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210-MS, 220-MS, and 225-MS GC/MS Ion Trap Mass Spectrometer Pre-installation Instructions

Checklist

NOTE: Do not unpack the shipping cartons.

Place a check in the checklist 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 site 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 92 cm (36 in.) wide. | <input type="checkbox"/> |
| Sufficient bench space is available for all components. | <input type="checkbox"/> |
| Bench can support system weight. | <input type="checkbox"/> |
| 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: 99.99% pure), regulator, and gas lines are installed. | <input type="checkbox"/> |
| Helium (99.999% pure), regulator, and gas lines are installed. | <input type="checkbox"/> |
| Shipping cartons examined for damage. If there was any damage, the damaged shipping carton procedure was completed. | <input type="checkbox"/> |

Requesting Installation

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

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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, you can analyze your samples.

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

This document includes pre-installation instructions for the 431-GC and the 450-GC.

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.



CAUTION

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. Determine if the installation site complies with all relevant safety regulations.



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

Before the Installation

User Representative

Schedule the installation when the User Representative is available, because one of the important duties of the Varian Representative is to familiarize the User Representative with the basic functions of the GC/MS.



Check the checklist box: *User Representative 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 72 cm (28 in.) wide by 92 cm (36 in.) long. If you move the instrument using the pallet, you need at least 92 cm (36 in.) clearance in the width of doorways. Allow additional room for maneuvering the shipping containers around corners or through doors.



CAUTION

The MS, foreline pump, and GC are heavy. To prevent personal injury, use appropriate moving and lifting techniques.



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

Bench Space and Load

The GC/MS has either the 431-GC or the 450-GC. Use the following information to plan the layout for your system. The Varian Representative will unpack the boxes and place the modules on the bench. Figure 1 shows a possible layout for the GC/MS with the 431-GC. Figure 2 shows a possible layout for the GC/MS with the 450-GC.

GC/MS with the 431-GC

In Figure 1, the 431-GC is to the left of the MS to allow the transfer line to connect from the GC to the GC/MS. The bench must be long enough and strong enough to support the weight of the system and any additional equipment see Table 1, and Table 2. The bench must be at least 84 cm (33 in.) deep.



Figure 1 Layout of the GC/MS with the 431-GC

Table 1 Bench Space

| Bench Length | Monitor and Keyboard | CPU | 431-GC | 210-MS, 220-MS, or 225-MS | Total |
|--------------|----------------------|------|--------|---------------------------|----------|
| cm | 43.8 | 18.6 | 33 | 25 | 120.4 cm |
| in. | 17.25 | 7.4 | 13 | 10 | 47.7 in. |

Table 2 Bench Load

| Bench Load | Monitor, CPU, and Keyboard | 431-GC | 210-MS or 220-MS | Total |
|------------|----------------------------|--------|------------------|----------|
| kg | 17.9 | 23 | 23 | 63.9 kg |
| lb | 39.4 | 51 | 51 | 141.4 lb |
| Bench Load | Monitor, CPU, and Keyboard | 431-GC | 225-MS | Total |
| kg | 17.9 | 23 | 34 | 74.9 kg |
| lb | 39.4 | 51 | 75 | 165.4 lb |

GC/MS with the 450-GC

In Figure 2, the 450-GC is to the left of the MS to allow the transfer line to connect from the GC to the GC/MS. The bench must be long enough and strong enough to support the weight of the system and any additional equipment see Table 3, and Table 4. The bench must be at least 84 cm (33 in.) deep.



Figure 2 Layout for the GC/MS with the 450-GC

Table 3 Bench Space

| Bench Length | Monitor and Keyboard | CPU | 450-GC | 210-MS, 220-MS, or 225-MS | Total |
|--------------|----------------------|------|--------|---------------------------|-----------|
| cm | 43.8 | 18.6 | 66 | 25 | 153.4 cm |
| in. | 17.25 | 7.4 | 26 | 10 | 60.65 in. |

Table 4 Bench Load

| Bench Load | Monitor, CPU, and Keyboard | 450-GC | 210-MS or 220-MS | Total |
|------------|----------------------------|--------|------------------|----------|
| kg | 17.9 | 43 | 23 | 83.9 kg |
| lb | 39.4 | 95 | 51 | 185.4 lb |
| Bench Load | Monitor, CPU, and Keyboard | 450-GC | 225-MS | Total |
| kg | 17.9 | 43 | 34 | 94.9 kg |
| lb | 39.4 | 95 | 75 | 209.4 lb |

Determining Space and Load

The GC/MS systems have similar requirements except that the 210-MS and the 220-MS use a separate foreline pump, whereas the 225-MS has a built-in foreline pump. The components of the GC/MS system, except for the foreline pump belong on a clean, flat bench.

210/220-MS Foreline Pump

The foreline pump, which is for the 210/220-MS only, belongs under the bench. The vacuum line connecting the MS to the foreline pump is 1.2 m (48 in.) long. The MS ships with a 1.7 m (66 in.) vacuum line attached. To accommodate the pump vacuum line, the bench should be no higher than 91 cm (36 in.). If your bench is higher, place a bench that can isolate vibrations under the pump. The bench must support the 11 kg (24 lb) pump. If your bench abuts a wall, drill a 3.8 cm (1.5 in.) diameter hole through the rear of the bench for the vacuum hose.

All GC/MS Systems

Put the PC either on the same bench as the MS or on a separate table. If you put it on a separate table, position it within 3 m (10 ft) of the rear of the MS to accommodate the length of the connections. Table 5 has more information about the system components.

Table 5 Dimensions and Weights

| Instrument | Height | | Width | | Depth | | Weight | |
|------------------|--------|------|-------|------|-------|------|--------|------|
| | cm | in. | cm | in. | cm | in. | kg | lb |
| 210-MS or 220-MS | 46 | 18 | 25 | 10 | 64 | 25 | 23 | 51 |
| 225-MS | 46 | 18 | 25 | 10 | 76.2 | 30 | 34 | 75 |
| 431-GC | 46 | 18 | 33 | 13 | 56 | 22 | 23 | 51 |
| 450-GC | 53 | 21 | 66 | 26 | 56 | 22 | 43 | 95 |
| Monitor | 36.2 | 14.3 | 41 | 16.1 | 18.3 | 7.2 | 5.7 | 12.6 |
| CPU | 41 | 16 | 18.6 | 7.5 | 44.5 | 17.5 | 11.7 | 25.8 |

Allow bench space for other functions see Table 6.

Table 6 Bench Space Allowances

| Purpose | Recommended Space Allowance |
|---|---|
| Provide access to the transfer line. | Allow at least 30 cm (12 in.) to the left side of the GC/MS. |
| Provide space for air circulation, gas lines, and electrical connections. | 210-MS and 220-MS Allow at least 15 to 30 cm (6 to 12 in.) behind the MS 225-MS Allow at least 25 to 30 cm (10 to 12 in.) behind the MS. |
| Dissipate heat and allow for routine maintenance. | Allow at least 76 cm (30 in.) above the GC/MS. |

The bench must be at least 84 cm (33 in.) deep to accommodate the system. Use Table 5 and Table 6 with the Calculation Worksheets, Table 7 and Table 8 to plan your system.

Table 7 Bench Space Calculation Worksheet for Your System

| Bench Length | Monitor and Keyboard | CPU | ____ GC | 210-MS or 220-MS or 225-MS | Other Components | Total |
|--------------|----------------------|------|---------|----------------------------|------------------|----------|
| cm | 43.8 | 18.6 | _____ | 25 | _____ | _____cm |
| in. | 17.25 | 7.4 | _____ | 10 | _____ | _____in. |

Table 8 Bench Load Calculation Worksheet for Your System

| Bench Load | Monitor, CPU and Keyboard | ____ GC | ____ MS | Other Components | Total |
|------------|---------------------------|---------|---------|------------------|---------|
| kg | 17.9 | _____ | _____ | _____ | _____kg |
| lb | 39.4 | _____ | _____ | _____ | _____lb |



Check the checklist box: **Sufficient bench space is available for all components.**



Check the checklist box: **Bench can support system weight.**

Vibration

Ensure that the bench for the GC/MS is 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 MS, not alongside the system on the bench.



Check the checklist box: ***Bench does not vibrate.***

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 instrument use. 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. 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 laboratory reduces this heating.



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

Humidity

The relative humidity of the operating environment must be between 20 and 80%, with no condensation. Operating the GC/MS 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. Put a temperature and humidity monitor in your laboratory.



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

Particulate Matter

The laboratory must not have excessive dust, smoke, or other particulate matter. Particulate matter may block airflow vents causing the electronics to over heat.



Check the checklist box: ***Laboratory 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.



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

Power Requirements

431-GC

The 431-GC requires a separate circuit and the outlet must have adequate amperage capacity and a reliable ground.

All voltages of the 431-GC are supplied with a standard molded power cord with an IEC60320 “Hot” connector. This power cord can be replaced to suit local power requirements.

Each 431-GC requires a clean power source capable of providing up to:

- 101V ac \pm 10%, 50 or 60 Hz \pm 2%, 14 Amps, 1.4 Kilowatts
- 120V ac \pm 10%, 60 Hz \pm 2%, 11 Amps, 1.3 Kilowatts
- 230V ac \pm 10%, 50 Hz \pm 2%, 6 Amps, 1.3 Kilowatts

Installation Category: II (per Standard IEC664).

Power supply interruptions/Dips conform to EN61000-4-11: 1994.

A voltage drop of 40% maximum, in a timeframe of 20 msec is allowed.

450-GC

The 450-GC requires a separate circuit and the outlet must have adequate amperage capacity and a reliable ground.

In 230V, 50 Hz countries, the 450-GC is supplied with a standard molded power cord with an IEC60320 “Hot” connector. This connector plugs into the receptacle on the rear of the GC. This power cord can be replaced to suit local power requirements. Power cords for North America and other 120V, 60 Hz applications are terminated in a 3-prong plug that requires a matching 120V ac receptacle, see the NEMA 5-20P power plug and outlet in Figure 3. Each 450-GC requires a clean power source capable of providing up to:

- 101 V ac \pm 10%, 50 or 60 Hz \pm 2%, 25 Amps, 2.5 Kilowatts
- 120 V ac \pm 10%, 60 Hz \pm 2%, 20 Amps, 2.4 Kilowatts
- 230 V ac \pm 10%, 50 Hz \pm 2%, 10 Amps, 2.3 Kilowatts

Installation Category: II (per Standard IEC664).

Power supply interruptions/Dips conform to EN61000-4-11: 1994.

A voltage drop of 40% maximum, in a timeframe of 20 msec is allowed.

MS

The MS requires a separate circuit and the outlet must have adequate amperage capacity and a reliable ground.

The MS requires a clean power source capable of providing up to:

- 90-132V ac, 60 Hz \pm 3 Hz, 12 A, 1.5 kW
- 180-264V ac, 50 Hz \pm 3 Hz, 6 A, 1.5 kW

GC/MS

The GC/MS requires the following:

- One dedicated duplex single-phase power source with earth grounds hard-wired to the main power panel ground for the GC.
- One dedicated fourplex power source for the MS, computer, and monitor.
- Additional sample preparation devices or test equipment requires a dedicated power.
- Never plug the MS and the GC 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, 100-120V ac 60 Hz \pm 3 Hz.
- Outside North America, power sources must be 10A, 200-240V ac, 50 Hz \pm 3 Hz.

NOTE: 120V and 101V systems are designed for single-phase use only.

Installation Site Power

Your laboratory power supply must be either 100-120V ac or 200-240V ac, and be stable (free of fluctuations due to slow changes in the average voltage or to changes resulting from surges, sags, or transients). The voltage must meet IEC 1000-4-5 and IEC 1000-4-11 standards for voltage stability. Evaluate any power source suspected of having noise problems with a recording-type power line monitor before operating the system.

NOTE: If you are concerned about the quality of your power, consider installing an uninterrupted power supply or a power conditioner or both.

Table 9 has the power requirements for instruments and components of the 210/220-MS GC/MS Ion Trap Mass Spectrometer.

Table 9 GC/MS Power Requirements

| Instrument/Component | Max Current Draw (AMPS) | |
|----------------------|-------------------------|----------|
| | 100-120V | 200-240V |
| 431-GC | 11 | 6 |
| 450-GC | 20 | 10 |
| MS | 12 | 6 |
| Computer | 3 | 1.5 |
| Monitor | 3 | 1.5 |
| Printer | 3 | 1.5 |

The power cable from the GC is approximately 2 m (6.7 ft) long and has a National Electronics Manufacturers Association (NEMA) 5-20P power plug, shown in Figure 3. NEMA 5-20P plugs are rated at 20A and 120V ac.

The power cable from the MS is approximately 2.5 m (8 ft) long and has a National Electronics Manufacturers Association (NEMA) 5-15P power plug, shown in Figure 3. NEMA 5-15P plugs are rated at 15A and 120V ac.

The power cables for the computer, monitor, and printer are approximately 2 m (7 ft) 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 230V ac.



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.

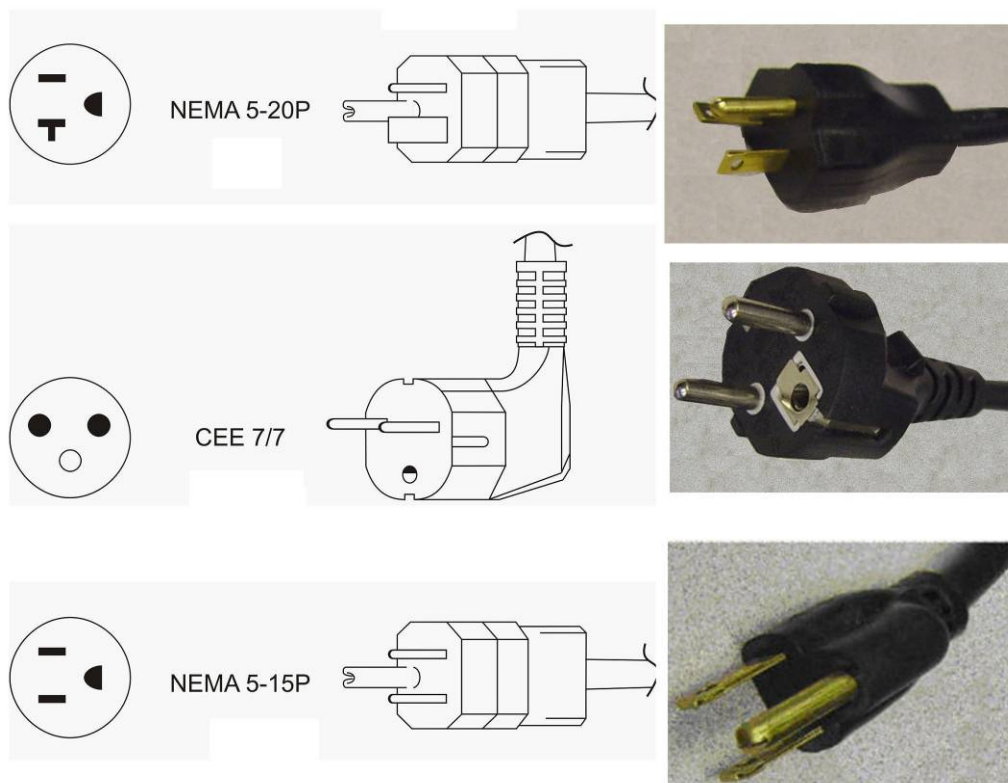


Figure 3 NEMA 5-20P, CEE 7/7, and NEMA 5-15P Outlets and Power Plugs



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

Qualified Computer Equipment

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

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

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 systems.

NOTE: Contact your Sales Representative for a list of the currently qualified equipment or more information.

Gas Requirements

Chemical Ionization Reagent Gases

The Chemical Ionization (CI) mode uses methane, isobutane, or ammonia as a reagent gas for CI operation consumes 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.

New gas lines typically contain significant amounts of adsorbed water vapor. Pump air through the gas line to evacuate the water. Use the shortest gas line possible to minimize pumping time.

Methane 99.99% purity

- Use a two-stage, 0-15 psi (0-1 bar) pressure regulator with a stainless steel diaphragm.
- Set the output pressure to the MS between 3 and 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 99.99% purity

- Use a two-stage, 0-15 psi (0-1 bar) pressure regulator with a stainless steel diaphragm.
- Set the output pressure to the MS between 3 and 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 99.99% purity

- Use a two-stage, 0-15 psi (0-1 bar) pressure regulator with a stainless steel diaphragm.
- Set the output pressure to the MS between 3 and 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 the 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.

You are responsible for determining and implementing appropriate precautions when using anhydrous ammonia and for compliance with all governmental regulations. You are responsible for understanding and adhering to all safe laboratory practices concerning the use of toxic gases, including anhydrous ammonia.



Check the checklist box: *CI reagent gas, 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

A carrier gas supply that has greater than 1 ppm oxygen or water may significantly affect the performance of the GC/MS. It may also damage components such as the capillary column, filaments, and multiplier. Verify that your gas suppliers use controlled tanks to ensure that purity standards are maintained. If you purchase pure gases in contaminated tanks, your system may become contaminated and require costly and time consuming repairs.

Optional Carrier Gas Filter

Use the optional carrier gas filters to protect your system from potential contamination and to ensure optimum performance. For replacement procedures, refer to the instructions enclosed with the filters. The 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 filter 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, refer to the instructions enclosed with the filter.

When the GC/MS Arrives

Inspecting the Shipping Cartons

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 the instrument may be damaged.



If no external damage is apparent, sign the receiving documents, "*Received but not inspected*" to indicate that the shipping cartons 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 shipping cartons. The Varian Representative opens them during installation. Move the shipping cartons to a warm, dry, and secure area near the place of installation.

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

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**, so the purchaser and the carrier are responsible for any damages incurred during shipping. 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: *Shipping cartons examined for damage. If there was any damage, the damaged shipping carton procedure was completed.*

Unpacking and Installing

The Varian Representative will review the Pre-installation Checklist with you to ensure that you have satisfied all of the site requirements. The Varian Representative will unpack and install the instrument and demonstrate the fundamental operation and maintenance procedures. The User Representative must be available during the installation.

The Varian Representative will demonstrate 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, which usually takes three days, is finished.

Spare Parts

The *210-MS, 220-MS, 225-MS GC/MS Ion Trap Mass Spectrometer Hardware Operation Manual* (part number 395414400), which is on the MS Workstation CD, has a list of spare parts for routine operation.

Preventive Maintenance

You are responsible for performing routine and preventive maintenance of the GC, MS, data system, and any other modules. 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, to maximize system operational time, and to optimize system performance. Refer to the *210-MS, 220-MS, and 225-MS GC/MS Ion Trap Mass Spectrometer Hardware Operation Manual* for details. Your Varian Representative will describe and demonstrate these procedures during the installation.

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