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Varian 320-MS LC/MS Quadrupole Mass Spectrometer Pre-installation Instructions

Checklist

NOTE: Do not unpack the shipping cartons.

Check off each checklist box after satisfying each requirement as described in the instructions. All requirements must be met before requesting installation.

NOTE: If the site 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"/>
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 installation site is at least 92 cm (36 in.) wide.	<input type="checkbox"/>
Bench space is sufficient.	<input type="checkbox"/>
Bench can support system weight. 320-MS with 460-LC, at least 114 kg (250 lb) 320-MS with HTS PAL, at least 103 kg (231 lb)	<input type="checkbox"/>
Bench does not vibrate.	<input type="checkbox"/>
Exhaust system is suitable.	<input type="checkbox"/>
Temperature maintained between 16 and 30 °C, (61-86 °F).	<input type="checkbox"/>
Relative humidity maintained between 20 and 80%.	<input type="checkbox"/>
Installation site is free of excessive particulate matter.	<input type="checkbox"/>
Specified electrical supply and power outlets are installed.	<input type="checkbox"/>
Nitrogen gas (at least 99% pure), regulator, and gas lines are installed.	<input type="checkbox"/>
Air (less than 0.1 ppm hydrocarbons), regulator, and gas lines are installed.	<input type="checkbox"/>
Argon (greater than 99.0% pure), regulator, and gas lines are installed. Argon required only for triple quadrupole instruments.	<input type="checkbox"/>
Materials and solvents of specified grade are on site.	<input type="checkbox"/>
Shipping cartons examined for damage. If there was any damage, the conditions were reported.	<input type="checkbox"/>

Requesting Installation

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

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Introduction

The Pre-installation Instructions are a guide for 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 to schedule the installation. After the Varian Representative completes the installation, and it is accepted, samples can be analyzed.

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

The LC/MS operates reliably under carefully controlled environmental conditions. You must provide suitable power sources, operating environment, materials, and solvents. Failures may occur if you use or maintain the system outside of the power and operating environment ranges and limits described in these instructions. The Varian Warranty and Service contract specifically excludes the repair of failures due to such causes.



All phases of preparing the installation site must conform to local safety, electrical, and building codes. These codes take precedence over any recommendations in these instructions. 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: *Installation site is in compliance with all relevant safety regulations.*

Before the Installation

User Representative

Schedule the installation when the User Representative will be available. One of the important duties of the Varian Representative is to familiarize the User Representative with the basic functions of the LC/MS.



Check the checklist box: *User Representative will be available during the installation and certification period.*

Entrance

Before arranging delivery of the LC/MS, determine that there is sufficient clearance to move the shipping cartons to the installation site. The largest shipping carton is 72 cm (28 in.) wide by 92 cm (36 in.) long. If the cartons are to be moved with the pallet, at least 92 cm (36 in.) clearance is needed. Allow additional room for maneuvering the shipping containers around corners and through doors.



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



CAUTION

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

Bench Space and Load

Use the following information to plan the layout of your LC/MS system. The Varian Representative will unpack the cartons and put the modules on the bench.

Figure 1 shows a possible layout for the LC/MS with the 212-LC pumps and the 460-LC AutoSampler. Tables 1 and 2 provide information about the bench.

Figure 2 shows a possible layout for the LC/MS with the 212-LC pumps and the HTS PAL AutoSampler. Tables 3 and 4 provide information about the bench.

The bench must be strong enough to support the weight of all modules, wide enough for all modules, and at least 84 cm (33 in.) deep for the MS.

LC/MS with 212-LC and LC-460

Figure 1 shows a possible layout for the LC/MS with the 212-LC pumps and the 460-LC AutoSampler.



Figure 1 Suggested Layout with 212-LC and 460-LC

Table 1 and Table 2 provide information about the modules in Figure 1.

Table 1 Bench Width with the 460-LC

Bench Width	212-LC	460-LC	MS	CPU	Monitor and Keyboard	Total
cm	26	30	53.5	18.7	51	178 cm
in.	10.5	12	21	7.5	20	71 in.

Table 2 Bench Load with the 460-LC

Bench Load	212-LC	460-LC	MS	CPU	Monitor and Keyboard	Total
kg	14.5	without cooling 19 with cooling 21	61	11.5	5.5	without cooling 111.5 kg with cooling 113.5 kg
lb	32	without cooling 42 with cooling 46	134	25.3	11.5	without cooling 245 lb with cooling 250 lb

212-LC and HTS PAL

Figure 2 shows a possible layout for the LC/MS with 212-LC pumps and CTC HTS PAL Autosampler.



Figure 2 Suggested Layout with 212-LC and HTS PAL

Table 3 and Table 4 provide information about the modules in Figure 2.

Table 3 Bench Width with the HTS PAL

Bench Width	212-LC	MS with HTS PAL	CPU	Monitor and Keyboard	Total
cm	26	53.5	18.7	51	150 cm
in.	10.5	21	7.5	20	59 in.

Table 4 Bench Load with the HTS PAL

Bench Load	212-LC	MS with HTS PAL	CPU	Monitor and Keyboard	Total
kg	14.5	71	11.5	5.5	102.5 kg
lb	32	162	23.5	11.5	231 lb

The system requires a clean, flat bench. The bench must be strong enough to support the weight of the modules. The area under the bench must be large enough for the foreline pump. If the bench is against a wall, drill a hole large enough for the vacuum tubing of your pump through the rear of the bench. The area under the bench must be large enough for the height of the foreline pump, see Table 8. If the bench is higher than 92 cm (36 in.) place a vibration-isolation bench under the foreline pump. The vibration-isolation bench must be capable of supporting the foreline pump.

Plan to put the monitor and keyboard on the same bench as the LC/MS. If the plan is to use a separate bench, position them within 3 m (10 ft) of the rear of the LC/MS. The CPU can go on or under the bench.

Table 5 Additional Bench Space Requirements

Function	Space Allowance
Provide space for air circulation, gas lines, and electrical connections.	15 to 30 cm (6 to 12 in.) behind the system.
Dissipate room heat and allow for routine maintenance.	At least 76 cm (30 in.) above the system.
Analytical Systems only: Provide space for solvent bottles.	At least 30 cm (12 in.) to side of the LC.

Please refer to the Varian LC Systems Pre-installation Instructions, part number 391483100, for information about LC modules.

Use Table 6 and Table 7 to determine the required width of the bench and the weight the bench must support for your configuration.

Regardless of configuration, the depth of the bench depends on the clearance between the bench and the wall to accommodate the vacuum hoses for the foreline pumps.

- If the distance between the bench and the wall is greater than or equal to 10.2 cm (4 in.) then the bench must be at least 84 cm (33 in.) deep. The vacuum hoses will have sufficient room to connect the MS to the foreline pump.
- If the distance between the bench and the wall is less than 10.2 (4 in.) then the bench must be at least 94 cm (37 in.) deep. To accommodate the vacuum hoses, two 5.8 cm (2.3 in.) holes must be drilled into the bench on the left side and to the rear of the MS location.

Table 6 Bench Width Worksheet

Bench Width	___-LC	Auto-sampler	Other Components	MS	CPU	Monitor and Keyboard	Total
cm	_____	_____	_____	53.5	18.7	51	___cm
in.	_____	_____	_____	21	7.5	20	___in.



Check the checklist box: **Bench space is sufficient.**

Table 7 Bench Load Worksheet

Bench Load	___-LC	Auto-sampler	Other Components	MS	CPU	Monitor and Keyboard	Total
kg	_____	_____	_____	61	11.5	5.5	___kg
lb	_____	_____	_____	134	25.3	11.5	___lb



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

320-MS with 460-LC, at least 114 kg (250 lb)

320-MS with HTS PAL, at least 103 kg (231 lb)

Vibration

Ensure that the benches are free from vibrations, especially those caused by equipment in adjoining locations. Because the foreline pump vibrates during operation, it belongs on the floor below the LC/MS, not on the bench with the LC/MS.



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

MS40+ Foreline Pump

Table 8 MS40+ Foreline Pump Details

Item	Information
Diameter of hole in bench, if needed	5.8 cm (2.3 in.)
Width	29.7 cm (11.8 in.)
Depth	41.8 cm (16.5 in.)
Height	22.8 cm (9 in.)
Vacuum hose length	1.8 m (6 ft)
Power cord length	2.5 m (8 ft)
Serial cable length	2.7 m (9 ft)
Dedicated circuit	1 circuit which can provide, 200-240V ac, 50-60 Hz, 10A
Power cord plug	CEE 7/7 or NEMA 6-15P

Exhaust System

Do not put the foreline pump in an enclosed space. The foreline pump exhaust most compounds introduced into the MS and small amounts of oil vapor.

Provide an adequate fume exhaust system for the outlet of each foreline vacuum pump. Each foreline pump must be vented at least 2 L/min. The API spray chamber must be vented at least 20 L/min to a separate vent line. Ensure that the exhaust system does not pull a vacuum on the API chamber. Consult local regulations for the proper method of exhausting the fumes.



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

Temperature

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

NOTE: As installation site 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 maintain a constant temperature (within the operational limits) around the system. Do not place the system near air ducts, windows, or heating and cooling systems. The average steady-state heat load for the MS alone is 6,000 Btu, with a possible short-term heat dissipation of 15,000 Btu during startup.



Check the checklist box: ***Temperature maintained between 16 and 30 °C (61-86 °F).***

Humidity

The relative humidity of the operating environment must be between 20 and 80%, with no condensation. Operating the LC/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 create condensation and result in short circuits.

Varian recommends using a combination temperature and humidity monitor in your installation site.



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

Particulate Matter

Your installation site must not have excessive dust, smoke, or other particulate matter. Particulate matter may block airflow vents causing the electronics to overheat.



Check the checklist box: *Installation site is free of excessive particulate matter.*

Power Requirements

212-LC

Power Input: 85-264V ac; 47-63 Hz; 60 Watts; 100 VA

460-LC

The 460-LC requires 95-240V ac \pm 10%; 50 - 60 Hz; 200 VA.

216-LC

115V ac; +15/-20%; 50/60 Hz; 250 VA

230V ac; +15/-20%; 50/60 Hz; 250 VA

(For UPS, assume 250W)

For 115V ac: one 5.0 AT-fuse (5 x 20 mm, IEC 127)

For 230V ac: one 2.5 AT-fuse

All fuses supplied with the 216-LC instrument are UL-listed and CSA-certified.

The 216-LC must be used with appliances and power sources that have the proper protective grounding.

MS

The MS requires a separate circuit, and the outlet must have adequate amperage capacity and a reliable ground. The power source must be clean and capable of providing up to 220-240V ac, 50/60 Hz \pm 3 Hz, 1.0 kW.

LC/MS

The LC/MS requires the following.

Table 9 LC/MS Circuits, Power Plug and Outlet Types

Component	Circuit	Power Plug and Outlet Type
320-MS	1 each 220V	US: 1 each NEMA 6-15P EU: 1 each CEE 7/7 plugs
MS40+ Foreline Pump	1 each 220V	US: 1 each NEMA 6-15P EU: 1 each CEE 7/7 plugs
Computer	110V or 220V, see appropriate user manual	
LC modules	110V or 220V see appropriate user manual	

Table 10 LC/MS Power Requirements

Module	Max Current Draw (Amps)
320-MS	10A
MS40+ Foreline Pump	10A

Use a separate dedicated power source for HPLC modules and additional instruments and equipment. 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.

Table 11 MS and Foreline Pump Power Cords

Power Cord	320-MS	MS40+ Foreline Pump
Length	1 each 2.5 m (8 ft)	1 each 2.5 m (8 ft)
Plug	US: 1 each NEMA 6-15P EU: 1 each CEE 7/7 plugs	US: 1 each NEMA 6-15P EU: 1 each CEE 7/7 plugs

The power cables for the CPU, monitor, and printer are approximately 2.13 m (7 ft) long. Figure 3 shows the power plugs and outlet types.



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.

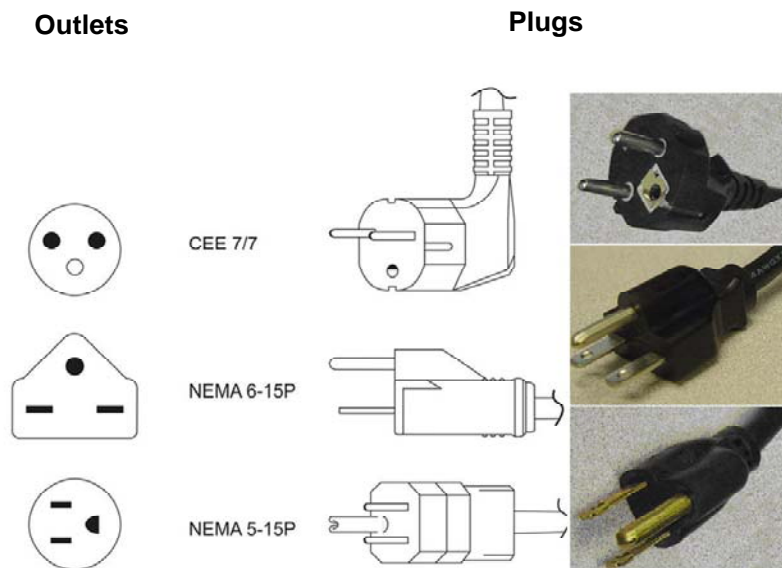


Figure 3 Outlets and Plugs

Installation Site Power

In the United States, the power supply to the installation site must be 200-240V ac for the MS and the foreline pump and 100-120V ac for the LC, autosampler, computer, printer and other modules.

In Europe, the power supply to the site must be 200-240V ac,

The power supply must 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 EN/IEC 61000-4-5 and EN/IEC 61000-4-11 standards for voltage stability.

A measured ground to neutral potential of greater than 3V ac or V dc indicates grounding problems that may need correction. Evaluate any power source suspected of having noise problems with a recording-type power line monitor before operating the system.

NOTE: If concerned about the quality of the power, install an uninterruptible power supply, or a power conditioner or both, see Table 12.

Table 12 Maximum Power Consumption

Module	Maximum Power Consumption
MS without pump	1200 VA
MS with foreline pump	3400 VA



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

Qualified Computer Equipment

If the Varian MS Workstation software is to be installed on a computer not purchased from Varian, the customer is responsible to ensure that the computer is adequately equipped and compatible with the operation of the data system and its communication interfaces. Please check the current list of requirements, available at the following web site.

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

Varian does not guarantee the function of the Varian MS Workstation software on computer hardware or operating systems that do not meet the specified requirements.

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

Gas Requirements

Nitrogen

A nitrogen gas supply that can provide up to a maximum of 12 L/min of gas regulated at 80 psi is sufficient for ESI or APCI operation for one LC/MS. If there is more than one LC/MS, use a nitrogen supply that can deliver a maximum of 18 L/min. The nitrogen must be at least 99% pure with less than 0.1 ppm hydrocarbons and less than 1% oxygen. It must be clean and dry with a -40 °C dew point. Use a nitrogen generator, or a liquid nitrogen boil-off to supply the nitrogen gas. All nitrogen generators require regular maintenance. The customer is responsible for setting up the preventive maintenance procedures and schedules (contact the nitrogen generator manufacturer). The Varian Warranty does not cover any MS problems caused by poor gas quality. It is the responsibility of the customer to conform to all regulations regarding the installation and operation of the gas system. The nitrogen supply uses ¼ in. connectors.



Check the checklist box: *Nitrogen gas (at least 99% pure), regulator, and gas lines are installed.*

Air

A compressed air gas supply, capable of providing up to 3 L/min of gas regulated to 80 psi with a two-stage regulator, is required as a nebulizing gas for negative ESI. The customer is responsible to conform to all regulations for the installation and operation of the gas system. The air must be clean and dry, with less than 0.1 ppm total hydrocarbons, including methane, and have a -40 °C dew point. The air supply uses ¼ in. connectors.



Check the checklist box: *Air (less than 0.1 ppm hydrocarbons), regulator, and gas lines are installed.*

CID Gas (triple quadrupole only)

Argon is required as collision gas for MS/MS work with triple quadrupole instruments. The argon supply uses 1/8 in. connectors. Use a two-stage 0-100 psi pressure regulator with a stainless steel diaphragm. The purity of the argon must be greater than 99.0%.



Check the checklist box: *Argon (greater than 99.0% pure), regulator, and gas lines are installed. Argon required only for triple quadrupole instruments.*

Materials and Solvents

The Varian Representative will prepare solutions to tune and evaluate the LC/MS. Please supply the materials on Table 13 and the solvents on Table 14.

Table 13 Materials

Quantity (each)	Item
2	50 mL clean and new volumetric flasks
2	1 L clean and new bottles for mobile phase reservoirs
1	1 L or larger bottle for LC/MS waste
2	10 mL clean and new volumetric flask
2	100 mL clean and new volumetric flask
1	Pipette 100 to 1000 μ L and tips
1	Pipette 20 to 200 μ L and tips
1	50 mL clean and new volumetric flask (for optional APCI)
1	500 mL clean and new volumetric flask (for optional APCI)

Table 14 Solvents for ESI or APCI

Quantity (each)	Solvent
2	4-liter bottle HPLC grade or better water, new and unopened
2	4-liter bottle HPLC grade or better, acetonitrile, new and unopened

Additional tubing is required to complete installation. Most of this tubing is included in the accessory kits of the LC modules. Additional tubing (PEEK™ or stainless steel) may be required for installation of special valves or modules. For most analytical HPLC systems, use 1/16 in. tubing with an ID of 0.005 in. Use 0.005 in. ID or smaller tubing downstream of the sample injector and autosampler to prevent peak broadening. Keep tubing as short as possible to prevent peak broadening and to minimize run time.



Check the checklist box: **Materials and solvents of specified grade are on site.**

When the LC/MS Arrives

Inspecting the Shipping Cartons

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 installation site.

After the instrument arrives, carefully inspect the exterior of the shipping cartons for evidence of any damage that could have possibly occurred during shipment. Inspect the cartons for the following:

- Water stains.
- Cuts, punctures, or deep indentations.
- Crushed corners or excessively abraded edges.
- Arrow point on the Tip N Tell™ indicator is blue.
- ShockWatch® indicator tube is red.

Tip N Tell

One indicator is on the exterior. Read and follow the instructions on the label. If the Tip N Tell arrow point is blue, the carton was on its side or tipped in transit and instrument damage may have occurred.



ShockWatch

One indicator is on the exterior. Read and follow the instructions on the label. If the tube on the ShockWatch indicator is red, the carton was dropped in transit and instrument damage may have occurred.

The instrument label may be yellow, purple, or red, depending on the sensitivity of the instrument to impact that exceeds a specified G-level force.



If no external damage is apparent, write "*Received but not inspected*" on the receiving documents to indicate that the cartons were not opened.

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 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 ships **FOB Destination**, contact the Varian office, and that office will file a claim against the carrier.

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



Check the checklist box: *Shipping cartons inspected for damage. If there was any damage, the conditions were reported.*

Unpacking and Installing

The Varian Representative will review the Pre-installation Checklist with the customer to ensure that the site requirements were met. The Varian Representative will unpack and install the instrument and demonstrate the fundamental operation and maintenance procedures. The User Representative must be present during the installation.

The Varian Representative will demonstrate that the system meets the performance specifications, which are on the data sheet and any additional criteria explicitly written into the sales contract.

Plan to analyze samples only after the installation is complete and the conditions of delivery accepted. The process requires at least three days.

Spare Parts

Please refer to the *Quadrupole Hardware Manual*, which has list of spare parts for routine operation.

Preventive Maintenance

The customer is responsible for performing routine and preventive maintenance of the LC, autosampler, MS, and data system. If using a nitrogen generator, perform the preventive maintenance to ensure that the nitrogen supply is clean and dry. Any instrument problems resulting from a contaminated gas supply are billable and not included in the Varian Warranty.

Perform regular preventive maintenance to increase the life of the system, to maximize system uptime, and to optimize system performance. Please refer to the *Quadrupole Hardware Manual* for details. The Varian Representative will describe and demonstrate these procedures during the installation.

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