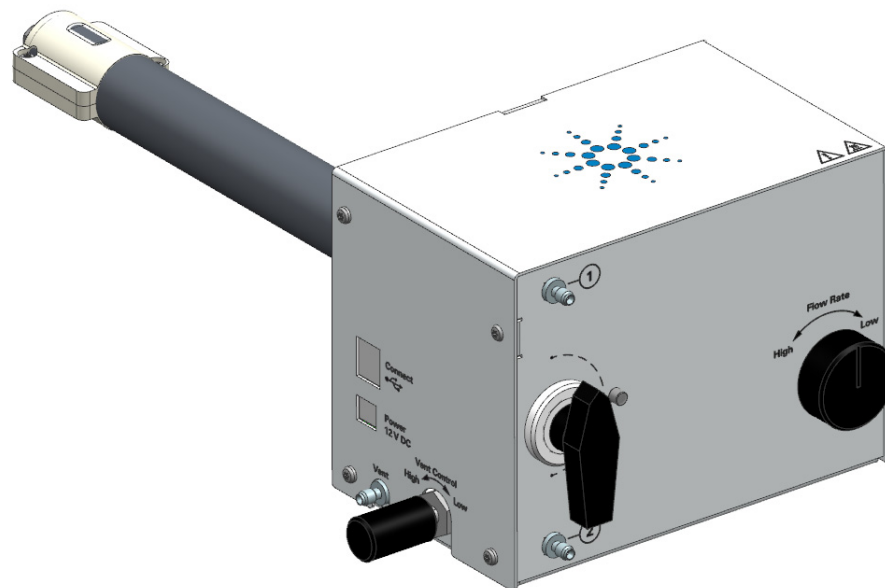


Agilent 8860, 8890, and 990 Micro Gas Chromatograph Gasifier

User Manual



Notices

© Agilent Technologies, Inc. 2021

No part of this manual may be reproduced in any form or by any means (including electronic storage and retrieval or translation into a foreign language) without prior agreement and written consent from Agilent Technologies, Inc. as governed by United States and international copyright laws.

Manual Part Number

G3535-90000

Edition

Third edition, August 2021
Second edition, January 2021
First edition, July 2020
Printed in China

Agilent Technologies, Inc.
412 Ying Lun Road
Waigaoqiao Free Trade Zone
Shanghai 200131 P.R.China

Warranty

The material contained in this document is provided “as is,” and is subject to being changed, without notice, in future editions. Further, to the maximum extent permitted by applicable law, Agilent disclaims all warranties, either express or implied, with regard to this manual and any information contained herein, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. Agilent shall not be liable for errors or for incidental or consequential damages in connection with the furnishing, use, or performance of this document or of any information contained herein. Should Agilent and the user have a separate written agreement with warranty terms covering the material in this document that conflict with these terms, the warranty terms in the separate agreement shall control.

Technology Licenses

The hardware and/or software described in this document are furnished under a license and may be used or copied only in accordance with the terms of such license.

Restricted Rights Legend

U.S. Government Restricted Rights. Software and technical data rights granted to the federal government include only those rights customarily provided to end user customers. Agilent provides this customary commercial license in Software and technical data pursuant to FAR 12.211 (Technical Data) and 12.212 (Computer Software) and, for the Department of Defense, DFARS 252.227-7015 (Technical Data -Commercial Items) and DFARS 227.7202-3 (Rights in Commercial Computer Software or Computer Software Documentation).

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.

Contents

1 Safety Information

Safety Information	6
Safety symbols	6
Safety and regulatory information	7
General safety precautions	7
Shipping Instructions	10
Cleaning Instructions	10
Disposal Instructions	10
Intended Use	10
Recycling the Product	11

2 Introduction

Introduction	14
Specifications	15
Principle of Operation	16
Flow path diagram	16
Hardware description	16

3 Installation for 8860 GC and 8890 GC

Before you begin	20
Compressed liquid/gas sample cylinder safety	20
Check ventilation condition	20
Tools and parts required for installation	20
Check compatibility to the GC system	20
Installation	22
Prepare the GC	22
Install the Gasifier mounting bracket	23
Install the Gasifier	24
Connect the Gasifier transfer line to the GC	26
Install the external filter unit	26
Connect the sample cylinder	27
Connect the power cord and USB cable	27
Update the GC Firmware and driver	28
Configuring the GC and Data System	28

4 Installation for 990 Micro GC

Before you begin	30
Compressed liquid/gas sample cylinder safety	30

Check ventilation condition	30
Tools and parts required for installation	30
Check compatibility to the GC system	30
Leak test	30
Installation	31
Install the mounting bracket and gasifier	31
Connect the transfer line to the GC	33
Install the external filter unit	34
Connect the sample cylinder	35
Connect the power cord and USB cable	36
Update the GC Firmware and driver	36
Configuring the GC and Data System	36

5 Operation

Gasifier Operation and Status	38
Gasifier parameters	38
8860 and 8890 GC Operation	39
Create the checkout method	39
Run a sample analysis	40
Typical operating conditions	41
990 Micro GC Operation	43
Create the checkout method	43
Run a sample analysis	43
Typical operating conditions	44

6 Maintenance and Troubleshooting

Periodic Maintenance	46
Troubleshooting	47
Chromatographic symptoms	47
Gasifier Not Ready Symptoms	51
Thermal Fault	52
Electronics Troubleshooting GC Power-On and Communication Symptoms	53
Checking for Leaks	53
Checking for Blockage	54
Error Messages	55

1

Safety Information

Safety Information	6
Shipping Instructions	10
Cleaning Instructions	10
Disposal Instructions	10

To prevent any injury to the user or any damage to the instrument, it is essential that you read the information in this chapter and the gas chromatograph (GC) user manuals.

If this manual is not in your native language, or if you have problems understanding the text, contact your Agilent office for assistance. Agilent cannot accept responsibility for any damage or injury caused by misunderstanding of the information in this manual.

Safety Information

Safety 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 potential explosion hazard.



Indicates electrostatic discharge hazard.



Indicates a hazard.
See the Agilent GC user documentation for the item labeled.



Indicates that you must not discard this electrical/electronic product in domestic household waste



Manufacturing date.



Safety and regulatory information

The Agilent Gasifier conforms to the following safety standards:

- Canadian Standards Association (CSA): C22.2 No. 61010-1
- CSA/Nationally Recognized Test Laboratory (NRTL): ANSI/UL 61010-1
- International Electrotechnical Commission (IEC): 61010-1, 61010-2-010, 61010-2-081
- EuroNorm (EN): 61010-1

The Agilent Gasifier conforms to the following regulations on Electromagnetic Compatibility

- (EMC) and Radio Frequency Interference (RFI):
- CISPR 11/EN 55011: Group 1, Class A
- IEC/EN 61326-1

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



NOTE

The Gasifier is designed and manufactured under a quality system registered to ISO 9001. Declaration of Conformity available.

The Gasifier meets the following IEC (International Electro-technical Commission) classifications:

- Safety Class 1
- 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 in non-classified locations. Do not operate it in an explosive atmosphere. 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 Gasifier 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.

General safety precautions

WARNING

When handling or using chemicals for preparation or use within the GC, all applicable local and national laboratory safety practices must be followed. This includes, but is not limited to, correct use of Personal Protective Equipment (PPE), correct use of storage vials, and correct handling of chemicals, as defined in the laboratory's internal safety analysis and standard operating procedures. Failure to adhere to laboratory safety practices could lead to injury or death.

WARNING

This instrument is designed for chromatographic analysis of appropriately prepared samples. It must be operated using appropriate gases, and within specified maximum ranges for pressure, flows, and temperatures as described in this manual. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

WARNING

It is the responsibility of the customer to inform Agilent customer support representatives if the instrument has been used for the analysis of hazardous samples, prior to any instrument service being performed or when an instrument is being returned for repair.

To ensure safe equipment operation, adhere to the following safety practices:

- Do not use flammable gas (such as H₂) other than your sample as purging gas. Use inert gas (such as N₂) instead.
- Perform periodic leak checks on all supply lines and pneumatic plumbing.
- Do not allow gas lines to become kinked or punctured. Place lines away from foot traffic and extreme heat or cold.
- To avoid exposure to potentially dangerous voltages, disconnect the instrument from all power sources before removing protective panels.
- Your product must only use the power cord that was shipped with this product. Do not use this power cord with any other product.

WARNING

Replace faulty or frayed power cords immediately. Contact your Agilent service representative.

- The instrument should be placed in a suitable location with sufficient ventilation to remove gases and vapors. Make sure there is enough space around the instrument for it to cool off sufficiently.
- Do not turn on the Power Supply if there is a possibility of any electrical damage. Instead, disconnect the power cord, and contact your Agilent office.
- The supplied power cord must be inserted into a power outlet with a protective earth ground connection.
- Do not change the external or internal grounding connections as this could endanger you or damage the Power Supply.
- The Power Supply is properly grounded when shipped. You do not need to make any changes to the electrical connections or to the Power Supply chassis to ensure safe operation.
- Do not place containers with flammable liquids on this Power Supply. Spillage of the liquid over hot parts may cause fire.
- Never try to repair or replace any component that is not described in this manual without the assistance of an Agilent service engineer. Unauthorized repairs or modifications will result in rejection of warranty claims.
- Always disconnect the AC power cord before attempting any type of maintenance.
- The customer should not attempt to replace the fuses in the Power Supply.
- Damage can result if the Power Supply is stored under unfavorable conditions for prolonged periods (for example, subject to heat, water, and so forth).
- This unit has been designed and tested in accordance with recognized safety standards and is designed for use indoors.
- If the Power Supply is used in a manner not specified by the manufacturer, the protection provided by the Power Supply may be impaired.

1 Safety Information

General safety precautions

- Substituting parts or performing any unauthorized modification to the Power Supply may result in a safety hazard.
- Before plugging in your instrument, verify that the voltage of your local power source is set appropriately.
- Turn off and cool down the GC and Gasifier before disconnecting the Transferline and GC.
- Do not use an Uninterruptable Power Supply (UPS) with a Gasifier.
- The input voltage of external power supply is 100-240V. Never use the mains supply which voltage fluctuations are exceeded +/- 10 % out of this range.
- Stop using Gasifier with frayed or damaged Transferline, and contact your local Agilent sales office.

CAUTION

Gasifier will be turned on as long as the power cord is connected to the power source. There is no "On/Off" switch.

CAUTION

Make sure that the sampler has been removed prior to maintaining, moving or relocating the Gasifier. Prior to moving, all covers and enclosures must also be seated properly. Make sure all covers and enclosures are secure.

WARNING

Appliance inlet coupler (main input power cord) is the power disconnect device. Do not position the instrument such that access to the coupler or plug is impaired.

WARNING

Transferline could be operated at temperatures high enough to cause serious burns. You should always cool the Gasifier to room temperature before working on it. If you must perform maintenance on the transferline, use a wrench and wear thermally protective gloves.

Add additional Warning information

WARNING

Do not place the Power Supply and Power cord on the top of GC or Gasifier when GC or Gasifier is powered on.

Shipping Instructions

Follow these steps to prepare your Gasifier for shipping:

- 1 Let the Gasifier cool down for at least 30 minutes before packing.
- 2 Cap every inlet and outlet port.
- 3 Cap all inlet and outlet tubing.
- 4 Always include the power cord kit and USB cable with the Gasifier.

Cleaning Instructions

To keep the Gasifier surface clean, refer to the remarks given below:

- Switch the GC off.
- Remove the GC power cable from the mains.
- Disconnect the Gasifier power cable.
- Use a soft (not hard or abrasive) brush to carefully brush away all dust and dirt.
- If the outer case is dirty, clean it with a soft, clean cloth dampened with mild detergent. Never clean the inside.
- Never use alcohol or thinners to clean the Gasifier. These chemicals can damage the case.
- Do not get water on the electronics components.
- Do not use compressed air to clean.

Disposal Instructions

Disposal of the Gasifier must be carried out in accordance with all (environmental) regulations applicable in your country.

Intended Use

Agilent products must only be used in the manner described in the Agilent product user guides. Any other use may result in damage to the product or personal injury. Agilent is not responsible for any damages caused, in whole or in part, by improper use of the products, unauthorized alterations, adjustments or modifications to the products, failure to comply with procedures in Agilent product user guides, or use of the products in violation of applicable laws, rules or regulations.

Recycling the Product

For recycling, contact your local Agilent sales office.



1 Safety Information
Recycling the Product

2

Introduction

Introduction 14

Specifications 15

Principle of Operation 16

This chapter describes the working theory of the Agilent Gasifier, the gasifier capabilities, some of the important features of the system and the hardware components.

Introduction

The Agilent GC gasifier is designed to enable flash vaporization of liquefied gases as a means of sample pretreatment before the gas chromatographic analysis. When vaporizing liquefied samples, it is important to understand the difference between evaporation and vaporization. Evaporation occurs gradually with an increase in temperature, while vaporization occurs with a pressure drop. For a mixed sample with low and high boiling points (bp), evaporation will allow low bp molecules to gasify first and travel on toward the GC while the high bp molecules remain behind in the liquid phase, resulting in fractionation. It will no longer accurately represent the samples in the cylinder.

To preserve the sample's composition from liquid state to gasified state, the Agilent gasifier uses a pressure reducing regulator that can create a severe and sudden pressure drop for high-pressurized liquid passing its orifice to ensure all compounds vaporize at the same time. This pressure reducing regulator can handle inlet pressures up to 1000 psi, and the outlet pressure is factory set to 12 psi +/-2.5 psi (a safe pressure to protect the micro GC injector die). It enables to provide a consistent pressure output for samples of different pressures, which is critical to produce reproducible GC performance. At the same time, both the regulator and the transfer line are heated to prevent condensation. The output flow can be adjusted via a needle valve. The tubing in the flow path are deactivated to avoid adsorption of active components. Adjusting three key variables – temperature, pressure, and flow – can help ensure proper vaporization and an accurate analytical result.

The GC Gasifier is powered by an external power adapter, and it is controlled by the gas chromatograph (GC) through a USB serial cable. Main components of GC Gasifier include:

- Two inlets for either gaseous or liquefied samples, switchable by a manual 2 position 3 way valve
- A heated regulator (the vaporizer), with a temperature set and controlled by the GC and displayed in GC software
- A heated transfer line, maintained at a constant 100 °C
- A mechanical needle valve for purging in the vent line. Users need to manually turn on/off the valve to start and end the purging.
- A mechanical needle valve for gas flow adjustment in the sample line. Users need to manually adjust the gas flow entering GC as needed.

Gasifier parameters are listed in the following table:

Table 1 Gasifier parameters

Parameter	Status
Vaporizer	ON
	OFF
	Temperature (in the range of 30 °C and 150 °C, default at 100 °C)
Transfer Line	ON
	OFF
	Temperature (Fixed at 100 °C)

When used with the Agilent 990 Micro GC, the gasifier mounts to the side of the Micro GC and the transfer line connects directly to the front inlet.

When used with the Agilent 8860 or 8890 GC, the GC Gasifier mounts adjacent to the back inlet.

Specifications

Table 2 Specifications

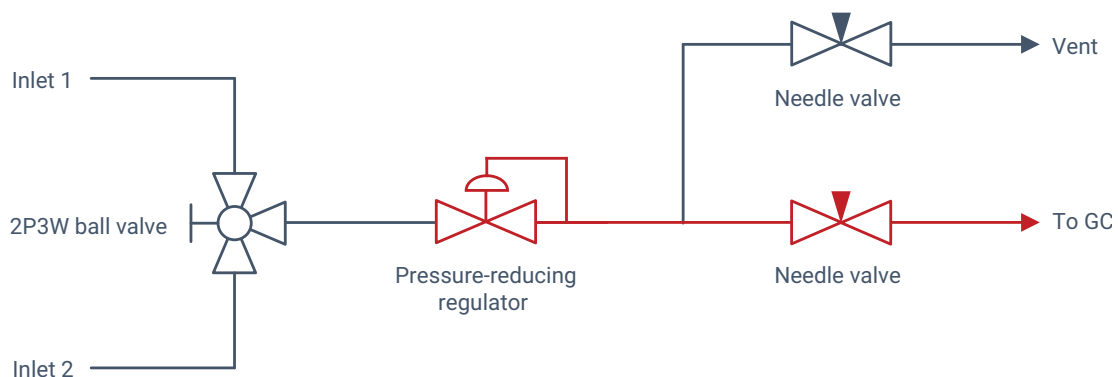
Feature	Specifications
General	Heated pressure-reducing regulator.
Operation temperatures	Regulator 150 °C +/- 1 °C Transfer line 100 °C +/- 1 °C
Sample input pressure/purge pressure	1,000 psi / 7,000 kPa maximum
Delivery pressure to GC	12 +/- 2.5 psi at 25 °C using 80 psi N ₂ as calibration gas and output flow adjusted to 30 ml/min with vent closed.
Repeatability	8890: C2~C5 ≤1%, C6+ ≤2% 8860: ≤2% 990: C2~C5 ≤1%, C6+ ≤2%
Concentration range	50 ppm to 100%
Sample carry-over	< 1% (500 ppm hexane after N ₂ purging 2 minutes with vent flow 150 ml/min, transfer line flow 20 ml/min)
Size	149.5 mm × 94.5 mm × 112.2 mm (length × width × height)
Weight	1.8 kg
Electrical supply	12 V, 65 W maximum
Storage Environmental Requirements	With 8890/8860: <ul style="list-style-type: none"> Humidity: 5% to 95% RH (noncondensing) Temperature: -40 to +70 °C With 990: <ul style="list-style-type: none"> Humidity: 10% to 95% RH (noncondensing) Temperature: -40 to +70 °C
Operating Environmental Requirements	With 8890/8860: <ul style="list-style-type: none"> Humidity: 5% to 95% RH (noncondensing) Temperature: 15 to +35 °C Maximum altitude: 4,615 meters above sea level (2000 meters for Japan, Korea, Australia and New Zealand) With 990: <ul style="list-style-type: none"> Humidity: 10% to 95% RH (noncondensing) Temperature: 0 to +50 °C Maximum altitude: 2,000 meters above sea level

NOTE

The Gasifier is intended for indoor use. Protect the Gasifier from corrosive chemicals, gases, dust, or particulate accumulation. The Gasifier should also be protected from the direct venting from air conditioners, heaters, furnaces, or fans.

Principle of Operation

Flow path diagram



Note: 2P3W = 2-position 3-way, red color denotes heated parts.

Figure 1. Gasifier internal flow paths

Hardware description

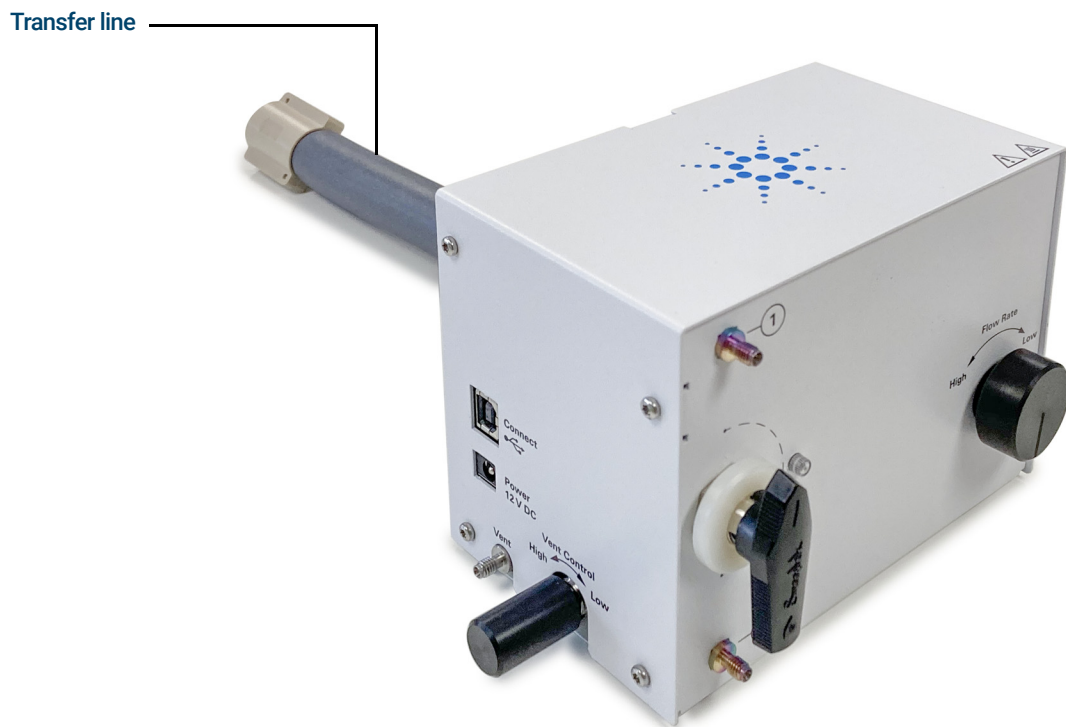


Figure 2. GC Gasifier

2 Introduction
Hardware description

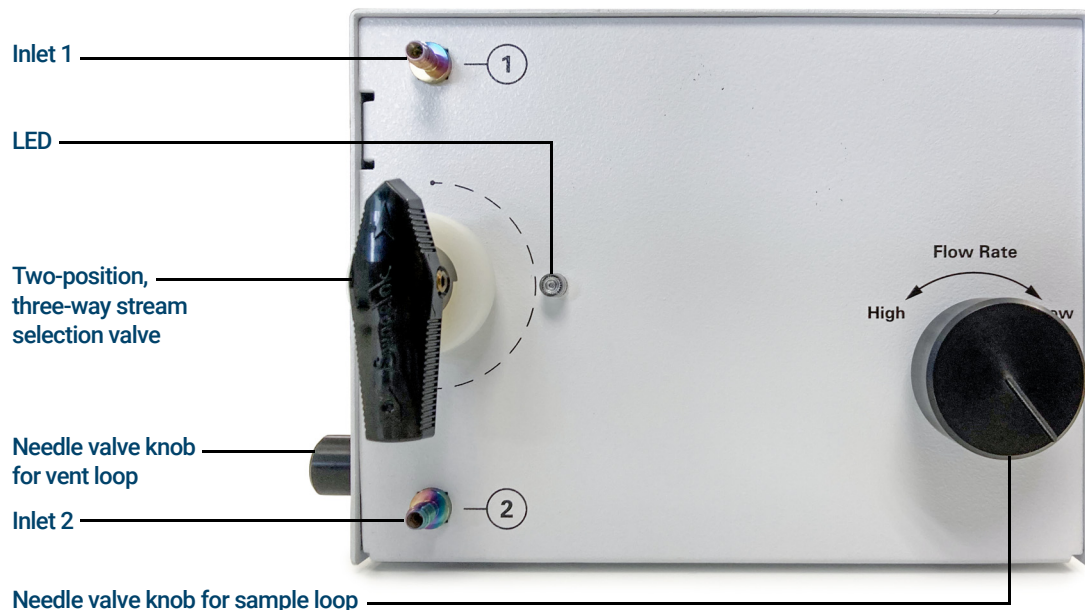


Figure 3. Inlet side (front view) of the GC Gasifier

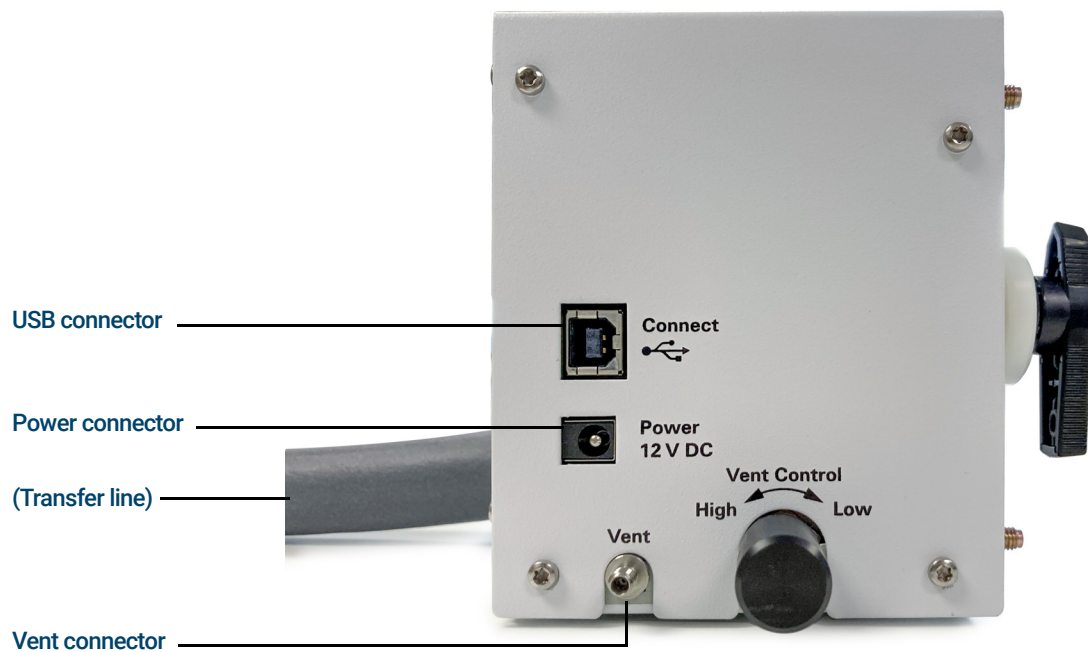


Figure 4. Vent side (left view) of the GC Gasifier

2 Introduction
Hardware description

3

Installation for 8860 GC and 8890 GC

Before you begin 20

Installation 22

Before you begin

Compressed liquid/gas sample cylinder safety

The Gasifier assists in the handling of high pressure liquid and gas samples. Make sure you are familiar with the safe use of compressed sample cylinders.

Check ventilation condition

For safety and environmental protection, make sure the waste coming out of the gasifier and GC vent connects to the ventilation system.

Tools and parts required for installation

- Torx T-20 screwdriver, 1 pcs
- 5/16 inch wrench, 2pcs
- Earthing pipe, P/N G3535-20038, 1pcs
- Gasifier mounting bracket, P/N G3535-00032, 1pcs
- Screws M4*8, P/N 0515-2113, 3pcs
- Screws M4*40 (long), P/N 0515-2195, 1pcs
- Screws M4*18 (short), P/N 0515-3034, 2pcs
- Cable Clamp, P/N 1400-1820, 2pcs
- Washer, P/N 2190-0599, 4pcs
- Union, P/N 0100-0124, 1pcs
- Filter Kit, P/M G3535-60008, 1pcs
- USB Cable, P/N 8121-3060, 1pcs
- Core Ferrite, P/N 9170-2626, 1pcs

Check compatibility to the GC system

The gasifier accessory installs on top of the back inlet. It is not compatible with:

- An ALS tray
- An injector mounted in the back position
- Any other accessory that installs over the back inlet

Hardware

The gasifier assumes the use of a gas sampling valve and valve box. If not present, install and verify proper operation before installing the gasifier.

3 Installation for 8860 GC and 8890 GC

Check compatibility to the GC system

Firmware and software

The gasifier requires GC firmware version 2.1.x or greater. To check the GC firmware version:

8890: At the touchscreen, go to **Settings > About**.

8860: The firmware version is displayed at the bottom of the home screen.

To get the latest firmware version or the Agilent GC Firmware Update Utility, visit the Agilent web site at www.agilent.com, or contact your Agilent service representative.

If using an Agilent Chromatography Data System, such as OpenLab, the gasifier requires GC Drivers version 3.3 or greater. Update the GC Drivers in the data system before beginning.

The driver will support connection to/communication with the following platforms:

- OpenLab CDS 2.1-2.5 (VL)
- OpenLab ChemStation C.01.07-C.01.10 (VL)
- OpenLab CDS EZChrom A.04.06-A.04.09 (VL&COMPACT)
- GC/MS MassHunter Acquisition B.10.0
- EZChrom Elite 3.3.2 SP2

Installation

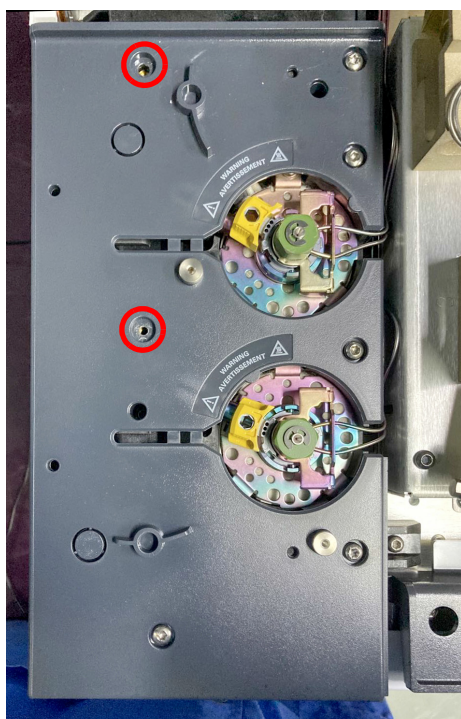
This procedure explains how to install the Agilent GC Gasifier on the 8860 or 8890 Gas Chromatograph (GC).

WARNING

Refer to the Safety Manual that came with your GC for hazards that may exist when maintaining your instrument. Access the manual using the Browser Interface or download it from www.agilent.com.

Prepare the GC

- 1 If an MS is installed, cool down and vent the MS. Refer to the MSD's Operating Manual for details.
- 2 On the GC touchscreen (8890 only) or in the browser interface, navigate to **Maintenance > Instrument > Perform Maintenance**, and put the GC into **Maintenance Mode**. Alternately, set the GC oven temperature to 40 °C. Turn off the inlet, detector, valve box, and other heaters.
- 3 When the GC has cooled to a safe handling temperature, turn off the GC and unplug the power cord.
- 4 If present, remove the back injector and mounting post.
- 5 Remove two Torx T-20 screws from the inlet cover. Retain the screws for later use.

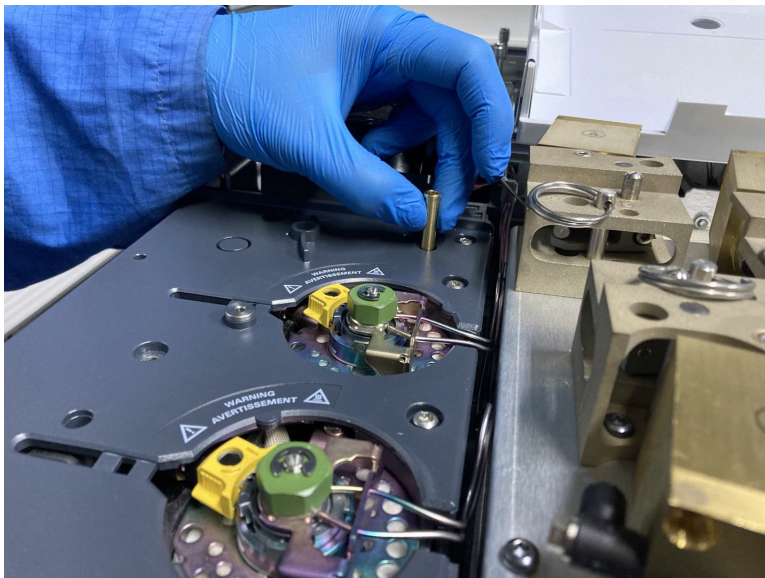


- 6 Remove the Pneumatic top cover from 8860/8890 GC by pressing the two buttons on the left and right, place it aside.
- 7 Raise the GC detector cover.

3 Installation for 8860 GC and 8890 GC
Install the Gasifier mounting bracket

Install the Gasifier mounting bracket

- 8** Insert the earthing pipe (P/N G3535-20038) into the hole.



- 9** Install the gasifier mounting bracket (P/N G3535-00032) on top of the 8890/8860 back inlet: using the two short screws (M4*18) provided in the installation kit at position 1 and 2, using the long screw (M4*40) with a washer at position 3 that has earthing pipe inserted, tighten those three screws by the Torx T-20 screwdriver.

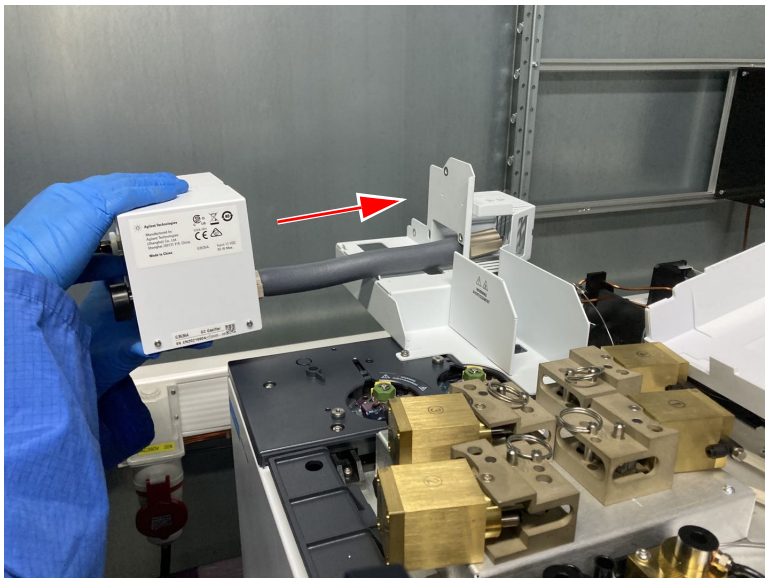


3 Installation for 8860 GC and 8890 GC

Install the Gasifier

Install the Gasifier

- 1 Insert the gasifier transfer line end into the square hole on the gasifier mounting bracket (P/N G3535-00032).



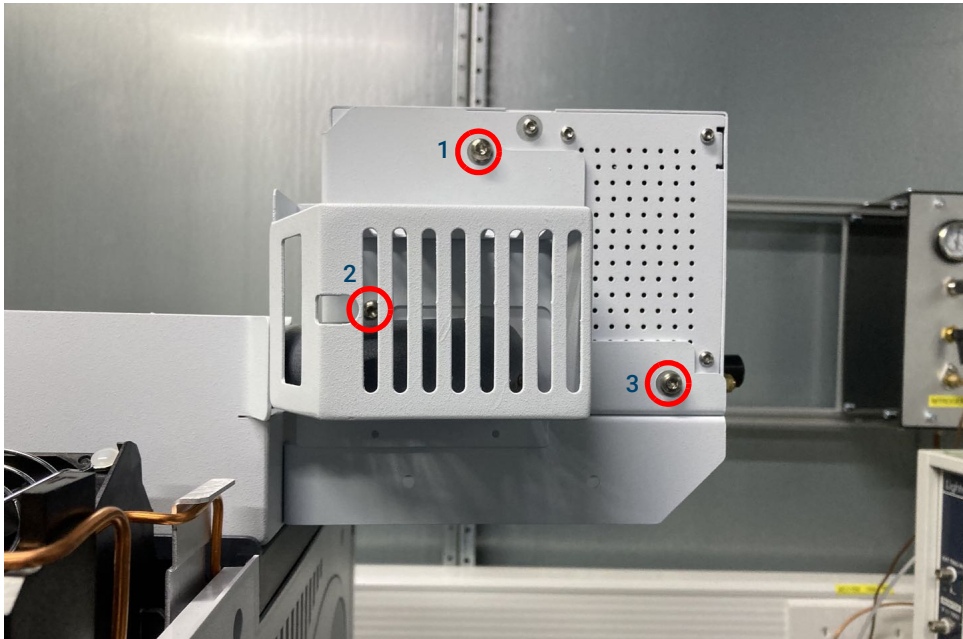
- 2 Bend the transfer line as shown, then carefully guide the transfer line through the guiding enclosure.



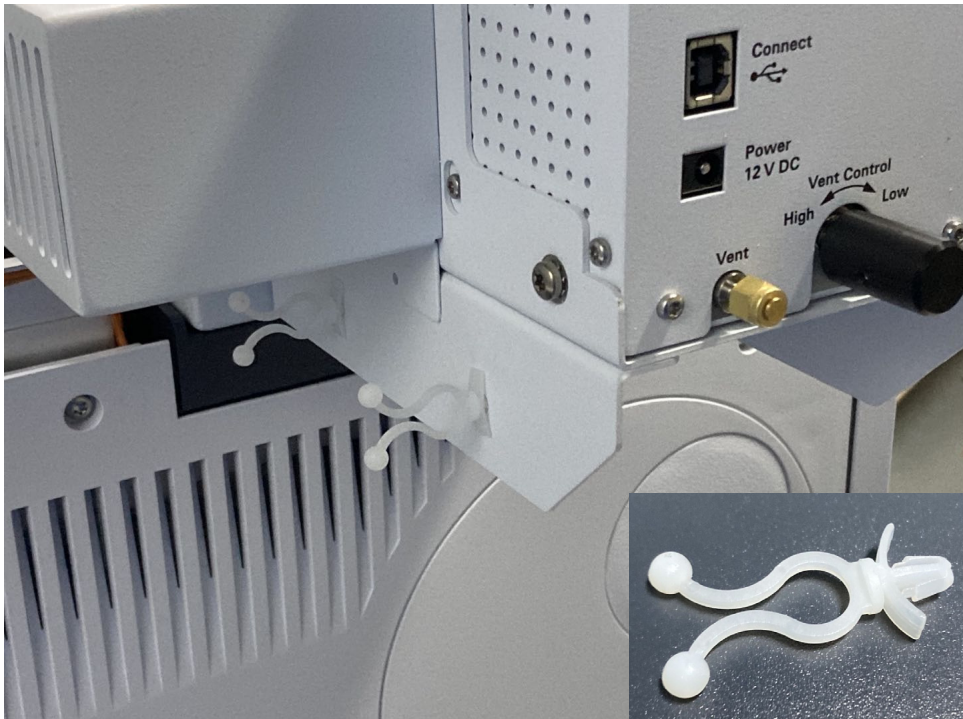
3 Installation for 8860 GC and 8890 GC

Install the Gasifier

- 3 Using a Torx T-20 screwdriver, secure the Gasifier to the mounting bracket with three (M4*8mm) screws and three washers.



- 4 Install the two cable clamps into the hole on the back of the gasifier mounting bracket (P/N G3535-00032).



3 Installation for 8860 GC and 8890 GC

Connect the Gasifier transfer line to the GC

Connect the Gasifier transfer line to the GC

- 1 Bend the “Sample In” 1/16-inch tubing connected to the gas sampling valve as shown below. To avoid cold points, the “Sample In” tubing should be as short as possible. If needed, cut the “Sample In” 1/16-inch tubing with pipe cutting pliers. Ensure that the end of the cutting is clean, without burrs.
- 2 Connect the gasifier transfer line and the GC “Sample In” 1/16-inch tubing using the union (P/N 0100-0124), tighten the two nuts with a 5/16 open end wrench.



Install the external filter unit

The Filter Kit (P/N G3535-60008) is recommended as a prefilter for the Agilent Gasifier. The filter kit contains Filter Assy (filter body and 7 μm sintered filter element), 1/8-inch SST Tube with 1/16-inch Reducer, UltiMetal Coating SST Tube, and Ferrule Set & Nut.

Whenever possible, remove particulate contaminants from samples introduced to the Gasifier.

Figure 5 illustrates the external sample filter assembly structure.

Agilent advises replacement of the external filter unit at regular intervals (an orderable sintered filter element P/N: 3150-0404). To install the sintered filter element, the male part of the Filter Assy must be hand-tightened into the female part of the Filter Assy, followed by a 1/8 turn with a 9/16-inch wrench. Orient the arrow on the female part of the filter towards the sample inlet. The following two figures demonstrated the Filter Assy components, how it is installed, and how to replace the sintered filter element.

3 Installation for 8860 GC and 8890 GC

Connect the sample cylinder

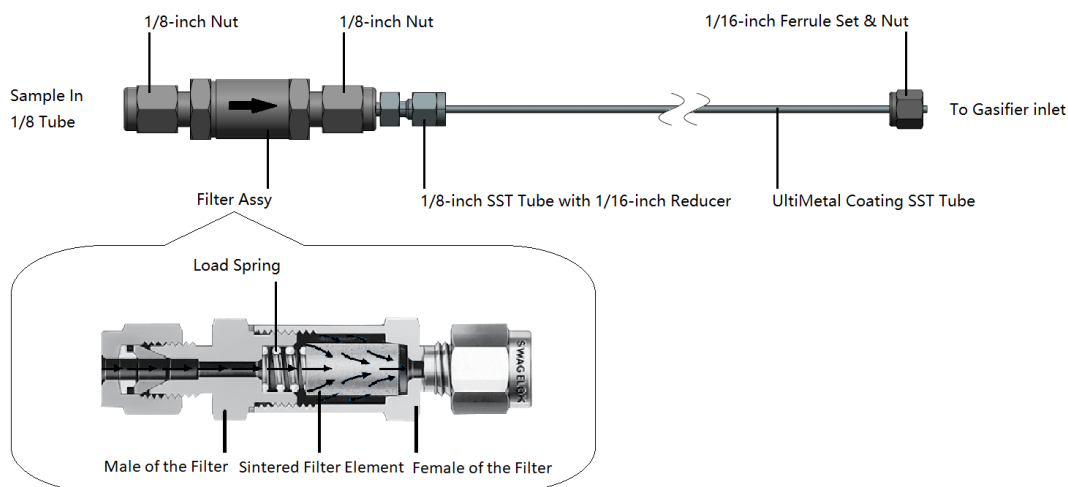


Figure 5. Gasifier External Filter Assembly Structure

Connect the sample cylinder

- 1 Connect the LPG or high-pressure sample to inlet 1 or 2 that has a filter unit installed using a 5/16 inch wrench.
- 2 Connect a long vent line to the VENT outlet to safely guide hazardous fumes to a fume hood or other appropriate vent.

Connect the power cord and USB cable

- 1 Lock the Core Ferrite (P/N 9170-2626) to the USB cable, about 50 cm away the USB connector, Gasifier side.
- 2 Connect the gasifier USB cable to the side of the gasifier and to either USB1 or USB2 on the GC.
- 3 Insert the USB cable and power cable into the two cable clamps and lock the clamps.



3 Installation for 8860 GC and 8890 GC

Update the GC Firmware and driver

- 4 Connect the power connector to the gasifier, and then plug the power cord into an appropriate power source.
- 5 Plug in the GC power cord and turn on the GC.

Update the GC Firmware and driver

The Agilent gasifier requires the minimum firmware and driver revisions listed on [page 21](#). Download the latest firmware and driver revisions from the Agilent web site at www.agilent.com/chem, or contact your local Agilent sales representative.

NOTE

Failure to update the firmware and driver will result in failing to recognize and control the gasifier.

Configuring the GC and Data System

Agilent OpenLab CDS, Agilent OpenLab ChemStation, Agilent GC/MS MassHunter Acquisition, and Agilent OpenLab CDS EZChrom Elite data systems contain information about the sampling equipment in use. When gasifier hardware installation is complete, update the GC configuration. See your data system documentation for details.

4

Installation for 990 Micro GC

Before you begin 30

Installation 31

Before you begin

Compressed liquid/gas sample cylinder safety

The Gasifier assists in the handling of high pressure liquid and gas samples. Make sure you are familiar with the safe use of compressed sample cylinders.

Check ventilation condition

For safety and environmental protection, make sure the waste coming out of the gasifier and GC vent connects to the ventilation system.

Tools and parts required for installation

- Torx T-20 screwdriver, 1 pcs
- 5/16 inch wrench, 1 pcs
- Filter Kit, P/N G3535-60008, 1 pcs
- Gasifier mounting bracket, P/N G3535-00016, 1 pcs
- Screws M4*8, P/N 0515-2113, 3 pcs
- USB Cable, P/N 8121-3060, 1 pcs
- Core Ferrite, P/N 9170-2626, 1 pcs

Check compatibility to the GC system

Before connecting the gasifier, check that your system meets the following software requirements.

Firmware and software

The gasifier requires micro GC firmware version 1.04 or greater.

The driver will support connection to/communication with the following platforms:

- OpenLab CDS 2.1-2.5 (VL)
- OpenLab ChemStation C.01.06-C.01.10 (VL)
- OpenLab CDS EZChrom A.04.06-A.04.09 (VL&COMPACT)

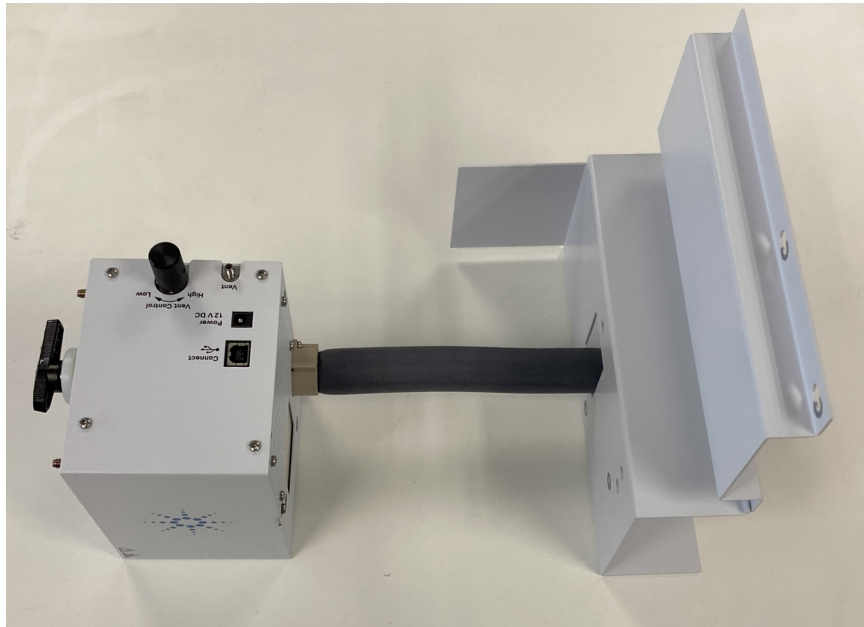
Leak test

To start up the Gasifier for the first time, or after a long idle period, Agilent advises you do a leak check for safety purposes. See **Checking for Leaks** on page 53 of the **Troubleshooting** section for a detailed procedure.

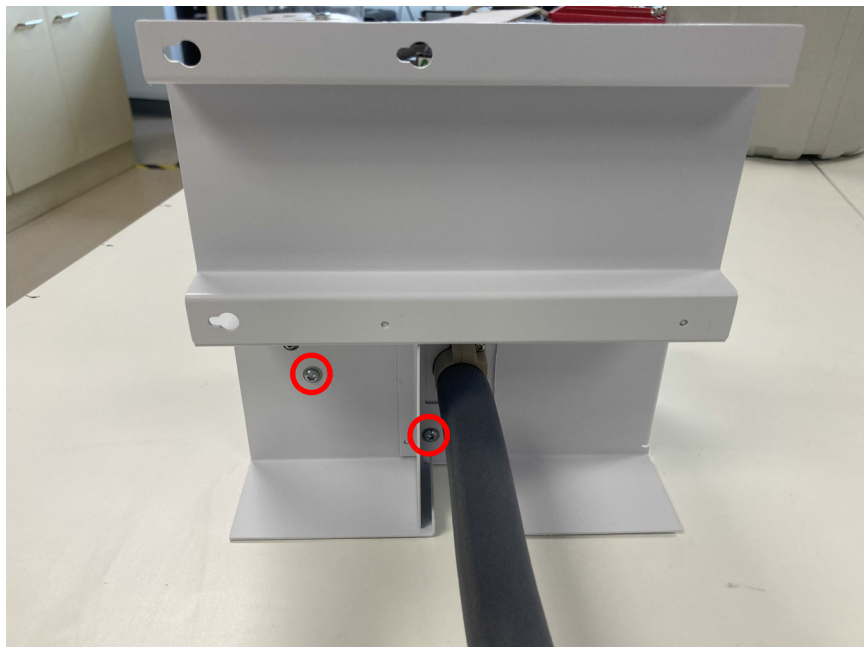
Installation

Install the mounting bracket and gasifier

- 1 Place the gasifier and the mounting bracket side-by-side in the position shown below, and align the transfer line to the hole in the bracket.



- 2 Use two Torx T-20 screws to mount the Gasifier II to the bracket.

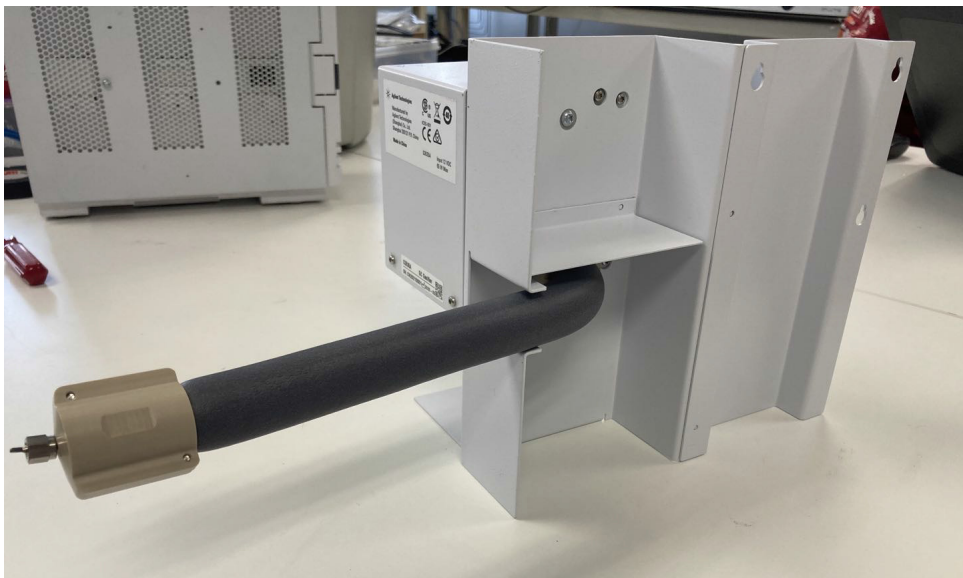


4 Installation for 990 Micro GC
Install the mounting bracket and gasifier

- 3** Attach three Torx T-20 screws (P/N 0515-2113, formerly P/N CP86757) to the left side of the 990 Micro GC, leaving them loose enough that the bracket can be installed.

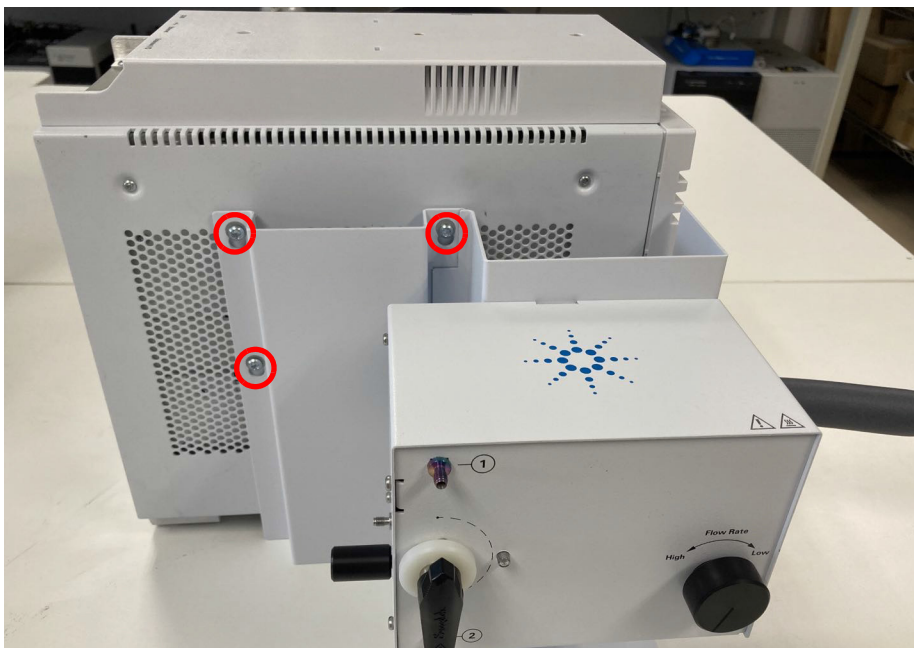


- 4** Bend the transfer line into the slit of the bracket such that the bracket can be attached to the left side of the 990 Micro GC.



4 Installation for 990 Micro GC
Connect the transfer line to the GC

- 5 Align the holes in the mounting bracket to the screws on the side of the GC. Slide the mounting bracket and gasifier into place, then tighten the three Torx T-20 screws to secure the gasifier.



Connect the transfer line to the GC

Connect the gasifier transfer line to the 990 Micro GC inlet directly using a 5/16 inch wrench.



Figure 6. Transfer line connected to the 990 Micro GC.

Use the Micro GC interface (Web UI, Local UI, or OpenLab) to set proper regulator & transfer line temperatures.

Install the external filter unit

The Filter Kit (P/N G3535-60008) is recommended as a prefilter for the Agilent Gasifier. The filter kit contains Filter Assy (filter body and 7 μ m sintered filter element), 1/8-inch SST Tube with 1/16-inch Reducer, UltiMetal Coating SST Tube, and Ferrule Set & Nut.

Whenever possible, remove particulate contaminants from samples introduced to the Gasifier. **Figure 7** illustrates the external sample filter assembly structure.

Agilent advises replacement of the external filter unit at regular intervals (an orderable sintered filter element P/N: 3150-0404). To install the sintered filter element, the male part of the Filter Assy must be hand-tightened into the female part of the Filter Assy, followed by a 1/8 turn with a 9/16-inch wrench. Orient the arrow on the female part of the filter towards the sample inlet.

Figure 7 and **Figure 8** show the Filter Assy components, how it is installed, and how to replace the sintered filter element.

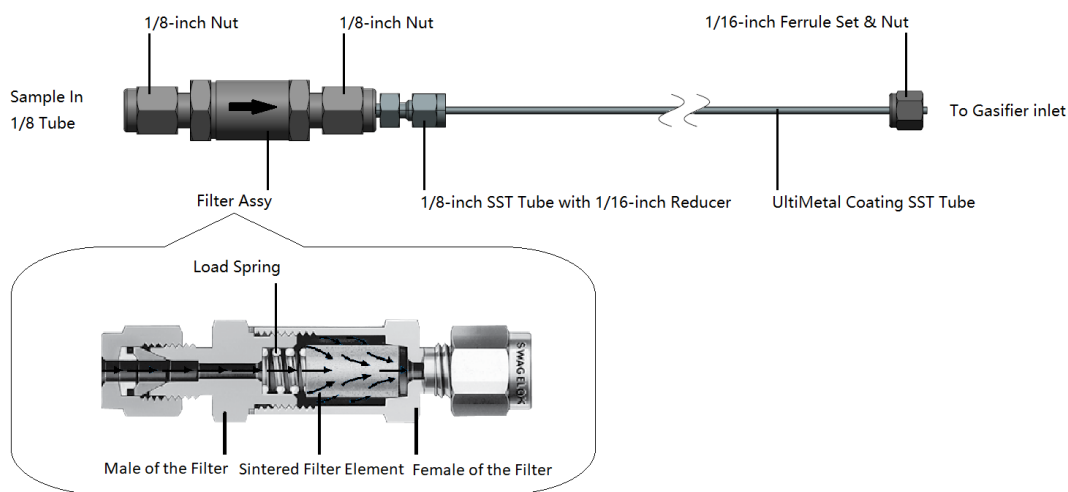


Figure 7. Gasifier External Filter Assembly Structure

4 Installation for 990 Micro GC

Connect the sample cylinder

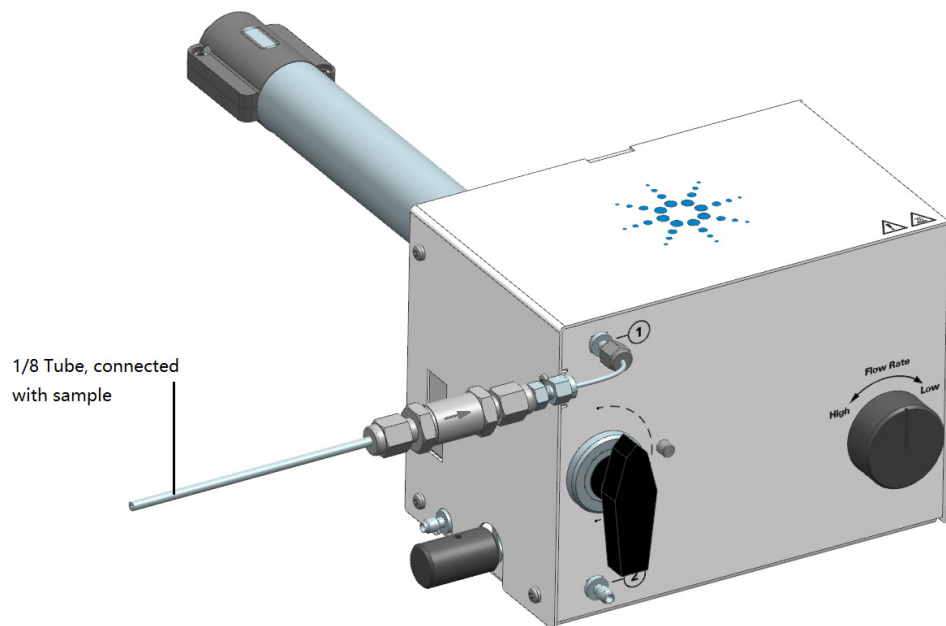


Figure 8. Gasifier integrated with External Filter Assembly

Connect the sample cylinder

- 1 Connect the LPG or high-pressure sample to inlet 1 or 2 socket using a 5/16 inch wrench.
- 2 Connect a long vent line to the VENT outlet to safely guide hazardous fumes to a fume hood or other appropriate vent.
- 3 After all connections are completed, wait for the temperature setting to be ready. The process takes approximately 40 minutes for the vaporizer to stabilize at 150 °C from room temperature, and approximately 15 minutes for the transferline to stabilize at 100 °C from room temperature.

4 Installation for 990 Micro GC

Connect the power cord and USB cable

Connect the power cord and USB cable

- 1 Connect the gasifier USB cable to the side of the gasifier and to an open USB port on the Micro GC.
- 2 Connect the power connector to the gasifier, and then plug the power cord into an appropriate power source.
- 3 Plug in the GC power cord and turn on the GC.

Update the GC Firmware and driver

The Agilent gasifier requires the minimum firmware and driver revisions listed on [page 30](#).

Download the latest firmware and driver revisions from the Agilent web site at www.agilent.com/chem, or contact your local Agilent sales representative.

NOTE

Failure to update the firmware and driver will result in failing to recognize the gasifier.

Configuring the GC and Data System

Agilent OpenLab CDS, Agilent OpenLab ChemStation, Agilent OpenLab CDS EZChrom Elite data systems contain information about the sampling equipment in use. When gasifier hardware installation is complete, update the GC configuration. See your data system documentation for details. [Figure 9](#) shows an example for updating Agilent OpenLab CDS configuration.

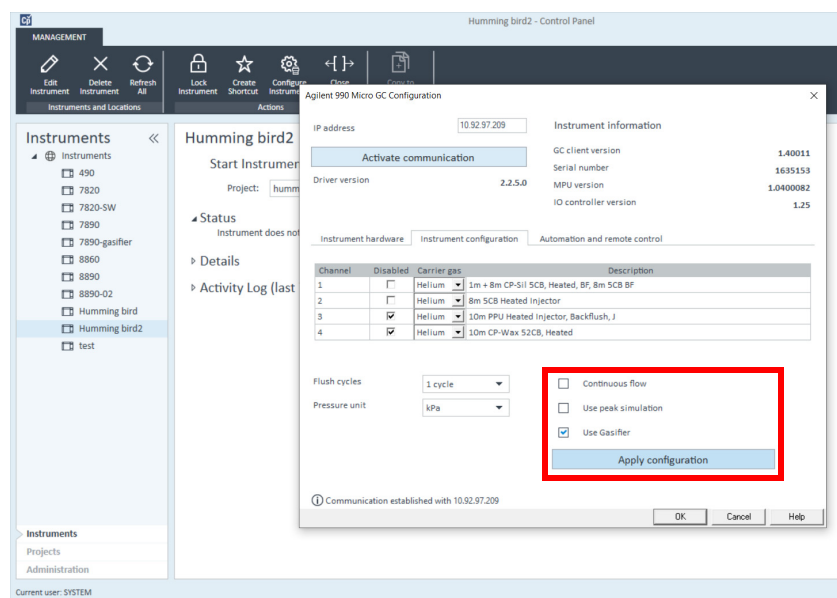


Figure 9. Agilent OpenLab CDS configuration (example).

- 1 Select the instrument from the **Instruments** menu
- 2 From the Agilent OpenLab CDS configuration window, check **Use Gasifier**
- 3 Click **Apply configuration**
- 4 Reboot the 990 micro GC

5

Operation

Gasifier Operation and Status 38

8860 and 8890 GC Operation 39

990 Micro GC Operation 43

Gasifier Operation and Status

The gasifier has a status light indicating its readiness as described in **Table 3**. The detailed gasifier status are displayed on the GC touchscreen, the Browser Interface, and an Agilent data acquisition software.

Gasifier status displays in the **Status** window with the following information:

- Vaporizer temperature and readiness
- Transfer line temperature and readiness
- Warnings and errors

Table 3 Gasifier Status light definitions

Light	Indication
Green	Gasifier is ready for use: All heated zones reach the setpoint
Orange	Gasifier is not ready for use: Heated zones still not reaches the setpoint, or are stabilizing.
Red	Gasifier has recoverable or critical error.

Gasifier parameters

Gasifier vaporizer and transfer line temperature can be set on following platforms:

- An Agilent data acquisition software compatible to the gasifier
- 8890 touchscreen
- 8890/8860 Browser Interface

8860 and 8890 GC Operation

Create the checkout method

- 1 On the touchscreen, or the browser interface, or the data acquisition software, set the parameters shown in **Table 4**.
- 2 Save the new method.

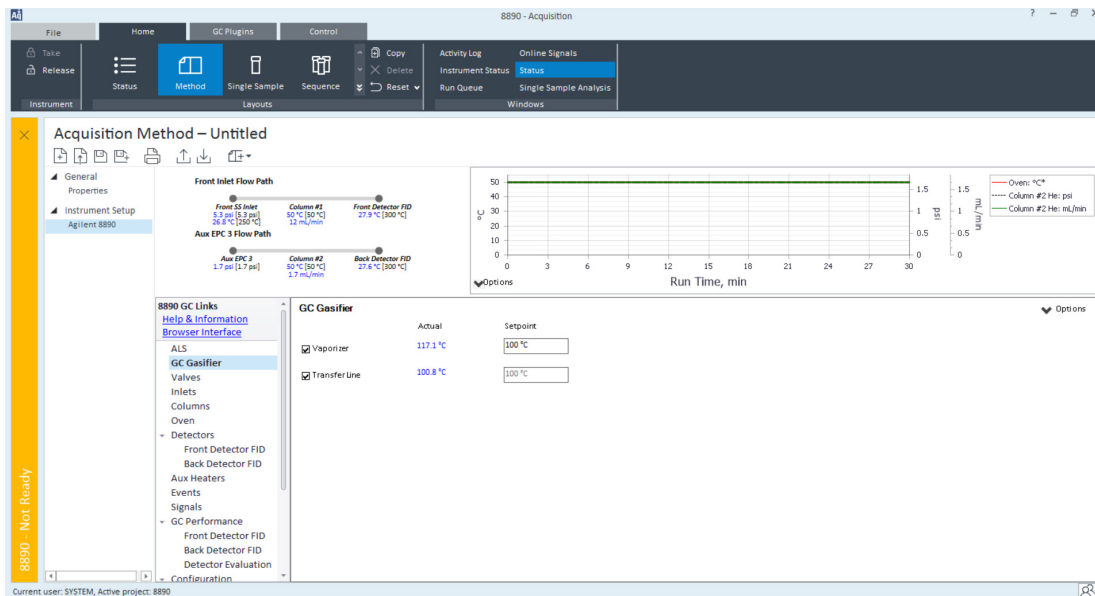


Figure 10. Setting Gasifier temperature on OpenLab CDS.

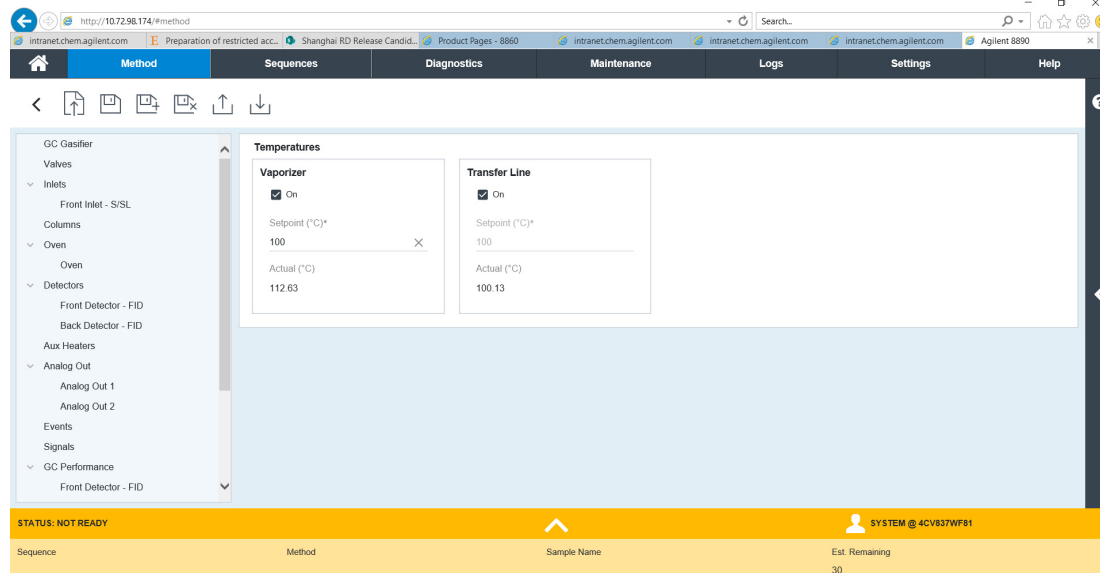


Figure 11. Setting Gasifier temperature on Browser interface.

5 Operation

Run a sample analysis

NOTE

If using the browser interface, save the gasifier checkout method using a new name.

Run a sample analysis

- 1 After all the connections are made, send checkout method to GC. It takes about 40 minutes for gasifier vaporizer stabilizing at 150°C from room temperature, 15 minutes for gasifier transfer line stabilizing at 100°C from room temperature.
- 2 Open the sample cylinder valve.
- 3 Open the VENT needle valve, and allow to flush for two to three minutes, then check the sample vent flow at the VENT-OUTLET.
- 4 Open the SAMPLE needle valve, and adjust the flow rate through the GC sample loop as needed, the typical flow rate is around 20~40 mL/min.
- 5 Close the Vent needle valve. The default minimum needle valve output flow is ~4 to 10 ml/min. If you want to totally shut off the vent flow, use an end cap provided in the installation kit.

CAUTION

Do not turn the knob with excessive force in order to protect the needle valve



- 6 Start the GC run or sequence.

NOTE

Monitoring the various flows by means of a flow meter, or equivalent, will help in setting the optimal conditions.

NOTE

In case of a high-pressure gas, the same procedure applies.

- 7 After finishing the analysis, close the sample source and open the vent to quickly purge the residue.

5 Operation

Typical operating conditions

- 8 Disconnect the sample source.
- 9 Before switching to another sample, or putting the gasifier into idle, connect an inert gas such as nitrogen (N₂) to purge the gasifier for 2 to 3 minutes to remove any residual sample from the gasifier. If a filter or quick connector attached, purge the system at least 5 minutes.

Typical operating conditions

When using the gasifier, be sure to maintain sufficient temperatures to prevent sample re-condensation in the gas lines.

An example method is provided in **Table 4**.

Table 4 Typical checkout conditions for C1~C6 LPG hydrocarbons

Parameter	Value
Gasifier	
Temperature	150 °C
Transfer line heater	On
Gas Sampling Valve	
Loop volume	0.25~1 mL
Valve box temperature	150 °C
Run time events	At 0.01 min.: Valve ON At 0.5 min.: Valve OFF
Column	
Column	19093P-M23 (HP-AL/M: 30m×0.53mm ID×15µm film)
Column flow	5 mL/min
Column mode	Constant flow
Split/splitless inlet	
Carrier gas	Helium
Liner	5190-2295
Temperature	200 °C
Mode	Split
Split ratio	40:1
Septum purge	3 mL/min
Gas saver	Off
Oven	
Oven equilibration	0.5 min
Initial temp	60 °C
Initial time	0
Rate 1	15 °C/min
Final temp	180 °C
Final time	2 min

5 Operation

Typical operating conditions

Table 4 Typical checkout conditions for C1~C6 LPG hydrocarbons (continued)

Parameter	Value
Detector (FID)	
Temperature	300 °C
H ₂ flow	30 mL/min
Air flow	300 mL/min
Makeup flow (N ₂)	25 mL/min
Lit offset	Typically 2 pA
Signal	
Data rate	5 Hz for channel 1, 20 Hz for channel 2

990 Micro GC Operation

Create the checkout method

- 1 On the data acquisition system such as OpenLab CDS, set the parameters shown in **Table 5**.
- 2 Save the method.

Run a sample analysis

- 1 After all the connections are made, send checkout method to GC. It takes about 40 minutes for gasifier vaporizer stabilizing at 150°C from room temperature, 15 minutes for gasifier transfer line stabilizing at 100°C from room temperature.
- 2 Open the sample cylinder valve.
- 3 Open the VENT needle valve, and allow to flush for two to three minutes, then check the sample vent flow at the VENT-OUTLET.
- 4 Open the SAMPLE needle valve, and adjust a flow through the Micro GC of 10-20 mL/min.
- 5 Close the Vent needle valve. The default minimum needle valve output flow is ~4 to 10 ml/min. If you want to totally shut off the vent flow, use an end cap provided in the installation kit.

CAUTION

Do not turn the knob with excessive force in order to protect the needle valve



- 6 Start the Micro GC run or sequence.
- 7 After finishing the analysis, close the sample source and open the vent to quickly purge the residue.
- 8 Disconnect the sample source.

5 Operation

Typical operating conditions

- 9 Before switching to another sample or put the gasifier into idle, connect an inert gas such as nitrogen (N₂) to purge the gasifier for 2 to 3 minutes to purge any residual sample from the gasifier. If a filter or quick connector attached, purge 5 minutes.

Typical operating conditions

When using the gasifier, be sure to maintain sufficient temperatures to prevent sample re-condensation in the gas lines.

An example method is provided in **Table 5**.

Table 5 Typical micro GC method

Parameter	Value
Carrier gas	Helium
Description	Channel 1, 8m CP-Sil 5CB, Heated, BF
Injector temperature	110 °C
Injection time	40 ms
Backflush time	0.0 s
Column temperature	100 °C
Pressure mode	Static
Initial pressure	150.0 kPa
Detector state	On
TCD temp limit check	On
Invert signal	Off
Sensitivity	Auto
Acquire channel	On
Sampling frequency	100 Hz
Run time	80 s
Acquisition delay	0 s
Stabilizing time	5 s
Sample time	30 s
Continuous flow	Off
Flush cycles	1 cycle

6

Maintenance and Troubleshooting

Periodic Maintenance 46

Troubleshooting 47

Periodic Maintenance

This section contains some suggestions for ensuring good performance of the gasifier. The maintenance interval varies with the use of the instrument.

WARNING

User should not open the heating box to adjust or maintain the regulator or other parts.

On an occasional basis:

- Check the gasifier vent/output flow for a possible leak (see [Checking for Leaks](#)) or block (see [Checking for Blockage](#)).
- If filter is used, replace it regularly
- Make sure the mounting bracket screws are tight.
- Be sure all cables are securely connected.
- Calibrate the gasifier. The consistent output pressure is critical for reproducible analysis and accurate quantitation. If your analysis needs be done regularly, it is recommended to verify the system by using your calibration standard weekly to establish the experimental relative response factor set. The results should be consistent, otherwise it may indicate there is pressure drifting and/or your gasifier has leak or block issue. If your test is only done occasionally, analyze the calibration standard before each set of analysis

The GC tracks gasifier usage. To view the current statistics, go to the **Maintenance** tab in the Browser Interface (or GC touchscreen for 8890).

Maintenance related items like Early Maintenance Feedback (EMF) and specific GC Gasifier hardware items with dedicated procedures will consist of the following, located under

Maintenance > GC Gasifier

- Vaporizer
- Transfer Line

Troubleshooting

Chromatographic symptoms	47
Gasifier Not Ready Symptoms	51
Thermal Fault	52
Electronics Troubleshooting GC Power-On and Communication Symptoms	53
Checking for Leaks	53
Checking for Blockage	54

Chromatographic symptoms

Success in flash vaporizing of pressurized liquid sample is largely a matter of ensuring the sample fluid remains at the right flow, pressure and temperature. Controlling those three conditions might be enough to eliminate many of the problems jeopardizing the subsequent GC result.

Peak areas not repeatable

- Check if the gasifier temperature zones are stabilized.
- Check if the flushing time is long enough to fill the gas sampling loop with representative sample
- Check peak area variation patterns of the run replicates: if the response change of low boiling point compounds and high boiling point compounds are out phased, it means fractionation happens. It can be caused by:
 - Low sample bomb pressure, samples are already partially vaporized in the cylinder. A partially filled sample cylinder will lead to discrimination due to evaporation inside the bottle. As a rough guideline, the bomb must be filled with 80% liquid. Increase the sample cylinder pressure (required pressure depends on the partial pressure of the sample constituents).

NOTE

It is strongly recommended that the sample is pressurized to at least 1380 kPa above the vapor pressure of the mixtures at all times.

- Samples are partially vaporized before entering the gasifier. If so, the tubing between the cylinder and gasifier may be cold to touch or even form frost or ice. Agilent Gasifier includes a pressure reducing regulator and flow adjusting needle valve that are essential for flash vaporizing. Please don't add unnecessary needle valve or restrictions not provided in the installation kit between sample cylinder and the gasifier inlet. Such components lead to pressure drop. The sample pressure drop may release a dissolved gas, thus causing the liquid to bubble or foam. Remove those pressure reducing components.
- Gasifier vaporizer temperature is not high enough to fully vaporize high boiling point components. Increase the gasifier vaporizer temperature.
- Check for leaks (See **"Checking for Leaks"** on page 53.)
- If it's not caused by sample or gasifier, it may be caused by GC system. Refer to GC troubleshooting manual to fix the problem.

Contamination or carryover

If your output has contamination or unexpected peaks, do the following:

Isolate the source

- 1 Disconnect the sample cylinder, connect with a N₂ source. Perform a N₂ blank run. If the contamination disappears, the problem may be either in the sample or in the connecting tubing (or in the quick connector or filter that installed between gasifier and sample cylinder).
- 2 Perform a blank run. If the contamination disappears, the problem is in the gasifier.
- 3 If it's caused by GC system, refer to the Troubleshooting section of the GC User Manual for information about how to eliminate the carryover.

Eliminate contamination or carryover caused by gasifier/sample supply

- Check for sample carryover from previous runs, purging the system using N₂ to see if the ghost peaks/carryover go away or get smaller. Make sure the vent outlet is not end capped. Using gas like N₂ to thoroughly purge the whole gasifier system prior to subsequent sample analysis. If necessary, do the following:
 - Increase the gasifier vent flow to assist the purging process.
 - Increase the gasifier vaporizer temperature to 150 °C to help baking out the contaminants
- Check for supply tubing and fitting contamination. Try new or clean filter/quick connector to see if ghost peaks/carryover disappear.
- Try to backflush the system:
 - 1 Disconnect the sample cylinder from the sample inlet, connect a tubing to exhaust vent if needed.

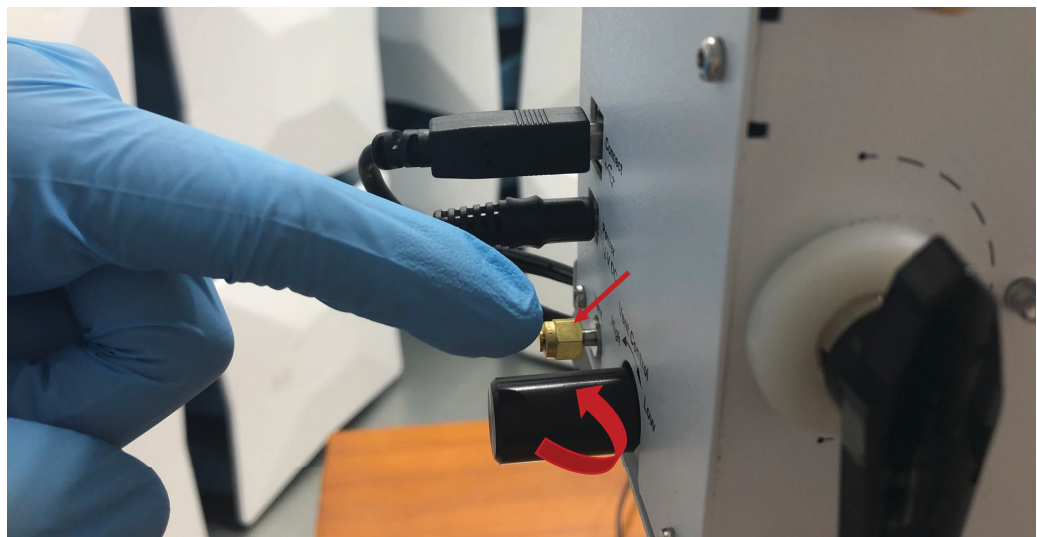


6 Maintenance and Troubleshooting
Chromatographic symptoms

- 2 Adjust the sample-flow needle valve to the maximum.



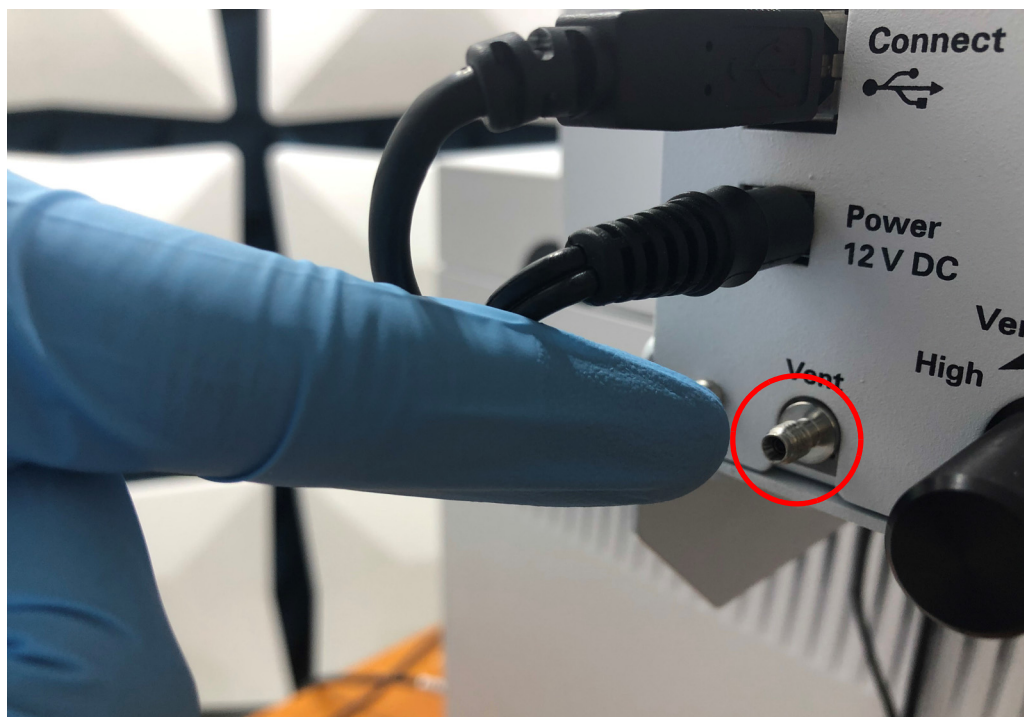
- 3 Remove the vent end cap if installed. Adjust the vent flow needle valve to the maximum.



6 Maintenance and Troubleshooting

Chromatographic symptoms

- 4 Connect a N₂ or Air source less than 14 psi to the vent port to backflush the system. Purge the system for at least 10 minutes. Increase the purge time if needed.



Peaks not displayed/No peaks

- Ensure sample cylinder has sample and/or the sample pressure is high enough.

NOTE

It is strongly recommended that the sample is pressurized to at least 1380 kPa above the vapor pressure of the mixtures at all times.

- Check that the Gasifier 2P3W valve is in the right position.
- Check that the Gasifier flow adjusting needle valve is not totally closed. If there is no flow when sample pressure is high enough and needle valve is not closed, check for Gasifier blockage. (See **“Checking for Blockage”** on page 54.)
- Ensure GC functions normally:
 - Check that the GC gas sampling valve connected to Gasifier functions correctly.
 - Verify the GC detector in use is assigned to a signal.
 - Check the GC column for proper installation.
 - Ensure that the GC column is not plugged. (Refer to the Troubleshooting section of the GC user manual.) Perform column maintenance.
 - Check that the GC detector functions normally. (Refer to the Troubleshooting section of the GC user manual.)
- Check for Gasifier leaks. (See **“Checking for Leaks”** on page 53.)

Low Peak Area or Height (Low Sensitivity)

- Ensure sample cylinder has sample and/or the sample pressure is high enough.

NOTE

It is strongly recommended that the sample is pressurized to at least 1380 kPa above the vapor pressure of the mixtures at all times.

- Ensure GC functions normally (Refer to the “Low Peak Area or Height (Low Sensitivity)” section of the GC User Manual.)
- Check if the vaporized flow coming out the transfer line is too low to provide representative sample within flushing time period. If that's the case, increase the vaporized flow or increase the flushing time. The typical flow range for 88XX series GC is 20~40 ml/min; for 990 micro GC is 10~20ml/min (990 injector has rather large restriction, the flow out of gasifier should be around 100 ml/min to get a 10~20 ml/min flow out of 990 micro GC)
- Check if the vaporizer temperature is set too low, increase the vaporizer temperature if needed
- Check for Gasifier leaks. (See “**Checking for Leaks**” on page 53.)
- If target analytes are chemically active, check if the connection parts between sample cylinder and gasifier are not deactivated. The tubing in the gasifier undergo Agilent proprietary deactivation treatment. When analyzing chemically active components such as H₂S, make sure the sample cylinder and the connections to the gasifier are deactivated.

Larger Peaks Than Expected

- Check that GC is configured with the right loop size and right column's dimensions
- Check the responses of components from low to high boiling points: if the areas of low boiling point compounds and high boiling point compounds are **out phased**, it means fractionation happens. It can be caused by:
 - Low sample bomb pressure, samples are already partially vaporized in the cylinder. If this is the case, increase the sample cylinder pressure.

NOTE

It is strongly recommended that the sample is pressurized to at least 1380 kPa above the vapor pressure of the mixtures at all times.

- Samples are partially vaporized before entering the gasifier. Agilent Gasifier includes a pressure reducing regulator and flow adjusting needle valve that are essential for flash vaporizing. Please don't add unnecessary needle valve or restrictions not provided in the installation kit between sample cylinder and the gasifier inlet. Such components lead to pressure drop. The sample pressure drop may release a dissolved gas, thus causing the liquid to bubble or foam. Remove those pressure reducing components.
- Gasifier vaporizer temperature is too high. The gasifier has a very compact structure. If the vaporizer temperature is too high, the heat may transfer to the sample inlet tubing. Low boiling point components may undergo evaporation before entering vaporizer. Decrease the gasifier vaporizer temperature.
- Carryover effect. (See “**Contamination or carryover**” on page 48.)

Gasifier Not Ready Symptoms

Gasifier Temperatures Never Becomes Ready

To be considered ready, a temperature must be at setpoint ± 1 °C. If a temperature never becomes ready, do the following:

- Check the electrical supply to Gasifier

- Check for a very large heating/cooling source nearby that may interfering the gasifier
- Check for breakage of gasifier cover if vaporizer temperature cannot get ready.

WARNING

Do not open the gasifier cover, contact your Agilent service representative.

- Check for breakage insulation of the transfer line if the transfer line temperature cannot get ready.

Gasifier Never Heats Up

- Check for errors from user interface (Local UI, Web UI, OpenLab, etc.).
- Check for communication between GC and Gasifier.

Gasifier Flow Too Low

- Ensure sample cylinder has sample and/or the sample pressure is high enough to sustain the whole analysis period.

NOTE

It is strongly recommended that the sample is pressurized to at least 1380 kPa above the vapor pressure of the mixtures at all times.

- Check for leaks. (See **“Checking for Leaks”** on page 53.)
- Check for blockage. (See **“Checking for Blockage”** on page 54.)

Gasifier Flow Not Adjustable

- If the needle valve knob can not turn at all, it means the valve is blocked.
- If the needle valve can be turned freely, but the flow stays unchanged:
 - Check that the sample cylinder has sample and/or the sample pressure is high enough
 - Check for leaks. (See **“Checking for Leaks”** on page 53.)
 - There may be some blockage before needle valve. Check for blockage. (See **“Checking for Blockage”** on page 54.)

Gasifier Flow Fluctuates

- Check that the sample cylinder has sample and/or the sample pressure is high enough
- Check if there is pressure reducing components like needle valve, restrictions between the sample cylinder and the gasifier inlet. Samples may partially vaporize before entering the gasifier. Remove those pressure reducing components.
- Gasifier vaporizer temperature is not high enough to fully vaporize high boiling point components. Increase the gasifier vaporizer temperature.

Thermal Fault

A thermal fault means that the Gasifier heated zone is not within its allowable temperature range (lower than minimum temperature or higher than maximum temperature). Several things could cause this error:

- A problem with the electrical supply to the Gasifier.
- Communication lost between the Gasifier and GC.

- A malfunction of the zone control electronics.
- A shorted temperature sensor.
- A shorted heater.

To recover from this state:

- 1 Fix the cause of the shutdown:
 - Check for the electrical supply.
 - Check for the communication between the Gasifier and GC.
- 2 If it's hardware malfunction, you need to send the Gasifier to Agilent Repair Center.

Electronics Troubleshooting GC Power-On and Communication Symptoms

Gasifier Does Not Power On

If the Gasifier status light does not on when gasifier power cord is plugged. It may suggest gasifier does not power on:

- Check the power cord.
- Check the building's power.

Gasifier Cannot Communicate with a GC

- Check that the Gasifier is powered on.
- Check the USB cable.
- Check that the GC has updated to the gasifier compatible driver and firmware version.

Checking for Leaks

Isolate the source

- 1 **External leak points** include the sample cylinder, regulator and its fittings, fittings of filters quick connector, connections between the sample cylinder and gasifier, connections between gasifier and the GC gas sampling valve.
- 2 **Gasifier leak points** include inside fittings and connections, outside connections to the upstream sample and downstream GC gas sampling valve.
- 3 **GC leak points** include inlets, detectors, column connections, valve connections, and connections between flow modules and inlets/detectors.

NOTE

For external and GC leak points, refer to the Troubleshooting section of the GC User Manual.

- 1 Gather the following:
 - Electronic leak detector capable of detecting the gas type
 - 7/16-in, 9/16-in, and 1/4-in wrenches for tightening Swagelok fittings
 - End caps
- 2 Check any potential leak points associated with any maintenance recently performed.

6 Maintenance and Troubleshooting

Checking for Blockage

- 3 Check fittings and connections that undergo thermal cycling, since thermal cycling tends to loosen some fitting types. Use the electronic leak detector to determine if a fitting is leaking.
 - Start by checking any newly made connections first.
 - Remember to check connections in the sample supply lines after changing filters, quick connectors or supply cylinders.

For any visible connections and fittings, you can use an electronic leak detector to do the leak check.

To Check for Gasifier Leaks

- 1 Power off the Gasifier.
- 2 Connecting a N₂ or Air cylinder to the Gasifier.
- 3 Disconnect Gasifier from GC.
- 4 End capping the Gasifier vent outlet and sample outlet.
- 5 Performing a pressure drop test:
 - Set the N₂ or Air cylinder regulator pressure to 415 kPa (60 psi).
 - Fully turn the regulator pressure adjustment knob counterclockwise to shut the valve.
 - Wait 10 min. If there is a pressure loss greater than 7 kPa (1 psi), there is a leak within the gasifier.

If there is gasifier internal leak, you should send the gasifier to Agilent Repair Center.

Checking for Blockage

- 1 Gather the following:
 - 7/16-in, 9/16-in, and 1/4-in wrenches for tightening Swagelok fittings
 - End caps
- 2 Power off the Gasifier.
- 3 Remove any installed filter.
- 4 Connecting a N₂ or Air cylinder to the Gasifier.
- 5 Disconnect Gasifier from GC.
- 6 End capping the Gasifier vent outlet and transfer line outlet.
- 7 Set the N₂ or Air cylinder regulator pressure to 415 kPa (60 psi).
- 8 Remove the Gasifier transfer line outlet end cap, adjust the sample flow control needle valve. The output flow should be able to increase to larger than 500 mL/min. If there is no flow at all, the gasifier has a serious blockage, send the gasifier to Agilent for service. If the flow can be increased but cannot reach 500 mL/min, the gasifier may have a moderate blockage issue. Try purging the system using maximum flow for 15 to 30 minutes to see if the blockage issue can be eliminated, otherwise send the gasifier to Agilent for service.
- 9 End cap the Gasifier transfer line outlet, remove the Gasifier vent outlet end cap, adjust the vent flow control needle valve. Repeat **step 8** to evaluate the vent line blockage issue.
- 10 If there is no blockage in either the transfer line or vent line, the blockage may be caused by the filter. Change to a new or clean filter prior to analysis afterwards.

Error Messages

When small and fatal errors happen somewhere in the gasifier during operation, a series of error messages will be generated and displayed on the Agilent data acquisition system, Browser interface and GC touchscreen.

Table 6 and **Table 7** list the gasifier related error messages, probable cause and suggested actions.

Table 6 Gasifier related error messages in 8890/8860 GC

Error Messages	Probable Cause	Suggested Action
GC Gasifier: Transfer Line Temperature Heating Too Slowly	<ol style="list-style-type: none"> 1 Transfer line insulation layer is damaged. 2 Ambient temperature is too low. 3 There is a cold source nearby. 	<ol style="list-style-type: none"> 1 Check the intactness of the Transfer line insulation layer. 2 Check the lab temperature, increase the lab temperature if possible. 3 Move away nearby cold source if existed. 4 If you have tried the above three solutions and the heating is still too slow, reach out to Agilent.
GC Gasifier: Transfer Line Temperature Sensor Shorted	Transfer line sensor short	<ol style="list-style-type: none"> 1 Powercycle gasifier. 2 Reach out to Agilent.
GC Gasifier: Transfer Line Temperature Heater Shorted	Transfer line heater shorted	<ol style="list-style-type: none"> 1 Powercycle gasifier. 2 Reach out to Agilent.
GC Gasifier: Vaporizer Temperature Heating Too Slowly	<ol style="list-style-type: none"> 1 Ambient temperature is too low. 2 There is a cold source nearby. 	<ol style="list-style-type: none"> 1 Check the lab temperature, increase the lab temperature if possible. 2 Move away nearby cold source if existed. 3 If you have tried the above two solutions and the heating is still too slow, reach out to Agilent.
GC Gasifier: Vaporizer Temperature Sensor Shorted	Vaporizer sensor shorted	<ol style="list-style-type: none"> 1 Powercycle gasifier. 2 Reach out to Agilent.
GC Gasifier: Vaporizer Temperature Heater Shorted	Vaporizer heater shorted	<ol style="list-style-type: none"> 1 Powercycle gasifier. 2 Reach out to Agilent.
GC Gasifier: Failed Memory Read	<ol style="list-style-type: none"> 1 Gasifier is not powered. 2 Gasifier doesn't return information before GC timeout. 	<ol style="list-style-type: none"> 1 Make sure the gasifier is powered on. 2 If gasifier is powered on, resolve the error in the pop out error message window. 3 If still not working properly after step 2, power cycle the gasifier. 4 If still not working properly after step 3, power cycle the GC. 5 If still not working properly after the above four steps, reach out to Agilent.

6 Maintenance and Troubleshooting

Error Messages

Table 7 Gasifier related error messages in 990 Micro GC

Error Code	Class	Error Messages	Probable Cause	Suggested Action
186	CRITICAL	Gasifier transfer line sensor short	Transfer line sensor short	<ol style="list-style-type: none"> 1 Powercycle gasifier 2 Reach out to Agilent
187	CRITICAL	Gasifier vaporizer sensor short	Vaporizer sensor short	<ol style="list-style-type: none"> 1 Powercycle gasifier 2 Reach out to Agilent
188	WARN	Gasifier transfer line sensor open	Transfer line sensor open	<ol style="list-style-type: none"> 1 Powercycle gasifier 2 Reach out to Agilent
189	WARN	Gasifier vaporizer sensor open	Vaporizer sensor open	<ol style="list-style-type: none"> 1 Powercycle gasifier 2 Reach out to Agilent
190	WARN	Gasifier transfer line heater open	Transfer line heater open	<ol style="list-style-type: none"> 1 Powercycle gasifier 2 Reach out to Agilent
191	WARN	Gasifier vaporizer heater open	Vaporizer heater open	<ol style="list-style-type: none"> 1 Powercycle gasifier 2 Reach out to Agilent
192	CRITICAL	Gasifier transfer line heater short	Transfer line heater shorted	<ol style="list-style-type: none"> 1 Powercycle gasifier 2 Reach out to Agilent
193	CRITICAL	Gasifier vaporizer heater short	Vaporizer heater shorted	<ol style="list-style-type: none"> 1 Powercycle gasifier 2 Reach out to Agilent
194	WARN	Gasifier transfer line heating too slow	<ol style="list-style-type: none"> 1 Transfer line insulation layer is damaged 2 Ambient temperature is too low 3 There is a cold source nearby 	<ol style="list-style-type: none"> 1 Check the intactness of the Transfer line insulation layer. 2 Check the lab temperature, increase the lab temperature if possible. 3 Move away nearby cold source if existed. 4 If you have tried the above three solutions and the heating is still too slow, reach out to Agilent.
195	WARN	Gasifier vaporizer heating too slow	<ol style="list-style-type: none"> 1 Ambient temperature is too low 2 There is a cold source nearby 	<ol style="list-style-type: none"> 1 Check the lab temperature, increase the lab temperature if possible. 2 Move away nearby cold source if existed. 3 If you have tried the above three solutions and the heating is still too slow, reach out to Agilent.
196	RECOVERABLE	Gasifier communication lost	<ol style="list-style-type: none"> 1 USB cable is loose or disconnected 2 Power adaptor is loose or disconnected 	<ol style="list-style-type: none"> 1 Check the gasifier indicator light. If the light is OFF, the power adaptor is loose or disconnected. Reconnect the power adaptor. 2 Check the connection of the USB cable. Disconnect and reconnect the USB cable. 3 If there is still no communication, reach out to Agilent.

www.agilent.com

© Agilent Technologies, Inc. 2021

Third edition, August 2021



G3535-90000

