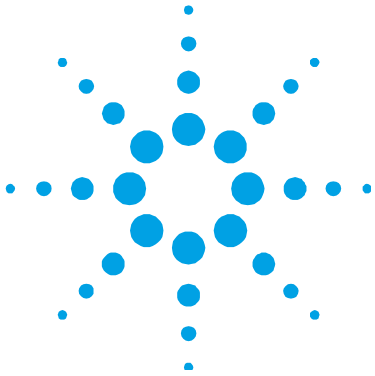

Cary 100/300/4000/5000/6000i Spectrophotometers

Hardware Manual

Agilent Technologies

Notices

Manual Part Number

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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.

Contents

1. Safety Practices and Hazards

Your Agilent Cary instrument and accessories have been carefully designed so that when used properly you have an accurate, fast, flexible and safe analytical system.

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

Information on safety practices appears throughout the documentation (both printed 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.

Ultraviolet radiation

The deuterium (standard in all instruments) and mercury lamps (if fitted) in the instrument emit hazardous ultraviolet (UV) radiation. This radiation can cause serious damage to eyes. NEVER look directly at either lamp and NEVER operate either lamp unless it is correctly mounted in the lamp turret (Cary 4000/5000/6000i only) and the turret is correctly mounted in the instrument.

NOTE The mercury lamp is fitted as standard in the Cary 4000/5000/6000i.

Ozone can be generated by radiation from the source lamps. Exposure to ozone can result in severe irritation to the skin, eyes, and upper respiratory system. The maximum permissible exposure level is 0.1 parts per million (0.2 milligrams per cubic meter).

ALWAYS ventilate the area surrounding the spectrophotometer such that the concentration of ozone does not exceed the maximum permissible level. All venting must be to outside air, never within the building.

Electrical hazards

The Cary 100/300/4000/5000/6000i instruments 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.

Panels or covers which are retained by screws on the spectrophotometer and accessories (with the exception of the lamp access cover) may be opened ONLY by Agilent-trained, Agilent-qualified, or Agilent-approved service engineers. Consult the manuals or product labels supplied with your computer, monitor and printer to determine which parts are operator-accessible.

Operators and other unauthorized personnel are permitted access ONLY to the lamp compartment and the sample compartment of the Cary. ALWAYS switch off the spectrophotometer before changing a lamp in the lamp compartment.

Good grounding/earthing is essential to avoid a potentially serious electric shock hazard. Ensure that there is an integral ground connection between the metal base of the spectrophotometer and accessories and the 3 pin earth-grounded receptacle. Consult the manuals or product labels supplied with your computer, monitor and printer for the relevant grounding requirements.

NOTE The safety classification is given as Equipment Class I.

Application of the wrong supply voltage can create a fire hazard and a potentially serious shock hazard, and could seriously damage the Cary system, accessories and any attached ancillary equipment. The Cary 4000/5000/6000i has a Universal Power Supply that adapts to the supply voltage. However, care must be taken to ensure that the correct voltage is used.

Do not connect the spectrophotometer or accessories to the mains power supply until you have made sure that the slide switch(es) (Cary 100/300 only) at the rear of these are correctly set for the mains power supply in the specific outlet in your laboratory to which the equipment will be connected. Consult the manuals supplied with your computer, monitor and printer for their specific voltage requirements.

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.

Other precautions

Both the deuterium and the visible lamps operate at high temperatures, and touching either of these lamps may result in burns. Before replacing a lamp that has been lit, switch off the spectrophotometer and either ensure that the lamp has cooled, or protect your fingers from burns.

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

Use of the Cary 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.

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:

Broken glass

Corrosive liquid

Ejecting parts

Electrical shock

Eye hazard

Fire hazard

Heavy weight (danger to feet)

Heavy weight (danger to hands)

Hot surface

Moving parts

Noxious gas

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.
	Focus
	Vertical adjustment
	Horizontal adjustment
CE	When attached to the rear of the instrument, indicates that the product complies with the requirements of one or more EU directives.

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/standby condition.
- An orange light indicates that a potential hazard is present.
- A blue light indicates that operator intervention is required.
- A red light warns of danger or an emergency.

CE compliance

Agilent Cary instruments 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), IEC or CISPR 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.

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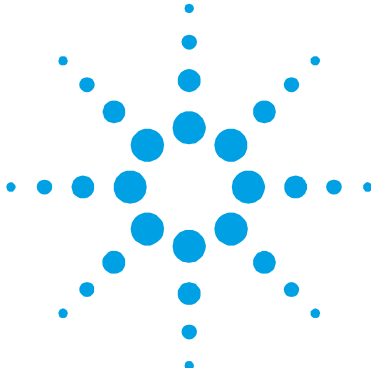

2. Introduction

Installation requirements

Before receiving your Agilent Cary instrument, you will have been provided with a Cary Pre-installation Manual, which describes the environmental and operating requirements of the Cary system. You must prepare your laboratory according to these instructions before the Cary can be installed. You should keep the pre-installation manual for future reference. If you have misplaced your copy, you can obtain a replacement from your local Agilent office.

Documentation

This manual provides instructions for installing and maintaining your Cary 100/300/4000/5000/6000i hardware. Thus it is referred to as the Cary Hardware Manual. Where procedures differ for the various instrument models, they will be clearly identified.

Instructions for installing the Cary WinUV software, together with an overview of the system, are included in the Cary WinUV Software Manual provided with the Cary WinUV software. Operating procedures are included in the Help.

Installation instructions for any Cary accessories you ordered are available online with the Cary WinUV software.

Specifications

The instrument is suitable for indoor use **only** and is classified Pollution degree 2 and Installation Category II (EN 61010-1).

Environmental

Table 1. Suitable conditions during instrument transportation, non-operation and operation

Condition	Altitude (m, ft)	Temperature (°C, °F)	Relative humidity, non-condensing (%)
Non-operating (transport)	0–2133, 0–7000	5–45, 41–113	20–80
Operating within performance specifications	0–853, 0–2800 853–2133, 2800–7000	10–35, 50–95 10–25, 50–77	8–80

For optimum analytical performance, it is recommended that the ambient temperature of the laboratory be maintained between 20 and 25 °C and be held constant to within ±2 °C throughout the entire working day.

Weights and dimensions

Weights

Cary 100/300:

- Packed: 75 kg (165 lb)
- Unpacked: 45 kg (99 lb)

Cary 4000/5000/6000i:

- Packed: 141 kg (310 lb)
- Unpacked: 91 kg (200 lb)

Dimensions (width x depth x height)

Cary 100/300:

- Packed: 860 x 770 x 655 mm (34 x 30 x 26 in)
- Unpacked: 640 x 650 x 320 mm (25 x 26 x 13 in)

Cary 4000/5000/6000i:

- Packed: 1425 x 800 x 670 mm (56 x 31 x 26 in)
- Unpacked: 1000 x 650 x 340 mm (40 x 26 x 14 in)

Power

Voltage

Cary 100/300:

- 100, 120, 220 or 240 VAC ±10%
- 230 +14% -6% VAC
- 230 +6% -14% VAC

Cary 4000/5000/6000i:

85–264 VAC

Frequency

47–63 Hz

Consumption

Cary 100/300:

270 VA (approximately)

Cary 4000/5000/6000i:

300 VA (approximately)

Mains inlet coupler

3/2 A 120/250 VAC 50–60Hz IEC type

Connections

Mains power cord

- Australia: 10 A 250 VAC. Complies with AS3112.
- USA: 10 A 125 VAC. Complies with NEMA 5-15P.
- Europe: 6 A 250 VAC. Complies with CEE7 sheet vii or NFC61.303 VA.

Rear

IEEE 488

Sample compartment

15-pin D-range connector with 2 high voltage pins: -1000 VDC, +125 VDC (Cary 100/300), +85 VDC (Cary 4000 to 6000i)

When the Accessory Controller Board is fitted in the Cary 100/300 and for all Cary 4000/5000/6000i instruments:

- Three connectors for accessories in the sample compartment (low voltage DC, and digital lines)
- One connector for accessories on the front of the instrument (identical to one of the connectors described above).

NOTE There is no separate Accessory Controller Board for the Cary 4000/5000/6000i. This functionality is part of the standard instrument.

NOTE For more information, refer to the Accessory Controller Board operation manual, in the Help.

Fuses

220–240 AC

Cary 100/300:

T4 AH 250 V, IEC 127 sheet 5, 5 x 20 mm ceramic

Cary 4000/5000/6000i:

F1.6 AH 250 V, IEC 127 sheet 5, 5 x 20 mm ceramic

100-120 VAC

Cary 100/300:

T5 AH 250 V, IEC 127 sheet 5, 5 x 20 mm ceramic

Cary 4000/5000/6000i:

F4 AH 250 V IEC 127 sheet 5, 5 x 20 mm ceramic

NOTE For safety reasons, any other internal fuse or circuit breaker is not operator-accessible, and should be replaced only by Agilent authorized personnel.

Fuse information on the rear of the instrument is the most up-to-date.

Gas supplies

The nitrogen purging system, which is not provided by Agilent, requires an operating pressure of 83 to 172 kPa (12 to 25 psig).

Nitrogen supply tubing should be clean, flexible plastic (Tygon polyvinyl chloride (PVC) or equivalent) tubing of 6 millimeter (1/4 inch) internal diameter. Do not use rubber tubing, as this is usually treated with talc, which will be carried into and contaminate the instrument optics.

CAUTION Do not use rubber tubing, as this is usually treated with talc, which will be carried into and contaminate the instrument optics.

Flow rates are between 0 and 30 liters per minute (64 cubic feet per hour).

3. Installation

In some countries, customer installation of the Agilent Cary 100/300 is allowed. If you wish to install the Cary system yourself, refer to the Installation Checklist on Page 21. The Agilent Cary 4000/5000/6000i must be installed by an Agilent customer service representative.

If your Cary is to be installed by an Agilent-trained and certified customer service representative, ignore the ‘Checklist’ and ‘GPIB Communications Card’ sections on Pages 21 and 22 respectively. However, you may need to refer to this information if you move the instrument at a later stage.

Lifting the instrument

WARNING

Heavy Weight Hazard
The Cary 100/300 instruments weigh in excess of 40 kg (88 lb) and the Cary 4000/5000/6000i instruments weigh in excess of 90 kg (198 lb). To reduce the risk of injured to personnel, mechanical lifting devices should be used whenever possible. Where manual lifting is unavoidable, at least two people should be used, and the lifting should be performed in accordance with your workplace occupational health and safety guidelines for heavy lifting.

Use a fork lift to lift the instrument off the packing pallet and up to the level of the bench where the instrument is to operate.

The instrument must be lifted onto the bench top by two people.

To do this:

Cary 100/300

1 One person should stand on of each side of the instrument.

2 Place fingers under the front and rear of the instrument.

Cary 4000/5000/6000i

1 One person should stand on of each side of the instrument.

2 Place the fingers of one hand under the ledge at the front of the instrument.

3 Place the fingers of the other hand under the ledge at the side towards the rear. Hook the thumb of the second hand around the rear of the instrument to prevent the hand from sliding along the ledge.

If you are ready to have the spectrophotometer installed by a customer service representative, (that is, the installation site has been prepared in accordance with the instructions included in the Cary Pre-installation Manual), complete the form at the front of the pre-installation manual and send it to your local Agilent office or dealer.

Check list

Use this check list to ensure that you complete each step of the installation procedure:

Step	Reference	Complete
Unpack the spectrophotometer and place it on the intended workbench.	Cary Unpacking Instructions (attached to the packing crate).	☐
Connect the monitor, printer, and keyboard to the computer, and connect the system to the power supply.	Page 26	☐
Install the Cary WinUV software.	Cary WinUV Software Manual	☐
Connect the GPIB cable or connect the USB-GPIB-HS converter.	Page 23	☐
How to install a GPIB card.	Page 23	☐
Connect the spectrophotometer to the computer, and connect the system to the power supply.	Page 26	☐
Plug the instrument into the power supply.	Page 27	☐
Check the latest release information.	Agilent Cary WinUV Pharma version 4_2 Readme.pdf or Agilent Cary WinUV version 4_2 Readme.pdf file(s) found in C:\Program files\Varian\Cary WinUV	☐
Check the Late Breaking News document accompanying the Cary WinUV Software for the latest list of problems and workarounds for each Cary WinUV application.	Late Breaking News	☐
Turn on the instrument on and allow the system to stabilize for two hours. During this time, unpack the Cary accessories (see below) and familiarize yourself with the Cary WinUV software.	Page 28 Cary WinUV Software Manual	☐
Perform the instrument tests, file a report near the instrument and mail a copy to the Service Manager, Agilent, 679 Springvale Rd, Mulgrave, Victoria, Australia, 3170	Page 28	☐

Continued...

Step	Reference	Complete
Unpack the accessories supplied with the instrument and check that you have received everything listed in the packing lists (enclosed in the packing crate and inside each accessory box).	Packing lists	☐
Read the installation section of each accessory manual to determine the order in which they need to be installed (depending on your software, the accessory manuals may be online) and install the accessories according to the instructions.	Accessory manuals	☐

GPIB communications

Either a GPIB communications card, (part number 9910102100) or a USB-GPIB-HS converter (part number 7910051600) must be installed in your computer to interface the computer and Cary spectrophotometer. See Page 23 for information on installing the PCI-GPIB communications card or for connecting the USB-GPIB-HS converter.

CAUTION The components on the communications card and computer are highly static-sensitive. To avoid damaging these components, you must drain any static charges from your body before installing the board, and prevent the generation of any new static charges during the installation. This can be done by wearing an ESD (electrostatic discharge) wrist strap attached to a grounding point. You can obtain a disposable ESD strap from Agilent using part number 7910031300; otherwise you can obtain one from your local electronics supplier.

USB-GPIB-HS converter

To install a National Instruments USB-GPIB-HS converter:

NOTE Ensure that the Cary WinUV software has been installed. Refer to the Agilent Cary WinUV Software Manual accompanying the Cary WinUV software.

---

1. Turn off the computer.
2. Connect one end of the converter to the instrument and the other end to the USB connection on the back of the computer.
3. Turn on the computer.

PCI-GPIB

To install a National Instruments PCI-GPIB communications card:

NOTE Ensure that the Cary WinUV software has been installed. Refer to the Agilent Cary WinUV Software Manual accompanying the Cary WinUV software.

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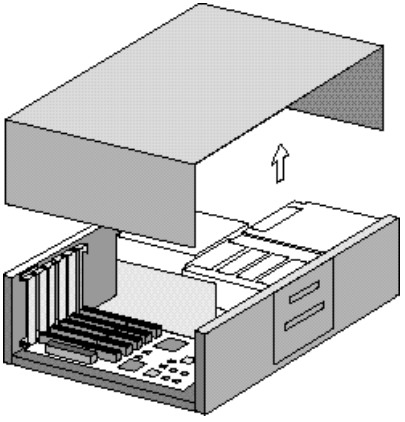
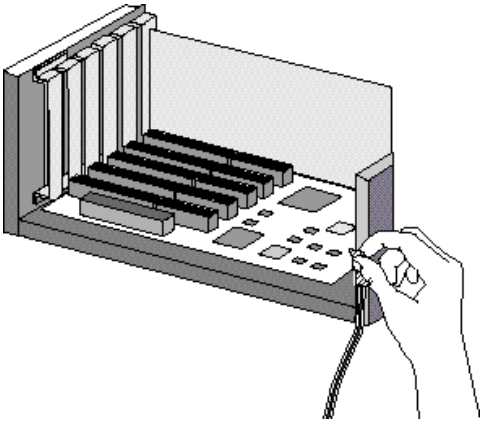
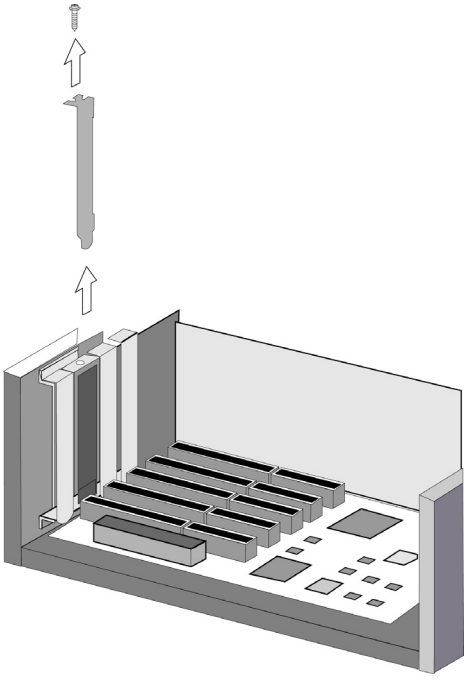
1. Turn off and unplug the computer.
2. Remove the cover, following the instructions in the manual provided with the computer.



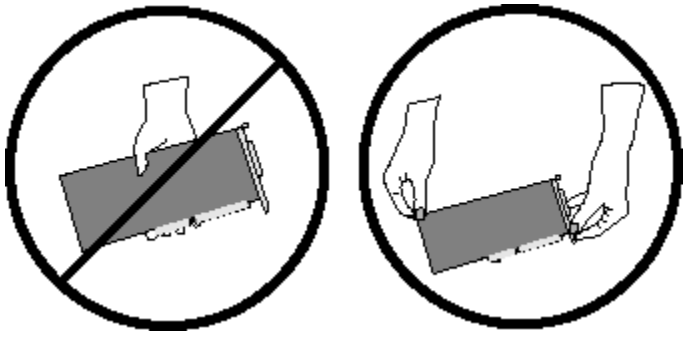
3 Attach one end of the ESD strap to a bare metal part of the computer chassis and wrap the other end around your wrist.



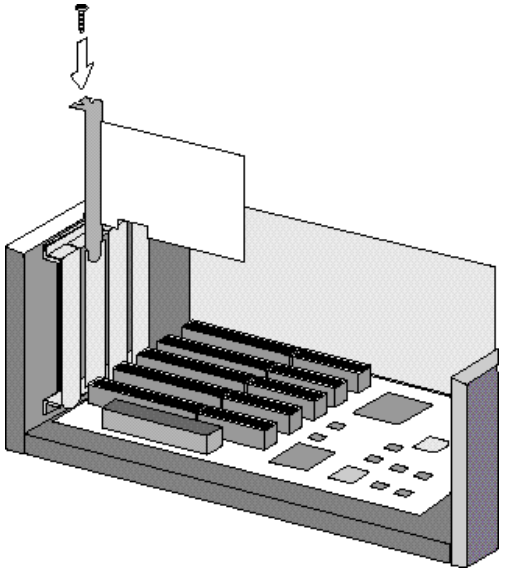
4 Remove a blanking plate from one of the empty slots in the computer.



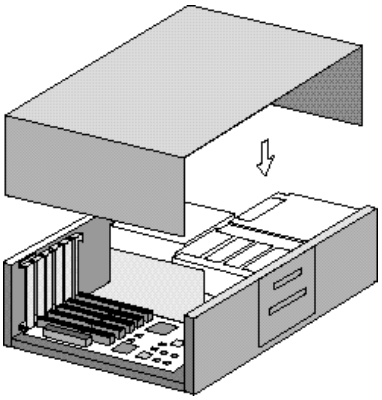
5 Remove the card from its static-shielded packaging. Do not touch the gold edge connectors.



6 Press the card firmly into the empty computer slot. The gold edge connectors should slide firmly into the matching sockets of the computer slot. Secure the card with the screw.



7 Replace the computer cover.



8 Connect the cable between the instrument and the computer (one end plugs into the interface board in the computer, and the other plugs into the socket in the rear of the instrument).

9 Connect the computer to the mains power

10 Turn on the computer.

Setting up the instrument

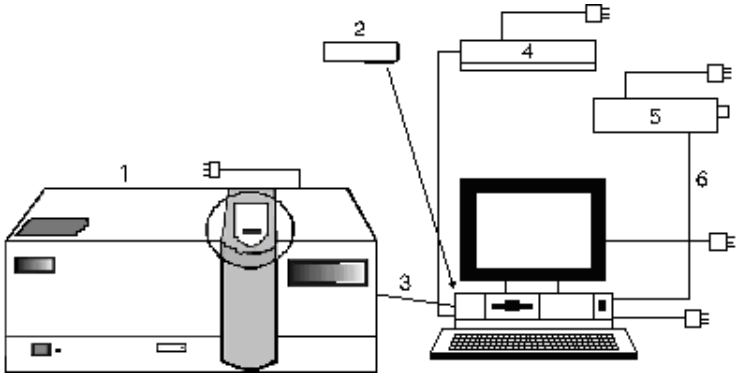


Figure 1. Cary system connection diagram (Cary 4000 shown)

1) Instrument 2) IEEE card 3) IEEE-488 cable
4) Plotter 5) Printer 6) Printer cable

Cabling

The monitor, printer and spectrophotometer are all connected to the computer via cables that plug into the back of the computer. Consult your monitor and printer manuals for details of their cabling requirements.

The spectrophotometer is connected to the computer by a shielded IEEE-488 cable. One end of this plugs into the interfacing board in the computer and the other plugs into the socket at the rear of the spectrometer.

Power

Requirements

Power requirements are detailed in your Cary Pre-installation Manual, and in the 'Specifications' section on Page 14. Thoroughly read this information before connecting the Cary system to the power supply.

Consult the manuals supplied with your printer and computer for their power requirements.

Connection

The mains power connection is located at the rear of the instrument. Before connecting the instrument to the power supply, ensure both the instrument and the power supply are turned OFF, and that the voltage selector switches on the instrument rear panel (Cary 100/300 only) are set to the correct mains power supply voltage (refer to the table on the rear panel of the instrument).

You should also check the fuses before connecting the instrument to the mains power supply to make sure they are the correct type and rating for your location. There are two operator accessible fuses located at the rear of the instrument. See Page 45 for instructions on how to check the fuses.

To connect the instrument to the mains power supply, plug the mains power cord into the back of the instrument and the free end of the power cord into the mains power supply, and then switch on the mains power supply.

Turning on the system

Before turning on the instrument, ensure that:

- You have connected the components of the system to one another, checked the setting of the voltage taps and connected the equipment to the power supply as described on Page 27.
- The sample compartment is empty.
- The sample compartment lid is closed.

CAUTION If you have a Cary 300 instrument, you MUST loosen the transit screw in the wavelength drive before turning on the instrument. Turning on the instrument without releasing this screw will damage the instrument. Use a flat-head screwdriver to loosen the transit screw approximately three turns. (The transit screw is located at the rear of the instrument, on the right side when viewed from the rear, and is clearly labeled).

Switch on the spectrophotometer by depressing the side of the rocker switch marked '|' on the front left side of the instrument.

NOTE For optimum performance, allow your Cary instrument to warm up for 2 hours before use.

Instrument performance tests

The Cary WinUV software has a Validate module, enabling you to carry out a number of performance tests, which check for conformance to specification for a major subset of instrument parameters. Many applications are equipped with validation files that enable you to the check that your software has been correctly installed. Refer to the Help for more information on validating your software.

If any of the tests fail to meet the specifications, you will need to arrange for an Agilent representative to diagnose and correct the problem.

Sample holders

This section describes how to install the sample holders in your instrument. Unless otherwise stated, removal procedures are the reverse.

Before the solid sample or single sample holders can be installed into the Cary 4000/5000/6000i instrument, they must be mounted onto the base plate. The base plate is then installed into the instrument using the LockDown mechanism (see Page 37).

Cell holders

Cary 100/300

The Cary 100/300 comes with a cell holder base and two single cell holders. These are shipped installed in the sample compartment; however, if removed, they can be reinstalled.

To reinstall the cell holder base and cell holders:

1. Open the sample compartment lid and remove the front panel.
2. Loosen the two black screws at the back of the sample compartment and remove the black screw on the front right side. Note the position of the locating pin at the front left side of the sample compartment.
3. Hold the cell holder base so that the black, solid section is away from you. Note the key holes at the back of the cell holder base.
4. Carefully place the cell holder base in the sample compartment and slot the keyholes under the two raised black screws at the back of the compartment. The front of the cell holder base should fit over the locating pin.
5. Tighten the raised black screws and also secure the black screw at the front right side of the compartment.
6. Holding a cell holder so that the notched section is to the right (see Figure 2), carefully place the cell holder over the two locating pins on the cell holder base in the reference beam.

Figure 2. Top view of cell holder with notched section to the right

7 Tighten the thumbscrew.

8 Repeat Steps 6 to 7 for the sample beam.

The cell holders are now installed and ready for use.

Cary 4000/5000/6000i

The Cary 4000/5000/6000i comes with two single cell holders. All instruments come with base plates as standard.

NOTE The single cell holders must be installed onto the base plate before they can be installed into the sample compartment of the instrument. For instructions on installing the base plate into the sample compartment, see Page 37.

To install the cell holder base and cell holders:

1 Open the sample compartment lid and remove the front cover.

2 Place the cell holder base in the sample position on the base plate. The notched pillar (see Figure 3) should be on the side to the right.

NOTE If you are operating in normal or double mode, the sample position is at the front of the sample compartment. If you are operating in reverse mode, the sample position is at the rear.

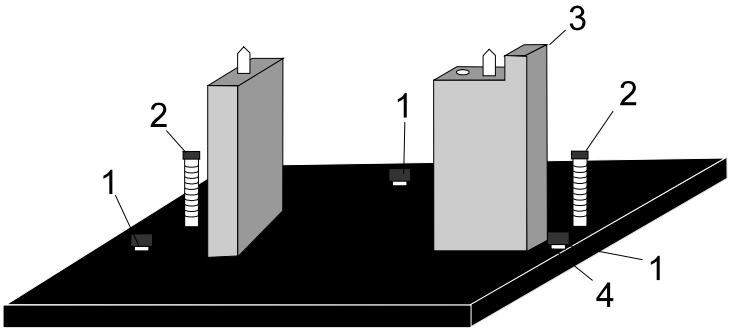


Figure 3. Cell holder base

1) Adjusting screws 2) Locating screws
3) Notched pillar 4) Locknuts

3 Tighten the two locating screws using the 1/8 inch hexagonal balldriver.

4 Place a cell holder on the cell holder base (it will only fit one way) and tighten the thumbscrew.

5 You can now install the base plate into the sample compartment of the instrument (see Page 37).

6 Once the base plate is installed, the cell holder must be aligned in the light beam (see the next section).

Aligning the single cell holder

Use this procedure for aligning the cell holders for all instruments.

To align the single cell holder:

1 Close the sample compartment lid. In the Cary Win UV software, click the Windows® **Start** button and then choose **Programs, Cary WinUV, Align**. Click the **Cary** tab and under 'Instrument Parameters', select **Zero order**. Click **Apply**.

2 Open the sample compartment lid and place a piece of white paper in the light path and note where the light beam strikes the cell holder. The beam should be centered on the aperture of the cell holder.

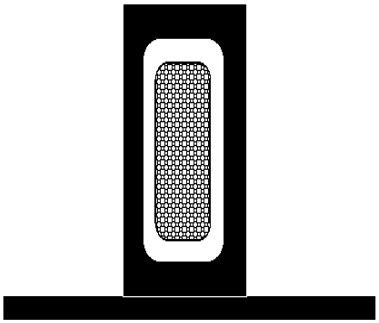


Figure 4. Single cell holder aperture. The thatched area in the middle shows the beam image

3 If the beam is not centered, use the 2.5 millimeter hexagonal balldriver to adjust the three adjusting screws in the cell holder base until the beam appears to be central to the aperture. Gently tighten the lock nuts underneath the cell holder base to fix the height of the adjusting screws.

Solid sample holder (Cary 4000/5000/6000i only)

The Cary 5000/6000i comes with two solid sample holders, which are optional for the Cary 4000. Each solid sample holder comes with four solid sample slides of various apertures: standard, 1, 5 and 10 millimeter.

To hold the solid samples, two 'V' holders are supplied (one small and one large). These are held in place on the solid sample slides by two screws. For delicate samples, a spacer is provided. This is placed between the V holder and the solid sample slide. Delicate samples are then held in place only by their edge.

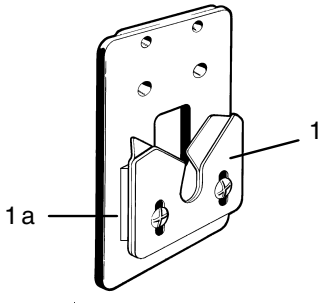


Figure 5. Solid sample slide showing V-holder (1) and spacer (1a)

Alternatively, you can attach a locking plate to a solid sample slide using the two 40 millimeter pins, as shown in Figure 6. This arrangement is suitable for large samples.

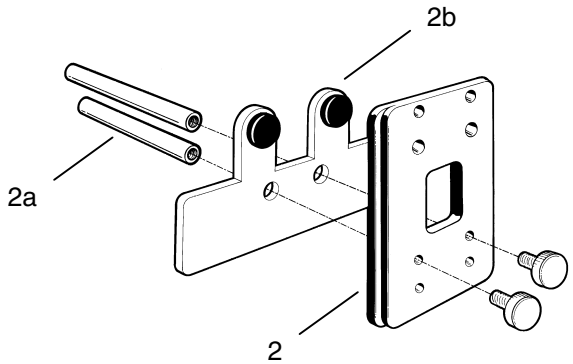


Figure 6. Solid sample slide (2) with pins (2a) and locking plate (2b)

The solid sample holder must be fitted to the LockDown base plate before being installed in the instrument.

To install the solid sample holder onto the base plate:

1 Screw the optical rails into the removable base plate using the 1/8 inch hexagonal balldriver to tighten the two locating screws. The notch should be on the right side. (Two post clips on the underside of the plate identify the back of the base plate.)

TIP You may find it more convenient to have a set of optical rails and solid sample holders permanently installed onto a base plate. You can then simply install and remove the base plate as required.

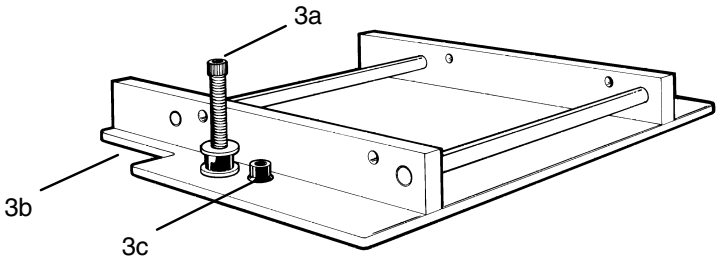


Figure 7. Optical rails showing the locating screw (3a), notch (3b) and adjustment screw (3c)

2 Place the other set of rails in the reference position with the notch towards the left side of the base plate. The setup procedure for both sample and reference solid sample holders is otherwise the same.

NOTE If you are operating in normal or double mode, the reference position is at the rear of the sample compartment. If you are operating in reverse mode, the reference position is at the front.

3 Loosely clamp the slide holder to its base. Insert the slide holder onto the optical rails but do not tighten the clamping screw.

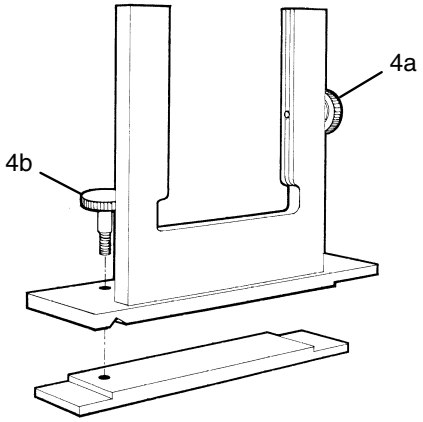


Figure 8. Slide holder showing the side screw (4a) and clamping screw (4b)

4 Insert the solid sample slide with attached V holder or locking plate into the center of the slide holder and tighten the side screw.

TIP It is recommended that you place the solid sample slide into the slide holder so that the slide masks the light beam before it reaches the sample. This minimizes scattering of the light beam.

5 You must now install the base plate into the sample compartment (see Page 37) and then align the accessory (see the next section).

Aligning the solid sample holder

To align the solid cell holder:

1 Close the sample compartment lid. In the Cary Win UV software, set the wavelength to 0 nanometers (zero order) by clicking the Windows **Start** button and then **Programs, Agilent, Cary WinUV, Align**. Click the **Cary** tab and under 'Instrument Parameters', select **Zero order**. Click **Apply**.

2 Place a piece of white paper in the light path and note where the light beam strikes the solid sample slide. The beam should be centered on the aperture.

3 If the beam is not centered, first align it by moving the slide holder along the optical rails to the center of the sample compartment. Tighten the clamping screw on the slide holder. You will then need to use the 2.5 millimeter hexagonal balldriver to adjust the three adjusting screws on the optical rail base until the beam appears to be visually aligned.

The solid sample holder is now aligned and ready for use.

NOTE You can use a polarizer/depolarizer with the solid sample holder. These are available from Agilent (part number 0210131600 or 0210131700).

Extra slide holders are also available (part number 5810005400). Two of these can be screwed into the ends of the optical rails.

If you want to use liquid rather than solid samples with your Cary instrument, you will first need to purchase a cell holder base (part number 0010048100) and a single cell holder (part number 0110260190) from Agilent.

Alternatively, you can buy a variable pathlength cell holder (see Figure 9) available from Agilent (part number 0210125300 for 50 mm; 6610014000 for 100 mm). This will slot into your solid sample holder base.

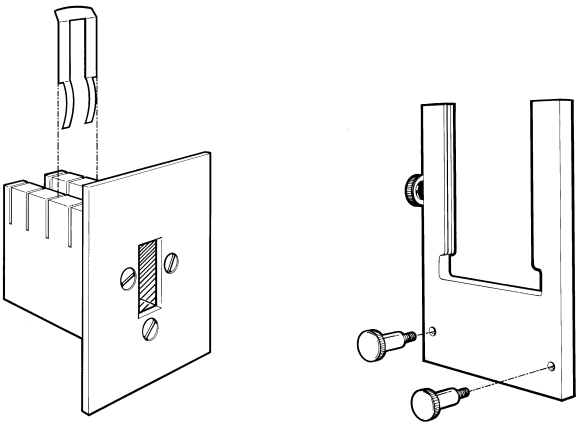


Figure 9. Optional accessories for the solid sample holder. Variable pathlength cell holder (left) and side mounted slide (right)

Position the sample so that the center of the sample sits in the center of the sample compartment (see Figure 10). The sample should be horizontally and vertically centered.

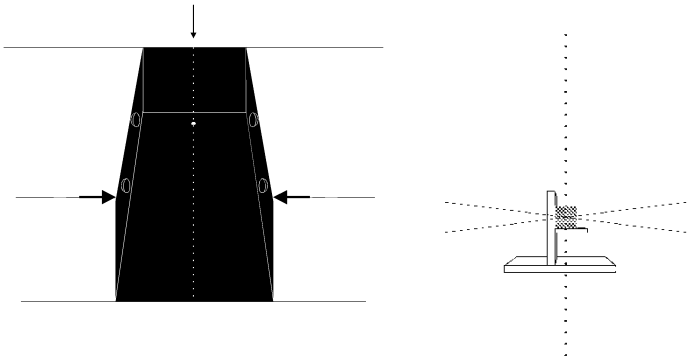


Figure 10. Aligning the sample in the sample compartment. Left: Sample compartment from above. The dotted line indicates the middle of the compartment. Right: Middle of the sample compartment when viewed from the side

Installing the base plate

The base plate needs to be locked into position in the sample compartment.

1. The LockDown mechanism features two posts at the back of the base plate and a clamp post at the front of the plate. Hold the base plate by the handle (with accessory), so that the posts are situated at the rear of the sample compartment.
2. Load the base plate into the sample compartment by pushing it backwards, allowing the two rear-mounted posts to engage under the clamps in the sample compartment floor.
3. Lower the front edge of the base plate so that the front post engages in the LockDown.
4. Move the lever at the front of the sample compartment to the left to lock the base plate into position.
5. You now need to align the accessory. See Page 35.

Installing other accessories

Your Cary instruments are compatible with a wide range of accessories. In the Help, there are descriptions of the accessories as well as instructions for installing them. Many of the installation instructions are available as a PDF file for easy printing from the Help.

Nitrogen purging

Cary 100/300

The sample compartment of the Cary 100/300 can be nitrogen purged if the Extended Sample Compartment is fitted. The nitrogen supply should be attached to the inlet tubes beneath the Extended Sample Compartment.

Refer to the Extended Sample Compartment operating instructions in the Help for further information.

Cary 4000/5000/6000i

The nitrogen purging system is NOT supplied by Agilent, but the following items are available from appropriate commercial suppliers:

Nitrogen

Ultra-high purity liquid nitrogen, for example Nitrogen 5.0, (in conjunction with a heat exchanger) is recommended because it is less expensive than compressed nitrogen and is usually of better quality. If compressed nitrogen must be used, the gas must be dry, oil-free and uncontaminated.

CAUTION Never use compressed nitrogen from a supplier who uses oil or water in the compression process. Such processes invariably leave fine particles of oil suspended in the nitrogen, which will form an oily deposit on optical surfaces. Use nitrogen from a supplier who fills containers from immersion pumps lubricated with liquid nitrogen.

NOTE The instrument warranty will be void if damage is caused by the use of unsatisfactory nitrogen.

Pressure regulator and gauge

Operating pressure is from 83 to 172 kPa (12 to 25 psig). Always use an appropriate regulator and gauge to ensure that the nitrogen supply is consistently maintained at the correct pressure.

Supply tubing

Use clean, flexible plastic (Tygon polyvinyl chloride (PVC) or equivalent) tubing of 6 millimeter (1/4 inch) internal diameter. Never use rubber tubing because it may be treated internally with talc that can be blown into the optical system.

CAUTION Never use rubber tubing, because it may be treated internally with talc that can be blown into the optical system.

Gas manifold

The manifold should be fitted with one inlet suitable for connection to the nitrogen supply system and two outlets suitable for connection to the spectrophotometer.

Flowmeter

Two flowmeters (complete with control valves) should be inserted in the system between the manifold outlets and the spectrophotometer (refer to diagram). Each flowmeter should be capable of monitoring flow rates between 0 and 30 liters per minute (64 cubic feet per hour).

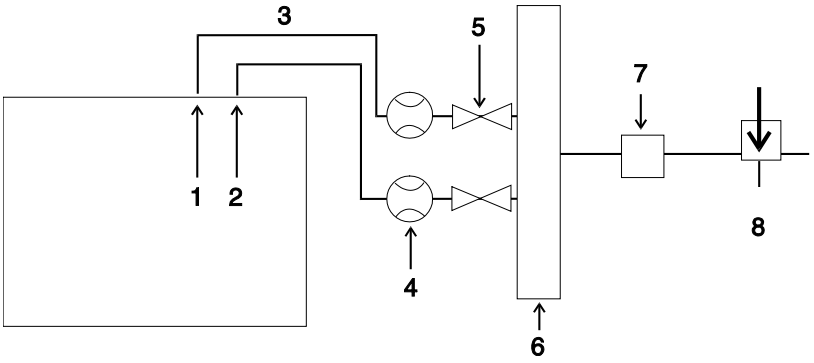


Figure 11. The position of flowmeters when purging with nitrogen

1) Instrument	2) Sample compartment	3) Tubing
4) Flowmeters	5) Shut-off valves	6) Manifold
7) Pressure regulator	8) Nitrogen control valve	

This figure is also included in the Cary 100/300/4000/5000/6000i Pre-Installation Manual.

Procedure

You may need to purge the instrument with nitrogen under the following circumstances:

- When taking measurements at wavelengths below 200 nanometers where it is necessary to minimize the effects of oxygen absorption bands and other absorbing species in the atmosphere such as organic solvents (for example, acetone and isopropanol).
- When taking measurements through water-absorption bands in the near-infrared region near 1370 and 1850 nanometers (Cary 5000/6000i), and 2580 and 2750 nanometers (Cary 5000).
- When operational conditions are such that environmental vapors or solid particles could cause damage to optical surfaces.
- When working continuously in the ultraviolet region for long periods. Purging will protect the optics.

To purge the instrument:

1. Ensure that the nitrogen purging system is installed according to the requirements on Page 38.
2. Open the nitrogen control valve and then adjust the regulator to provide a supply pressure between 83 and 172 kPa (12 and 25 psig).
3. Set the flowmeter valves to give the following flow rates:

- Instrument: 0–20 L/min
- Sample compartment: 0–10 L/min

NOTE If samples are frequently changed, you may need to increase the flow rate through the sample compartment.

NOTE You can gauge the success of purging by scanning for oxygen in the UV-Vis region and by scanning for water vapor in the NIR region (Cary 5000/6000i only).

Removing the sample compartment base

Cary 100/300

The Cary 100/300 has a rectangular base plate in the sample compartment to protect the connectors from spills. You will need to remove this plate when you install an accessory that plugs into one of the sockets underneath the sample compartment.

The plate should be replaced in the sample compartment when the accessory is removed to prevent damage to the connectors from liquid spillage.

Cary 4000/5000/6000i

The base of the Cary 4000/5000/6000i sample compartment is completely removable. This allows for large apparatus to be positioned in the sample compartment.

NOTE Once the floor of the sample compartment has been removed, the optical alignment with respect to the floor has been lost. Before performing any microcell analyses, you will need to realign the optics.

To remove the base:

1. Remove the front door.
2. Remove the cover plate between the floor and the horizontal extrusion.
3. Remove the horizontal extrusion by unscrewing the 2 screws in its base.
4. Remove the lower cover plate.
5. Undo the fasteners holding the sample compartment floor.
6. Remove the sample compartment floor — the LockDown mechanism will also be removed.

4. Maintenance

This chapter includes some of the maintenance procedures for the Agilent Cary instrument that may be carried out by an operator. Others are included in the Help. Any maintenance procedures not specifically mentioned in this chapter or in the Help should be carried out only by Agilent-trained, Agilent-qualified or Agilent-authorized service engineers.

WARNING **Electrical Shock Hazard**

This instrument contains 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. Operators and other unauthorized personnel must NEVER remove the main cover. Only Agilent-trained, Agilent-qualified, or Agilent-approved service engineers may open the main cover of the instrument.

NOTE This section refers only to maintenance procedures for the Cary spectrophotometer. You should refer to your computer and printer manuals for their maintenance procedures.

Cleaning

Any spills in the sample compartment should be immediately wiped up and any deposits on the sample compartment windows should also be removed.

The exterior surfaces of the Cary spectrophotometer 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.

Source lamps

Instructions for how to change and align both the visible and ultraviolet (UV) lamps for Cary instruments are included in the Help provided with the software.

For both lamps the following safety precautions should be observed:

WARNING

Hot Surface and Electrical Shock Hazards

Lamp surfaces and mounting brackets will become hot during operation and will remain hot for some time after being switched off. The temperatures are sufficient to cause burns.

The UV and mercury lamps operate at high voltage. Contact with this voltage can cause death, serious injury, or painful electric shock. Before changing the deuterium or visible lamps, ALWAYS switch off the instrument, remove the power supply cable and allow the lamps to cool.

CAUTION

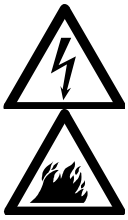
Care must also be taken when removing lamps. Touching the glass envelope of either the deuterium or visible lamp will reduce its efficiency. NEVER touch the glass surfaces of new lamps. ALWAYS handle a lamp by its base, using a soft cloth.

Fuses

The spectrophotometer contains two fuses, which are located at the back of the instrument. To replace a fuse, disconnect the spectrophotometer from the power supply, and replace the blown fuse with one of the type and rating as indicated in the 'Specifications' section on Page 14.

The fuses have a code marked on the cap (for example, T 2AH250V). This refers to the fuse characteristic ('T': time lag, 'F': fast-acting), the current rating ('x': amperes), the braking capacity ('H': heavy, 'L': low) and the voltage rating ('y': volts). This code must correspond to the code appearing next to the fuse holders.

WARNING **Electrical Shock and Fire Hazards**



To prevent reduced safety protection or unwanted fusing, ALWAYS ensure that the code on the fuse cap matches the information printed next to the fuse holders.

To check a fuse:

1. Disconnect the instrument from the mains power supply.
2. Undo the fuse cap by pressing the cap and turning it counter-clockwise.
3. Carefully pull out the cap. The fuse should be held in the fuse cap.
4. Check that the fuse is the correct type and is not damaged. If necessary, replace the fuse.
5. Place the fuse into the cap, push the cap in, and then turn the cap clockwise.
6. Reconnect the instrument to the mains power supply.

NOTE If a fuse repeatedly blows, it may indicate other problems with the Cary instrument. A service call may be required.

Spare parts

Cary 100/300

Item	Part number
PCI-GPIB National Instruments card. Supplied as standard.	9910102100
Controller GPIB USB	7910051600
Instrument fuse* 4 A time lag, ceramic, 5 x 20 mm	1910008900
Instrument fuse*, 5 A time lag, ceramic, M205	1910009100
Thumbscrew kit: Includes all thumbscrews for instrument and accessory.	9910064100
Spares kit: Includes accessory locating pin, accessory fastening screws (rear), instrument feet (plastic), instrument cover snap cap washer, snap cap, ACB cover plate, socket covers for ACB.	9910064300
Visible QI lamp	5610021700
Deuterium lamp	5610021800

* Refer to the information printed on the back of the instrument to determine which fuse types you need.

Cary 4000/5000/6000i

Item	Part number
Instrument fuse T2 AH 250 V for 240 V operation	1910009400
Instrument fuse T2.5 AH 250 V for 110 V operation	1910009500
VIS lamp	5610013900
Deuterium lamp	0110713990
Mercury lamp	5610136300
PCI-GPIB card	9910102100
Controller GPIB USB	7910051600

For further information about spare parts and their part numbers, refer to the Agilent website, www.agilent.com

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