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Agilent Cary 600 Series FTIR Spectrometers and Microscopes

User's Guide



Agilent Technologies

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Safety Notices

CAUTION

A **CAUTION** 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 damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

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.

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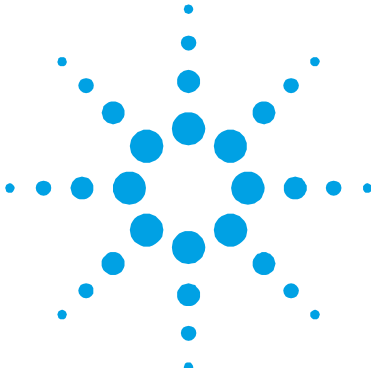
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Your Agilent Cary 600 Series FTIR spectrometers, microscopes and accessories have been carefully designed so that when used properly you have an accurate, fast, flexible and safe analytical system. Unless specified otherwise, this manual covers the Agilent Cary 660, 670, 680 Spectrometers and the Agilent Cary 610 FTIR Microscope.

If you have purchased an Agilent Cary 620 FTIR microscope, see the Agilent Cary 620 FTIR Microscope User's Guide.

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Information about safety practices appears throughout the documentation (both hard copy and online) provided with your instrument and accessories. Before using the instrument or accessories, you must thoroughly read these safety practices.

Observe all relevant safety practices at all times.

General

Operation of an Agilent Cary 600 Series FTIR spectrometer and microscope involves the use of compressed gases, high voltage energy, and hazardous materials including liquid nitrogen, tungsten halogen source lamps that emit ultraviolet radiation and a helium-neon laser operating in the visible region at 632.8 nanometers. The instrument is rated at Class II (USA) or Class 2 (European). Careless, improper or unskilled use of this spectrometer or microscope can cause death or serious injury to personnel, and/or severe damage to equipment and property. You may choose to wear personal protective equipment, such as optical safety glasses, but this is not required for this instrument.

The spectrometer incorporates interlocks and covers that are designed to prevent inadvertent contact with any potential hazards. If the instrument is used in any manner not specified by Agilent, this protection may be impaired. Develop safe working habits that do not depend upon the correct operation of the interlocks for safe operation. Do not bypass any interlock or cover.

These safety practices are provided to help you operate the instrument safely. Read each safety topic thoroughly before attempting to operate the instrument and **always** operate the spectrometer and microscope in accordance with these safety practices.

Verifying Safe State

The following general safety precautions must be observed during all phases of operation, maintenance and service of this instrument.

To ensure continued safety of the instrument after maintenance or service procedures verify the instrument is returned to a safe state for the user. This includes running performance checks to verify the instruments safety systems are functioning correctly. Check the general condition of the instrument during operation for wear or signs of corrosion that are likely to inhibit function or safety.

Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument. Agilent Technologies assumes no liability for the customer's failure to comply with these requirements.

Ultraviolet radiation

Tungsten halogen source lamps (for near-infrared analysis) emit hazardous ultraviolet (UV) radiation. This radiation can cause serious damage to eyes. NEVER look directly at the lamp and always wear appropriate protective equipment and clothing when required.

Cryogenic cooling

Some detectors used with your Agilent Cary 600 Series FTIR instrument (MCT) are cryogenically-cooled. The liquid nitrogen used in this process is extremely cold (-196 °C, -320.8 °F) and can cause damage to the human body. Use appropriate protective equipment when working with liquid nitrogen.

Compressed gas cylinders

Consult the Agilent Cary 600 Series FTIR Site Preparation Guide for gas pressure requirements. Compressed gas cylinders contain highly pressurized gas. If storage conditions are outside of the recommended supplier's safety codes, the cylinders can explode or rapidly release gas into the environment. This may result in injury or death.

- Store and handle compressed gases carefully and in strict adherence to safety codes.
- Secure cylinders to an immovable structure or wall.
- Store and move cylinders in an upright, vertical position. Before transport, remove regulators and install cylinder cap.
- Store cylinders in a well-ventilated area away from heat, direct sunshine, freezing temperatures, and ignition sources.
- Clearly mark cylinders so there is no doubt as to their contents.

- Use only approved regulators and connections.
- Use only connector tubing that is chromatographically clean and has a pressure rating significantly greater than the highest outlet pressure from the regulator.
- Due to the relatively high purge and/or air-bearing flow requirements, it is recommended that a plumbed source of pressurized dry air/N2 or a dedicated compressor and dry air generator is used. Gas cylinders for these purposes are not recommended as a long term solution.

Electrical hazards

The Agilent Cary 600 Series FTIR spectrometers, microscopes and some accessories contain electrical circuits, devices, and components operating at dangerous voltages. Contact with these circuits, devices and components can cause death, serious injury, or painful electrical shock.

NOTE The above model is Equipment Class I.

Replace blown fuses with fuses of the size and rating as stipulated in the text adjacent to the fuse holder or in the manuals where listed.

Do NOT use power cords with faulty or frayed insulation.

Do not replace power cord with one of a lower rating than specified. Use only Agilent supplied power cord for your country.

CAUTION Use of controls or adjustments or performance of procedures other than those specified in this manual, may result in hazardous radiation exposure.

Laser safety

The Agilent Cary 600 Series FTIR spectrometers use a helium-neon laser operating in the visible region at 632.8 nanometers. The spectrometer is a Class 2 laser product, powerful enough to warrant caution in its use. Agilent Cary 600 Series FTIR spectrometers and microscopes comply with FDA and CE standards for light emitting products.

An attenuated portion of the laser beam passes into and through the spectrometer sample compartment. Although not powerful enough to harm your skin should your hand intercept it, the laser light could cause retinal (eye) damage during prolonged direct viewing. This is not possible given the normal optical layout of the spectrometer. However, if a highly reflective surface such as a mirror is allowed to intercept the beam, the beam could be redirected out of the sample compartment resulting in on-axis or direct viewing. Care must be taken to avoid this.

The laser in the spectrometer is operating when the green power indicator of the spectrometer is active. The Agilent Cary 600 Series FTIR spectrometers incorporate an interlock switch that automatically turns off power to the laser if the interferometer compartment cover is opened.

No maintenance of the spectrometer or microscope by users is required to maintain specifications, proper operation, and compliance with FDA and CE standards for light-emitting products.

Labeling

Laser safety labels are located on the rear of the Agilent Cary 600 Series FTIR spectrometer and underneath the top cover.



Figure 1. Laser safety label locations on the rear of the Agilent Cary 600 Series FTIR spectrometer

The laser safety warning just above the Purge and Air Bearing connections states 'Laser radiation. Do not stare into beam. Class 2 laser product. (IEC 60825-1/2007). Max. output: 1 mW/600-700 nm. If the spectrometer is purchased where a local language is supported, the localized warning will be present next to, or near, the English version.

Under top cover

The following image shows the laser safety warning located on the top of, and underneath, the interferometer compartment cover.

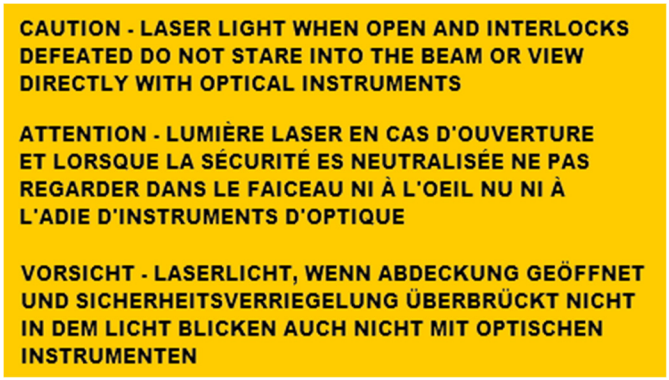


Figure 2. Laser safety warning located on top of internal compartment cover

Near apertures

The following image shows the laser safety warning located near all apertures on both the Agilent Cary 600 FTIR Series instruments and microscopes.



Figure 3. Laser safety warning located near apertures

Laser aperture locations

WARNING



Laser Hazard
Avoid exposure – laser light may be emitted from this aperture. The laser light could cause retinal (eye) damage if prolonged direct viewing occurs. This is a Class 2 laser product. It is not powerful enough to harm your skin should your hand intercept it.
The optical design of the 600 Series spectrometer and the 610 FTIR microscope normally precludes this. Always wear appropriate safety equipment and clothing.

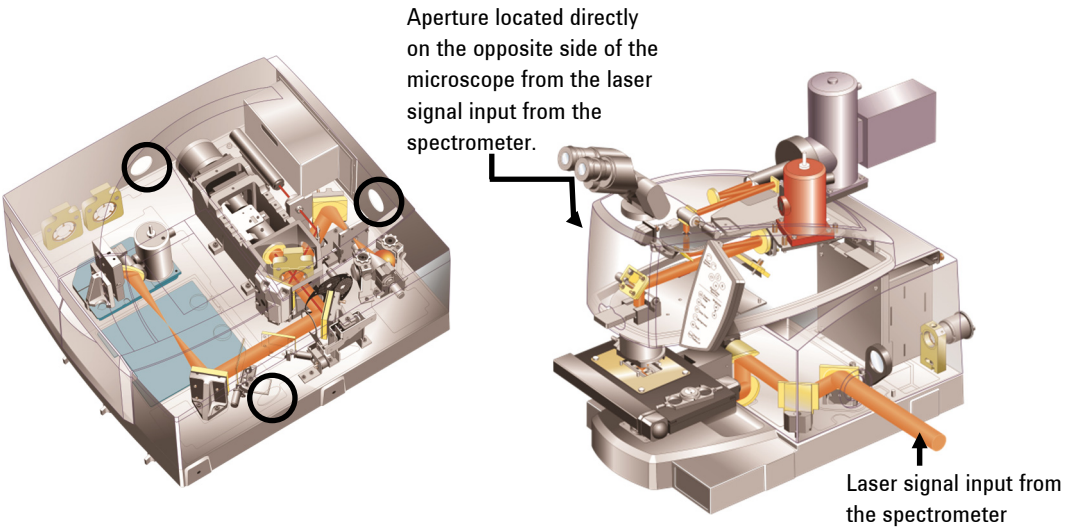


Figure 4. Laser aperture locations on the spectrometer (indicated by the circles on the image) and microscope

Other precautions

Infrared sources operate at high temperatures, which may burn you. Before replacing a source element that has been lit, switch off the instrument and ensure that the source has adequately cooled.

Do not block the ventilation grills on the instrument and accessories. Consult the manuals supplied with your computer, monitor and printer for their specific ventilation requirements.

Use of the Agilent Cary 600 Series FTIR system and accessories may involve materials, solvents and solutions which are flammable, corrosive, toxic or otherwise hazardous.

Careless, improper, or unskilled use of such materials, solvents and solutions can create explosion hazards, fire hazards, toxicity and other hazards which can result in death, serious personal injury, and damage to equipment and property.

Always ensure that laboratory safety practices governing the use, handling and disposal of such materials are strictly observed. These safety practices should include the wearing of appropriate safety clothing and safety glasses.

Use only spare parts from Agilent with your instrument.

Warning and caution messages

Carefully read all warnings and cautions and observe them at all times.

A Warning message is used in the text when failure to observe instructions or precautions could result in death or injury. Warnings have the following format:

WARNING



Hazard Type

Nature of the hazard, information on how to avoid the hazard, and possible consequences if you don't.

The triangular symbols that appear in conjunction with warnings are outlined in the next section.

A Caution message is used when failure to observe instructions could result in damage to equipment (Agilent-supplied and/or other associated equipment). Cautions have the following format:

CAUTION Caution information appears here.

Information symbols

The following triangular symbols appear in conjunction with warnings on the spectrometer and associated documentation. The hazard they depict is shown below each symbol:



Electrical shock



Extreme cold



Eye hazard



Heavy weight (danger to feet)



Heavy weight (danger to hands)



Hot surface



Laser hazard

The following symbol may be used on warning labels attached to the instrument. When you see this symbol, refer to the relevant operation or service manual for the correct procedure referred to by that warning label.



The following symbols also appear on the instrument or in the documentation:

I	Mains power on
O	Mains power off
	Fuse
	Single phase alternating current
	Direct current
	Caution, disconnect all supplies, risk of electric shock

Color coding

The various indicator lights appearing on Agilent instruments and associated accessories are color-coded to represent the status of the instrument or accessory.

- A green light indicates the instrument is in normal or standby mode.
- A yellow light indicates that the instrument needs attention.
- A blue light indicates that operator intervention is required.

CE compliance

Agilent Cary 600 Series FTIR spectrometers and microscopes have been designed to comply with the requirements of the Electromagnetic Compatibility (EMC) Directive and the Low Voltage (electrical safety) Directive (commonly referred to as the LVD) of the European Union. Agilent has confirmed that each product complies with the relevant directives by testing a prototype against the prescribed EN (European Norm) standards.

Proof that a product complies with the directives is indicated by:

- The CE marking appearing on the rear of the product.
- The documentation package that accompanies the product, containing a copy of the Declaration of Conformity. This declaration is the legal declaration by Agilent that the product complies with the directives and also shows the EN standards to which the product was tested to demonstrate compliance.

Electromagnetic compatibility

EN55011/CISPR11

Group 1 ISM equipment: group 1 contains all ISM equipment in which there is intentionally generated and/or used conductively coupled radio- frequency energy which is necessary for the internal functioning of the equipment itself.

Class A equipment is equipment suitable for use in all establishments other than domestic and those directly connected to a low voltage power supply network which supplies buildings used for domestic purposes.

This device complies with the requirements of CISPR11, Group 1, Class A as radiation professional equipment. Therefore, there may be potential difficulties in ensuring electromagnetic compatibility in other environments, due to conducted as well as radiated disturbances.

Operation is subject to the following two conditions:

1 This device may not cause harmful interference.

2 This device must accept any interference received, including interference that may cause undesired operation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try one or more of the following measures:

1 Relocate the radio or antenna.

2 Move the device away from the radio or television.

3 Plug the device into a different electrical outlet, so that the device and the radio or television are on separate electrical circuits.

4 Make sure that all peripheral devices are also certified.

5 Make sure that appropriate cables are used to connect the device to peripheral equipment.

6 Consult your equipment dealer, Agilent Technologies, or an experienced technician for assistance.

Changes or modifications not expressly approved by Agilent Technologies could void the user's authority to operate the equipment.

ICES/NMB-001

This ISM device complies with Canadian ICES- 001.

Cet appareil ISM est conforme à la norme NMB-001 du Canada.

South Korean Class A EMC declaration

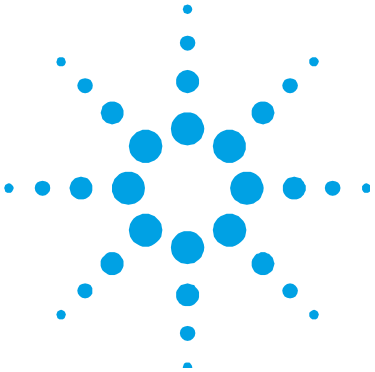
A 급 기기 (업무용 방송통신기자재)

This equipment is Class A suitable for professional use and is for use in electromagnetic environments outside of the home.

이 기기는 업무용 (A 급) 전자파적합기기로서 판 매자 또는 사용자는 이 점을 주

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2. Introduction

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This manual contains the information required to successfully get started using Agilent Cary 600 Series FTIR spectrometers and microscopes. Where mentioned, the specifications between spectrometer and microscope differ. All other specifications are for both. Unless specified otherwise, this manual covers the Agilent Cary 660 and 670 Spectrometers and the Agilent Cary 610 Microscopes.

If you have purchased the spectrometer only, skip all instructions related to the microscope. If you have purchased an Agilent Cary 620 FTIR microscope, see the Agilent Cary 620 FTIR Microscope User's Guide.

Specifications

Agilent Cary 600 Series FTIR spectrometers and microscopes are suitable for indoor use *only* and are classified Pollution degree 2 and Installation Category II (EN 61010-1).

All specifications are included in the Agilent Cary 600 Series FTIR Site Preparation Guide.

Fuses

Position the equipment for easy access to the disconnecting switch on the rear of the instrument.

Table 1. Fuse specifications

Instrument	Fuse type
Agilent Cary 600 Series FTIR spectrometer	T4 AH 250 V, IEC601272-2 Sheet 5, 5x20 mm, Littelfuse 0215004 or equivalent
Agilent Cary 610 FTIR microscope (typical)	1FS1: T2.0 AH 250 V, IEC601272-1 Sheet 5, 5 x 20 mm, Littelfuse 0215020 or equivalent

Purge gas

Purge gas must be water-free air (dried to dew point of -70 °C) or dry nitrogen. In this manual, the term 'purge gas' refers to dry nitrogen or dry air.

Purge can be supplied to the sample compartment, instrument enclosure and microscope in any combination.

Flow rate for purge: 10 L/min (20 ft^3/hr) maximum; you must have a flow meter to monitor the flow of the purge gas. If purging the spectrometer and microscopes, a flow rate of 10L/min (40 ft^3/hr) is recommended.

To enable independent control of flow to the microscope, it is strongly recommended that a second flow meter be ordered (one flow meter comes as standard). Use Flow meter (part number 2910006000) and T-Piece 6mm tube push fit purge gas connector (part number 1610140100).

A regulator is required if the source pressure is greater than 60 psi (420 kPa).

Tubing should be clean and free of any dust and debris. Do not use tubing treated with talcum powder.

Laser

Specifications for the laser light that is accessible during operation are:

- Maximum accessible power: < 600 µW
- Pulse duration: Continuous
- Wavelength: 632.8 nm
- Maximum beam divergence: Cone of angle 15 degrees or less coming to a focus in the center of the sample compartment and diverging thereafter.

Specifications for the embedded laser in the spectrometer are:

- Maximum accessible power: < 1 mW
- Pulse duration: Continuous
- Wavelength: 632.8 nm
- Maximum beam divergence: 1.3 milliradians

WARNING



Laser Hazard

The laser light could cause retinal (eye) damage if prolonged direct viewing occurs. This is a Class 2 laser product. It is not powerful enough to harm your skin should your hand intercept it.

The optical design of the 610 FTIR microscope normally precludes this. You are never required to remove the protective housing of the 610 FTIR microscope. Always wear appropriate safety equipment and clothing.

Liquid nitrogen

WARNING



Extreme Cold Hazard

Liquid nitrogen is very cold and can cause damage to the human body. Use appropriate protective equipment when handling liquid nitrogen.

If you are using the MCT or InSb detector you will need a supply of liquid nitrogen to cool it. It takes about 500 milliliters (16 ounces) of liquid nitrogen for the initial fill to bring the Dewar to an equilibrium temperature. It will take about 20 minutes to reach equilibrium. Then add an additional 200 milliliters (7 ounces) of liquid nitrogen to top off the Dewar. See Page 38, for more information on filling the spectrometer Dewar and Page 40 for more information on filling the microscope Dewar.

Table 2. Cooling methods for available detectors

Detector	Cooling method
High-sensitivity MCT	Liquid nitrogen
Linearized high-sensitivity MCT	Liquid nitrogen
Linearized broadband MCT	Liquid nitrogen
Room temperature DLaTGS	None
Cooled DLaTGS	Peltier
Far-infrared DLaTGS	None
PbSe	None

Installation requirements

Before receiving your Agilent Cary 600 Series FTIR instrument, you will have been given a Site Preparation Guide, which describes the environmental and operating requirements of the Cary 600 Series FTIR system. You must prepare your laboratory according to these instructions before the Cary 600 Series FTIR can be installed. You should keep the Site Preparation Guide for future reference. If you have misplaced your copy, you can obtain a replacement from your local Agilent office.

Training

The software provided with your Agilent Cary 600 Series FTIR spectrometer and microscope includes extensive Help.

If Agilent installs the instrument(s), the Agilent representative will demonstrate the basic operating procedures while conducting the installation performance tests during the installation procedure. The Agilent representative, however, is not necessarily experienced in complex analytical routines and is not authorized to conduct extensive training.

To ensure that your operators benefit the most from witnessing the installation performance tests, operator training should be completed before your equipment is installed. It is strongly recommended that you take advantage of the special training courses that are conducted at various locations by the Agilent customer support and sales organization. In some areas, it may be possible to arrange for operator training to be carried out after the installation, using your own instrument. To investigate this possibility, contact your local Agilent sales and service office.

Documentation

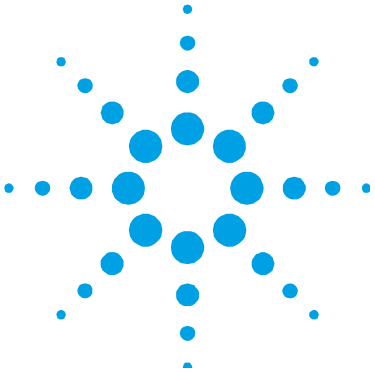
You have been provided with the following documentation to help you set up and operate your Agilent FTIR system:

- This User's Guide, provides safety practices and hazards information, basic instructions for installing, operating and maintaining your Agilent Cary 600 Series FTIR spectrometers and microscopes. Where procedures differ for the various instrument models they will be clearly identified.
- An extensive Help system containing context-sensitive Help, analysis methodology, operating procedures and various accessories is provided in the Help and electronic manuals loaded onto your computer hard drive during software installation.

Conventions

The following conventions have been used in procedures throughout the documentation:

- Bolded items indicate an action. For example, ‘click **OK’** and ‘From the **Edit** menu, choose **Copy’**.
- ALL CAPITALS indicate keyboard commands. For example, ‘press ENTER’ and ‘press SHIFT+F8’.



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Unpacking

As soon as the shipment arrives:

1 Locate the shipping list documentation and check that you have received all of the items listed.

NOTE If any of the listed items are missing, stop immediately and call Agilent customer service.

2 Carefully check the exterior of the shipping containers for any external damage. (Stains on the containers may indicate exposure to water.)

CAUTION Do not open the shipping containers unless otherwise instructed by your Agilent representative.

3 If the shipping container(s) appear to be damaged (water damage, crushed package, and so on), contact Agilent and the carrier within five days. Do not accept packages with obvious puncture damage. All other damage should be noted on the shipping document and signed by the delivery agent.

4 If you are sure that all boxes have been delivered and appear to be undamaged, place them where their contents can come to room temperature.

CAUTION Do not unpack any additional boxes or packages or the spectrometer or microscope unless otherwise instructed by your Agilent representative. Your Agilent representative will complete the unpacking and installation of your Agilent Cary 600 Series FTIR spectrometers and microscopes. If incorrectly unpacked, equipment may become damaged.

Locate the PC keyboard and mouse for ergonomically correct access.

Allow at least 50 mm (2 in.) of space on the sides, and 150 mm (6 in.) at the rear of the system to permit free air circulation.

Installing the software

While your Agilent representative will install the Resolutions Pro software for you during the installation process, it may become necessary to re-install it if the computer is replaced.

The Agilent Resolutions Pro software installation disks will install all files required to run the software.

See the Agilent Resolutions Pro Software Installation Manual for instructions on how to install and register your software.

Spectrometer and microscope connections

While your Agilent representative will install the spectrometer and microscope for you during the installation process, it may become necessary to reconnect cables if you move the instruments.

Spectrometer

Power is connected to the instrument and purge line (if used) at the rear of the instrument.

To connect the power and purge lines to the spectrometer:

1 Make sure the power switch on the rear of the spectrometer is in the off (0) position.

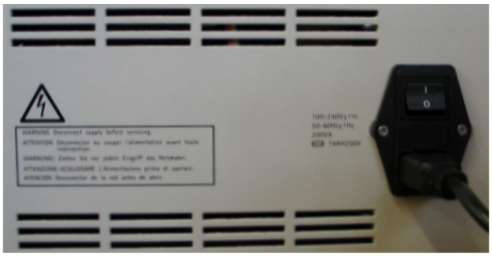


Figure 5. Power switch and socket on the rear of the spectrometer

2 Connect the power cord to the rear of the spectrometer.

3 Connect the other end of the power cable to the electrical power outlet.

4 If you have a purged spectrometer (or you wish to purge the sample compartment), connect the gas purge line to the fitting on the rear of the spectrometer.



Figure 6. Purge fittings on the rear of the spectrometer

CAUTION Use only dry air or dry nitrogen to purge the spectrometer and/or microscope.

Spectrometer penthouse connections

The penthouse connectors include connectors for external accessories, external detectors, and the data system (via USB). Do not open the penthouse -- there are no user-serviceable parts inside. To access the connectors, lift the spectrometer cover.

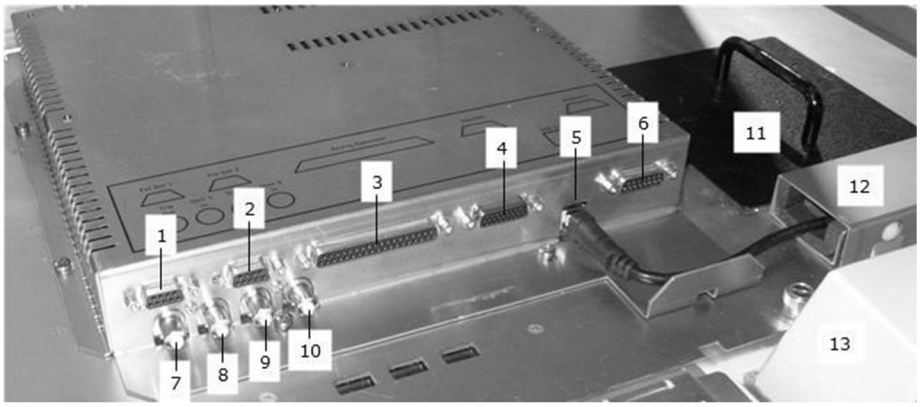


Figure 7. Spectrometer penthouse connections

1 EXT DET 1 - Used to connect an external detector

2 EXT DET 2 - Used to connect an external detector

3 Analog Expansion - Provides alternate signal paths and controls

4 FPA/TRS - Used to connect either an FPA detector or TRS accessory

5 USB 2.0 - Data system connector to PC

6 Accessory - Used to connect an additional accessory

7 TRIG OUT - Located under the EXT DET 1 connector, but obscured in this image. Used to trigger to an external device

8 USER 1 IN - Used to receive a signal from an external device

9 SIGNAL OUT - Used to send a signal to an external device

10 USER 5 IN - Used to receive a signal from an external device for second ADC (if fitted)

11 Beam splitter access cover

12 Metal cover for cable routing

13 Sample compartment connectors (not shown)

Microscope

Power to the instrument and purge line (if used) is connected at the rear of the instrument:

To connect the power and purge lines to the microscope:

1 Make sure the power switch on the rear of the microscope is in the off (0) position.



Figure 8. Power switch and socket on the rear of the microscope. USB to PC cable also shown.

2 Connect the power cord to the rear of the microscope.

3 Connect the other end of the power cable to the electrical power outlet.

4 For purging of the microscope, connect the gas purge line to the fitting on the rear of the microscope upper cover.

CAUTION Use only dry air or dry nitrogen to purge the spectrometer and/or microscope.

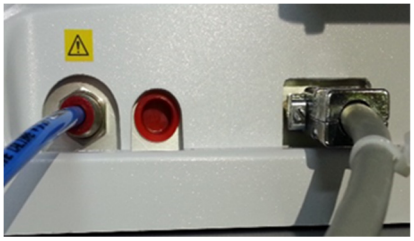


Figure 9. Upper rear connectors on the microscope. Left to right: Purge fitting to gas supply; Video out to video capture card installed in the computer (non-ToupCam models only); Microscope to spectrometer EXT DET 1 or EXT DET 2 connection (see Figure 7).

5 **For older cameras (the camera is inside the microscope):** Connect the 'Video out' connector to the back of the microscope and then to the video capture card installed in the computer.



Figure 10. Video capture card (installed in PC) with 'Video out' cable connected

For ToupCam Cameras (the camera is on top of the microscope, 1 in the image below): Connect the cable (2 in the image below) from the camera into a free USB 3 port on the computer.



Figure 11. ToupCam camera and USB 3 cable

6 Connect the 'Detector out' cable to the back of the microscope and then to the EXT DET 1 or EXT DET 2 spectrometer penthouse connector.

Connecting the motorized stage cables

NOTE There are two versions of the motorized stage control box, identified in this manual by their color: cream (older version) or black (newer version).



Figure 12. Older (left) and newer model (right) motorized stage controller connections

The connectors are, from left to right:

RS-232 Connect to a RS-232A serial port on the computer using a RS-232 serial cable. If no serial port is available on the computer, use the RS-232 to USB adapter (shown below). Follow the procedure on Page 34 for the driver installation instructions.



Power Connects to the power transformer

USB Currently not used (the USB and joystick positions are reversed on the black motorized stage controller)

Joystick Connects to the joystick.

Z Connects to the Z-axis motor used to control the stage height (see 2 on Figure 13) using the cable shown below. The newer black model also uses the 15-pin to 9-pin adapter cable (shown on the right).





Stage Connects to the X/Y stepping motors on the right side of the stage (see 1 on Figure 13)

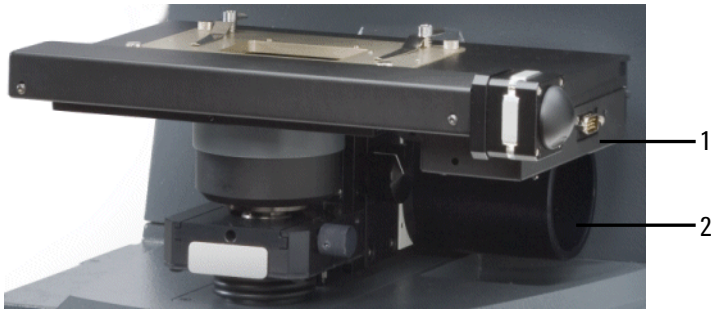


Figure 13. Motorized stage connections

Where:

1 X/Y stage control

2 Z stage control

Installing the RS-232 to USB adapter cable driver

Perform this procedure only if you are using the RS-232 to USB adapter cable.

Ensure that both the RS-232 cable and the RS-232 to USB adapter cable are NOT plugged in to the computer before performing this procedure.

1 Turn on the computer and insert the Tripp.Lite Keyspan USA-19HS Driver Disc. If the CD does not automatically launch, double-click launch.exe on the disk.

2 Follow the prompts to install the driver.

3 Plug in just the USB adapter and USB cable to the computer (not the RS-232 cable from the stage controller). Microsoft Windows will automatically detect the USB adapter cable.

4 Once the detection has completed, plug in the RS-232 cable from the stage controller into the USB adapter.

5 Turn on the microscope to complete the installation.

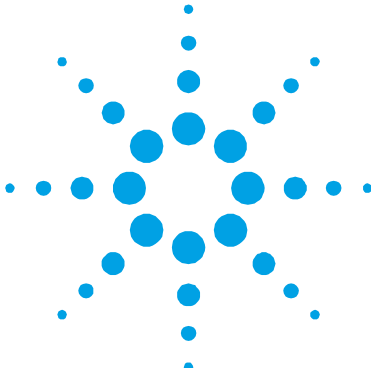
Refer to the USB Serial Adapter software manual that came with the adapter for more information.

Programming accessories for hardware recognition

While many accessories purchased will be pre-programmed, some may not. Agilent provides the 'Service Application' software to program or reprogram your programmable accessory to work with the hardware recognition capabilities.

Most components are programmed in the factory; however, some may require reprogramming. See the Resolutions Pro Help for instructions on how to program accessories. Specifically, click 'Start' > 'All Programs' or 'All Apps' > 'Agilent Resolutions' > 'Resolutions Pro Help' > 'Accessories' > 'Programming Accessories for Hardware Recognition'.

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4. Operation

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Turning off the system	43

For additional hardware information, see the Resolutions Pro Help. If you have purchased the spectrometer only, skip all instructions related to the microscope. If you have purchased an Agilent Cary 620 FTIR microscope, see the User's Guide supplied with that instrument.

To access the Resolutions Pro Help:

1. Start the Resolutions Pro software.
2. Press F1 on the keyboard to display the Help.
3. Click the **Contents** tab if necessary.
4. Click the plus (+) icon next to 'About Your FTIR Systems' to expand it.
5. Click the plus (+) icon next to 'Agilent 600 Series FTIR' to expand it for hardware information on your spectrometer or click the plus (+) icon next to '610-IR' for hardware information on your Agilent Cary 610-IR microscope.

Lights

There are two LEDs on the front of the spectrometer in the lower left corner. The following table summarizes the LED behavior:

Table 3. LED descriptions

Position	Condition	Comment
Top — Power/Scan	Flashing yellow	The spectrometer is initializing.
	Solid yellow	The spectrometer has not correctly initialized and needs attention.
	Solid green	The spectrometer has initialized and is ready.
	Flashing green	The spectrometer is scanning.
Bottom — A/D over-range	Off	Normal operation.
	Flashing blue	The A/D exceeds its maximum value. Reduce the sensitivity setting or increase the beam attenuation.

Turning on the system and filling the Dewar

Spectrometer

CAUTION This procedure applies to detectors requiring liquid nitrogen. Most instruments are supplied with DLaTGS detectors, which do not require nitrogen cooling. Always check the detector type and cooling requirements before performing this procedure.

To fill the spectrometer Dewar with liquid nitrogen:

1 Turn on the spectrometer power switch located on the rear of the spectrometer.

NOTE If the spectrometer has been turned off for an extended period, it will take about 30 minutes to reach its operating temperature. (If you collect data before the spectrometer has reached operating temperature, your data may not be accurate.)

2 If you have a cryogenically-cooled detector (MCT), fill its Dewar with liquid nitrogen as follows:

WARNING



Extreme Cold Hazard
Liquid nitrogen is very cold and can cause damage to the human body. Use appropriate protective equipment when handling liquid nitrogen.

a Raise the spectrometer cover. The Dewar access hole is on the right rear of the detector compartment cover.

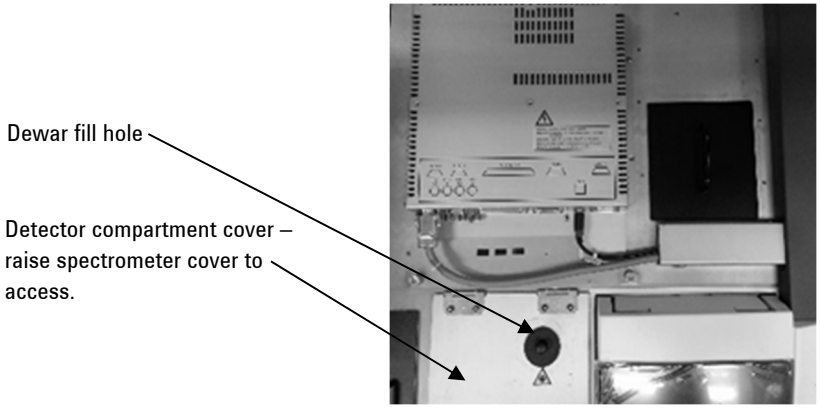


Figure 14. Dewar hole on spectrometer

b Reach through the hole and remove the liquid nitrogen Dewar plug.

c Carefully fill the detector Dewar with liquid nitrogen using the provided funnel. This takes about 2.5 medium-sized Styrofoam cups (475 milliliters, 16 ounces) of liquid nitrogen. Minimize spills by adding half a funnel of liquid nitrogen at a time and allowing it to cool down until the vapor plume dies down. Repeat as required.

d Allow about 20 minutes for the Dewar to come to thermal equilibrium.

e Top up the Dewar with about 200 milliliters (7 ounces) of liquid nitrogen.

f Replace the plug.

g Lower the spectrometer cover.

3 Turn on the computer and monitor.

4 If you are setting up your spectrometer or if you change the spectrometer detector, beamsplitter, or source, you must configure the hardware before you can collect any data. If your hardware is already configured, you are ready to collect data.

Microscope

CAUTION This procedure applies to detectors requiring liquid nitrogen. Most microscopes are supplied with MCT detectors which require nitrogen cooling. Always check the detector type and cooling requirements before performing this procedure.

To fill the microscope Dewar with liquid nitrogen:

1 Turn on the microscope power switch located on the rear of the microscope.

2 Remove the appropriate liquid nitrogen Dewar plug. This plug is easily removed by hand.



Figure 15. Top of the microscope showing the liquid nitrogen plug

WARNING



Extreme Cold Hazard

Liquid nitrogen is very cold and can cause damage to the human body. Use appropriate protective equipment when handling liquid nitrogen.

3 Carefully fill the detector Dewar with liquid nitrogen using the provided funnel. This takes about 2.5 medium-sized Styrofoam cups (475 milliliters, 16 ounces) of liquid nitrogen. Minimize spills by adding half a funnel of liquid nitrogen at a time and allowing it to cool down until the vapor plume dies down. Repeat as required.

4 Allow about 20 minutes for the Dewar to come to thermal equilibrium.

5 Top up the Dewar with about 200 milliliters (7 ounces) of liquid nitrogen.

6 Replace the plug.

CAUTION Large liquid nitrogen spills can damage the detector and other microscope components. Do not fill the Dewar to the top. This can freeze the elastomer o-ring Dewar seal causing a loss of vacuum. This will require the detector assembly to be returned for a pump-down.

Using the microscope shutter

To open or close the microscope shutter:

1 Look directly at the front of the microscope.

2 Gently pull the black handle between the right side of the microscope and spectrometer towards you.

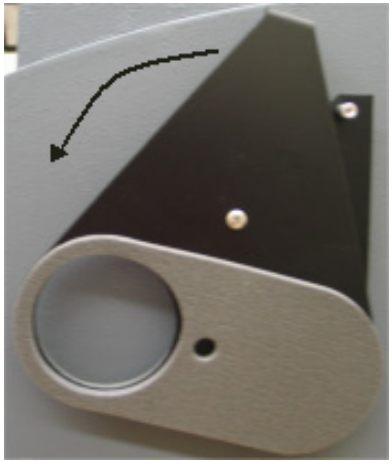


Figure 16. Side view of closed shutter and handle

3 To close the shutter, gently push the black lever away from you.

Accessing the Help

To access the Resolutions Pro Help:

1 Start the Resolutions Pro software.

2 Press F1 on the keyboard to display the Help.

3 Click the **Contents** tab if necessary.

4 Click the plus (+) icon next to 'Software' to expand it.

5 Click the plus (+) icon next to 'Software How To' to expand it.

6 For collect information, highlight 'Perform a Collect' and click the links for the required information or highlight 'Collecting Microscope Data' or 'Microscope Mapping Data' for information on using the microscope to collect data.

Turning off the system

Unless the system will be idle for some time or will be moved, we recommend that the spectrometer not be turned off. The computer and peripherals can be turned off if desired.

NOTE Agilent recommends that you disable the screen saver because it may interfere with long data collections. If you want to have a dark screen during long periods of disuse, it is better to turn off the monitor:

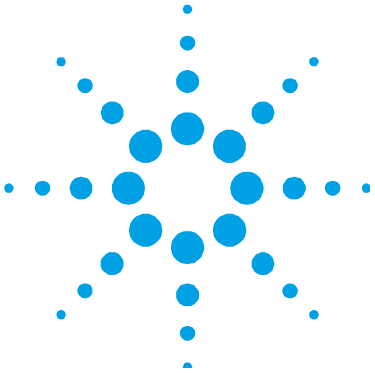
To shut down the computer module of the system:

1. Exit Resolutions Pro and close all other applications.
2. Choose **Shut down** from the **Start** menu.

CAUTION Using the computer's power switch to quit Microsoft Windows may cause data to be lost. Always use the procedure advised by Microsoft.

If necessary, turn off the spectrometer or microscope power switch.

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5. Maintenance

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Cleaning 48
Spare parts 48

This chapter includes information on how to access the Agilent Cary 600 FTIR spectrometers and microscopes maintenance procedures that may be carried out by an operator. Any maintenance procedures not specifically mentioned should be carried out only by Agilent-trained, Agilent-qualified or Agilent-authorized representatives.

WARNING



Eye Hazard

Near-infrared operation: The tungsten-halogen lamp is extremely bright, has high ultraviolet (UV) output, and should not be directly viewed. Avoid direct exposure to the lamp. In addition, appropriate UV filtering glasses are recommended to remove harmful UV radiation. This lamp should always be turned off when not in use, as it has a limited lifetime.

Far-infrared operation: The mercury arc lamp emits harmful ultraviolet (UV) radiation and must not be viewed by the unprotected eye. Appropriate UV filtering glasses are strongly recommended. Avoid direct exposure to the lamp. This lamp should always be turned off when the instrument is not in use or when the cover is opened. This is easily accomplished by selecting the other source position in the software.

UV-visible operation: The xenon and deuterium lamps emit harmful ultraviolet (UV) radiation and must not be viewed by the unprotected eye. Appropriate UV filtering glasses are strongly recommended. Avoid direct exposure to the lamp. The lamps should always be turned off when the instrument is not in use or when the cover is opened. This is easily accomplished by selecting the other source position in the software.

WARNING



Electrical Shock Hazard

Contact with these circuits, devices and components can result in death, serious injury, or painful electrical shock. This instrument contains electrical circuits, devices and components operating at dangerous voltages.

WARNING



Hot Surface Hazard

Burn danger. Allow hot parts to cool before proceeding with any maintenance procedure.

WARNING



Extreme Cold Hazard

Liquid nitrogen is very cold and can cause damage to the human body. Use appropriate protective equipment when handling liquid nitrogen.

WARNING



Laser Hazard

The laser light could cause retinal (eye) damage if prolonged direct viewing occurs. This is a Class 2 laser product, not powerful enough to harm your skin should your hand intercept it. The optical design of the 610 FTIR normally precludes this. You are never required to remove the protective housing of the 610 FTIR. Always wear appropriate safety equipment and clothing.

NOTE

This section refers only to maintenance procedures for the instrument. You should refer to your computer and printer manuals for their maintenance procedures and to Resolutions Pro Help for the maintenance procedures for any accessories you ordered.

Routine

Routine maintenance information is provided in the Resolutions Pro Help.

To access the Help:

1. Start the Resolutions Pro software.
2. Press F1 on the keyboard to display the Help.
3. Click the **Contents** tab if necessary.
4. Click the plus (+) icon next to 'Maintenance' to expand it.

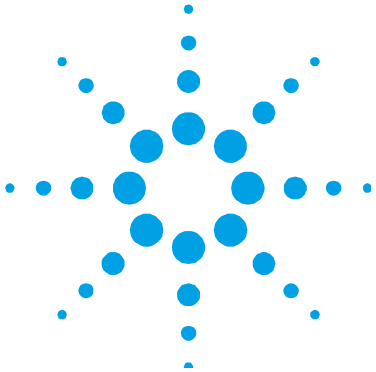
Cleaning

Any spills in the sample compartment or on the spectrometer or microscope should be immediately wiped up.

The exterior surfaces of the instrument should be kept clean. All cleaning should be done with a soft cloth. If necessary, this cloth can be dampened with water or a mild detergent. Do not use organic solvents or abrasive cleaning agents.

Spare parts

For spare parts and consumables ordering information, refer to the Agilent website, www.agilent.com



6. Troubleshooting

For troubleshooting help, refer to the Resolutions Pro Help.

To access the Troubleshooting section of the Help:

1. Start the Resolutions Pro Software.
2. Press F1 on the keyboard to display the Help.
3. Click the **Contents** tab if necessary.
4. Click the plus (+) icon next to 'Troubleshooting' to expand it.

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www.agilent.com

In This Guide

The guide describes the following:

- Safety Practices and Hazards
- Introduction
- Unpacking and Installation
- Operation
- Maintenance
- Troubleshooting

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