Varian 810/820-MS
ICP Mass Spectrometers

Pre-installation Manual

Installation Category II
Pollution Degree 2
Safety Class 1 (EN 61010-1)

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Varian Australia is ISO 9001:2000 certified

Contents

1. Introduction

To successfully install the Varian 810/820-MS ICP Mass Spectrometer system, refer closely to the laboratory facility requirements provided in this manual.

Attention to accuracy and detail is vital when preparing the laboratory for the Varian 810/820-MS ICP Mass Spectrometer. A checklist is included in this manual to guide you through the pre-installation process.

Note Failure to provide and maintain the correct laboratory conditions will void the instrument warranty. It may also reduce the instrument performance, operational life and the operator protection provided by the instrument.

Complete the pre-installation checklist when you have built your laboratory and installed the facilities in accordance with the specifications outlined in this manual. Strike out any entries that are not applicable, and send the completed, signed pre-installation checklist to your local Varian office, or Varian agent. Upon receipt of the completed pre-installation checklist, a Varian representative will contact you to arrange a mutually convenient time to install the Varian 810/820-MS system.

If you encounter difficulties or have questions regarding preparing the laboratory for instrument installation or if you require information on the Varian 810/820-MS operator training courses, please contact your Varian representative.

Place Varian business card here

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2. Safety

2.1 Safety messages

A 'Warning' message indicates that failure to observe instructions or precautions could result in death or personal injury. Symbols depicting the nature of the specific hazard are also placed alongside warnings.

A 'Caution' message indicates that failure to observe instructions could result in damage to equipment or property.

A 'Note' provides advice or information.

2.1.1 Warning symbols

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

Toxic material

Electric shock

RF radiation

Dangerous surface temperatures

Heavy object (Danger to hands)

Heavy object (Danger to feet)

Harmful vapors or fumes

Fire

Part can be ejected

Explosion

UV radiation

Corrosive chemicals

Sharp object

Moving parts

Strong magnetic field. Keep pacemakers and magnetic data storage devices clear from this area.

Cryo gas

This 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.

2.2 Compressed gas hazards

Gas 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 and secured to an immovable structure or a purpose-built cylinder stand. Ensure that a suitable trolley is used when moving cylinders.

Use only approved regulators and hose connectors (refer to the gas supplier's instructions). Keep gas cylinders cool and properly labeled. All cylinders must be fitted with a pressure relief device, which will empty the cylinder if its internal pressure rises above the safe limit. Ensure that you have the correct cylinder before connecting it to the instrument. Wear suitable protective clothing and gloves when working with cryogenic gases.

Ensure that the gas supplies are turned off at the source tank when the instrument is not in use.

3. Laboratory environment

3.1 Instrument location

It is your responsibility to unpack the instrument and accessories and inspect all items for shipping damage. For information about taking delivery of the instrument, unpacking and inspecting items for shipping damage, refer to Section 8 'Equipment on-site'.

The Varian 810/820-MS ICP Mass Spectrometer system is a precision scientific instrument. The location chosen for the system must be clean, free from vibration and maintained at a constant temperature. Locate the Varian 810/820-MS system away from doors, windows or anything that will cause fluctuations in temperature or humidity. For further information about environmental conditions, refer to Section 3.3.

The instrument is floor-standing, not bench-mounted. The four wheels fitted to the chassis allow the instrument to be easily maneuvered over smooth flat surfaces. The two castors on the right side swivel and allow the instrument to be turned. The two wheels on the left do not swivel. You can prevent the instrument from rolling by activating the two lockable feet fitted to the instrument chassis in the two front corners. The wheels provide the instrument with a 50 mm ground clearance. Access to the rear of the instrument is required for routine maintenance. In some instances your customer support representative may roll the instrument away from the wall to improve access to the rear of the instrument.

The Varian 810/820-MS ICP Mass Spectrometer weighs 307 kg (676 lb). Ensure that the flooring is capable of supporting this weight.

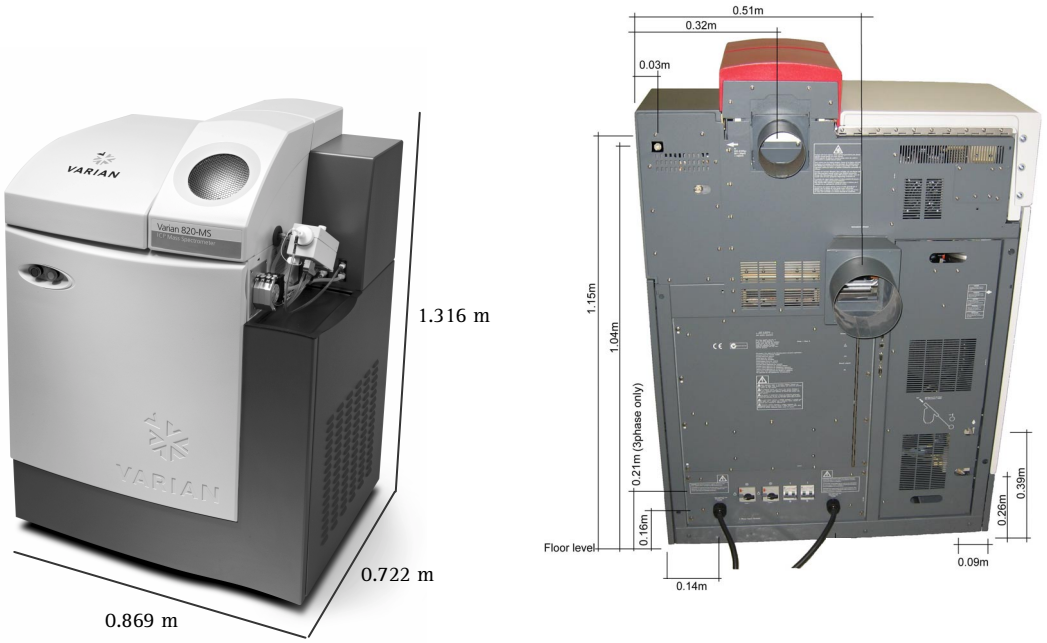
For instrument dimensions, refer to Figure 1.

Provide a minimum of 150 mm (6 in) on all sides of the instrument to allow a free circulation of air around the instrument. Additional floor space is required for the instrument accessories and the water cooler. If the water cooler is to be installed in the laboratory with the instrument, consideration must be given to additional air conditioning.

Allow additional space at the rear of the instrument for the exhaust ducting. Exhaust ducting is connected to the rear of the instrument and typically routed through the laboratory ceiling. Refer to Section 3.3.3.2, 'Extraction fan system', for additional information.

To benefit from Varian online help and diagnostic resources, connect the instrument personal computer (PC) to the Internet. Also, provide a telephone close to the instrument so that the instrument's operator will be able to discuss technical or application issues with Varian support specialists while operating the instrument.

3.2 Instrument weights and dimensions



Note: The instrument is fitted with either a three-phase cable or two single-phase power cables.

Figure 1. *Varian 810/820-MS instrument dimensions*

Table 1. *ICP-MS system weights and dimensions*

Product	Width	Height	Depth	Weight
Varian 810/820-MS ICP Mass Spectrometer	896 mm 35.3 in	1316 mm 52.0 in	722 mm 28.7 in	307 kg 676 lb
Instrument shipping dimensions	1300 mm 51 in	1580 mm 59 in	1240 mm 49 in	520 kg 1145 lb
Varian SPS3 Autosampler accessory with diluter	570 mm 22.4 in	515 mm 20.3 in	285 mm 11.2 in	17 kg 37.5 lb
Autosampler shipping dimensions	775 mm 30.5 in	835 mm 32.9 in	500 mm 193.7 in	33 kg 72.8 lb

3.3 Laboratory facilities for environmental control

The environmental conditions within the laboratory will affect instrument performance and operational life. The environment must be free of dust, corrosive vapors and vibration, and maintained at a cool and stable temperature.

Note Failure to maintain the correct laboratory environment in accordance with the specifications outlined in this manual will void the instrument warranty.

The environmental conditions of the laboratory will affect the ability of the extraction fans to cool the instrument. You should determine the humidity level you can achieve and maintain within the laboratory before you order the instrument extraction fans.

Note Failure to maintain the humidity level within the specifications could cause condensation to form within the instrument leading to possible component failure.

The maximum dust level within the laboratory must not exceed 1,000,000 air-bound particles of 0.5 micron and greater per cubic foot (Class 1,000,000). Sample preparation areas and materials storage facilities should be located in a room separate from the instrument and maintained at the same clean air space class as the instrument, or better.

In order to perform ultra-trace (parts per trillion) level analysis, you must maintain the laboratory environment, including the sample preparation area, in accordance with Class 1000 clean airspace requirements. An additional extraction fan is required for the instrument in a clean room environment.

To maintain the clean air space level, the laboratory must maintain positive air pressure at all times, even when the door is open, to prevent air borne particles from being drawn into the laboratory. For further details refer to Section 3.3.4, 'Air Replacement'.

Table 2. *Suitable environmental conditions for the Varian 810/820-MS instrument*

Instrument condition	Altitude	Temperature (°C)	Relative humidity non-condensing (%)
Non-operating (e.g., storage)	0-2133 m (0-7000 ft)	5-45	20-80
Operating safely but not necessarily meeting performance specifications	0-2000 m (0-6562 ft)	5-31 31–40	≤ 80 ≤ [80-3.33(t-31)]
Operating normally but not necessarily meeting performance specifications	0-2000 m (0-6562 ft)	15-27	25-80
Operating within performance specifications	0-2000 m (0-6562 ft)	18-23 (max change of 2 °C per hour)	25-80

3.3.1 Temperature

The operational temperature range is 15–27 °C (59–81 °F). However, in order to meet analytical specifications the range is 18–23 °C (64–73 °F) with less than 2 °C (3.6 °F) drift per hour.

The instrument plasma and vacuum systems will automatically shut down if the temperature becomes too high, but there is no hardware protection if the conditions become too cold. If the laboratory temperature drops too low, the instrument may fail due to condensation formation on water-cooled components. It is the operator's responsibility to ensure the laboratory temperature is maintained within specification.

The instrument must be stored within a temperature range of 5–45 °C.

Note Failure to maintain the correct temperature for storage or operation of the instrument will void the warranty and could reduce the instrument's operational life and performance.

3.3.2 Humidity

The humidity of the laboratory environment will affect the ability of the cooling air to remove heat from the instrument and may cause condensation to form inside the instrument. Environments containing a high level of moisture will assist the extraction system in removing heat. The instrument exhaust system is less efficient at cooling in dry air. Therefore, in dry climates a larger capacity extraction system may be required.

The instrument is not fitted with a humidity sensor. Therefore, it is your responsibility to maintain the relative non-condensing humidity of the laboratory within the range of 25% to 80%.

Maintain the relative non-condensing humidity of any storage facility with the range of 20% to 80%.

Note Failure to maintain the correct humidity for storage or operation will void the instrument warranty and could reduce the instrument's operational life and performance.

3.3.3 Air conditioning

Air conditioning is essential for the environment in which the Varian 810/820-MS instrument is operated and in some cases, stored. The air conditioning requirements vary depending on the climate in your area.

Ensure that you consider the heat dissipation from each component operating within the laboratory. Decide if the instrument extraction fan duct will be vented inside or outside the laboratory, as this will have a significant impact on the ability for the air conditioning system to cool the room and replace the extracted air.

The water cooler unit can radiate up to 3 kW of heat, so if possible, locate it outside the laboratory.

3.3.3.1 Heat dissipation of system components

Table 3. *Heat dissipation of Varian 810/820-MS system components. The instrument heat dissipation value is approximate and applies when both the plasma and instrument exhausts are ducted outside the laboratory.*

Product	Heat dissipated (W)
Varian 810/820-MS	2500
2800 W water cooler	3000
Varian SPS3 autosampler (with diluter)	100
VGA 77P accessory	24
CETAC Ultrasonic Nebulizer (5000+) accessory	1000
Each person working in the laboratory	100
Personal computer	300
PC monitor (CRT)	150
PC monitor (LCD)	50
Printer	270
Laser ablation accessory	1950

➨ **Note** Consider the effect of the temperature of the air entering the room when selecting an air conditioning system.

3.3.3.2 Extraction fan system

The standard Varian 810/820-MS ICP Mass Spectrometer requires two separate exhaust systems. They are referred to as the “plasma exhaust” and the “instrument exhaust”. A third exhaust is required for the Clean Room model instrument. The plasma exhaust vents toxic vapors, ozone and heat that are generated by the plasma and by the vacuum pumps.

Warning
The plasma exhaust may contain toxic gases. NEVER operate the plasma or vacuum pumps unless the outlet is connected to a suitable exhaust system.

The exhaust fans and ducting are not supplied with the instrument. It is your responsibility to supply and fit the exhaust systems into the laboratory before the Varian 810/820-MS system is installed.

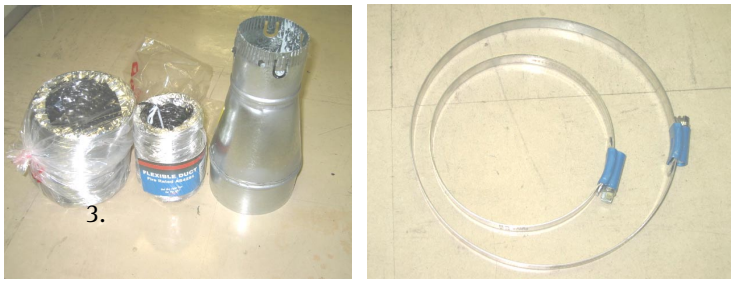


Figure 2. *Exhaust ducting parts. From left to right:*
Tube flexible duct 150 mm diameter, part number 3710051800;
Tube flexible duct diameter 100 mm, part number 3710050100;
Adaptor exhaust air duct 152–100 mm, part number 1610132100;
150 mm duct clamp, part number 0810000300;
100 mm duct clamp, part number 0810183400

Heat generated by the two rotary vacuum pumps is vented into the laboratory by a fan-forced air grille in the left side of the instrument. Additional ducting is required for the Clean Room model instrument to direct this air outside the laboratory.

General exhaust system requirements

- The extraction system must comply with rules and/or regulations imposed by the local authorities responsible for control of facilities and fixtures in the work place.
- The instrument and plasma exhaust systems should have separate exhaust fans or adjustable in-line baffles to control the airflow.
- Flexible ducting must be used to allow movement of the instrument for routine maintenance and service.
- Ducting must be corrosion resistant and heat resistant up to 60 °C.
- The ducting should be routed through the ceiling directly above the instrument. Allow at least a 0.5 m (20 in) radius around each duct from fire alarms, sprinkler heads or any heat-sensitive devices.

- The extraction fan control switches and indicator lamps must be easily accessible and visible to the instrument operator.

Instrument exhaust system requirements

This exhaust is responsible for cooling the instrument hardware by drawing room air through the instrument.

- Minimum rate of 8.5 m^3/min (300 ft^3/min).
- The air extracted from the instrument exhaust is clean and it is safe to recirculate it back into the laboratory by the room air conditioning system, or you can vent the instrument exhaust outside the laboratory building.
- The instrument exhaust removes approximately 2320 W of heat from the instrument. The exhaust air temperature is approximately 5 °C (9 °F) above room temperature.
- The internal diameter of the instrument exhaust ducting is 150 mm (6 in).
- Consult local regulatory authorities for advice about the distance of the instrument exhaust outlet from the toxic output of the plasma exhaust outlet.

Plasma exhaust system requirements

This exhaust must be vented outside the laboratory building. It carries toxic, combustible and corrosive vapors from the torch compartment, including reacted and non-reacted collision reaction interface (CRI) gases (Varian 820-MS only) and the rotary pump exhaust.

- Minimum airflow rate is 3 m^3/min (100 ft^3/min).
- An excessive airflow rate will cause the plasma to 'flutter' and adversely affect analytical performance. Do not exceed an airflow rate of 4 m^3/min.
- Fit a back draft damper to the exhaust outlet. This will stop any toxic gases flowing back into the laboratory when the extraction fan is not operating.
- The exhaust outlet location must be clear of doors, windows and air conditioning inlets to prevent recirculation and accidental inhalation of the toxic and corrosive exhaust fumes. Consult local regulatory authorities for advice about the distance of the plasma exhaust outlet from other building ventilation and exhaust ducts.

- The temperature of the plasma exhaust gas at the back of the instrument is approximately 15 °C (59 °F) above room temperature. Approximately 995 W of heat is extracted by the plasma exhaust system.
- The internal diameter of the ducting is 100 mm (4 in).

Clean Room model instrument exhaust system requirements

The Clean Room model instrument requires a third extraction duct to remove warm air from the rotary pump compartment.

- The minimum flow rate is 8.5 m^3/min (300 ft^3/min).
- The air extracted from this exhaust is clean and it is safe to recirculate it back into the laboratory by the room air conditioning system, or you can vent the instrument exhaust outside the laboratory building.
- This exhaust removes approximately 2500 W of heat from the instrument and the exhaust air temperature is approximately 10 °C (47 °F) above room temperature.
- The 150 mm (6 in) internal diameter ducting is not included in the Clean Room Kit.

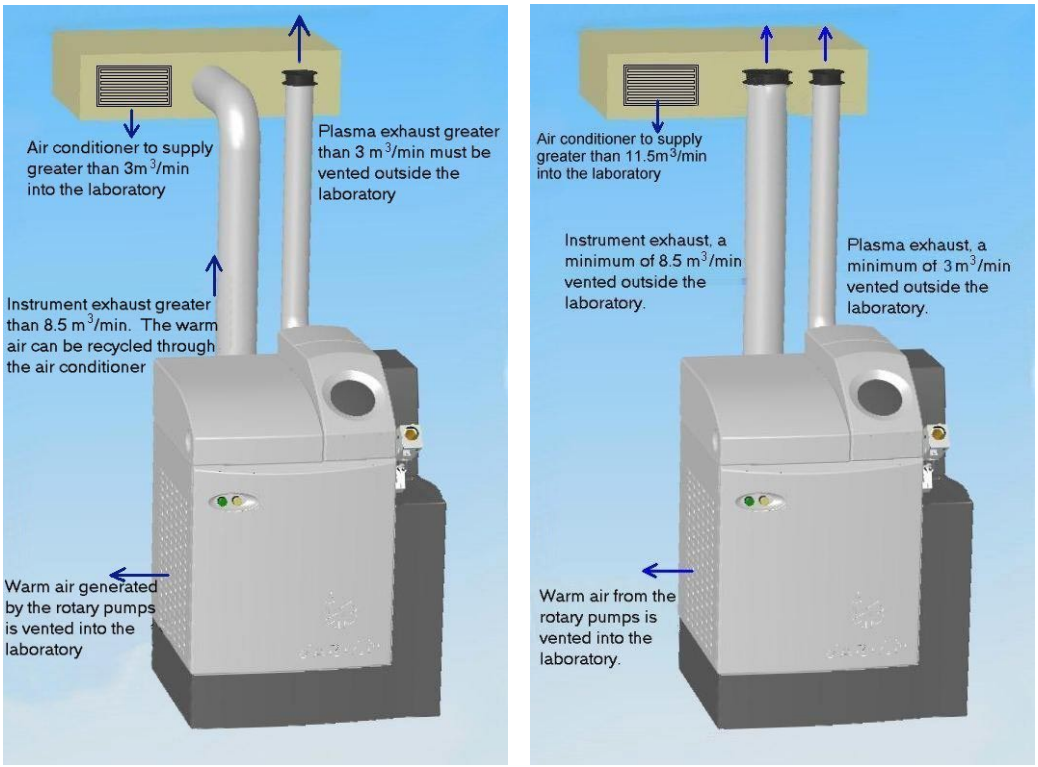


Figure 3 *Two different exhaust duct routing options*

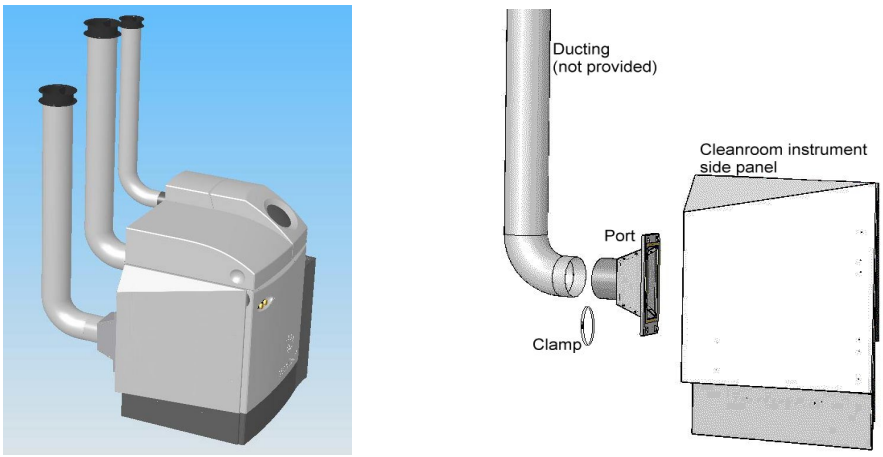


Figure 4. *A special side panel is fitted to the Clean Room model instrument*

3.3.4 Air replacement

In order to maintain a clean air space, the air pressure within the laboratory should be slightly higher than that of the environment outside the laboratory. If this positive pressure environment is maintained, airborne particles will not be drawn into the laboratory when the door is opened.

Consider the rate at which air is extracted from the laboratory by the exhaust systems and ensure that there is a greater rate of clean air entering the room.

Varian recommends the instrument extraction fan removes 8.5 m^3 of air per minute and the plasma exhaust fan removes 3 m^3 of air per minute. You can reduce the air replacement rate by re-circulating the instrument exhaust system through the laboratory air conditioner. Depending on the fan sizes, this will reduce the requirement to supply air into the laboratory from >11.5 m^3/min to >3 m^3/min (from >300 ft^3/min to >100 ft^3/min).

The plasma exhaust gas is toxic and must not be re-circulated into the laboratory.

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4. Electrical power supplies

The installation of electrical power supplies must comply with the rules and regulations imposed by the local authorities responsible for the use of electrical energy in the workplace.

Avoid connecting the instrument and PC to an unstable mains power supply. Electric motors, elevators, welders and industrial air-conditioning units may contribute to electrical interference on the mains power supply line. If your laboratory mains supply is of poor quality, exhibiting spikes, transients or fluctuations, use a Mains Voltage Stabilizer or an Uninterruptible Power Supply (UPS), for the instrument and PC.

Note The use of this ICP-MS product and associated accessories, ancillaries or peripherals with marginal power supply or other inadequate facilities or utilities shall immediately void the instrument warranty. An unstable, marginal or inadequate power supply condition necessitates fitting a suitable Power Line Conditioner or Uninterruptible Power Supply, at the cost of the user.

4.1 Instrument mains requirements

The Varian 810/820-MS ICP Mass Spectrometer is available as a three-phase model instrument or as a single-phase model instrument. When you order the instrument, select the model which best suits the power supply at your laboratory.

The instrument will be configured at the Varian factory to suit a three-phase or a single-phase mains supply system. There are no facilities inside the instrument to accommodate power supplies other than those specified below. If the laboratory mains power supply is not within the specified limits, you must provide an appropriate transformer.

The earth/ground pin of the mains outlet must be connected to a suitable earth/ground point.

Table 4. *Mains power requirements for the single-phase instrument and the three-phase instrument*

Instrument power options	Voltage range ± 5%	Nominal line current	Frequency ±1 Hz
Single-phase Two outlets required	200–240 V AC	22 A at 208 V AC 14 A at 208 V AC	50/60 Hz
Three-phase Five wire STAR or WYE	200–240 V AC (line to neutral) 346–416 V AC (line to line)	11.2 A at 230 V AC Unbalanced average per phase	50/60 Hz

4.1.1 Instrument power ratings

Three-phase model instruments have a power rating of 7.9 kVA.

Single-phase model instruments have a different power rating for each power cable. The supply rated at 22 A has a power rating of 4.5 kVA. The supply rated at 14 A has a power rating of 3.2 kVA.

4.1.2 Single-phase model instrument connection

Laboratory wiring

You must provide two mains power outlets/sockets for the instrument. Connect each to separate branch circuits, each with a 30 A 'C-Type' circuit breaker in order to avoid nuisance tripping. Note that C-Type circuit breakers are typically used in circuits containing motors because they allow for a momentary large current draw during motor startup. Varian recommends that the circuit breakers be located within easy reach of the operator (within 3 m/10 ft) and that they are marked as the disconnecting devices for the spectrometer. If the circuit breaker cannot be located near the instrument, provide switchable mains outlets.

Instrument power cable

Two 3 m (10 ft) lengths of single-phase three core (3 x 4 mm^2) cable are supplied with the instrument. The insulation color for each of the wires inside the cable conforms with European color-coding:

- Active – Brown
- Neutral – Light Blue
- Ground/Earth – Green/Yellow

According to manufacturer specifications, both cables are rated for 38 A at 40 °C.

Connecting the instrument to mains outlet receptacles

Two mains power plugs suitable for the country of destination are provided with each instrument. Your customer support representative will connect the plugs to the power cords during installation.

For deliveries to Australia and New Zealand, two 3-pin 32 A IP66 Clipsal™ 56P332 connectors rated at 250 V are provided.

For deliveries to the USA, Canada, and Japan, two 3-pin 30 A NEMA L6-30P Hubble#2621 twist-lock connectors rated at 250 V are provided.

For deliveries to Europe, two 3-pin 32 A IEC309 IP44 connectors rated at 240 V are provided.

4.1.3 Three-phase model instrument connection

Laboratory wiring

You must provide an appropriate wall-mounted 3 phase mains outlet except in countries or regions where government regulations specify that all three-phase supplies are to be directly wired into the wall.

Provide a 25 A ‘C-Type’ circuit breaker in order to avoid nuisance tripping. Note that C-Type circuit breakers are typically used in circuits containing motors because they allow for a momentary large current draw during motor startup. Varian recommends that a switch or the circuit breaker be located within easy reach of the operator (within 3 m/10 ft) and that it be marked as the disconnecting device for the spectrometer.

Instrument power cable

A 3 m (10 ft) length of three-phase five core (5 x 4 mm^2) cable is supplied with the instrument. The insulation color for each of the wires inside the three-phase cable conforms with European color coding:

- Line 1: Black
- Line 2: Brown
- Line 3: Black
- Neutral: Blue
- Earth/Ground: Green/yellow

According to manufacturer specifications, the cable is rated for 34 A at 40 °C.

Connecting the instrument to the mains outlet receptacle

The power cable is terminated with a three-phase connector appropriate for the country in which it will be installed.

A mains power plug, suitable for the country of destination, is provided with each instrument. Your customer support representative will connect the plug to the power cord during installation.

For deliveries to Australia and New Zealand, a 5-pin 20 A IP66, right angle connector rated at 500 V is provided.

For deliveries to Europe, a 5-pin, 32 A, IEC309, IP44 connector rated at 415 V is provided.

No connectors are provided with three-phase instruments delivered to the USA, Canada or Japan.

4.2 Peripheral and accessory mains power requirements

4.2.1 Water cooling system

The water cooling system must be provided with a separate, high current single-phase mains circuit and outlet (i.e., individually protected by a fuse or circuit breaker).

For information related to the water cooler's mains power requirements, refer to the manufacturer's specifications for the cooler you have selected. In areas where 208/220/230/240 V AC supplies are not normally available in a single-phase configuration, supplies may be taken from two phases of a two- or three-phase system provided that the system voltage levels are not exceeded.

4.2.2 Personal computer, printer and accessories

In general, the PC, printer and ICP-MS compatible accessories each require a single-phase mains power source (three wire system – active, neutral, ground or two actives and a ground). For information specific to each of the accessories compatible with the Varian 810/820-MS system, refer to the appropriate manufacturer's literature.

If 208/220/230/240 V AC mains power supplies are not available in a single-phase configuration, use two phases of a two- or three-phase system provided the system voltage levels are not exceeded.

Provide a separate mains connection outlet for each unit in the system and position each mains outlet within reach of the standard power cables. Do not use any mains double adaptors or extension cords. Refer to Table 5 for typical mains power requirements and cable lengths for components in a typical Varian 810/820-MS system.

Table 5. *Typical mains power requirements for the Varian 810/820-MS ICP Mass Spectrometer system*

Product	Power related parameters	Typical values
Personal computer	Voltage	115, 220, 240 V AC ±10%
	Frequency	49–61 Hz
	Nominal power rating	240 W
	Mains power cable length	2 m (6 ft 6 in)
Printer	Voltage	115, 220, 240 V AC ±10%
	Frequency	49–61 Hz
	Nominal power rating	110 W
	Mains power cable length	2 m (6 ft 6 in)
Varian SPS3 Autosampler	Voltage	100-240 V AC ±10%
	Frequency	49–61 Hz
	Nominal power rating	80 W
	Mains power cable length	2 m (6 ft 6 in)
VGA-77P Vapor Generation Accessory	Voltage	115, 220, 240 V AC ±10%
	Frequency	50/60 Hz ±1 Hz
	Nominal power rating	24 W
	Mains power cable length	2 m (6 ft 6 in)
AGM1 Auxiliary Gas Module	Voltage	No electrical requirements
	Frequency	N/A
	Nominal power rating	N/A
	Mains power cable length	N/A

5. Gas supplies

5.1 General information

All gas supply installations must comply with rules imposed by the local authorities responsible for the use of compressed or cryogenic liquid gas supplies in the workplace.

When preparing the Varian 810/820-MS system gas supply, consider the following points:

- The plasma gas supply is argon only. Varian recommends the use of liquid argon. It is generally more pure, convenient and cheaper per unit volume, however the gaseous form is also acceptable.
- Varian 820-MS: The collision reaction interface (CRI) gas supplies are hydrogen and helium only.
- Typical argon gas consumption for the instrument is 12 to 20 L per minute. A tank containing liquid equivalent to 120 m^3 (4300 ft^3) of gas, will last for approximately 100 hours of continuous instrument operation with the plasma on. A cylinder of gaseous argon containing 8.6 m^3 (304 ft^3) will last approximately 6 hours of operation with the plasma on.
- Stop valves, pressure gauges and suitable regulators must be fitted to all gas outlets. Use a two-stage regulator for each gas supply outlet. Varian 820-MS: CRI installations will require a regulator designed specifically for hydrogen. Their location must be easily accessible for the instrument operator.
- The instrument is supplied with 3 m (10 ft) PTFE gas hose/s. The argon hose connection is located on the back, right side of the instrument (as viewed from the front). Varian 820-MS: The helium and hydrogen connections are located on the back left side of CRI model instruments (as viewed from the front).

- The instrument's plasma gas inlet hose is fitted with a standard ¾"–½" BSP Swagelok® female fitting. A quick-release adaptor is supplied to connect the instrument gas hose to the instrument. Your customer support representative will connect the gas hose.

5.2 CRI (Varian 820-MS only)

Hydrogen and helium are the only gases compatible with the CRI technology.

CRI-compatible instruments are supplied with two 3 m (10 ft) Teflon hoses and an appropriate fitting for each hose.

5.3 VGA-77P

The VGA-77P Vapor Generation Accessory is only compatible with argon gas.

The minimum gas supply pressure for the instrument exceeds the maximum input pressure for the VGA-77P. To avoid accidental damage to the VGA-77P, provide a separate regulated gas supply line.

50 mL/min of argon will flow through the VGA-77P even when it is switched off. To avoid unnecessary consumption of argon, fit an inline shut off valve into the argon supply for the VGA-77P.

Fit a barbed connector to the regulator to accommodate the VGA-77P gas hose with an internal diameter of 6 mm (¼ in).

5.4 AGM-1

The AGM-1 Auxiliary Gas Module must be supplied only with oxygen gas. Refer to Table 6 for information regarding gas input pressure requirements. The AGM-1 is fitted with 6 mm (¼ in) internal diameter flexible hose for connection to a standard barbed connector.

5.5 Varian SPS3

The Varian SPS3 sample preparation system autosampler does not require a gas supply.

5.6 Gas purity requirements

The following limits apply to the instrument argon gas supply:

Minimum argon purity:	99.996%
Maximum oxygen content:	5 ppm
Maximum nitrogen content:	20 ppm
Maximum water content:	4 ppm
Maximum hydrogen content:	1 ppm

The following limits apply to the oxygen used for the AGM-1 accessory:

Minimum oxygen purity:	99.996%
Maximum water content:	4 ppm

The following limits apply to the CRI gases (Varian 820-MS only):

Minimum hydrogen purity:	99.996%
Minimum helium purity:	99.996%

5.7 Gas pressure requirements

The Varian 810/820-MS is compatible with a wide range of sample introduction accessories, nebulizers and torches. For information about the gas supply requirements of accessories not manufactured by Varian, refer to the manufacturer's literature and specifications.

Table 6. *ICP-MS system gas pressure requirements*

Product	Permissible pressure range	Recommended input pressure	Required flow rate (L/min)	Compatible gas
Varian 810/820-MS	600–830 kPa 87–120 psi	700 kPa (regulated) 102 psi (regulated)	Up to 28	Argon
CRI system (Varian 820-MS only)	275–480 kPa 40-70 psi	380 kPa (regulated) 50 psi (regulated)	Up to 2.2 for each gas	Hydrogen Helium
VGA 77P	300–350 kPa 44–51 psi	325 kPa (regulated) 47 psi (regulated)	Up to 0.1	Argon
AGM-1	300–700 kPa 44–102 psi	400 kPa (regulated) 58 psi (regulated)	Up to .07	Oxygen

5.8 Storage of gas cylinders

Secure all cylinders containing gas under pressure to a rigid structure, in an adequately ventilated area.

Warning
Never locate gas cylinders near an ignition source or in a position subjected to direct heat.

5.9 Cryogenic liquids

Cryogenic liquid argon is stored under pressure at -186 °C (-303 °F) in portable liquid cylinders (PLCs).

As contact with the super-cold liquid, gas or pipe surfaces can cause severe skin damage, shield the PLC from unauthorised access and route or cover all piping to prevent accidental skin contact.

For high gas flow rates and/or low ambient temperatures, you may need to pass the liquid through an external evaporator rather than use the internal pressure of the PLC. Most PLCs also have “pressure builder” valves if the argon does not evaporate fast enough on its own to maintain the delivery gas pressure. Additionally, liquid argon has special storage requirements and cannot be stored for extended periods of time. Contact your local authorities and cryogenic gas supplier for more detailed information on storage and boil off rates for local types of PLC.

Warning
Contact with super cold liquid, gas or metal surfaces can cause severe eye or skin damage. ALWAYS wear protective equipment on hands, face and body when working with cryogenic liquids

6. Water cooling system

6.1 Water cooler specifications

The water cooler you select must meet the specifications outlined in Table 7.

Table 7. *Water cooler requirements*

Cooling capacity	Minimum of 2800 W
Water temperature	Maintained at 20 °C ± 1 °C (68 °F ± 1.8 °F) Note: This is the temperature of the water supplied to the instrument.
Differential pressure through the instrument	Minimum of 275 kPa (40 psi)
Maximum pressure head	Do not exceed 960 kPa (140 psi)
Flow rate	At 275 kPa a water flow of 6.35 L/m is required when the RF power is ON.
Water purity	Resistivity must be greater than 20 kΩ/cm (particle size no greater than 0.1 mm) pH: between 7 and 9 Total chlorine: < 20 ppm Total nitrate: <10 ppm Total sulfate: <100 ppm

Ensure the cooler is fitted with a bypass valve to ensure it is not damaged when the instrument is switched off.

Room temperature influences the ability of the cooler to remove heat from the instrument. If the cooler is operating in an environment warmer than 25 °C (77 °F), or if the cooler is located more than 3 m from the instrument, a larger capacity cooler may be required. Refer to the manufacturers specifications and ensure that the model you have selected is capable of removing 2800 W of heat when operating at the temperature of the intended location.

Your Varian customer support representative will install the instrument water cooler with the ICP-MS instrument.

6.2 Locating the water cooler

Select a clean environment where the ambient temperature is stable. Refer to the appropriate manufacturer's specification for the operating temperature range. If the temperature exceeds the specified maximum, the cooler will fail to cool the instrument satisfactorily.

Note Failure to maintain the appropriate manufacturer's operating temperature specification will void the instrument warranty.

You must consider the environmental conditions when selecting a cooler. Consider locating the water cooler in a room next to the ICP-MS laboratory to reduce the noise and air conditioning load in the laboratory.

Unimpeded airflow to the intake and discharge vents of the air-cooled refrigeration system is essential. Provide clearance of 100 mm (4 in) around all sides of the unit.

The required floor space depends on the cooler make and model. Refer to the appropriate manufacturer's specifications for unit dimensions.

Typically, the mains cable is 2.4 m long (8 ft) and connected to the rear of the unit. The cable length may vary between models.

Two 3 m (10 ft) long water hoses with an internal diameter of 9.5 mm (⅜ in) are supplied with the Varian 810/820-MS instrument. You may require a larger capacity water cooler if the hose length is extended beyond 3 m (10 ft). If you extend the ⅜ in hose by more than 10 m (33 ft), replace it with ¾ in ID hose.

6.3 Anti-algae requirements

The Varian 810/820-MS instrument water cooling system consists of copper, brass, Teflon and nylon. To prevent growth of anaerobic bacteria in the instrument cooling system, add an algaecide as recommended by the water cooler manufacturer. Note that different manufacturers recommend different algaecides.

7. Other pre-installation requirements

7.1 Personal computer specifications

The PC should be an industry standard Pentium-based PC with the following specifications:

- Processor: Minimum - Pentium® 4 operating at 1 GHz
  Recommended - > 2 GHz
- Hard disk memory: Minimum of 80 GB hard drive storage capacity
- Random access memory: Minimum - 256 MB
  Recommended - 512MB
- CD drive: Minimum - one (1) read only
  Recommended - one (1) read/write for data back-up
- Integrated video, audio, and network support
- Mouse and keyboard
- Two USB ports
- Serial port for RS232 communication:
  Minimum - one (1) However an additional port may be required for a laser ablation accessory
- Operating system: Microsoft® Windows® 2000 or Windows XP
- You must provide all the necessary cables such as PC, printer and network cables required to support each device.

7.2 Rotary vacuum pump oil

Oil for the two rotary vacuum pumps is provided with the instrument. The oil is drained from the pumps after the instrument has been tested at the Varian factory.

7.3 Test solutions

Your customer support representative will carry out analytical performance verification of the Varian 810/820-MS as part of the instrument installation.

The following solutions will be required to tune the instrument and run the performance tests. 500 mL of each should be sufficient for the installation testing.

- ICP-MS quality 1% nitric acid (HNO_3) known as the 'Blank'.
- ICP-MS quality 1 ppb 1% HNO_3 multi-element* test solution (known as the '1ppb VAR-TS').
- ICP-MS quality 5 ppb 1% HNO_3 multi-element* test solution (known as the '5ppb VAR-TS').
- ICP-MS quality 250 ppb 1% HNO_3 multi-element* test solution (known as the '250ppb VAR-TS')
- ICP-MS quality 20 ppb Sc, Y Blank solution in 1% HNO_3 matrix (known as the 'Blank & VAR-IS-1').
- ICP-MS quality 1 ppb As, 20 ppb Sc, Y solution in 1% HNO_3 matrix (known as the '1ppb As & VAR-IS-1' and '1ppb As No Matrix').
- ICP-MS quality 5 ppb As, 20 ppb Sc, Y solution in 1% HNO_3 matrix (known as the '5ppb As & VAR-IS-1').
- ICP-MS quality 1 ppb As 20 ppb Sc, Y solution in 1% HNO_3 1% hydrochloric acid (HCl) matrix (known as the 1ppb As 1%HCl Matrix').

*The two multi-element tune solutions contain Be, Mg, Co, In, Ce, Ba, Pb, Tl, and Th.

The ICP-MS 'quality' refers to the level of purity of the reagents used in the preparation of the test solutions. The purity of the reagents and the treatment of the pipette tips and glassware, used to prepare and store each of the solutions above, is outlined in Varian Application Note #00621.

7.3.1 Preparation of Test Solutions

It is important that the above test solutions are prepared accurately and precisely in order to be used in the tuning and testing of the ICP-MS.

Due to the low concentration level of the above test solutions, there may be a requirement to purchase a concentrated stock solution and prepare the working test solutions from this.

Below is an example that outlines the procedure for dilution from a 10ppm multi-element solution using volumetric flasks and reagents specified in Varian Application Note #00621:

1. To prepare the 500ppb multi-element test solution (500ppb VAR-TS), pipette 25mL of the 10ppm multi-element stock solution into a 500mL volumetric flask and dilute up to the mark using 1% HNO_3.
2. To prepare the 5ppb multi-element test solution (5ppb VAR-TS), pipette 5mL of the 500ppb VAR-TS into a 500mL volumetric flask and dilute up to the mark using 1% HNO_3.
3. To prepare the 1ppb multi-element test solution (1ppb VAR-TS), pipette 1mL of the 500ppb VAR-TS into a 500mL volumetric flask and dilute up to the mark using 1% HNO_3.

7.4 Ultrasonic cleaning

In order to maintain optimum analytical performance from the Varian 810/820-MS instrument, regular cleaning of the sampler cone, the skimmer cone and ion lens components is required. The cleaning process uses an ultrasonic cleaning bath. The minimum recommended ultrasonic bath size is length 150 mm x width 150 mm x depth 100 mm (6 in x 6 in x 4 in).

7.5 Waste fluid container

A waste fluid container is not provided with the instrument. You should select a container that is durable (not glass), wide necked, chemically inert and capable of containing approximately 2 L (4 pints) of fluid. Locate the container in full view of the instrument's operator.

It is important to select an appropriate tube for the drain. Tubing compatible with aqueous solvents is supplied with the instrument; however alternative tubing will be required when using organic solvents. Refer to the Varian consumables catalogue for tubing information.

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8. Equipment on-site

8.1 Delivery information

Generally, Varian spectrometers are sold Carriage Paid To (CPT) according to Incoterms 2000 with the transportation from this point at the customer's expense. Due to the size and nature of this spectrometer, it is advisable that a third party is engaged to assist with transportation from the point of unloading to the final placement of the instrument in the laboratory. All major Varian Sales and Service offices will be able to assist in the task of recommending a third party that specializes in the transportation of precision scientific instrumentation. To aid in the final placement of the instrument in the laboratory an unpacking procedure is provided.

8.2 Insurance after delivery

As the carrier's liability ceases upon equipment delivery, Varian recommends that the owner of the Varian 810/820-MS system arranges for separate insurance that will cover transportation from the delivery point to the installation site. The definition of "delivery point" will vary according to the carrier, the shipping method, and in some cases the terms of the sale. Some carriers will deliver only to their own distribution centre, while others may deliver to the actual installation site.

8.3 Transit damage

Transit damage can be obvious or concealed, and in either case acknowledgement of the damage by the carrier will only be received if it is reported in accordance with the transit agreement. For any claims against damage in transit, the following general rules apply:

- Before accepting delivery, you should inspect the packages for signs of obvious damage. The nature of any obvious damage must be noted on the carrier's waybill, and must be countersigned by a representative of the carrier.

- The instrument must be inspected for concealed damage. The time taken for the concealed damage inspection must be kept within the limits as stated in the terms of conditions of carriage.
- The Varian Sales and Service department must receive a copy of any instrument transit damage report.

Although the instrument shipping cartons are designed to protect the instrument and withstand any “reasonable” stress during transit, they must not be subjected to sharp jolts and shocks, and must not be inverted or tilted unnecessarily. Markings on the shipping carton indicate which side of the package is the top.

8.4 In-house transit routes

Use Figure 5 as a reference for planning the in-house transit route you wish to use to deliver the instrument into the laboratory. Consider the instrument vertical, horizontal and turning clearances. Consider obstacles such as narrow doorways, steep ramps and steps as they will inhibit movement of the instrument. Refer to section 3.2 “Weights and dimensions” for instrument dimensions. The maximum ramp incline the instrument can traverse is 15°.

The instrument is equipped with two fixed wheels and two castors allowing it to be unpacked in an unloading bay area and rolled into the laboratory. It is much easier to move the instrument once it has been unpacked from the shipping carton. No lifting equipment is required to remove the instrument from the shipping carton.

If you intend transporting the instrument into the laboratory in its shipping carton, consider the shipping carton dimensions when planning the in-house transit route. In addition, when you position the packing carton, allow space to roll the instrument down the ramps fitted to the carton. Allow a space approximately 5 m (16 ft) in length for the crate, the ramp and the instrument.

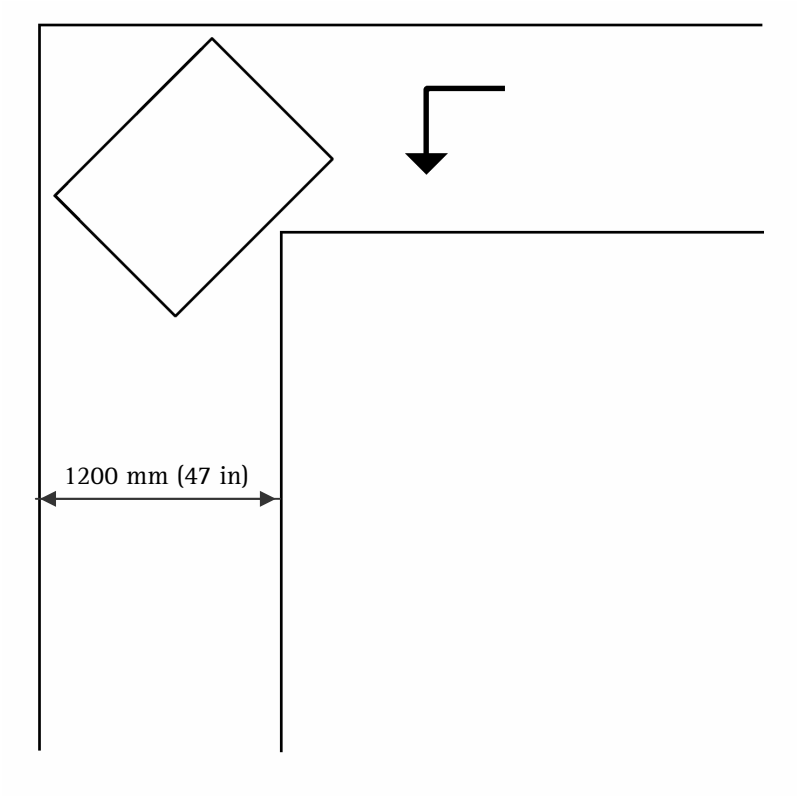


Figure 5. *Allow at least a 1200 mm (47 in) space to turn the non-crated Varian 810/820-MS instrument. The chassis dimension from corner to corner is approximately 1150 mm (45 in). Allow additional room to turn the instrument, as only two of the four wheels swivel. The minimum turning dimension for the crated instrument is 1420 mm (56 in).*

Warning
When the Varian spectrometer is in its shipping carton, the carton is designed to allow forklift lifting from under the long sides of the carton only. It is unsafe to lift from either of the narrow sides.

As the instrument weighs 307 kg (677 lb), use care when maneuvering it. Ask for assistance when maneuvering the instrument. Two people can maneuver the instrument more safely than can one.

8.5 Varian 810/820-MS ICP Mass Spectrometer unpacking instructions

These instructions outline a procedure for removing the instrument from the packing crate. A document containing more details regarding unpacking the instrument is fixed to the outside of the packing crate.

When storing the instrument, ensure that the storage conditions remain within 5–45 °C (41–113 °F) and 20–80% relative humidity, non-condensing.

Metric bolts are used in the packing crate assembly.

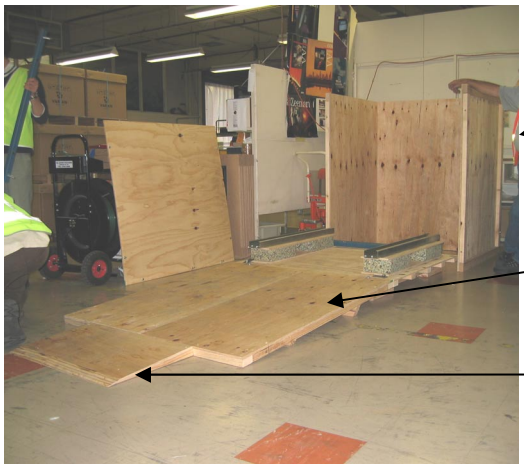
Warning
Do not attempt to connect the instrument to the mains power supply.

1. Remove the two self-tapping bolts from the RAMP side of the crate using a 13 mm (0.5 in) socket.
2. Remove the crate lid using an 11 mm (0.4 in) socket suitable for the bolts. At least two people will be required to lift the lid off the crate.
3. Remove the RAMP side of the packing crate. A second, smaller ramp is also included in the packing crate. In order to roll the instrument out of the crate, the smaller ramp must be fixed to the larger ramp using the two clamps provided.
4. Remove the three remaining sides and set them aside.

The instrument front panel is secured to one side of the packing crate.

The top panel and ramp-side panel have been removed from the crate.

5. Position the RAMP side panel on the ground. Fit two of the long bolts into the holes provided on the ramp to secure it to the crate base.

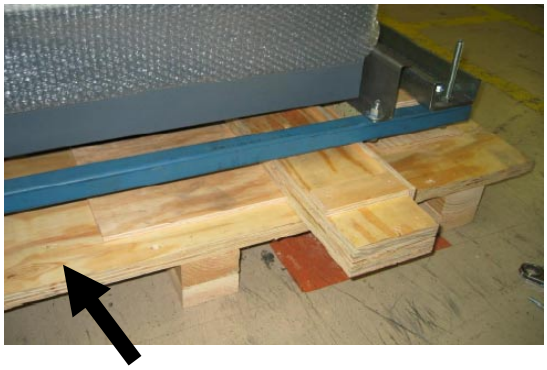


Three of the crate walls can be removed from the packing crate base together.

Large ramp – this is the side of the packing crate that is removed first.

Small ramp – this is attached to the inside of one of the crate walls.

6. Secure the small ramp to the large ramp using the two small brackets provided.
7. Remove the two wooden supports from the crate wall and slide them under the instrument wheels.



8. Lower the instrument wheels onto the wooden supports and remove the two metal stabilization bars.
9. Slowly roll the instrument down the ramps. At least two people are required to safely perform this step.
10. Remove the brackets bolted to the sides of the instrument chassis using a 13 mm (0.5 in) socket.

11. The instrument front panel is clipped to the side of the crate. Release it using the clips located on either side near the top corners.


12. Fit the front panel to the instrument and position it in the laboratory.
13. To prevent the instrument from moving, you can activate the two feet located in the instrument chassis. Remove the instrument front panel. Using a screwdriver, push down on the end of the rod to extend the instrument foot. Push down on the tab to retract the foot.



9. Installation overview

Only a Varian-approved customer support representative may install the Varian 810/820-MS ICP Mass Spectrometer system. The standard system installation time is twelve hours.

The Varian 810/820-MS installation will include the following items:

- Pre-installation check of the laboratory facilities
- Varian 810/820-MS instrument installation
- Water cooler installation
- Installation of all ICP-MS instrument accessories
- Installation performance tests for the instrument

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10. Pre-installation summary and checklist

10.1 Varian 810/820-MS ICP Mass Spectrometer Pre-installation summary

Use the information contained in this summary as an approximate guide. Ensure that you read the complete Pre-installation manual before beginning laboratory preparations for the Varian 810/820-MS ICP Mass Spectrometer system.

Environmental requirements
Operating conditions: Temperature range: 15–27 °C (59–81 °F) Humidity range: 25–80% non-condensing

Air replacement: Ensure that the airflow into the laboratory is greater than the rate at which the air is removed via the extraction fans. A positive air pressure within the laboratory relative to the outside laboratory air pressure will prevent dust being drawn into the room when the laboratory door is opened.

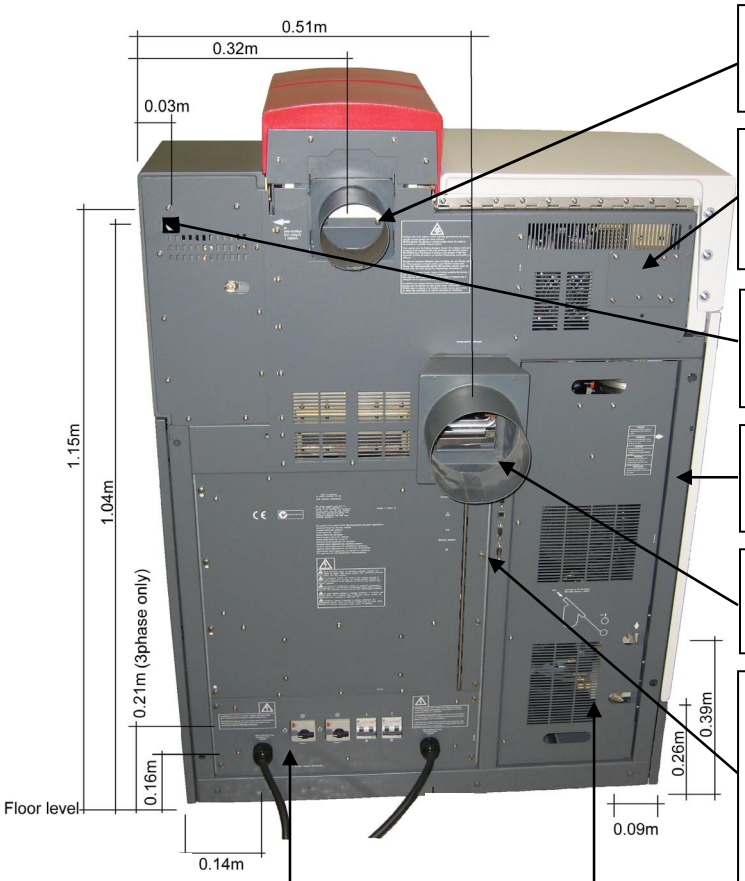
Clean air space: A minimum of Class 1,000, 000 for standard operation. Class 1000 for ultra trace analysis.

Storage conditions: Temp: 5–45 °C (41-113°F). Humidity: 20-80% relative humidity non-condensing.

The three-phase instrument power rating is 7.9 kVA.
The single-phase instrument has a different power rating for each supply, the 22 A power supply is rated at 4.5 kVA, the 14 A power supply is rated at 3.2 kVA.

Instrument heat dissipation: 2.5 kW into the room when both exhaust systems are ducted outside the laboratory.

Instrument weights and dimensions
Width: 896 mm (35.3 in); depth: 722 mm (28.7 in); height: 1316 mm (52.0 in)
Weight: 307 kg (676 lb); shipping weight: 520 kg (1145 lb)
Instrument has 4 wheels and a ground clearance of 0.05 m (2 in). Approach angle 15°.



Plasma exhaust requirements
Flow: 3 m^3/min (100 ft^3/min)
Duct size: 100 mm (4 in) internal diameter

CRI gas requirements
(Varian 820-MS only)
Helium and Hydrogen only
Purity: 99.996%

Instrument gas supply requirements
Argon gas purity: 99.996%
Argon supply pressure: 275-480 kPa

Clean Room extraction requirements
Flow: 8.5 m^3/min (300 ft^3/min)
Duct size: 150 mm (6 in) internal diameter

Instrument extraction requirements
Flow: 8.5 m^3/min (300 ft^3/min)
Duct size: 150 mm (6in) internal diameter

PC requirements (minimum)
Pentium 4, 1 GHz, 80 GB HD, 256 MB RAM, 2 x USB ports, 1 x RS232 port (2 if using laser ablation accessory), CD drive, integrated audio, video and network support, Microsoft Windows 2000 operating system

Water cooler requirements
2.8 kW is the minimum water cooler capacity requirement at a room temperature of 25 °C (77 °F). A larger cooler is required if the environment temperature is above 35 °C (95 °F). Set water temperature to 20 °C (68 °F). Supply pressure: 275 kPa (40 psi) Flow rate: 8 L/m RF ON

Electrical requirements for the single-phase model
Two separate supplies 200-240 V AC ±5% 50/60 ±1 Hz
Power supply #1 22 A Nom.@208 V AC. Power supply #2 14 A Nom.@208 V AC
Two connectors are provided with the instrument. Australia and New Zealand: 3-pin 32 A IP66 Clipsal® 56P332 250 V
USA, Canada and Japan: 3 pin 30 A NEMA L6-30P Hubbel #2621 twist-lock connectors rated at 250 V
Europe: 3-pin 32 A IEC309 IP44 connectors rated at 240 V
Electrical requirements for the three-phase model instrument
200–240 V AC ±5%. 11.2 A unbalanced average per phase average @230 V AC
Mains connector for Australia and New Zealand: 5-pin 20 A IP66 right-angled connector rated at 500 V
Europe: 5-pin 32 A IEC309 IP44 connector rated at 415 V. No 3-phase connectors are provided for USA, Canada and Japan.

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10.2 Varian 810/820-MS ICP Mass Spectrometer Pre- installation checklist

Note Failure to provide and maintain the correct laboratory conditions may reduce the instrument performance, operational life and the operator protection provided by the instrument.

Tick the box to indicate that each requirement is complete. Strike out any point not applicable to your ICP-MS system or laboratory.

- ❑ Instrument has been delivered, unpacked and positioned in the laboratory.
- ❑ No damage was found upon inspection of the instrument.
- ❑ Any instrument damage has been reported to the company responsible for transporting the instrument, a Varian representative was informed of the damage and a copy of the damage report has been sent to the Varian office.
- ❑ An appropriate water cooler has been delivered.

  Brand: _____

  Model number: _____

  Serial number: _____
- ❑ All accessories are available (list serial numbers below)

  Autosampler: _____

  VGA: _____

  Ultrasonic Nebulizer: _____

  Laser ablation accessory: _____

  Additional accessories:

  Type and model: _____

  Serial number: _____

  Type and model: _____

  Serial number: _____

- ❑ A personal computer is available for the instrument

  Brand: _____

  Processor: _____

  RAM size in MB: _____

  Hard disk size in MB: _____

  Operating system: _____

- ❑ Symantec pcAnywhere™ telediagnostics software is installed on the PC.
- ❑ The PC is connected to the Internet.
- ❑ Printer

  Brand: _____

  Model number: _____

- ❑ Installation of the instrument exhaust system is complete. The two extraction fans have been installed and are operational. The ducting connected to each extraction fan is of a sufficient length to enable the movement of the instrument whilst it is connected to the ducting.

  The RF enclosure exhaust draws a flow of: _____ m^3/min and it is vented to the atmosphere outside the building.

  The instrument exhaust draws a flow of: _____ m^3/min.

  The rotary pump exhaust draws a flow of: _____ m^3/min (Clean Room model instrument only).

- ❑ The electrical power supply for the instrument is complete.

  Note that the instrument mains power requirements will be either a single-phase configuration or a three-phase configuration depending on the country in which the instrument is to be installed. Specify the instrument mains power configuration to suit your country or laboratory when you place the instrument order.

- ❑ Installation of the appropriate mains power sockets in the laboratory wall within 2 m of the desired instrument location is complete.

- ❑ The instrument will operate on a three-phase mains power supply. Each phase has been measured and the values are listed below.

  Phase 1 to neutral AC voltage is: _____ V

  Phase 2 to neutral AC voltage is: _____ V

  Phase 3 to neutral AC voltage is: _____ V

  Earth to neutral AC voltage is: _____ V

  The current rating of the mains power socket is: _____ A

  The mains power wiring configuration is: _____

  _____

  _____

  _____

  _____

  (e.g., Three-phase STAR 5 wire)

- ❑ The instrument will operate from a single-phase power supply. Each line has been measured and the values are recorded below.

  Supply voltage #1 is: _____ V

  Supply voltage #2 is: _____ V

  The current rating of the mains power socket #1 is: _____ A

  The current rating of the mains power socket #2 is: _____ A

  The mains power wiring configuration is: _____

  _____

  _____

  _____

  _____

  (e.g., Single-phase three wire grounded mid-point)

- ❑ Instrument argon gas supply is ready and the regulated output is positioned close to the instrument. Note that the instrument gas hose is 3 m long.

  Argon source is (e.g., cylinders/PLC): _____

  Purity of argon is: _____

- ❑ 15 L of distilled water is available for the water cooler. This requirement is dependent on the cooler manufacturer's specifications.
- ❑ Algaecide is available. It is the correct type and quantity in accordance with the water cooler manufacturer's specifications.
- ❑ ICP-MS 1 ppb 1% HNO_3 multi-element test solution is available (at least 500 mL)
- ❑ ICP-MS 5 ppb 1% HNO_3 multi-element test solution is available (at least 500 mL)
- ❑ ICP-MS 500 ppb 1% HNO_3 multi-element test solution is available (at least 500 mL)
- ❑ ICP-MS quality Blank solution in 1% nitric acid matrix is available (at least 500 mL)
- ❑ ICP-MS quality Blank 20 ppb Sc, Y solution in 1% nitric acid matrix is available (at least 500 mL)
- ❑ ICP-MS quality 1 ppb As, 20 ppb Sc, Y solution in 1% nitric acid matrix is available (at least 500 mL)
- ❑ ICP-MS quality 5 ppb As, 20 ppb Sc, Y solution in 1% nitric acid matrix is available (at least 500 mL)
- ❑ ICP-MS quality 1 ppb As 20 ppb Sc, Y solution in 1% nitric acid 1% hydrochloric acid matrix is available (at least 500 mL)
- ❑ An ultrasonic cleaning bath is available.

  Length: _____ mm Width: _____ mm Depth: _____ mm
- ❑ A waste container is available

  Volume: _____
- ❑ A logbook is available for recording instrument parameters and maintenance data

Publication date: 11/07

All preparations have been completed in accordance with the information provided in the Varian 810/820-MS ICP Mass Spectrometer Pre-installation manual. Please arrange for installation of my Varian 810/820-MS instrument as soon as possible. I understand that if the site is not prepared in accordance with the enclosed instructions, additional installation charges may be applicable.

(Please print)

Company name and address:

_____

_____

_____

_____

Contact name: _____

E-mail address: _____

Position: _____

Telephone: _____

Date: _____

Signed: _____

Preferred instrument installation date: _____

Upon completion of the Pre-installation checklist, detach it from this book, retain a copy for yourself and return the signed checklist to your local Varian representative office.

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