Agilent MassCode UV Module

User Manual

Agilent Technologies

Notices

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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.

In This Manual...

This manual covers the Agilent MassCode UV Module (Agilent model number G5201A), a component of Agilent's MassCode PCR System.

1 Introduction to the MassCode UV Module

This chapter gives an introduction to the MassCode UV module (Agilent model number G5201A), instrument overview and electrical connections.

2 Site Requirements and Specifications

This chapter provides information on environmental requirements and physical specifications.

3 Installing the UV Module

This chapter provides information on unpacking, stack considerations, installation of the module, and an overview of the module's status indicators.

4 Maintenance

This chapter describes the maintenance of the MassCode UV Module.

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4 Maintenance

1 Introduction to the MassCode UV Module

This chapter gives an introduction to the MassCode UV module (Agilent model number G5201A), instrument overview and electrical connections.

Introduction to the UV Module

The MassCode UV Module is a component of Agilent's MassCode PCR system (LCMS SQ APCI MassCode PCR Bundle, Agilent part no. G6080AA). The UV module is designed to UV-irradiate MassCode PCR samples, in order to release photocleavable MassCode tags from the MassCode PCR amplicons prior to mass spectrometry.

The MassCode UV Module includes the following components and features:

- User-replaceable UV lamp assembly for sample irradiation
- User-replaceable UV module tubing tray assembly for sample flow during irradiation (see Table 1)
- Easy front access to UV lamp and tubing tray assemblies for fast replacement

The UV module should be installed in the MassCode PCR system stack positioned just upstream of the mass spectrometer. See Installing the UV Module for complete installation instructions.

For UV module specifications, see Physical Specifications on page 17.

WARNING **Ensure the proper usage of the equipment, or the protection provided by the equipment may be impaired.**

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

Overview of the Hydraulic Path

The hydraulic path of the MassCode UV Module initiates at a connection to the autosampler, continues through the tubing tray assembly, and terminates at a connection to the mass spectrometer. The disposable tubing tray assembly is made up of a continuous, 4-m length of Tefzel tubing routed in a serpentine pattern through a plastic tray. The configuration of the Tefzel tubing in the assembly has been optimized to provide optimal UV-exposure time for the MassCode PCR samples.

Table 1 UV-module tubing data

Specification	Value
Maximum pressure*	100 bar (10 MPa)
Tubing i.d.	0.01 in (0.254 mm)
Tubing o.d.	0.0625 in (1.588 mm)
Materials in contact with solvent	Tefzel (ETFE)

* Maximum isocratic pump pressure setting to be applied in ChemStation.

Electrical Connections

- The APG Remote connector is used to connect the MassCode UV Module to the 1260 Series Isocratic Pump (G1310B) via an APG Remote Cable. Using the APG Remote connector for the UV module-isocratic pump interface allows integrated control of the UV module with other stack components during an experimental run.
- The power input socket accepts a line voltage of 120 – 240 volts AC with a line frequency of 50 or 60 Hz. Maximum power consumption is 120 VA. There is no voltage selector on your module because the power supply has wide-ranging capability. There are no externally accessible fuses, because automatic electronic fuses are implemented in the power supply.
- The RS-232 and ICSP connectors are used only to provide signals for Agilent service.

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

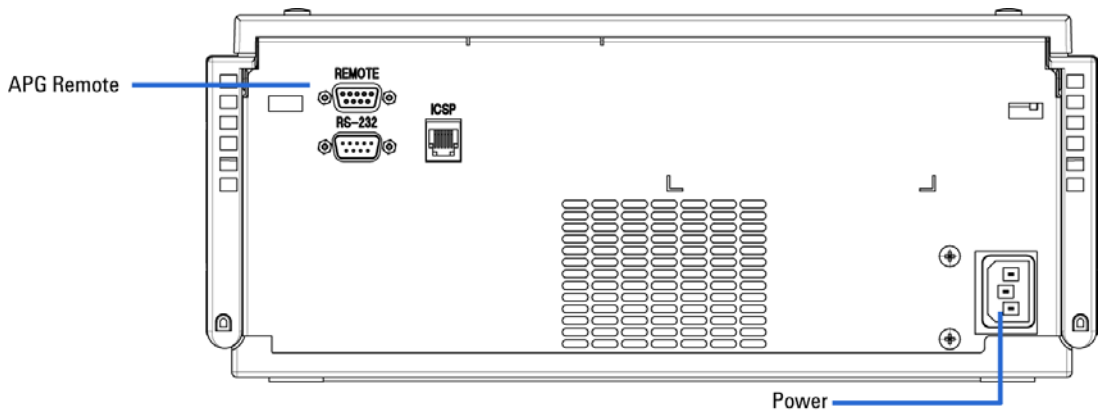


Figure 1 Rear view of MassCode UV Module

Instrument Layout

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

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

1 Introduction to the MassCode UV Module

2
Site Requirements and Specifications

This chapter provides information on environmental requirements and physical specifications.

Site Requirements

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

Power Consideration

The module power supply has wide ranging capabilities (see Table 2 on page 17). It accepts any line voltage in the 120 – 240 volts AC range. Consequently, there is no voltage selector in the rear of the module. There are also no externally accessible fuses, because automatic electronic fuses are implemented in the power supply.

WARNING

Module is partially energized when switched off, as long as the power cord is plugged in.

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

→ Make sure that it is always possible to access the power plug.

→ Remove the power cable from the instrument before doing any repair or maintenance tasks.

WARNING

Incorrect line voltage at the module

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

→ Connect your module to the specified line voltage.

Power Cords

Different power cords are offered as options with the module. All power cords have the same format female connector that plugs into the power-input socket at the rear of the module. The different power cord options consist of different male ends designed to match the wall socket of a particular country or region.

WARNING

Absence of ground connection or use of unspecified power cord

The absence of ground connection or the use of unspecified power cord can lead to electric shock or short circuit.

→ 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

Use of unsupplied cables

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

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

WARNING

Unintended use of supplied power cords

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

→ Never use the power cords that Agilent Technologies supplies with this instrument for any other equipment.

Bench Space

The module dimensions and weight (see Table 2 on page 17) allow placement of the instrument on almost any desk or laboratory bench. It needs an additional 2.5 cm (1.0 inch) of space on either side and approximately 8 cm (3.1 inches) in the rear for air circulation and electric connections.

If the bench will carry the MassCode PCR System, make sure that the bench is designed to bear the weight of all modules (approximately 105 kg/230 lbs).

The UV module must be operated in a horizontal position and must be installed on a level surface to ensure proper operation of the leak detection system.

Environment

Your module will work within specifications at ambient temperatures and relative humidity as described in Table 2 on page 17.

CAUTION

Condensation within the module

Condensation will damage the system electronics.

→ Do not store, ship or use your module under conditions where temperature fluctuations could cause condensation within the module.

→ If your module was shipped in cold weather, leave it in its box and allow it to warm slowly to room temperature to avoid condensation.

Physical Specifications

Table 2 Physical Specifications for the MassCode UV Module, Agilent model number G5201A

Type	Specification	Comments
Weight	7.8 kg 17 lbs	
Dimensions (height × width × depth)	140 × 345 × 435 mm 5.5 × 13.5 × 17 inches	
Line voltage	120 – 240 VAC	Wide-ranging capability
Line frequency	50 or 60 Hz	
Power consumption	Max 120 VA, 85 W	Maximum
Ambient operating temperature	15–35 °C (59–95 °F)	
Humidity	< 85% RH at 35 °C	Non-condensing
Operating altitude	Up to 2000 m (6500 ft)	
Safety standards: IEC, CSA, UL, EN	Installation Category II, Pollution Degree 2	For indoor use only

3
Installing the UV Module

This chapter provides information on unpacking, stack considerations, installation of the module, and an overview of the module's status indicators.

Unpacking the UV Module

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 instrument may have been damaged during shipment.

CAUTION

"Defective on arrival" problems

If there are signs of damage, please do not attempt to install the module. Inspection by Agilent is required to evaluate if the instrument is in good condition or damaged.

→ Notify your Agilent sales and service office about the damage.

→ An Agilent service representative will inspect the instrument at your site and initiate appropriate actions.

Condensation

Exposure to condensation may damage the module electronics and should be avoided.

CAUTION

Condensation within the module

→ Do not store, ship or use your module under conditions where temperature fluctuations could cause condensation within the module.

→ If your module was shipped in cold weather, leave it in its box and allow it to warm slowly to room temperature to avoid condensation.

Delivery Checklist

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

Table 3 MassCode UV Module (model no. G5201A) Checklist

Description	Quantity
UV module	1
Power cable	1
APG remote cable (part no. 5061-3378)	1
UV lamp assembly (part no. G5201-60100)	2
UV module tubing tray assembly (part no. G5201-60000)	2

Optimizing the Stack Configuration

To ensure optimum performance of the MassCode UV module in the Agilent 1260 series system, use the configuration shown in Figure 2. This configuration optimizes the system flow path, ensuring minimum delay volume and minimizes the bench space required.

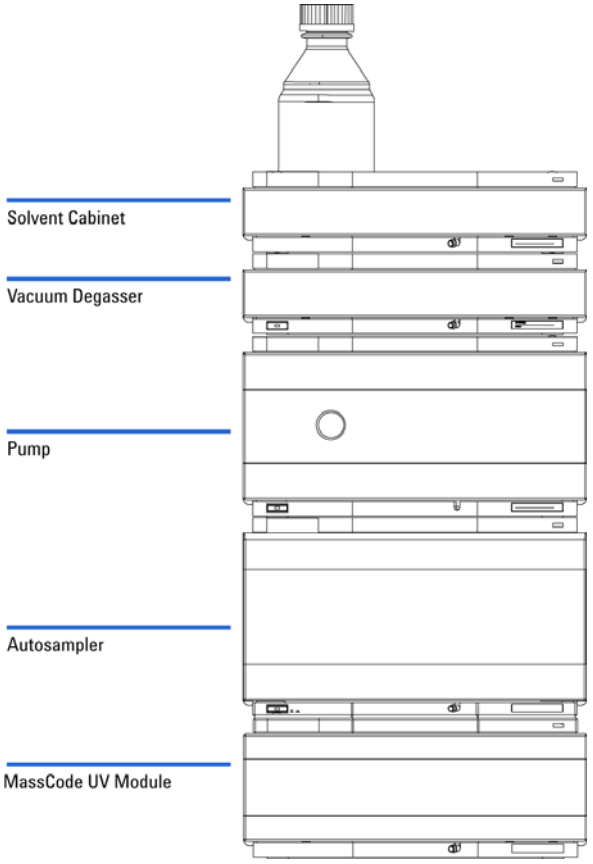


Figure 2 Recommended stack configuration for LC modules of the MassCode PCR system including MassCode UV Module (front view)

Installing the UV Module in the MassCode PCR System Stack

Preparations	Locate bench space. Provide power connections. Unpack the UV module.
Parts required	MassCode UV module (model no. G5201A) Autosampler (model no. G1367E) Isocratic Pump (model no. G1310B) Vacuum Degasser (model no. G1322A) Solvent Cabinet 2 APG remote cables CAN cable Module power cords

Use the following instructions to install the UV module in the Agilent MassCode PCR System (Agilent part no. G6080AA). If adding the G5201A MassCode UV Module to a previously-installed HPLC, see page 26.

1 Place the UV module on the bench in a horizontal position.

2 Ensure the line power switch at the front of the UV module is OFF (with the line power switch protruding and the green light not illuminated).

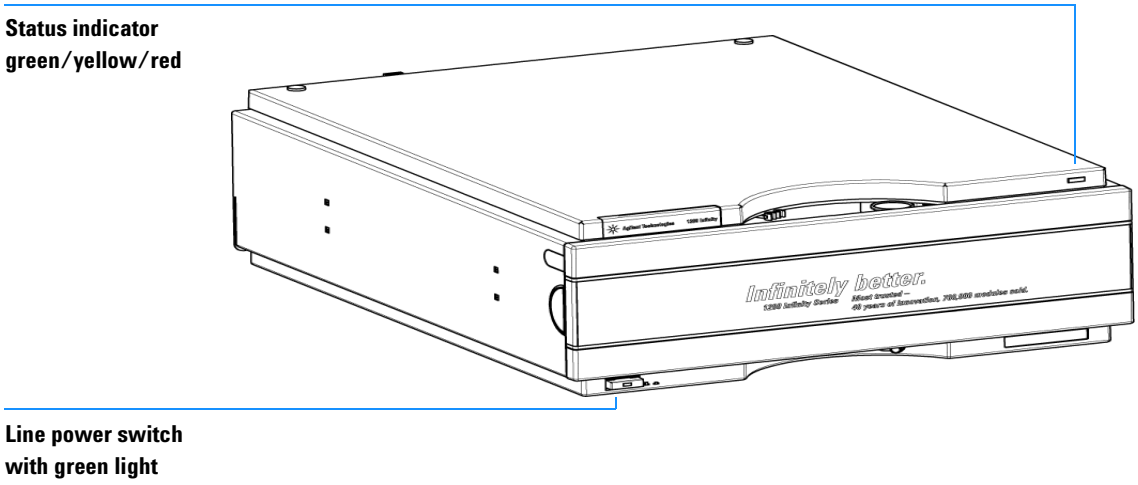


Figure 3 Front View of UV module

NOTE The module is turned ON when the line power switch is pressed and the green indicator light is illuminated. The module is turned OFF when the line power switch is protruding and the green light is OFF.

3 Place the autosampler module, isocratic pump module, vacuum degasser module, and solvent cabinet on top of the MassCode UV module, in the stack configuration shown in Figure 2 on page 22.

4 Connect an APG remote cable between the back of the MassCode UV module and the back of the isocratic pump, using ports labeled REMOTE.

5 Connect a second APG remote cable to the REMOTE port at the back of the autosampler, for later connection to the LC/MS.

6 Connect a CAN cable between the back of the isocratic pump and the back of the autosampler, using the CAN bus ports. See the instruction manuals for the 1260 Infinity Isocratic Pump (publication G1310-90012) and for the 1260 Infinity High Performance Autosampler (publication G1367-90012) for more information.

7 Connect the power cable provided with each module to the power input socket at the rear of each module. Leave all power cables disconnected from the power line.

NOTE To disconnect a module from line, unplug the power cord. Make sure that it is always possible to access the power plug for each module.

8 Install the UV lamp assembly and the tubing tray assembly (see "Installing the UV Lamp Assembly and Tubing Tray Assembly in the Module" on page 27).

Installing the UV Module in an Existing HPLC Stack

Preparations	Unpack the UV module.
Parts required	MassCode UV module Agilent LC/MS System (previously installed) UV Module power cord

Use the following instructions to add the G5201A MassCode UV Module to a previously installed HPLC.

1 Disconnect each of the HPLC modules in the stack from the power line.

NOTE To disconnect a module from line, unplug the power cord. Make sure that it is always possible to access the power plug for each module.

2 Install the G5201A UV module in the flow path directly between the wellplate autosampler and the LC/MS.

3 Disconnect the APG remote cable that connects the isocratic pump to the vacuum degasser in the existing HPLC stack. An APG remote connection to the vacuum degasser is not required.

4 Connect the APG remote cable between the back of the MassCode UV module and the back of the isocratic pump, using ports labeled REMOTE.

5 Verify that a second APG cable connects the REMOTE ports of the autosampler and the LC/MS.

6 Verify that a CAN cable connects the CAN bus ports of the isocratic pump and the autosampler.

7 Connect the G5201A UV module power cable to the power input socket at the rear of the module. Leave the power cable disconnected from the power line.

8 Install the UV lamp and the tubing tray assemblies (see "Installing the UV Lamp Assembly and Tubing Tray Assembly in the Module" on page 27).

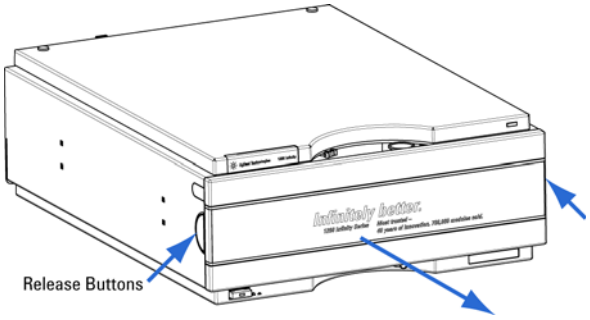
NOTE It is important to use only the prescribed length and volume of tubing supplied with the G5201A UV Module to ensure proper flow and detection of the MassCode PCR samples.

Installing the UV Lamp Assembly and Tubing Tray Assembly in the Module

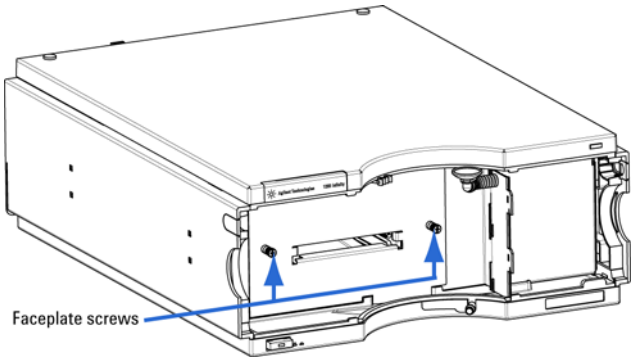
Preparations	Module is installed in the MS system.
Parts required	UV lamp assembly (part no. G5201-60100) UV module tubing tray assembly (part no. G5201-60000) Pozidriv #1 screwdriver (part no. 8710-0899)

1 Ensure the line power switch at the front of the module is OFF (with the line power switch protruding).

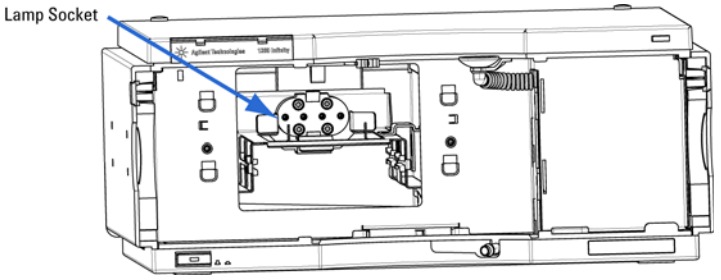
2 Press the release buttons and remove the front cover to have access to the UV lamp and tubing tray assembly installation areas.



3 Remove the front metal faceplate after loosening the two screws on the plate using a Pozidriv #1 screwdriver.

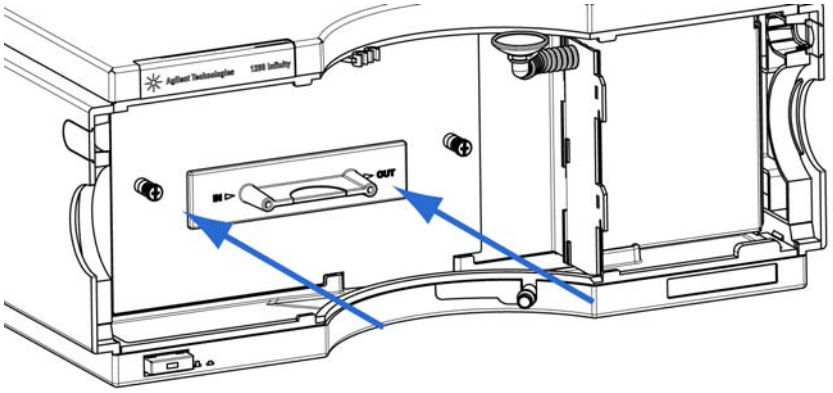


4 Hold the lamp by the end of the bulb and slide the lamp assembly into the module cavity horizontally. Use the guides in the cavity to assist with positioning, and press the bulb firmly into the socket. Tug the bulb gently to verify that it has been engaged by the socket springs.



5 Reattach the front metal faceplate and secure the plate by tightening the two faceplate screws. The back of the metal faceplate has a small protrusion that must be positioned in the top, left corner during installation.

6 Install the tubing tray assembly by sliding the assembly into the open slot in the metal faceplate, until the front plate of the assembly contacts the metal faceplate. Make sure that the tubing tray is oriented as shown, with input tubing (labeled IN) at left and the output tubing (labeled OUT) at right, before sliding the assembly into the module.



7 Record the tray installation date on the sticker provided on the module to indicate when the tubing tray assembly will need to be replaced.

8 Replace the front cover of the module, while pulling the tubing through the opening at the top of the cover.

NOTE The UV module should only be operated with the front cover in place.

9 Verify that the UV lamp and tubing tray assemblies were properly installed using the LED status indicator on the top right corner of the module.

a Plug the power cord into the appropriate wall socket.

b Press the line power switch to the ON position. Once power is applied, you may hear an audible click when the solenoid in the UV module engages the tubing tray assembly to prevent removing the tray while the UV lamp is turned on.

When both assemblies are properly installed, the LED status indicator will display continuous yellow illumination during UV lamp warm-up (10 to 30 minutes), and then continuous green illumination, indicating *Ready* status. If either the UV lamp assembly or the tubing tray assembly is not properly installed, the LED will display an intermittent red/yellow illumination pattern, indicating an *Error* status.

NOTE When first powered ON, the status indicator displays a brief initialization sequence of red, yellow, then green illumination, before displaying one of the stable conditions described above.

Establishing Flow Connections to the Module

Preparations	Module is installed in the MassCode PCR system stack, with UV lamp and tubing tray assemblies installed. Mass Spectrometer is unpacked and prepared for flow connections.
Parts required	Two male PEEK fittings (included in UV module tubing tray assembly package, PN G5201-60000) Plastic tubing cutter (Agilent PN 8710-1930)

1. Ensure the line power switch at the front of the MassCode UV Module is OFF (with the line power switch protruding).
2. Remove the front cover of the module to allow visual access to the labels on the tubing tray assembly.
3. Cut a small amount of tubing (<1 cm) from each end of tubing that protrudes from the tray using Agilent's plastic tubing cutter. It is important to remove any beveled or ragged edges from the tubing before connecting the tubing to other modules.
4. Attach a male PEEK fitting to each cut end of tubing. Slide the fitting onto the tubing, leaving approximately 1 cm of tubing extending from the fitting.
5. Locate the section of tubing entering the UV module on the left side of the tray (labeled IN) and connect the end fitting to the autosampler at valve position 6.
6. Locate the section of tubing exiting the UV module on the right side of the tray (labeled OUT) and connect the end fitting to the inlet filter of the 6100 Series Mass Spectrometer.
7. Replace the front cover of the module, pulling the tubing through the opening at the top of the cover. Excess tubing may be stored behind the front cover.

WARNING

Toxic, flammable and hazardous solvents, samples and reagents

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

→ When working with solvents observe appropriate safety procedures (for example wear goggles, safety gloves and protective clothing) as described in the material handling and safety data sheet supplied by the solvent vendor and follow good laboratory practices.

Overview of the MassCode Module Status Indicators

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

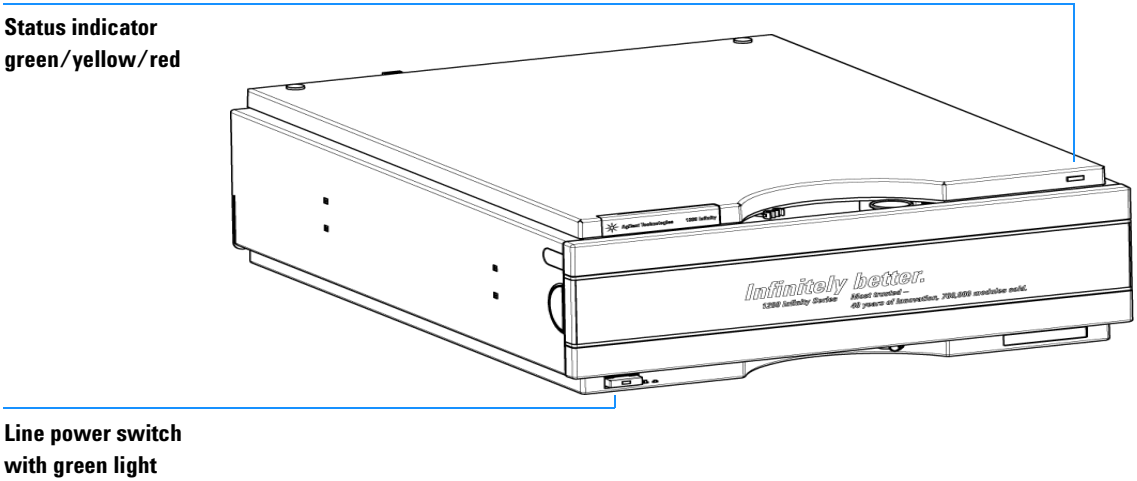


Figure 4 Front View of UV module

Power Supply Indicator

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

Module Status Indicator

The UV module status indicator indicates one of the following possible conditions:

- A *green* status indicator indicates *Run* condition, in which the module is ready to perform a run or has a run in progress.
- A *yellow* indicator indicates a *Not-ready* condition. The module is in a not-ready state when it is waiting for a specific condition to be reached (for example, UV lamp warm-up or completion of a self-test).
- A *yellow-red* flashing indicator status indicates a module assembly *Error* condition. Errors that produce this status include a UV lamp assembly fault (end-of-life or improper installation) or an uninstalled or improperly installed tubing tray assembly. An error condition always interrupts analysis. See Maintenance for instructions.
- A *red* indicator status indicates an internal *Error* condition (for example, leak or defective internal components). An error condition always interrupts analysis.
- When the status indicator is OFF, the module is powered off.

NOTE When first powered ON, the status indicator displays a brief initialization sequence of red, yellow, then green illumination, before displaying one of the stable conditions described above.

4 Maintenance

This chapter describes the maintenance of the MassCode UV Module.

Overview of Maintenance

The following pages describe maintenance of the MassCode UV Module.

Table 4 MassCode UV Module Maintenance Tasks

Procedures	Typical Frequency	Notes
Cleaning the module	If leak or spill occurs	
UV lamp assembly exchange	Annually/after 3600 hours operation or if lamp fails	UV lamp end-of-life is signalled by status indicator state of flashing yellow-red.
Tubing tray assembly exchange	Every 3 months/after 1200 hours usage or if leak originating in tubing occurs	
Leak correction	If leak occurs	Check for leaks.
Leak handling system replacement	If broken or corroded	Check for leaks.

Cleaning the Module

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

WARNING

Liquid dripping into the electronic compartment of your module.

Liquid in the module electronics can cause shock hazard and damage the module.

→ Do not use an excessively damp cloth during cleaning.

→ Do not allow solvent to flow into the module from solvent lines or open fittings.

Exchanging the UV Lamp Assembly

When required	Replace if lamp fails, indicated by yellow-red flashing status indicator. For preventative maintenance, replace annually, or after 3600 hours of operation, whichever comes first.
Tools required	Pozidriv #1 screwdriver (part no. 8710-0899)
Parts required	UV lamp assembly (part no. G5201-60100)

WARNING

Injury by touching hot lamp

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

→ If so, wait for lamp to cool down.

WARNING

Breakage of the glass lamp may result in injury, including cuts and mercury exposure

→ Handle lamps carefully to avoid breakage.

→ If breakage occurs, use appropriate hazardous material procedures to clean up broken glass and mercury.

WARNING

Ultraviolet radiation (UVC) exposure

The lamp emits Ultraviolet radiation (UVC) when under power. UVC radiation is harmful to the skin and the eyes either from direct or reflected radiation.

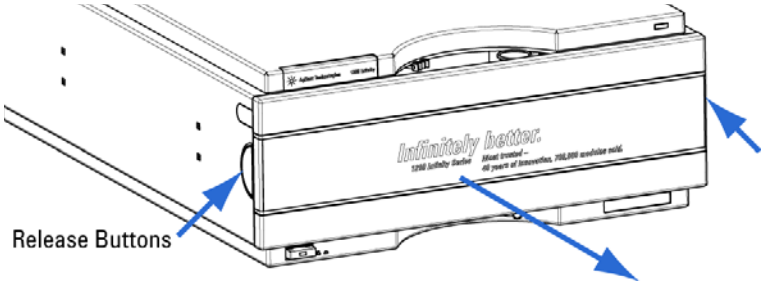
The module is designed with safety features that protect the user against UVC exposure when the module is used in the manner specified in this instruction manual. These features include interlock mechanisms that allow UV emissions from the lamp only when protective structures, including the tubing tray assembly and metal faceplate, are properly installed.

→ Do not disable the module's safety interlocks or other safety features.

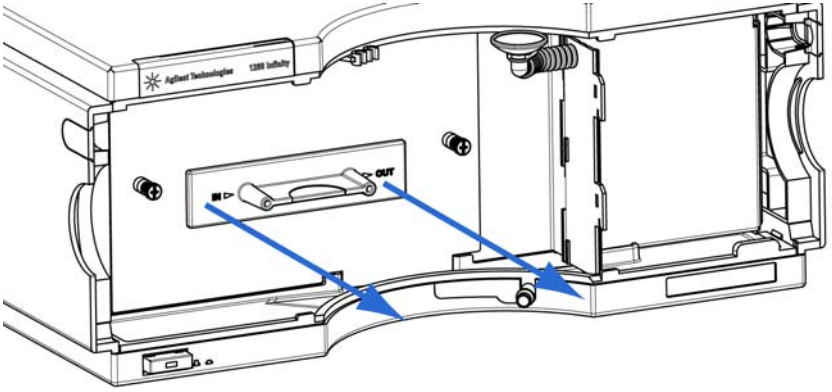
→ Do not use the lamp outside of the module for illumination or other purposes.

1 Ensure the line power switch at the front of the module is OFF (with the line power switch protruding).

2 Press the release buttons and remove the front cover.

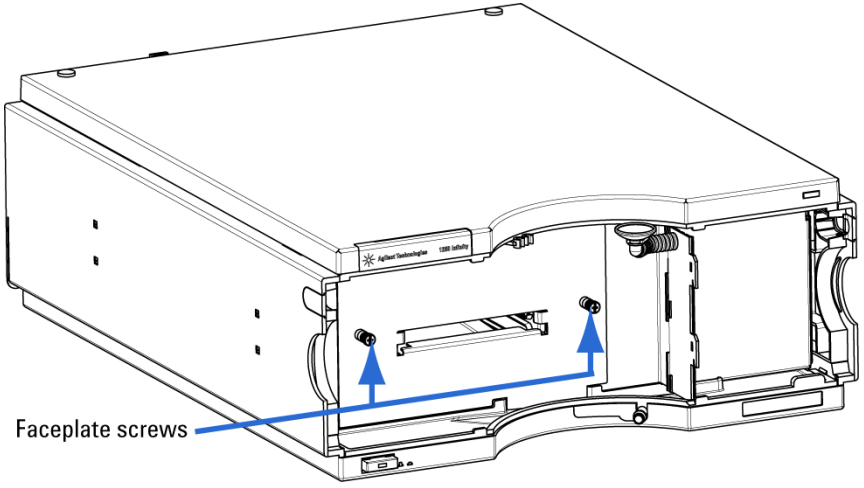


3 Remove the tubing tray assembly.

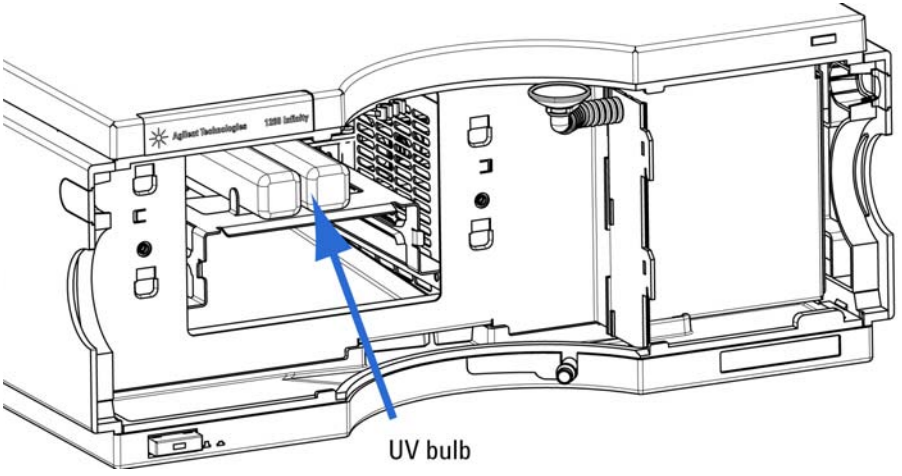


CAUTION Do not attempt to remove the tubing tray assembly when the power is ON. The module is designed with a safety interlock feature that prevents removal of the assembly while power is ON.

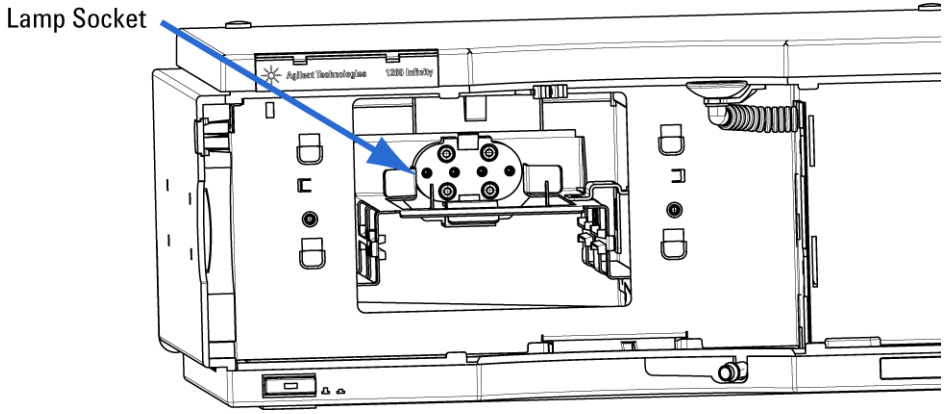
4 Remove the front metal faceplate after loosening the two screws on the plate using a Pozidriv #1 screwdriver.



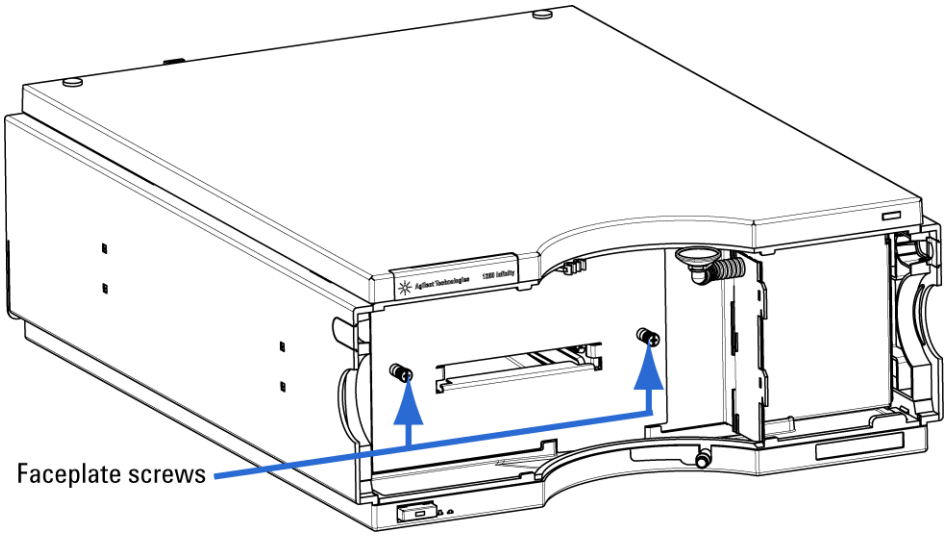
5 Grasp the UV bulb firmly and pull the lamp assembly out of the socket.



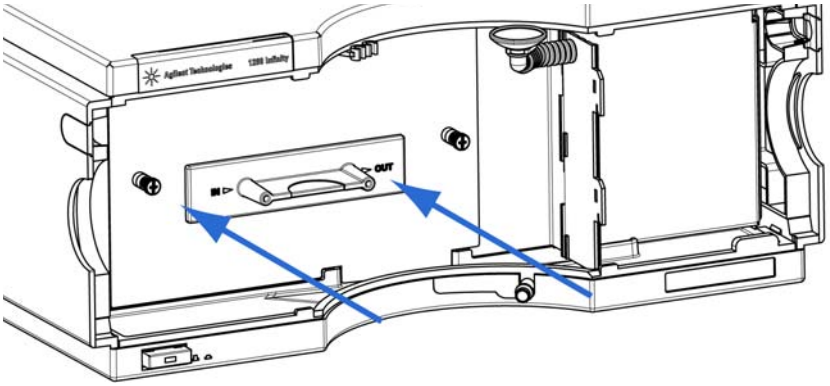
6 Install the new UV lamp assembly. Use the guides in the cavity to assist with positioning, and press the bulb firmly into the socket. Tug the bulb gently to verify that it has been engaged by the socket springs.



7 Replace the front metal faceplate and secure the plate by tightening the two faceplate screws.



8 Install the tubing tray assembly by sliding the assembly into the open slot in the metal faceplate.



9 Replace the front cover of the module, while pulling the tubing through the opening at the top of the cover.

NOTE The UV module should only be operated with the front cover in place.

CAUTION The UV lamp contains mercury (Hg). Manage lamp waste in accordance with local disposal laws.

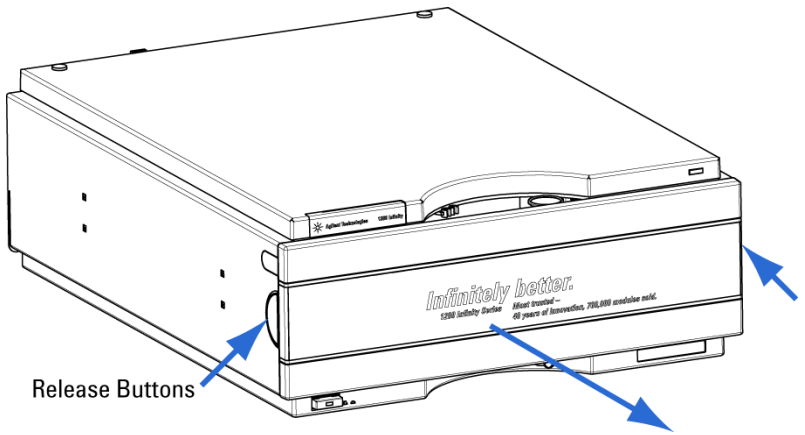
Exchanging the Tubing Tray Assembly

When required	Replace if tubing leak detected. For preventive maintenance, replace every three months, or after 1200 hours of operation, whichever comes first.
Tools required	None
Parts required	UV module tubing tray assembly (part no. G5201-60000)

NOTE It is normal for the UV module tubing to display some brown discoloration during the three month/1200 hours of operation usage interval. The tubing tray assembly does not need to be replaced due to this color change.

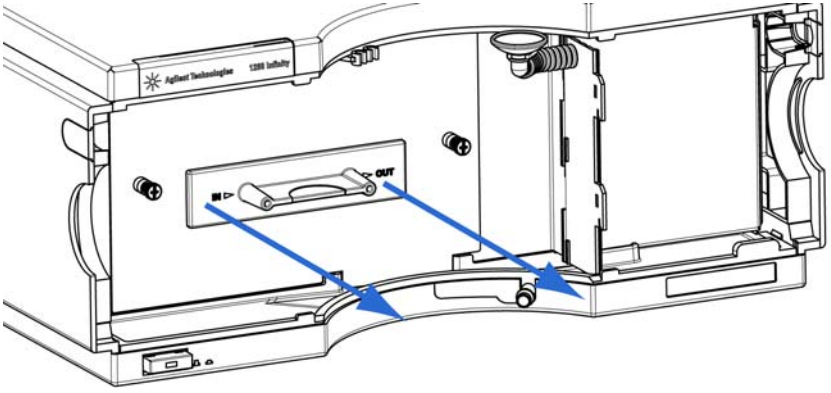
1 Ensure the line power switch at the front of the module is OFF (with the line power switch protruding).

2 Press the release buttons and remove the front cover.



3 Remove the used tubing tray assembly.

CAUTION Do not attempt to remove the tubing tray assembly when the power is ON. The module is designed with a safety interlock feature that prevents removal of the assembly while power is ON.



4 Install the new tubing tray assembly by sliding the assembly into the open slot in the metal faceplate, until the front plate of the tubing assembly contacts the metal faceplate.

5 Record the tray installation date on the sticker provided on the module to indicate future tubing tray replacement needs.

6 Replace the front cover of the module, while pulling the tubing through the opening at the top of the cover.

NOTE The UV module should only be operated with the front cover in place.

Correcting Leaks and Replacing the Leak Handling System

When required	If a leakage has occurred or leak handling parts are broken or corroded.
Tools required	Tissue
Parts required	Leak funnel (part no. 5061-3356) Leak funnel holder (part no. 5041-8389) Leak tubing (120 mm) (part no. 0890-1711)

Overview of the Leak Handling System

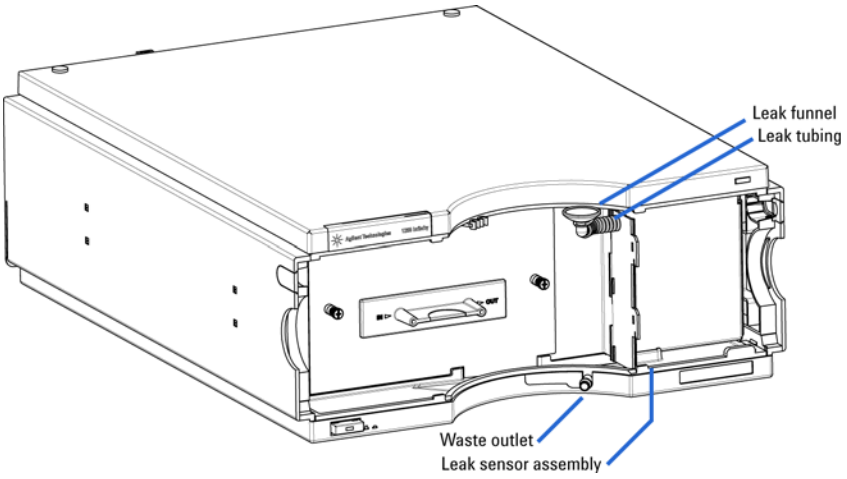


Figure 5 MassCode UV Module leak handling system components

Correcting Leaks

1 Unplug the UV module from the power line.

2 Ensure the line power switch at the front of the module is OFF (with the line power switch protruding).

3 Remove the front cover.

4 Use tissue to dry the leak sensor area.

5 Remove the tubing tray assembly from the module.

CAUTION Do not attempt to remove the tubing tray assembly when the power is ON. The module is designed with a safety interlock feature that prevents removal of the assembly while power is ON.

6 Observe the capillary connections and the tubing sample flow area for leaks and correct, if required.

7 Replace the front cover.

Replacing Leak Handling System Parts

1 Remove the front cover.

2 Pull the leak funnel out of the leak funnel holder.

3 Pull the leak funnel with the tubing out of its location.

4 Replace the leak funnel and/or the tubing.

5 Insert the leak funnel with the tubing in its position.

6 Insert the leak funnel into the leak funnel holder.

7 Replace the front cover.

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In This Book

This manual contains the technical reference information about the MassCode UV Module.

Version A

G5201-90000
Revision A

Agilent Technologies