



# **Agilent 6100 Series**

## **Single Quad LC/MS Systems**

### **Site Preparation Guide**

## Notices

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## Warranty

**CAUTION**

**WARNING**

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## Safety Notices

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

A **WARNING** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a **WARNING** notice until the indicated conditions are fully understood and met.

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# 1 Site Preparation

Before an Agilent 6100 Series Single Quad LC/MS system can be installed, the site must be properly prepared

Site preparation includes, but is not limited to:

- Ensuring adequate space is available for the Single Quad LC/MS system
- Ensuring adequate electrical power is available at the correct voltages and frequencies
- Ensuring the environmental control systems are adequate to maintain a correct, stable operating environment
- Ensuring adequate preparations are made for safe exhaust venting
- Ensuring the supplies necessary for instrument operation are available including an adequate supply of clean, dry nitrogen gas

Delays due to inadequate site preparation could cause loss of instrument use during the warranty period. In extreme cases, Agilent Technologies may ask to be reimbursed for the additional time required to complete the installation. Agilent provides service during the warranty period, and under maintenance agreements, only if the specified site requirements are met.

Site preparation is generally the customer's responsibility

Unless previous arrangements have been made with Agilent Technologies, site preparation is the responsibility of the customer. Customer responsibilities include, but are not limited to:

- Planning, scheduling, and preparing the site according to the specifications in this manual
- Verifying that the electrical environment is safe and adequate for the Single Quad LC/MS system installation and operation
- Compliance with all local laws (codes, ordinances, and regulations) for mechanical, building, and electrical distribution systems. ***Compliance must exist prior to Installation.***
- Providing lifting equipment adequate to unload the system from the delivery vehicle and transport it to the site where it will be installed. Also, someone to help lift the Single Quad LC/MS onto the laboratory bench.
- Adequate secure storage space for the system until it can be installed by an Agilent Technologies representative

An Agilent Technologies representative will perform the actual installation and verify instrument performance

An Agilent Technologies service representative will install the Single Quad LC/MS and verify its performance. The service representative's responsibilities are limited to:

- Unpacking the Single Quad LC/MS system and verifying that all components are present and undamaged
- Installing, connecting, and turning on Single Quad LC/MS system components
- Verifying that the system meets Agilent Technologies performance standards
- Providing basic user familiarization for system hardware and software

Agilent Technologies is not responsible for:

- Any task not listed in the Agilent 6100 Series Single Quad LC/MS Systems Installation Guide (G1960-90071) or the installation guides for the LC, data system, and other accessories
- Installing a nitrogen gas generator unless additional installation time is purchased
- Connecting, or verifying the performance of, hardware and software not provided by Agilent Technologies
- Testing the Single Quad LC/MS system against customer standards or samples
- Detailed instruction in the operation of the computer operating system and Single Quad LC/MS software. Contact Agilent Technologies for information concerning training classes.
- Setting up laboratory procedures. Assistance with laboratory procedures can be obtained from an Agilent Applications Engineer (AE) on a consulting basis at additional cost.
- Operation of the Single Quad LC/MS system following installation
- Hookup and connect the LAN for HOUSE network or Web server

### Space and weight requirements

Table 1 lists dimension and weight information for the Single Quad LC/MS and related components. Your site must have enough bench space for the Single Quad LC/MS, LC, data system, and accessories. In addition, there must be sufficient space around the system for ventilation and maintenance access. At least 30 cm (12 in) to the left, 20 cm (7.9 in) to the right of the Single Quad LC/MS and at least 10 cm (3.9 in) behind the Single Quad LC/MS must be kept clear.

Benches must be sturdy enough to support the weight of the entire system.

### **WARNING**

Do not stack the whole Agilent 1100/1200 Series LC systems on top of the Single Quad LC/MS as it is potentially unstable and dangerous. The LC/MS system can handle up to three LC modules on top. The three recommended LC modules that are the Binary Pump, the Degasser and the Solvent Tray. It is not recommended to have any liquid bottle on top of the LC/MS as it may pose a safety hazard.

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The foreline pump can be located on a laboratory bench or on the floor. Note that the foreline pump emits vibrations which may affect scientific equipment. Ensure sensitive equipment is properly isolated from the foreline pump vibrations when selecting a location for the foreline pump. It must be close to the Single Quad LC/MS because they are connected by a 200-cm (79-in) hose. Approximately 30 cm (12 in) of that hose is inside the Single Quad LC/MS. The hose exits from the back of the Single Quad LC/MS. The hose is stiff and cannot be bent sharply.

### **CAUTION**

Do not put the foreline pump on your laboratory bench if vibration-sensitive equipment is located on the bench.

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The Single Quad LC/MS must also be connected to the drain bottle. The drain bottle must be below the Single Quad LC/MS. A 180-cm (72-in) Teflon hose is provided to connect the Single Quad LC/MS to the drain bottle. Approximately 30 cm (12 in) of that hose is alongside the Single Quad LC/MS. The hose can be stretched to almost 150 cm (59 in) if necessary. A hose extension kit (G1946-67002) is available. It adds 120 cm (48 in) to the length of the hose.

### **CAUTION**

The total hose length should not exceed 300 cm (120 in).

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## Site Preparation

Table 1. Product dimensions<sup>1</sup>

| Product  | Dimensions, cm (in)  |             |             | Weight, kg (lb) |
|--|--|-------------|-------------|-----------------|
|  | Height   | Width       | Depth       |                 |
| 6100 Series Single Quad LC/MS Mainframe <sup>2</sup> |  |             |             |                 |
| • Footprint <sup>3</sup>                             | 45.0 (18.0)  | 35.0 (14.0) | 63.5 (25.0) | 60.7 (133.8)    |
| • Maximum cabinet dimensions <sup>4</sup>            | 45.0 (18.0)  | 35.0 (14.0) | 75.0 (29.0) | 63.4 (137.6)    |
| • Foreline pump (Varian MS40+ – 6100B)               | 22.8 (9.0)   | 29.7(11.7)  | 41.8 (16.5) | 33.0 (72.7)     |
| • Foreline pump (Edwards E1M18 – 6100A)              | 23.0 (9.2)   | 17.0 (6.8)  | 51.0 (20.4) | 32.0 (70.4)     |
| • Foreline pump (Edwards XDS35i – optional)          | 39 (15.3)  | 29 (11.4)   | 47.6 (18.7) | 48.0 (106)      |
| Agilent G1948B API-ES Interface <sup>5</sup>         | 17.0 (6.8)   | 18.0 (7.1)  | 9.5 (3.7)   | 1.7 (3.75)      |
| Agilent G1947B APCI Interface <sup>5</sup>           | 23.0 (9.2)   | 18.0 (7.1)  | 9.5 (3.7)   | 1.7 (3.75)      |
| Agilent G1971B APPI Interface <sup>5</sup>           | 23.0 (9.2)   | 18.0 (7.1)  | 13.0 (5.1)  | 1.7 (3.75)      |
| Agilent G1982B NanoSpray source option               | 15.0 (5.9)   | 13.0 (5.1)  | 13.0 (5.1)  | 1.6 (3.5)       |
| Agilent G1978B Multimode Source <sup>5</sup>         | 23.0 (9.2)   | 18.0 (7.1)  | 13.0 (5.1)  | 1.7 (3.75)      |
| Agilent Jet Stream Technology <sup>5</sup>           | 23.0 (9.2)   | 18.0 (7.1)  | 11.5 (4.5)  | 1.7 (3.75)      |
| Agilent 1200 Series LC System                        | Height and weight of the LC system depends on the number and type of modules included in the system. Most Agilent 1100/1200 Series LC modules are approximately 35 cm (14 in) wide and 45 cm (18 in) deep. |             |             |                 |
| Data System  | Data system size and weight depend on the components included in the data system. Reserve at least 100 cm (38 in) of bench space for the data system. A typical data system weight is 34 kg (75 lb).       |             |             |                 |

<sup>1</sup> All dimensions are approximate.

<sup>2</sup> The Single Quad LC/MS requires a source of nitrogen gas. Typically, this is either a 160-liter Dewar flask of liquid nitrogen or a nitrogen generator. Be sure to plan for the space your nitrogen source requires.

<sup>3</sup> The footprint dimensions represent the minimum dimensions of the supporting surface. This surface must also be relatively vibration free and capable of supporting at least 65 kg (143 lb).

<sup>4</sup> Maximum cabinet dimensions are with the APCI interface installed. Add at least 30 cm (1 foot) in front of the instrument and at least 55 cm (1.8 feet) above the instrument to provide adequate instrument access.

<sup>5</sup> Agilent Jet Stream Technology, Electrospray, APCI, APPI, and Multimode interfaces attach to the front of the Single Quad LC/MS. Their depths must be added to the depth of the Single Quad LC/MS. Heights for the interfaces include the height of the nebulizer.



## Electrical requirements

You are responsible for providing appropriate electrical power and power outlets for all of the components in your Agilent 6100 Series Single Quad LC/MS system. Power considerations include:

- Voltage ranges of major components
- Power configurations
- Power requirements
- Power plugs and cords

### Voltage ranges of major components

The Agilent 6100 Series Single Quad LC/MS includes a full-range power supply that can operate without reconfiguration on wide ranges of single-phase alternating current (AC) electrical power:

| 6100A Series         | 6100B Series  |
|----------------------|---|
| 200-240 VAC, 50/60Hz | <ul style="list-style-type: none"> <li>▪ 200-230 VAC, 60 Hz</li> <li>▪ or</li> <li>▪ 200-240 VAC, 50Hz</li> </ul> |

**CAUTION**

The Varian MS40+ and Edwards XDS35i pumps feature voltage operation between 200 – 240 VAC.

A 208 VAC nominal Edwards E1M18 Foreline pump is used for main voltages 200-210 VAC.

A 230 VAC nominal Edwards E1M18 Foreline pump is used for main voltages 220-240 VAC.

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The foreline pump also draws its power from the LC/MS. However, a different foreline pump may be supplied depending on the voltage range on which the Single Quad LC/MS will be operating. The pump is supplied according to the standard voltage in the country from which the order originates. For example, if an order originates from a Agilent Technologies sales office in Germany, the foreline pump supplied may be configured to operated on the standard voltage and frequency of electrical power in Germany.

**CAUTION**

If an instrument is being ordered from one location, but is to be installed in another location with different electrical power characteristics, this must be noted on the order. A special note must also be made if the electrical power at the site is different from the standard electrical power in that country.

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## Power configurations

Electrical power for the Single Quad LC/MS may be delivered in either single-phase or 208-Wye configuration (Table 2). Correct grounding for the 208-Wye configuration must be verified by an electrician. The neutral wire cannot be used for safety grounding. The ground wire should carry zero current except for ground-fault current or static electric discharge. The entire system should share an isolated, noise-free electrical ground. This system ground should be electrically separate from the ground for the rest of the building, back to the main ground for the facility.

### **WARNING**

Connecting a Single Quad LC/MS to a power source that is not equipped with a protective earth contact (ground) could cause a shock hazard for the operator and can damage the instrument.

### **WARNING**

Interrupting the protective conductor inside or outside the LC/MS or disconnecting the protective earth terminal (ground) could cause a shock hazard for the operator.

Table 2. Power configuration

| Configuration | Measurement                        | Nominal voltage                        |
|---------------|------------------------------------|--|
| Single phase  | Line to neutral                    | 200, 220, 230, or 240 Vac <sup>1</sup> |
|               | Line to ground                     | 200, 220, 230, or 240 Vac <sup>1</sup> |
|               | Ground to neutral                  | < 0.5 V rms <sup>2</sup>               |
| 208-Wye       | Line to Line (phase A to phase B)  | 208 Vac                                |
|               | Line to ground (phase A to ground) | 120 Vac                                |
|               | Line to ground (phase B to ground) | 120 Vac                                |

<sup>1</sup> Varies with country.

<sup>2</sup> If ground to neutral voltage exceeds 0.5 V, notify the customer; a qualified electrician should inspect this issue. Instrument installation can proceed if line to neutral voltage is nominal.

### Power requirements

Table 3 lists the power requirements for the Agilent 6100 Series Single Quad LC/MS and related equipment. Extra power capacity for future additions is needed.

Each product listed requires a dedicated circuit. The Single Quad LC/MS, LC, and data system should each have a separate circuit breaker.

Power must meet the stability specifications listed in Table 3. Use a line monitor to check power stability. If your line power is unstable, you may need to install a line conditioner.

Table 3. Power requirements

| Product                                    | Line voltage                                   | Maximum continuous power consumption | Supply circuit rating | Number of outlets |
|--|--|--------------------------------------|-----------------------|-------------------|
| 6100 Series Single Quad LC/MS <sup>1</sup> | 200-240 V AC                                   | 2000 VA                              | 15 A                  | 1                 |
| 1100/1200 Series LC                        | 100-120 or 220-240 V AC ± 10%<br>50/60 Hz ± 5% | 1000 VA <sup>2</sup>                 | 15 A                  | 4 - 6             |
| ChemStation Data System                    | 100-120 or 220-240 V AC ± 10%<br>50/60 Hz ± 5% | 1000 VA <sup>2</sup>                 | 15 A                  | 4 - 6             |

<sup>1</sup> The Single Quad LC/MS operates on either voltage range. The Edwards E1M18 Foreline pump is supplied for one voltage range or the other based on the standard voltage in the country where the order originates.

<sup>2</sup> Depends on product configuration.

**WARNING** Excessive fluctuations in the voltage of the power supply can damage the instrument. Make sure the supply voltage does not fluctuate more than +5% or -10% from the rated voltage. This equipment must be installed in a Over Voltage Category II environment as defined in IEC 60664-1.

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### Power plugs and cords

The Single Quad LC/MS is supplied with a power cord set appropriate for the country from which the order originates. For example, if an order originates from a Agilent Technologies sales office in Germany, the power cord and plug supplied will be compatible with the standard voltage and outlet configuration in Germany. See Appendix A on page 25 for illustrations of the power cords available. The length of all Single Quad LC/MS power cords is approximately 2.5 m (8 ft).

Data system components also include power cords set appropriate for the country where the order was placed. Power cord lengths for the data system components and accessories are approximately 2.3 m (7.5 ft).

#### **CAUTION**

If an instrument is being ordered from one location, but is to be installed in another location with different electrical power characteristics, this must be noted on the order. A special note must also be made if the electrical power at the site is different from the standard electrical power in that country.

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#### **WARNING**

**Make sure the power cords supplied with the Single Quad LC/MS are appropriate for your country and site before using them.**

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#### **WARNING**

**Do not use extension cords with the Single Quad LC/MS or LC.**

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#### **WARNING**

**Maintain easy access to the power cords so they can be disconnected during maintenance**

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### Other electrical considerations

Additional electrical considerations include:

- Electromagnetic interference (EMI), such as is generated by NMRs, radio transmitters, and microwave links, may interfere with system performance.
- Protect the system from static electricity by observing humidity and temperature requirements. Minimize the presence of non-conductive products such as carpets and vinyl floor tiles.
- Install emergency-off pushbuttons that can disconnect power to the ventilation system and all electric equipment in the room except overhead lighting.
- Separate convenience outlets should be provided for building maintenance and other appliances. Convenience outlets must be on the main circuits separate from the Single Quad LC/MS system. Convenience outlets must share the normal building distribution ground, **not** the Single Quad LC/MS system ground.
- In some geographical areas it may be advisable to install lightning protection for personnel and equipment.

### Air conditioning requirements

Air conditioning considerations include temperature, humidity, airborne dust, and exhaust venting. Each of these is considered in more detail in the following material.

#### Temperature and humidity

The Agilent 6100 Series Single Quad LC/MS is specified for operation under the following conditions:

- 15 to 35°C (59 to 95°F)
- The constant temperature is  $\pm 3^\circ\text{C}$  from the calibration temperature
- $< 80\%$  relative humidity
- Non-condensing, non-corrosive atmosphere

Environmental control systems must maintain these temperature and humidity ranges.

The Single Quad LC/MS dissipates up to 2000 Watts (6800 BTU/hr). The LC and data system also contribute significantly to the cooling load although the exact amounts depend on their configurations. Additional allowances should be made for other heat sources such as heat from other equipment, heat from adjacent rooms, and heat from laboratory personnel.

#### Airborne dust

Agilent recommends a maximum airborne particle density of  $55 \mu\text{g}/\text{m}^3$ . If you suspect your site exceeds this limit, contact your local Agilent Customer Service Organization. Agilent Customer Engineers with special training and equipment can test for airborne particle density. They can offer suggestions for reducing airborne dust.

#### Exhaust venting

There are two sources of exhaust on the Single Quad LC/MS: the spray chamber and the foreline pump. The drain hose routes a combination of liquid and vapor from the spray chamber to the drain bottle. The liquid and gas are both made up of undiluted solvent and sample. The foreline pump outputs gas removed from the vacuum manifold by the turbomolecular pumps. The foreline pump exhaust may also contain traces of solvent and sample. The exhaust filter in/on the foreline pump traps only pump fluid. It does not trap exhaust gases or traces of solvent and sample that may be present in the exhaust gases.

**WARNING** User safety requires that the exhaust gases from the Single Quad LC/MS be vented external to the building and not recirculated by the environmental control system. Health hazards include chemical toxicity of solvents, samples, buffers, pump fluid vapor, and aerosolized biological samples.

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The spray chamber exhaust (via the drain bottle) and the foreline pump exhaust *cannot* be vented into the laboratory. They must be vented external to the building. Further, the spray chamber exhaust and foreline pump exhaust must be vented *separately*. They cannot be joined at any point. This is to prevent traces of foreline pump fluid from entering the spray chamber when drying gas is not flowing.

The combined exhaust flow from the spray chamber and foreline pump is up to 30 L/min. Flow is continuous as long as the instrument is on. The exhaust system must have no backpressure at 20 L/min. Ideally, both exhaust vents should be at or slightly below atmospheric pressure (negative pressure). If a negative pressure vent is not available, the length of the tubing from the foreline pump to the vent and from the drain bottle to the vent should each not exceed 460 cm (15 ft).

**WARNING** Backpressure in the spray chamber exhaust tubing and drain bottle can force sample and solvent back up the waste tubing and out the stream selection valve.

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Agilent service representatives will not install an Agilent 6100 Series Single Quad LC/MS until an adequate exhaust system is present and functioning.



### Nitrogen gas requirements

The Agilent 6100 Series Single Quad LC/MS systems requires a very large quantity of high-purity nitrogen for drying gas, nebulizing gas, Agilent Jet Stream Technology sheath gas (if applicable) and to pressurize the calibrant delivery system.

**WARNING** Nitrogen is the only acceptable drying gas and nebulizing gas. Use of air, oxygen, or other gases when combined with volatile solvents and high voltages in the spray chamber, could result in an explosion. Use of air, oxygen, or other gases will also cause deterioration of parts in the Single Quad LC/MS and have a negative effect on instrument operation and sensitivity.

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Due to volume of nitrogen required, we recommend obtaining it from a nitrogen generator (gas separator) or from a large (160 liters or greater) Dewar of liquid nitrogen.

Liquid chromatographs other than the Agilent 1100/1200 Series LC may require compressed gases for the LC autosampler and for sparging the LC solvents. If you are installing a liquid chromatograph other than the Agilent 6100 Series LC, see the site preparation and installation material supplied with that LC.

**WARNING** Compressed or liquefied gases can be dangerous. Please contact your gas supplier for handling and safety information for the gases you use.

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### Nitrogen purity

The nitrogen gas must be free of contaminants. Table 4 lists specifications for the nitrogen. Purity specifications vary according to the source of the nitrogen. This is due to the different types of contaminants common to different nitrogen sources. Bottled nitrogen tends to be contaminated with hydrocarbons which can severely degrade Single Quad LC/MS performance. Even with the gas conditioner (purifier) supplied with the Single Quad LC/MS, it is virtually impossible to remove all of the hydrocarbon contaminants if the bottled nitrogen is not at least 99.5% pure to start with. Oxygen is the primary contaminant in nitrogen supplied by a generator. Oxygen has less impact on Single Quad LC/MS performance and, in some operating modes for some applications, can actually be beneficial in small concentrations. Therefore, the purity specification for nitrogen from a generator can be less stringent.

At least one BHT-4 hydrocarbon trap is supplied with the Single Quad LC/MS for the nitrogen gas. Its primary function is to remove hydrocarbon contamination from the nitrogen before the contamination reaches the Single Quad LC/MS. This conditioner has 1/4-inch Swagelok fittings.

On G6130B and G6150B systems, at least one BMT-4 moisture trap is also supplied with the Single Quad LC/MS for the nitrogen gas. Its primary function is to remove moisture from the nitrogen before the moisture reaches the Single Quad LC/MS drying gas. BMT-4 moisture traps should be installed upstream of BHT-4 traps. The BMT-4 conditioner has 1/4-inch Swagelok fittings.

Table 4. Nitrogen gas requirements – 6100 Series *without* Agilent Jet Stream Technology

| Source                                      | Purity   | Pressure range                | Flow  |
|---|--|-------------------------------|---|
| Bottled nitrogen                            | 99.99% pure <sup>1</sup> or better and hydrocarbon free <sup>2</sup> | 80 – 100 psi (5.5 to 6.8 bar) | Up to 15 liters/minute <sup>4</sup> (900 liters/hour) |
| Nitrogen generator or liquid nitrogen Dewar | 99.5% pure <sup>3</sup> or better and hydrocarbon free <sup>2</sup>  | 80 – 100 psi (5.5 to 6.8 bar) | Up to 15 liters/minute <sup>4</sup> (900 liters/hour) |

<sup>1</sup> With the remaining gas being oxygen.

<sup>2</sup> Less than 0.1 parts per million of hydrocarbons.

<sup>3</sup> With the remaining gas being oxygen and trace argon (< 0.1%).

<sup>4</sup> At least 3 liters/minute is required at all times to prevent air from entering the instrument.

Table 4.1 Nitrogen gas requirements – 6100 Series *with* Agilent Jet Stream Technology

| Source                                      | Purity  | Pressure range                | Flow   |
|---|---|-------------------------------|--|
| Bottled nitrogen                            | Not supported   | Not supported                 | Not supported  |
| Nitrogen generator or liquid nitrogen Dewar | 99.5% pure <sup>3</sup> or better and hydrocarbon free <sup>2</sup> | 80 – 100 psi (5.5 to 6.8 bar) | Up to 30 liters/minute <sup>4</sup> (1800 liters/hour) |

<sup>1</sup> With the remaining gas being oxygen.

<sup>2</sup> Less than 0.1 parts per million of hydrocarbons.

<sup>3</sup> With the remaining gas being oxygen and trace argon (< 0.1%).

<sup>4</sup> At least 3 liters/minute is required at all times to prevent air from entering the instrument.

### Regulators, tubing, and fittings

You must supply an appropriate regulator for your source of nitrogen gas. The regulator must be able to supply gas in the specified pressure range. It must have one outlet with 1/4-inch Swagelok fittings. Gas generators have built-in regulators so they do not require an external regulator. A Dewar of liquid nitrogen typically requires a single-stage regulator (see the Dewar manufacturer's literature for specifics). Nitrogen from a house supply requires a single-stage regulator if the supply is at a pressure higher than the specified range. Bottled, compressed nitrogen typically requires a dual-stage regulator. See the Agilent Chemical Analysis Columns and Supplies Catalog (5988-4785ENUS) for dual-stage regulators available from Agilent Technologies.

## Site Preparation

300 centimeters of heavy-wall 1/4-inch Teflon tubing is supplied with the Single Quad LC/MS for connecting the nitrogen supply to the Single Quad LC/MS. You may need to supply additional heavy-wall 1/4-inch Teflon tubing if the nitrogen supply is located farther from the Single Quad LC/MS. 1/4-inch medical-grade polypropylene tubing can be substituted for the Teflon tubing. You must supply fittings, ferrules, and connectors of a Swagelok design for the 1/4-inch tubing.

## Laboratory supply requirements

Complete laboratory supply requirements depend on your applications.

### Operating supplies

Operation of the Single Quad LC/MS requires the following supplies:

- Acetonitrile, HPLC-grade or better
- Water, HPLC-grade or better
- Ammonium formate, 99.7% minimum purity (for the checkout procedure)

### Cleaning solvents

Cleaning tasks for the Single Quad LC/MS require the following HPLC-grade or better solvents:

- Isopropyl alcohol
- Methanol
- Water

Proper storage, handling, and disposal of these chemicals is required for personal and environmental safety.

## **WARNING**

**Compressed or liquefied gases can be dangerous. Please contact your gas supplier for handling and safety information for the gasses you use.**

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### Fume hood

An auxiliary work space and fume hood are needed for some maintenance procedures.

### Telephone

The laboratory should have a telephone with a cord long enough to be used at the data system screen. This allows the system operator to communicate with Agilent support personnel. In addition, a house network needs to be established by customer prior to the system's installation. This house network line will allow remote control and diagnosis of the Single Quad LC/MS through the WebEx. This is required for some service contracts.

## Site Preparation

### Tools

Maintenance of the Single Quad LC/MS requires the following basic hand tools.

Table 6. Commonly used tools

| Description                      | Part number              |
|----------------------------------|--------------------------|
| Adjustment fixture for nebulizer | G1946-20215 <sup>1</sup> |
| Magnifier                        | G1946-80049 <sup>1</sup> |
| Pliers, needle nose              | 8710-0004                |
| Safety glasses                   | 9300-1159 <sup>1</sup>   |
| Screwdrivers                     |                          |
| flat blade, large                | 8730-0002                |
| Torx T-10                        | 8710-1623 <sup>1</sup>   |
| Torx T-20                        | 8710-1615 <sup>1</sup>   |
| Wrenches                         |                          |
| 0.89-mm, hex                     | 8710-1225 <sup>1</sup>   |
| 3-mm, open end                   | 8710-2699 <sup>1</sup>   |
| 1/4-inch x 5/16-inch, open end   | 8710-0510 <sup>1</sup>   |
| 1/2-inch x 9/16-inch, open end   | 8710-0877 <sup>1</sup>   |
| 10-mm, hex                       | 8710-2612 <sup>1</sup>   |

<sup>1</sup> Included in the shipping kit supplied with the 6100B Single Quad LC/MS.

### Data system supplies

You will need paper for printing the results of the testing done during installation and later for printing reports of your analyses. You may also need appropriate media such as floppy disks, tape cartridges, or writable CD-ROM/DVD-ROM for making backup copies of your data files.

### Spare parts and consumables

The parts in this section are used in the operation and maintenance of an Agilent 6100 Series Single Quad LC/MS system. Keeping these parts on hand can reduce system downtime related to instrument maintenance and repair.

Table 7. Recommended spare parts and consumables

| Description   | Part Number    |
|---|----------------|
| Chemical consumables  |                |
| Calibrant solutions – Dependent on LC/MS & Source model   |                |
| Electrospray (ESI) calibrant solution   | G2431A         |
| APCI/APPI calibrant solution  | G2432A         |
| ESI-Low calibrant solution  | G1969-85000    |
| ▪ APCI/APPI-Low calibrant solution  | G1969-85010    |
| Performance standards   |                |
| Electrospray/APCI positive ion performance standard   | G2423A         |
| OQ/PV standards kit (caffeine) for LC/MS;<br>5 x 5 ml ampoules; 0.1, 0.5, 1.0, 5.0, 10.0 ng/μl  | 5065-9908      |
| OQ/PV standards kit (Sulfonamides) for LC/MS;<br>5 x 2 ml ampoules; 0.01, 0.025, 0.1, 0.5, 1.0 ng/μl                                      | 5188-6523      |
| Gas filters   |                |
| Big Hydrocarbon Trap, 1/4", for nitrogen  | BHT-4          |
| Big Moisture Trap, 1/4", for nitrogen   | BMT-4          |
| Universal Hydrocarbon Trap, 1/8"  | RMSH-2         |
| General supplies  |                |
| Abrasive mesh (micro-grit paper)  | 8660-0852      |
| Cloths, clean, lint-free  | 05980-60051    |
| Cotton swabs  | 5080-5400      |
| 1/8-inch od copper tubing, 50 feet length, for Helium line  | G2440-60031    |
| Agilent 1200 Series LC parts  |                |
| Deuterium lamp, shine through, for DAD detector   | 2140-0590      |
| LC columns  | See Appendix C |
| LC column clamps (6/package)  | 5063-6526      |
| Maintenance kit:<br>1 inlet cap, 1 outlet cap, 10 wear retainers, 10 PTFE frits,<br>4 piston seals, 1 gold outlet seal, 1 gold inlet seal | G1311-68710    |
| PEEK fitting, F120, for 1/16-inch tubing (2/package)  | 0100-1516      |
| PEEK tubing, 0.005-inch id, 1/16-inch od  | 0890-          |

## Site Preparation

|                        |                |
|------------------------|----------------|
|                        | 1915           |
| Rotor seal (Vespel)    | 0100-1853      |
| Solvent bottle         |                |
| plain neck, 1 liter    | 9301-0656      |
| threaded neck, 1 liter | 9301-1420      |
| Vials and vial caps    | See Appendix B |

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continued

**Recommended spare parts - *continued***

| <b>Description</b>   | <b>Part number</b> |
|--|--------------------|
| Agilent 6100 Series Single Quad LC/MS parts                    |                    |
| Capillary – Dielectric, 0.5 mm                                 | G1946-80009        |
| Capillary – Fast Polarity Switching, 0.6 mm                    | G1960-80060        |
| Canted coil spring for capillary cap                           | 1460-2571          |
| H.T. capillary cap   | G1946-20301        |
| Capillary seal, front, ¼-inch id                               | 0905-1475          |
| Corona needle (3/package)                                      | G2429A             |
| Electron multiplier horn                                       | 05971-80103        |
| Foreline pump oil, Inland 45, 1 liter (use with Edwards E1M18) | 6040-0834          |
| Foreline pump oil, SW60, 1 liter (use with Varian MS40+)       | 6040-1361          |
| Inlet filter assembly  | G1946-60180        |
| Inlet filter union   | 0101-0949          |
| Replacement 5 micron filter element for inlet filter assembly  | 0101-2051          |
| Fuse, 8A, Time Delay   | 2110-0969          |
| Fuse, 12.5A, Time Delay  | 2110-1398          |
| Nebulizer needles  |                    |
| APCI nebulizer needle  | G2428A             |
| Electrospray nebulizer needle                                  | G2427A             |
| Agilent Jet Stream nebulizer needle                            | G1958-60136        |
| Ferrule for nebulizer needle                                   | G1946-20213        |



### Receiving the system

When your Single Quad LC/MS system is delivered, it is your responsibility to provide for removal of the shipping containers from the truck and their storage until installation. Contact your Agilent service representative as soon as your shipment arrives to arrange an installation date.

#### Delivery and unloading

The shipping containers are large and heavy. The largest container is approximately:

- 65.58 cm (27 in) high
- 53.97 cm (21.25 in) wide
- 85.72 cm (33.75 in) deep
- 106 kg (234 lbs)

The shipping containers require a loading dock and a fork lift or similar lifting device. If no loading dock and/or suitable lifting device is available, the containers cannot be removed from the delivery truck. If you make prior arrangements with your Agilent service representative, the system can be delivered in a lift-gate truck. This removes the need for a loading dock, but a lifting device is still required to move the containers.

#### CAUTION

The shipping containers must be kept upright at all times to prevent damage to the instrument.

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All doorways, hallways, floors, and elevators must be able to accommodate the largest, heaviest container.

#### Inspecting for damage

Once the shipping containers are unloaded, examine them for any obvious *external* damage. If any of the containers appear damaged, note on the carrier's bill of lading that there is: ***Apparen damage - subject to inspection and test.*** Arrange for both the carrier's claims representative and your Agilent service representative to be present when the containers are unpacked.

Do not open any of the shipping containers unless a representative of Agilent Technologies is present. Opening any of the containers without an Agilent Technologies representative being present will void the receiving warranty on the Instrument.

### **Storage**

It is your responsibility to store the containers until installation. If your site does not have adequate storage space, the containers may be stored at your expense in a bonded warehouse. Allow space for data system and accessory containers, too. The shipping container should be kept so it can be used again if there is a need to ship the system from one location to another.

The environment in the storage area should be between 5 and 50 °C (41 and 122 °F), below 95% relative humidity, non-condensing and non-corrosive.

### **Unpacking**

Do not open any shipping containers until an Agilent representative is present. Warranty claims for missing items will not be honored unless an Agilent representative is present to verify the contents of each container as it is unpacked.

The actual shipping containers become your property and should not be returned to Agilent Technologies.

### Installation and verification

#### Installation

Once the installation has begun, it should progress in a timely manner to completion. Delays due to inadequate site preparation could cause loss of instrument use during the warranty period. In extreme cases, Agilent Technologies may ask to be reimbursed for the additional time required to complete the installation.

The Single Quad LC/MS is too heavy (approximately 60 kg (134 lb)) to be lifted by one person. You must supply someone to help lift it onto the laboratory bench.

The primary user of the Single Quad LC/MS should be present during installation to receive familiarization instruction from the Agilent service representative.

Installation is not included with the purchase of a nitrogen generator. If you do not want to install the generator yourself, you must purchase additional Agilent Customer Engineer (CE) time.

You are also responsible for the availability of compressed gas to supply the nitrogen generator including, if necessary, the installation of an air compressor.

#### Verification

The final step in the installation process is system verification. Your Agilent service representative will test the system against Agilent standards as documented for the product(s) you have purchased. The modes of operation for which a signal-to-noise performance verification may be performed are as follows:

- Electrospray, positive ionization (only with G1948B Electrospray Interface)
- Electrospray with Agilent Jet Stream Technology (if applicable), positive ionization (only with Agilent Jet Stream Technology Interface)

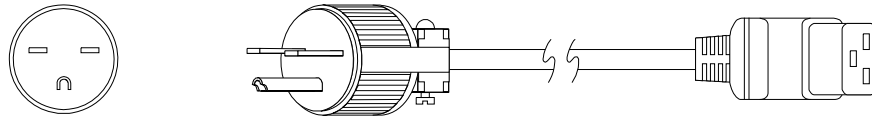
Not all tests are performed for every system.

***The Agilent service representative will not test your system against your standards or samples.*** Further, the Agilent service representative will not set up your laboratory procedures. Assistance with laboratory procedures can be obtained from your local Agilent Applications Engineer (AE) on a consulting basis at additional cost.

## Appendix A: Power Cords

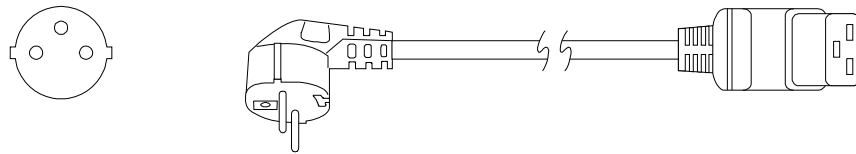
This appendix shows the power cords available for the Agilent 6100 Series Single Quad LC/MS.

US and Canada, NEMA 6-15P (Agilent Part Number 8120-8623)



An alternative power cord (G1946-60066) with a NEMA L6-30P connector is available at extra cost. It is useful if a twist-lock plug is desired.

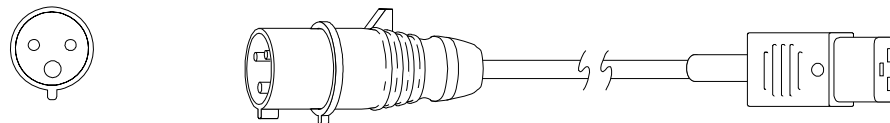
European Power, CEE 7/7 (Agilent Part Number 8120-8621)



UK / Hong Kong / Singapore, BS 1363 (Agilent Part Number 8120-8620)



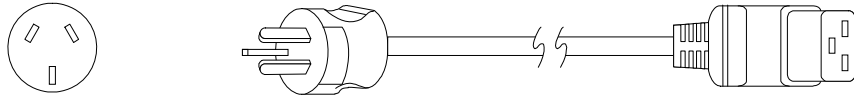
Switzerland / Denmark, IEC 309 (Agilent Part Number 8120-8622)



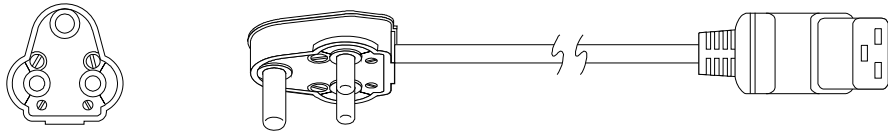
## Site Preparation

Australia, (Agilent Part Number 8120-8619)

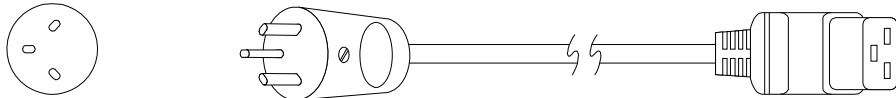
China, (Agilent Part Number 8121-0070)



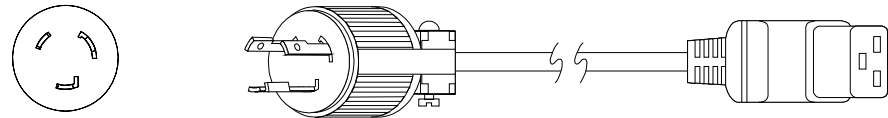
India / South Africa, BS 546 (Agilent Part Number 8121-0710)



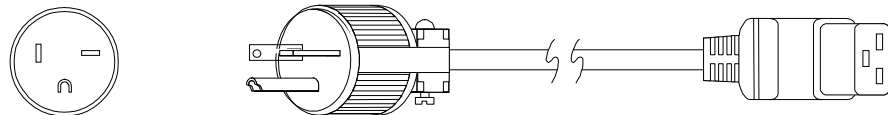
Israel, SI 32 (Agilent Part Number 8121-0161)



Japan, NEMA L6-20P (Agilent Part Number 8120-6903)



Taiwan, NEMA 6-20P (Agilent Part Number 8120-6360)



Korea, 15A, 2.5 M (Agilent Part Number 8121-1222)

(Not Shown)

## Appendix B: LC Columns and Supplies

This appendix lists some of the LC columns and supplies commonly used for Single Quad LC/MS analyses. For more column and supply information, see the Agilent Chemical Analysis Columns and Supplies Catalog (5988-4785ENUS) The catalog is also online at <http://www.agilent.com/>. Select **Products**, then **Chemical Analysis**, then **Supplies Catalog**.

### Vials

Table 12. Wide-opening crimp-top glass vials, 12 x 32 mm

| Description   | Part number |
|---|-------------|
| Amber crimp-top vial with write-on spot (100/package)         | 5181-3376   |
| Clear crimp-top vial (100/package)                            | 5181-3375   |
| Clear crimp-top vial with write-on spot (100/package)         | 5182-0543   |
| Polypropylene wide-opening crimp-top vial, 1 ml (100/package) | 5182-0567   |

Table 13. Crimp caps with septa

| Description   | Part number |
|---|-------------|
| Blue aluminum crimp cap, Teflon/red rubber septa (100/package)  | 5181-1215   |
| Green aluminum crimp cap, Teflon/red rubber septa (100/package) | 5181-1216   |
| Red aluminum crimp cap, Teflon/red rubber septa (100/package)   | 5181-1217   |
| Silver aluminum crimp caps with Teflon/red rubber (100/package) | 5181-1210   |
| Manual crimper  | 8710-0979   |

Table 14. Inserts for 2 ml, 12 x 32 mm wide-opening vials

| Description  | Part number |
|--|-------------|
| 100 $\mu$ l, glass inserts with polymer feet (100/package)         | 5181-1270   |
| 100 $\mu$ l, polypropylene inserts with polymer feet (100/package) | 5182-0549   |

Table 15. Vial racks

| Description                           | Part number |
|---------------------------------------|-------------|
| For 12 mm vials (5/package – foam)    | 9301-0987   |
| For 12 mm vials (5/package – plastic) | 9301-0722   |
| 12 mm tray (5/package)                | 5181-8824   |

## Site Preparation

### LC Columns

Due to their extraordinary stability, ZORBAX StableBond columns provide clean LC/MS separations without bonded-phase contamination. StableBond columns use sterically-protected silanes to minimize column bleed when used at low pH.

Table 16. Column sizes for electrospray or APCI LC/MS and LC/MS/MS

| Application  | Sample complexity | Recommended column sizes (mm)                    |
|--------------|-------------------|--|
| Quantitative | Simple matrix     | 2.1 x 50, 2.1 x 30, 2.1 x 15, 4.6 x 30, 4.6 x 15 |
| Quantitative | Complex matrix    | 1 x 150, 2.1 x 150, 4.6 x 150                    |
| Qualitative  | Complex matrix    | 1 x 150, 2.1 x 150                               |

Table 17. ZORBAX StableBond columns for LC/MS (Agilent part numbers)

| Description      | µm  | Size (mm) | C18        | C8         | C3         |
|------------------|-----|-----------|------------|------------|------------|
| Analytical       | 5   | 4.6 x 150 | 883975-902 | 883975-906 | 883975-909 |
| Narrow bore      | 5   | 2.1 x 150 | 883700-922 | 883700-906 | 883700-909 |
| Narrow bore      | 5   | 2.1 x 50  | 860975-902 | 860975-906 | 860975-909 |
| Rapid resolution | 3.5 | 4.6 x 150 | 863953-902 | 863953-906 |            |
| Rapid resolution | 3.5 | 4.6 x 75  | 866953-902 | 866953-906 |            |

Table 18. ZORBAX StableBond rapid resolution cartridge columns (Agilent part numbers)

| Description             | µl  | Size (mm) | C18        | C8         |
|-------------------------|-----|-----------|------------|------------|
| Analytical (3/package)  | 3.5 | 4.6 x 15  | 831975-932 | 831975-936 |
| Analytical (3/package)  | 3.5 | 4.6 x 30  | 833975-932 | 833975-936 |
| Analytical              | 3.5 | 4.6 x 15  | 831975-902 | 831975-906 |
| Analytical              | 3.5 | 4.6 x 30  | 833975-902 | 833975-906 |
| Narrow bore (3/package) | 3.5 | 2.1 x 15  | 875700-932 | 875700-936 |
| Narrow bore (3/package) | 3.5 | 2.1 x 30  | 873700-932 | 873700-936 |
| Narrow bore             | 3.5 | 2.1 x 15  | 875700-902 | 875700-906 |
| Narrow bore             | 3.5 | 2.1 x 30  | 873700-902 | 873700-960 |

Table 19. ZORBAX StableBond CN and phenyl columns for LC/MS (Agilent part numbers)

| Description       | µl  | Size (mm) | CN         | Phenyl     |
|-------------------|-----|-----------|------------|------------|
| Analytical        | 5   | 4.6 x 150 | 883975-905 | 883975-912 |
| Narrow bore       | 5   | 2.1 x 150 | 883700-905 | 883700-912 |
| Narrow bore       | 5   | 2.1 x 50  | 860975-905 | 860975-912 |
| Rapid resolutions | 3.5 | 4.6 x 150 | 863953-905 | 860953-912 |
| Rapid resolutions | 3.5 | 4.6 x 75  | 866953-905 | 866953-912 |

Table 20. ZORBAX rapid resolution cartridge hardware

| Description | Part number |
|-------------|-------------|
|-------------|-------------|

## Site Preparation

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|  |            |
|--|------------|
| 15-mm spacer, 30-mm spacer, 2 end fitting assemblies | 820222-901 |
| 15-mm cartridge spacer                               | 820315-015 |
| 30-mm cartridge spacer                               | 820330-030 |
| 50-mm cartridge spacer                               | 820350-050 |
| Sealing gasket (2/package)                           | 820370-901 |
| End fitting assembly                                 | 820311-001 |

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