G3529A Helium Conservation Module

Agilent 8890 and 8860 Gas Chromatographs

Installation Instructions

Notices

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The Programmable Helium Conservation module can be ordered as an 8890 or 8860 Gas Chromatograph (GC) accessory (G3529A) and installed into a GC in your lab, or it can be installed at the factory in a new GC. Even with the factory installation, you must complete gas connections and configure the GC for use.

This chapter provides the information needed to complete installation and configuration for the accessory and for factory installations.

Parts Supplied

Table 1 lists the parts delivered with the Helium Conservation module.

Table 1 Parts supplied

Part	Part number	Quantity
Programmable Helium Conservation module	G3529-60100	1
Helium Conservation module ship kit (not order-able)	G3950-68004	1
ESD wrist strap, disposable		1

Other Useful Parts (Not Supplied)

In addition to the parts provided, in some cases you may also need additional parts to make the plumbing connections between the Helium Conservation module and the GC inlet and other EPC modules. See **Table 2** for selected additional parts.

Table 2 Common GC gas plumbing hardware, not supplied

Part	Part number
Tee, 1/8-inch brass, 2/pk	5180-4160
Union, 1/8-inch brass, 2/pk	5180-4127
Tubing cutter	8710-1709
Cap, 1/8-inch Swagelok, brass, 6/pk	5180-4121

Tools Required

- Two 7/16-inch open-end wrenches
- T-10 and T-20 Torx drivers

Installation Procedure

This procedure explains how to install the Helium Conservation module. If installed at the factory, you can skip the sections which do not apply.

WARNING **Refer to the Safety Manual that came with your GC for hazards that may exist when maintaining your instrument.**

WARNING **Before proceeding, turn off the column heater and other heated zones and let them cool down. When they have cooled, turn off any detector gases at their supply, then turn off the main power switch and unplug the power cord.**

WARNING **If an MS is installed on the GC, it must be cooled and vented prior to inlet installation. Refer to the *Operation* Manual for the MS for cool down and venting procedures.**

CAUTION **Always allow time for the column heater and other heated zones, to cool before turning off the gas supplies. Failure to allow cooling may damage the flow path.**

Prepare the GC

If the Helium Conservation module was factory installed, remove the pneumatics cover, then skip to the next section.

If installing the G3529A accessory, prepare the GC as follows:

1 Cool the GC. From the browser interface of touchscreen (8890), go to **Maintenance >Instrument> Perform Maintenance**, and put the GC into Maintenance Mode. Or set the GC oven temperature to 40 °C. Turn off the inlet, detector, valve box, and other heaters.

2 If an MS is installed, cool down and vent the MS. Refer to the *Agilent 5977B Series MSD Operating Manual* for details.

3 When the oven reaches setpoint, turn off the GC and unplug the power cord.

4 Press the buttons on each side of the pneumatics cover and lift up to remove it from the GC.

CAUTION

Electrostatic discharge (ESD) is a threat to GC electronics. Before continuing, wear a properly grounded ESD wrist strap to prevent damage to GC electronics.

5 Put on an ESD wrist strap, and attach the ground to the GC sheet metal frame for electrostatic protection.

6 Remove the EPC module bracket. Loosen the thumbscrew adjacent to the inlet EPC module, then facing the front of the GC, slide the bracket to the left and lift off. See **Figure 1**.

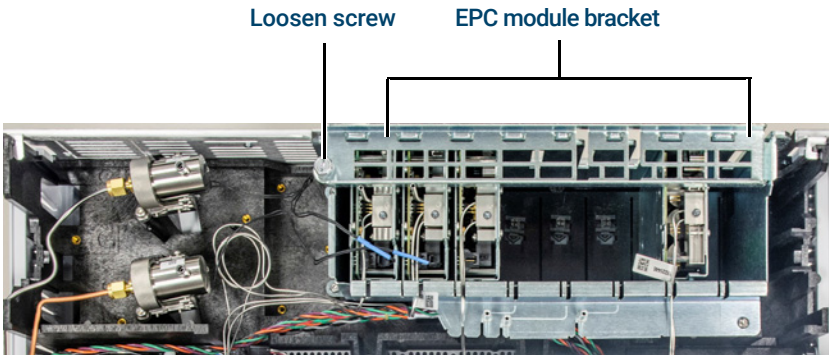


Figure 1. Remove the EPC module bracket

7 Identify the channel IDs

Install Helium Conservation module (installation only)

If installed at the factory, skip to the next section.

1 Determine the installation location of the Helium Conservation module in the pneumatics area. Facing the back of the GC, bays are numbered 1–8 as in **Figure 2**. The module is normally installed in bay 3.

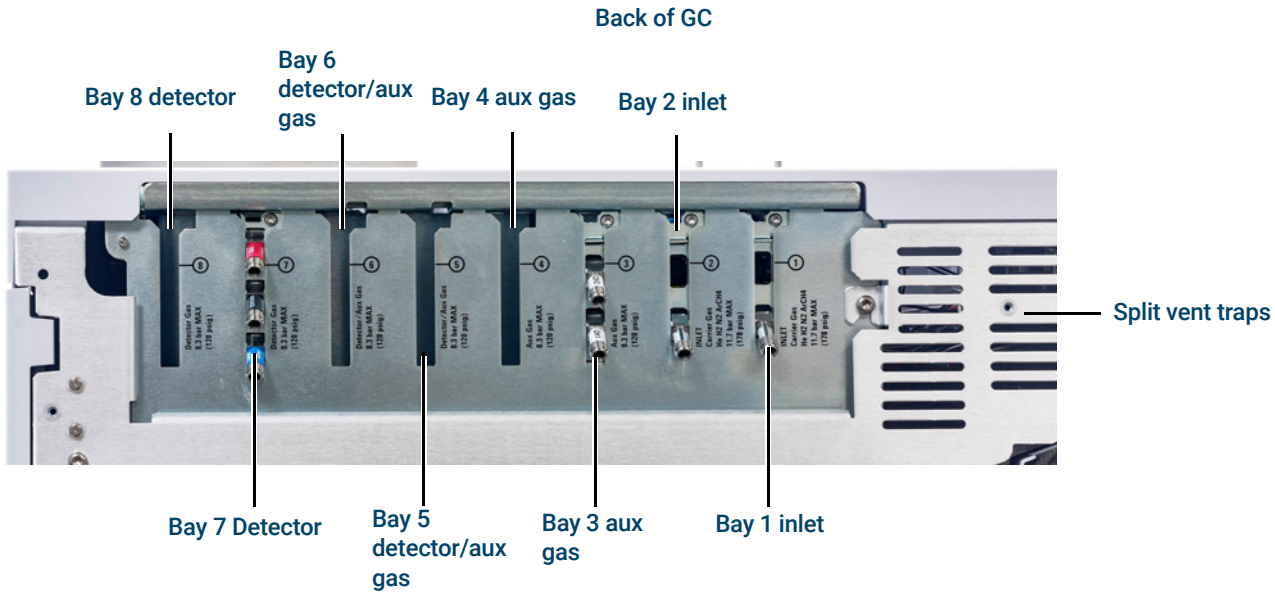


Figure 2. Bay identification (back of GC) (8890 is shown. 8860 similar, but does not have bays 4 or 5).

The bay determines the communications cable used to control the module, which in turn determines the Aux EPC channel designations used by the GC and Agilent data system software. See **Table 3**.

If there is clear plastic tubing installed, then a valve actuator is present. If a valve box is installed on top of the GC, then a PCM and an Aux EPC can be used.

Table 3 Aux EPC designations for EPC module locations

EPC Bay	Aux EPC channel designation for GC and data system
EPC 6 (detector/aux gas)	Aux EPC 4, 5, 6
EPC 5 (detector/aux gas)	Aux EPC 7, 8, 9
EPC 4	Aux EPC 4, 5, 6
EPC 3	Aux EPC 1, 2, 3, and Helium Conservation module

2 Vertically slide the connected Helium Conservation module fully into Bay 3, with its carrier gas connection facing rearward (see labeling on the GC for desired location). Be careful not to pinch the wires. See **Figure 3**.

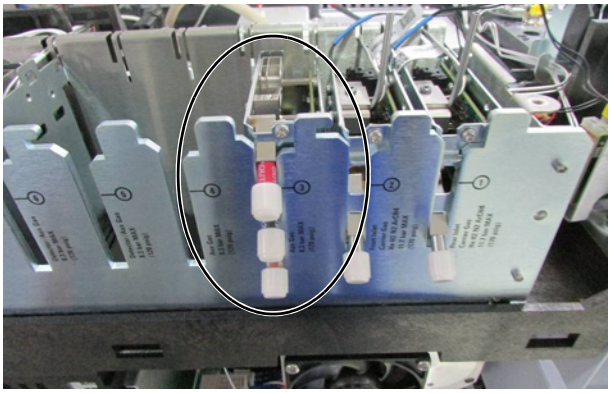


Figure 3. Insert the Helium Conservation module in Bay 3

3 Gently push it down, making sure its connector fits into the communications connector located at the bottom of the bay. See **Figure 4**.

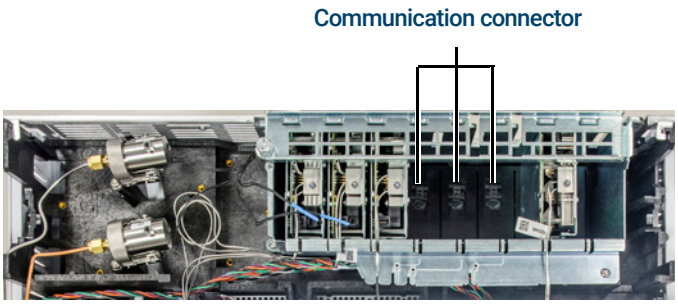


Figure 4. Connect the Helium Conservation module to the communications connector

Make sure the Helium Conservation module metal tab sits into the bracket slot and the bottom of the module sits behind the small post. See **Figure 5**.

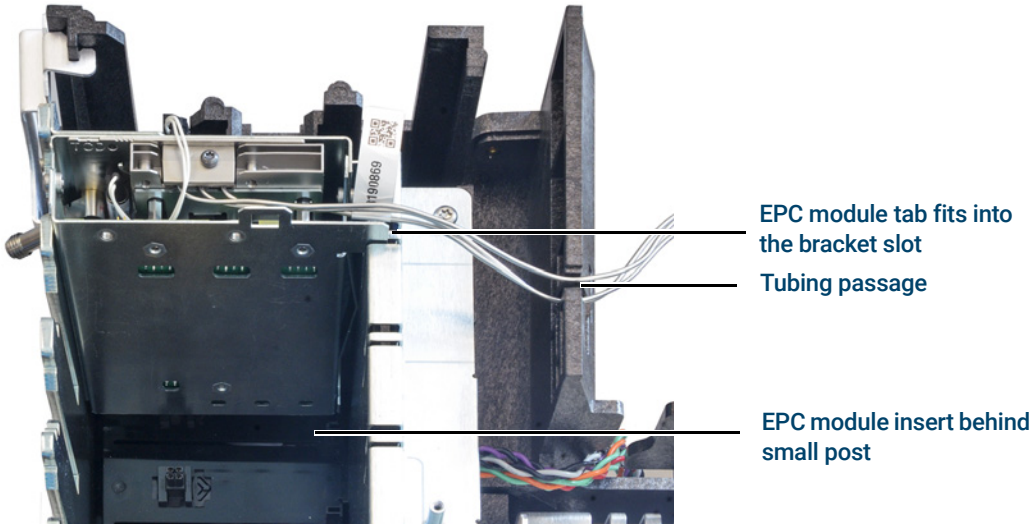


Figure 5. Install the Helium Conservation module

4 Reinstall the EPC module bracket and secure with the thumbscrew. Make sure the tubing is not pinched.

Plumb the Helium Conservation module to the GC

1 Route the purge tubing so that it is out of the way.
   - Bend the tubing no closer to the flow block than 1 cm.
   - Make any bend with a radius of at least 1 cm. Do not kink the tubing.

2 Remove the protective caps from the Helium Conservation module source gas connections.

3 Connect the Helium Conservation module's carrier output (**OUT**) to the GC. The output from the module will become the input to the GC inlets and other devices, as desired. This connection will require additional fittings and tubing not supplied in the accessory. **Figure 6** and **Figure 7** below show a simple and a more complex example of plumbing diagrams.

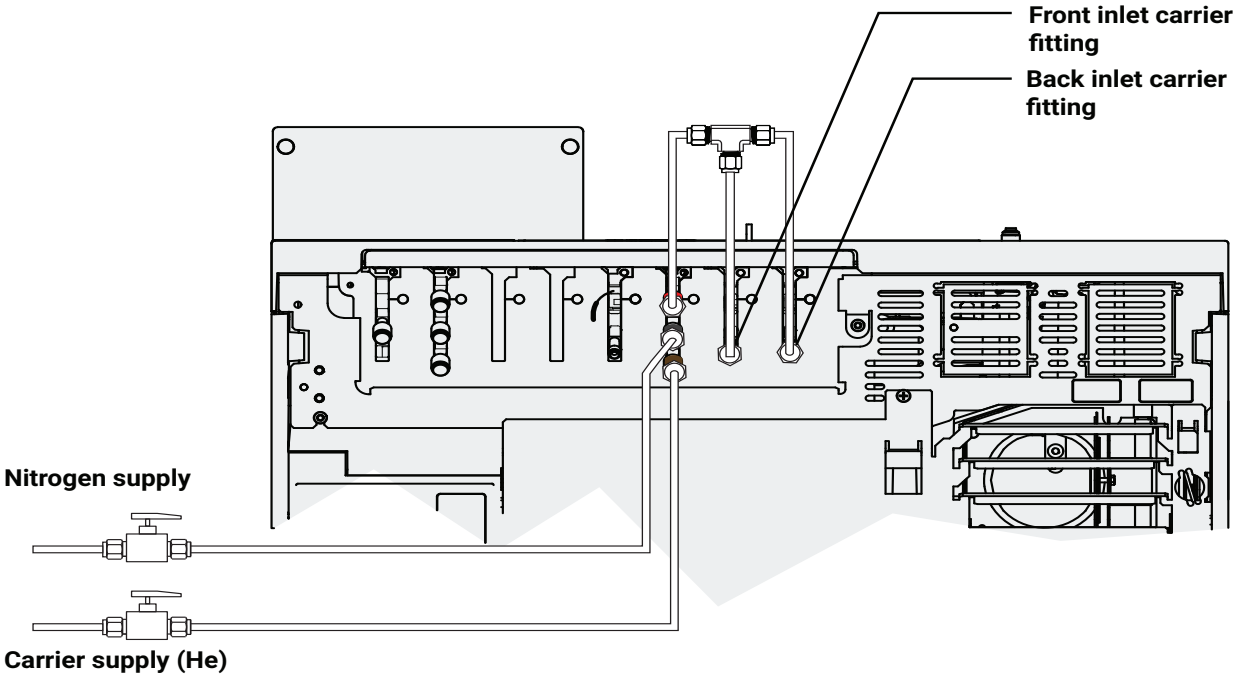


Figure 6. Plumbing example using two inlets (8890 shown, 8860 is similar)

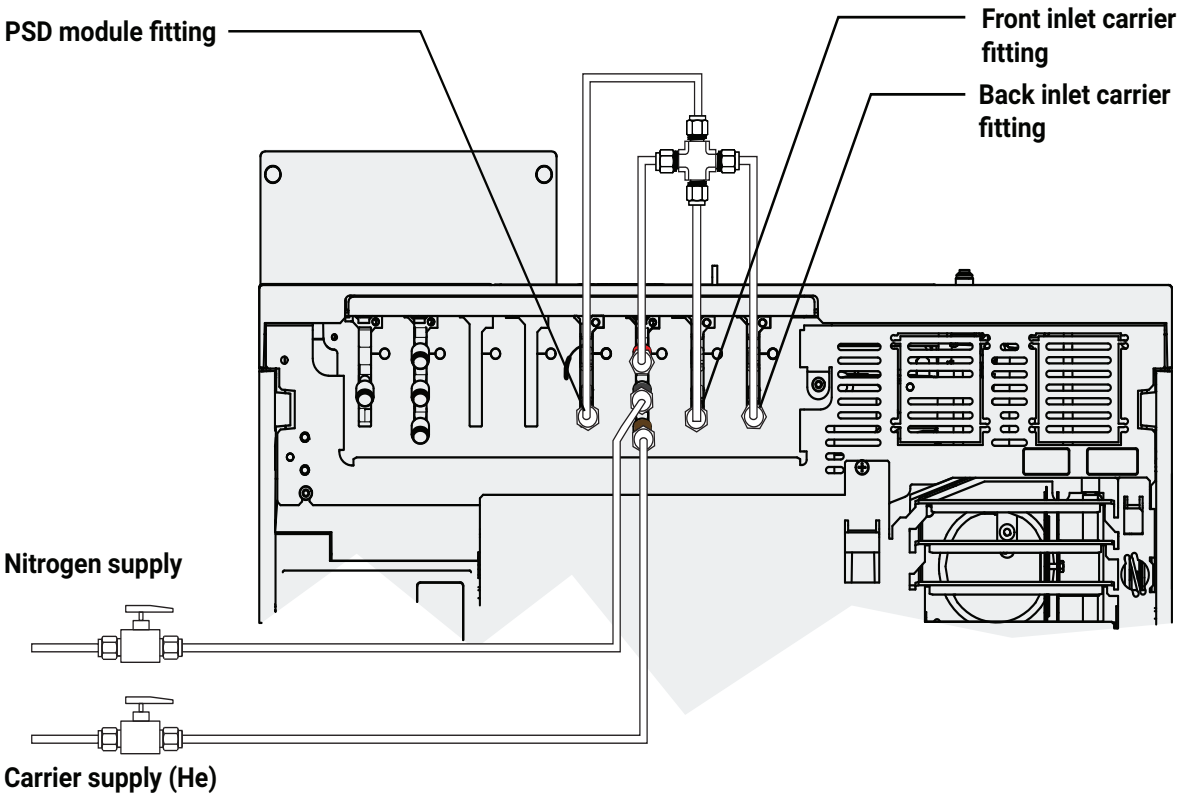


Figure 7. Plumbing example using two inlets and a PSD (8890 is shown, 8860 is similar)

Configure the Helium Conservation module at installation

If installing the module into the GC, configure it and zero the sensors as described below. If the Helium Conservation module was factory installed, skip to the next section.

1 Connect the GC power cord to the power outlet.

2 Switch on the GC.

3 A popup message, "New Hardware Detected," appears on the touchscreen.

For 8890, select **Configure** and follow the prompts to complete configuration.

For 8860, select **OK**. Connect to the GC using the Browser Interface. In the popup message, select Configure and follow the prompts to complete configuration.

Connect the gases to the Helium Conservation module

1 Connect the helium supply to the **HE** (bottom) fitting on the Helium Conservation module. See **Figure 6** and **Figure 7** on page 11.

2 Connect the nitrogen supply to the **N2** (middle) fitting on the Helium Conservation module.

3 Turn on gas source(s) to pressurize the system and to leak check all fittings. Set the source pressure to between 620 kPa (90 psi) and 690 kPa (100 psi). The maximum allowable source pressure is 827 kPa or 120 psi. Make sure the source pressure is at least 138 kPa (20 psi) higher than the maximum pressure needed during a run. (For a flow mode, the highest pressure typically occurs at the end of the hottest oven temperature ramp.)

   See also **Table 4** on page 16.

4 Re-install the pneumatics cover.

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This chapter describes how to use the Programmable Helium Conservation module on your 8890 or 8860 GC.

Overview

The Agilent Programmable Helium Conservation module provides a fast, efficient way to switch the carrier gas type used by the GC. Switching the gas type allows you to conserve expensive gases by using a cheaper gas, typically chromatographic grade nitrogen, during GC idle times.

The Helium Conservation module is intended to deliver carrier gases to the GC on which it is installed.

The Sleep/Wake feature

The 8890 and 8860 GC provide an instrument schedule to help you conserve resources. Using the instrument schedule, you can create sleep, wake, and conditioning methods that allow you to program resource usage. See the GC Operation Manual.

How the Helium Conservation module works

The Helium Conservation module is plumbed to both the alternate gas supply and the supply of the normal GC inlet carrier gas, typically helium. The output from the conservation module connects to the inlet carrier gas input (and possibly to the inputs for other devices, such as the EPC module for a purged union). See **Figure 8**.

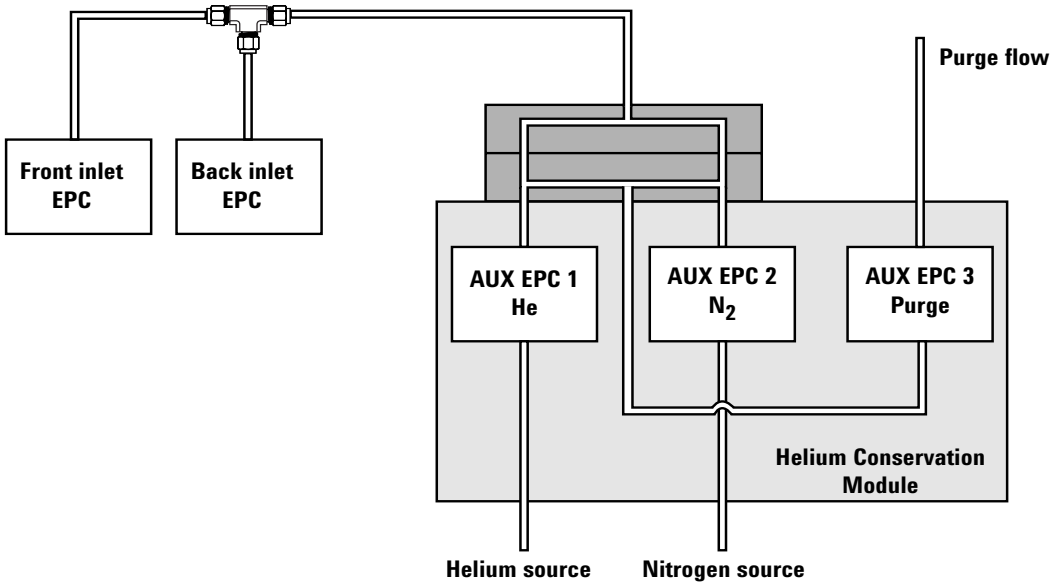


Figure 8. Programmable Helium Conservation module

During normal operation, your methods set the conservation module flows to turn off the alternate gas supply. The normal carrier gas supply flows to the inlets and connected devices. See **Figure 9**.

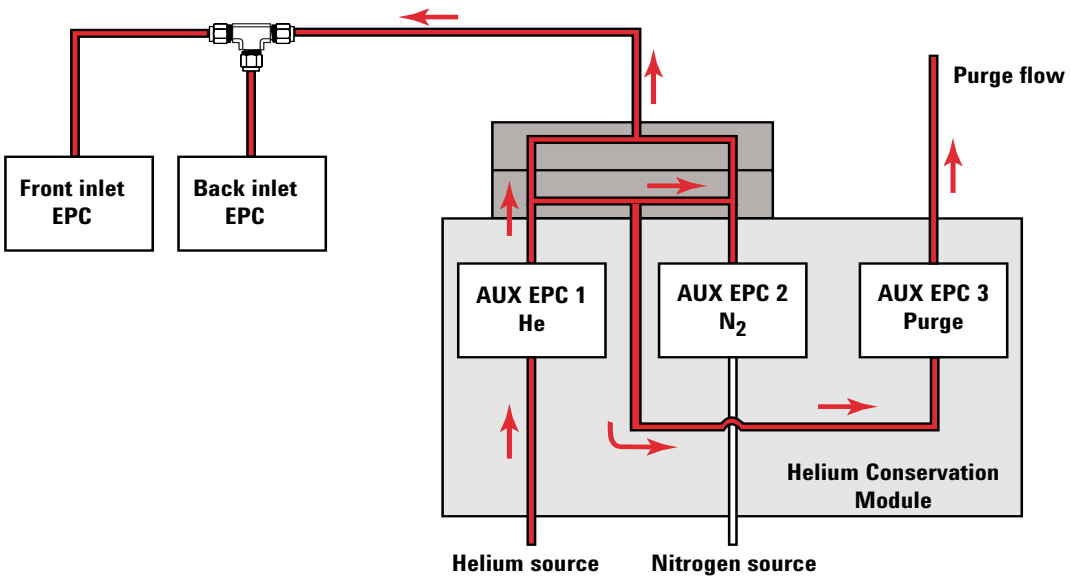


Figure 9. Flows during normal operation

During idle times, use the GC instrument schedule to put the GC into Sleep mode. Program the sleep mode to turn on the alternate (nitrogen) carrier gas supply and to switch off the normal (helium) gas supply. During Sleep mode, the GC will purge with the nitrogen carrier gas. See **Figure 10**.

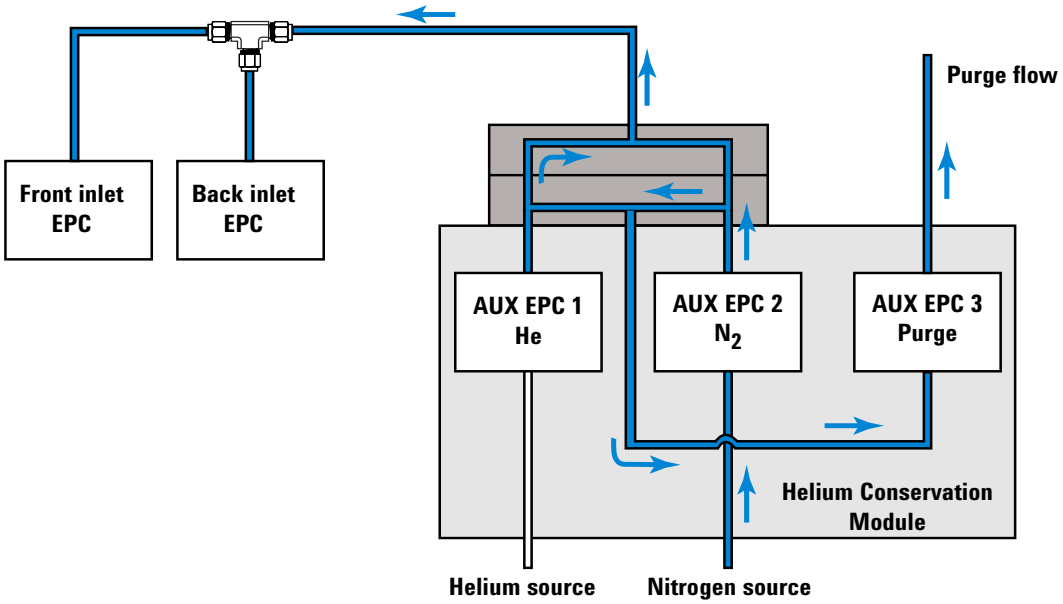


Figure 10. Flows during sleep

Before the next planned GC usage, awaken the GC to operating normal temperatures, gas types, and flows so it purges residual nitrogen and becomes ready for use. See **Figure 9**.

How carrier gas switching differs from the GC Gas Saver feature

The GC Gas Saver feature reduces split vent flow after the sample has moved onto the column, during and between runs. Because Gas Saver is run-based, it works when the GC is in active use.

The conservation module changes the type of gas flowing through the GC columns when the GC is idle, such as overnight and during weekends.

Both features can work together to help you conserve carrier gas.

Operation

- The Helium Conservation module requires some small changes to your normal operating procedures.
- Always use clean, chromatographic grade gases as the alternate gas supply. Use of lower grade gases will contaminate your system. See **Table 4**.

Table 4 Carrier gas requirements

Gas type	Purity	Supply pressure at the Helium Conservation module
Nitrogen (carrier)	99.9995 %	620 kPa (90 psi) to 690 kPa (100 psi) (827 kPa or 120 psi maximum)
Helium (carrier)	99.9995 %	620 kPa (90 psi) to 690 kPa (100 psi) (827 kPa or 120 psi maximum)

- The Helium Conservation module works with the energy conservation features of your GC. For more information about energy conservation on the GC, see the GC *Operation* Manual. The *Operation* Manual provides important information about typical detector stabilization times and other information you need to make a useful instrument schedule.

  The maximum pressure reliably delivered to an inlet can be 138 kPa (20 psi) less than the pressure delivered to the Helium Conservation module.
- With maximum allowable pressure supplied to the Helium Conservation module, the maximum inlet supply pressure is 690 kPa (100 psi). See **Table 4**. The module is not compatible with methods that require higher head pressures. Agilent recommends using the module to provide column head pressures of 552 kPa (80 psi) or less.

Method considerations

This section discusses issues related to the sleep method.

Split flow

The GC can more accurately control higher flows of helium than of nitrogen. If using a high split flow, so that the inlet total flow is approximately 200 mL/min or higher, set a lower split flow in the sleep method. Always set the total flow < 200 mL/min.

Very clean TCD systems

Typically, 15 minutes of purging with the normal carrier gas is sufficient for most GC detectors and MS systems to return to normal expected operation. However, some TCD applications with a very clean, very stable baseline may require more time to stabilize after returning to the application carrier gas. Very clean and stable TCD systems may need up to 3 hours to completely recover the original baseline. Consider your system and application requirements when setting the instrument schedule. Set the GC wake time to give your system enough time to recover before you plan to use it.

Waking the GC—What method is best?

You can wake the GC to the **WAKE** method, to the **CONDITIONING** method, to the last active method, or to the **CONDITIONING** method followed by one of the other methods. All of these approaches will work with your Programmable Helium Conservation module.

A **WAKE** method sets temperatures and flows. The oven temperature program is isothermal since the GC does not start a run. When the GC loads a **WAKE** method, it remains at those settings until you load another method using the keypad, data system, or by starting a sequence.

A **CONDITIONING** method sets flows and temperatures for the duration of the method's oven program. When the program ends, the GC loads either the **WAKE** method or the last active method before sleep, as specified in the instrument schedule. In general, use the **CONDITIONING** method if you want to run an oven ramp on wake, or to specifically control the wake time before loading your analytical method.

To program the Helium Conservation module

The GC uses the Sleep method and the Instrument Schedule to switch the carrier gas flow when the GC is not in use. In general:

1 Enable the Instrument Schedule.

2 Create the Sleep method and edit it so that all components plumbed to the helium conservation model recognize the correct gas type during the GC sleep cycle.

The following procedure assumes the use of the GC's browser interface or an Agilent data system.

1 Connect to the GC using the Browser Interface or Agilent data system (online session, if available).

2 If Instrument Schedule has never been used, optionally load a method that will be the basis for the Sleep method in the Instrument Schedule. (If a Sleep method already exists, skip this step.)

3 Enable the Instrument Schedule.

   a Open the Instrument Schedule.
   Browser interface: Go to **Settings > Scheduler > Sleep/Wake**.
   Data system: Go to instrument configuration, then select the Resource Conservation tab.

   b Select the desired wake option.
   Browser interface: To have the GC wake by using the last loaded method, or to perform a conditioning run when sleep ends, go to **Settings > Scheduler > Scheduler**

Options.
Data system: Select a schedule option. Checkboxes for choosing the wake method and whether to perform a conditioning run when sleep ends appear below the schedule.

c Program the Instrument Schedule.

4 Select **Edit Sleep Method**.

a Go to **Columns > Helium Conservation** and set the gas type to use (typically, nitrogen for sleep mode).

b Go to **Configuration > Modules**. For each module plumbed to the Helium Conservation Module (inlet, detector, PSD, and so forth), enable helium conservation control. (Note that the gas type becomes no longer selectable for that module.)

c Go to the settings for each inlet. In general, set a low split flow, for example 20 mL/min. Make sure that the total inlet flow is < 200 mL/min.

d As desired, set reduced temperatures to conserve energy. See the GC's *Operation* manual for more information.

5 Save the Sleep method.

- Browser interface: Select the **Save** icon.
- Data system: Select Set Sleep Method.

6 If using the Wake method, edit it as needed to set flows and temperatures. Make sure that each module plumbed to the helium conservation module is NOT using the helium conservation module. (The gas types for these modules should match the gas type needed for the analysis.)

7 If performing a conditioning run, edit the conditioning method as needed to set the desired flows and temperatures. Again, make sure that each module plumbed to the helium conservation module is NOT using the helium conservation module. (The gas types for these modules should match the gas type needed for the analysis.)

8 If using a data system, synchronize the clocks if needed.

9 In your analytical methods, go to **Columns** and select the helium conservation module, select the correct gas type.

Notes:

- For each module set to use the helium conservation module, the configured gas type matches the gas set for the helium conservation module, and is not selectable.
- When the helium conservation module flow is turned off, its last-used gas type displays for all modules that use it.
- Be sure to edit the sleep method settings for **all** connected modules. If a connected module is not set to "Enable Helium Conservation Control," and if the GC goes into Sleep mode, that module may go into shutdown.
- Setting too high a split flow, or turning off all flows, can lead to a module shutting down during sleep.

Other Uses

With a few modifications, the Programmable Helium Conservation module can also be used to switch from hydrogen carrier gas to nitrogen carrier gas during times of inactivity.

WARNING

When using hydrogen carrier gas, to avoid a fire or explosion hazard, always connect the Helium Conservation module purge vent to a fume hood or similar to avoid venting uncombusted hydrogen gas. Read the *GC Safety Manual* for additional information.

To use the Helium Conservation module for switching hydrogen gas:

- Plumb the hydrogen carrier gas supply to HE on the module.
- Plumb the nitrogen carrier gas supply to N2 on the module.

Operation for hydrogen-nitrogen switching is similar to operation when switching between helium and nitrogen. Use the instrument schedule to switch to inert nitrogen flow when the system is not in use.

Troubleshooting and Tips

If using a conditioning run, you can use higher than normal column flows to help clean out the system faster. The **WAKE** or **CONDITIONING** method can also save helium by using lower split flows.

Troubleshooting

If the system becomes Not Ready or goes into a flow shutdown:

- Check that every module (inlet, PSD, and so forth) connected to the helium conservation module has Enable Helium Conservation Control selected.
- Check gas supplies.
- Check the split flows. The GC can control total nitrogen flows up to approximately 200 mL/min. Reduce the split flow.
- Check the gas pressures delivered to the Helium Conservation module. The module needs at least 690 kPa (100 psi) to be able to accurately deliver 552 kPa (80 psi) to the inlet EPC modules. The maximum allowable delivery pressure to the module is 827 kPa (120 psi), which would provide a maximum inlet source pressure of 690 kPa (100 psi). For systems with large gas demands, you may need to further lower the total gas usage of the system during sleep times.

Maintenance

There are no user serviceable parts inside the Helium Conservation module.

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