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Varian 300 Series Quadrupole GC/MS Pre-installation Instructions

Checklist

NOTE: Do not unpack the boxes.

Place a check in the box after satisfying each requirement as described in the instructions. All requirements must be met before requesting installation.

Note: If the laboratory is not ready for installation when the Varian Representative arrives, Varian, Inc. reserves the right to invoice for the Representative's time.

Requirements	<input checked="" type="checkbox"/>
Principal installation area is in compliance with all relevant safety regulations.	<input type="checkbox"/>
User Representative will be available during the installation and certification period.	<input type="checkbox"/>
Entrance to the laboratory is at least 36 in. (92 cm) wide.	<input type="checkbox"/>
Sufficient bench space is available for all components.	<input type="checkbox"/>
Bench can support system weight.	<input type="checkbox"/>
System bench does not vibrate.	<input type="checkbox"/>
Laboratory temperature maintained between 16 and 30 °C.	<input type="checkbox"/>
Relative humidity maintained between 20 and 80%.	<input type="checkbox"/>
Laboratory is free of excessive particulate matter.	<input type="checkbox"/>
Ventilation system is suitable.	<input type="checkbox"/>
Specified electrical supply and power outlets are installed.	<input type="checkbox"/>
CI reagent gas (methane, isobutane, or ammonia: 99.999% pure), regulator, and gas lines are installed.	<input type="checkbox"/>
Argon (99.999% pure), regulator, and gas lines are installed. Argon required only for Triple Quadrupole Systems.	<input type="checkbox"/>
Helium (99.999% pure), regulator, and gas lines are installed.	<input type="checkbox"/>
The shipping cartons were examined for damage and if damaged, the conditions were reported.	<input type="checkbox"/>

Request for Installation

After preparing your site, contact the Customer Service office in your region to schedule installation.

Contents

Introduction.....	2	Qualified Computer Equipment.....	10
Safety.....	2	Gas Requirements.....	10
Principal Operator.....	2	CI Reagent Gases.....	10
Entrance.....	3	CID Gas (Triple Quadrupole only).....	12
Bench Space and Load Requirements.....	4	GC Carrier Gases.....	12
Vibration.....	7	Instrument Arrival.....	13
Temperature.....	7	Inspection.....	13
Humidity.....	7	Unpacking and Installing.....	14
Particulate Matter.....	7	Spare Parts.....	14
Ventilation System.....	8	Preventive Maintenance.....	14
Power Requirements.....	8		

Introduction

The Pre-installation Instructions guide you through each requirement of the checklist. Follow these instructions to ensure that the installation requires no more than the usual three days. Have the completed checklist available when you call to schedule the installation. After the Varian Representative has completed the installation and you have accepted the installation, you can analyze your samples.

After you meet all of these requirements, contact the Customer Service office in your region to schedule installation.

The GC/MS operates reliably under carefully controlled environmental conditions. You must provide suitable power sources, operating environment, and materials. Using or maintaining a system outside of the power and operating environment ranges and limits described in these instructions, may cause failures. The Warranty and Service contract specifically excludes the repair of failures due to such causes.



All phases of the installation site preparation must conform to local safety, electrical, and building codes. These codes take precedence over any recommendations in these instructions, and the customer is responsible for compliance.

Safety

Safety is the most important consideration for instrument use. Determine if the installation site complies with all relevant safety regulations.

- Check the checklist box: *Principal installation area is in compliance with all relevant safety regulations.*

Principal Operator

Determine who will be the principal operator and consider that person's schedule. Since one of the important duties of the Varian Representative is to familiarize the principal operator with the basic functions of the GC/MS, it is very important to arrange for the installation when the principal operator is available.

- Check the checklist box: *Principal operator will be available during the installation and Varian certification period.*

Entrance

Before arranging for delivery of the GC/MS, determine that there is sufficient clearance to move the shipping container to the installation site. The shipping box is 28 in. (72 cm) wide by 36 in. (92 cm) long. If you move the instrument using the pallet, you need at least 36 in. (92 cm) clearance. Allow additional room for maneuvering the shipping containers around corners and/or through doors.



Check the checklist box: *Entrance to the lab is at least 36 in. (92 cm).*



CAUTION

The 300-MS or 320-MS, foreline pump, and gas chromatograph are heavy. To prevent personal injury, use appropriate moving and lifting techniques.

Bench Space and Load Requirements

The following information is provided to help you plan your layout. The Varian Representative will unpack the boxes and place the modules on the bench.

Tables 1 and 2 show possible layouts for the GC/MS. The GC will be placed on the left side of the instrument to allow the transfer line to connect the GC to the MS. The bench must be strong enough to support the weight of the system and any additional equipment, long enough for the system, and at least 33 in. (84 cm) wide.



Table 1 300-MS or 320-MS GC/MS Bench Space and Load with CP-8400 AutoSampler

Bench	System Components				
Length	Monitor and Keyboard	CPU	GC and CP-8400 AutoSampler	MS	Total
in.	18	8	26	20	72 in.
cm	46	20	66	52	184 cm
Load	Computer Workstation		GC and CP-8400 AutoSampler	MS	Total
lbs	35		115	134	284 lbs
kg	16		52	61	129 kg



Table 2 300-MS or 320-MS GC/MS Bench Space and Load with Combi PAL AutoSampler

Bench	System Components				
Length	Monitor and Keyboard	CPU	CP-3800 GC and Combi PAL Autosampler	300-MS or 320-MS	Total
In.	18	8	26	20	72 inches
cm	46	20	66	52	184 cm
Load	Computer Workstation		CP-3800 GC and Combi PAL Autosampler	300-MS or 320-MS	Total
lbs	35		123	134	292 lbs
kg	16		53	61	130 kg

The GC/MS system, except for the foreline pump, belongs on a clean, flat bench. The foreline pump belongs under the bench. The vacuum line that connects the MS to the foreline is 66in. (1.7mm) long. To accommodate the pump, the bench should be no higher than 36 in. (91 cm). If your bench is higher, be sure to place a vibration-isolation bench under the pump. The bench must be capable of supporting the 55 lb (25 kg) pump. If your bench abuts a wall, drill a 1.5 in. (3.8 cm) diameter hole through the rear of the bench for the vacuum hose.

The PC can be put either on the same bench as the MS, or on a separate table. If you put it on a separate table, position it within 10 ft (3 m) of the rear of the MS.

Refer to the CP-3800 GC Pre-installation Instructions (part number 391467500) for more information about the GC.

Table 3 has more information about the system components and Table 4 has other recommendations.

Table 3 Dimensions and Weights of GC/MS System Components

Instrument	Height		Width		Depth		Weight	
	in.	cm	in.	cm	in.	cm	lb.	kg
300-MS or 320-MS	15.2	39	20	52	28	72	134	61
CP-3800 GC	20	51	26	66	22	56	95	43
Combi PAL AutoSampler	26.5	64.8	33.8	82.8	13.7	33.5	28	10
Computer Workstation	17	43	17	43	21	53	35	16

Table 4 Bench Space Recommendations

Purpose	Recommended Space Allowance
Provide access to the transfer line.	Allow at least 12 in. (30 cm) to the left side of the GC/MS.
Provide space for air circulation, gas lines, and electrical connections.	Allow at least 6 to 12 in. (15 to 30 cm) behind the system.
Dissipate heat and allow for routine maintenance.	Allow at least 30 in. (76 cm) above the instrument.

Decide how you will arrange your system. Use Table 5 to determine the bench length you need and the load you will put on it. Regardless of system components, the bench must be at least 33 in. or 84 cm deep to accommodate the MS.

Table 5 Determine the Bench Length and Load for Your System

Bench	System Components					
Length	Monitor and Keyboard	CPU	GC	MS	Other Components	Total
in.	18	8	26	20		inches
cm	46	20	66	52		cm
Load	Computer Workstation		GC	MS	Other Components	Total
lbs	35		95	134		inches
kg	16		43	61		cm

- Check the checklist box: *Sufficient bench space is available for all components.*
- Check the checklist box: *Bench can support system weight.*

Vibration

Ensure that lab benches are free from vibrations, especially those caused by equipment in adjoining locations. Because the foreline pump vibrates during operation, put it on the floor below the mass spectrometer, not alongside the system on the bench.

- Check the checklist box: *System bench is free from vibrations.*

Temperature

The optimal operating temperature is between 16 and 30 °C (61-86 °F).

NOTE: As laboratory temperature increases, system reliability decreases due to heat generated by electronic components during operation. This heat must dissipate to the surrounding air for reliable operation.

The airflow around the system must be adequate. The air conditioning system must be capable of maintaining a constant temperature in the immediate vicinity of the system. Therefore, do not place the system near air ducts, windows, or heating and cooling systems. The average steady-state heat load of the GC/MS is 6,000 Btu, with a possible short-term heat dissipation of 15,000 Btu during startup.

Hot air vented from GC column ovens may contribute to room heating and to the resulting air conditioning load. Ducting the GC column oven air out of the lab reduces this heating effect.

- Check the checklist box: *Lab temperature maintained between 16 and 30 °C.*

Humidity

The relative humidity (RH) of the operating environment must be between 20 and 80%, with no condensation. Operating the mass spectrometer at a very low humidity may result in the accumulation and discharge of static electricity, shortening the life of electronic components. Operating the system at high humidity may produce condensation and result in short circuits.

Varian recommends that your laboratory be equipped with a temperature/humidity monitor to assist in the conformance to the temperature and humidity specifications.

- Check the checklist box: *Relative humidity maintained between 20 and 80%.*

Varian recommends that your laboratory be equipped with a temperature/humidity monitor to assist in the conformance to the temperature and humidity specifications.

Particulate Matter

Your laboratory must not have excessive dust, smoke, or other particulate matter. A layer of dust on the electronic components could act as an insulating blanket and reduce heat transfer to the surrounding air.

- Check the checklist box: *Lab is free of excessive particulate matter.*

Ventilation System

The foreline pump exhausts most compounds introduced into the MS along with oil vapor from the pump. Check that the ventilation system is suitable for the foreline pump. Consult local regulations.

Provide an adequate fume exhaust system for the foreline vacuum pump outlet. Consult local regulations.

- Check the checklist box: *Ventilation system is suitable.*

Power Requirements

The GC/MS system requires the following:

- One dedicated duplex single-phase power source with earth grounds hard-wired to the main power panel ground for the gas chromatograph.
- One fourplex power source for the mass spectrometer, computer, and monitor.

Additional sample preparation devices or test equipment, require a dedicated power source separate from the above.

Never plug the mass spectrometer and the chromatograph into the same power source or the power source may overload. Never use the free outlet on any of the power sources for equipment that draws more than 2A.

- Within North America, these power sources must be 20A, 100-115 VAC 60 Hz \pm 3 Hz.
- Outside North America, power sources must be 10A, 200-240 VAC, 50 Hz \pm 3 Hz.

Table 6 has the power requirements for instruments and components of the GC/MS.

Table 6 GC/MS Current Requirements

<i>Instrument/Component</i>	<i>Max Current Draw 110-115V (Amps)</i>	<i>Max Current Draw 200-240V (Amps)</i>
CP-3800 GC	20	10
300-MS or 320-MS	10	5
Computer	3	1.5
Monitor	3	1.5
Printer	3	1.5

The quality of the power supplied to your laboratory is very important. It must be either 100-115 VAC or 200-240 VAC, and it must be stable, that is, it must be free of fluctuations due to slow changes in the average voltage or to changes resulting from surges, sags, or transients. The power supplied should meet IEC 1000-4-5 and IEC 1000-4-11 standards for voltage stability. If you are concerned about the quality of the power, consider using an uninterruptible power supply (UPS) and a power conditioning device. Table 7 shows the maximum power consumption.

Table 7 Maximum Power Consumption

GC/MS	Maximum Power Draw
300-MS or 320-MS with DS42 pump	1200 VA

The power cable from the GC is approximately 6.7 ft (2 m) long and has a National Electronics Manufacturers Association (NEMA) 5-20P power plug, shown in Figure 1. NEMA 5-20P plugs are rated at 20A and 120 VAC.

The power cable from the mass spectrometer is approximately 8 ft (2.5m) long and has a National Electronics Manufacturers Association (NEMA) 5-15P power plugs, shown in Figure 1. NEMA 5-15P plugs are rated at 15A and 120 VAC.

The power cables for the computer, monitor, and printer are approximately 7 ft (2m) long. They have NEMA 5-15P plugs.

Systems shipped outside the United States and Canada have CEE 7/7 plugs. These plugs are rated at 16A and 230 VAC and are shown in Figure 1.



CAUTION

Replacing or substituting power cords or plugs must be done with strict compliance with all regulations including electrical codes, power cord color coding and appropriate regulatory agency certification marks.

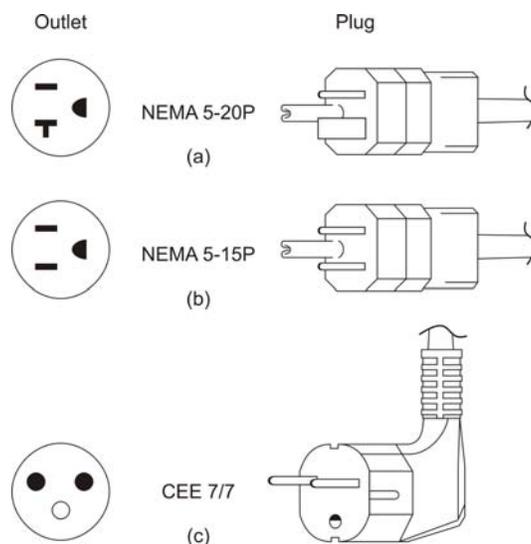


Figure 1 NEMA 5-20P, NEMA 5-15P, and CEE 7/7 Power Plugs and Outlets

Check the checklist box: *Specified electrical supply and power outlets installed.*

Qualified Computer Equipment

If you need to install the Varian MS Workstation software on a computer not purchased from Varian, it is your responsibility to ensure that this computer is adequately equipped and compatible with the operation of the data system and its communication interfaces. Please consult the current list of requirements, available at this web site.

http://www.varianinc.com/cgi-bin/nav?products/chrom/gcms/msws_computer_req

NOTE: For a list of the currently qualified equipment or more information, contact your Sales Representative.

Gas Requirements

CI Reagent Gases

The CI mod uses methane, isobutane, or ammonia. The amount of gas consumed during CI operation is approximately 1 to 2 mL/min. The CI reagent gas should contain less than 1 ppm water. The methane, isobutane, or ammonia supply line connects directly to the CI gas inlet using 1/8 inch Swagelok® fittings.

Before evacuation, new gas lines typically contain adsorbed water vapor. The longer the gas line, the longer the pumping time required to remove the water. Use as short a line as possible.

Methane 5.0 Research Grade (99.999% purity)

- Use a two-stage, 0–15 psi (0–1 bar) pressure regulator with a stainless steel diaphragm.
- Set the output pressure to the 300-MS or 320-MS to 3–5 psi (0.2–0.3 bar).

- Use stainless steel gas lines for methane.
- Flame treat or solvent wash gas lines to remove oil.

Isobutane 5.0 Research Grade (99.999% purity)

- Use a two-stage, 0–15 psi (0–1 bar) pressure regulator with a stainless steel diaphragm.
- Set the output pressure to the 300-MS or 320-MS to 3–5 psi (0.2–0.3 bar).
- Use stainless steel gas lines for isobutane.
- Flame treat or solvent wash gas lines to remove oil.

Ammonia 5.0 Research Grade (99.999% purity)

- Use a two-stage, 0–15 psi (0–1 bar) pressure regulator with a stainless steel diaphragm.
- Set the output pressure to the 300-MS or 320-MS to 3–5 psi (0.2–0.3 bar).
- Use stainless steel gas lines for ammonia.
- Flame treat or solvent wash gas lines to remove oil.



**WARNING:
INHALATION
HAZARD**



**WARNING:
CHEMICAL HAZARD**

Ammonia, Anhydrous (CAS Number 7664-41-7)

Anhydrous Ammonia gas is highly toxic. Inhalation may cause irritation to eyes and throat and may cause pulmonary edema, which can result in serious injury or death. Repeated exposure to Anhydrous Ammonia may cause permanent lung damage.

- Refer to Material Safety Data Sheet (MSDS) for Anhydrous Ammonia for exposure control/personal protection, handling/storage, accidental release, first aid, and fire fighting measure requirements.
- Only use anhydrous ammonia with an appropriate ventilation system for the instrument, the exhaust from the foreline pump, and the gas cylinder. Use appropriate safety shutoff valves for the anhydrous ammonia supply and interconnecting lines.

The operator is responsible for determining and implementing appropriate precautions when using anhydrous ammonia and for compliance with all governmental regulations. It is the operator's responsibility to understand and adhere to all safe laboratory practices concerning the use of toxic gases, including anhydrous ammonia.



Check the checklist box: *Cl reagent gas, regulator, and gas lines are installed.*

CID Gas (Triple Quadrupole only)

Use a two-stage 0-100 psi pressure regulator with a stainless steel diaphragm. Argon is required as a collision gas for MS/MS work with triple quadrupole instruments. The argon purity must be at least 99%. Set the output gas pressure to 60-80 psi.



Check the checklist box: *Argon is at least 99.999% pure and the appropriate regulator and gas lines are installed.*

GC Carrier Gases

Helium

Helium is required as a carrier gas for the GC, with a minimum of 99.999% ultra-high purity, and less than 1.0 ppm each of water, oxygen, and total hydrocarbons. The minimum requirement is one 257 ft³ tank with an Alltech regulator #AL8111, or equivalent tank. Use a two-stage 0-100 psi pressure regulator with a stainless steel diaphragm.



Check the checklist box: *Helium is at least 99.999% pure and the appropriate regulator and gas lines are installed.*



CAUTION

The presence of greater than 1 ppm oxygen or water in the carrier gas supply may significantly affect the performance of the 300-MS or 320-MS GC/MS. It may also damage components such as the capillary column, filaments, and multiplier. Varian recommends that you verify your gas suppliers use controlled tanks to ensure that purity standards are maintained.

If you purchase pure gases in contaminated tanks, you may have a contaminated system that requires costly and time-consuming repairs.

Carrier Gas Filter

Using a carrier gas filter is required for optimum performance and protecting your system from potential contamination. Your GC Accessory Kit includes a GC/MS Gas Clean Oxygen/Moisture filter (CP-17973) and filter base. This easy-to-remove gas filter cartridge combines three highly adsorptive materials in one filter to remove water, oxygen, and organic compounds. Install the carrier gas filters so that the indicator is visible. Replace the filter when the indicator shows that the filter is saturated, or after one year of service, depending on which comes first. For replacement procedures, refer to the instructions enclosed with your filter.

Instrument Arrival

Inspection

After the GC/MS arrives, carefully inspect the exterior of the shipping cartons for evidence of any damage that might have occurred during shipment. Inspect the cartons for the following:

- Water stains.
- Cuts, punctures, or deep indentations.
- Crushed corners or excessively abraded edges.
- Blue beads in the Tip (N) Tell arrow point.

Two Tip (N) Tell indicators and labels are affixed to the exterior of the shipping boxes. Read and follow the instructions on the label. If the Tip (N) Tell arrow point is blue, the box was on its side or tipped in transit and instrument damage may have occurred.



If no external damage is apparent, sign the receiving documents, "*Received but not inspected*" to indicate that the boxes have not been opened.

Varian will not accept liability for damage if you received obviously damaged materials without noting the damage on the receiving documents.

Do not open any boxes. The Varian Representative opens them during installation. Move the shipping containers to a warm, dry, secure area near the place of installation.

If a shipping carton shows evidence of damage, do the following:

1. Report the conditions to the carrier when you receive the shipment.
2. Note the damage on all copies of the shipping documents.
3. Write a brief description of the damage.
4. Ask the driver to sign next to your comments to signify agreement with the observations.
5. Contact the appropriate Varian office to report the damage.

Systems are shipped either **FOB Varian** or **FOB Destination**. The manner of shipment determines who is responsible for filing a claim against the carrier if the system was damaged in transit. Most systems are shipped **FOB Varian**, therefore any damages incurred in shipment are the responsibility of the purchaser and the carrier. Contact the Varian office for assistance with filing claims and billing repairs. If the system is shipped **FOB Destination**, contact the Varian office, and that office will file a claim against the carrier.



Check the checklist box: *The shipping cartons were examined for damage and if damaged, the conditions were reported.*

Unpacking and Installing

Before arriving, a Varian Representative will contact you to review the "Pre-installation Checklist" to ensure that you have satisfied all of the site requirements. The Varian Representative will unpack and install the GC/MS system and demonstrate fundamental operation and maintenance procedures. Therefore, the system operator must be available during the installation.

The Varian Representative uses only a Varian qualified computer when testing the system specifications. Varian does not guarantee the function of the Varian MS Workstation software on any other computer hardware or operating system.

The Varian Representative demonstrates that your system meets the performance specifications unless there are additional criteria explicitly written into your sales contract.

Plan to analyze your samples only after the installation is completed and you have accepted the conditions of delivery. This usually takes three days.

Spare Parts

The 300 Series Quadrupole Hardware Manual has a list of spare parts for routine operation (part number 395412500).

Preventive Maintenance

You are responsible for performing routine and preventive maintenance of the chromatograph, mass spectrometer, and data system. Any instrument problems resulting from a contaminated gas supply are billable and not included in the Warranty.

Perform regular preventive maintenance to increase the life of the system, maximize system uptime, and optimize system performance. Refer to the 300 Series Quadrupole Hardware Manual for details. Your Varian Representative will describe and demonstrates these procedures during the installation.

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