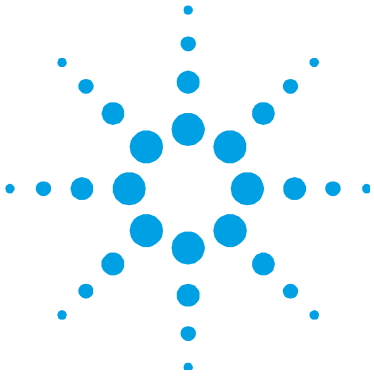

Agilent 240/280 Series AA

(including Zeeman)

User's Guide

Agilent Technologies

Notices

Manual Part Number

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Agilent Technologies, Inc.

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Safety Notices

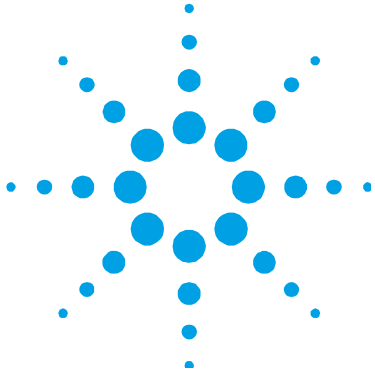
CAUTION

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

General

Your Agilent AA 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.

Operation of an atomic absorption spectrometer can involve the use of compressed gases, flames, and hazardous materials including corrosive fluids and flammable liquids. Unskilled, improper, or careless use of this instrument can create explosion hazards, fire hazards, or other hazards which can cause death, serious injury to personnel, or severe damage to equipment and property.

Information on safety practices is provided with your instrument and operation manuals, and also referenced in your Agilent accessory manuals. Before using your instrument or accessories, you must thoroughly read these safety practices.

Observe all relevant safety practices at all times.

The safety practices described below 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 in accordance with these safety practices.

Electrical Hazards

The instrument and 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 electric shock.

Panels and covers that are retained by fasteners which require the use of a tool for removal may only be opened by Agilent field service engineers. Consult the manuals or product labels supplied with your PC, monitor, printer/plotter, water-cooling system and vacuum pump (where required) to determine which parts are operator-accessible.

Application of the wrong supply voltage, connection of the instrument to an incorrectly wired supply outlet, or lack of proper electrical grounding can create a fire hazard or a potentially serious shock hazard, and could seriously damage the instrument and any attached ancillary equipment.

Always use a 3-wire outlet with ground connection which is adequately rated for the load. The installation must comply with local and national safety regulations.

Do not connect the instrument to the mains power supply until you have made sure that the operating voltage is correctly set for the mains power supply in the specific outlet in your laboratory to which the equipment is connected.

Heat, Vapors and Fumes

Heat, vapors and fumes generated by flame, furnace and vapor generation methods can be hazardous to personnel.

Heat, vapors and fumes must be extracted from the instrument by an exhaust system. The instrument must be vented into a self-contained arrangement of collector hood, ducting and exhaust fan. The system must be vented to the outside air, never within the building. Locate the system outlet such that the exhaust cannot re-enter the building through any door, window, air conditioning inlet, or other ventilator. Construct the system in accordance with local codes and regulations for ventilation.

The exhaust system must be capable of providing an exhaust ventilation rate of at least 6 cubic meters per minute (200 cfm). Locate the exhaust fan at least 3 meters (10 feet) away from the flame and as close to the outlet as possible. The motor must be mounted away from the hot gases, and plastic parts must not be used as they will melt. Fit a back-draft damper to the outlet end of the system. Equip the exhaust fan power supply with an indicator close to the instrument to indicate whether the exhaust fan is on or off. *Always* switch the exhaust fan on *before* lighting the flame.

Use fireproof ducting that is in accordance with your local fire prevention regulations. Locate the ducting away from fire alarms, sprinkler heads and other heat-sensitive devices. Do not make solder joints in the ducting—the hot exhaust in the duct may melt the joint.

Regularly check the system by smoke test to ensure that the exhaust system is working.

When operating the atomic absorption spectrometer, *always* have the chimney in place to ensure correct ventilation.

Compressed Gases and Cylinders

All compressed gases (other than air) can create a hazard if they leak into the atmosphere. Even small leaks in gas supply systems can be dangerous. Any leak (except that of air) can an explosion hazard, a fire hazard, or result in an oxygen–deficient atmosphere. Such hazards can cause death, serious injury, asphyxiation, anesthetic effects, and serious damage to equipment and property.

Cylinders must be stored and handled strictly in accordance with local safety codes and regulations. Cylinders must be used and stored only in a vertical position. Secure all cylinders to an immovable structure or a properly constructed cylinder stand. The area in which cylinders are stored must be adequately ventilated to prevent toxic or explosive accumulations. Move cylinders only on a properly constructed trolley.

Keep cylinders cool. This rule applies to every cylinder of compressed gas. Cylinders have pressure relief devices that release the contents of the cylinder if the temperature exceeds 52 °C (125 °F).

Ensure that all cylinders are clearly labeled so that there can be no doubt about the contents. If the cylinder label is not legible, do not use the cylinder—return it to your supplier. Always ensure that you have the right cylinder before connecting the cylinder to the instrument.

If air is supplied from a compressor, all moisture must be extracted from the air before it is supplied to the gas control module. Moisture can affect the internal components of the gas control system and create a potentially hazardous situation.

Use only approved regulators and hose connectors.

Never attempt to refill cylinders.

Remember that for cylinder connections, left-hand thread fittings are used for fuel; right-hand thread fittings are used for support gases.

When your analytical program is complete, or at the end of the working day, always ensure that all gas supplies are turned off at the cylinders.

Gas Hoses and Connections

Even small leaks in gas supply systems can be dangerous. Any leak can create an explosion hazard, a fire hazard, or can result in an oxygen-deficient atmosphere. Such hazards can cause death, serious injury, asphyxiation, anesthetic effects, and serious damage to equipment and property.

Use only approved regulators, connectors and fittings. If in any doubt, consult your local gas supplier or your Agilent representative.

Ensure that all gas connectors and hoses are correctly assembled.

Arrange gas hoses so that they will not be damaged, stepped on, or have things dropped on them.

Never use frayed or damaged hoses.

Perform leak tests at all joints and seals every day before the instrument is used. Test for leaks with a brush and soapy water or a proprietary leak-detecting solution. *Never* use a naked flame when testing for leaks.

Ultraviolet Radiation

Hazardous ultraviolet radiation is emitted by flames, hollow cathode lamps and deuterium lamps. This radiation can cause serious damage to human eyes and skin.

Always wear safety glasses conforming to an approved standard, and certified or otherwise warranted to protect the eyes from ultraviolet radiation. Never look directly at the light emitted by a hollow cathode lamp.

When using a flame, always operate your spectrometer with the flame shield closed, and the sample compartment front panel and chimney in place.

Other

Other specific warnings and cautions appear in the manual and in the online Help where appropriate, and detail the specific hazard, describe how to avoid it, and specify the possible consequences of not heeding the warning or caution.

Warning and Caution Messages

WARNING

Name of Warning
A 'Warning' message is used in the text when failure to observe instructions or precautions could result in death or injury.

CAUTION A 'Caution' message is used when failure to observe instructions could result in damage to equipment (Agilent supplied and/or other associated equipment).

NOTE A 'Note' message is used to give advice or information.

Warning Symbols

The following is a list of symbols that appear in conjunction with warnings in this manual and on the spectrometer. The hazard they describe is also shown. The beginning of the warning text is noted by a warning icon:

WARNING

A triangular symbol indicates a warning. The meanings of the symbols that may appear alongside warnings in the documentation or on the instrument itself are as follows:

Corrosive liquids

Electrical shock

Explosion hazard

Eye hazard

Fire hazard

Heavy weight (danger to feet)

Heavy weight (danger to hands)

Hot surface

Magnetic field

Moving part

Noxious gases

Sharp object

Toxic material

Read all warnings and cautions carefully and observe them at all times.

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 appear on the instrument for your information.

I	Mains power on
0	Mains power off
	Fuse
	Single phase alternating current
	When attached to the rear of the instrument, it indicates that the product complies with the requirements of one or more EU directives.
	Flame off
	Flame on
	Indicates lamp present
	When attached to the rear of the product, indicates that the product has been certified (evaluated) to CSA 61010.1 and UL 61010-1.

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 mode.
- 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

Your Agilent AA instrument has 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 these directives is indicated by:

- the CE Marking appearing on the rear of the product, and
- the documentation package that accompanies the product containing a copy of the Declaration of Conformity. The Declaration of Conformity is the legal declaration by Agilent that the product complies with the directives listed above, and 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.

7 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.

Flame Operation

Flammable Solvents

Unskilled, improper, or careless use of flammable solvents in or near an atomic absorption spectrometer can create explosion hazards and fire hazards. These can result in death, or severe personal injury or burns.

Remember at all times that the combination of a flame and flammable solvents can present a serious hazard. All relevant safety practices governing the use of flammable solvents must be strictly followed.

To reduce the possibility of fire or explosion:

- When initially selecting an organic solvent, choose a solvent having the highest flash point consistent with your analytical requirements.
- Never use a solvent having a specific gravity lower than 0.75.
- Never leave uncovered containers of flammable solvent standing near the burner. When aspirating such solvents, always use a covered container and feed the capillary tubing through a 2 mm diameter hole in the cover. Always use the smallest volume of solvent consistent with your analytical requirements.
- Always use solvent-resistant tubing such as nitrile rubber for the drainage system and the vapor vent. Lead the drainage tube to a suitable wide-necked waste vessel (as described in the next paragraph). The standard plastic laboratory tubing supplied with your instrument is not suitable for draining organic solvents or venting organic vapors. If organic or toxic solutions are being used in the spray chamber, vent tubing must be connected to the vapor vent on the liquid trap, run parallel to the drain tubing, and led to an active exhaust system. Do not lead the vapor tubing to the waste vessel. If you are not using toxic or hazardous liquids in the spray chamber, leave the vapor vent uncovered.
- Use small, wide-necked waste vessels and empty them frequently—do not accumulate large volumes of flammable solvent. Do not use glass waste vessels—use vessels made of a material that will not shatter in the event of a flashback. Metal vessels will corrode and it is difficult to determine the level of liquid in them. Ensure that your waste vessel is below the instrument and located in an open, well-ventilated position where you can see it. Never locate the vessel in a confined space.
- When your analytical program has been completed, or at the end of the working day, always empty and rinse the waste vessel.
- When your analytical program has been completed, or at the end of the working day, always empty, clean and refill the liquid trap.
- Do not mix nitric or perchloric acid residues with organic solvent residues.

- Keep the burner slot, spray chamber and liquid trap clean.
- Always use the internal igniter to light the flame as the flame will not operate unless all the safety interlocks are satisfied.

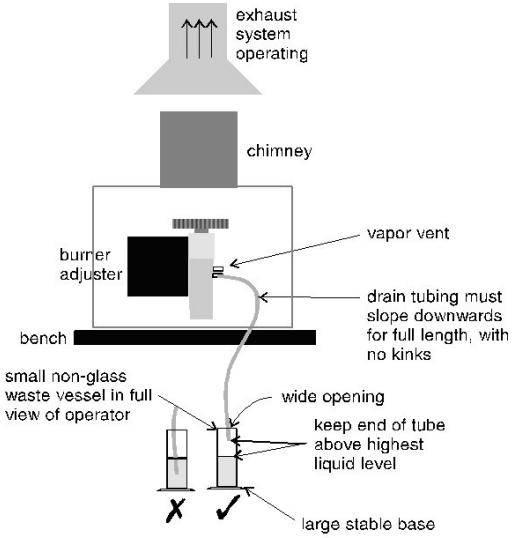


Figure 1. System setup diagram

Compressed Gases and Cylinders for Flame Operation

This spectrometer is to be used only with air, nitrous oxide, and acetylene for flame operation.

Never use oxygen or oxygen-enriched air as the oxidant because this will result in an explosion.

Never use any gas except acetylene as the fuel gas.

Acetylene

Unskilled, improper, or careless use of acetylene can create explosion hazards and fire hazards which can result in death, severe personal injury or burns.

Use acetylene at pressures lower than 105 kPa (15 psig). At pressures above this level, acetylene can explode spontaneously. Your Agilent AA is designed to operate at fuel supply pressures between 65 and 100 kPa (9.5-14.5 psig). Refer to the Specifications section or the rear of the instrument for the exact range and recommended pressure.

Do not use any tubing or connector that reacts chemically with acetylene. Never pass acetylene through copper tubing, or brass tubing or fittings containing more than 65% copper, since this may provoke an explosion. Never bring acetylene into direct contact with copper, silver, liquid mercury, gaseous chlorine or grease, as an explosion could result.

Use only acetylene that is packed in acetone. Some gas suppliers offer acetylene packed in material other than acetone. While these alternatives may overcome some of the disadvantages of acetone, they may also introduce the more serious problem of corrosion in the gas control module and must not be used with Agilent atomic absorption spectrometers.

If the pressure in the acetylene cylinder is allowed to fall below 700 kPa (100 psig), or the consumption is greater than 1/7 of the cylinder contents per hour, acetone may be carried over from the cylinder and into the spectrometer. Acetone in the spectrometer can damage seals, O-rings and hoses, degrade analytical performance and precipitate flashbacks.

Minimize the amount of acetone which is carried over with the acetylene by:

- Replacing cylinders when their contents pressure drops below 700 kPa (100 psi)
- Ensuring that the rate of acetylene drawn off from each cylinder is not excessive.

If high rates of consumption are observed then connect 2 or more cylinders in parallel to a manifold. This reduces the rate at which acetylene is drawn from each cylinder.

To reduce the possibility of fire or explosion:

- Test the supply 'plumbing' regularly for leaks with a brush and soapy water or a proprietary leak-detecting solution (never use a naked flame when testing for leaks)
- 'Crack' the cylinder before use by gently opening the valve to check for any drops or spray of acetone. Any cylinder showing acetone should be returned to the supplier for replacement.

Use 'Instrument Grade' acetylene that is at least 99.5% pure.

Turn off fuel gas at the cylinder when you have finished your flame analysis.

Refer also to your local regulations governing the use of acetylene.

Nitrous Oxide

The de-compression of high pressure N_2O gas at the regulator can cause excessive cooling and eventual freezing of the regulator. To prevent regulator malfunction and possible flashback, the gas should be heated with an in-line or wrap-around heater.

Burners

Improper or careless use of burners can create explosion hazards and fire hazards which can cause death, serious injury to personnel and damage to equipment and property.

Whenever you handle burners, remember that the burner may be very hot. Always use protective gloves to handle burners.

Burners are clearly identified by the fuel/oxidant combination for which they are intended. Always fit the correct burner. Never attempt to use an air-acetylene burner for nitrous oxide-acetylene, as this will cause a flashback.

Use only acetylene as the fuel gas.

Use only air or nitrous oxide as oxidant. Never attempt to use oxygen or oxygen-enriched air, as this will cause a flashback.

Burner interlocks are incorporated to minimize the possibility of using the wrong burner. Never interfere with or attempt to bypass any interlock fitted to this instrument.

To minimize the rate of burner blockage, the burner slot must be cleaned and polished as described in the Maintenance section.

Never allow burners to become blocked. Progressive burner blockage can increase the static pressure in the liquid trap to the point at which the liquid seal is breached. This can cause a flashback and create an explosion hazard or a fire hazard.

Never allow carbon to build up on the slot, as glowing particles can dislodge and fall through the slot, causing a flashback.

Always turn the flame off before attempting to clean the burner slot. Never clean the slot of a burner while a flame is running.

Never leave a flame unattended.

Never disassemble or modify a burner. *Never* use a damaged burner.

Nebulizer

Incorrect assembly and fitting of nebulizers to an atomic absorption spectrometer can create explosion hazards and fire hazards which can cause serious injury to personnel and damage to equipment and property.

Ensure that the nebulizer is correctly assembled and correctly fitted to the spray chamber before lighting the flame. Nebulizers should be correctly adjusted before lighting the flame.

Never remove a nebulizer from the spray chamber while the flame is on, and do not use a mechanical device (for example, a wire) to clean the capillary of a nebulizer while a flame is operating. Always extinguish the flame before removing the nebulizer from the spray chamber.

Regularly test all connections for leaks. Rectify all leaks before lighting the flame.

Liquid Trap

Improper use of the liquid trap can create explosion hazards, fire hazards, and toxic vapor hazards which can result in death or serious personal injury.

The liquid trap interlock is incorporated to minimize the possibility of attempting to operate the instrument with an empty trap or with the drain tube missing. Never interfere with this interlock. Never attempt to bypass this interlock.

Always fill the liquid trap with the same solvent that is being used for your samples.

The trap is designed to provide a liquid seal under all normal conditions with solutions having a specific gravity greater than 0.75. Never use a solution or solvent having a specific gravity lower than 0.75, otherwise the liquid seal can be breached. This can create a flashback and create an explosion hazard or a fire hazard.

A length of tubing must be connected to the drain outlet on the trap and led to a suitable waste vessel. The free end of the tubing must remain above the liquid in the waste vessel. Do not use glass waste vessels—use vessels made of a material that will not shatter in the event of a flashback.

A length of tubing should be connected to the vapor vent (the upper nipple) on the liquid trap when you are analyzing organic or toxic liquids. This tubing should be led out from the sample compartment, parallel to the drain tubing, and *must* slope downwards to enable any liquid overflow to drain out and prevent the tubing from becoming blocked. Do *not* lead the vapor tubing to the waste vessel. If necessary, an active exhaust system should be used to draw away toxic vapors. If you are not analyzing solutions of a toxic nature, leave the vapor outlet uncovered.

Heat Hazards

An open flame, burners and other hot surfaces can present heat hazards that can result in severe burns.

When operating a flame system, always operate your spectrometer with the flame shield closed, and the sample compartment front panel in place. Keep your hands out of the sample compartment while a flame is burning.

When operating a flame system make sure the chimney is in place with the cutaway skirt (if present) to the back. Before you touch the instrument chimney, turn the flame off and allow the chimney to cool.

When you change burners, remember that the burner may be very hot. Always use protective gloves when removing a burner from the instrument.

Perchloric Acid

Aspiration of perchloric acid and perchlorates into a nitrous oxide-acetylene flame can create an explosion hazard which can result in death or serious injury, including temporary or permanent impairment of hearing.

Do not use perchloric acid unless it is absolutely essential for sample preparation. If perchloric acid must be used, it may be possible to reduce the risk of explosion by taking the following measures:

- Use an air-acetylene flame instead of a nitrous oxide-acetylene flame.
- Reduce the concentration of perchloric acid and metal in all analytical solutions to the lowest practicable level. The concentration of perchloric acid should be reduced in the digestion stage and further reduced by extending the fuming stage.
- Aspirate all solutions for the shortest practicable period.
- Aspirate distilled water between samples. Minimize the aspiration of air.
- Use separate spray chamber/liquid trap and drain assemblies for perchloric acid analyses and organic solvent analyses to prevent perchloric acid from mixing with organic solvent residues.

NOTE When solvent extractions of perchloric solutions are performed, some of the acid may dissolve in the organic solvent that is subsequently aspirated. Also, if the organic solution is aspirated while floating on the surface of the acid, do not allow the capillary tube to drop below the organic layer and suck up aqueous perchloric acid.

When using perchloric acid, wear approved ear protectors and approved safety glasses and ensure that all instrument safety covers are in position.

Flashbacks

Analysis over many years has shown that in most cases, flashbacks are associated with one or more of the following points. If you experience a flashback, check this list to see if any of the points are relevant, and take steps to remedy the situation.

1. Keep the burner clean. Deposits must not be allowed to build up in or on the burner slot because they can partially block it (thus causing the pressure to build up in the spray chamber and breach the seal provided by the liquid trap), or glowing particles can fall down through the slot into the spray chamber and ignite the combustible gas mixture inside.
   The use of a hard object to brush off glowing carbon particles during flame operation is not recommended because of the increased risk of knocking one of the particles down the slot.
   When using an organic solvent, a reduced uptake rate should be used to restrict the amount of liquid fuel that is fed to the flame.
2. The width of the burner slot must not exceed the maximum design specification [Mark VIA: 0.47 mm (0.0185 in.) for N_2O; Mark 7 0.46 mm (0.0181 in.) for N_2O; or 0.54 mm (0.021 in.) for air]. Even a small increase in width can greatly increase the possibility of a flashback occurring.
   The burner slot must be regularly cleaned according to the instructions included in the Maintenance chapter of this manual.

3 Ensure that the spray chamber and liquid trap are kept clean.
If dirty solutions are being analyzed (for example, engine oils), ensure that the spray chamber, liquid trap, float and drain tube are regularly cleaned and flushed with a suitable solvent so that sludge does not build up in the parts.

4 Ensure that the correct O-rings are used on the burner, nebulizer block and nebulizer, and that they remain undamaged.
Damage to O-rings in the spray chamber can result in the leakage of gas which can be ignited by the flame and in turn set fire to the spray chamber.
Damage to O-rings in the nebulizer can allow leakage of the oxidant which can reduce the total flow of gas through the burner slot and so increase the possibility of a flashback occurring.

5 The liquid trap must be filled with the same solution as the matrix used for the standards and samples.

6 The drain tube must be attached to the lower nipple of the liquid trap, and it must slope downwards all the way to the drain vessel so that the waste liquid drains smoothly.
The end of the drain tube must not be allowed to drop below the level of the liquid in the vessel. (Conversely, the level of liquid must not be allowed to rise sufficiently to cover the end of the tube.)

When using organic or toxic liquids in the spray chamber, a vent tube must be attached to the upper vent nipple of the liquid trap. It must slope downwards (running parallel to the drain tube) to prevent it becoming blocked should any liquid drain out, and be vented to an active exhaust system.
All of the above points must be observed because a sudden surge of waste liquid can affect the pressure in the spray chamber and result in a flashback.

7 Since N_2O is stored in the cylinder under pressure as a liquid, when it expands through the regulator it can cool the regulator sufficiently to form ice on the outside and prevent it from operating correctly.
Prevent freezing by using a heater on the N_2O regulator on the supply cylinder. Contact the supplier of the regulator for a suitable heater.

8 As free acetylene is unstable at elevated pressure, it has to be stored in the cylinder by dissolving it in acetone.
If the gas is withdrawn too quickly, or the cylinder pressure is allowed to drop below 700 kPa, acetone may be drawn off in sufficient quantities to affect analytical performance, damage seals, O-rings and hoses, or even cause a flashback. Observe the recommendations concerning the use of acetylene.

9 Where possible, you should not perform digests with perchloric acid. As this acid is well known for forming unstable salts, operators using this acid should ensure that the minimum amount is allowed to reach the spectrometer, and that the burner, spray chamber and liquid trap are thoroughly cleaned after each analysis to ensure that unstable salts are not allowed to build up. Failure to do this can result in unpredictable flashbacks.

10 Aspirating solutions (especially alkaline/ammoniacal ones) that contain high concentrations of Ag and Cu can lead to the formation of acetylides which can spontaneously decompose and cause a flashback.

Furnace and Zeeman Operation

Gases

The graphite tube atomizer gas supply system is designed for use with inert gases and air.

Never use pure hydrogen with the graphite tube atomizer since this could result in leakage and potentially explosive accumulation of hydrogen. You may, however, use a proprietary, prepackaged mixture of 95% argon (or nitrogen) and 5% hydrogen. *Never* attempt to create your own mixture of hydrogen and an inert gas for use with the GTA system.

Heat Hazards

A hot furnace atomizer can present heat hazards that can result in severe burns to personnel. Never put your hands in the sample compartment while you are operating your furnace.

Allow the furnace atomizer to cool before removing it from the sample compartment.

Vapors and Fumes

Never place your head over the graphite tube atomizer while it is operating. This could cause inhalation of hazardous or toxic fumes, or your skin and eyes could be injured by corrosive vapors or fumes.

The chimney or the optional exhaust accessory must be in place for furnace operation to ensure that toxic vapors and heat are exhausted.

UV Radiation

When viewing the sample during the drying stage, use only a rear coated mirror (as supplied) or the Tube-CAM option. *Never* look directly at the furnace during either the ash or atomize stages.

Magnetic Field (Zeeman only)

The magnet produces a variable magnetic field of up to 0.8 Tesla peak at mains frequency in the workhead during the read stage.

To avoid interference with heart pacemakers or magnetic storage media, keep them at least 300 mm from the magnet.

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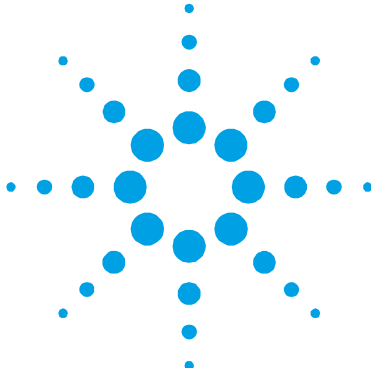

2. Introduction

The Agilent 200 series AA spectrometers are controlled by Agilent's innovative AA worksheet software. The Agilent series AA includes the following instruments:

240/240FS AA, 240Z AA, 280 AA and 280Z AA.

This documentation is appropriate for all of the instruments listed above.

The software is based on a spreadsheet that mimics an analyst's workbook and combines flame, furnace, Zeeman and vapor operation in one integrated package.

The SpectrAA Base and PRO software versions run under Microsoft® Windows® 7 64-bit (the SpectrAA CFR Software is only supported using Microsoft XP® (Service pack 3)) operating systems, and provides the following:

- Innovative, easy to use interface
- Dedicated function keys for critical functions
- Extensive Help including audio and video demonstrations of how to set up your instrument

- "Tool Tips" state the allowed range for each field
- Comprehensive error system
- The capacity to simultaneously operate one flame and one furnace (deuterium or Zeeman) spectrometer simultaneously from one computer (requires SpectrAA PRO version software)
- Features to assist users to achieve compliance with US FDA 21 CFR Part 11 requirements (optional CFR version only) which currently only runs under Windows XP (Service pack 3)

Installation Requirements

Before you receive your instrument, you are given an Agilent AA Site Preparation Guide; which describes the environmental and operating requirements of the Agilent AA system. You must prepare your laboratory according to those instructions before the Agilent AA 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.

Agilent AA Documentation

This manual covers the installation of the Agilent SpectrAA software for 240/280 series AA instruments. Instructions for installing, operating and maintaining the instruments are included in the SpectrAA Help (see Page 67).

Operating instructions for the Sample Introduction Pump System (SIPS) and other AA accessories are given in the manuals accompanying the accessories or in the SpectrAA Help

Conventions

The following conventions have been used throughout this manual:

- Single quotes (' ') indicate a selection you can make from several choices, such as radio buttons, checkboxes and software items.
- ALL CAPITALS indicates text you must type in from the keyboard (e.g. type SETUP at the prompt).

Specifications

Your Agilent AA instrument is designed for indoor use. It is suitable for the following categories:

- Installation category II
- Pollution degree 2
- Equipment Class I

Environmental

Condition	Altitude	Temp t (°C)	Humidity (%RH) non-condensing
Non-operating (transport)	0-2133 m (0-7000')	5-45	20-80
Operating within performance specifications	0-853 m (0-2800')	10-35	8-80
	853-2133 m (2800-7000')	10-25	8-80

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

Power

System unit	Required supply voltage	Rating
240 AA	100 VAC +10% -5% 120, 220 or 240 VAC ±10% 230 VAC +14% -6% 230 VAC +6% -14% 50 or 60 Hz ±1 Hz	170 VA
280 AA	100 VAC +10% -5% 120, 220 or 240 VAC ±10% 230 VAC +14% -6% 230 VAC +6% -14% 50 or 60 Hz ±1 Hz	230 VA
Zeeman version		
240Z AA	208-240 VAC ± 10 % 50 or 60 Hz ± 1 Hz	3500 VA **
280Z AA	208-240 VAC ± 10 % 50 or 60 Hz ± 1 Hz	3500 VA **
GTA accessory power supply	208, 220 or 240 VAC ± 10% 230 VAC + 14% - 6% 230 VAC + 6% - 14% 50 or 60 Hz ± 1 Hz	3500 VA **

** In normal operation, the Zeeman and GTA units draw surge currents in excess of the nominal rating. Power supplies to these units must be isolated from other supplies to the system and should include delayed action protection devices such as circuit breakers or motor start fuses.

Surges in the Zeeman instrument occur in the “read” cycle during atomization and may be up to 28 A for up to 10 seconds in any 1 to 2 minute period.

Surges in the GTA accessory depend on the choice of ramp rate and programmed temperature and may be up to 35 A for approximately 1 second, reducing to about 20 A for up to 10 seconds, perhaps repeating every 1 to 2 minutes.

Power Connections

Agilent AA instruments are supplied with different power plugs to suit the area into which they are sold:

	AA instrument	GTA 120, Zeeman
Area - code	**Plug supplied**	
Australia -00	10 A, 250 VAC Complies with AS3112	Clipsal 439D15M
USA -01	Complies with NEMA 5-15P	Complies with NEMA L6-30P (Hubbell #2621)
Canada -01	Complies with NEMA 5-15P	20 A, 250 VAC, Complies with NEMA L6-20P (Hubbell #2321+)
Europe -02	Perena 3410 (Complies with CEE 7 Sheet VII or NFC 61.303)	Kaiser CEBEC 616 VDE (Complies with DIN 49441R2)
	Suitable socket required	
Australia -00	General purpose 10 A 250 V outlet (HPM 787, Clipsal 15)	Dedicated circuit, 15 A 250 V outlet (HPM 787/15, Clipsal 15/15)
USA -01	To comply with NEMA 5-15R (15 A supply) (Hubbell IG 5262)	To comply with NEMA L6-30R (30 A supply) (Hubbell #2626)
Canada -01	To comply with NEMA 5-15R (15 A supply) (Hubbell IG 5262)	20 A, 250 VAC, Complies with NEMA L6-20R (Hubbell #2326+)
Europe -02	To comply with CEE 7 standard No.7 Sheet VII, or Norma Francais C61.303 Sheet V.A.	No standard known (Kaiser CEBEC 702 type 31/131.5)
Power supply, current rating and overload protection	Between 5 and 20 A	Between 30 and 40 A
Power supply	Single phase	Single phase

Other Electrical Connections

Rear of instrument:

- IEEE 488
- Accessory, 9-way female D-range type
- Accessory, MCA, 6 way DIN type (AA280FS and AA280Z only)
- USB port, optional
- UltrAA lamp connections: Burndy circular 6-way, optional (actual number depends on the model and option selected)

WARNING

Shock Hazard
***High voltage*– To maintain safety, only the UltrAA lamp power supplies should be used at these connections.**

Front of instrument:

- Zeeman workhead CPC 14 way connection behind the Left cover (Zeeman only).

WARNING

Shock Hazard
To prevent connector damage, switch OFF the instrument before inserting the plug and *always* turn the locknut fully clockwise to the detent position. To maintain safety, only the Zeeman workhead connector should be used at this connection.

Lamp bay:

- Deuterium lamp:
  Molex 3-way connection, in lamp compartment (behind lamp panel in lamp compartment on 240/280 series AA instruments).

WARNING

Shock Hazard
To maintain safety, only the deuterium lamp should be used at these connections.

- Hollow cathode lamps:
  - 4 lamp capacity on the 240 series AA
  - 8 lamp capacity on the 280 series AA

WARNING

Shock Hazard
High voltage **– To maintain safety, only hollow cathode lamps should be used at these connections.**

Fuses

Non-Zeeman
240 series AA
T2.5 A H250 V, IEC 127 sheet 5, 5 x 20 mm (100-120 & 220-240 VAC)
280FS AA
T4 A H250 V, IEC 127 sheet 5, 5 x 20 mm (100-120 & 220-240 VAC)
Zeeman
240Z/280Z AA
15 A long delayed-action circuit breaker with a thermal cutout.
T3.15 A H 250 V, IEC 127 sheet 5, 5 x 20 mm (208-240 VAC)
T3.15 mA L 250 V, IEC 127 sheet 2, 5 x 20 mm (208-240 VAC)
T1 A L 250 V, IEC 127 sheet 2, 5 x 20 mm (208-240 VAC)
T8 A L 250 V, IEC 127 sheet 2, 5 x 20 mm (208-240 VAC)
T800 mA L 250 V, IEC 127 sheet 2, 5 x 20 mm (208-240 VAC)

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

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

Gas supplies

	C_2H_2	Air	N_2O	Air Purge
	Instrument grade >99.5% pure	Must be clean & dry. (Air filter to be used if required)	Instrument grade >99.5% pure	
Allowed range	65-100 kPa (9.5-14.5 psi)	245-455 kPa (35-65 psi)	245-455 kPa (35-65 psi)	245-455 kPa (35-65 psi)
Recommended	75 kPa (11 psi)	350 kPa (50 psi)	350 kPa (50 psi)	
Typical flow rate	0-10 (L/min)	13.5-20 (L/min)	11-16 (L/min)	10 (L/min)
Connection	1.8 m (6 ft) length of 6.3 mm (1/4 in) ID red hose with 9/16 in-18UNF L/H thread fitting#	1.8 m (6 ft) length of 6.3 mm (1/4 in) ID black hose with 9/16 in-18UNF fitting#	1.8 m (6 ft) length of 6.3 mm (1/4 in) ID blue hose with ¾ in-16UNF fitting#	Barb to take 6.3 mm (1/4 in) hose

#Adaptors are available

Other gas connections

Sample compartment: Push-on Air/N_2O connector for burner
Push-on C_2H_2 connector for burner

Weights and Dimensions

Spectrometer System unit	Width	Depth	Height	Weight
240 AA instrument only	790 mm (31 in.)	585 mm (23 in.)	575 mm (22.5 in.)	56 kg (123 lb)
240 AA instrument and shipping box	1215 mm (48 in.)	780 mm (31 in.)	880 mm (35 in.)	97 kg (213 lb)
280 AA instrument only	790 mm (31 in.)	585 mm (23 in.)	735 mm (29 in.)	69 kg (152 lb)
280 AA instrument and shipping box	1170 mm (46 in.)	890 mm (35 in.)	890 mm (35 in.)	106 kg (234 lb)
280Z AA instrument only	790 mm (31 in.)	585 mm (23 in.)	735 mm (29 in.)	61 kg (135 lb)
280Z AA instrument and shipping box	1170 mm (46 in.)	890 mm (35 in.)	890 mm (35 in.)	92 kg (203 lb)

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3. Installation

This chapter describes how to prepare your personal computer (PC) and printer for use with the Agilent AA system and install the SpectrAA software on your PC.

PC Requirements

If you are supplying your own PC for use with an Agilent AA instrument, the recommended configurations of that PC are listed on the following page.

Recommended PC Configuration

- IBM compatible PC with 2.66 GHz processor
- 4 GB RAM
- 500GB Hard disk drive
- 256MB Graphics card supporting 1024 x 768 resolution
- 16 speed DVD drive
- Integrated audio/sound card and speakers
- Keyboard and Mouse
- 19 in LCD Monitor
- Windows 7 Professional 64-bit (Service Pack 1) operating system*

NOTE The PC must have one spare PCI expansion slot for the Agilent PCI-GPIB interface card.

If SPS 3 or ETC 60 accessories are being used an RS232 port is required for each of these.

A USB port is required if the camera option is to be used.

NOTE * Windows XP (SP3), with NTFS file system is required for the SpectrAA CFR version. Currently, SpectrAA CFR is not compatible with Windows 7.

Installation Procedure Overview

There are three software installation scenarios:

- SpectrAA Base (for use with SpectrAA Base version 5.2 or greater and Windows 7 Professional 64-bit SP1 operating systems)
- SpectrAA PRO (for use with SpectrAA PRO version 5.2 or greater and Windows 7 Professional 64-bit SP1 operating systems)
- SpectrAA CFR (for use with SpectrAA CFR software version 5.1 and Windows XP SP3 operating systems only)

The following table lists the procedure for each software installation scenario.

SpectrAA Base (Page 42)	SpectrAA PRO (Page 45)	SpectrAA CFR (Page 47)
1. Install SpectrAA Base	1. Install SpectrAA Base	1 Install SpectrAA Base v 5.1(27)
2. Configure instrument for use	2. Configure one or two instruments for use	2 Configure one or two instruments for use
3. Install SpectrAA Help and Videos	3. Install SpectrAA Help and Videos	3 Install SpectrAA Help and Videos
4. Install GPIB Communications Card or USB-GPIB-HS Converter	4. Install SpectrAA PRO	4 Install SpectrAA CFR
	5. Install GPIB Communications Card or USB-GPIB-HS Converter	5 Install GPIB Communications Card
	6. Configure for DUO operation (if DUO is used)	6 Configure for DUO operation (if DUO is used)

Guidelines for Software Installation

The following information assumes that you are working on a clean, empty hard disk. If you have any other files on the PC hard disk, ensure that you make backups of these files before continuing.

NOTE Agilent will not assume responsibility for the loss of data files or third party software.

For instructions on installing the Windows operating system refer to the documentation supplied with Microsoft Windows. It is the responsibility of the customer to ensure that the Microsoft Windows operating system is installed on the computer.

Installing the SpectrAA Base Software

NOTE This procedure is for SpectrAA version 5.2 or greater and Microsoft Windows 7 Professional 64-bit SP1 operating systems only.

1. Close down all Microsoft Windows applications.
2. Insert the SpectrAA Base CD-ROM into your CD-ROM drive. The installation program should start automatically. If the program does not auto start, do the following:
   a. From the Windows **Start** menu, select **All Programs > Accessories > Run**. The Run dialog displays.
   b. In the Run dialog, type X:\SpectrAABase.exe (where X represents the letter of your CD-ROM drive) and select **OK** to start the installation.
   c. Click **Yes** on the User Account Control window to run the program.
3. Select the language from the drop-down menu to use during the installation of the SpectrAA software. Click **OK**.
4. Select **Next** to start the installation.
5. Review the License Agreement and then select **I accept the agreement** and then click **Next** or 'Cancel' if you do not accept the agreement. Clicking 'Cancel' will stop the software installation.
6. Follow the prompts, selecting **Yes**, **Next** or **OK** on each page.
7. The SpectrAA **User Information** window will be displayed. Check that the selections are correct, or reenter them, and then click **Next**.
8. Follow the prompts, selecting **Yes**, **Next** or **OK** on each page.
9. Click **Install**.
10. From the 'SpectrAA Instrument Configuration' window, select your instrument type from the drop down list on the 'Instrument #1' page. Then do the following:

    If you are running a one instrument system:

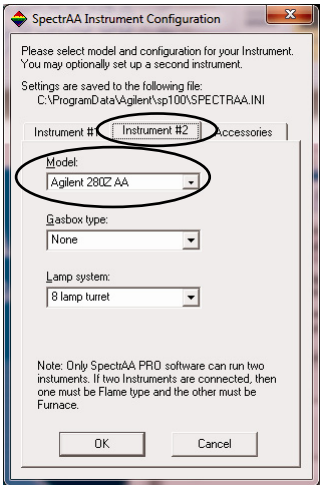
    Continue with Step 11.

If you are running an Agilent AA-DUO system (simultaneous flame and furnace operation):
You must now set up the second instrument. To do this:

a Select the **DUO** check box.

b Select the **Instrument #2** tab.

c Select the instrument type from the drop-down list. It does not matter which instrument is assigned to which page, however, 'Instrument #1' must have the IEEE "9" setting and 'Instrument #2' must have the IEEE "8" setting. The IEEE settings are configured after installing SpectrAA PRO. Take note of which instrument is listed in 'Instrument #2'. See the following image.



11 If you are using any accessories, click the **Accessories** tab in the 'SpectrAA Instrument Configuration' window. Select your GTA (Graphite Tube Atomizer), Flame Autosampler and /or ETC 60 from the drop-down lists.

a If you select GTA 120, the option for High capacity racks is enabled. Select this option to enable support for the optional high capacity carousel (130 x 1.1 mL samples and 5 x 10 mL standard/modifier solutions).

b If you select Agilent SPS 3 flame autosampler, click **Edit COM port parameters** to define the COM port and the settings to be used for communicating with the autosampler. Refer to the SPS 3 operation manual for details of the required communications parameters.

c If you are installing the ETC 60 and want to control this accessory from the SpectrAA software, select the COM Port from the drop-down menu to be used to control this accessory.

12 Click **OK**.

13 Once the installation is complete, click **Finish**.

14 A message may appear prompting you to install the QuickCam drivers. Click **OK** to dismiss the message. You must install the SpectrAA PRO and/or the GPIB Communications device first. The QuickCam drivers are installed later in this procedure.

15 Click **OK** to install the SpectrAA Help.

16 Remove the SpectrAA Base CD and then insert the SpectrAA Help CD. The installation program should start automatically. If the program does not auto start, do the following:

a From the Windows **Start** menu, select **All Programs > Accessories > Run**. The Run dialog displays.

b In the Run dialog, type X:\AAHelp\setup.exe (where X represents the letter of your CD-ROM drive) and select **OK** to start the installation.

c Click **Yes** on the User Account Control window to run the program.

17 Click **Yes** to start the SpectrAA Help and Videos installation.

18 Click **Finish** when the installation is complete.

19 Do one of the following:

- If you are installing SpectrAA PRO, proceed to the next section ‘Installing the SpectrAA PRO Software’, or
- Reboot your PC and then install the PCI-GPIB Communications Card (see Page 51) or the USB-GPIB-HS Converter (see Page 55).

Installing the SpectrAA PRO Software

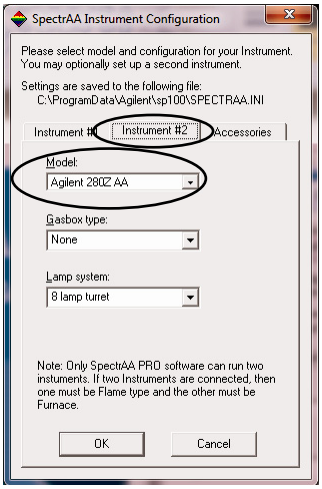
NOTE Installation of the SpectrAA Base version 5.2 or greater must be completed prior to installing the SpectrAA PRO version 5.2 or greater software. Refer to Page 42 for details.

NOTE The selections entered during installation of the Base software (such as User Information, Directory Location) will be used for the PRO installation.

To install the SpectrAA PRO software:

1. Close down all Microsoft Windows applications.
2. Insert the SpectrAA PRO CD-ROM into your CD-ROM drive. The installation program should start automatically. If the program does not auto start, do the following:
   a. From the Windows **Start** menu, select **All Programs > Accessories > Run**. The Run dialog displays.
   b. In the Run dialog, type X:\SpectrAAPro.exe (where X represents the letter of your CD-ROM drive) and select **OK** to start the installation.
   c. Click **Yes** on the User Account Control window to run the program.
3. Select the language from the drop-down menu to use during the installation of the SpectrAA software. Click **OK**.
4. Select **Next** to start the installation.
5. Review the License Agreement and then select **I accept the agreement** and then click **Next** or 'Cancel' if you do not accept the agreement. Clicking 'Cancel' will stop the software installation.
6. Follow the prompts, selecting **Yes**, **Next** or **OK** on each page.
7. A dialog box appears asking for confirmation of the installation destination for SpectrAA Pro.exe. Click **Yes** to install into the previously created SP100\Run folder
8. Click **Install** to begin the installation.

9 The SpectrAA **Instrument Configuration** window will be displayed again. Check that the selections are correct and click **OK**. Take note of which instrument is listed in 'Instrument #2' if running an Agilent AA-DUO system.



10 During installation, you will be asked whether or not to delete the files 'Workgrp.ini' and 'User.ini'. These are created if you opened the SpectrAA software after installing SpectrAA Base but before installing SpectrAA PRO. Select 'Delete this file' (recommended) for both dialog boxes.

11 Click 'Yes' to install the SpectrAA Help if you skipped that step during the SpectrAA Base installation or 'No' to cancel the Help installation if it has already been completed.

12 Once the software installation is complete, restart your computer.

Installing the SpectrAA CFR Software

IMPORTANT This procedure is only for use with Windows XP SP3 systems and SpectrAA CFR version 5.1 (27) software. If you are not using SpectrAA CFR software version 5.1 (27), please see Page 42 for software installation instructions.

Because the CFR version is an upgrade to the base installation, the SpectrAA Base version 5.1 (27) must be installed before any installation of the CFR version. The operating system must be installed before starting the SpectrAA software installation.

Installing the SpectrAA Base Software

NOTE Windows XP (SP3), with NTFS file system is required for the SpectrAA CFR version. Currently, SpectrAA CFR is not compatible with Windows 7.

To install the SpectrAA Base version 5.1 (27) software:

1. Ensure that the PC is on and that no other Windows applications are running.
2. Insert the SpectrAA CD into the CD ROM drive. The installation program should start automatically. If the program does not auto start, do the following:
   a. From the Windows **Start** menu, select **Run**. The Run dialog displays.
   b. In the Run dialog, type X:\SETUP.EXE (where X represents the letter of your CD-ROM drive) and select **OK** to start the installation.
3. Once the installation program commences, follow the prompts, selecting **Yes**, **Next** or **OK** on each page.
4. On the User Information window enter the user information as requested.

5 From the ‘Choose Destination Location’ window, select the drive or sub-directory where the SpectrAA software will be installed. If you wish to install the file in a directory other than the default location, select **Browse**.

6 From the Select Program Folder window choose the name the program shortcut will use on the Windows Start menu.

7 On the Start Copying Files window, check that all settings are correct. Select **Next** to begin the installation.

8 From the ‘SpectrAA Instrument Configuration’ window, select your instrument type from the drop down list on the ‘Instrument #1’ page. Then do the following:

If you are running a one instrument system:

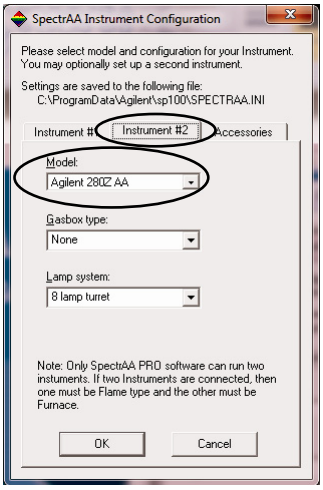
Continue with Step 9.

If you are running an Agilent AA-DUO system (simultaneous flame and furnace operation):
You must now set up the second instrument. To do this:

a Select the **DUO** check box.

b Select the **Instrument #2** tab.

c Select the instrument type from the drop-down list. It does not matter which instrument is assigned to which page, however, ‘Instrument #1’ must have the IEEE “9” setting and ‘Instrument #2’ must have the IEEE “8” setting. The IEEE settings are configured after installing SpectrAA CFR. Take note of which instrument is listed in ‘Instrument #2’. See the following image.



9 If you are using any accessories, click the **Accessories** tab in the 'SpectrAA Instrument Configuration' window. Select your GTA (Graphite Tube Atomizer), Flame Autosampler and /or ETC 60 from the drop-down lists.

   a If you select GTA 120, the option for High capacity racks is enabled. Select this option to enable support for the optional high capacity carousel (130 x 1.1 mL samples and 5 x 10 mL standard/modifier solutions).

   b If you select Agilent SPS 3 flame autosampler, click **Edit COM port parameters** to define the COM port and the settings to be used for communicating with the autosampler. Refer to the SPS 3 operation manual for details of the required communications parameters.

   c If you are installing the ETC 60 and want to control this accessory from the SpectrAA software, click **Edit COM port parameters** to define the COM port to be used to control this accessory.

   d Click **OK**.

10 From the AA Language Installer window, select your preferred language from the drop down menu. SpectrAA uses the selected language where possible. Where the selected language is not available (as is the case for some of the cookbooks), English is displayed. Select **Install** to continue the installation.

11 When requested, remove the installation CD and replace it in the CD drive with the SpectrAA Help and Videos CD ROM. Click **OK** to install the Help.

12 From the 'Install Videos' window, you can select to copy the Help videos to your hard disk (recommended). This will enable you to view the videos at any time without inserting the Help and Videos CD-ROM into the CD drive. Select the destination folder for the videos (if applicable) and click **Yes** or **No** as required.

13 Once you have finished installing the base software, click **Finish** to complete the SpectrAA Base installation. Follow the instructions in the next section to install the SpectrAA CFR software.

Installing the SpectrAA CFR Software

NOTE Windows XP (SP3), with NTFS file system is required for the SpectrAA CFR version. Currently, SpectrAA CFR is not compatible with Windows 7.

NOTE Installation of the SpectrAA Base version 5.1 (27) must be completed prior to installing the SpectrAA CFR software. Refer to Page 47 for details.

NOTE The selections entered during installation of the Base software (e.g. User Information, Directory Location) will be used for the CFR installation.

To install the SpectrAA CFR software:

1 Close down all Microsoft Windows applications.

2 Insert the SpectrAA CFR CD-ROM into your CD-ROM drive. The installation program should start automatically. If the program does not auto start, do the following:

   a From the Windows **Start** menu, select **Run**. The Run dialog displays.

   b In the Run dialog, type X:\SETUP.EXE (where X represents the letter of your CD-ROM drive) and select **OK** to start the installation.

3 Once the installation program commences, follow the prompts, selecting **Yes**, **Next** or **OK** on each page.

4 The SpectrAA **Instrument Configuration** window will be displayed again. Check that the selections are correct and click **OK**.

5 Once the installation is complete, restart your computer.

6 Shutdown the PC and install the National Instrument PCI card. Refer to Page 51 for details.

7 Once the PCI card is installed, if you are running an Agilent AA-DUO system, you will now need to configure the Agilent AA-DUO system. Refer to Page 55 for more details.

Shut down the PC, re-start it and open the SpectrAA. As soon as the Index page is displayed, shut down the PC again. This automatically creates the necessary configuration files.

GPIB Communications

Either a GPIB communications card or the optional USB-GPIB-HS converter must be installed in your computer to interface the computer and the Agilent AA. See the next section for information on installing the PCI-GPIB communications card or Page 55 for connecting the USB-GPIB-HS converter.

NOTE Although the Agilent field service engineer will install the GPIB communications device for you during the installation process, you may need to configure the driver yourself at some later stage, for example if you change the PC.

Installing the PCI-GPIB Communications Card

The National Instruments PCI-GPIB card supplied with the instrument must be installed in your PC to interface the PC with the Agilent AA spectrometer and accessories.

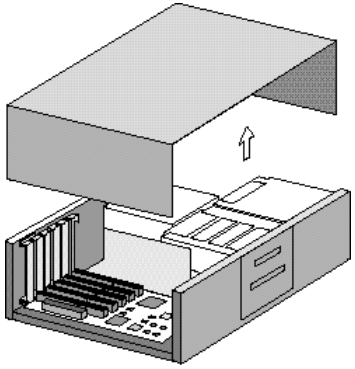
CAUTION The components on the communications card and in the PC are highly static-sensitive. To avoid damaging these components you must drain any static charges from your body before installing the board, and prevent the generation of any new static charges during the installation.
This can be done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

To install a National Instruments PCI-GPIB communications card:

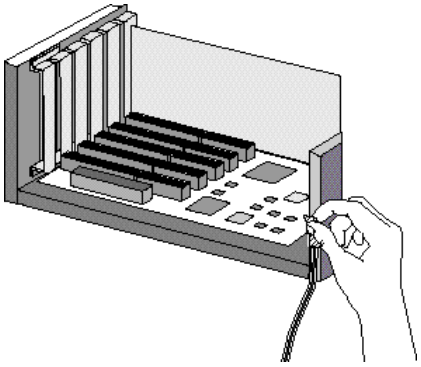
NOTE Ensure that the SpectrAA software has been installed.

1 Turn off and unplug the computer.

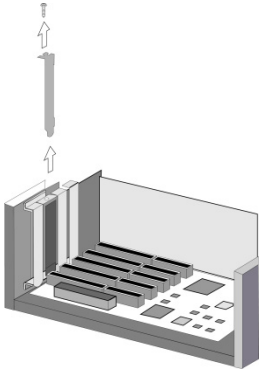
2 Remove the cover, following the instructions in the manual provided with the computer.



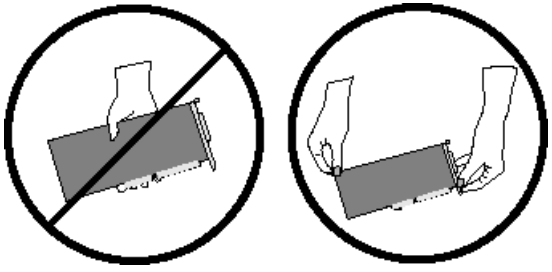
3 Attach one end of the ESD strap to a bare metal part of the PC chassis and wrap the other end around your wrist.



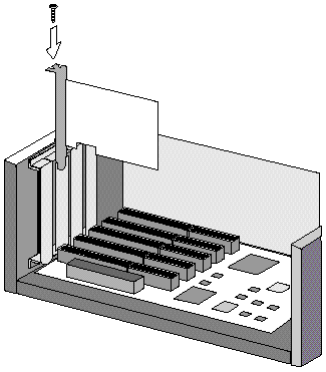
4 Remove a blanking plate from one of the empty slots in the computer.



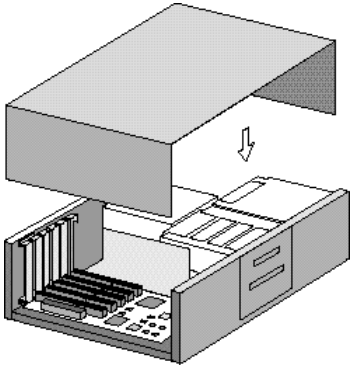
5 Remove the card from its static-shielded packaging. Do not touch the gold edge connectors.



6 Press the card firmly into the empty PC slot. The gold edge connectors should slide firmly into the matching sockets of the PC 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 the computer on.

Configuring the PCI-GPIB Communications Card

Microsoft Windows XP and Windows 7 use ‘plug-n-play’ for fully automatic setup.

Installing the USB-GPIB-HS Converter

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

NOTE Ensure that the SpectrAA software has been installed.

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.

Setting Up for Agilent AA-DUO Operation

NOTE You must install the GPIB Communications Card or Converter first before performing this procedure.

If you are running an Agilent AA-DUO system, you need to reconfigure one of the instruments so they have different IEEE addresses.

To reconfigure an AA for use in an AA-Duo system:

1. Ensure the SpectrAA Base and PRO or CFR software is installed.
2. With the computer turned off, connect the two Agilent AA instruments via an IEEE-488 GPIB cable.
3. Connect one of the Agilent AA systems via an IEEE-488 GPIB cable to the GPIB card in the computer or by connecting the USB-GPIB-HS converter to the computer.
4. Reboot the computer if you haven't done so already.
5. Ensure that both instruments are switched *off*.
6. From the Windows 7 **Start** menu, select **All Programs > Accessories > Run** or from the Windows XP **Start** menu, select **Run**. The Run dialog displays.

7 In the Run dialog, for Windows 7 type C:\Program Files (x86)\Agilent\sp100\Run\DUAL.EXE or for Windows XP type C:\SP100\RUN\DUAL.EXE and then select **OK** to start the program.

8 A window displays asking you to turn on the instrument you wish to reconfigure. You must select 'Instrument 2' in the configuration. When you have switched on the instrument, select **OK**.
A command window is displayed. The process may take about a minute. During this time you will hear the instrument resetting.

9 Restart the computer and open the SpectrAA. As soon as the Index page is displayed, shut down the PC again. This automatically creates the necessary configuration files.

10 Restart the computer, turn on both AA instruments and then start the Agilent SpectrAA software.

The instruments are now ready to be used as a simultaneous flame/furnace system. Refer to the Help for further information on dual instrument operation.

NOTE During dual instrument operation do not turn any connected instrument ON or OFF while readings are being taken.

Starting the SpectrAA Software

To start the SpectrAA software:

1 Click **Start > (All) Programs > SpectrAA** and then **SpectrAA** again. Alternatively, double-click the SpectrAA icon on the desktop.

2 The first time the SpectrAA software is opened a Software Registration dialog will appear. Click **Next**.

NOTE Ensure the software registration is completed by the user of the SpectrAA software. For further information refer to the Software Registration Help.

3 Complete all the fields on the 'Customer Details' page. Click **Next**.

NOTE The Product Key is found on the cover of the Agilent SpectrAA software CD case which was delivered with the instrument.

4 Complete all the fields on the 'Product Details' page. Click **Next**.

5 Complete all the fields on the 'Work Environment Details' page.

6 Click **Register**.

7 A dialog appears stating 'Your Agilent Software Registration has been successful'.

NOTE If your computer is not connected to the internet, refer to the Software Registration Help for further information.

8 The application will now open, and you can collect your data.

SpectrAA Release Notes and Software Status Bulletin

Refer to the SpectrAAReleaseNotes.pdf file in the installation directory and the Software Status Bulletin document for further details. The file includes latest release information and important notes including the detail of any know problems and suggested work-arounds.

Installing the Drivers for the Tube-CAM Furnace Camera Option

NOTE These instructions are required only if the Tube-CAM furnace video option has been fitted to your instrument.

It is only necessary to install the driver files as described in the following procedure. While it is possible to install all options, these are not necessary for operation of the camera in SpectrAA software.

This installation refers to Logitech PRO9000 cameras.

Driver Installation

To install the drivers:

1. Ensure the SpectrAA software has been installed and the computer has been restarted. Do *not* open the SpectrAA software and do *not* connect the camera.
2. Insert the Logitech Quickcam CD-ROM into your CD-ROM drive.
3. Navigate to the installation CD and double-click 'Setup.exe'.
4. Select your preferred language in the 'Preferred Language' dialog box on the 'Welcome' screen and then click **Next**.
5. Ensuring that the camera is *not* connected, (contrary to screen instructions) click **Next**.
6. Select **Custom Install** and then click **Next** on the 'Choose Set-up' screen.
7. On the 'Install Webcam Software' screen (see Figure 2):
   a. Select 'Logitech Webcam Software'.
   b. Deselect 'Logitech Motion Detection'.
   c. Deselect 'Logitech Video Effects'.
   d. Select 'Logitech Webcam Drivers'.
   e. Deselect 'Logitech Vid-HD'.
   f. Click **Next**.

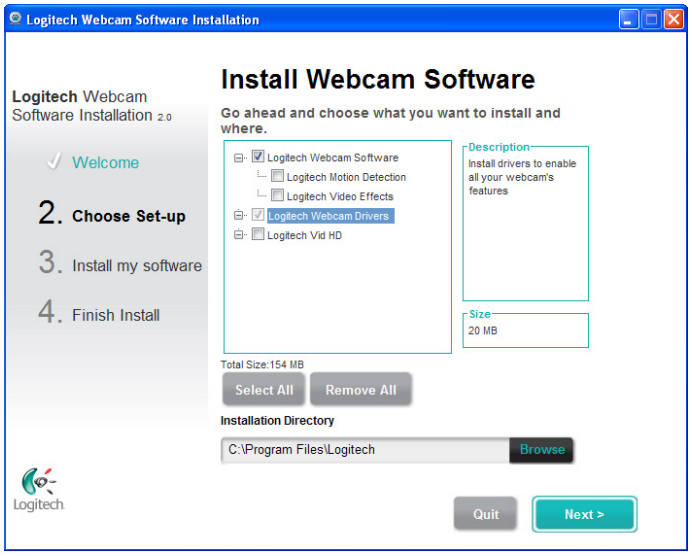


Figure 2. Logitech Webcam Drivers installation window

8 If an 'Update' screen is displayed, click **Next**.

The 'Installing Software' screen will be displayed.

9 After the installation has completed the 'Check Settings' screen will be displayed. Click **Next**.

10 The software is now installed. Click **Checkout my webcam**.

The Logitech Webcam Software will be displayed.

11 Plug in the Logitech Webcam into the USB port on the spectrometer.

If installation is successful an image of a Logitech Webcam camera will be displayed on the software window.

12 Select **Quick capture** and then **Controls**.

The image from the Tube-CAM video is not currently displayed in the 'Webcam Control' window because the hollow cathode lamps are not yet illuminated.

13 On the ‘Controls’ screen:

a Deselect ‘RightSound’

b Deselect ‘RightLight’.

c Deselect ‘Autofocus’.

d Select ‘Advanced Settings’.

14 When ‘Advanced Settings’ are displayed:

a Deselect ‘Auto’ to the right of the ‘Gain’ slider.

b Set the ‘Exposure’ and ‘Gain’ sliders to maximum.

c Click **Save**.

The camera image will appear black because the SpectrAA is turned off.

Printer Setup

The printer must be a make and model supported by Windows. To install your printer, follow the instructions provided with the printer. For more information refer to your printer documentation or Microsoft Windows Help.

Troubleshooting

This section contains solutions to some common problems you may encounter during the installation of the SpectrAA software.

The SpectrAA software isn’t communicating with the instrument.

- Ensure the computer has been restarted after installing the software and the GPIB card or USB-GPIB-HS converter.
- Check the cables and connections.
- Check that the instrument and any associated accessories are turned on.
- Check that you are not running the Simulator software. (Select **Help about system information**.)
- Ensure the PCI-GPIB driver has been installed and configured. Refer to Pages 51 and 54 for details.

4. Software Overview

The Agilent AA system software (SpectrAA) is a powerful interface that provides high levels of spectrometer control and is easy to use. This chapter provides a brief overview of the SpectrAA software to help you familiarize yourself with its various windows. A more detailed description and instructions for use are included in the extensive Help. The optional SpectrAA CFR version software offers you the tools to help you achieve compliance with the US FDA 21 CFR Part 11 requirements. More information on the CFR compliance features of the software is detailed in the Help.

Starting the SpectrAA Software

To start the SpectrAA software click **Start > Programs > SpectrAA**. Alternatively, double-click on the desktop SpectrAA icon (created during the installation of the software).

SpectrAA Windows

Index Page

When you start the SpectrAA software, the first screen to appear is the introductory screen.

The Index page contains four buttons: Worksheet, Reports, Administration and Exit.

The function of each button is as follows:

Worksheet	Opens the Worksheet window (see Page 63)
Reports	Opens the Reports window (see Page 65)
Administration	Opens the Administration window (see Page 66)
Exit	Shuts down the SpectrAA software.

Worksheet Window

The Worksheet window allows you to develop and edit methods, sequences and labels, and initiate sample analysis.

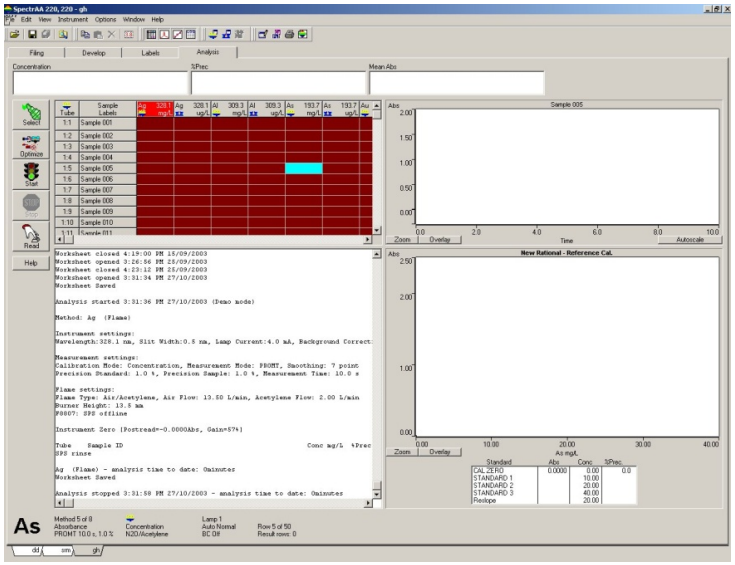


Figure 3. The Analysis page of the Worksheet window

The worksheet is the fundamental file type for SpectrAA, containing one or more methods, sample labels, sequence information and analytical results. You may load an existing worksheet or develop a new one.

The Worksheet window consists of four tabbed pages: Filing, Develop, Labels and Analysis. To access a particular page, click on the appropriate page tab appearing under the menu bar.

The Filing Page

Use the Filing page to perform basic worksheet operations such as opening, saving, and closing worksheets, creating a template from a worksheet and loading worksheets. You can also view information about the worksheet currently open. If you have the CFR version of the software, the Filing page enables you to apply electronic signatures (approval) to the worksheet.

The Develop Page

Use the Develop page to add, delete, review and modify methods, modify sequence parameters, change the order of methods and copy methods to the Method Library.

The Labels Page

Use the Labels page to set up solution labels, weights, volumes and dilution factors and to configure SPS or PSD samplers.

The Analysis Page

Use the Analysis page to control the AA and initiate analysis. Data is presented in the form of a spreadsheet, with one row per sample. The sample labels are displayed in the left hand column with concentration results for each element across the remaining columns (see Figure 3).

The SpectrAA software enables you to have up to a maximum of ten worksheets open at the same time. The Worksheet tab at the bottom of the Analysis page enables you to switch between worksheets.

Worksheet Menus

When you are viewing the worksheet the following menu items are available:

File	This menu allows you to perform filing tasks such as opening, saving and renaming files.
Edit	The Edit menu allows you to copy and paste information, Edit Replicates and Go To certain parts of a worksheet.
View	The View menu enables you to nominate what is displayed on the Analysis page.
Instrument	This menu enables you to perform many Instrument functions such as Optimization, Reslope and Zero.
Options	The Options menu enables you to alter the displays on the Analysis page.
Window	This menu enables you to quickly move around the software.
Help	This menu enables you to access the Help.

NOTE Not all menu items are available on all pages of the Worksheet window. If an item or menu is grayed it is unavailable on that page.

Menu items can be accessed by clicking on the desired item with the mouse, or pressing Alt and the active (underlined) letter in the menu name (e.g. Alt+E to access the “Edit” menu). This displays a menu list. The options in the menu list can be accessed in the same manner.

Reports Window

The Reports window allows you to generate a report for the current worksheet or any of the worksheets saved in the system.

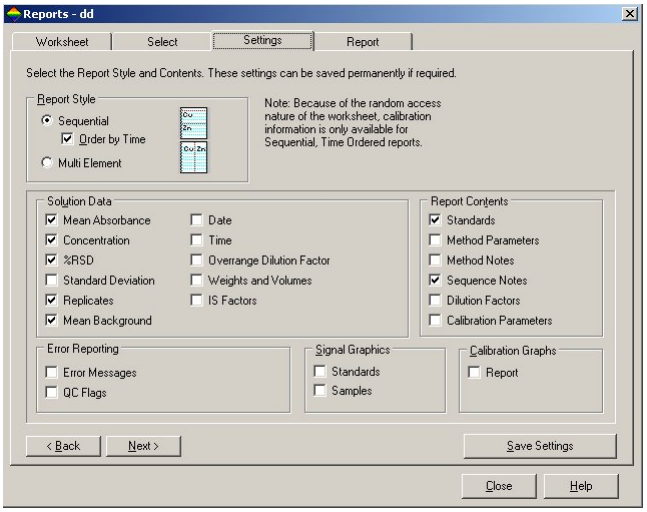


Figure 4. The Settings page of the Reports window

The Reports window consists of four tabbed pages: Worksheet, Select, Settings and Report. To select a particular page, click on the appropriate page tab appearing under the menu bar.

The Worksheet Page

Use the Worksheet page to select the worksheet results to include in the report. You can use the “Filter” and “Search” buttons to refine your search.

The Select Page

Use the Select page to choose methods and solutions to include in the report.

The Settings Page

Use the Settings page to specify the report style and content.

The Report Page

Use the Report page to view and print the report, write it to a text file, or export it to a PRN file.

Administration Window

The Administration window allows you to: migrate worksheets into the system (such as old worksheets on CD-ROM, etc.); delete worksheets and library methods; and activate and modify password protection of the system. The Administration window also allows you to configure your system.

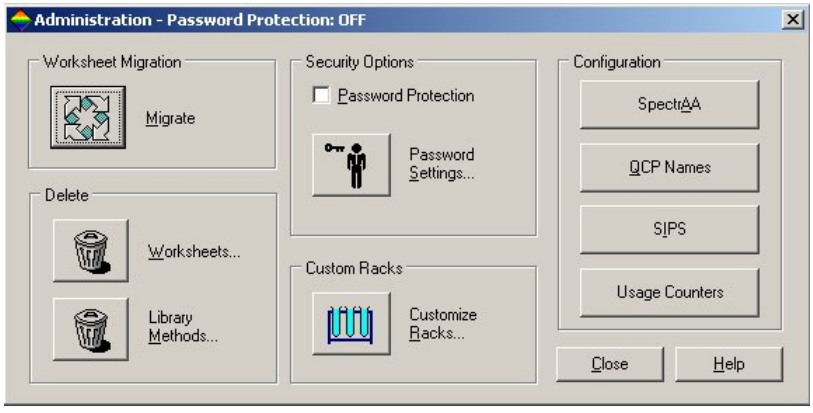


Figure 5. The Administration window

Working With the SpectrAA Software

Menu Bar

The Worksheet window contains a menu bar directly beneath the window title bar. This bar displays a number of menu items. For more information on these menus see Page 64.

NOTE When menu items or options appear grayed they are unavailable for selection.

Toolbar

The Toolbar appears on the Index page and the Worksheet window and provides easy shortcuts to many common functions and other windows.

Figure 6. The Worksheet window toolbar

Dialog Boxes

In some cases, selecting a menu option or pressing a button activates a dialog box. This is a box that contains a number of different input fields relevant to that operation.

You can move the focus from field to field in a dialog box either by clicking on each entry item with the mouse or by pressing the **Tab** and arrow keys to move the cursor from field to field. After entering/changing any values in a dialog box, press “OK” to accept the changes and close the dialog.

Help

The SpectrAA software contains extensive Help, which serves as your primary source of information on how to effectively use the software and the instrument. The Help consists of contextual help and multimedia help. The Help also contains an extensive ‘How To...’ section. This section provides many set by set instructions on how to perform common procedures.

The contextual help is accessed from any window, page or dialog box in the SpectrAA software by pressing F1 (the Help function key), the 'Help' button (where available), or by selecting 'On-line Help' from the Help menu at the top of any page in the Worksheet window, and provides help specific to that screen.

The multimedia help contains hardware-related information and other details to help you set up, operate and maintain your Agilent AA instrument.

For example, the Help includes:

- Installation procedures for the components of the instrument that are customer-installable
- Maintenance procedures for the parts of the spectrometer that are customer-serviceable
- Checklists to help you ensure that you have correctly prepared your system for analysis.

NOTE To view the video clips included in the online help you must have the SpectrAA CD inserted in the CD-ROM drive. Alternatively, you can copy the video files from the Help CD into the \\run\help subdirectory within the directory where the SpectrAA software is loaded.

Searching for Help

You can quickly get Help on a specific topic using keywords and the Search facility.

To search for information on a particular subject:

1. Open the Help (if it is not already open).
2. Select the **Search** tab at the top of the SpectrAA Help window.
3. Enter the word(s) you want to search for in the field provided and select **List Topics**.
4. A list of all the Help topics associated with the keyword(s) displays in the second list.
5. Select the desired topic and click **Display**.

Printing Help

To obtain a printed copy of the current Help topic:

1. Select the Print icon at the top of the SpectrAA Help window.
2. From the Print Topics dialog, select whether you want to print the selected topic or a range of topics and then select **OK**.

The topics you selected will be printed on the nominated printer.

NOTE Information presented in a popup window cannot be printed.

Viewing Help While You Work

If the Help window obscures the application you are working in, you may want to resize the Help window or move it so that you can view both the Help window and your application window at the same time. This is useful if you are using Help to follow a step-by-step software procedure.

Quitting Help

To close the SpectrAA Help window, select the “X” on the top right corner of the Help window or press Alt+F4 to close the window.

This page is intentionally left blank.

5. Getting Started

This chapter describes how to set up the Agilent AA system for analysis and get you started using the instrument.

You should have already:

- Prepared your PC and installed the SpectrAA software as described in Chapter 3.
- Become familiar with the SpectrAA user interface as described in Chapter 4.

Instrument Setup

Use the following checklist to ensure that you set up your system correctly. You must:

- Connect the components of the system to one another (see ‘Connections’ on Page 72).
- Connect the equipment to the power supply, and check the setting of the two voltage taps where fitted (see ‘Power’ on Page 72).
- Install the hardware components as per your analytical requirements. Refer to the Help for details.

Connections

Your Agilent AA instrument is supplied with a set of gas hose fittings and a mains cable which suits the common utility standard in the local region. A Country Kit must be ordered with the Agilent AA instrument.

Power

The mains power connection is located at the rear of the instrument. Refer to the next section for instructions on connecting the instrument to the mains power supply.

Gas Hoses

Three rubber hoses are permanently attached to the instrument. Each hose is 1.8 meters long and is color-coded for air (black), nitrous oxide (blue) and acetylene (red). Each is fitted with female fittings suitable for USA standard regulators. Adaptors are supplied for other areas.

NOTE Gas hose connections are not detailed in this section as they are described in your Agilent AA Site Preparation Guide.

Accessories

For details on connecting accessories such as SIPS or UltrAA lamps, refer to the manuals accompanying the accessories.

Power

Requirements

Power requirements are detailed in your Agilent AA Site Preparation Guide, and also in the Specifications section in Chapter 1 of this manual. You should check the power requirements and read through the section ‘Electrical power supplies’ in the Site Preparation Guide before connecting the Agilent AA system to the power supply.

Consult the manuals supplied with your printer and PC (if required) for their power requirements.

Connection

Before connecting the instrument to the power supply, ensure that both the spectrometer and the mains power supply are turned off. Check that the two voltage selector switches on the instrument rear panel (if present) are set to the correct mains power supply voltage—refer to the table on the rear panel. The voltage selectors are set by the Agilent field service engineer when the instrument is first installed.

To connect the instrument to the 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 the mains power supply on.

Moving Your Instrument

WARNING

Heavy Weight

The instrument weighs over 50 kg (110 lb). Do not attempt to lift the instrument alone. Always use two or more people when lifting or carrying the instrument into position.

Starting the System

The instrument power switch is a rocker type, located on the front of the instrument on the left hand side. Switch this to 'I' to start the system. The green indicator light should come on.

For instructions on how to start any accessories, refer to the manuals supplied with the accessories.

If you have not already done so, start the SpectrAA software as described on Page 62.

Pre-analysis Checklist

The general preparation procedure is as follows:

1. Install all the required hardware, including any associated accessories such as SIPS, according to the instructions in the Help (see Page 67) and any accessory manuals.
2. Turn on the instrument and any peripheral accessories as described in the previous section.
3. Ensure the exhaust system is working. To do this, hold a thin single-ply tissue up to the mouth of the extraction hood. The tissue should be drawn towards the hood.
4. Check the gas supplies to make sure you have enough gas to complete your analysis. You must also check that the acetylene cylinder pressure is above 700 kPa (about 100 psi) to ensure that acetone is not drawn into the instrument.
5. Set the delivery pressure of the gases to the following:

	Recommended		Permissible	
	kPa	psi	kPa	psi
Acetylene	75	11	65-100	9.5-14.5
Air	350	50	245-455	35-65
Nitrous oxide	350	50	245-455	35-65

6. Inspect the gas hoses for damage, replacing any damaged hoses. Turn on the gas supplies to your instrument and test all hoses and connections for leaks. If a leak is found, repair it immediately.
7. Load a worksheet and develop the method(s) as per your analytical requirements.
8. Optimize the system.
9. Start an Autorun.

NOTE Detailed procedural help for Steps 7 to 9 are provided in the Help. See Page 67 for details of how to find information in the Help.

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In This Guide

The guide describes the following:

- Safety Practices and Hazards
- Introduction
- Installation
- Software Overview
- Getting Started

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