

Agilent Gas Clean Filter System

User Manual



Notices

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WARNING

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About the Gas Clean Filter System

The Agilent Gas Clean Filter system delivers high purity gases to your analytical instruments, reducing the risk of column damage, sensitivity loss, and instrument downtime. The filters are designed for use with the GC, GC/MS, ICP-OES, ICP-MS, LC/MS, and any other analysis instrument using carrier gas. Six filters are available, including CO₂, oxygen, moisture, and organics trap (charcoal).

Components

The Gas Clean Filter System consists of a connecting unit and filter (**Figure 1**). The connecting unit is equipped with inlet and outlet connectors for the gas lines, and two needle-like valves that automatically start the flow of gas once a filter is attached. The filters come filled with dry nitrogen and are made from a heavy-walled polycarbonate sealed at the base with PTFE. When installed onto the connecting unit, the needle-like valves puncture the PTFE seals and allow gas to flow through the filter.



Figure 1. The components of the Gas Clean Filter System (connecting units vary in appearance but perform the same functionality)

Features

The Gas Clean Filter System delivers the following features and benefits:

- Cleaner gas, longer instrument life, greater sensitivity, higher data accuracy, and overall long-term stability for your instruments and analyses.

- A high-flow connecting unit that handles flow rates up to 20 L/min for collision gas applications and supply gas for ICP-MS, ICP-OES, and LC-MS.
- A fast-stabilizing and absorbent filter material.
- Filter housing constructed with a transparent and virtually unbreakable, heavy-walled polycarbonate material.
- The ability to change the Gas Clean Filter without tools or gas shut-off.

Filter types

Each Gas Clean Filter type is designed to filter out a specific impurity that may exist in the gas supply. The following filter types are available:

- **Carbon Dioxide** - Eliminates CO₂ from supply gas to the Total Organic Carbon (TOC) analyzer, and improves sensitivity and accuracy in TOC analysis.
- **Oxygen** - Prevents oxidation of the GC column, septum, liner, and glass wool.
- **Moisture** - Delivers faster stabilization times for increased GC productivity, and prevents hydrolization damage to the stationary phase, column, liner, glass wool, or septum in the GC.
- **Process Moisture** - Prevents oxidation of GC components and is safe to use with acetylene in process GC applications.
- **Charcoal** - Removes organic compounds and ensures correct performance of FID detectors in the GC.
- **Carrier Gas** - Delivers faster stabilization times for increased GC productivity, removes oxygen, moisture, and hydrocarbons from the carrier gas for MS applications, and provides ultimate GC column protection.
- **Sulfur** - Removes water and sulfur specific compounds such as H₂S, COS, and SO₂ from gas streams for the SCD.

Table 1 on page 6 shows recommended filter connection diagrams for common instrument configurations.

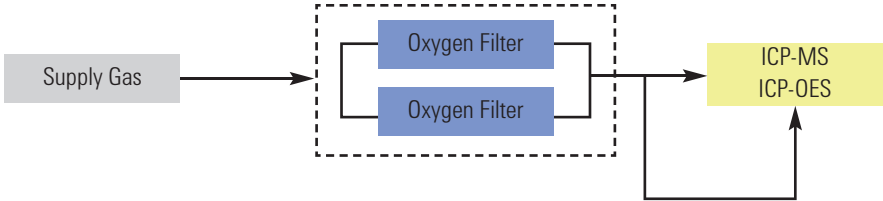
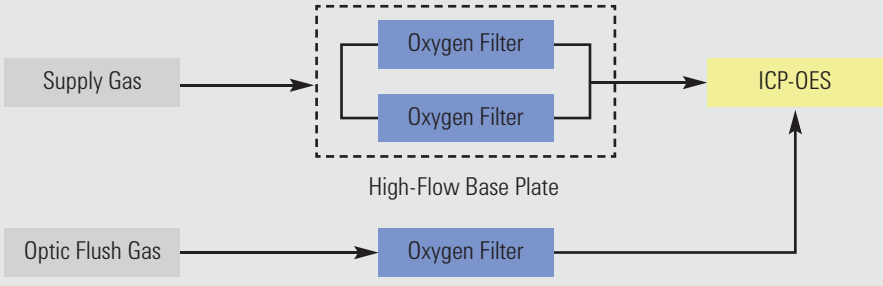


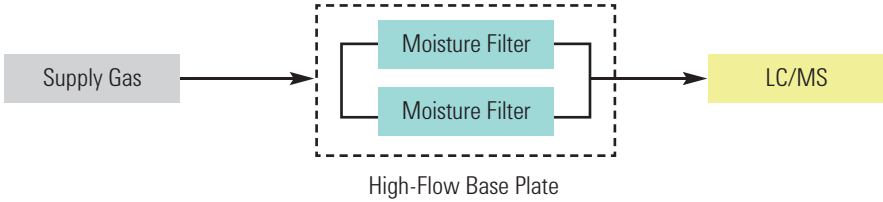
Table 1 Connection diagrams for common detectors

Detector	Connection Diagram
<p>ECD Electron Capture Detector</p>	<p>The diagram shows two gas lines: Carrier Gas (grey) and Nitrogen (green). Both pass through an Oxygen Filter (blue) and a Moisture Filter (teal). The Carrier Gas line continues through a Column (orange) to the ECD (yellow). The Nitrogen line also passes through a Moisture Filter and then splits: one path goes to the ECD as Anode Purge Gas, and the other path goes to the ECD as Make-Up Gas.</p>
<p>FID Flame Ionization Detector (Carrier Gas = Make-Up Gas)</p>	<p>The diagram shows Carrier Gas (grey) passing through an Oxygen Filter (blue) and a Moisture Filter (teal) to a Column (orange). The Column output goes to the FID (yellow). Hydrogen (pink) and Air (blue) flow through Charcoal Filters (grey) and then combine to enter the FID.</p>
<p>FID Flame Ionization Detector (Carrier Gas differs from Make-Up Gas)</p>	<p>The diagram shows Carrier Gas (grey) passing through a GC/MS Filter (pink) to a Column (orange). The Column output goes to the FID (yellow). Make-Up Gas (orange), Hydrogen (pink), and Air (blue) flow through Charcoal Filters (grey) and then combine to enter the FID.</p>
<p>FPD Flame Photometric Detector PFPD Pulsed Flame Photometric Detector</p>	<p>The diagram shows Carrier Gas (grey) passing through an Oxygen Filter (blue) and a Moisture Filter (teal) to a Column (orange). The Column output goes to the FPD/PFPD (yellow). Hydrogen (pink) and Air (blue) flow through Charcoal Filters (grey). The output from the first Charcoal Filter goes to Flame 1, and the output from the second Charcoal Filter goes to Flame 2. Both Flame 1 and Flame 2 then enter the FPD/PFPD.</p>

Table 1 Connection diagrams for common detectors (continued)

Detector	Connection Diagram
<p>MS (ITD, MSD) Ion Trap Detector, Mass Selective Detector</p>	
<p>NPD, PND Nitrogen-Phosphorous Detector</p> <p>TID, TSD Thermionic Detector (Carrier Gas = Make-Up Gas)</p>	
<p>TCD Thermal Conductivity Detector</p>	
<p>SCD Sulfur Chemiluminescence Detector</p>	

Table 1 Connection diagrams for common detectors (continued)

Detector	Connection Diagram
<p>ICP-OES/ICP-MS</p> <p>Inductive Coupled Plasma-Optical Emission Spectrometry/-Mass Spectrometry</p> <p>(Plasma Gas = Nebulizer Gas)</p>	
<p>ICP-OES</p> <p>Inductive Coupled Plasma-Optical Emission</p> <p>(Different Optic Flush Gas)</p>	
<p>Total Organic Carbon (TOC) Analyzer</p>	
<p>Zero-Air Generator</p>	
<p>LC/MS</p> <p>Mass Spectrometry</p>	

Contact your local Agilent sales representative for the filter sets applicable to your instrument configuration.

Safety Information

General gas safety

- 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).
- Perform periodic leak checks on supply lines, fittings, and pneumatic plumbing to prevent a potentially hazardous condition.

Safety precautions for hydrogen use

Hydrogen gas can be used with and purified by Gas Clean Filters with the following Safety Precautions:

WARNING

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

WARNING

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

WARNING

Hydrogen is a commonly used GC carrier gas and detector fuel gas. Hydrogen is potentially explosive and has other dangerous characteristics.

- Hydrogen is combustible over a wide range of concentrations. At atmospheric pressure, hydrogen is combustible at concentrations from 4% to 74.2% by volume.
 - Hydrogen has the highest burning velocity of any gas.
 - Hydrogen has a very low ignition energy.
 - Hydrogen that is allowed to expand rapidly from high pressure can self-ignite.
 - Hydrogen burns with a nonluminous flame which can be invisible under bright light.
-

Safety precautions for the Oxygen Filter

WARNING

The oxygen content of the gas entering the Oxygen or Carrier Gas Filter should never exceed 0.5%. Care should be taken when changing gas cylinders to avoid air entering the system. If air may have entered the system, flush the lines before installing a filter.

The filter must never be emptied.

Maximum system pressure

WARNING

Inlet pressure of filters should never exceed 15 bar (219 psi).

Cleaning

Wipe away dust and residue using a lint-free cloth.

Once the filter is consumed, the filter and filter material cannot be replenished or reused.

Recycling the product

When filters are replaced, they must be treated as chemical waste and disposed of according to local policy.

Installation

Before you begin

Be sure to choose a centralized installation location where all instruments are easily reachable and where the filter's indicating material is always visible.

Gas Clean Filter connecting units are available for both 1/4-inch and 1/8-inch gas lines. Be sure you have selected the appropriate connecting unit to use with your lab setup.

Prepare your instrument

Prepare your instrument by doing the following:

- 1 Lower any heated zone temperatures on your instrument to less than 100 °C.
- 2 Set any purge flows on your instrument to 400 mL/min.
- 3 If your system pressure is higher than 7 bar (100 psi), reduce the pressure.

Install the connecting unit

The connecting unit can be mounted on a laboratory bench top, affixed to the wall (with optional wall-mounting bracket for the single filter connecting unit), or mounted to the back of a 7890, 9000, 8860, or 8890 GC (with the respective Gas Clean Carrier Gas Kit).

- If you wish to install your connecting unit to a laboratory bench top, see **"Installing on a laboratory bench top"** below.
- If you wish to install your connecting unit to a wall, skip to **"Installing on a wall"** on page 12.
- If you have the Gas Clean Carrier Gas Kit for 7890 (CP17988) and wish to install the connecting unit to the back of a 7890 GC, skip to **"Installing the Gas Clean Carrier Gas Kit for 7890"** on page 18.
- If you have the Gas Clean Carrier Gas Kit for 9000 (CP17995) and wish to install the connecting unit to the back of a 9000 GC, skip to **"Installing the Gas Clean Carrier Gas Kit for 9000"** on page 20.
- If you have the Gas Clean Carrier Gas Kit for 8860 and 8890 (CP179880) and wish to install the connecting unit to the back of a 8860 or 8890 GC, skip to **"Installing the Gas Clean Carrier Gas Kit for 8860 and 8890"** on page 21.

Installing on a laboratory bench top

You can install the connecting unit onto the laboratory bench top using two screws (not supplied).

Gather the following:

- Screws (2), at least 25 mm long and less than 5-mm od (not supplied)
- Screw driver or power drill

To install the connecting unit to the laboratory bench top:

Install the connecting unit

- 1 Remove the two black plastic caps by pushing a thin, narrow object (such as a paper clip) from the bottom of the connecting unit into the underside of the caps until they pop out (**Figure 2**).



Figure 2. Removing the plastic caps from the connecting unit

- 2 Determine the best location on your laboratory bench top to install the connecting unit and filter.
 - Make sure the filter's indicator is clearly visible so that exhausted filters can be easily identified.
 - Make sure you have ample space above the bench top and connecting unit for installation and removal of the filter.
 - Make sure the gas lines reach the location and will not interfere with other activities in the chosen installation location.
 - Check that the mounting screws will not penetrate any dangerous objects such as gas and power lines.
- 3 Place the connecting unit in the chosen location, and use a screw driver or power drill to install the screws into the bench top through the two openings on the top of the connecting unit.
- 4 Replace the black plastic caps on the connecting unit to cover the two screw hole openings.

Installing on a wall

This option is only available for a single filter connecting unit using the optional wall mounting bracket.

Gather the following:

- Wall mounting bracket kit (CP7981)
- Phillips-head screw driver
- Hex wrench (4 mm)
- Power drill with 5-mm od drill bit
- Pencil

Install the connecting unit

To install the wall mounting bracket:

- 1 Determine the location on the wall where you wish to install the wall mounting bracket.
 - Make sure you have ample space above the mounting bracket with connecting unit installed for installation/removal of the filter.
 - Make sure the gas lines reach the location and will not interfere with other activities in the chosen installation location.
 - Check that the mounting screws will not penetrate any dangerous objects such as gas and power lines once installed.
- 2 Hold the wall mounting bracket against the wall in the location that you plan to install it, and use a pencil to mark the drilling location for the screw holes (**Figure 3**).

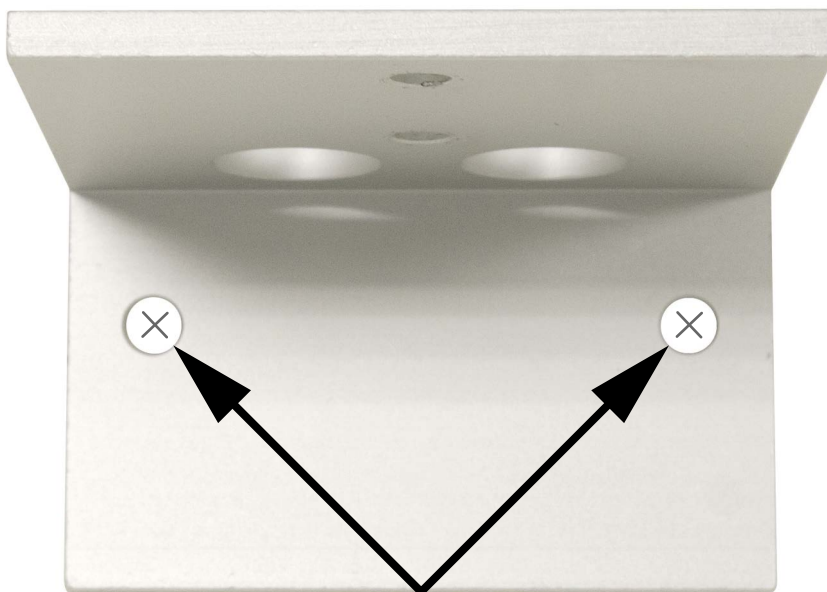


Figure 3. Mark the drilling locations on the wall using the screw holes in the wall mounting bracket as a guide

Lay the mounting bracket down on a flat surface.

- 3 Using a power drill with a 5-mm od drill bit, drill about 5 cm into the wall in both locations. Wipe away any excess dust and residue.
- 4 If required, install the supplied drywall anchors into the drilled holes, and make sure each anchor is flush against the wall's edge (**Figure 4**).

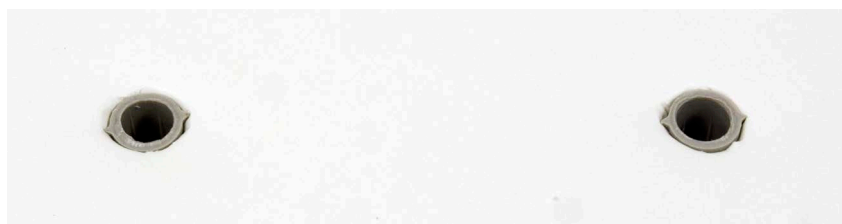


Figure 4. Plastic drywall anchors installed in wall

Install the connecting unit

- 5 Hold the wall mounting bracket in place against the wall using one hand, then use your other hand to install each screw into the wall (or drywall anchor, **Figure 5**). Finger tighten the screws as far as possible, and then use a screwdriver to complete the screw installation. The wall mounting bracket should rest flush against the wall.



Figure 5. Installing the wall mounting bracket

- 6 The connecting unit supports gas connections on the base plate edge for surface mounting and from below when mounting the connecting unit against a wall. The connecting unit ships from the factory with the gas connections installed on the edge. In this step, the standard connecting unit is shown. Steps are similar for all connecting unit types.

Install the connecting unit

You can optionally change the gas inlet-outlet locations to the bottom of the connecting unit as follows:

- a** Using a 5-mm hex wrench, remove the two plugs on the underside of the connecting unit (**Figure 6**).

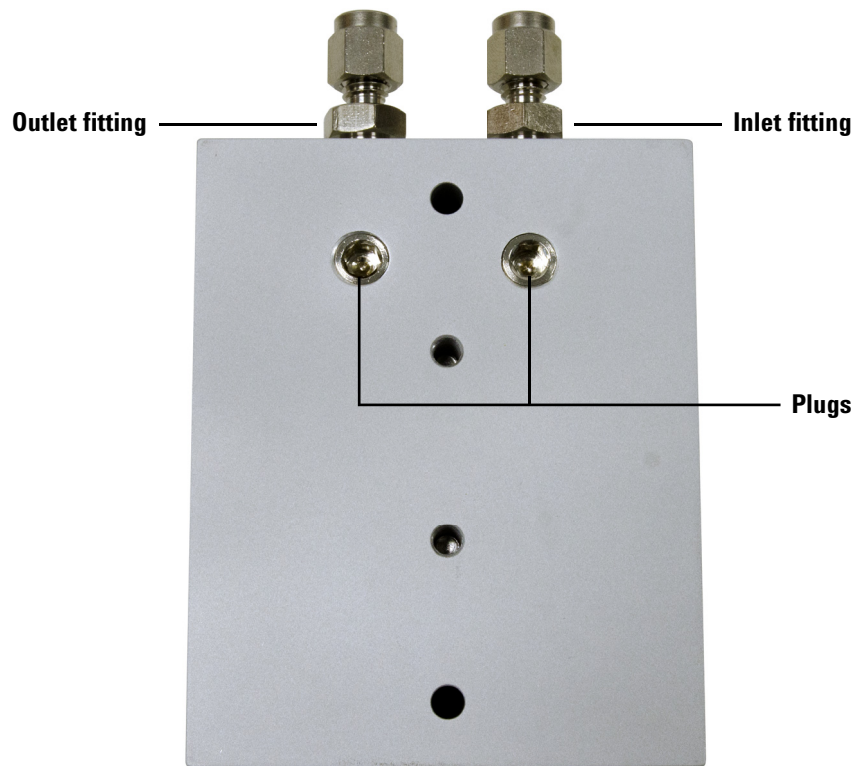


Figure 6. Plugs and inlet/outlet fittings on the connecting unit

- b** Using a 1/2-inch wrench, remove the inlet and outlet fittings on the end of the connecting unit (**Figure 6**).

Install the connecting unit

- c Install the plugs on the end of the connecting unit using a 5-mm hex wrench (**Figure 7**).



Figure 7. Plugs installed on the end of the connecting unit

- d Install the inlet and outlet fittings on the underside of the connecting unit using a 1/2-inch wrench (**Figure 8**).

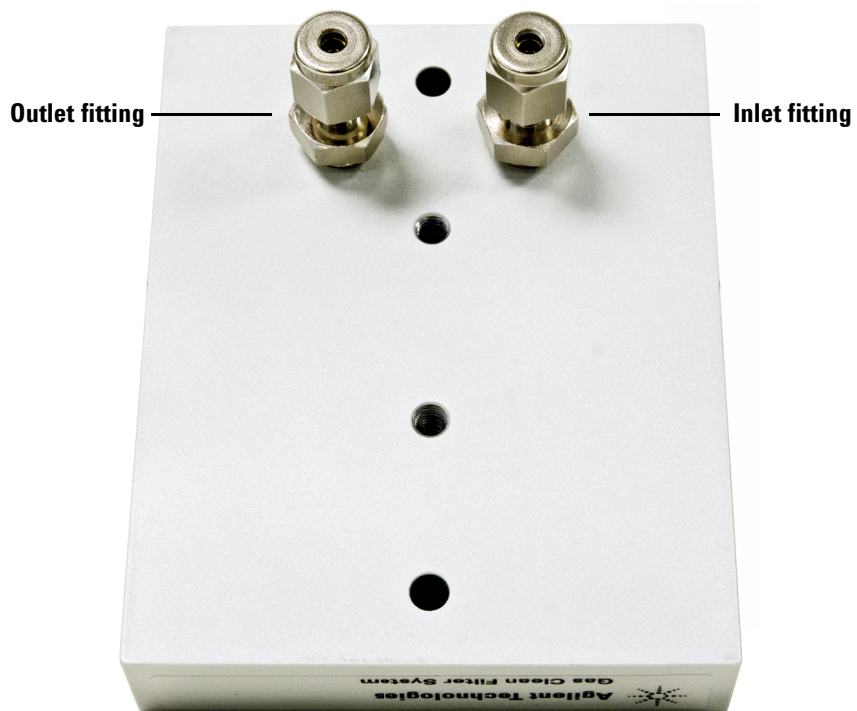


Figure 8. Inlet and outlet fittings installed on the underside of the connecting unit

Install the connecting unit

- 7 Install the connecting unit to the wall mounting bracket.
 - a Depending on the inlet/outlet fitting orientation on the connecting unit, align the connecting unit to the bracket as shown in **Figure 9**.

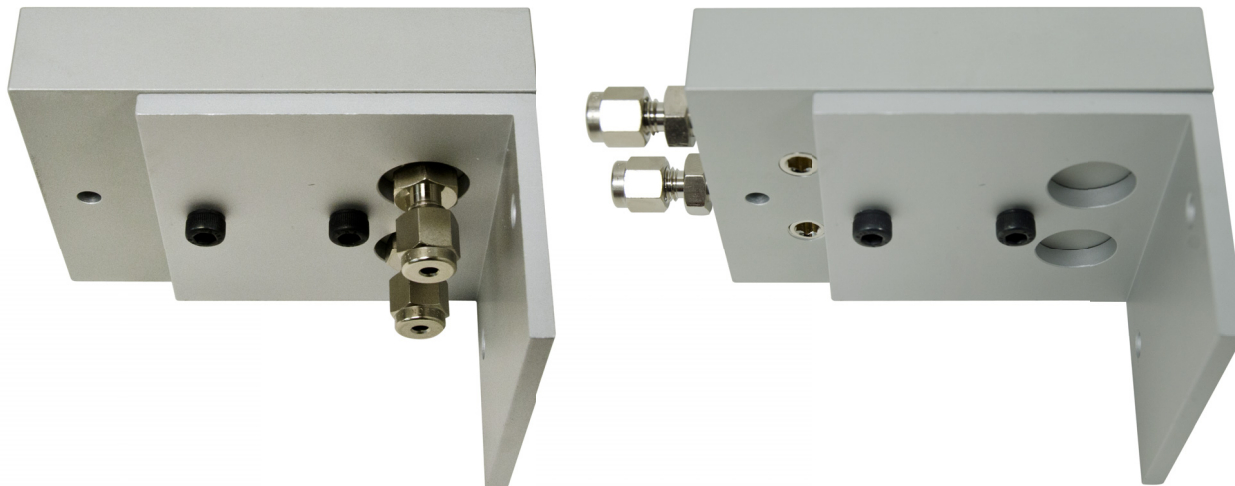


Figure 9. Connecting unit orientations on wall mounting bracket

- b Using your hand, install the hex screws from the bottom-up until they are finger tight (**Figure 10**).

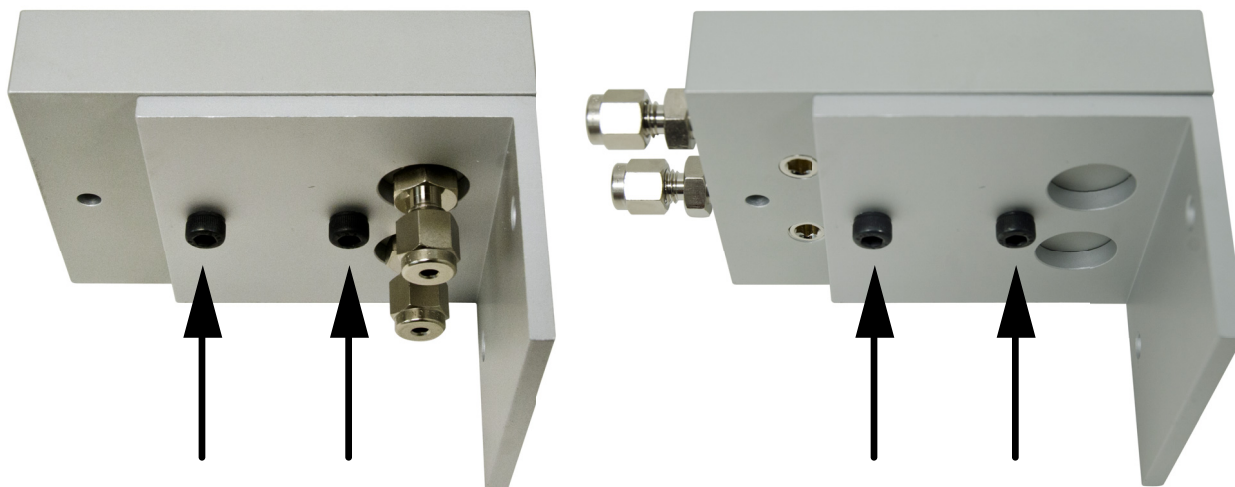


Figure 10. Hex screws installed

- c Use a 4-mm hex wrench to tighten the screws. The connecting unit should be tight against the wall mounting bracket.

Installing the Gas Clean Carrier Gas Kit for 7890

Gather the following:

- T-10 Torx driver
- T-20 Torx driver
- Gas Clean Carrier Gas Kit for 7890 (CP17988)

To install the bracket and bracket connecting unit to the back of a 7890 GC:

- 1 Place the bracket (5003-1356) against the back of the 7890 GC in the location shown in **Figure 11**, then align the screw holes as shown in **Figure 12**.

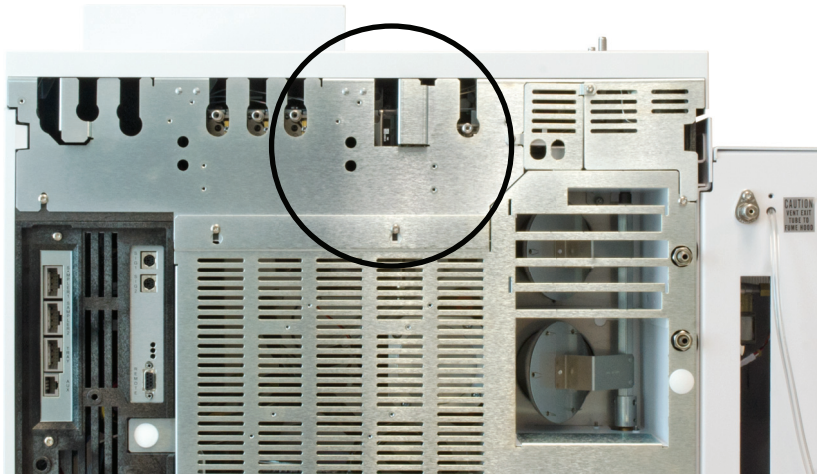


Figure 11. Location on back of 7890 GC to install bracket

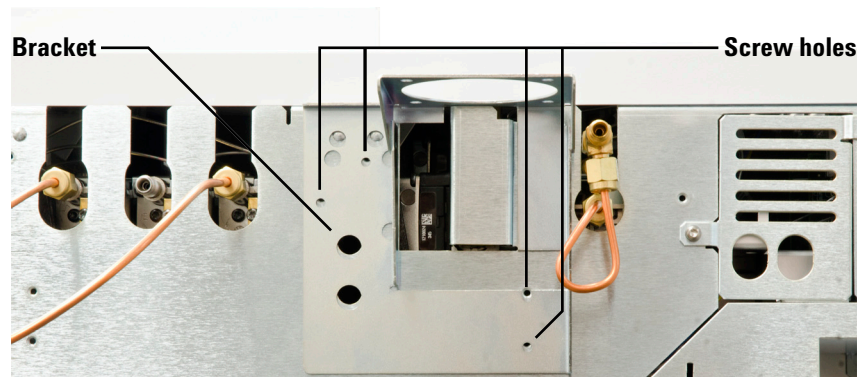


Figure 12. Screw hole locations on back of 7890 GC and bracket

Install the connecting unit

- Using a T-10 Torx driver, install the four T-10 screws to secure the bracket to the GC. See [Figure 13](#).

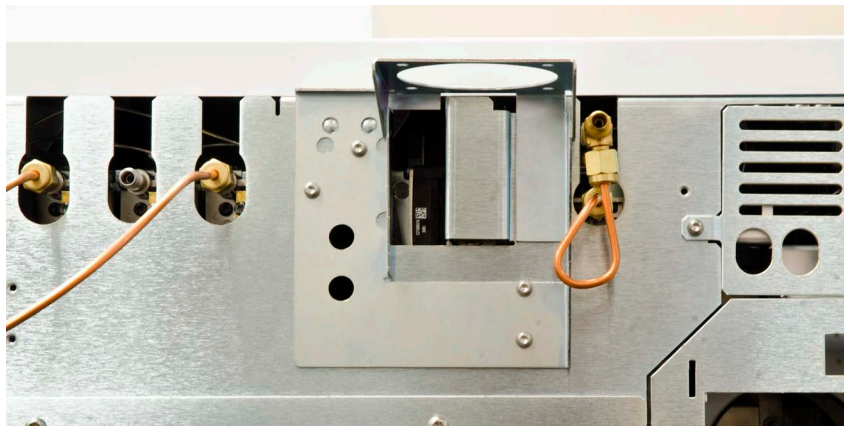


Figure 13. Bracket 5003-1356 installed to 7890 GC

- If you wish to run the inlet and outlet plugs from the bottom of the bracket connecting unit, see [step 6](#) on [page 14](#) before installing the bracket connecting unit to the bracket.
- Install the bracket connecting unit to the bracket using the supplied T-20 Torx screws.
 - If you have an ALS installed with your system, install the bracket connecting unit to the top of the bracket ([Figure 14](#)).

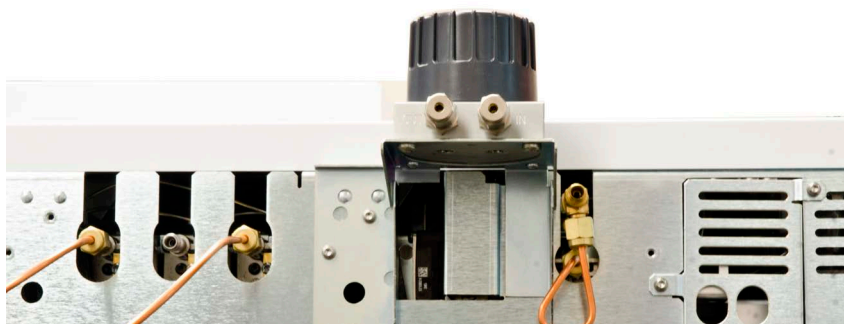


Figure 14. Bracket connecting unit installed on the bracket top for ALS and general configurations

Install the connecting unit

- If you have a PAL Auto Sampler installed with your system, install the bracket connecting unit to the underside of the bracket (**Figure 15**).



Figure 15. Bracket connecting unit installed on underside of bracket for PAL Auto Sampler configuration

Installing the Gas Clean Carrier Gas Kit for 9000

Gather the following:

- T-20 Torx driver
- 7/16-inch open end wrench
- 9/16-inch open end wrench
- Gas Clean Carrier Gas Kit for 9000 (CP17995)

To install the bracket and bracket connecting unit to the back of a 9000 GC:

- 1 Place the bracket (5000-9684) over the studs on the back of the GC and slide down to lock in place. Secure with a T20 screw from the kit (0515-2581).

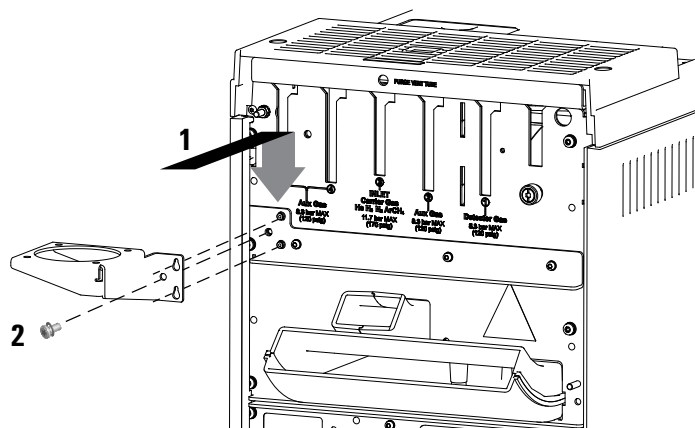


Figure 16. Location on back of 9000 GC to install bracket

- 2 Install the filter base onto the bracket using the four (4) screws provided.

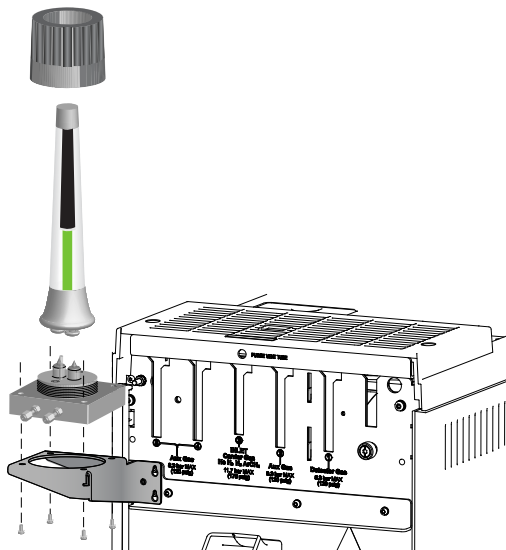


Figure 17. Gas Clean Carrier Gas Filter alignment

Installing the Gas Clean Carrier Gas Kit for 8860 and 8890

Gather the following:

- T-20 Torx driver
- 7/16-inch open end wrench
- 9/16-inch open end wrench
- Gas Clean Carrier Gas Kit for 8860 and 8890 (CP179880)

To install the bracket and bracket connecting unit to the back of a 8860 or 8890 GC:

- 1 Loosen the screw shown below. Place the mounting bracket over the studs on the back of the GC and slide down to lock in place. Secure with a T20 screw from the kit (0515-2581). Retighten the back panel screw.

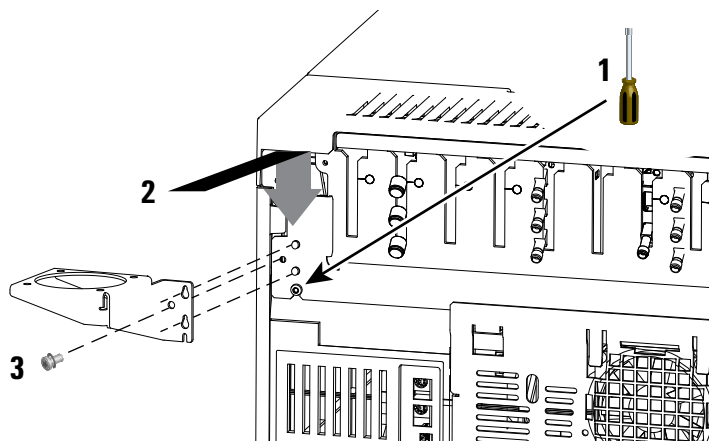


Figure 18. Location on back of 8890 or 8860 GC to install bracket

- 2 Install the filter base onto the bracket using the four (4) screws provided.

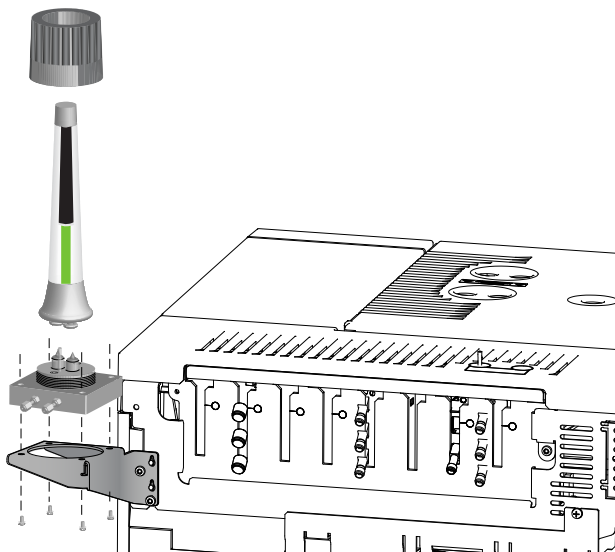


Figure 19. Gas Clean Carrier Gas Filter alignment

Connect the gas lines

Before starting, make sure you have enough gas line tubing to reach the area where you wish to mount the Gas Clean Filter system. For best results, use pre-cleaned gas lines.

Gather the following:

- Swagelok nuts (included with the connecting unit assembly)
- Front and back ferrules (included with the connecting unit assembly)
- Wrench, 7/16-inch (for 1/8-inch nuts) or 9/16-inch (for 1/4-inch nuts)
- Pre-cleaned tubing
- Ball valve (0100-2144), required for the Gas Clean Carrier Gas Kit for 7890 (CP17988)
- Electronic leak detector, such as the Agilent G3388B Handheld Electronic Gas Leak Detector

To connect the gas lines to the connecting unit:

- 1 Place a Swagelok nut, back ferrule, and front ferrule to the tubing as shown in [Figure 20](#).

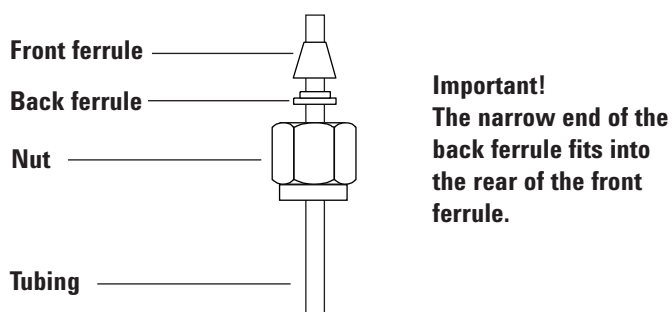


Figure 20. Swagelok nuts and ferrules

Connect the gas lines

- 2 Push the tubing towards the base until it rests firmly against the shoulder in the fitting, and make sure that the front ferrule is touching the fitting. Slide the Swagelok nut over the ferrule and thread it onto the fitting (**Figure 21**).

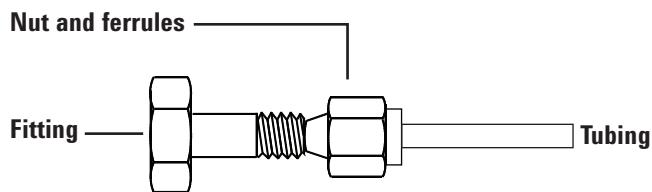


Figure 21. Assemble the fitting

- 3 Push the tube fully into the fitting, then withdraw it approximately 1 to 2 mm (see **Figure 22**).

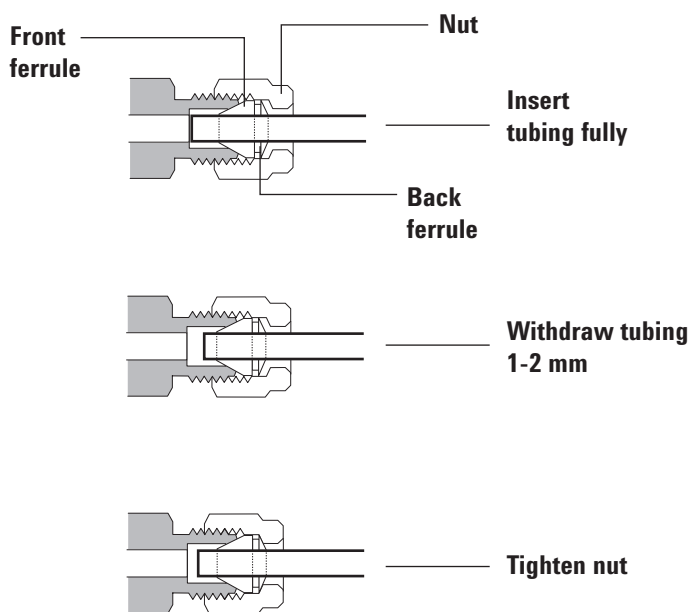


Figure 22. Insert the tubing

- 4 Finger-tighten the nut. Then use a wrench to tighten the nut 3/4 turn (for 1/8-inch tubing).

Install the filter to the connecting unit

- 5 If you have the Gas Clean Carrier Gas Kit for 7890 (CP17988), install a ball valve immediately following the outlet connection on the bracket connecting unit as shown in **Figure 23**.

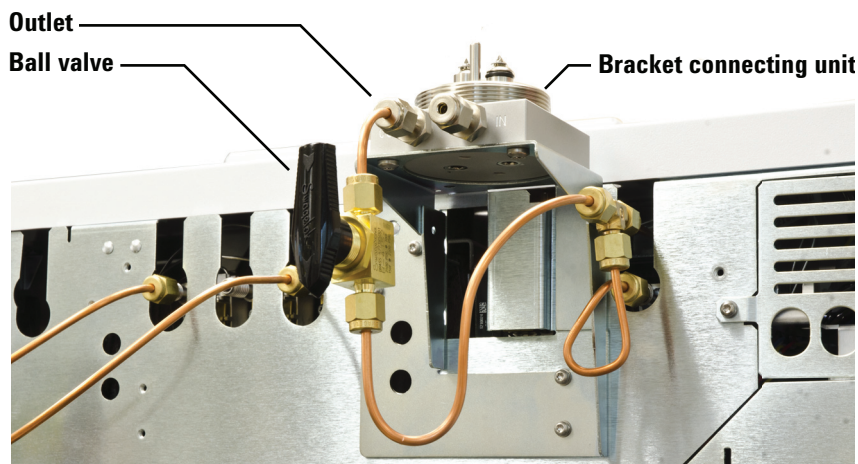


Figure 23. Ball valve installed following the outlet connection on the bracket connecting unit

A ball valve installation is optional for standard connecting units.

- 6 Set the gas line pressure to a value between 2 bar (30 psi) and 4 bar (60 psi) when installing the filter to the connecting unit. Be sure to keep the pressure above 2 bar (30 psi) so that air does not enter the filter.
- 7 Check all connections for leaks using the leak detector.

Install the filter to the connecting unit

CAUTION

Wear clean, lint-free gloves to prevent contamination of parts with dirt and skin oils.

If you have the Gas Clean Carrier Gas Kit for 7890, 9000, or 8860/8890, skip to “**Bracket connecting unit**” on page 30.

Standard connecting units

To install the filter on a standard connecting unit:

Install the filter to the connecting unit

- 1 Unscrew the plastic ring nut from the top of the connecting unit (**Figure 24**).

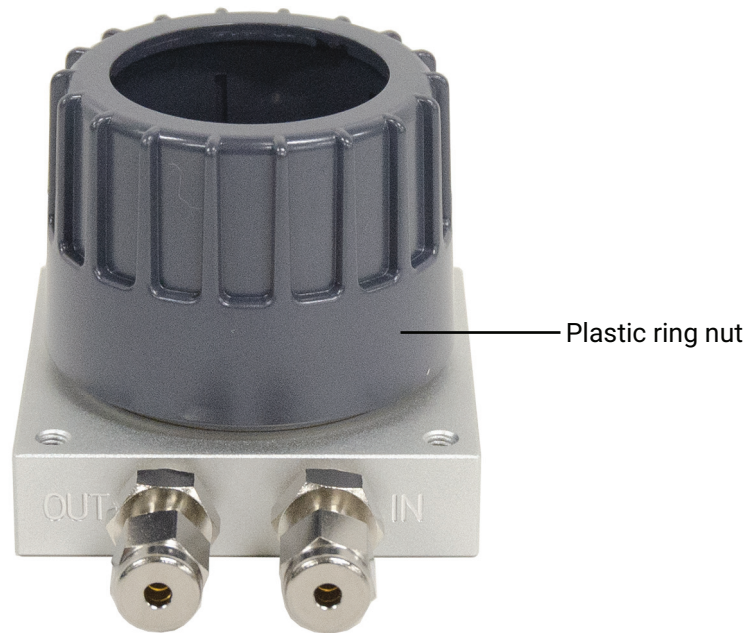


Figure 24. Remove the plastic ring nut

- 2 Flush the gas line of oxygen and moisture.

Install the filter to the connecting unit

If available, use the optional flush head (part number CP7987) to flush the gas line (Figure 25). Place the flush head over the valves and alignment pin and push down until it rests on the base of the connecting unit. Install the plastic ring nut to hold it in place.



Figure 25. Using the flush head to flush the gas line of oxygen and moisture

Install the filter to the connecting unit

If you do not have the flush head, use a small object to depress the inlet valve. (The inlet valve has an O-ring positioned at the top of the cylinder, as shown in [Figure 26.](#))

WARNING

Pierce points are sharp.

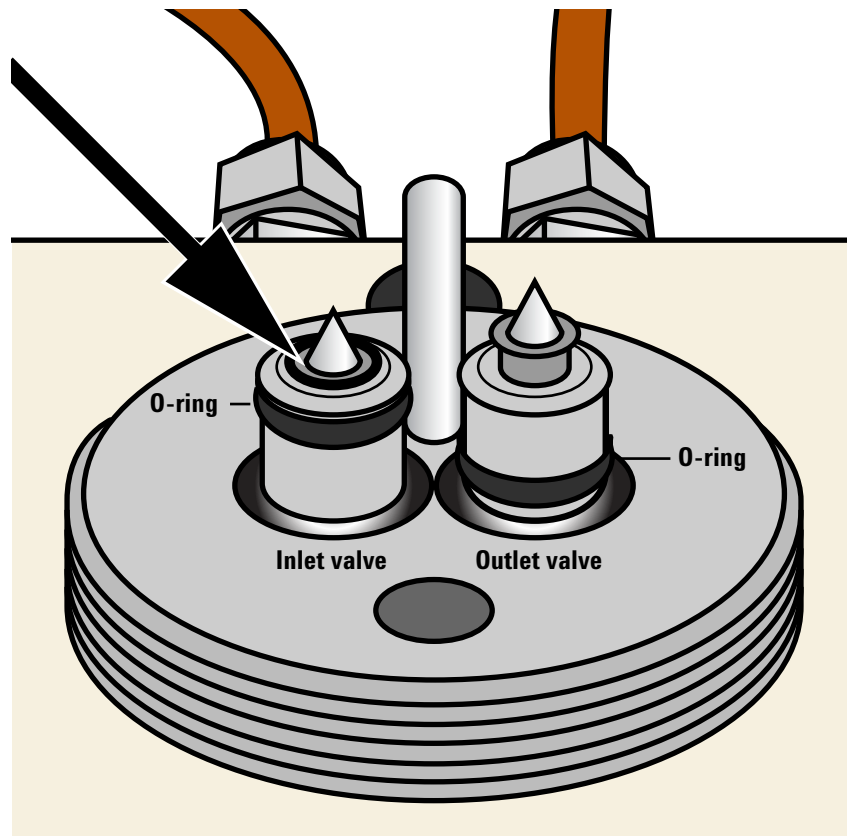


Figure 26. Depress the inlet valve to flush the gas line of oxygen and moisture

Install the filter to the connecting unit

Flush the gas lines for at least several minutes to ensure the gas lines are free of oxygen and moisture.

- 3 Remove the filter from the packaging, then remove the two aluminum plugs from the bottom of the filter (**Figure 27**).



Figure 27. Remove the aluminum plugs from the filter

- 4 Place the plastic ring nut over the filter, then place the filter on top of the connecting unit (it will only fit one way due to the alignment pin shown in **Figure 28**). Be careful to not damage the connecting unit and filter components by forcing an incorrect filter orientation.



Figure 28. Alignment pin

Install the filter to the connecting unit

- 5 Tighten the plastic ring nut while gently pressing down on the filter. Let the nut pull the filter onto the connecting unit as it is tightened (**Figure 29**).



Figure 29. Tighten the plastic ring nut to secure the filter to the connecting unit

- 6 Allow the filter to pressurize for 3 minutes.

Install the filter to the connecting unit

- 7 Flush the filter. Set the instrument split vent flow (purge flow) to 400 mL/min, then:
 - If using a Moisture Filter in combination with an MS detector, purge the filter for at least 60 minutes. This will flush the filter of **dry nitrogen** so that it does not appear as a background ion in your MS analysis.
 - For all other filter and detector combinations, purge for 4 minutes.
- 8 Restore to normal operating supply pressure and method settings. Remember to keep at a minimum supply pressure of 2 bar (30 psi).

Bracket connecting unit

To install the Carrier Gas filter on the Gas Clean Carrier Gas Kit:

- 1 Turn the ball valve to the on position.
- 2 Unscrew and remove the plastic ring nut from the top of the bracket connecting unit (**Figure 30**).

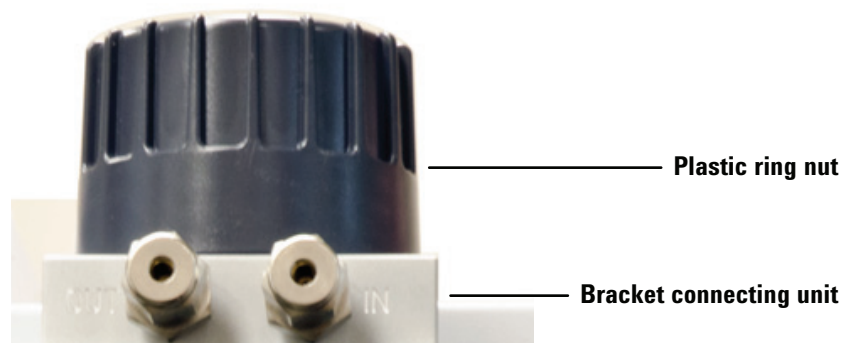


Figure 30. Remove the plastic ring nut from the bracket connecting unit

- 3 Flush the gas line of oxygen and moisture.

Install the filter to the connecting unit

If available, use the optional flush head (part number CP7987) to flush the gas line (Figure 31). Place the flush head over the valves and alignment pin and push down until it rests on the base of the connecting unit. Install the plastic ring nut to hold it in place.

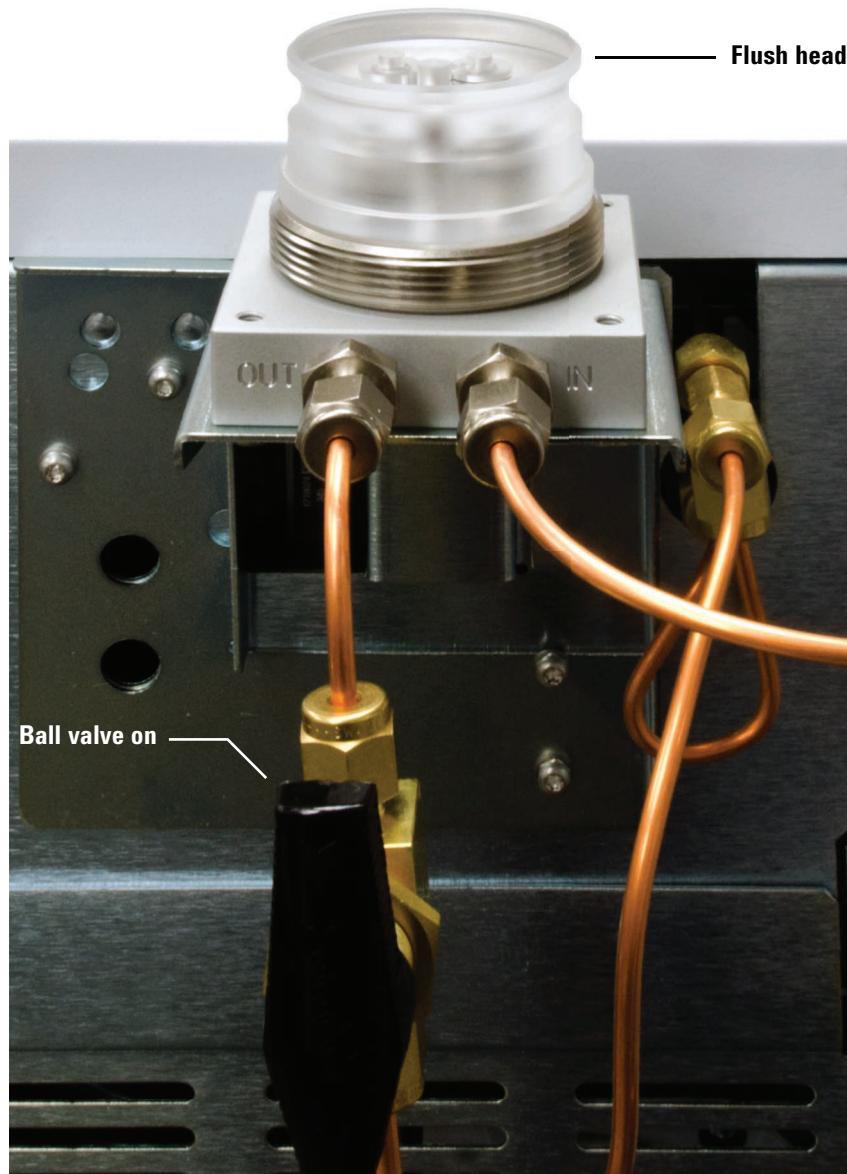


Figure 31. Using the flush head to flush the gas line of oxygen and moisture (7890 installation shown)

Install the filter to the connecting unit

If you do not have the flush head, use a small object to depress the inlet valve. (The inlet valve has an O-ring positioned at the top of the cylinder, as shown in [Figure 32.](#))

WARNING

Pierce points are sharp.

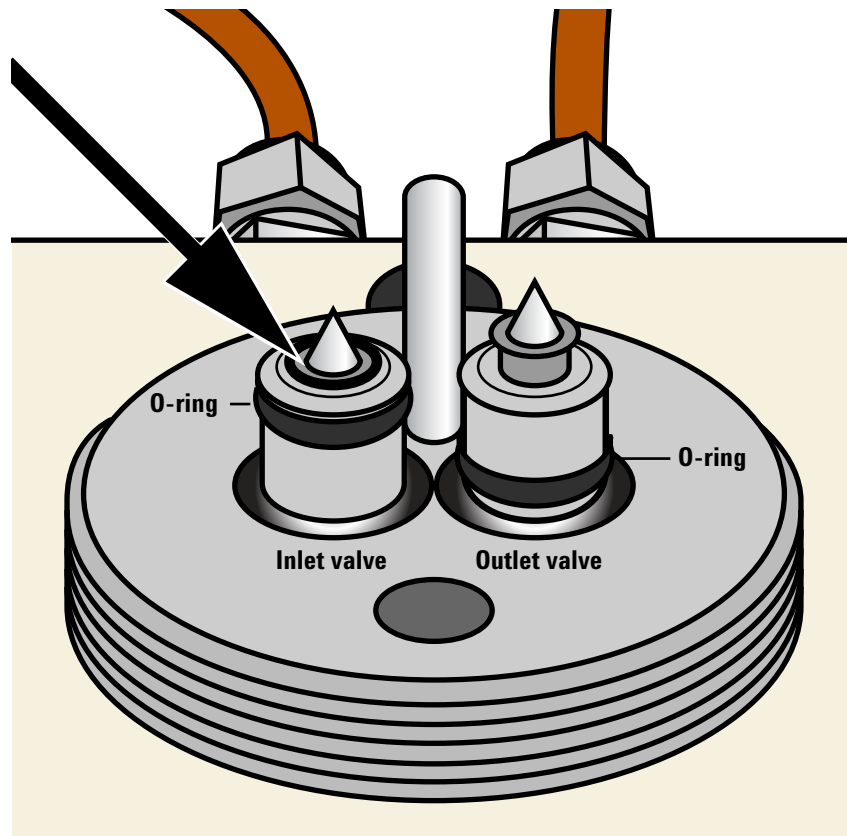


Figure 32. Depress the inlet valve to flush the gas line of oxygen and moisture

Install the filter to the connecting unit

Flush the gas lines for at least several minutes to ensure the gas lines are free of oxygen and moisture.

- 4 Remove the Carrier Gas filter from the packaging, then remove the two aluminum plugs from the bottom of the filter (**Figure 33**).



Figure 33. Remove the aluminum plugs from the Carrier Gas filter

- 5 Place the plastic ring nut over the Carrier Gas filter, then place the filter on top of the bracket connecting unit (it will only fit one way due to the alignment pin shown in **Figure 34**). Be careful to not damage the bracket connecting unit and filter components by forcing an incorrect filter orientation.

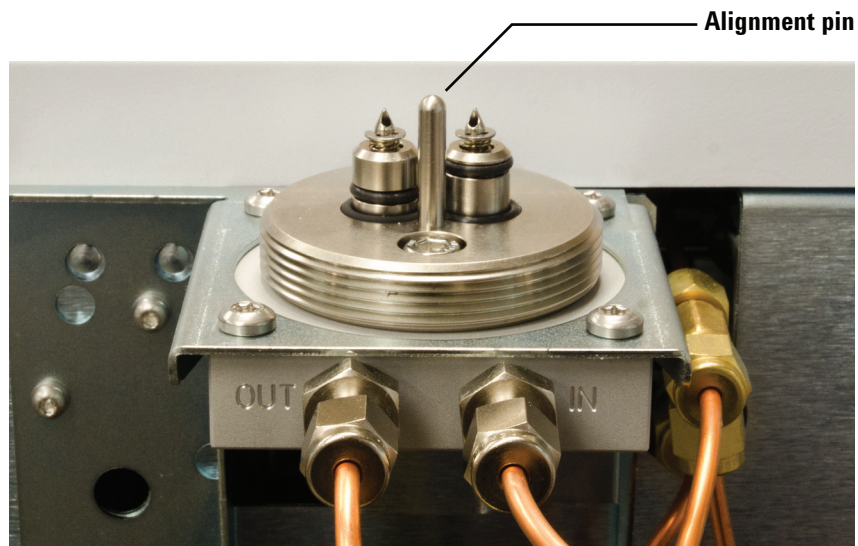


Figure 34. Alignment pin (7890 installation shown)

- 6 Tighten the plastic ring nut while gently pressing down on the filter. Let the plastic ring nut pull the Carrier Gas filter onto the bracket connecting unit as it is tightened (**Figure 35**).

Install the filter to the connecting unit

CAUTION

For brackets mounted to 9000, 8860, and 8890 GCs, be sure to hold onto the bracket while tightening. Failure to do so can allow you to over-stress the bracket, and cause it to bend.



Figure 35. Carrier Gas filter installed to the bracket connecting unit, 7890 shown

- 7 Allow the Carrier Gas filter to pressurize for 3 minutes.
- 8 Flush the filter. Set the instrument split vent flow (purge flow) to 400 mL/min, then:

Install a two- or four-position connecting unit

- If using a Moisture Filter in combination with an MS detector, purge the filter for at least 60 minutes. This will flush the filter of **dry nitrogen** so that it does not appear as a background ion in your MS analysis.
 - For all other filter and detector combinations, purge for 4 minutes.
- 9 Restore to normal operating supply pressure and method settings. Remember to keep at a minimum supply pressure of 2 bar (30 psi).

Install a two- or four-position connecting unit

The steps for installing a two- or four-position connecting unit are similar to the steps for the single-filter connecting unit. Refer to the previous sections in this chapter for details ("[Installation](#)" on page 11).

Two-position connecting unit

When installing the two-position connecting unit, refer to [Figure 36](#) for gas line and filter installation locations.

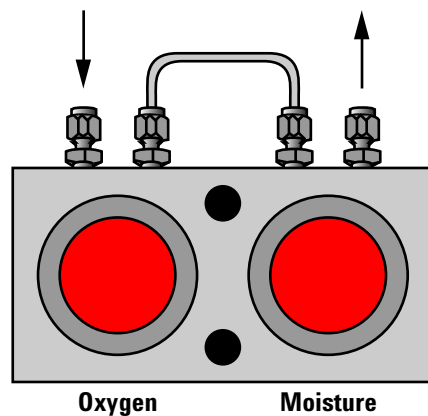


Figure 36. Two-position connecting unit

Four-position connecting unit

When installing the four-position connecting unit, refer to [Figure 37](#) and [Figure 38](#) for common gas line and filter configurations.

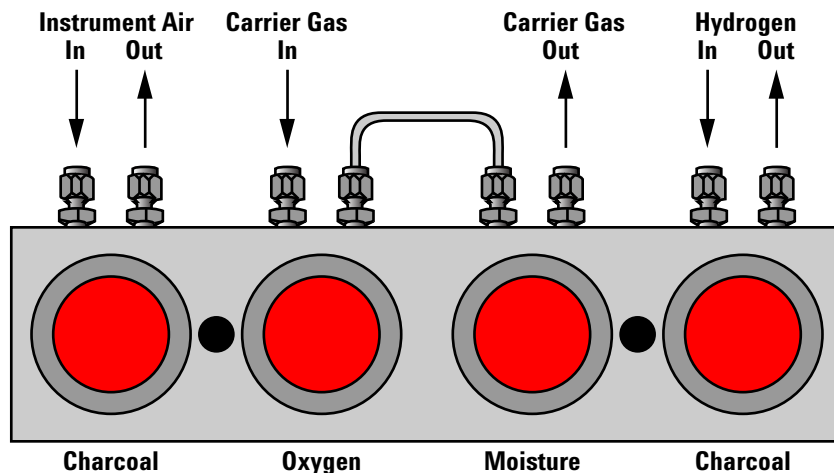


Figure 37. Configuration 1: Four-position connecting unit

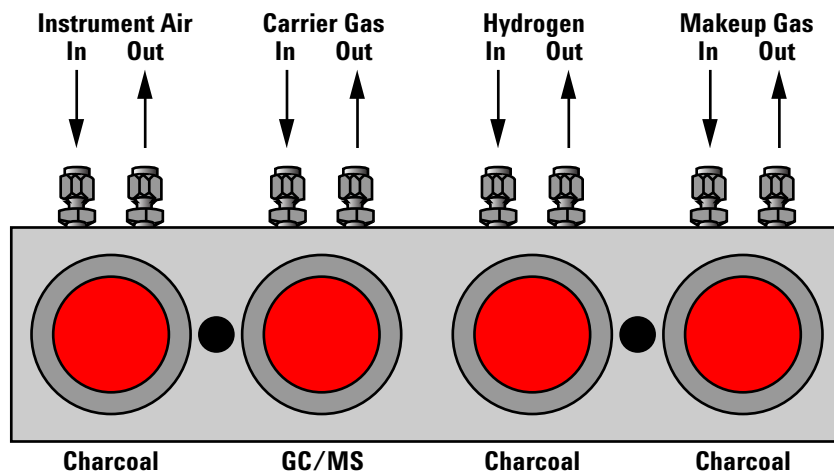


Figure 38. Configuration 2: Four-position connecting unit

Gas Flow in a Gas Clean Filter

Gas flows in an upward direction from the bottom of the filter to the top, and then downward through the filter material, indicating material, and out the bottom of the filter (see **Figure 39**).

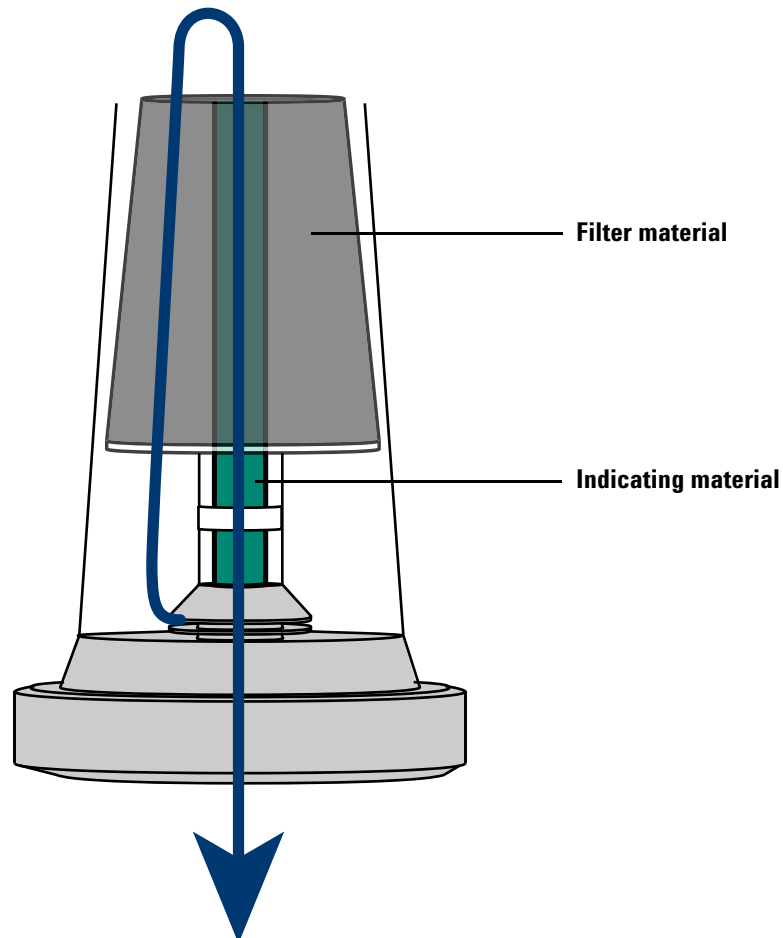


Figure 39. Flow of gas through the Gas Clean Filter

Gas Clean Sensor

About the Gas Clean sensor

The Gas Clean sensor (CP179885) provides a quick and simple way to check the status of the Gas Clean filters used with your 8860 or 8890 GCs. When installed over a filter, and plugged into an appropriate power source, the LED at the top of the sensor indicates the status of the filter:

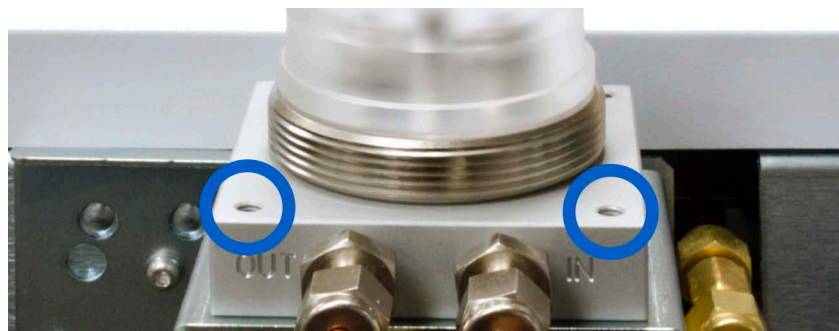
- **Green:** The filter is usable.
- **Yellow:** The filter is saturated and needs to be replaced.
- **Flashing yellow:** The sensor is not able to accurately read the filter's status. Typically, this means the sensor has not been installed correctly.

On 8860 and 8890 GCs, the sensor will trigger a diagnostic condition on the GC's touchscreen. Select this notification and follow its directions to replace the filter, or see **"Replacing the Gas Clean Filter"** on page 40.

Each sensor may only be used with one filter at a time.

To install the Gas Clean sensor

- 1 Ensure the filter mounting bracket is installed so that the screw heads are on the bottom of the bracket. If the screw heads are on top, the sensor will be unable to accurately read the filter's status.



To install the Gas Clean sensor

- 2 Slide the sensor down over the top of the filter, rotating it so that the status indicator is easily visible.



- 3 Plug the sensor into one of the USB ports located in the back of the GC.

Replacing the Gas Clean Filter

When to replace the Gas Clean Filter

As gas passes through the filter material, the filter picks up impurities and eventually becomes consumed over time. When this occurs, an increased amount of impurities reach the indicating material, which causes the material to change color from the top-down.

When 75% or more of the indicating material's color has changed, this indicates that the filter is consumed (see **Figure 40**). If you are using the gas clean sensor, the sensor's status indicator will turn yellow once the filter is consumed.

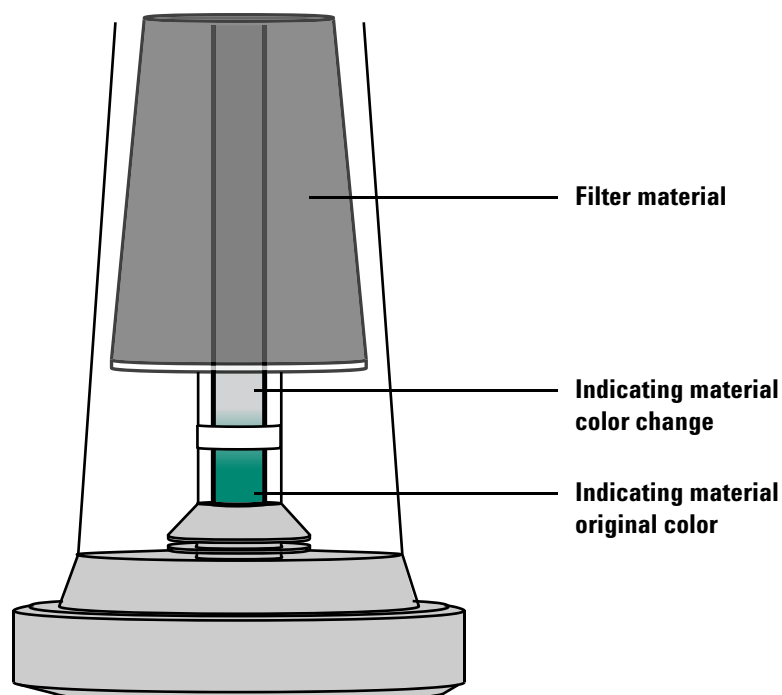


Figure 40. Indicating material color change

Agilent recommends replacing the filter when 75% or more of the indicator's color has changed (from the top down) or within one year of installation.

The indicator color and consumed indicator colors are different for each type of filter. See **Table 2** for a description of each filter indicator color and consumed color change.

Table 2 Indicating material color description

Filter type	Original color	Consumed color
Oxygen Filter	Green	Gray
Moisture Filter/ Process Moisture Filter	Green	Pale brown
Charcoal Filter	No indicator	No indicator
Carrier Gas filter	Oxygen: Green Moisture: Green	Gray Pale brown
CO ₂ Filter	White	Violet

See **“To replace the Gas Clean Filter”** on page 41 for more information.

To replace the Gas Clean Filter

This procedure shows the standard connecting unit in the examples. Steps are similar for all connecting unit types.

On 8860 and 8890 GCs, the gas clean sensor will trigger a diagnostic condition on the GC's touchscreen. Select this notification and follow its directions to replace the filter, or follow the directions below.

To replace the Gas Clean Filter:

- 1** Lower any heated zone temperatures on your instrument to less than 100 °C.
- 2** Set any split vent flows (purge flows) on your instrument to 400 mL/min.
- 3** If your system pressure is higher than 7 bar (100 psi), reduce the pressure to a pressure no lower than 2 bar (30 psi) to ensure easy removal of the saturated filter.

To replace the Gas Clean Filter

- 4 Remove the saturated filter by unscrewing the knurled or plastic ring nut that secures the filter to the connecting unit (**Figure 39**).



Figure 41. Unscrew the knurled or plastic ring nut

- 5 Remove the new filter and O-rings from the packaging.
- 6 Remove the old upper set of O-rings using the supplied tool and replace with new O-rings (**Figure 42**).

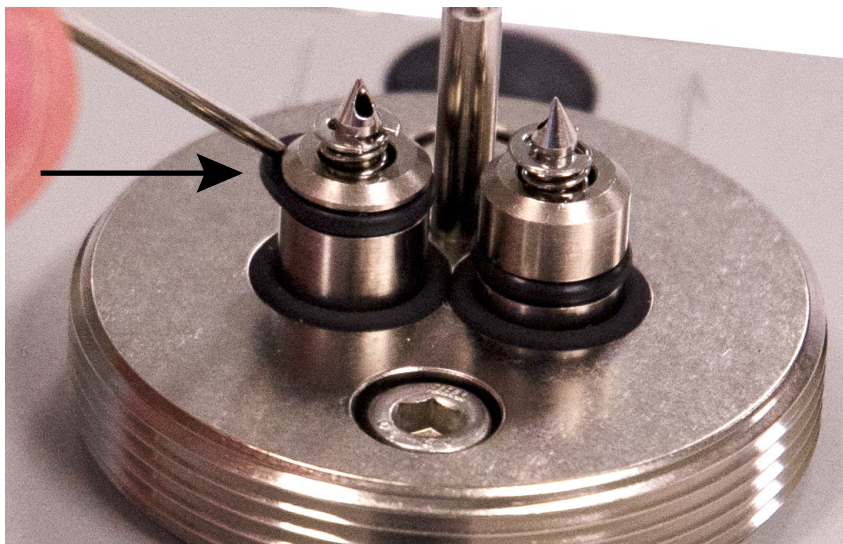


Figure 42. Remove upper pair O-rings only when replacing filter

To replace the Gas Clean Filter

- 7 Remove the two aluminum plugs from the bottom of the new filter (**Figure 43**).



Figure 43. Aluminum plugs removed from bottom of the new filter

- 8 Place the knurled or plastic ring nut over the filter, then put the filter on top of the connecting unit (it will only fit one way due to the alignment pin).
- 9 Tighten the knurled or plastic ring nut while gently pressing down on the filter; let the ring pull the filter onto the connecting unit.

CAUTION

For brackets mounted to 9000, 8860, and 8890 GCs, be sure to hold onto the bracket while tightening. Failure to do so can allow you to over-stress the bracket, and cause it to bend.

- 10 Carefully check the connections for leaks. See **“Checking for Leaks”** on page 44 for more information.

Treat used filters as chemical waste and dispose of them according to local policy.

Checking for Leaks

During leak-free operation, the filter indicator should not change color for several months, depending on the quality of your gas.

If you notice a color change in your filter's indicating material immediately following installation, this indicates a gas leak in your system, or poor gas quality. Take note whether the color change occurred from the top down or from the bottom up, and refer to one of the following sections:

- **"Indicator changes color from the top down"** on page 44
- **"Indicator changes color from the bottom up"** on page 45

Indicator changes color from the top down

If the indicating material changed color from the top down (see **Figure 44**), there is a leak upstream of the filter in your gas line, or your gas quality is poor. Check for leaks at the cylinder, regulator, and fittings, and check your gas quality.

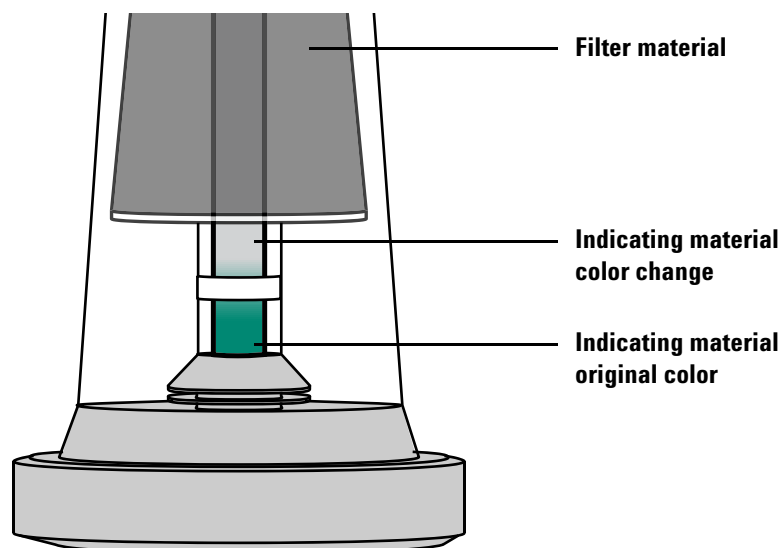


Figure 44. Indicating a leak upstream from the filter

CAUTION

When about 75% of the indicator changes color from the top down, this indicates that the entire filter is consumed and needs to be replaced.

Indicator changes color from the bottom up

If your filter's indicator changes color from the bottom up shortly after installation (see [Figure 45](#)), this indicates a leak downstream of the filter in your gas line. Check for leaks between the filter and your instrument.

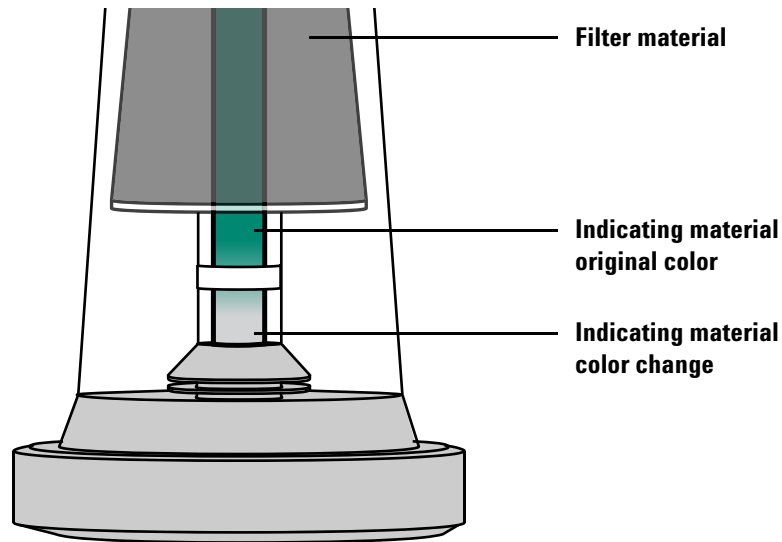


Figure 45. Indicating a leak downstream from the filter

If the entire indicator has not changed color (from the bottom up), the filter is not consumed and is still usable (see [Figure 45](#)).

Replacement Parts

Table 3 Agilent Gas Clean Filter Starter Kits

Description	Part No.
Gas Clean Carrier Gas Kit for 7890 Includes Carrier Gas Purifier (CP17973), a 7890 GC mounting bracket, and a single bracket connecting unit	CP17988
Gas Clean Carrier Gas Kit for 9000 Includes Carrier Gas Purifier (CP17973), a 9000 GC mounting bracket, and a single bracket connecting unit	CP17995
Gas Clean Carrier Gas Kit for 8860 and 8890 Includes Carrier Gas Purifier (CP17973), a 8860/8890 GC mounting bracket, and a single bracket connecting unit	CP179880
Agilent Gas Clean FID Filter kit Includes a 4-position 1/8 in connecting unit and two Charcoal filters, one Oxygen filter, and one Moisture filter	CP7995
Gas Clean Filter Kit, 1/8 in Includes a 4-position 1/4 in connecting unit and two Charcoal filters, one Oxygen filter, and one Moisture filter	CP736530
Agilent Gas Clean Carrier Gas filter kit, 1/8 in Includes a 1-position connecting unit 1/8 in and two Carrier Gas filters	CP17976
Agilent Gas Clean Carrier Gas filter kit, 1/4 in Includes a 1-position connecting unit 1/4 in and two Carrier Gas filters	CP17977
Agilent Gas Clean Carrier Gas filter Installation kit Includes 1 m copper tubing (CP17976), two nuts and two ferrules, 1/8 in	CP17978
Agilent Gas Clean CO ₂ kit Includes 2-position 1/4 in connecting unit and CO ₂ and moisture filters	CP17982
Agilent Gas Clean CO ₂ kit Includes 2-position 1/8 in connecting unit and CO ₂ and moisture filters	CP17983
TCD Filter Kit Includes a 2-position 1/8 in connecting unit, one Oxygen filter, and one Moisture filter	CP738408
GC Installation Kit Includes CP736530 and many useful fittings and accessories	19199N

Table 4 Connecting Units

Description	Part No.
1-position connecting unit, 1/4 in	CP7980
1-position connecting unit, 1/8 in	CP7988
2-position connecting unit, 1/4 in	CP738406
2-position connecting unit, 1/8 in	CP738407
4-position connecting unit, 1/4 in	CP7989
4-position connecting unit, 1/8 in	CP736520
High flow connecting unit, 1/4 in	CP17984
High flow connecting unit 1/8 in	CP17985
1-position stainless steel connecting unit, 1/4 in	CP7980P4
1-position stainless steel connecting unit, 1/8 in	CP7988P8
1-position stainless steel connecting unit, 3 mm	CP7988P3
1-position stainless steel connecting unit, 6 mm	CP7980P6
1-position 7890 GC bracket connecting unit (for bracket 5003-1356)	CP742950

Table 5 Replacement Gas Clean Filters

Gas Clean Filters	Part No.
Agilent Gas Clean CO2 Filter	CP17969
Agilent Gas Clean Oxygen Filter	CP17970
Agilent Gas Clean Moisture Filter	CP17971
Agilent Gas Clean Process Moisture Filter	CP17971P
Agilent Gas Clean Charcoal Filter	CP17972
Agilent Gas Clean Carrier Gas Purifier	CP17973
Agilent Sulfur Filter	CP17989

Table 6 Accessories and Fittings

Gas Clean Filters	Part No.
Wall mounting bracket for connecting units CP7980 and CP7988	CP7981
7890 GC mounting bracket for bracket connecting unit (CP742950)	5003-1356
Ring nut connecting unit	5043-0403
Flush head for connecting unit	CP7987

Table 6 Accessories and Fittings (continued)

Gas Clean Filters	Part No.
Male connector, 1/4-in. with dust filter	CP7986
Male connector, 1/8-in. with dust filter	CP82117
O-rings, two sets	CP7983
Male connector, stainless steel, 1/4 in with dust filter	CP7986SS
Male connector, stainless steel, 1/8 in with dust filter	CP82117SS
Male connector, stainless steel, 3 mm with dust filter	CP82117SS3
Male connector, stainless steel, 6 mm with dust filter	CP7986SS6

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