



Agilent 7697A Headspace Sampler

Site Preparation

Notices

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WARNING

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Agilent 7697A Headspace Sampler Site Preparation

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This section outlines the space and resource requirements for Agilent 7697A Headspace Sampler (HS) installation. For a successful and timely installation of the instrument, the site must meet these requirements before beginning installation. Necessary supplies (gases, tubing, operating supplies, consumables, and other usage-dependent items such as columns, vials, and solvents) must also be available. For MS systems using chemical ionization, methane reagent gas is also required for performance verification. Refer to the Agilent website at www.agilent.com/chem for the most up-to-date listing of 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.

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 7697A Headspace Sampler installs on the *right* side of the GC. This configuration supports Agilent MS, MSD, and ALS products. See [Figure 1](#) through [Figure 5](#) for example total dimensions when used as a system with various Agilent products.

Table 1 Required height, width, depth, and weight

Product	Height*	Width	Depth	Weight
7697A Headspace Sampler				
• 111 vial model, G4557A	80 cm (32 in.)	69 cm (27 in.)	70 cm (27.5 in.)	46 kg (101 lb)
• 12 vial model, G4556A	61 cm (24 in.)	64 cm (25 in.)	69 cm (27 in.)	38.2 kg (84 lb)

* The 12 vial model headspace sampler requires 23 cm (9 in.) clearance above the unit for operational access, and 38 cm (15 in.) clearance above the unit for maintenance access. The 111 vial model requires 11 cm (5 in.) above the unit for maintenance access.



Figure 1 Example bench space needed for a 7890A GC–7697A HS system with 7693A ALS



Figure 2 Example bench space needed for a 7890A GC–7697A HS system with 7693A ALS



Figure 3 Agilent 7697A HS with 7890A GC and 5975 Inert MSD (computer not included)

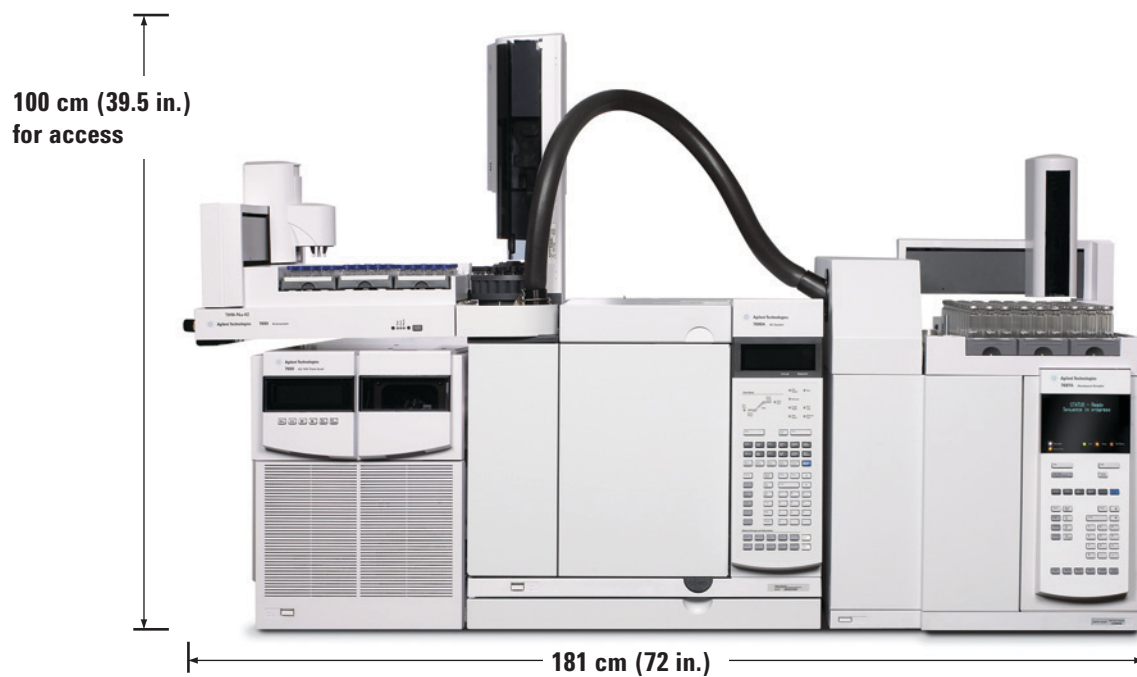


Figure 4 Agilent 7697A HS with 7890A GC and 7000 Series Triple Quadrupole MS (computer not included)

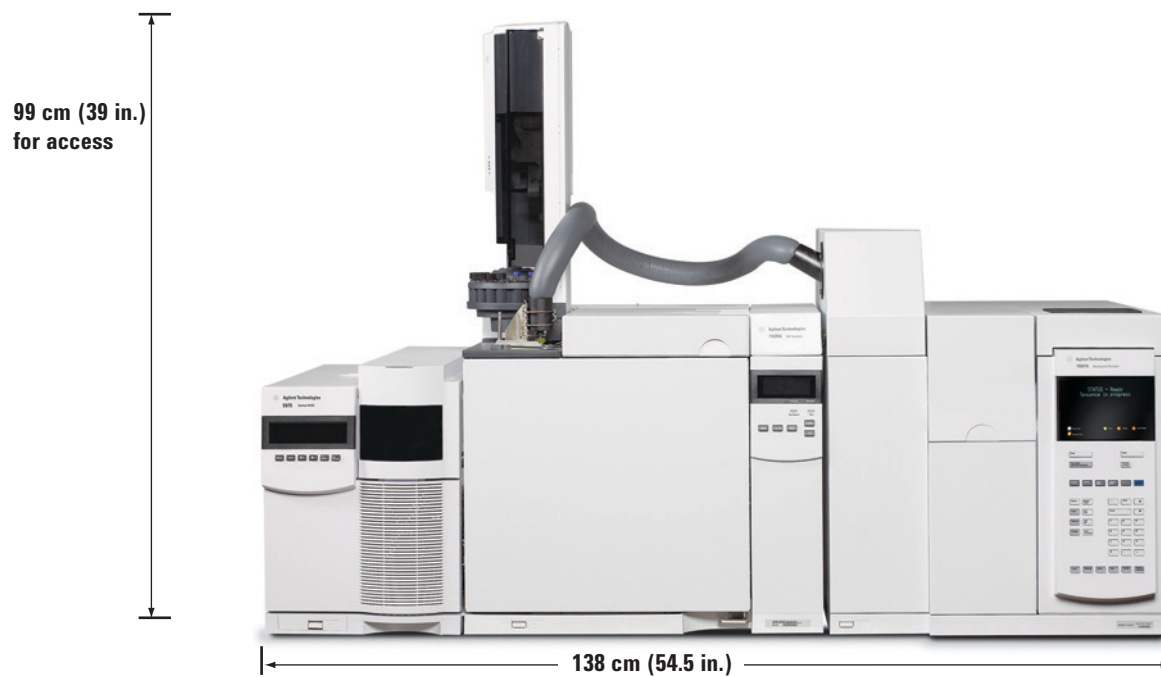


Figure 5 Agilent 7697A HS with 7820A GC and 5975 Inert MSD (computer not included)

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, depending on the model.

The length of a 7697A Headspace Sampler transfer line is about 99 cm (39 inches).

Power Consumption

Table 2 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.

Table 2 Power consumption

Product	Line voltage (VAC)	Frequency (Hz)	Maximum continuous power consumption (VA)	Current rating (amps)	Power outlet current rating
111 Vial model	100*/120 single phase (-10% / +10%)	50/60	850	6.2	15 Amp
111 Vial model	200/220/230/240 single/split phase (-10% / +10%)	50/60	850	3.8/3.4/3.3/3.1	10 Amp
12 Vial model	100*/120 single phase (-10% / +10%)	50/60	850	6.2	15 Amp
12 Vial model	200/220/230/240 single/split phase (-10% / +10%)	50/60	850	3.8/3.4/3.3/3.1	10 Amp

* Users of 100 V power (Japan) receive the 120 V US power option with a 100 V/120 V step up transformer.

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 2. 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 or noxious, the exhaust must be vented to a fume hood. 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/chem.

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 3](#). The conditions assume a noncondensing, noncorrosive atmosphere.

Table 3 Environmental conditions for operation and storage

Product	Conditions	Operating temp range	Operating humidity range
7697A Headspace Sampler	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.

Carrier gas type and purity

For typical installations, the headspace sampler uses the GC carrier gas for its carrier gas. During installation, you will connect the GC inlet carrier gas flow to the headspace sampler **Carrier** fitting.

If you have purchased the optional G4562A Carrier Gas EPC Module Accessory, you can plumb gas from the source directly to the headspace sampler. However, the carrier gas type must match the type used by the GC. (During installation, you will choose the type of connection to the GC based on available hardware and the needs of the analysis.)

Agilent recommends that carrier gases be 99.9995% pure. See [Table 4](#) for acceptable carrier gas types. Agilent also recommends using high quality traps to remove hydrocarbons, water, and oxygen.

Table 4 Carrier gas types

Carrier gas requirements	Purity	Notes
Helium	99.9995%	Hydrocarbon free
Hydrogen	99.9995%	SFC grade
Nitrogen	99.9995%	
Argon (95%)/Methane (5%)	99.9995%	

WARNING

When using hydrogen (H₂) as the carrier gas or fuel gas, be aware that hydrogen gas can flow into the GC oven and create an explosion hazard. Therefore, be sure that the supply is turned off until all connections are made and ensure the inlet and detector column fittings are either connected to a column or capped at all times when hydrogen gas is supplied to the instruments.

Hydrogen is flammable. Leaks, when confined in an enclosed space, may create a fire or explosion hazard. In any application using hydrogen, leak test all connections, lines, and valves before operating the instrument. Always turn off the hydrogen supply at its source before working on the instrument.

Please refer to the Safety manual shipped with your instrument.

Vial pressurization gas type and purity

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 7697A 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.

Carrier gas

If using carrier gas supplied from the GC, skip this section.

If you have purchased the optional G4562A Carrier Gas EPC Module Accessory, you must supply sufficient carrier gas pressure to the headspace sampler to provide head pressure in the GC (and connected detectors).

Table 6 lists minimum and maximum delivery pressures measured at the bulkhead fittings on the back of the headspace sampler.

Table 6 Delivery pressures for Agilent inlets required at the headspace sampler, in kPa (psig)

	Agilent GC inlet type				Purged packed*	On-column*
	Split/Splitless	Multimode	VI			
Carrier (max)	827 (120)	827 (120)	827 (120)		827 (120)	827 (120)
Carrier (min)	138 kPa (20 psi) above pressure used in method					

* Inlet type not recommended.

Vial pressurization gas

Supply vial pressurization gas to the headspace sampler at the pressure shown in Table 7, measured at the bulkhead fitting.

Table 7 Delivery pressures for vial pressurization gas

Minimum	138 kPa (20 psi) above the maximum vial pressure setpoint
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 8](#) lists the most common connection types between an Agilent 7697A headspace sampler and a 7890A GC, along with any additional required hardware.

The Agilent 7697A will ship with a transfer line and hardware for a through-septum connection in a split-splitless or multimode inlet. See [Table 8](#).

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

Table 8 Connecting an Agilent 7697A headspace sampler to an Agilent 7890A GCs

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

Table 8 Connecting an Agilent 7697A headspace sampler to an Agilent 7890A GCs (continued)

Inlet type	Connection type	Comments	Required additional hardware
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/chem for more details and the latest information about Agilent headspace sampler products, options, and accessories.

Cabling required

Agilent provides one LAN cable (8121-0940) and one APG remote cable (G1530-60930).

If adding the headspace sampler to an existing MS/MSD–GC, order part number G1530-61200, APG Remote Y-cable, for connecting the instruments. (If purchasing a new, complete MS/MSD–GC–HS system, the G1530-61200 cable is included.)

If using the headspace sampler with a nonAgilent GC, order part number G1530-60560, General purpose remote cable.

Recommended

In addition, if using an Agilent 7890A GC with a split/splitless or multimode inlet and GC carrier gas control, Agilent recommends accessory G3521A, 7890A S/SL MMI Weldment for Headspace. 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 9 Headspace sampler transfer line parts

Description	Part number
Transfer line components	
Ferrule, polyimide Valcon, 5/pk	
0.53 mm, 1/32 in. for tubing OD $0.50 \leq 0.80$ mm	0100-2595
0.25, 0.32 mm, 1/32 in. for tubing OD $0.25 \leq 0.40$ mm	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	0100-2594
Transfer lines	
Deactivated fused silica, 250 μm x 5 m	160-2255-5
Deactivated fused silica, 320 μm x 5 m	160-2325-5
Deactivated fused silica, 450 μm x 5 m	160-2455-5
Deactivated fused silica, 530 μm x 5 m	160-2535-5
ProSteel deactivated stainless steel, 5 m length	160-4535-5
ProSteel 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 10 Headspace sampler sample loops

Description	Part number
Sample loops, SN 2000	
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
3.0 mL	G4556-80108
3.0 mL, Certified	G4556-80128
5.0 mL	G4556-80109
Sample loops, SN 1030	
0.025 mL	G4556-80111
0.05 mL	G4556-80112
0.1 mL	G4556-80113
0.5 mL	G4556-80115
1 mL	G4556-80116
3 mL	G4556-80118
5 mL	G4556-80119
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	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 1/8-inch Swagelok connections for its carrier gas supply and vent, and a 1/16-inch Swagelok connection for the vial pressurization gas supply. See [Figure 6](#).

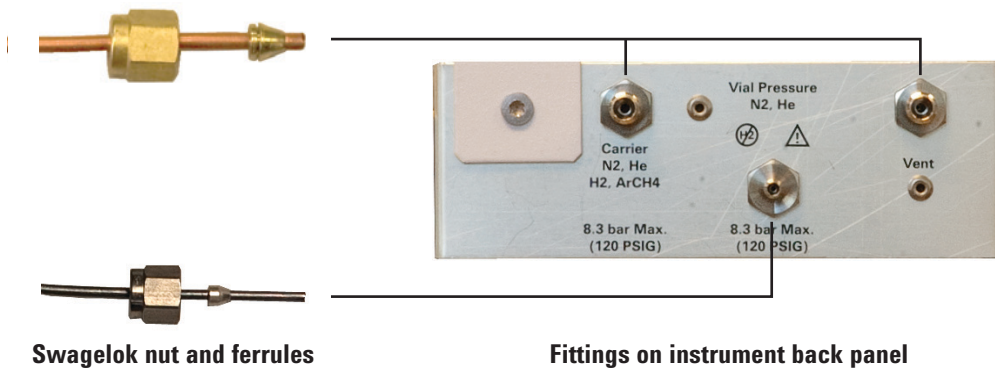


Figure 6 Example Swagelok connectors and hardware

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

- Agilent provides 1/8-inch to 1/16-inch reducing hardware and tubing sufficient to connect the **Vial Pressure** input fitting to a nearby (within about 1.6 m) gas supply that terminates in a 1/8-inch Swagelok fitting.

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 11](#) lists the additional plumbing hardware needed for various configurations.

Table 11 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.
Optional configurations	
<ul style="list-style-type: none"> • HS uses separate carrier gas (requires G4562A) • HS uses separate vial pressurization gas 	You must supply 1/8-inch tubing and fittings to connect the Carrier gas fitting to the gas supply. No other parts needed unless vial pressurization gas supply is > 1.5 m from the HS.
Any configuration	You must supply any Tee fittings and extra tubing.

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 12](#) 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 12 Tank regulators

Gas type	CGA number	Max pressure	Part number
Air	346	125 PSIG (8.6 Bar)	5183-4641
Hydrogen, Argon (95%)/Methane (5%)	350	125 PSIG (8.6 Bar)	5183-4642
Helium, Argon, Nitrogen	580	125 PSIG (8.6 Bar)	5183-4644
Air	590	125 PSIG (8.6 Bar)	5183-4645

When connecting gas supplies to the HS:

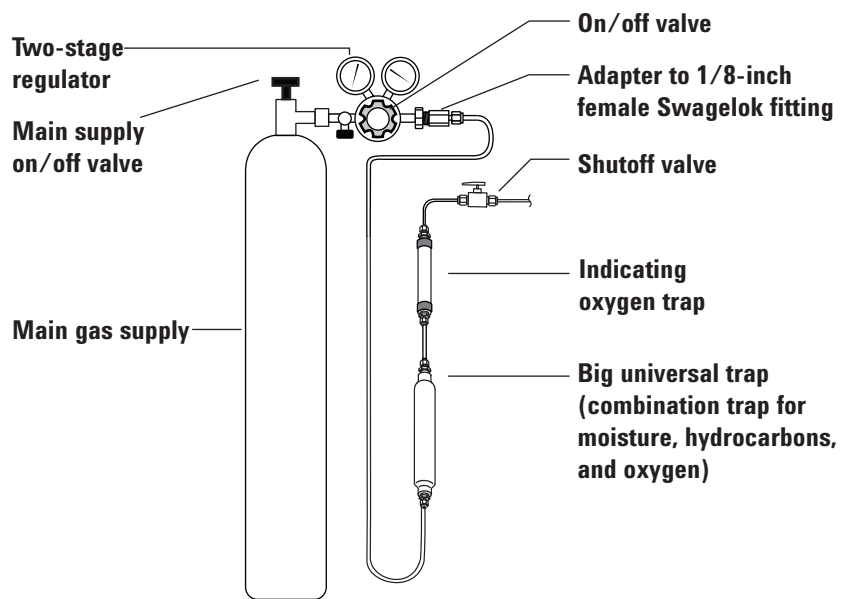
- Never use liquid thread sealer to connect fittings. Never use chlorinated solvents to clean tubing or fittings.

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.



Trap size and shape will vary by manufacturer.

Figure 7 Recommended traps and plumbing configuration from a carrier gas cylinder

- 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.

- Flow- and pressure-controlling devices require at least 20 psi (138 kPa) pressure differential across them to operate properly. Set source pressures and capacities high enough to ensure this.

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 13](#) lists the recommended traps. See the Agilent online store for the complete listing of traps and trap accessories. As shown in [Figure 7](#), install the indicating trap last so that it warns when the combination begins to fail.

Table 13 Recommended traps

Description	Part number
Carrier gas	
Big universal trap. Removes oxygen, moisture, hydrocarbons, carbon dioxide and carbon monoxide from helium gas streams.	RMS
Indicating oxygen trap.	IOT-2-HP
Vial pressurization gas	
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.

Cable Lengths

The distance between system modules may be limited by some of the cabling and the vent or vacuum hoses. Plan to set up the work space as shown in [“Dimensions and Weight”](#).

- The length of the Agilent-supplied remote cable is 2 meters (6.6 feet).
- The length of the Agilent-supplied LAN cable is 10 meters (32.8 feet).
- The lengths of the Agilent-supplied power cords are 2 meters (6.6 feet).

Site LAN Network

If you intend to connect your system to your site's LAN network, you must have an additional shielded twisted pair network cable.

NOTE

Agilent Technologies is not responsible for connecting to or establishing communication with your site LAN network. The representative will test the system's ability to communicate on a mini-hub or LAN switch only.

NOTE

The IP addresses assigned to the instrument(s) must be fixed (permanently assigned) addresses. If you intend to connect your system to your site's network, each piece of equipment must have a unique, fixed (static) IP address assigned to it.

Basic Tools and Supplies

The headspace sampler comes with a few basic tools and consumables depending on the specific model that you ordered. Depending on your requirements, you will need other tools and parts for installation. [Table 14](#) lists other useful tools not included with the HS. See the Agilent website at www.agilent.com/chem for the latest parts and supplies.

Table 14 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.

