

Agilent 8697 Headspace Samplers

Site Preparation



Notices

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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.

Agilent 8697 Headspace Samplers

Site Preparation

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This guide outlines the site requirements for Headspace Sampler installation to a GC. Site requirements include the necessary space, electrical supplies, gas supplies, operating supplies, and consumables required to successfully install the Headspace Sampler and related instruments and systems.

The site must meet the requirements specific in this guide before beginning installation.

Refer to the Agilent Web site at www.agilent.com for the most up-to-date listing of Headspace Sampler, GC, GC/MS, and ALS supplies and consumables.

Customer Responsibilities

The specifications in this manual outline the necessary space, electrical outlets, gases, tubing, operating supplies, consumables, and other usage-dependent items such as columns, vials, and solvents required for the successful installation of instruments and systems.

If Agilent is delivering installation and familiarization services, users of the instrument should be present throughout these services; otherwise, they will miss important operational, maintenance, and safety information.

If Agilent is delivering installation and familiarization services, 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 Technologies provides service during the warranty period and under maintenance agreements only if the specified site requirements are met.

Two persons are required to safely lift, assemble, and move the instrument. If Agilent is delivering installation and familiarization services, one other person should be available to help safely move the instrument.

Site Preparation Checklist

For typical system requirements for system installation, see the diagrams on **page 7** through **page 15**.

Use the following checklist to ensure that the site is properly prepared for GC system installation.

- Ensure that the location in which the Headspace Sampler system is being installed meets the requirements for environmental conditions. See **“Environmental Conditions”** on page 20.
- Prepare bench space for the Headspace Sampler system. Ensure that the bench has the size and weight capacity to accommodate the Headspace Sampler and associated components. See **“Bench Preparation”** on page 6. Also see **“Dimensions and Weight”** on page 17.
- Ensure that system components are oriented so that they can be connected properly. See **“Maximum Length of Cables and Hoses”** on page 16.
- If the system being installed includes an MS, ensure that the bench allows for proper installation and connection of the foreline pump.
- Ensure that appropriate venting is provided for the GC system. See **“Exhaust Venting”** on page 19.
- Ensure that a dedicated power circuit is available for each GC and mass selective detector in the system. See **“Power Consumption”** on page 18.
- Ensure that appropriate gas and reagent supplies are provided for the GC system.
- Ensure that appropriate gas plumbing is provided for the GC system.

Ensure that the appropriate power outlet and cooling system are available for the cooling plate (if purchased). See **“Power Consumption”** on page 18 and **“Cooling Plate Requirements”** on page 30.

Bench Preparation

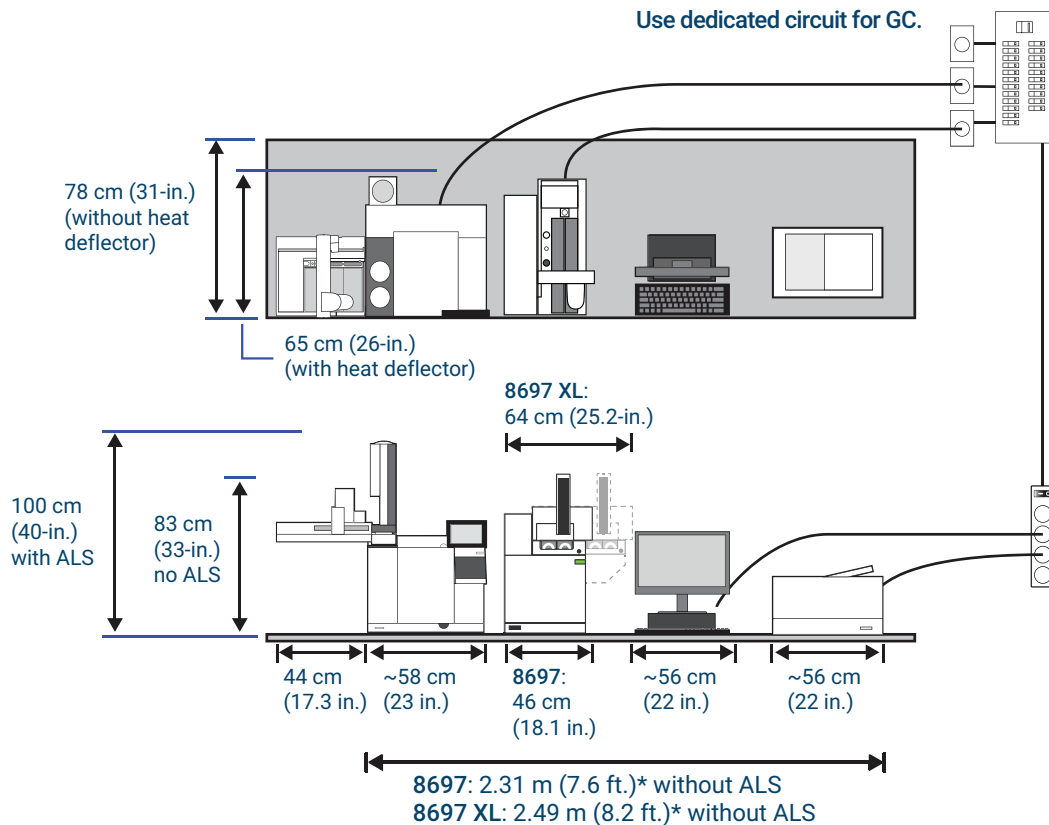
When planning a bench layout:

- Consider component dimensions, weights, and space requirements. See **“Dimensions and Weight”** on page 17.
- Consider the lengths of cables and hoses for connection of components.
- For systems that include an MS, consider foreline pump requirements.
- Allow space for operational access.
- Note that the 7200 Q-TOF requires 48 cm (1.6 ft) of space in front to allow for the RIS probe extraction tool handle when installed.
- Note that some repairs to Headspace Sampler system will require access to the back of the instrument(s).

Examples are provided here for systems including a GC, computer and printer. Most examples also include an MS.

See several example layouts below.

Typical GC System - 8890 GC, 8697 Headspace Sampler, with computer and printer



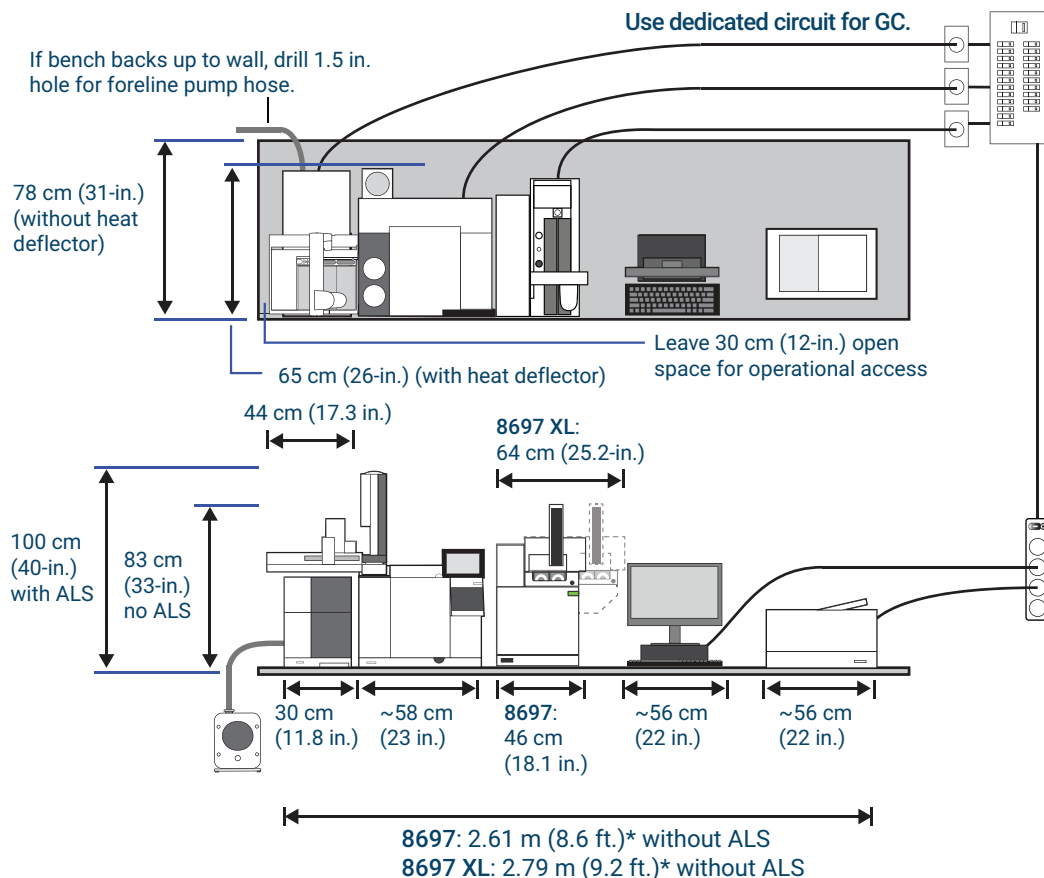
Maximum power consumption: 4800 VA (16,378 Btu/hr)
*Bench space includes 5 cm (2 in.) gap between instruments.

Application	Gas*	Purity	Supply Pressure†
Vial pressurization gas	Helium	99.9995	241 kPa (35 psi) above the maximum vial pressurization setpoint (828 kPa or 120 psi maximum)
	Nitrogen	99.9995	448 kPa (65 psi), or 241 kPa (35 psi) above the maximum vial pressurization setpoint (828 kPa or 120 psi maximum), whichever is higher.

* Use 1/8-in Swagelok gas connections

† 1 psi = 6.89 kPa

Typical GC/MS System - 5977 MSD, 8890 GC, 8697 Headspace Sampler, with computer and printer



Maximum power consumption: 5904 VA (20,145 Btu/hr)
 *Bench space includes 5 cm (2 in.) gap between instruments.

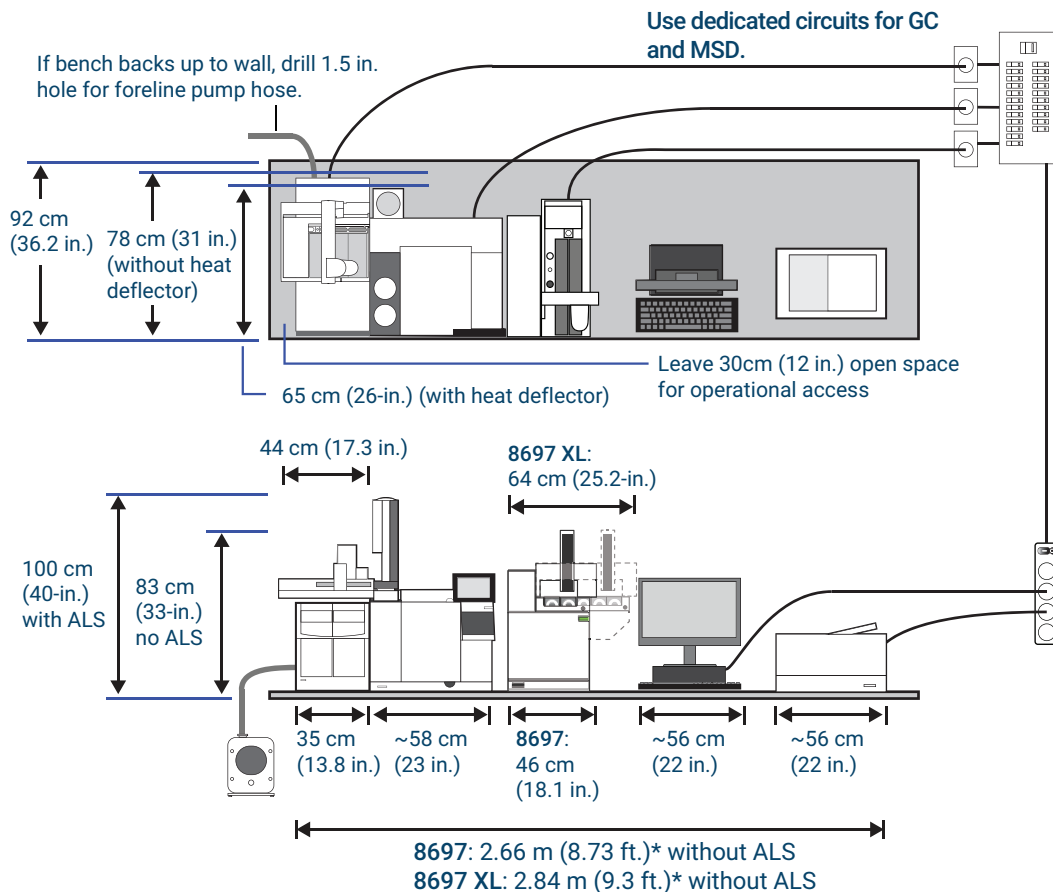
Application	Gas*	Purity	Supply Pressure†
Vial pressurization gas	Helium	99.9995	241 kPa (35 psi) above the maximum vial pressurization setpoint (828 kPa or 120 psi maximum)
	Nitrogen	99.9995	448 kPa (65 psi), or 241 kPa (35 psi) above the maximum vial pressurization setpoint (828 kPa or 120 psi maximum), whichever is higher.

* Use 1/8-in Swagelok gas connections

† 1 psi = 6.89 kPa

Agilent 8697 Headspace Samplers Site Preparation

Typical GC/MS System - 7000 or 7010 MSD, 8890 GC, 8697 Headspace Sampler, with computer and printer



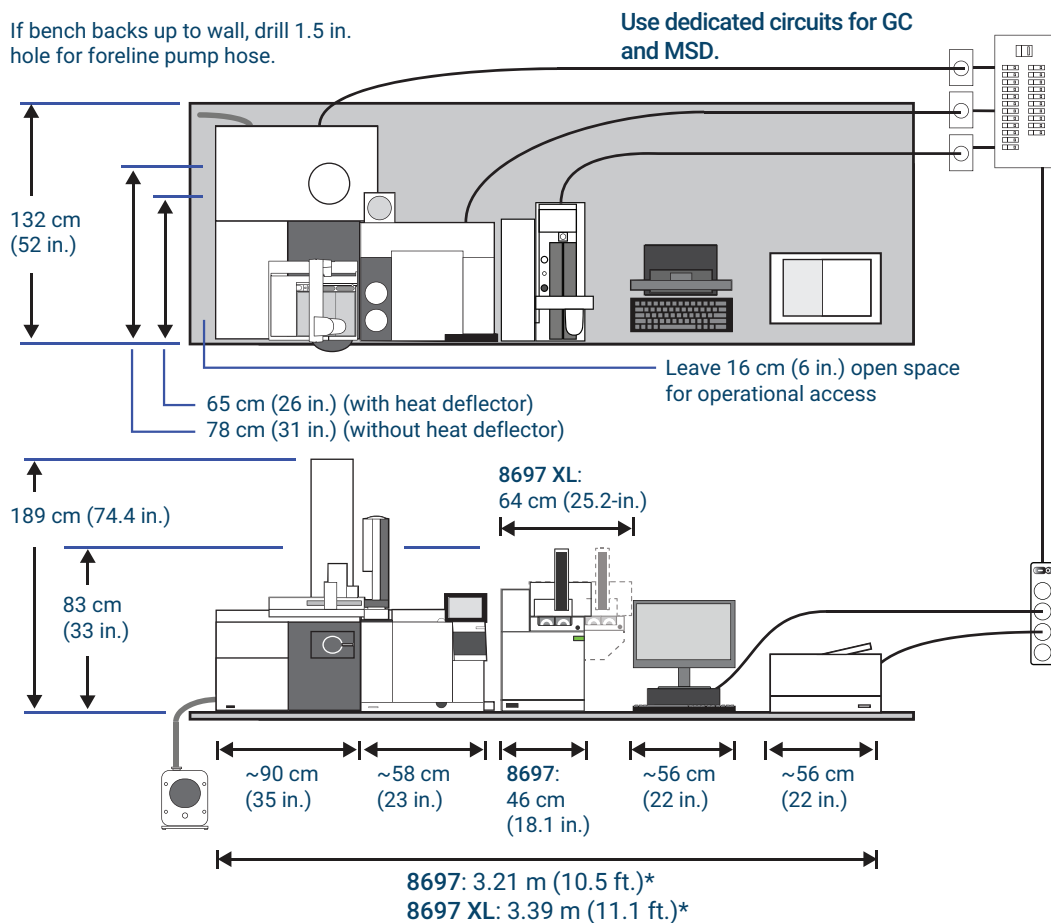
Maximum power consumption: 6404 VA (21,851 Btu/hr)
 *Bench space includes 5 cm (2 in.) gap between instruments.

Application	Gas*	Purity	Supply Pressure†
Vial pressurization gas	Helium	99.9995	241 kPa (35 psi) above the maximum vial pressurization setpoint (828 kPa or 120 psi maximum)
	Nitrogen	99.9995	448 kPa (65 psi), or 241 kPa (35 psi) above the maximum vial pressurization setpoint (828 kPa or 120 psi maximum), whichever is higher.

* Use 1/8-in Swagelok gas connections

† 1 psi = 6.89 kPa

Typical GC/MS System - 72x0 MSD, 8890 GC, 8697 Headspace Sampler, with computer and printer



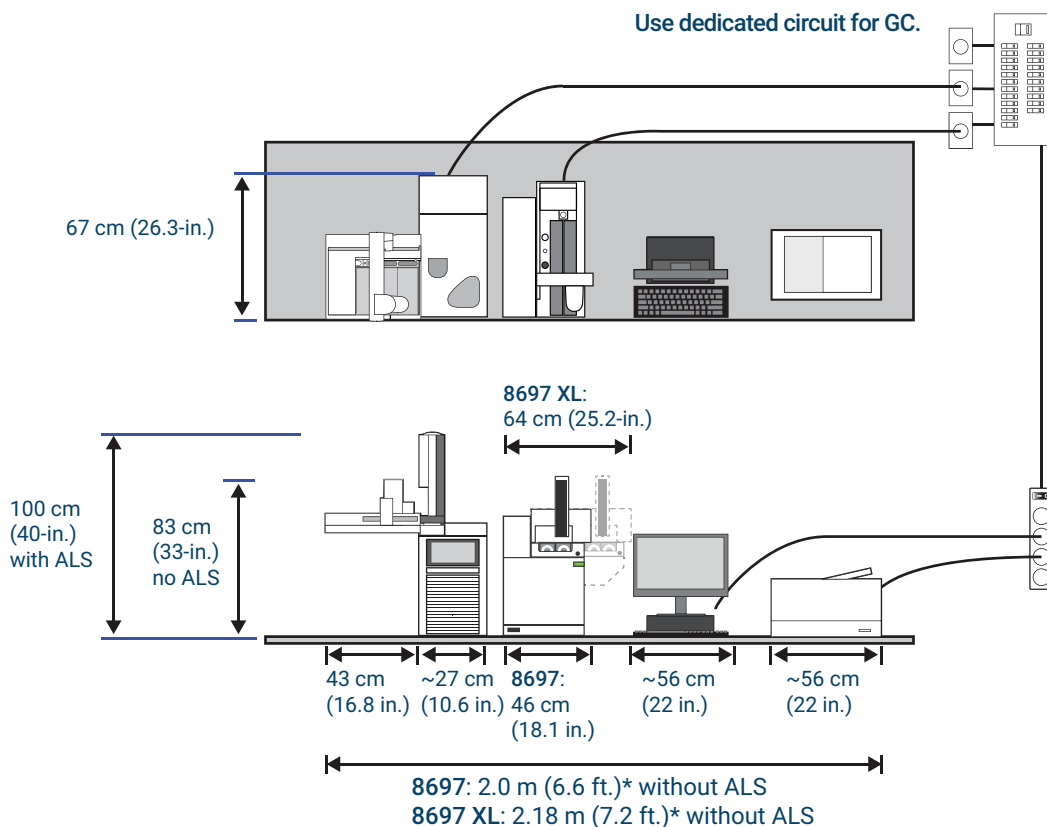
Maximum power consumption: 6600 VA (22,520 Btu/hr)
Place foreline pump on floor or on vibration reducing bench.
*Bench space includes 5 cm (2 in.) gap between instruments.

Application	Gas*	Purity	Supply Pressure†
Vial pressurization gas	Helium	99.9995	241 kPa (35 psi) above the maximum vial pressurization setpoint (828 kPa or 120 psi maximum)
	Nitrogen	99.9995	448 kPa (65 psi), or 241 kPa (35 psi) above the maximum vial pressurization setpoint (828 kPa or 120 psi maximum), whichever is higher.

* Use 1/8-in Swagelok gas connections

† 1 psi = 6.89 kPa

Typical GC System - 9000 GC, 8697 Headspace Sampler, with computer and printer



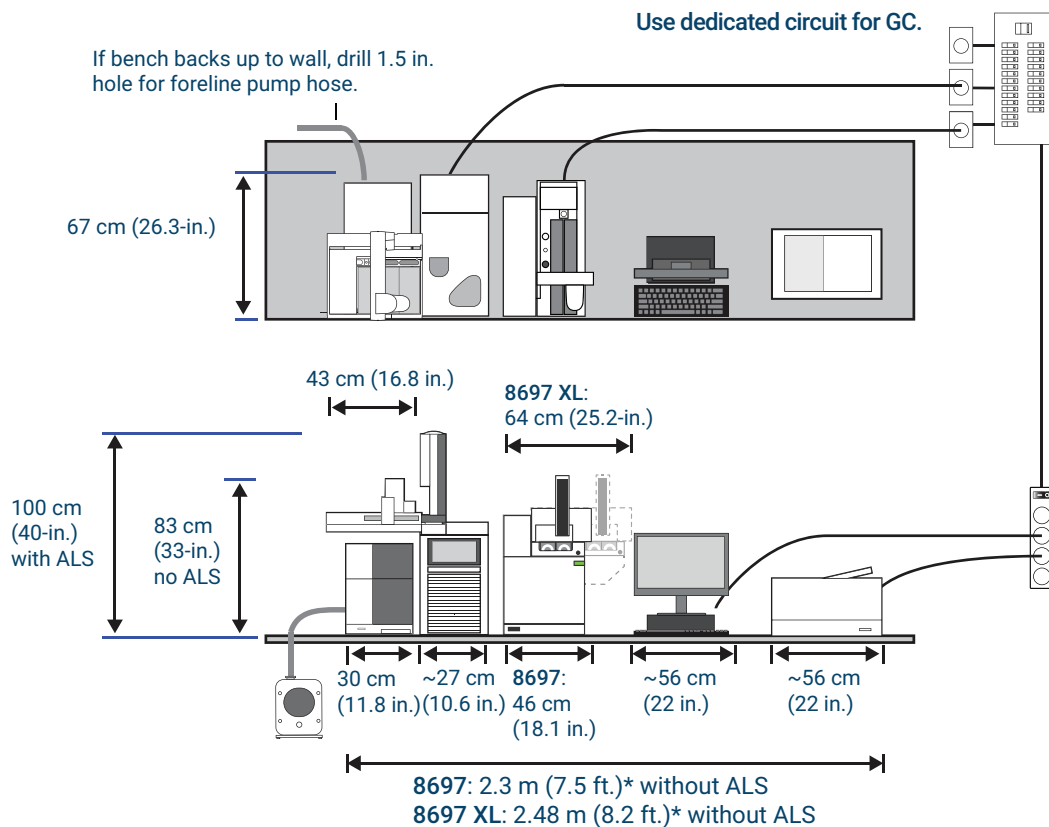
Maximum power consumption: 3398 VA (11,584 Btu/hr)
*Bench space includes 5 cm (2 in.) gap between instruments.

Application	Gas*	Purity	Supply Pressure†
Vial pressurization gas	Helium	99.9995	241 kPa (35 psi) above the maximum vial pressurization setpoint (828 kPa or 120 psi maximum)
	Nitrogen	99.9995	448 kPa (65 psi), or 241 kPa (35 psi) above the maximum vial pressurization setpoint (828 kPa or 120 psi maximum), whichever is higher.

* Use 1/8-in Swagelok gas connections

† 1 psi = 6.89 kPa

Typical GC/MS System - 5977 MSD, 9000 GC, 8697 Headspace Sampler, with computer and printer

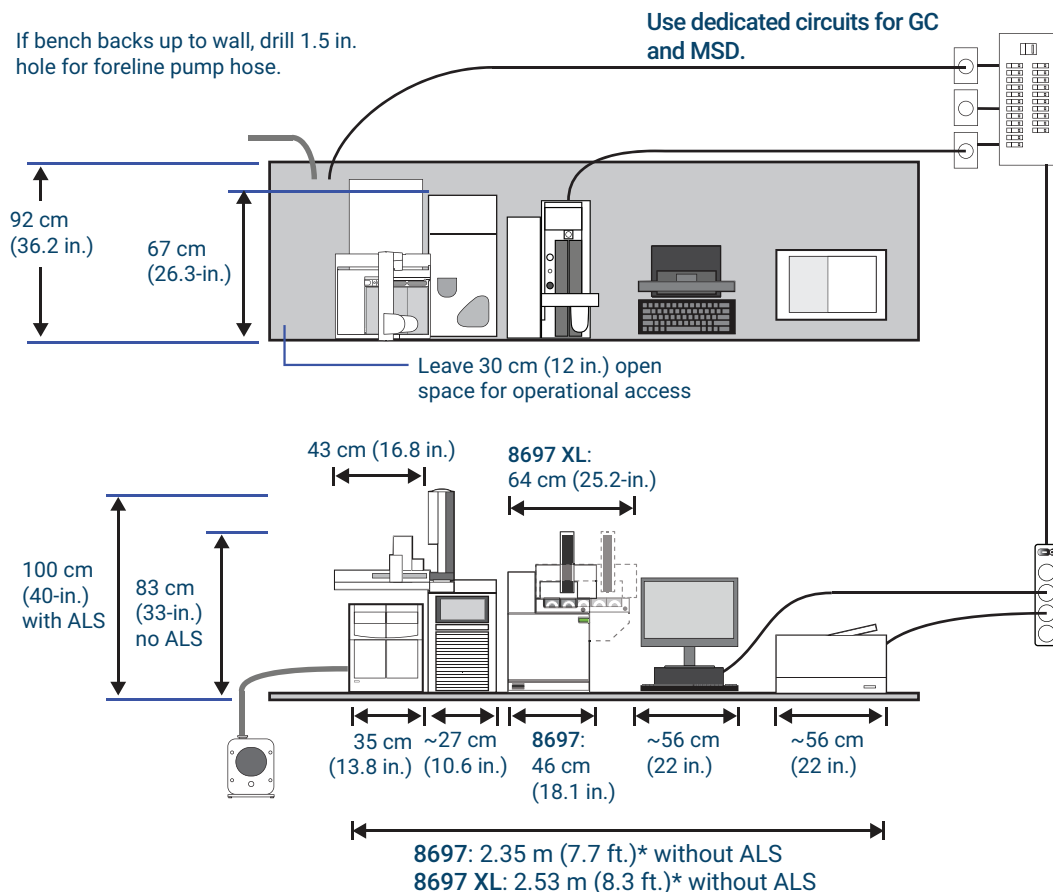


Maximum power consumption: 4498 VA (15,349 Btu/hr)
 *Bench space includes 5 cm (2 in.) gap between instruments.

Application	Gas*	Purity	Supply Pressure†
Vial pressurization gas	Helium	99.9995	241 kPa (35 psi) above the maximum vial pressurization setpoint (828 kPa or 120 psi maximum)
	Nitrogen	99.9995	448 kPa (65 psi), or 241 kPa (35 psi) above the maximum vial pressurization setpoint (828 kPa or 120 psi maximum), whichever is higher.

* Use 1/8-in Swagelok gas connections
 † 1 psi = 6.89 kPa

Typical GC/MS System - 7000 MSD, 9000 GC, 8697 Headspace Sampler, with computer and printer



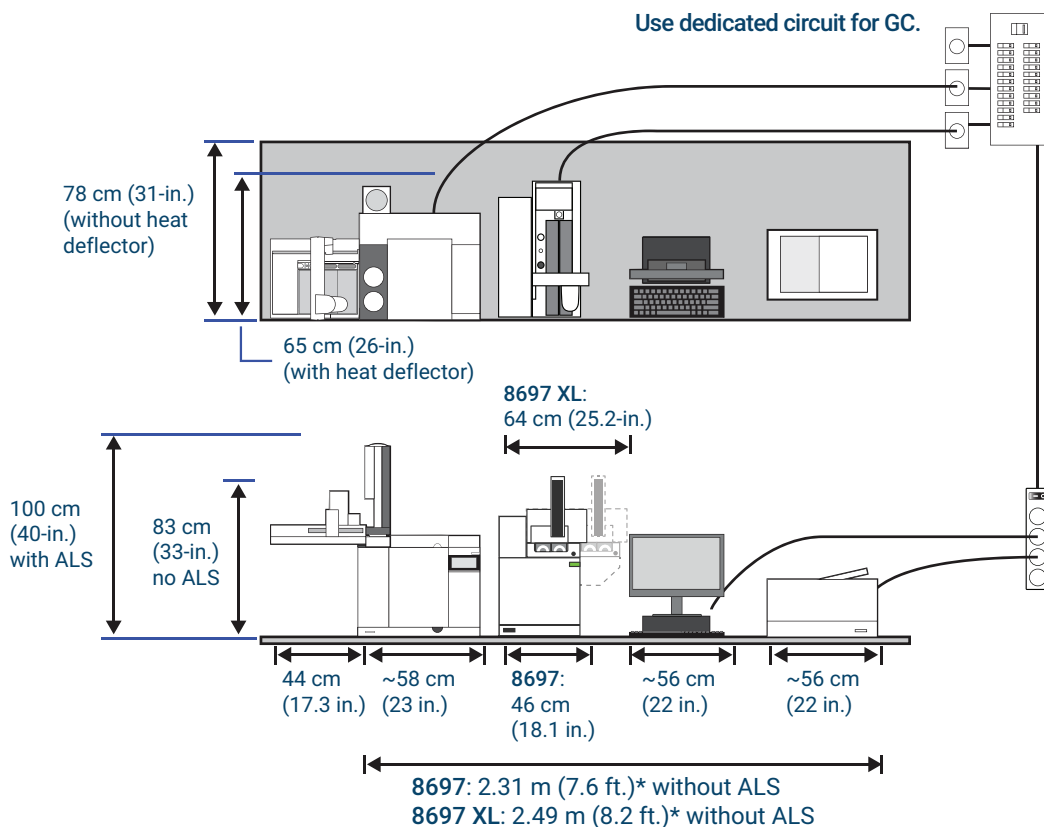
Maximum power consumption: 4998 VA (17,054 Btu/hr)
 *Bench space includes 5 cm (2 in.) gap between instruments.

Application	Gas*	Purity	Supply Pressure†
Vial pressurization gas	Helium	99.9995	241 kPa (35 psi) above the maximum vial pressurization setpoint (828 kPa or 120 psi maximum)
	Nitrogen	99.9995	448 kPa (65 psi), or 241 kPa (35 psi) above the maximum vial pressurization setpoint (828 kPa or 120 psi maximum), whichever is higher.

* Use 1/8-in Swagelok gas connections

† 1 psi = 6.89 kPa

Typical GC System - 8860 GC, 8697 Headspace Sampler, with computer and printer



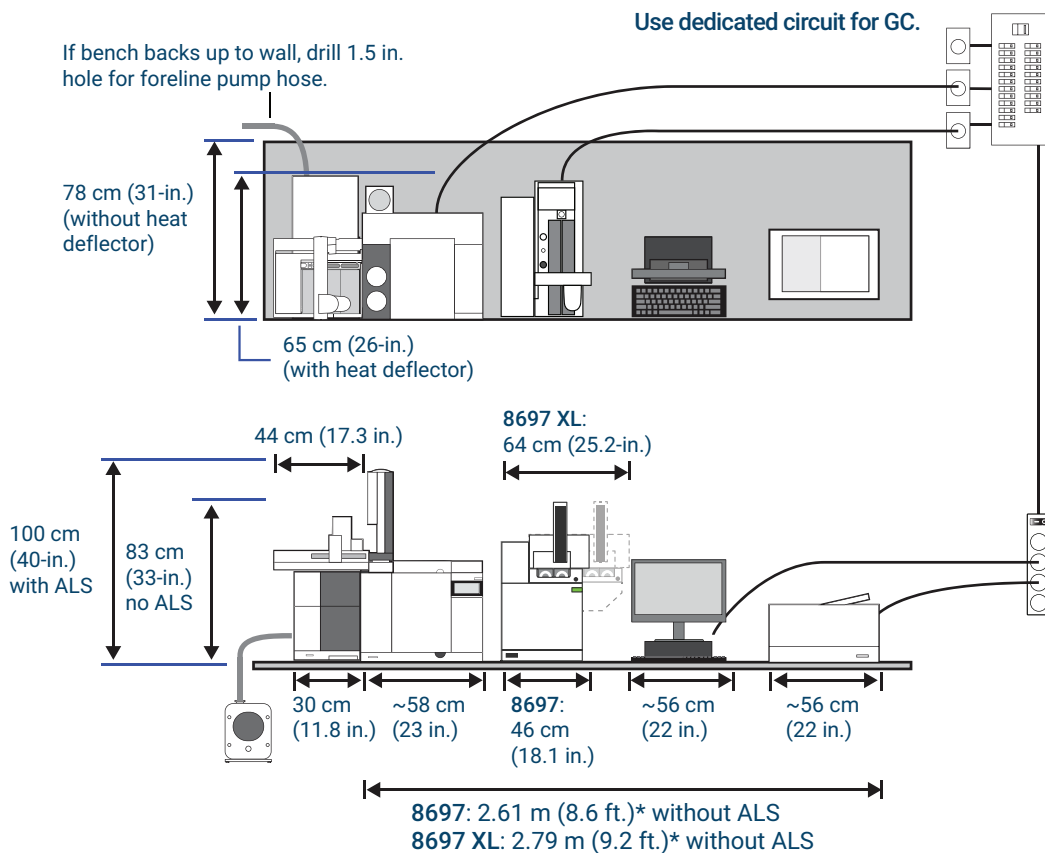
Maximum power consumption: 4100 VA (13,990 Btu/hr)
*Bench space includes 5 cm (2 in.) gap between instruments.

Application	Gas*	Purity	Supply Pressure†
Vial pressurization gas	Helium	99.9995	241 kPa (35 psi) above the maximum vial pressurization setpoint (828 kPa or 120 psi maximum)
	Nitrogen	99.9995	448 kPa (65 psi), or 241 kPa (35 psi) above the maximum vial pressurization setpoint (828 kPa or 120 psi maximum), whichever is higher.

* Use 1/8-in Swagelok gas connections

† 1 psi = 6.89 kPa

Typical GC/MS System - 5977 MSD, 8860 GC, 8697 Headspace Sampler, with computer and printer



Maximum power consumption: 5200 VA (17,743 Btu/hr)
 *Bench space includes 5 cm (2 in.) gap between instruments.

Application	Gas*	Purity	Supply Pressure†
Vial pressurization gas	Helium	99.9995	241 kPa (35 psi) above the maximum vial pressurization setpoint (828 kPa or 120 psi maximum)
	Nitrogen	99.9995	448 kPa (65 psi), or 241 kPa (35 psi) above the maximum vial pressurization setpoint (828 kPa or 120 psi maximum), whichever is higher.

* Use 1/8-in Swagelok gas connections

† 1 psi = 6.89 kPa

Maximum Length of Cables and Hoses

The distance between system modules may be limited by some of the cabling and the vent or vacuum hoses.

Table 1 Cable and hose lengths

Description	Length
Remote cable	2 m (6.6 ft)
LAN cable	10 m (32.8 ft)
Power cords	2 m (6.6 ft)
Vacuum hose	1.3 m (4.24 ft)
Foreline pump power cord	2 m (6.6 ft)
8697 Headspace Sampler transfer line	99 cm (39-in.)
ELVDS Cable	1 m (3.3 ft)

Dimensions and Weight

Select the laboratory bench space before the system arrives. Pay special attention to the total height requirements. Avoid bench space with overhanging shelves.

The Agilent 8697 Headspace Sampler installs on the *right* side of the GC. This configuration supports Agilent MS and ALS products. See “**Bench Preparation**” on page 6 for example total dimensions when used as a system with various Agilent products.

Table 2 Required height, width, depth, and weight

Product	Height*	Width	Depth	Weight
8697 Headspace Sampler 48-Vial tray	80 cm (32 in.)	46 cm (18.1 in.)	64 cm (25.2 in.)	37 kg (81.6 lb)
8697 Headspace Sampler – XL Tray				
120-Vial tray	80 cm (32 in.)	64.0 cm (25.2 in.)	64 cm (25.2 in.)	39.1 kg (86 lb)
120-Vial tray with cooling plate	80 cm (32 in.)	64.0 cm (25.2 in.)	64 cm (25.2 in.)	46.8 kg (103 lb)

* The instrument requires 11 cm (5 in.) above the unit for maintenance access.

Attempts to install the headspace sampler to the *left* of the GC will cause interference between the transfer line and the tray or tray access.

The length of an 8697 Headspace Sampler transfer line is about 99 cm (39 inches).

CAUTION

The supporting surface for the 7200/7250 Q-TOF GC/MS system should be kept relatively vibration free. Do not put the rough pump on your laboratory bench with the 7200/7250 Q-TOF GC/MS due to the vibration that the pump creates. Vibration can lead to a loss of mass accuracy and resolution.

Power Consumption

Table 3 lists site power requirements.

- The number and type of electrical outlets depend on the size and complexity of the system.
- Power consumption and requirements depend on the country to which the unit ships.
- The voltage requirements for your instrument are printed near the power cord attachment.
- Power line conditioners should not be used with Agilent instruments.
- Instruments with the optional cooling plate require additional outlets and power for the coolant chiller and pump. Typical recirculator cooling power capacity varies from 1000 to 2000 watts.

Table 3 Power consumption

Line voltage (VAC)	Frequency (Hz)	Maximum continuous power consumption (VA)	Current rating (amps)	Power outlet current rating
100–120 single phase (–10% / +10%)	50/60	850	6.2	15 Amp
200–240 single/split phase (–10% / +10%)	50/60	850	3.8–3.1	10 Amp

WARNING

Do not use extension cords with Agilent instruments. Extension cords normally are not rated to carry enough power and can be a safety hazard.

Although your instrument should arrive with the parts needed for operation in your country, compare its voltage requirements with those listed in **Table 3**. If the voltage option you ordered is not suitable for your installation, contact Agilent Technologies.

CAUTION

A proper earth ground is required for instrument operations. Any interruption of the grounding conductor or disconnection of the power cord could cause a shock that could result in personal injury.

To protect users, the metal instrument panels and cabinet are grounded through the three-conductor power line cord in accordance with International Electrotechnical Commission (IEC) Requirements.

The three-conductor power line cord, when plugged into a properly grounded receptacle, grounds the instrument and minimizes shock hazard. A properly grounded receptacle is one that is connected to a suitable earth ground. Be sure to verify proper receptacle grounding.

Exhaust Venting

During normal operation of the instrument, some of the sample vents outside the instrument through a vent on the back panel. If any sample components are toxic, noxious, otherwise hazardous or if hydrogen is used, the exhaust must be vented to a fume hood. If the Headspace is in an enclosed small space then a fume hood should be used regardless of the Headspace gases connected. Place the instrument in the hood or attach a large diameter venting tube to the outlet for proper ventilation.

To further prevent contamination from noxious gases, attach a chemical trap to the **Vent** fitting on the back of the instrument. Order part number RDT-1020, Universal/external split vent trap. This trap comes with 3 cartridges and uses 1/8-inch Swagelok fittings. for replacement cartridges, see the Agilent catalog for consumables and supplies, or visit the Agilent website at www.agilent.com.

Environmental Conditions

Operating the instrument within the recommended ranges optimizes instrument performance and lifetime. Performance can be affected by sources of heat and cold from heating, air conditioning systems, or drafts. See **Table 4**. The conditions assume a noncondensing, noncorrosive atmosphere.

Table 4 Environmental conditions for operation and storage

Product	Conditions	Operating temp range	Operating humidity range
8697 Headspace Samplers	Operation	10 to 40 °C (50 to 104 °F)	5 to 95% (noncondensing)
	Storage	-40 to 70 °C (-40 to 158 °F)	5 to 95% (noncondensing)

Gas Selection

The HS requires two gas supplies: one for carrier gas flow (and sampling), and one for vial pressurization. The GC provides the carrier gas. The vial pressurization gas is controlled by the headspace sampler.

WARNING

Never use flammable gas for vial pressurization. Flammable gases, such as hydrogen and argon/methane, can create an explosion hazard when used for vial pressurization. The 8697 Headspace Sampler does not support use of flammable gases for vial pressurization.

Agilent recommends that vial pressurization gases be 99.9995% pure. See [Table 5](#) for acceptable vial pressurization gas types. Agilent also recommends using high quality traps to remove hydrocarbons, water, and oxygen.

Table 5 Vial pressurization gas types

Carrier and vial pressurization gas requirements	Purity	Notes
Helium	99.9995%	Hydrocarbon free
Nitrogen	99.9995%	

Gas Supply Pressures

The instrument requires specific gas supply pressures as described below.

Vial pressurization gas

Supply vial pressurization gas to the headspace sampler at the pressure shown in **Table 6**, measured at the bulkhead fitting.

Table 6 Delivery pressures for vial pressurization gas

Minimum	Helium: 241 kPa (35 psi) above the maximum vial pressure setpoint, or Ambient pressure + 241 kPa (35 psi), whichever is higher. Nitrogen: 448 kPa (65 psi), or 241 kPa (35 psi) above the maximum vial pressure setpoint, or Ambient pressure + 241 kPa (35 psi), whichever is highest.
Maximum	828 kPa (120 psi)

Accessories Needed for Various HS Configurations

The headspace sampler can be connected to the GC using one of several techniques. Some techniques require specific optional hardware. Before your new instrument arrives, you should determine how you will connect the sampler to the GC. **Table 7** lists the most common connection types between an Agilent 8697 HS sampler and a GC, along with any additional required hardware.

The Agilent 8697 will ship with a transfer line and hardware for a through-septum connection in a split-splitless or multimode inlet. See **Table 7**.

If your desired connection type requires other specific hardware, make sure it is available for installation.

Table 7 Connecting an Agilent 8697 headspace sampler to an Agilent 8890, 8860, or Intuvo 9000 GC

Inlet type	Connection type	Comments	Required additional hardware
Split/splitless Multimode	Transfer line through septum	<ul style="list-style-type: none"> • Can be disconnected to support autosampler or manual injection. • Can support frequent column changes. • Multimode inlet supports concentrating injections. • Supports all carrier gas control modes. 	None
Volatiles interface	Transfer line through interface (direct connection)	<ul style="list-style-type: none"> • High sensitivity. • Allows small volume injections. • Most inert. • Not recommended with frequent column changes. • Not recommended if you ever need to inject directly into inlet. The volatiles interface connection does not also support an autosampler or manual injection. 	
Cool on-column	Transfer line through septum	<ul style="list-style-type: none"> • Can be disconnected to support autosampler or manual injection. • Can support frequent column changes. • Supports all carrier gas control modes. 	None
Purged packed	Transfer line through septum	<ul style="list-style-type: none"> • Can be disconnected to support autosampler or manual injection. • Can support frequent column changes. • Recommended only for use when the GC controls its carrier gas flow and the HS provides additional flow for injection. 	Order G4562A, 7697A Carrier Gas EPC Module Accessory
Split/splitless	Direct connection into inlet carrier stream	<ul style="list-style-type: none"> • Reduced potential for leaks. • GC controls carrier flow most accurately. 	Order G3520A, 7890 Transfer Line Interface.
Multimode	Direct connection into inlet carrier stream	<ul style="list-style-type: none"> • Reduced potential for leaks. • GC controls carrier flow most accurately. 	Order G3520A, 7890 Transfer Line Interface.

Agilent does not support installation into the PTV inlet.

Please visit the Agilent web site at www.agilent.com for more details and the latest information about Agilent headspace sampler products, options, and accessories.

Recommended

In addition, if using an Agilent GC with a split/splitless or multimode inlet and GC carrier gas control, Agilent recommends accessory G3552A S/SL MMI Weldment for Headspace (this accessory applies to the 8890, 8860, and 9000 GCs). This accessory replaces the standard inlet septum head so that HS installation requires no on-site tubing cutting at the inlet.

Optional

The instrument ships with the parts needed to install a length of 530 μm fused silica as the transfer line. Other materials and internal diameter transfer lines are available.

The transfer line heater assembly is 1 meter in length and accommodates the following tubing types:

- Fused silica capillary of 0.25 mm, 0.32 mm, and 0.53 mm id with maximum od of 0.67 mm
- Metal capillary of 0.53 mm id, such as Agilent UltiMetal or ProSteel, with maximum od of 0.67 mm

For one transfer line, a piece of fused silica or ProSteel approximately 1 m in length is required in addition to one ferrule and one nut and reducing union. If using ProSteel, order a ProSteel sleeve to protect the transfer line when operating above 200°C. ProSteel operated above 200°C in the transfer line without the sleeve can permanently bind to the heated conduit tube. See the table below.

Table 8 Headspace sampler transfer line parts

Description	Part number
Transfer line components	
Ferrule, polyimide, graphite, 5/pk	
0.53 mm, 1/32 in. for tubing OD 0.50 x 0.80 mm	0100-2595
0.4 mm id, for columns up to 250 μm od	5190-1437
Septum nut, transfer line, for split/splitless and multimode inlets	G3452-60835
Blanking nut, 1/16-inch stainless steel	01080-83202
Nut and reducing union for 6 port valve and transfer line connection, 1/16-inch to 1/32-inch	0100-2594
Transfer lines	
Fused silica, Ultimate Plus Deactivated, .25 mm x 5 m	CP802505
Fused silica, Ultimate Plus Deactivated, .32 mm x 5 m	CP803205
Fused silica, Ultimate Plus Deactivated, .53 mm x 5 m	CP805305
UltiMetal Plus Guard Column, .53 mm x 5 m	CP6577
Sleeve for ProSteel, 5 m length	4177-0607

The headspace sampler comes with a 1 mL sample loop. After checkout, you can install a different sample loop if desired. See the table below. (Note that the instrument ships with adapters for all sample loop sizes.)

Table 9 Headspace sampler sample loops

Description	Part number
Sample loops, inert	
0.025 mL	G4556-80101
0.05 mL	G4556-80102
0.1 mL	G4556-80103
0.5 mL	G4556-80105
1.0 mL	G4556-80106
1.0 mL, Certified	G4556-80126
2.0 mL	G4556-80107
3.0 mL	G4556-80108
3.0 mL, Certified	G4556-80128
5.0 mL	G4556-80109
Adapters for sample loops	
Sample loop adapter: 1 ea. used with 0.025, 0.05, and 0.10 mL sample loops 2 ea. used with 0.5 and 1.0 mL sample loops 1 ea. used with 3.0 mL sample loops	G4556-20177
Sample loop adapter: 1 ea. used with 0.025, 0.05, and 0.10 mL sample loops	G4556-20178

Gas Plumbing

This section first lists the types of connections and hardware needed for installation, then describes in general the hardware requirements for various configurations.

Parts required to connect gases to the headspace sampler

The instrument uses a 1/8-inch Swagelok connection for the vial pressurization gas supply.

Agilent provides sufficient tubing and fittings to connect the headspace sampler in the standard configuration

NOTE

Plumb the gas supply tubing/regulators so that one 1/8-inch Swagelok female connector is available for each gas needed at the instrument.

- Agilent provides sufficient tubing (1.65 m) and fittings to connect the GC inlet carrier gas to the headspace sampler **Carrier** input fitting.

Table 10 lists the additional plumbing hardware needed for various configurations.

Table 10 Additional plumbing hardware requirements

Configuration	Comments
Standard	
<ul style="list-style-type: none"> • HS uses GC inlet carrier gas • HS uses separate vial pressurization gas 	No additional parts needed unless vial pressurization gas supply is > 1.5 m from the HS.

Tanks and regulators

Supply instrument gases using tanks, an internal distribution system, or gas generators. If used, tanks require two-stage pressure regulators with packless, stainless steel diaphragms. Two-stage regulators eliminate pressure surges.

Table 11 lists available Agilent two-stage tank regulators. All Agilent regulators are supplied with the 1/8-inch Swagelok female connector. The type of regulator you use depends on the gas type and supplier. The Agilent catalog for consumables and supplies contains information to help you identify the correct regulator, as determined by the Compressed Gas Association (CGA). Agilent Technologies offers pressure-regulator kits that contain all the materials needed to install regulators properly.

Table 11 Tank regulators

Gas type	CGA number	Max pressure	Part number
Helium, Argon, Nitrogen	580	125 PSIG (8.6 Bar)	5183-4644

When connecting gas supplies to the HS:

- Never use liquid thread sealer to connect fittings. Never use chlorinated solvents to clean tubing or fittings.

WARNING

All compressed gas cylinders should be securely fastened to an immovable structure or permanent wall. Compressed gases should be stored and handled in accordance with the relevant safety codes.

Gas cylinders should not be located in the path of heated oven exhaust.

To avoid possible eye injury, wear eye protection when using compressed gas.

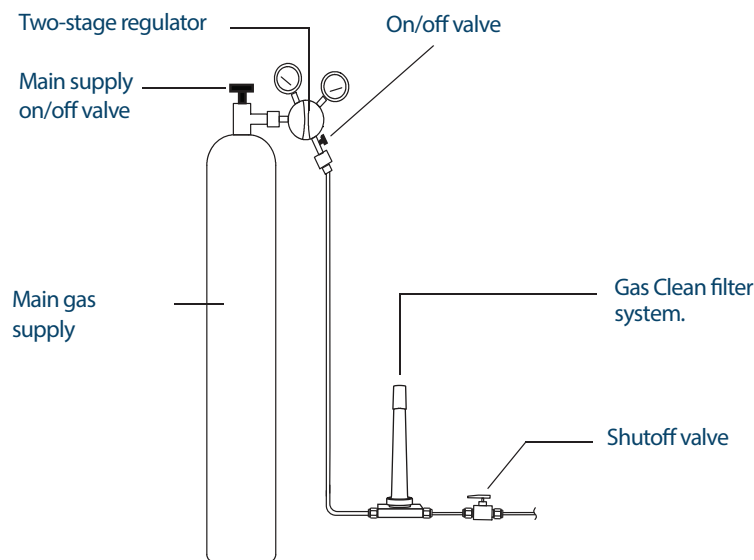


Figure 1. Recommended filters and plumbing configuration from a carrier gas cylinder

- You must supply pre-cleaned, 1/8-inch copper tubing and a variety of 1/8-inch Swagelok fittings to connect the GC to inlet and detector gas supplies.
- Agilent strongly recommends two-stage regulators to eliminate pressure surges. High-quality, stainless-steel diaphragm-type regulators are especially recommended.
- On/off valves mounted on the outlet fitting of the two-stage regulator are not essential but are very useful. Be sure the valves have stainless-steel, packless diaphragms.
- Agilent strongly recommends installation of shut-off valves at each GC inlet supply fitting to allow the GC to be isolated for maintenance and troubleshooting. Order part number 0100-2144.
- Flow- and pressure-controlling devices require at least 10 psi (69 kPa) pressure differential across them to operate properly. Set source pressures and capacities high enough to ensure this.
- Situate auxiliary pressure regulators close to the instrument inlet fittings. This ensures that the supply pressure is measured at the instrument (rather than at the source); pressure at the source may be different if the gas supply lines are long or narrow.
- Never use liquid thread sealer to connect fittings.
- Never use chlorinated solvents to clean tubing or fittings.

Supply tubing for gases

Use the stainless steel supply tubing supplied with the instrument, or preconditioned copper tubing (part number 5180-4196) to supply gases to the instrument. Do not use ordinary copper tubing, which contains oils and contaminants.

CAUTION

Do not use methylene chloride or other halogenated solvent to clean tubing that will be used with an electron capture detector. They will cause elevated baselines and detector noise until they are completely flushed out of the system.

CAUTION

Do not use plastic tubing for supplying carrier gas. It is permeable to oxygen and other contaminants that can damage columns and detectors.

Plastic tubing can melt if near hot exhaust or components.

The tubing diameter depends on the distance between the supply gas and the HS and the total flow rate for the particular gas (in the HS or GC). Tubing of 1/8-in diameter is adequate when the supply line is less than 15 feet (4.6 m) long.

Use larger diameter tubing (1/4-in) for distances greater than 15 feet (4.6 m) or when multiple instruments are connected to the same source.

Be generous when cutting tubing for local supply lines. A coil of flexible tubing between the supply and the instrument lets you move the HS without moving the gas supply. Take this extra length into account when choosing the tubing diameter.

Pressure regulator tubing connections

Use PTFE tape to seal the pipe-thread connection between the pressure regulator outlet and the fitting to which you connect the gas tubing. Instrument grade PTFE tape (part number 0460-1266), from which volatiles have been removed, is recommended for all fittings. Do not use pipe dope to seal the threads; it contains volatile materials that will contaminate the tubing.

Traps

Using chromatographic-grade gases ensures that the gas in your system is pure. However, for optimum sensitivity, install high-quality traps to remove traces of water or other contaminants. After installing a trap, check the gas supply lines for leaks.

Table 12 lists the recommended traps. See the Agilent online store for the complete listing of traps and trap accessories. As shown in **Figure 1**, install the indicating trap last so that it warns when the combination begins to fail.

Table 12 Recommended traps

Description	Part number
Vial pressurization gas: Replacement Gas Clean Filter, carrier gas	CP17973
Agilent Gas Clean Carrier Gas filter kit, 1/8 in (Includes a 1-position connecting unit 1/8 in and two Carrier Gas filters)	CP17976
Universal/External split vent trap	RDT-1020

Moisture in carrier gas damages columns. Agilent recommends installing a moisture trap after the source regulator and before any other traps.

A hydrocarbon trap removes organics from gases. Place it after a molecular sieve trap and before an oxygen trap, if they are present.

An oxygen trap removes 99% of the oxygen from a gas plus traces of water. Place it last in a series of traps. Because trace amounts of oxygen can damage columns, use an oxygen trap with carrier gases.

Cooling Plate Requirements

If using the optional cooling plate, the coolant, water bath, and pump must meet the requirements listed below.

Coolant: Use only distilled water, ethylene glycol, or propylene glycol as coolant.

Water bath and pump specifications: The water bath and pump system used to control the sample vial temperatures must meet the following specifications:

- The components must meet national standards for safety requirements, be suitable for unattended operation, be suitable for continuous operation, and be controllable for high-temperature protection.
- The recommended coolant temperature range is 4 to 80 °C.
- If you use a built-in pump, it must be suitable for external circulation of liquid and for connection of 1/4- in od (6.35 mm) tubing or larger.
- If you use a pressure pump, it must maintain a pressure from 1.5 to 2.5 psi (10.3 to 17.2 kPa).
- If you use a suction pump, the pump vacuum cannot exceed -4 psi (27 kPa).

Basic Tools and Supplies

The headspace sampler comes with a few basic tools and consumables. Depending on your requirements, you will need other tools and parts for installation. **Table 13** lists other useful tools not included with the HS. See the Agilent website at www.agilent.com for the latest parts and supplies.

Table 13 Tools and parts for installation

Tool	Agilent part number	Used for
Required		
Torx T-20 driver	5182-3465	Transfer line installation
Open-end wrenches:		Swagelok fittings for gas connections, sample loop, and transfer line
• 7/16-inch (2)	8710-0972	
• 5/16-inch	8710-0510	
Tubing cutter	8710-1709	Gas supply plumbing
Precision tubing cutter	5190-1442	1/16-inch stainless steel tubing
Recommended		
Tubing, copper, 1/8-inch, precleaned, 12 ft	5021-7107	Gas supply plumbing. Keep spares and extras on hand.
1/8-inch Swagelok nut and ferrule	Brass 5181-7481 Stainless 5181-7482	Gas supply plumbing. Keep spares and extras on hand.
1/16-inch Swagelok nut and ferrules	Nut 0100-0053 Ferrules 0100-1490	Gas supply plumbing. Keep spares and extras on hand.
1/8-inch Swagelok Tee fitting	0100-0090	Gas supply plumbing.
Shutoff (ball) valve, 1/8-inch Swagelok	0100-2144	Install in gas supply lines, near the instrument, to quickly isolate the instrument when performing maintenance.
Included		
1/4-in. x 3/16-in. wrench	8710-2618	Transfer line installation
Column cutting wafer	5181-7487	Transfer line installation

If using a different sample loop size or transfer line size, purchase the desired parts in advance. See **“Accessories Needed for Various HS Configurations”** for a list of part numbers.

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