Agilent G1888 Network Headspace Sampler

Site Prep and Installation Guide

Agilent Technologies

Notices

Manual Part Number

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Acknowledgements

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Safety Notices

CAUTION

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.

WARNING

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.

Manual Overview

This manual contains four chapters and one appendix.

1 Introduction

This chapter gives an overview of the manual and contains safety information.

2 Site Preparation

This chapter provides the requirements for preparing the site before installing the Headspace Sampler. It covers the requirements for temperature and humidity, space, power, gas, and venting.

3 Installation

Installation describes how to install the Headspace Sampler. It includes instructions for unpacking the unit, checking the contents, connecting the power and gas supplies, making connections to an integrator or Agilent data system, and connecting the unit to a GC.

4 Running Checkout Samples

This chapter provides information on preparing and running the checkout sample to confirm that the sampler is operating correctly.

A Connecting a Swagelok Fitting

This appendix describes proper Swagelok connections.

Contents

1 Introduction

This chapter gives an overview of the manual and provides safety information.

About this Manual

This manual explains the requirements and procedures for installing the Agilent Technologies G1888A Headspace Sampler. The manual is intended for Agilent Service personnel performing the installation. It includes basic information for preparing a site and for installing the Headspace Sampler, including attaching it to the GC and setting flow rates for various inlet configurations.

For operating directions, see the *Agilent Headspace Sampler User Information CD ROM*.

Video supplements

Click this icon when it appears throughout the manual to view video supplements to certain procedures.

Important Safety Warnings

Before moving on, there are several important safety notices that you should always keep in mind when using the Headspace Sampler.

Many internal parts of the instrument carry dangerous voltages

If the instrument is connected to a power source, even if the power switch is off, potentially dangerous voltages exist on:

- The wiring between the instrument power cord and the AC power supply, the AC power supply itself, and the wiring from the AC power supply to the power switch

With the power switch on, potentially dangerous voltages also exist on:

- All electronics boards in the instrument
- The internal wires and cables connected to these boards
- The wires for any heater (such as the oven)

WARNING **All these parts are shielded by covers. With the covers in place, it should be difficult to accidentally make contact with dangerous voltages. Unless specifically instructed to, never remove a cover unless the heated zones are turned off.**

WARNING **If the power cord insulation is frayed or worn, the cord must be replaced. Contact your Agilent service representative.**

Electrostatic discharge is a threat to instrument electronics

The printed circuit (PC) boards in the instrument can be damaged by electrostatic discharge. Do not touch any of the boards unless it is absolutely necessary. If you must handle

them, wear a grounded wrist strap and take other antistatic precautions. Wear a grounded wrist strap any time you must remove the electronics cover.

Many parts are dangerously hot

Many parts of the instrument operate at temperatures high enough to cause serious burns. These parts include but are not limited to:

- The carousel and its contents
- The sample probe/loop assembly

You should always cool these areas of the instrument to room temperature before working on them. They will cool faster if you first set the temperature of the heated zone to room temperature. Turn the zone off after it has reached the setpoint. If you must perform maintenance on hot parts, use a wrench and wear gloves. Whenever possible, cool the part of the instrument that you will be maintaining before you begin working on it.

WARNING **Be careful when working behind the instrument. During cool-down cycles, the instrument emits hot exhaust which can cause burns.**

Gases

- Do not use flammable carrier gases.
- Do not use hydrogen as a carrier gas in the Headspace Sampler. Hydrogen creates a potential explosion hazard due to the venting of gases during operation and “standby.”
- Wear eye protection when using compressed gas to avoid eye injury.
- Fasten all compressed gas cylinders securely to an immovable structure or permanent wall.
- Store and handle compressed gases in accordance with relevant safety codes.
- Do not put gas cylinders in the path of a hot air vent (including a GC oven exhaust).

General warnings

- Perform periodic leak checks on supply lines, fittings, and pneumatic plumbing to prevent a potentially hazardous condition.
- To avoid a potential shock hazard when using liquid solution to locate leaks, turn the main power switch off and disconnect the main power cord. Be careful not to spill leak solution on electrical leads.

Safety and Regulatory Certifications

The Headspace Sampler conforms to the following safety standards:

- Canadian Standards Association (CSA): C22.2 No. 1010.1
- CSA/Nationally Recognized Test Laboratory (NRTL): UL 61010A–1
- International Electrotechnical Commission (IEC): 61010–1
- EuroNorm (EN): 61010–1

The instrument conforms to the following regulations on Electromagnetic Compatibility (EMC) and Radio Frequency Interference (RFI):

- CISPR 11/EN 55011: Group 1, Class A
- IEC/EN 61326
- AUS/NZ 

This ISM device complies with Canadian ICES-001. Cet appareil ISM est conforme a la norme NMB–001 du Canada.

The instrument is designed and manufactured under a quality system registered to ISO 9001.

Information

The Agilent Technologies Headspace Sampler meets the following IEC (International Electro-technical Commission) classifications: Safety Class I, Transient Overvoltage Category II, Pollution Degree 2.

This unit has been designed and tested in accordance with recognized safety standards and is designed for use indoors. If the instrument is used in a manner not specified by the manufacturer, the protection provided by the instrument may be impaired. Whenever the safety protection of the Agilent Headspace Sampler has been compromised, disconnect the unit from all power sources and secure the unit against unintended operation.

Refer servicing to qualified service personnel. Substituting parts or performing any unauthorized modification to the instrument may result in a safety hazard.

Symbols

Warnings in the manual or on the instrument must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions violates safety standards of design and the intended use of the instrument. Agilent Technologies assumes no liability for the customer's failure to comply with these requirements.

See accompanying instructions for more information.

Indicates a hot surface.

Indicates hazardous voltages.

Indicates earth (ground) terminal.

Indicates explosion hazard.

Indicates electrostatic discharge hazard.

Electromagnetic compatibility

This device complies with the requirements of CISPR 11. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try one or more of the following measures:

1. Relocate the radio or antenna.
2. Move the device away from the radio or television.
3. Plug the device into a different electrical outlet, so that the device and the radio or television are on separate electrical circuits.
4. Make sure that all peripheral devices are also certified.
5. Make sure that appropriate cables are used to connect the device to peripheral equipment.
6. Consult your equipment dealer, Agilent Technologies, or an experienced technician for assistance.
7. Changes or modifications not expressly approved by Agilent Technologies could void the user's authority to operate the equipment.

Sound Emission Certification for Federal Republic of Germany

Sound pressure

Sound pressure Lp < 70 dB(A) according to DIN-EN 27779 (Type test).

Schalldruckpegel

Schalldruckpegel LP < 70 dB(A) nach DIN-EN 27779 (Typprufung).

Fuses

Table 1 lists the fuses required for proper operation. These fuses should only be accessed by Agilent service personnel.

Table 1 Fuses

Fuse designation	Location	Fuse rating and type
F2, F3	Power line module	10A 250V, glass tube
F3	Terminal near transformer	10A 250V, glass tube
F3, F4	Power board	6A 125V, glass tube
F1	Power board	1A 250V, glass tube

Cleaning

To clean the unit, disconnect the power and wipe down with a damp, lint-free cloth.

Recycling the Product

For recycling, contact your local Agilent sales office.

2
Site Preparation

This chapter describes requirements and tasks to complete before installing the Headspace Sampler in the laboratory.

Introduction to Site Preparation

This chapter provides site preparation information for the Aglient G1888A Headspace Sampler, covering the requirements for:

- Temperature and humidity
- Space
- Power
- Gas
- External plumbing
- Venting

Contact an Agilent sales representative for the current Site Preparation Checklist. Use the checklist to ensure that the proper equipment and parts are present, and that installation is completed properly. The checklist can also be found on the web at www.agilent.com/chem. Click "**Library**" and search for the Headspace Sampler model number.

Temperature and Humidity Requirements

Performance range

The Headspace Sampler operates in environment temperatures from 5 °C to 45 °C (41 °F to 113 °F) and 5% to 90% relative humidity .

The minimum operating temperature for the oven while it is turned on is 40 ℃. However, the actual minimum temperature depends on the environment. Generally, the minimum oven temperature will equal 20 ℃ above ambient. The oven can be turned off to use the Headspace Sampler closer to ambient temperature.

Optimum performance

The optimum temperature and humidity are 20 °C to 27 °C (58 °F to 80 °F) and 50% to 60% relative humidity (without condensation).

Space Requirements

The Headspace Sampler requires a laboratory bench with an unobstructed surface approximately 64 cm (25 inches) deep by 46 cm (18.1 inches) wide and capable of supporting at least 30 kg (102 lb.).

The unit is approximately 56 cm (22 inches) high. The area above it must be clear. Allow enough room to open the top lid of the Headspace Sampler. Shelves or any overhanging obstructions limit access to the top of the instrument and interfere with cooling.

Other devices used with the Headspace Sampler (gas chromatographs, detectors, integrators, or workstations) will require additional bench space. See the manual for each instrument for the applicable space requirements. Figure 1 shows instrument footprints for a sample installation.

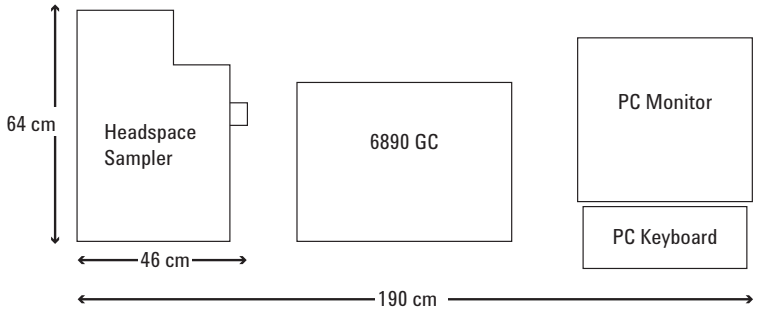


Figure 1 Example of space needed on lab bench

Power Requirements

Line voltage

The Headspace Sampler operates from one of these line voltage supplies:

- 115 VAC single phase (90 VAC to 130 VAC), 50 to 60 Hz, 750 VA max
- 230 VAC single phase (198 VAC to 264 VAC), 50 to 60 Hz, 750 VA max

The Headspace Sampler is shipped with the voltage set to 230 VAC. The maximum power the Headspace Sampler can accept is 750 VA. The recommended neutral to ground level is a maximum of 3 VAC. The Headspace Sampler should have a dedicated ground.

Power line cord

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

When plugged into a properly grounded receptacle, the three-conductor power line cord provides power and grounds the instrument. A properly grounded receptacle has its ground contact connected to a suitable earth ground. Verify that the receptacle is properly grounded.

Gas Requirements

The gas entering the Headspace Sampler becomes part of the carrier gas for the GC column. It may come from a pressure-regulated purified source (see Figure 3 on page 27) or from the GC itself. A gas supply connection for vial pressurization is also required. Gas at 550 kPa (80 psi) is recommended.

We recommend “instrument” or “chromatographic” purity grades specifically intended for chromatographic use. The gas purities in Table 2 are recommended for optimal chromatographic performance.

Table 2 Gas purity requirements

Gas	Purity
Helium	99.9995% pure
Nitrogen	99.9995% pure

WARNING **Do not use hydrogen in the Headspace Sampler. Hydrogen creates a potential explosion hazard due to venting during operation and standby.**

External Plumbing

Supply tubing

The Headspace Sampler ships with plumbing kits for both electronic and manual pressure control (EPC and MPC, respectively). The kits contain enough tubing to reach a gas source 3 meters from the Headspace Sampler. Extra plumbing is needed if the gas supply is not within 3 meters.

If extra plumbing is needed, use only preconditioned copper tubing (part number 5180-4196) to supply gases to the instrument. Ordinary copper tubing contains oils and contaminants. Plastic tubing is permeable to oxygen and other contaminants that can damage columns and detectors.

The required tube diameter depends on the distance from the supply or source to the Headspace Sampler and the total flow rate for the particular gas. Tubing of 1/8-inch od is adequate when the supply is less than 3 meters (10 feet) away from the instrument. Use 1/4-inch od tubing for longer distances.

Gas connection to the Headspace Sampler is made with 1/8-inch Swagelok® bulkhead fittings. *Never use Teflon tape on Swagelok-type fittings.*

Do not use “pipe dope” or “liquid thread sealant” on any pipe threads. Use only PTFE plumbing tape for these fittings.

Regulators

Two-stage regulators are recommended. Consult a local gas supplier for the type and size of cylinder valve connections. If possible, obtain Compressed Gas Association (CGA) numbers. Suitable two-stage regulators are also available from Agilent.

If cylinders and regulators are stored outdoors where temperature fluctuates, use an additional single-stage regulator at the back of the instrument.

If a single gas source supplies several instruments (via a manifold or T-connections), the pressure in the lines will fluctuate. Add single-stage regulators at the back of each instrument to stabilize the pressure. See Figure 2 below.

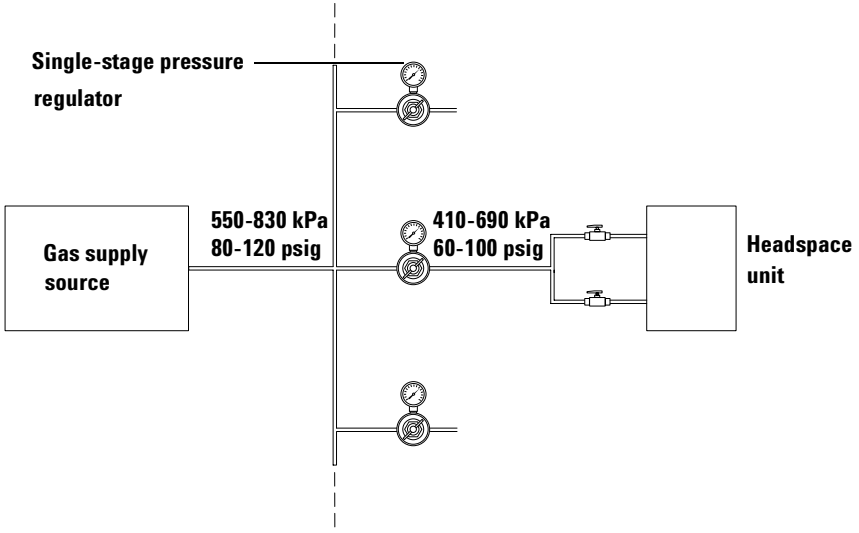


Figure 2 Single stage regulator used to stabilize pressure

Set regulators to deliver 410 to 690 kPa (60 to 100 psi) to the instrument. Flow and pressure regulators require at least 140 kPa (20 psi) pressure drop across them to maintain regulation. See Table 3 for the correct regulator to use with each outlet fitting.

Table 3 CGA Numbers and Pressure Regulator Kit Part Numbers

Cylinder outlet fitting CGA number	Part number for pressure regulator kit with 1/8-inch Swagelok outlet
346	5183-4641
540	5183-4643
580	5183-4644
590	5183-4645

The gas to the Headspace Sampler becomes the carrier gas. Traps are recommended to protect the columns. See Figure 3.

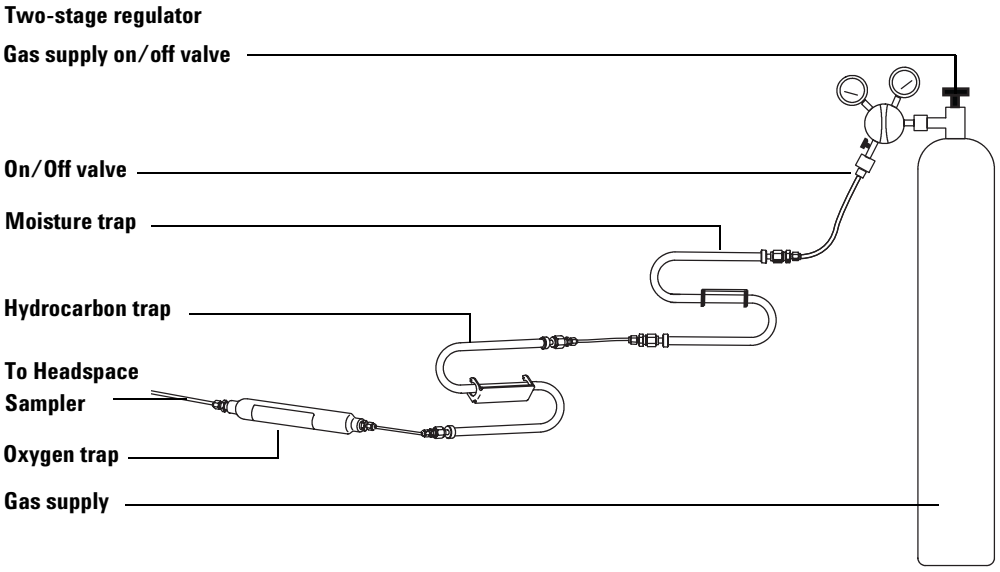


Figure 3 Plumbing a pressure-regulated gas purified source

Venting Requirements

During normal operation, some of the vial headspace gas is vented to the outside of the Headspace Sampler. If the components of this gas are expected to be toxic or noxious, place the unit within a fume hood or attach a vent system, at atmospheric pressure, to the port on the sampler unit. Use a 1/8-inch Swagelok fitting for the connection. See Figure 4 for the location of the vent line.

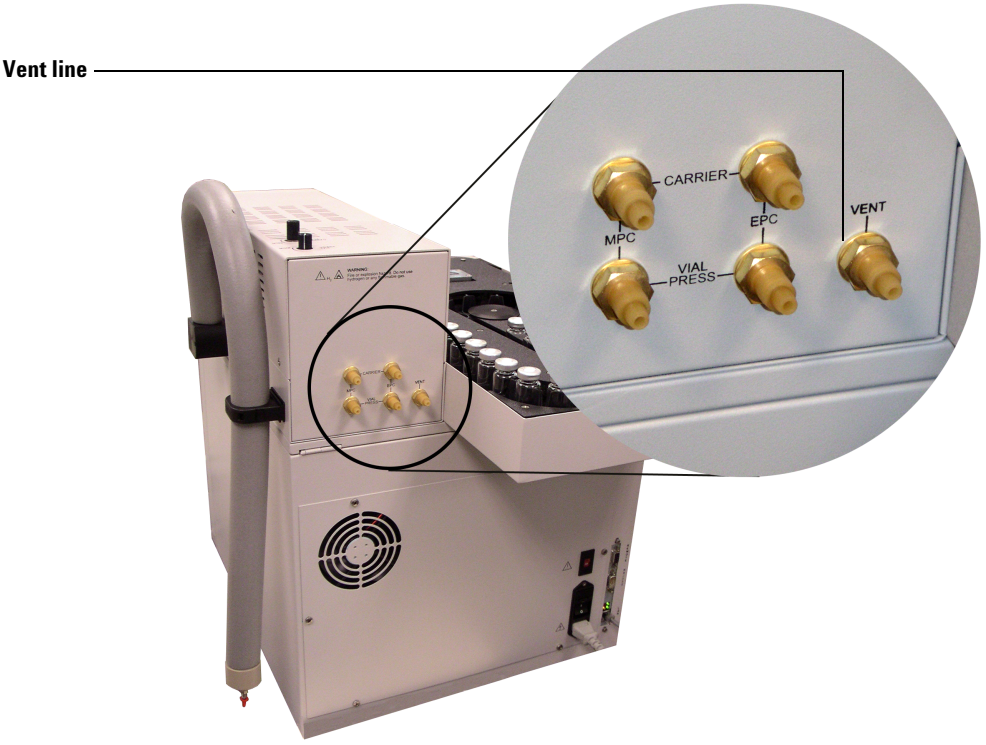


Figure 4 Location of vent line on back of instrument

Sampler Considerations

One or more optional parts and kits may be required for the installation, depending on the intended use.

- The Headspace Sampler ships with a deactivated flowpath and a 1-mL sample loop. A 3-mL sample loop (part number 2321700004) can be ordered separately.
- To enable software method control of the Headspace Sampler flows and pressures, an Agilent 6890 or Agilent 6850 GC must have an auxiliary electronic pressure control (EPC) module. Order kit G1888-60705. The kit contains the EPC module, the bleeder weldment, and the interface kit.
- To splice the transfer line into the inlet, order the Manual Pressure Control Interface Kit G1290-60515.
- There is an optional wire support for the transfer line for use on an Agilent 6890 GC. Order Transfer Line Support Kit G2319-60600.

3
Installation

This chapter describes steps to install the Headspace Sampler in the laboratory. It is assumed that the GC has already been installed, is working properly, and is available for the Headspace Sampler Installation.

Installation

CAUTION The Headspace Sampler contains metric fittings which are not compatible with Swagelok or other fittings except for the external gas connections on the rear of the unit.

To install the Headspace Sampler:

1. Unpack the unit and check the contents. See page 33.
2. Place the unit in a suitable location. See page 34.
3. Connect the power cord. See page 35.
4. Connect the headspace sampler to the gas chromatograph (GC). See page 37.
5. Connect the control cables to the GC and set communication options. See page 50.
6. Perform the checkout procedure. See page 56.

Contact an Agilent sales representative for the current Installation Checklist. Use the checklist to ensure that the proper equipment and parts are present, and that installation is completed properly. The checklist can also be found on the web at www.agilent.com/chem. Click "**Library**" and search for the Headspace Sampler model number.

Unpack the Unit and Check the Contents

Inspect the shipping containers for damage. If a container is damaged or shows signs of stress, notify both the carrier and your local Agilent office. Keep all shipping materials for inspection by the carrier.

Check the items received against the packing lists. If there are any discrepancies, notify your local Agilent office immediately. Retain the shipping containers until all contents are checked for completeness and instrument performance is verified.

Place the Unit in Position

1 Place the Headspace Sampler on a bench top to the left of the GC.

CAUTION The space above the Headspace Sampler must be free of overhanging obstructions that could interfere with cooling and limit access to the top of the instrument or prevent the top from opening.

2 Free the transfer line from the side of the Headspace Sampler. Open the plastic collar holding the line in place. Use a small flat blade screwdriver to press the release tab if necessary. See Figure 5.

Figure 5 The transfer line release tab

3 Position the Headspace Sampler so that the transfer line can easily reach the GC inlet without kinks or sharp bends.

Connect the Power Cord

1 Verify the proper operating voltage setting. The Headspace Sampler is shipped with the voltage set to 230 VAC. If needed, set the voltage selector to 115 VAC. Also note the location of the fuses. See Figure 6.

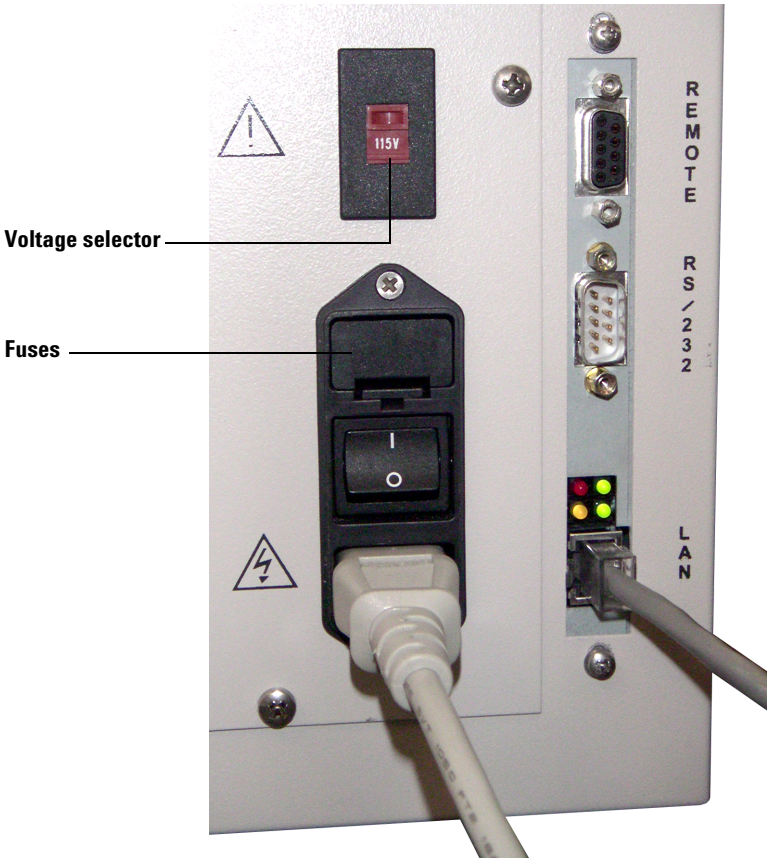


Figure 6 Power connection

2 Plug the Headspace Sampler power cord into a properly grounded outlet. See page 23 for power requirements.

3 Turn on the Headspace Sampler to verify that it is working properly. The Headspace Sampler performs a self-test when it starts up. Verify that each test is labeled “OK”. The self-test information can also be viewed at any time from the diagnostic screen.

   a Press the **Menu** key.

   b Scroll down to Advanced Functions with the cursor keys. Press **Enter**.

   c Scroll down to Diagnostic and press **Enter**.

   Use the cursor arrows to scroll through the multiple test screens. A typical diagnostic test screen is shown in Figure 7.

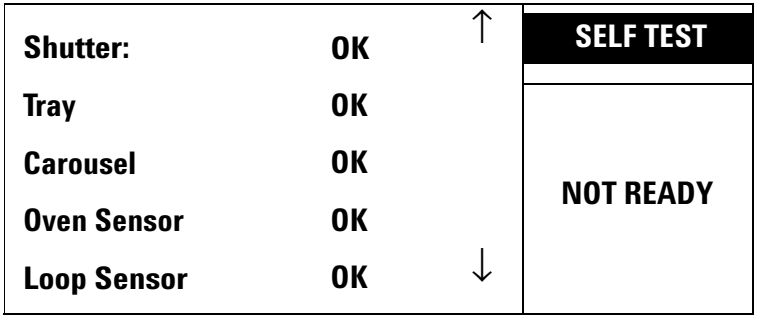


Figure 7 Self-test screen

See the G1888A Headspace Sampler operating manual for a description of the system diagnostic messages.

Connect the Plumbing and Transfer Line

Flow modes

The Agilent G1888A Headspace Sampler can operate in two flow modes:

- Electronic pressure control (EPC)

  EPC mode requires an EPC inlet and an Auxiliary EPC control module in the GC. The modules provide carrier and vial pressurization gas control via GC or Agilent data system setpoints.

- Manual pressure control (MPC)

  MPC mode uses the manual flow controller and pressure regulator on the G1888A Headspace sampler to control the carrier and vial pressurization gases.

See Figure 8 for the MPC flow controller and pressure regulator locations.

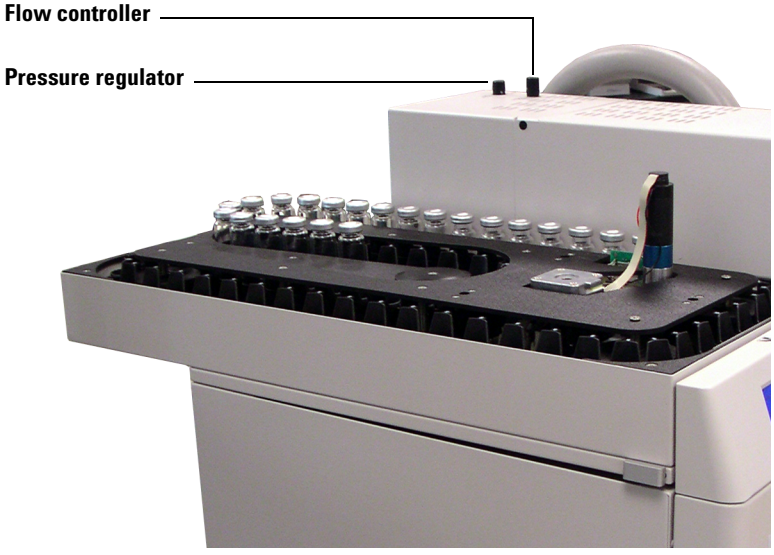


Figure 8 Flow controller and pressure regulator location

There are several ways to connect the Agilent Headspace Sampler to the GC. The type of connection depends on the GC model, the selected flow mode, and how the instruments are to be used. The possibilities include:

EPC connections

Direct connection to a split/splitless inlet The sampler is inserted between the inlet flow module and the inlet, allowing real method control, via the GC, of flows and pressures for consistent results between setups. The system is easy to duplicate and monitor but requires time to convert back to normal inlet injection for nonheadspace samples.

Direct connection to a volatiles interface The transfer line from the sampler is connected to the volatiles interface. See the 6890 GC's user information for instructions.

MPC connections

Needle connection to a split/splitless inlet The transfer line from the sampler ends in a needle (part no. 2322590005) that is inserted through the inlet septum. Conversion to normal injection is rapid and simple.

Needle connection to a cool on-column inlet The transfer line from the sampler ends in a small od needle (part no. 2322590004) that is inserted through the inlet septum.

Typical installation procedures

For MPC installations with a split/splitless inlet:

1. Verify that the flow mode toggle switches on the Headspace Sampler are set to MPC (page 40).
2. Connect the on/off valves to the gas input fittings on the Headspace Sampler (page 41).
3. Connect the gas input fittings to a pressure-regulated gas source (page 42).
4. Connect the transfer line using a needle connection to a split/splitless inlet (page 43).

For EPC installations with a split/splitless inlet:

1. Set the flow mode toggle switches on the Headspace Sampler to EPC (page 40).
2. Connect the on/off valves to the gas input fittings on the Headspace Sampler (page 41).
3. Connect the vial pressurization gas to the GC auxiliary EPC module (page 46).
4. Connect the carrier gas and transfer line directly to the split/splitless inlet by splicing into the carrier gas line (page 48).

Alternative installations

To install the Headspace Sampler on a 4890D or 5890 Series II GC, contact Agilent Service.

Set the flow mode on the Headspace Sampler

Choose the flow mode for the carrier gas and vial pressurization gas and set the flow mode toggle switches on the headspace sampler.

1 Open the lid of the Headspace Sampler. Locate the two tabs near the top of the Headspace Sampler on the left and right sides. Push the tabs towards the back of the instrument and lift the lid. Use caution when opening the lid due to its weight. The lid locks in place when fully opened.

2 Set the toggle switches for carrier gas and vial pressurization gas on the underside of the Headspace Sampler lid to the necessary positions. See Figure 9. The factory default setting is MPC.

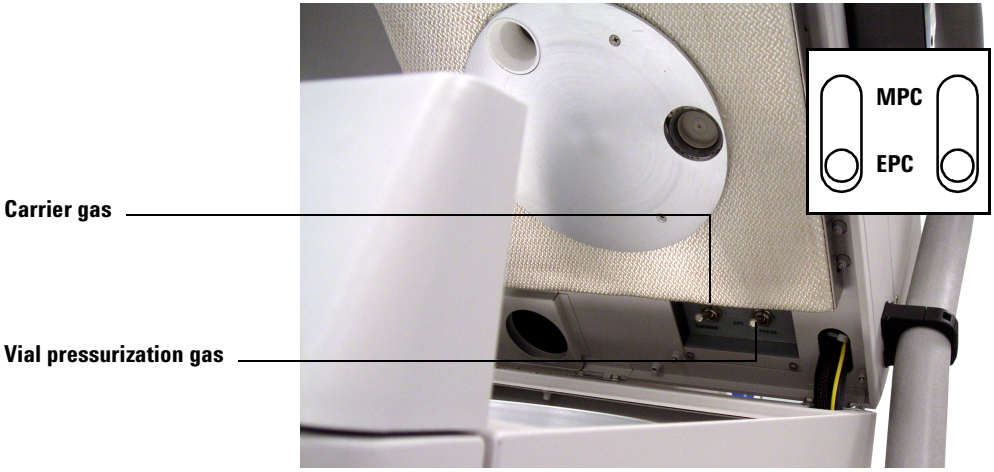


Figure 9 The pressure control toggle switches

Connect on/off valves to the gas input fittings

Install two on/off valves and tubing on the gas input fittings as shown in Figure 10. The figure shows a connection to the MPC input fittings.

- For **EPC**, use the fittings on the **right**
- For **MPC**, use the fittings on the **left**

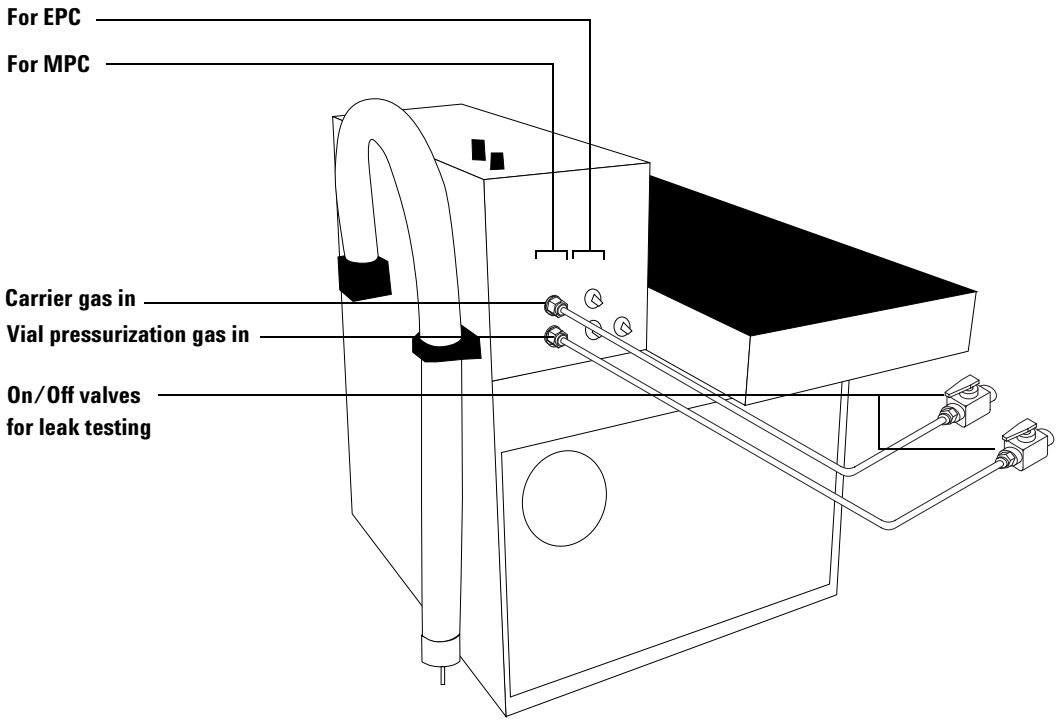


Figure 10 On/Off valves connected

MPC connections

Carrier gas and vial pressurization gas connections

If both the carrier gas and vial pressurization gas are MPC, Install a T-fitting to the on/off valves. Run a line from a pressure-regulated gas source to the T-fitting as shown in Figure 11.

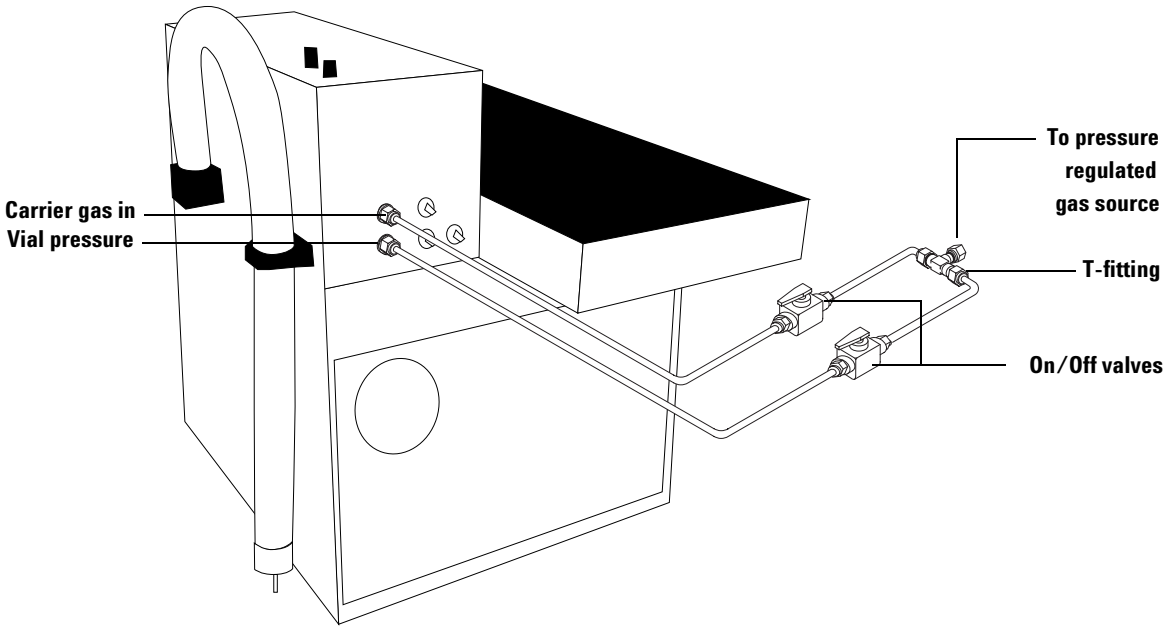


Figure 11 Carrier and vial pressure connections

If only one gas input fitting uses MPC, run a line from a pressure-regulated gas source directly to the on/off valve connected to the MPC gas input fitting.

Needle connection from transfer line to a split/splitless inlet

If the Headspace Sampler uses MPC for the carrier gas, the transfer line connects to the GC inlet by a needle passing through the inlet septum.

This system easily converts to normal injection. The installation does not disturb the normal plumbing between the inlet flow module and the inlet. Normal inlet flow reduces to minimize dilution of the headspace sample. Most of the flow through the inlet comes from the sampler.

The Headspace Sampler shipping kit includes a 0.7 mm outer-diameter (od) transfer line needle (part no. 2322590005). This needle is also called a “transfer line terminal.” The 0.7 mm od needle is most appropriate for use with the purged/packed inlet and the split/splitless inlet.

A smaller diameter needle (part no. 2322590004) must be used for on-column injection and may be used with other inlets. Order this needle separately.

Follow these steps to connect the transfer line to the GC. This procedure is described for the 6850 GC. Installation is similar for a 6890 GC.

1. Install a deactivated direct liner (part no. 5181-8818) in the split/splitless inlet.
2. Remove the standard septum nut from the inlet.
3. Attach the transfer line to the needle. Use two 7-mm wrenches to tighten it.
4. Insert the needle through the strain relief coupling.

5 Push an 11-mm through-hole septum onto the needle. Carefully remove any pieces of septum cored by the needle. Be sure the needle bore is clear. Figure 12 shows the assembly.

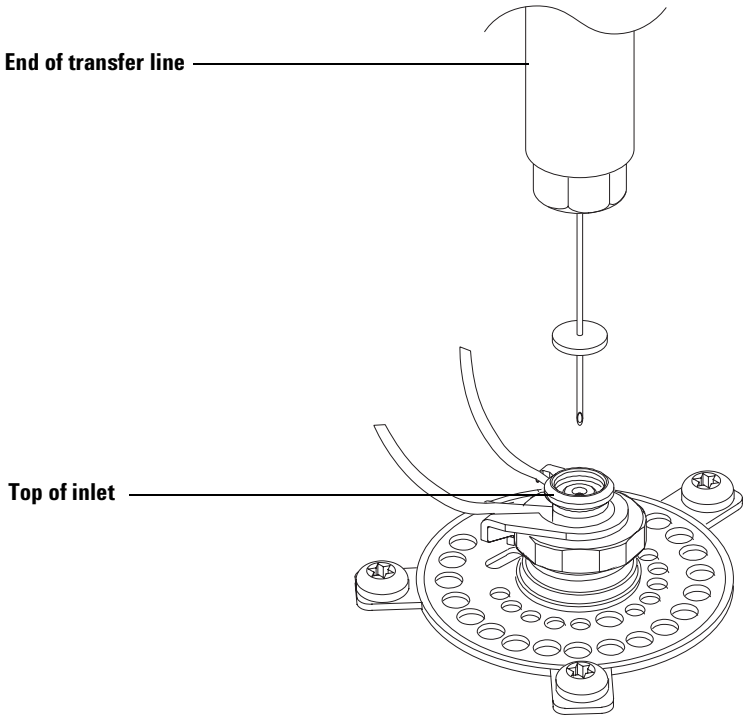


Figure 12 The needle assembly

6 Insert the tip of the needle into the inlet. Force the septum (it is oversized) into the recess in the top of the inlet. See Figure 13 for the assembled view.

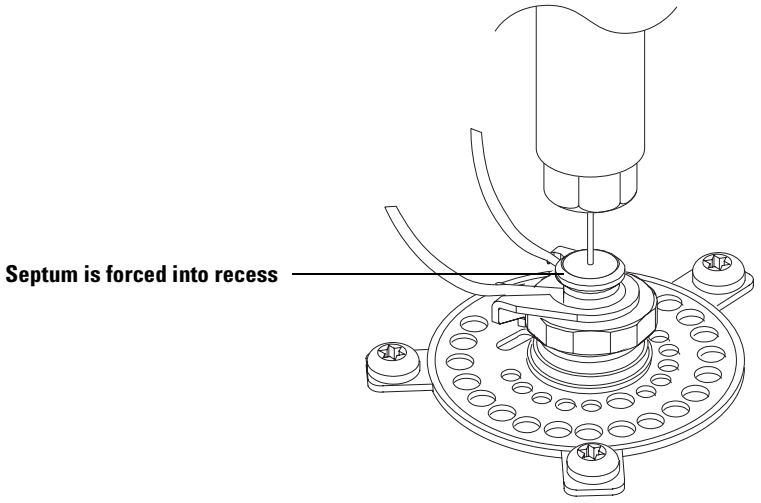


Figure 13 The transfer line attached to the inlet

7 Screw on and tighten the strain relief coupling.

When operating, set a small flow of carrier gas through the inlet using the GC inlet control. Set most of the flow using the flow controller in the Headspace Sampler. Use an electronic flow meter connected to the inlet split vent to verify the actual flow rate.

EPC connections

Connect the vial pressurization gas for an EPC setup

An Auxiliary gas channel in the GC supplies vial pressurization gas. The following steps describe installation for a 6890 GC with EPC control of headspace. The installation procedure is similar for a 6850 GC.

1. If the GC does not have an Auxiliary EPC module, install the G1940A Headspace Interface Kit. Follow the instructions provided with that kit.
2. Install the external sampler interface kit (part no. G1888-60705) into the GC. Follow the procedure for installing onto a back-pressure regulated system.
3. Locate the block on the Auxiliary EPC module that connects the three gas outlet tubes for the auxiliary channels to the pneumatics module.
4. Remove the screw that holds the block to the pneumatics module. Pull the block free of the module and rotate it so that the frits are on top. See Figure 14.

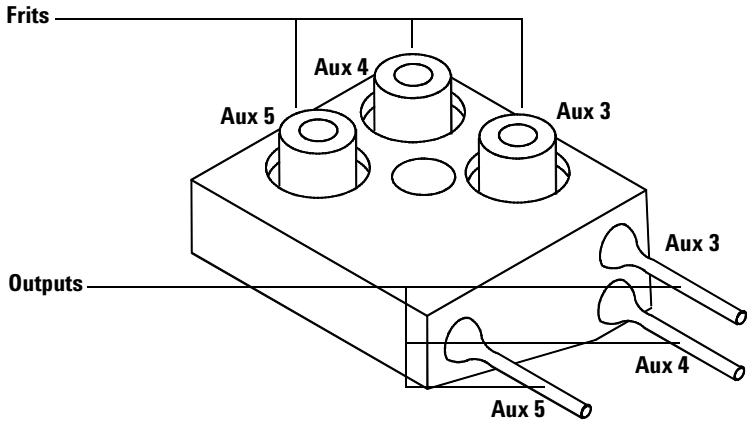


Figure 14 The Auxiliary EPC module gas outlet block

5 Choose a channel for the vial pressurization control. Remove that channel's frit from the block. Remove the O-ring that seals the channel.

6 Place an O-ring on a zero-resistance brass tube frit (part no. G1570-20540). Place the O-ring/frit combination in the block.

7 Reconnect the block to the pneumatics module. Tighten the screw.

8 Use tubing and Swagelok fittings to connect the appropriate Auxiliary module output, the bleed weldment, and the VIAL PRESSURE fitting to the on/off valve on the back of the Headspace Sampler as shown in Figure 15. Do not disturb the brass end on the bleed weldment.

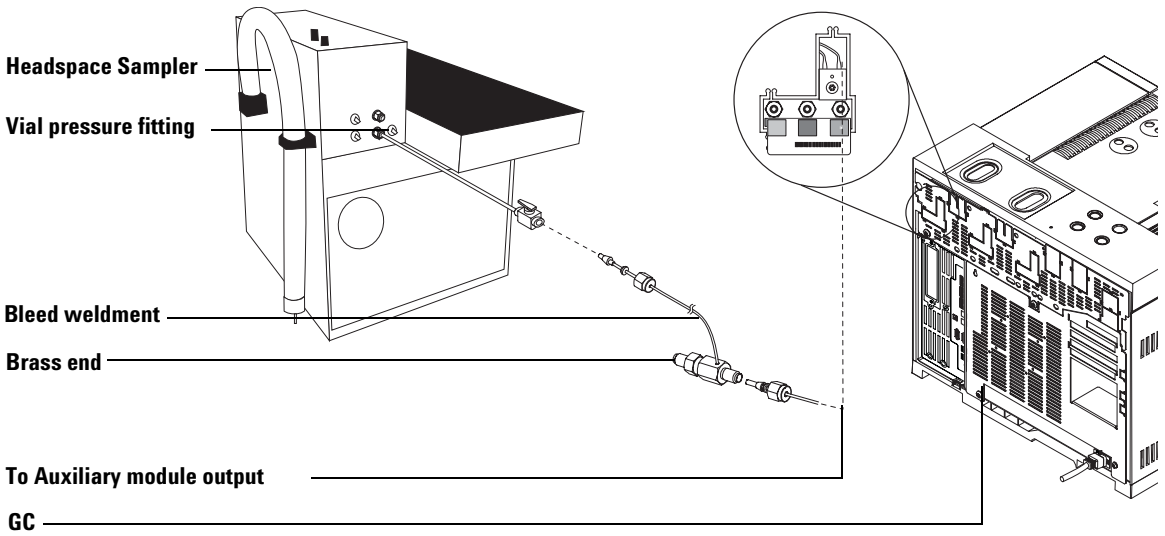


Figure 15 Connecting the Headspace Sampler to the auxiliary module

Direct connection from the transfer line to a split/splitless inlet

The GC inlet control channel supplies carrier gas. The following steps describe installation for a 6890 GC with EPC control of headspace. The installation procedure is similar on a 6850 GC.

1 Install a split inlet liner (part no. 5183-4647) in the inlet.

2 Locate the carrier line to the split/splitless inlet shown in Figure 16.

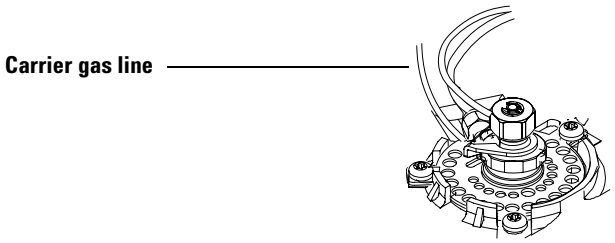


Figure 16 The split/splitless inlet carrier gas line

3 Cut the carrier line to the split/splitless inlet about 1 to 2 inches from the inlet body.

   a Carefully score the circumference of the tubing.

   b Hold the tubing with pliers on each side of the score and flex it until it breaks free.

   c File the edges until they are smooth.

4 Slide the nut onto the inlet side of the carrier line.

5 Attach a zero-dead-volume (ZDV) union to the short piece of carrier line attached to the inlet as shown in Figure 17.

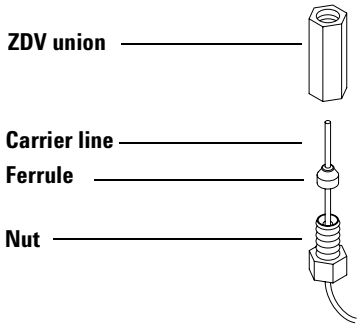


Figure 17 Attaching the ZDV union to the carrier line

6 Attach the headspace sampler transfer line to the ZDV union. See Figure 18.

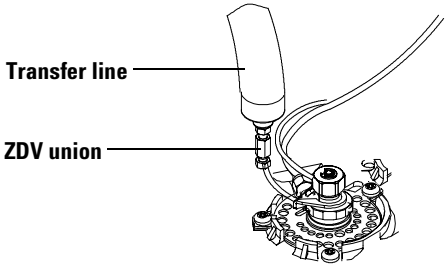


Figure 18 Connecting the transfer line to the carrier line

7 Use the other ZDV union to connect the free end of the carrier gas line to the length of tubing provided in the shipping kit. Route the tubing out the back of the GC to the rear panel of the sampler.

8 Connect the tubing to the CARRIER fitting on the sampler.

Control Setup

Connect the control cables

Connect the remote start/stop cable to the back of the sampler. Be sure to connect the spade lug to the ground screw. Connect the free end of the cable to the GC.

Depending on the setup, other cable connections may be needed. Refer to Table 4 for an overview of cable connections used with the Headspace Samplers.

Table 4 Cables for Headspace Samplers

Sampler port	Connect to	Part number
LAN*	Hub*	8121-0940
Remote	6820, 6850 and 6890 GCs	G1530-60930
APG Y-cable	6890N and 5973N	G1530-61200
Serial (RS-232)	PC	G1530-60600
Remote	4890 and 5890 Series II GCs	35900-60700

*Through a network hub or similar connection.

Figure 19 shows some common cabling configurations. These cabling configurations are valid for the G2070AA and G2922AA software set.

Cables

1. **8121-0940, Cable, 7.5-m 100-BaseT LAN**
2. **G1530-60930, 2-m APG remote cable, 9-pin male to 9-pin male**
3. **G1530-60600, 2-m RS-232 cable, 9-pin female to 9-pin female**
4. **G1530-61200, 2-m APG Y-cable, two 9-pin male, one 9-pin female**
5. **8121-1013, USB-DB9 RS-232 adapter cable**

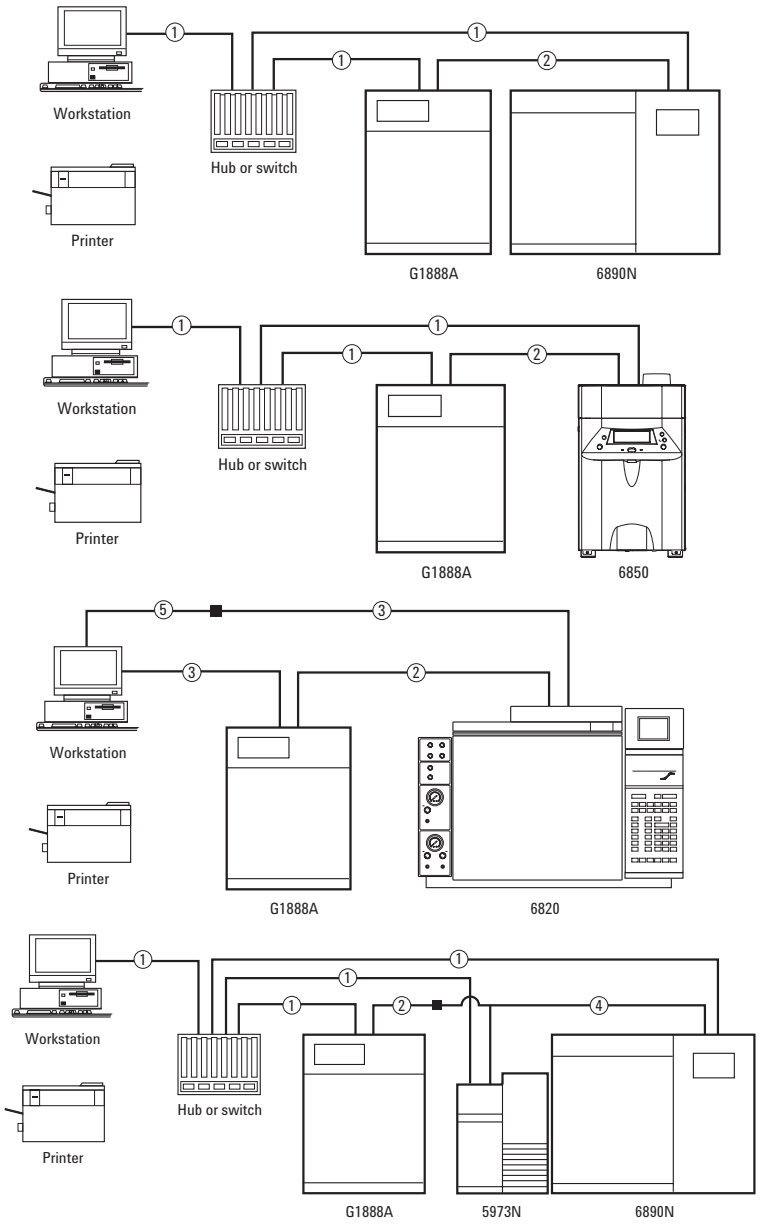


Figure 19 Common cabling configurations

Set communication options

If using RS-232 or LAN communications, configure the communications as described below.

LAN settings

If the Headspace Sampler is connected to a LAN, set the IP Address, subnet mask, and gateway using the `Advanced Functions` menu.

1. Press the **Menu** key.
2. Scroll down to Advanced Functions. Press **Enter**.
3. Scroll down to LAN Config. and press **Enter** or press **.** followed by **4** on the numeric keypad.
4. The LAN Config. screen is shown in Figure 20. Use the cursor and keypad to enter new values. Press **Enter** to set the value.

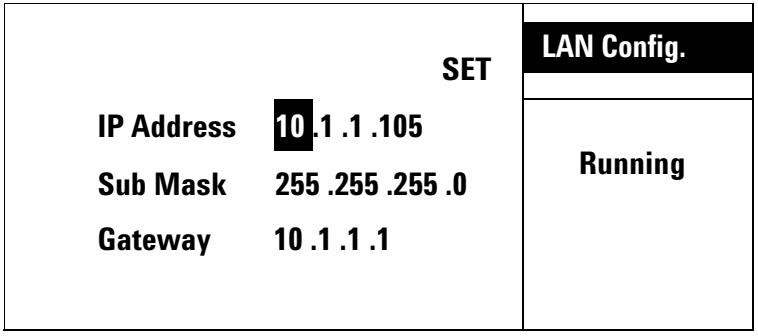


Figure 20 The LAN Config. screen

After configuring the LAN settings, disable the RS-232 port using the `Advanced Functions` menu.

1. Press the **Menu** key.
2. Scroll down to Advanced Functions. Press **Enter**.
3. Scroll down to Enable RS232 and press **Enter** or press **.** followed by **6** on the numeric keypad.

4 The Enable RS232 screen is shown in Figure 21. Use the cursor to choose No from the ADV. FUNCT list. Press **Enter**.

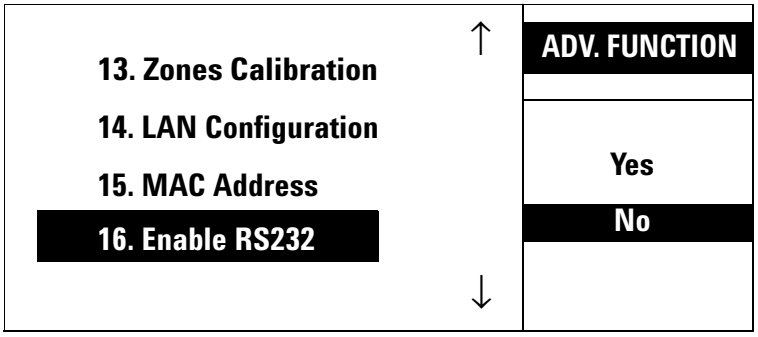


Figure 21 The Enable RS232 screen

Headspace Sampler automatically resets after after disabling the RS-232 port.

Additional RS-232 settings

If using RS-232 communications with the Headspace Sampler, enable RS-232 capabilities using the `Advanced Functions`.

1 Press the **Menu** key.

2 Scroll down to Advanced Functions. Press **Enter**.

3 Scroll down to Enable RS232 and press **Enter** or press **.** followed by **6** on the numeric keypad.

4 The Enable RS232 screen is shown in Figure 22. Use the cursor to choose Yes from the ADV. FUNCT list. Press **Enter**.

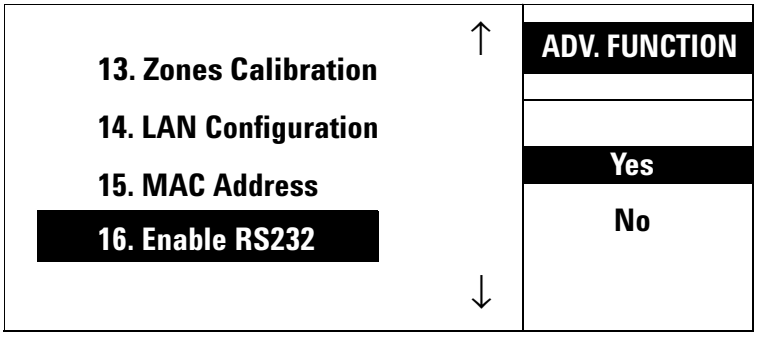


Figure 22 The Enable RS232 screen

4
Running Checkout Samples

This chapter describes the checkout steps for the Headspace Sampler.

Running Checkout Samples

Prepare the checkout sample

The checkout sample is three detector-specific compounds in ethanol. The box contains 1 mL of sample and a bottle of 5-µL capillary pipettes.

The checkout method calls for a 5-µL sample in a 20-mL headspace vial. The default Headspace Sampler vial size is 20 mL. See the Headspace Sampler Operating Manual for instructions to set the vial size if needed.

1. Snap the top off the checkout sample ampoule. Transfer the contents to a screw-cap bottle.
2. Dispense one capillary pipette
3. Hold the pipette with clean tweezers. With the checkout sample bottle and the pipette as close to horizontal as practical, dip the end of the pipette into the sample. See Figure 23

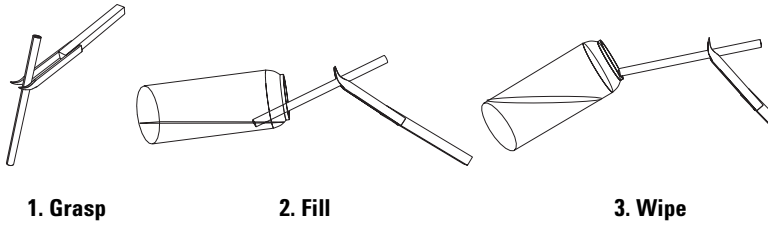


Figure 23 Filling a pipette

4. The pipette will fill by capillary action. When it has filled completely, pull the pipette out of the sample. Wipe the bottom edge of the pipette against the edge of the vial to remove any droplets on the outside.
5. Drop the filled pipette into a 20-mL headspace vial. Crimp a cap on the vial.

Run the sample

1. Set the method parameters on the GC and Headspace sampler. See Table 5 on page 58 for checkout settings or load the stored checkout method as described in "6850/6890 GC checkout method" on page 58. If needed, install the checkout column and liner.
2. If using MPC, set the carrier gas flow as follows:
   a. Set the GC inlet split ratio and column head pressure to the values given in Table 7 on page 61.
   b. Set the split flow to 4 mL/min. The total flow will read 11 mL/min.
   c. With an electronic flow meter connected to the GC split vent, turn up the headspace carrier gas flow until the flow rate out the split vent is approximately 80 mL/min. Remove the flow meter. See Figure 24.

NOTE The GC and Headspace pressure readings should be similar. Record the headspace pressure reading—it can be used to set up future checkout runs.

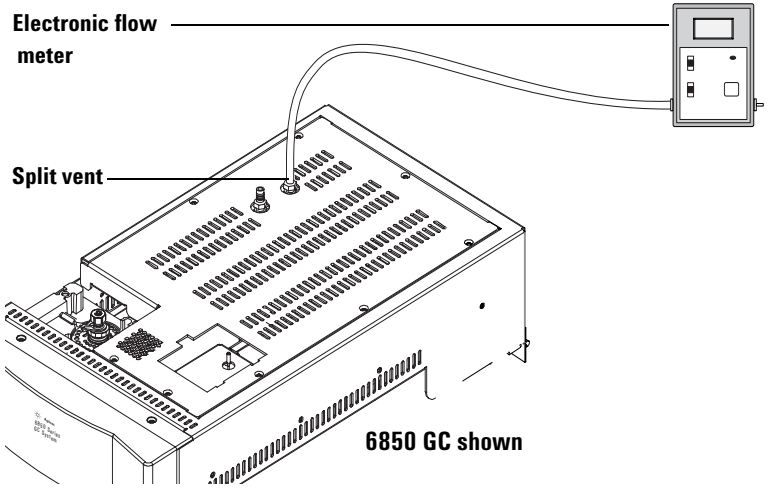


Figure 24 The electronic flow meter connected

3 Run the checkout sample.

The results should be similar to the chromatograms shown on pages 65 to 68.

6850/6890 GC checkout method

Load the existing checkout method

The Headspace Sampler ships with a stored method containing the checkout settings. Do the following steps to load the checkout method.

1 Press the **Menu** key.

2 Highlight Advanced Functions with the cursor keys. Press **Enter**.

3 Use the cursor keys to select Stored Meth. (Advanced Function number 7) and press **Enter**.

4 The screen shown in Figure 25 appears. Use the cursor keys to select Checkout. Press **Enter**.

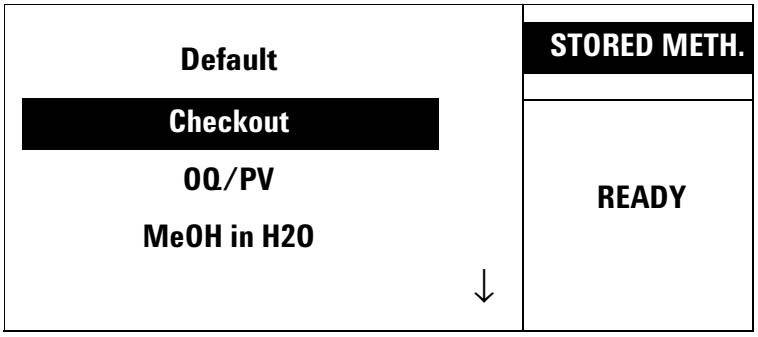


Figure 25 The Stored Method screen

Create a new checkout method

If the checkout settings in the stored methods screen are not acceptable, use Tables 5 through 12 and Figures 26 through 29 to create a new Headspace Sampler checkout method. This section covers several inlets and detector types. Use the settings that apply.

Table 5 Headspace Sampler settings

Headspace method	
Oven temperature	100 °C
Valve temperature	110 °C
Transfer line temperature	115 °C
Loop volume	1 mL
Vial pressure	15 psi (See Table 11 if using EPC control)
GC cycle time	5.5 min
Vial equib time	7.0 min
Pressurization time	0.08 min

Table 5 Headspace Sampler settings (continued)

Headspace method	
Loop fill time	0.5 min
Loop equib time	0.05 min
Injection time	1.0 min

Table 6 GC oven settings

Oven	
Initial temperature	100 °C
Initial time	4.00 min
Rate	0 (Off)
Maximum temperature	300 °C
Equilibration time	1.00 min
Run time	4.00 min

Table 7 Inlet settings

Inlet (volatiles or split/splitless)	
Mode	Split
Initial temperature	250 °C (On)
Pressure	19.5 psi (On)
Split ratio	20:1 (G1289)
Split flow	80 mL/min (G1289)
Total flow	87 mL/min (G1289)
Gas saver	Off
Gas type	Helium
Liner	5181-8818

Table 8 Column settings

Column	
Model number	689019091J-413, HP-5 5% Phenyl methyl silicone 685019091Z-413E, HP-1 Methyl silicone
Maximum temperature	325 °C
Length	30 m
Diameter	320 µm
Film thickness	0.25 µm
Mode	Constant flow
Initial flow	4.0 mL/min
Initial pressure	19.5 psi
Average velocity	60 cm/s
Outlet pressure	Ambient

Table 9 Detector settings (FID, NPD, µECD)

Detector parameters	FID	NPD	µECD
Temperature	300 °C	300 °C	
Hydrogen flow	30 mL/min	2.0 mL/min	
Air flow	400 mL/min	60 mL/min	Constant makeup
Mode	Constant makeup	Constant makeup	30 mL/min
Makeup flow	25 mL/min	8 mL/min	Nitrogen or argon/methane
Makeup gas type	Nitrogen or helium	Nitrogen or helium	
Flame	On		On
Electrometer	On	On	
Lit offset	2.0		
Adjust offset		30	
Bead		On	
Equilibration time		0	

Table 10 5973 MSD settings

5973 MSD unique parameters	
Column	6890/5973A MSD 19091S-433, HP-5MS 5% Phenyl methyl siloxane
Solvent delay	3 min
Run time	6.5 min
Headspace event time for GC cycle time	7 min
Scan range	45 to 300
Method used	Atune file
Inlet pressure	12 psi
Column flow	1.1 mL/min with foreline reading of 60
Split ratio	80:1
Injector	External device

Use the settings given in Table 11 when using a GC with EPC control.

Table 11 GC Aux pressure settings for EPC control

Aux Pressure 3 (for vial pressurization on G1888A)	
Gas type	Helium
Initial pressure	15 psi (On)
Initial time	0 min
Rate	0 (Off)

Table 12 Checkout sample

Checkout sample	
Type	Headspace OQ/PV Standard
Part number	5182-9733
Size	5 µL (by micro-pipette) in 20-mL headspace vial

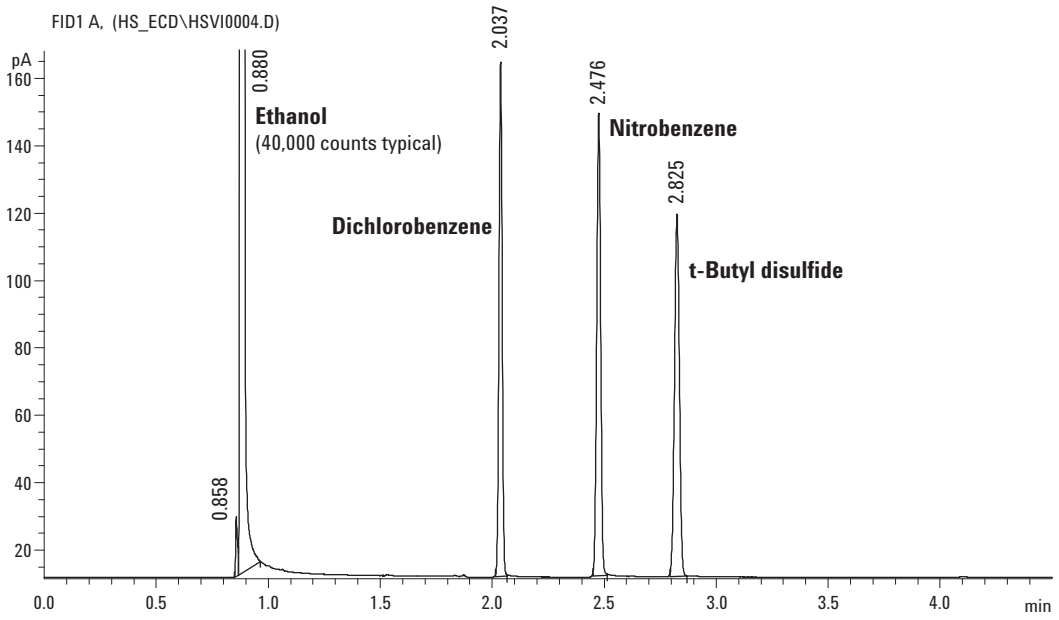


Figure 26 FID checkout chromatogram

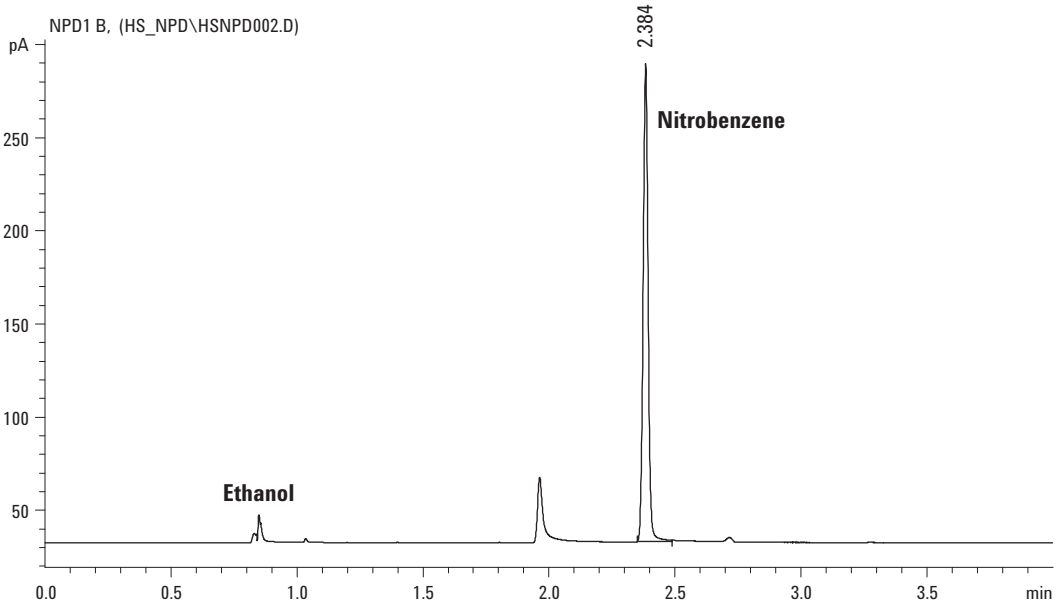


Figure 27 NPD checkout chromatogram

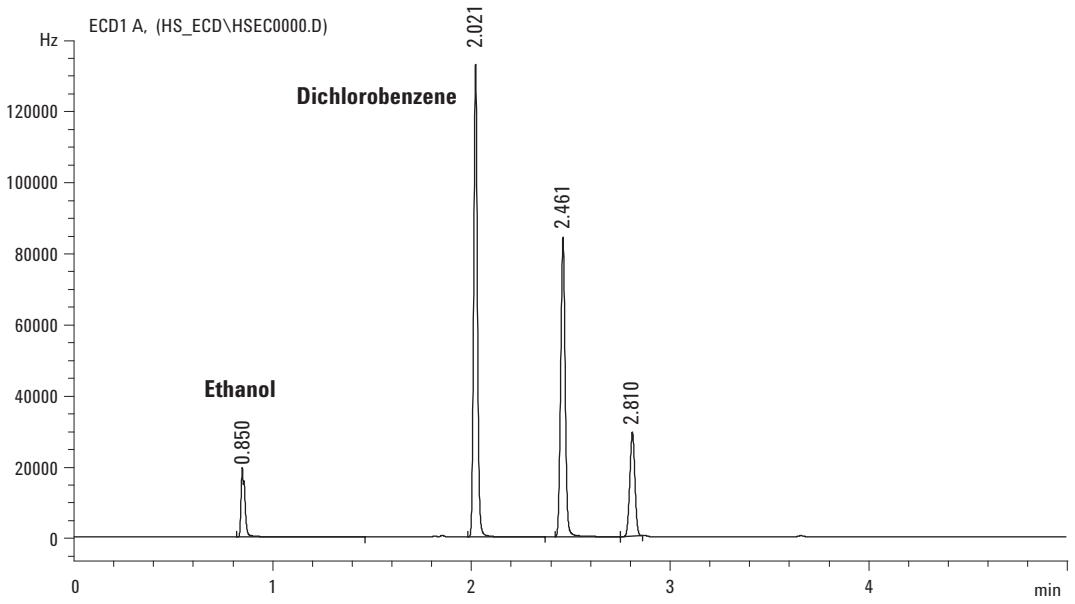


Figure 28 µECD checkout chromatorgram

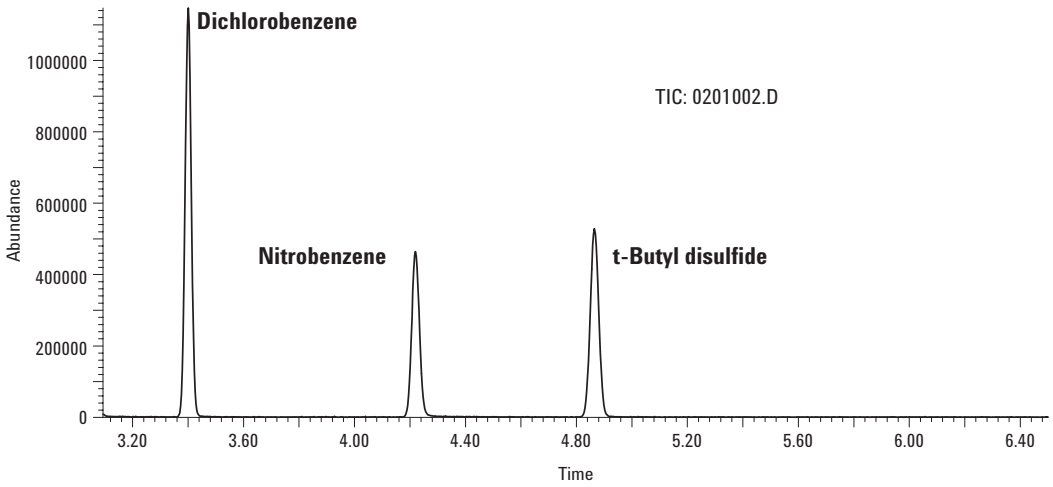


Figure 29 MSD checkout chromatorgram

A
Connecting a Swagelok Fitting

This chapter describes proper Swagelok connections.

Preparation

Objective

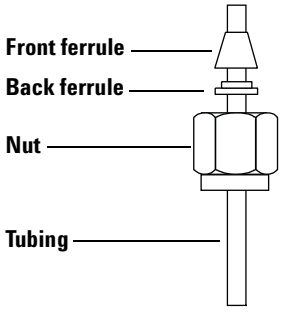
To make a leak-free tubing connection that can be taken apart without damaging the fitting

Materials needed

- 1/8-inch (or 1/4-inch, if used) preconditioned copper tubing
- 1/8-inch (or 1/4-inch, if used) Swagelok nuts
- Front and back ferrules
- Two 7/16-inch (for 1/8-inch nuts) or 9/16-inch (for 1/4-inch nuts) wrenches

Procedure

1 Place a Swagelok nut, back ferrule, and front ferrule to the tubing as shown in Figure 30.



IMPORTANT!
The narrow end of the back ferrule fits into the rear of the front ferrule.

Figure 30 Swagelok nuts and ferrules

2 Clamp a stainless steel plug or similar fitting in a bench vise.

CAUTION Use a separate stainless steel fitting in a vise for initial tightening of the nut. Do not use an inlet or detector fitting. Strong forces are required to properly set the ferrules, and damage to an inlet or detector fitting is very costly to repair.

3 Push the tubing into the stainless steel plug (Figure 31).

4 Make sure that the front ferrule is touching the plug. Slide the Swagelok nut over the ferrule and thread it onto the plug.

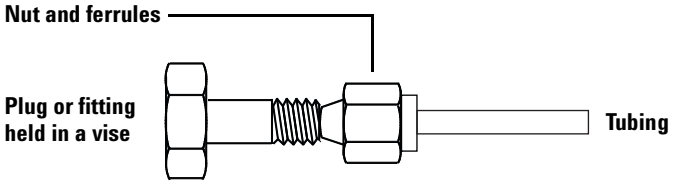


Figure 31 Assembling the fitting

5 Push the tube fully into the plug, then withdraw it approximately 1 to 2 mm. Finger-tighten the nut (Figure 32).

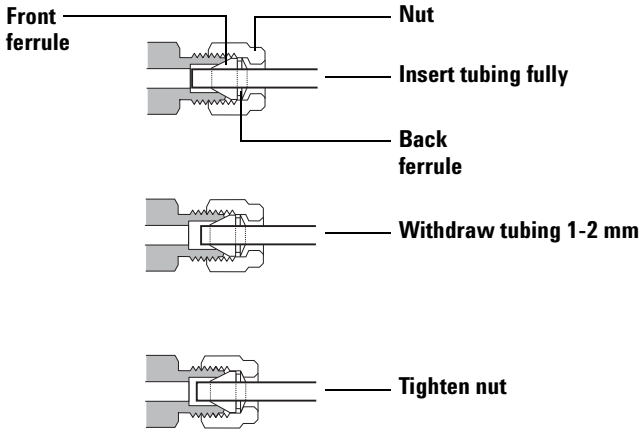


Figure 32 Insert the tubing

6 Mark the nut with a pencil line (Figure 33).

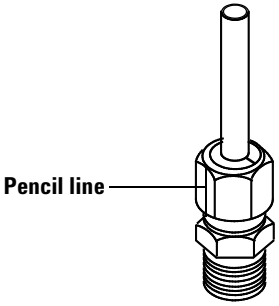


Figure 33 Marking the fitting

7 **For 1/8-inch Swagelok fittings**, use a pair of 7/16-inch wrenches to tighten the fitting 3/4 of a turn (Figure 34). **For 1/4-inch fittings,** use a pair of 9/16-inch wrenches to tighten them 1-1/4 turn (Figure 34).

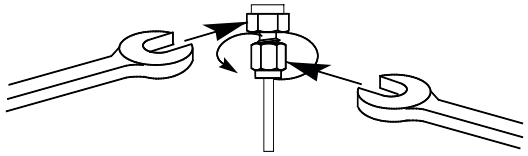


Figure 34 Final tightening

8 Remove the plug from the fitting. To connect the tubing, with nut and ferrules, to another fitting, finger-tighten the nut, then use a wrench to tighten it 3/4 of a turn (1/8-inch fittings) or 1-1/4 of a turn (1/4-inch fittings).

9 A correctly-swaged connection is shown in Figure 35. Note that the end of the tubing in a correctly-swaged fitting is not crushed and does not interfere with the action of the ferrules.

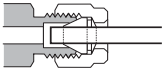


Figure 35 Completed fitting

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