.
	Indicates eye damage may result from directly viewing the light produced by the deuterium lamp used in this product.

WARNING

A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

CAUTION

A caution alerts you to situations that could cause a possible loss of data. Do not proceed beyond a caution until you have fully understood and met the indicated conditions.

The Waste Electrical and Electronic Equipment (WEEE) Directive (2002/96/EC)

Abstract

The Waste Electrical and Electronic Equipment (WEEE) Directive (2002/96/EC), adopted by EU Commission on 13 February 2003, is introducing producer responsibility on all Electric and Electronic appliances from 13 August 2005.

NOTE



This product complies with the WEEE Directive (2002/96/EC) marking requirements. The affixed label indicates that you must not discard this electrical/electronic product in domestic household waste.

Product Category:

With reference to the equipment types in the WEEE Directive Annex I, this product is classed as a "Monitoring and Control instrumentation" product.

Do not dispose off in domestic household waste

To return unwanted products, contact your local Agilent office, or see www.agilent.com for more information.

Radio Interference

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

Test and Measurement

If test and measurement equipment is operated with equipment unscreened cables and/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.

Sound Emission

Manufacturer's Declaration

This statement is provided to comply with the requirements of the German Sound Emission Directive of 18 January 1991.

This product has a sound pressure emission (at the operator position) < 70 dB.

- Sound Pressure $L_p < 70$ dB (A)
- At Operator Position
- Normal Operation
- According to ISO 7779:1988/EN 27779/1991 (Type Test)

UV-Radiation

NOTE

This information is only valid for UV-lamps without cover (e.g. 2140-0590).

Emissions of ultraviolet radiation (200-315 nm) from this product is limited such that radiant exposure incident upon the unprotected skin or eye of operator or service personnel is limited to the following TLVs (Threshold Limit Values) according to the American Conference of Governmental Industrial Hygienists:

Table 32 UV-Radiation Limits

Exposure/day	Effective Irradiance
8 hours	0.1 $\mu\text{W}/\text{cm}^2$
10 minutes	5.0 $\mu\text{W}/\text{cm}^2$

Typically the radiation values are much smaller than these limits:

Table 33 UV-Radiation Typical Values

Position	Effective Irradiance
Lamp installed, 50 cm distance	Average 0.016 $\mu\text{W}/\text{cm}^2$
Lamp installed, 50 cm distance	Maximum 0.14 $\mu\text{W}/\text{cm}^2$

Solvent Information

Observe the following recommendations on the use of solvents.

Flow Cell

Avoid the use of alkaline solutions (pH > 9.5) which can attack quartz and thus impair the optical properties of the flow cell.

Prevent any crystallization of buffer solutions. This will lead into a blockage/damage of the flow cell.

If the flow cell is transported while temperatures are below 5 degree C, it must be assured that the cell is filled with alcohol.

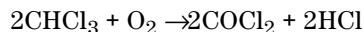
Aqueous solvents in the flow cell can built up algae. Therefore do not leave aqueous solvents sitting in the flow cell. Add small % of organic solvents (e.g. Acetonitrile or Methanol ~5%).

Solvents

Brown glass ware can avoid growth of algae.

Always filter solvents, small particles can permanently block the capillaries. Avoid the use of the following steel-corrosive solvents:

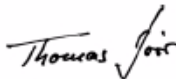



- Solutions of alkali halides and their respective acids (for example, lithium iodide, potassium chloride, and so on).
- High concentrations of inorganic acids like nitric acid, sulfuric acid especially at higher temperatures (replace, if your chromatography method allows, by phosphoric acid or phosphate 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, di-isopropylether) such ethers should be filtered through dry aluminium 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, ethylene diamine tetra-acetic acid).
- Mixtures of carbon tetrachloride with 2-propanol or THF.

Declaration of Conformity for HOX2 Filter

Declaration of Conformity			
We herewith inform you that the			
Holmium Oxide Glass Filter (Type Hoya HY-1) (Part No. 79880-22711)			
meets the following specification of absorbance maxima positions:			
361.0 nm – 418.9 nm – 453.7 nm – 536.7 nm			
(spectral bandwidth: 2 nm).			
Agilent Technologies guarantees the traceability of the specified absorbance maxima to a National Institute of Standards & Technology (NIST) Holmium Oxide Solution Standard with a lot-to-lot tolerance of ± 0.3 nm.			
The wavelength calibration filter built into the Agilent Technologies UV-VIS detectors			
			Wavelength accuracy:
Product No.	79880A	(1090 system)	± 1 nm
	79883A	(1090 system)	± 1 nm
	79854A	(1050 series)	± 1 nm
	G1306A	(1050 series)	± 1 nm
	G1315A/B/C	(1100 series)	± 1 nm
	G1365A/B/C	(1100 series)	± 1 nm
	G1600A		± 1 nm
is made of this material and meets these specifications. It is, therefore, suitable for wavelength calibration of these detectors within the specified wavelength accuracy of the respective detector over its wavelength range.			
April 13, 2005			
----- (Date)			
			
----- (Engineering Manager)		----- (Quality Manager)	
P/N 89550-90501 		Revision: D Effective by: April 13, 2005	
		 Agilent Technologies	

Agilent Technologies on Internet

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

<http://www.agilent.com>

Select “Life Sciences & Chemical Analysis Solutions” under “Support”

It will provide also the latest firmware of the Agilent 1100 series modules for download.

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In This Book

This manual contains the user information about the Agilent 1100 Series Diode Array and Multiple Wavelength Detector SL.

The manual describes the following:

- installing the detector,
- introduction to the diode array detector and its optimization,
- basic diagnostics and troubleshooting,
- maintenance,
- parts and materials for maintenance,
- control module screens
- regulatories.

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