

PICARRO

Maintenance Guide

Inlet Particulate Filter Replacement for Picarro Analyzers



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1. Introduction

1.1 Applicability

This guide provides replacement procedures for the G2000, G4000, L2000, PI2000, and PI5000 series analyzers.

There are separate filter replacement procedures based on the filter type; either stainless steel (S1020, "SS") or Teflon (S1021, for use with models that handle reactive gases, and for use with the GasScouter™ backpack). Teflon is the trade name for PTFE (polytetrafluoroethylene).

Gases are filtered by two in-line, sub-micron particulate filters before reaching the measurement cavity. Only one of these, the inlet filter, is user-replaceable.

Replacement filters can be purchased from Picarro and installed by the user.

Picarro recommends replacing the inlet particulate filter every 12 months.



WARNING

The inner (second) filter is inside the analyzer's internal hot box and is NOT user replaceable. Do not open the hot box. If you suspect the inner filter is clogged, contact Picarro for replacement by a Picarro-certified technician. User replacement of the inner filter or breaking the anti-tamper seal voids the analyzer warranty.

1.2 Symptoms of a Clogged Filter

Filters can become clogged after months or years of use in dirty environments.

Some symptoms of a clogged filter are:

- The analyzer reports "pressure low" in the dialogue at the bottom of the data viewer screen
- Outlet_Valve value drops significantly from its factory value (which is unique to each analyzer).
- Response time is slower than usual.



WARNING

If liquid water is accidentally sucked into the inlet line, it will clog the filter and impede flow (usually for a few days) until it evaporates. If you suspect a wet filter, it is important to NOT turn off the analyzer or replace the filter until it is dry.

The reason for this is that the increased humidity due to liquid water in the filter can cause condensation on the optics if the analyzer is allowed to cool from its operating temperature. Often, after the filter dries, the analyzer will begin functioning normally, and a filter replacement is not necessary.

- **Dry the filter by running Clean Dry Air (CDA) through the analyzer. If the analyzer functions normally after drying, a filter replacement is not necessary.**
 - **If drying the filter does not fix the problem, replace the filter.**
-

2. Safety

Read the following safety warnings prior to servicing the analyzer.



WARNING

Picarro analyzers weigh 20 kg (44 lbs) or more. Use the technique described below (or follow your local regulations) when lifting the analyzer.

- a. Before lifting, inspect the unit for slippery substances or sharp edges.
- b. Lift with two people, one on each side of the analyzer.
- c. Crouch down and stay close to the unit. Always keep your back as straight as possible.
- d. Position your feet for sturdy balance. Lift with your legs, not your back.
- e. Do not twist the back while carrying the unit. Rotate direction with hip joints.
- f. Lower the unit by bending at the knees.



CAUTION

Follow the *System Shutdown and Preparation* procedure prior to opening the instrument. Ensure all power is disconnected.



CAUTION

HOT SURFACE: When disconnecting the sample line from the inlet, remember that the area surrounding the inlet may be hot.



CAUTION

When using compressed gases, follow all appropriate safety conventions, including use of eye protection, physical restraint of cylinders, etc.



CAUTION

A flow of clean, relatively dry gas should always be directed to the instrument for several minutes prior to shutting down. Trapping a high-moisture content gas sample in the cavity can cause condensation damage to the mirrors as the instrument cools from its operating temperature.



CAUTION

Do not turn off the pump or disconnect the vacuum line while the instrument is still operating. Doing so could result in damage to the optics.



CAUTION

If you have trouble turning off the analyzer software, do NOT use the Windows Task Manager to kill the process(es). Instead, double-click on the “*Stop Instrument*” icon in the Diagnostics folder located on your desktop and select the option to “*Turn off analyzer in current state*”. See Section 3.2 and Figure 2.

3. System Shutdown and Preparation

Complete this section before servicing the analyzer.

3.1 Shutdown (Windows OS)

Use the following procedure to shutdown the analyzer on Windows operating systems.



NOTE

Note this procedure is not applicable to G430x analyzers, please refer to Chapter 10 G4301/G4302 Inlet Filter Replacement.

1. With the pump still running, switch to a source of clean, dry gas at the sample inlet and allow it to run until the water channel reading on the GUI falls below 0.2% (2000 ppm). This will prevent any damage from condensation to the cavity surfaces.
2. Click the **Shutdown** button located on the left side of the Data Viewer window.
3. A window will pop-up (Figure 1) asking the user to confirm the shutdown. (Note: If three options are given on an older instrument, choose the “**For Shipment**” option.)

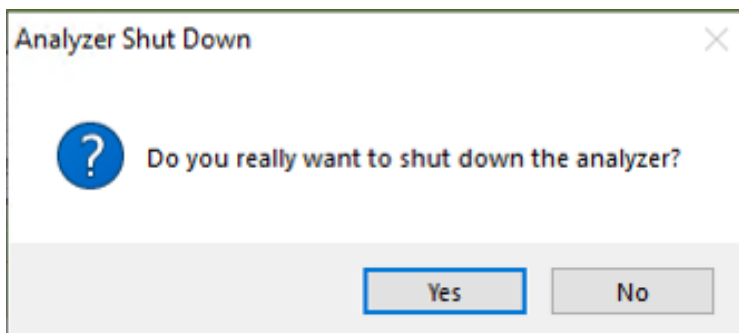


Figure 1: Shutdown Confirmation Pop-Up Dialog

After clicking **Yes** to confirm shutdown, the analyzer software and then the computer OS will shut off after a few minutes. *Leave any dry gas or desiccant attached to the inlet during this process.*

4. When the instrument fans audibly turn off, and when the green power button light on the front of the instrument turns off, shut off the pumps manually from the rocker switch on the side of the pump.

Shutdown from Stop Instrument in Diagnostics Folder

To shut down instrument if analyzer software does not respond to a normal Shut down attempt from the UI:

1. Open the Diagnostics folder and double-click the *Stop Instrument* icon.
2. Select “Turn of analyzer in current state”.

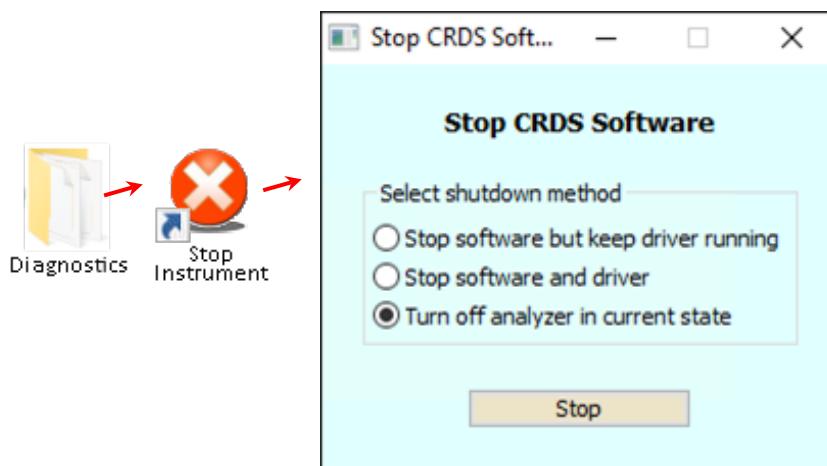


Figure 2: Shutting Down Analyzer from Stop Instrument Icon

Disconnections Prior to Servicing

1. Disconnect the pump and any input gases.
2. Disconnect the AC power cable from the back of the instrument.
3. Disconnect any monitor, keyboard, or mouse that may be connected.
4. If necessary, move the analyzer to a clean work environment.

3.2 Shutdown (Linux OS)

This section describes how to safely shutdown the analyzer on Linux operating systems using dry gas, closing the CRDS application, and powering off the instrument from the Picarro Launch Pad.



CAUTION

A flow of clean, dry gas should always be directed to the instrument for several minutes prior to shutting down. Trapping a high-moisture content gas sample in the cavity can cause condensation damage to the mirrors as the instrument cools from its operating temperature.



CAUTION

Do not turn off the pump or disconnect the vacuum line while the instrument is operating.

Flow Clean, Dry Gas (When Using an A2000 Pump)

1. With the pump still running, switch to a source of clean, dry gas at the sample inlet and allow it to run until the water channel reading on the GUI falls below 2000 ppm. This will prevent any damage from condensation to the cavity surfaces. This dry gas may be from a tank (target 2-3 PSIG pressure) or from a desiccant column like the DrieRite column, C0360, sold on store.picarro.com).

Shutdown (CRDS Data Viewer)

2. Click on the **Shutdown** button from the bottom left side of the Data Viewer window.
3. A message displays prompting the user to confirm the shutdown. Once confirmed, the analyzer software and hardware will turn off.

Note you must be logged in to shut down the analyzer.

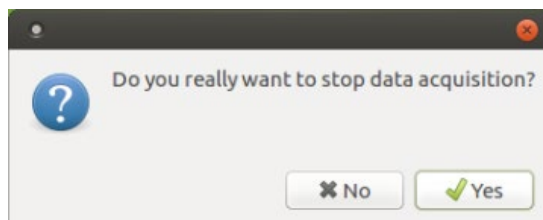


Figure 3: Analyzer Shutdown Dialog

4. Manually turn off the pumps and dry gas only if system requires it.



NOTE

Leave any dry gas or desiccant attached to the inlet during this process.

5. From the Picarro Launch Pad select **Power Off** to turn off the hardware.
6. When the instrument fans audibly turn off, and when the green power button light on the front of the instrument turns off, shut off the pump manually from the rocker switch located on the pump.

4. Stainless Steel Particulate Filter Replacement

This section provides instructions for G2000 and L2000 analyzer models that have an internally mounted stainless steel first filter.

4.1 Required Parts and Tools

- S1020 Particulate filter kit for input sample line (replace every 12 months)
- 2 mm Hex driver
- 9/16" open-end wrench
- 5/8" open-end wrench
- 11/16" open-end wrench
- Snoop or equivalent leak test solution

4.2 Remove the Old Particulate Filter

1. Shut down the analyzer by following **Section 3, System Shutdown and Preparation**, and move the analyzer to a clean work environment.
2. Using a 2 mm hex driver, remove the top lid of the analyzer by removing six M3 x 6 mm socket flathead screws (Figure 3).

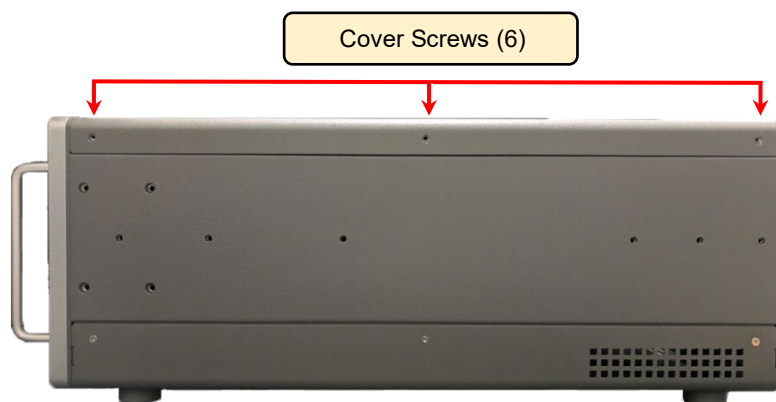


Figure 4: Cover Removal

3. Remove the small piece of foam from around the input bulkhead by sliding it toward the right side of the analyzer (Figure 4).

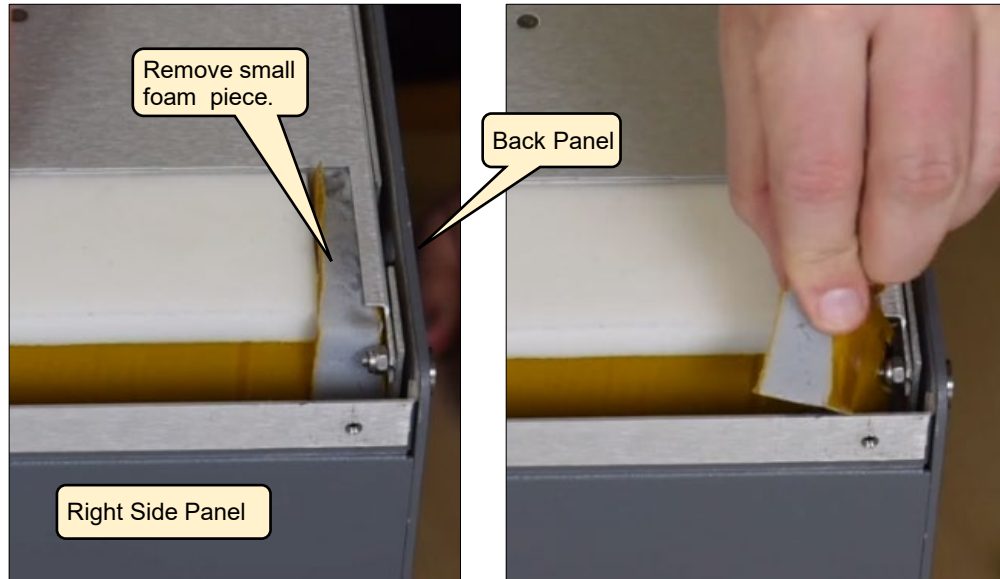


Figure 5: Bulkhead Foam Removal

4. Using the 5/8" wrench, loosen the retaining nut on the input bulkhead as shown in Figure 5 (about 1 full turn should be enough).

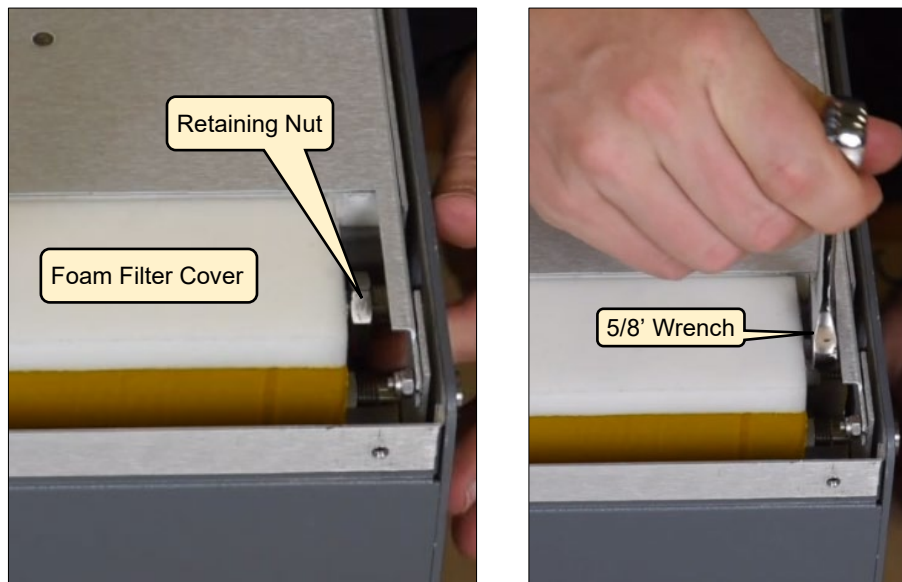


Figure 6: Bulkhead Retaining Nut Loosened

5. Slide the foam and metal filter toward the right side panel, then lift it out to expose the filter (Figure 6).

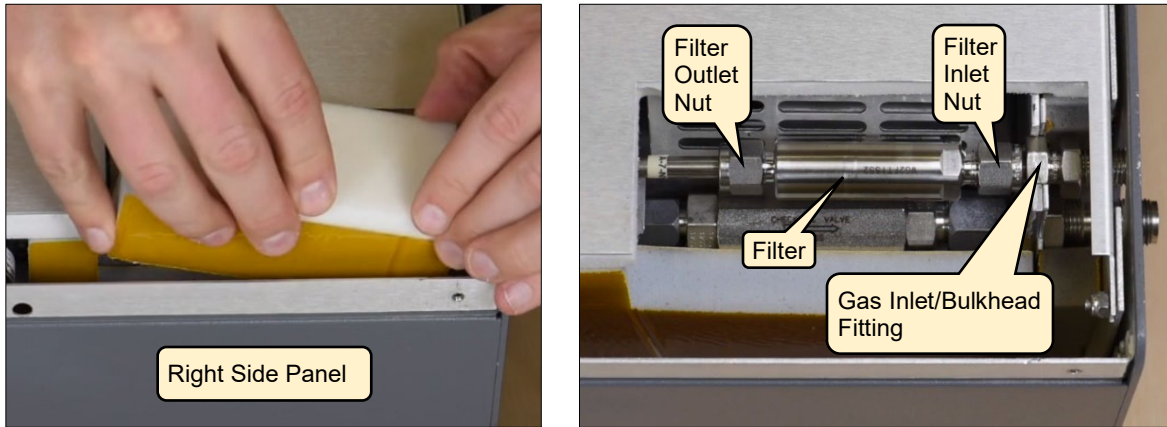


Figure 7: Foam Filter Cover Removal

6. Using the 9/16" and 11/16" wrenches, disconnect the filter inlet Swagelok nut, then remove the bulkhead fitting through the back panel (Figure 7).

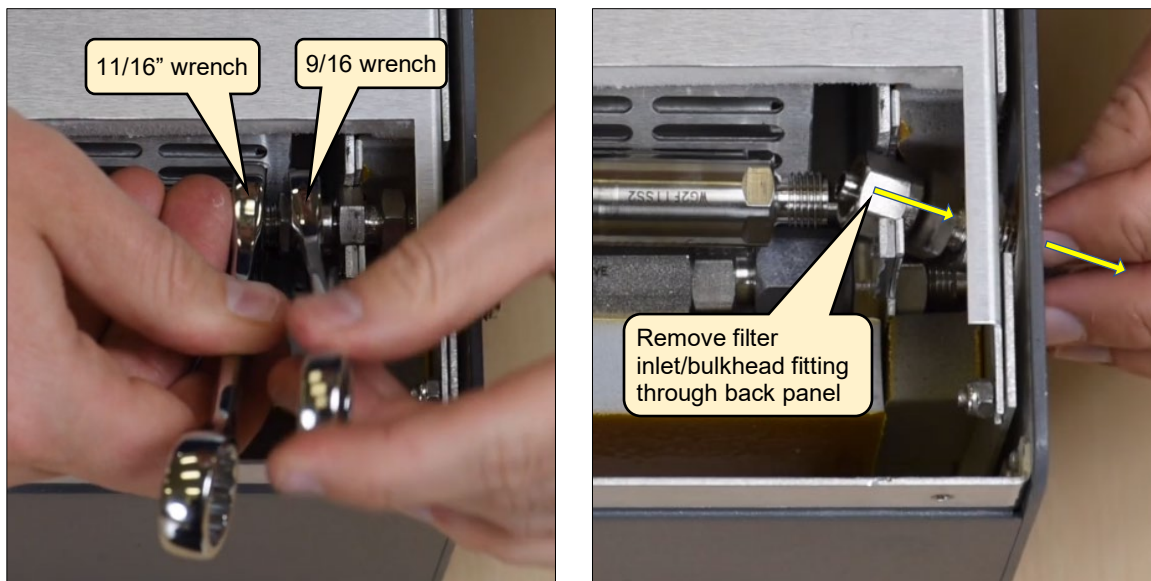


Figure 8: Filter Inlet Nut Disconnection and Bulkhead Fitting Removal

7. Using the 9/16" and 11/16" wrenches, disconnect the filter outlet Swagelok nut, then remove the filter (Figure 8).

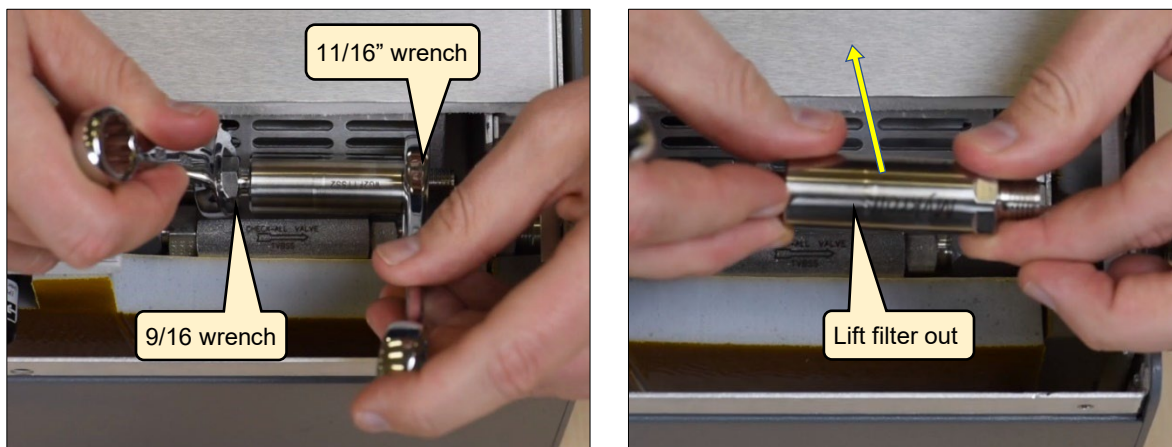


Figure 9: Filter Outlet Nut Disconnection and Filter Removal

4.3 Installing the New Filter



NOTE

When reattaching 1/4" Swagelok fittings, the nut should be hand-tightened and then turned an additional 1/8 of a turn using a wrench.

1. Place an absorbent cloth or paper in the area that will be occupied by the filter and fittings. This will be used to absorb fluid during the leak test performed after installation of the new filter. See Figure 10 for cloth positioning.
2. Remove the filter from its packaging and attach it to the filter outlet Swagelok nut using the 9/16" and 11/16" wrenches. The arrow on the filter needs to point away from the bulkhead fitting as shown in Figure 9.
3. Using the 9/16" and 11/16" wrenches, reposition the filter inside the analyzer, and reattach to the filter outlet Swagelok nut.

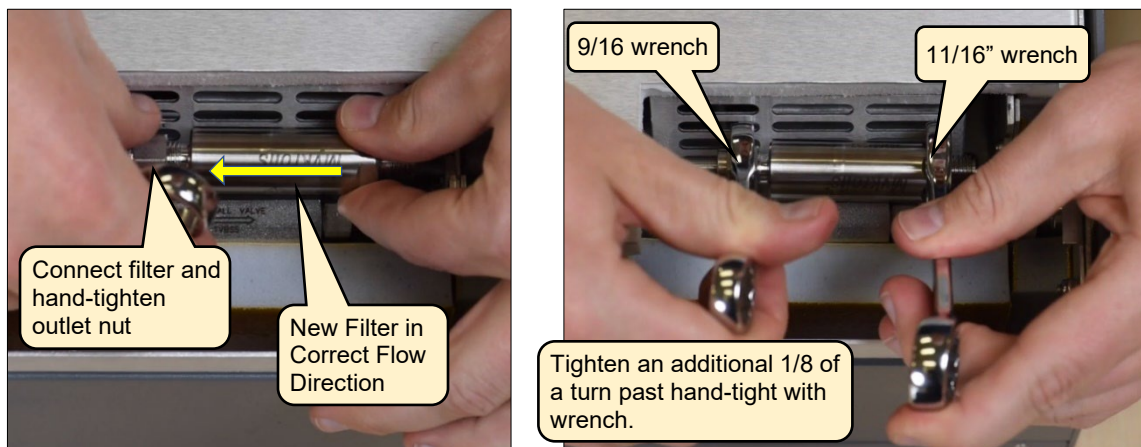


Figure 10: Connect New Filter to Outlet Swagelok Fitting and Tighten

4.4 Leak Test after Reassembly

1. With the instrument still turned off, and absorbent cloth or paper under all relevant fittings, connect a tank of dry gas to the analyzer inlet and set the pressure to 2-3 PSIG (Figure 10).



CAUTION

Ensure the absorbent cloth or paper is situated correctly to prevent ingress of leak test solution into the instrument.

2. Invert the Snoop bottle and squeeze to expel any bubbles from the delivery tube. Apply Snoop or an equivalent leak test solution to each fitting that was disconnected, watching for any bubbles to form. If bubbles form, retighten the leaky fitting and retest.
3. When no bubbles form, the system is ready to be used. Wipe away all excess leak test solution and remove the absorbent cloth or paper.

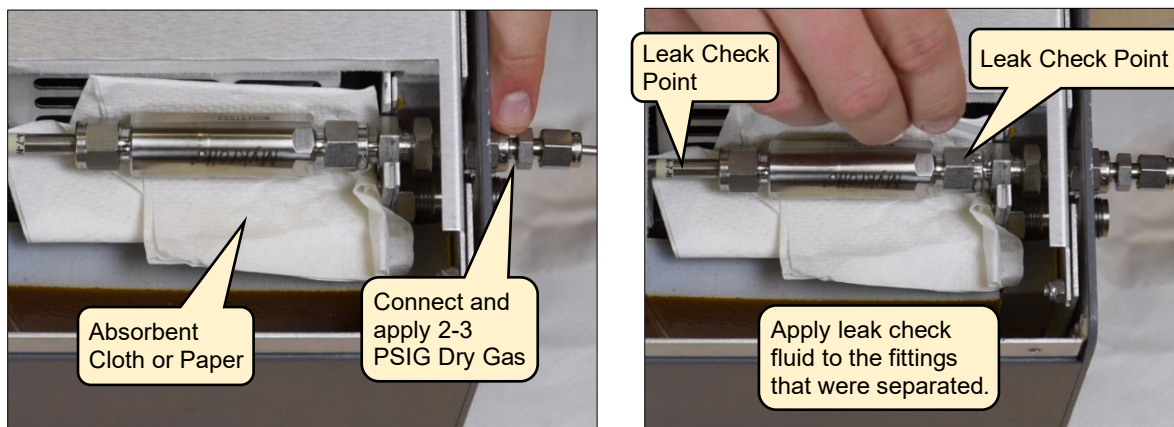


Figure 11: Leak Test After Reassembly – Stainless Steel Filter

4.5 Final Assembly

1. Reposition the foam filter cover and using the 5/8" wrench, tighten the retaining nut on the bulkhead fitting to secure it.
2. Reposition the small piece of foam around the input bulkhead fitting.
3. Using the 2 mm hex driver, reattach the analyzer top cover with 3 screws on each side.

5. PTFE Particulate Filter Replacement

This section provides instructions for Picarro G2000 analyzers that use an internally mounted PTFE (Teflon) filter:

G2103 (NH₃), G2114 (H₂O₂, CH₄), G2205 (HF), G2307 (CH₂O), G2108 (HCl)

5.1 Required Parts and Tools

- S1021 Particulate filter kit for input sample line; includes PTFE filter and PTFE ferrules (Replace every 12 months)
- 2 mm Hex driver
- Vise-Grips or pliers
- 9/16" open-end wrench
- 5/8" open-end wrench
- Snoop or equivalent leak test solution

5.2 Remove the Old Particulate Filter

1. Shut down the analyzer by following **Section 3, System Shutdown and Preparation**, and move the analyzer to a clean work environment.
2. Using a 2 mm hex driver, remove the top lid of the analyzer by removing six M3 x 6 mm socket flathead screws (Figure 11).

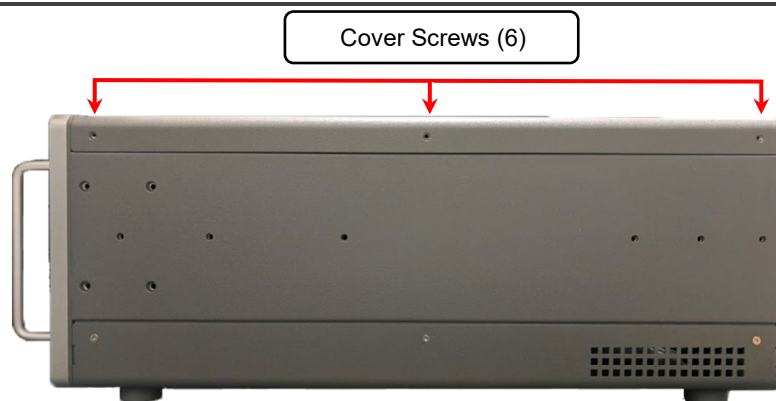


Figure 12: Cover Removal

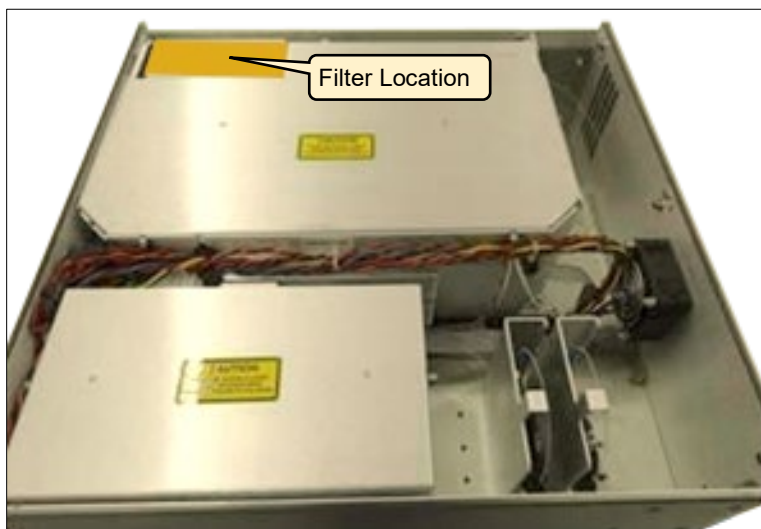


Figure 13: Filter Location

3. Remove the small foam piece surrounding the bulkhead as shown below in Figure 13.

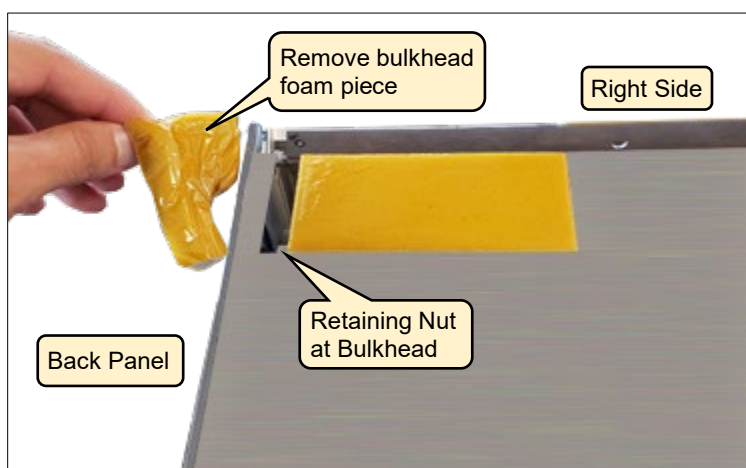


Figure 14: Bulkhead Foam Removed and Retaining Nut Loosened

4. Using the 5/8" wrench, loosen the filter cover retaining nut on the input bulkhead (about 1 full turn should be enough). See Figure 14.
5. Slide the filter cover (with foam on top and side) toward the right side of the analyzer to remove it.

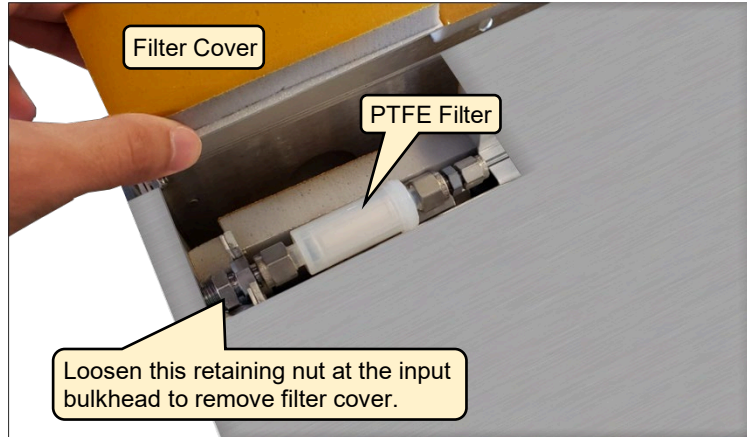


Figure 15: Foam Filter Cover Removal

6. Using a 9/16" wrench and pliers or Vice-grips, loosen input and output nuts that are connecting the filter to the analyzer.



CAUTION

When using pliers to hold the filter, grip with just enough pressure to prevent it from turning. Too much pressure can damage the filter.

7. Slide the filter and bulkhead slightly toward the back of the analyzer and lift out.

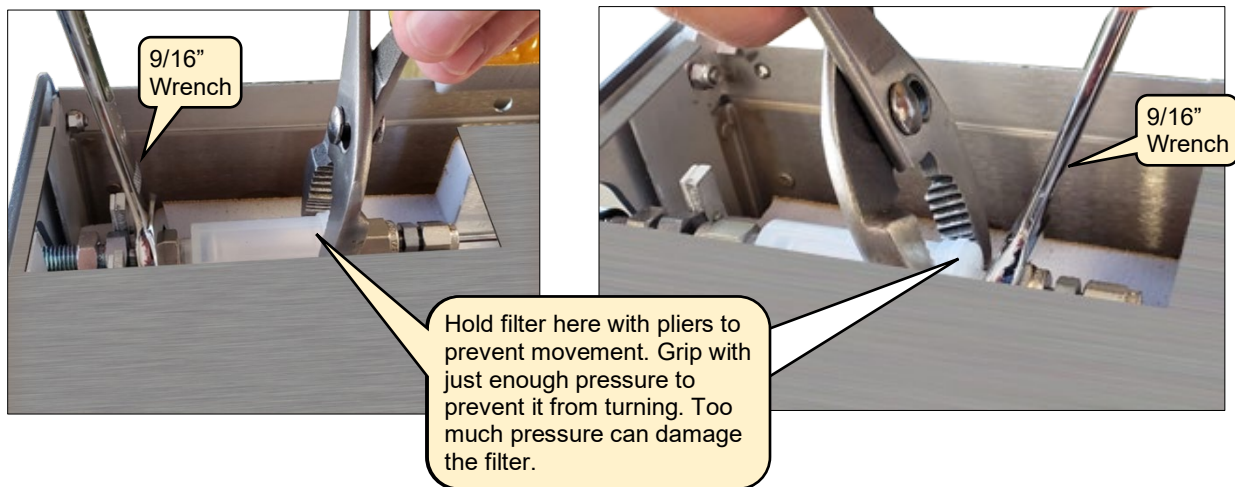


Figure 16: Loosening Filter Input and Output Nuts

8. Inspect the filter input/output connector nut interfaces for damage. Also inspect the PTFE ferrules on the tubing inside the nuts as shown in Figure 16. Replace any damaged ferrules with the new ones provided in the filter kit.

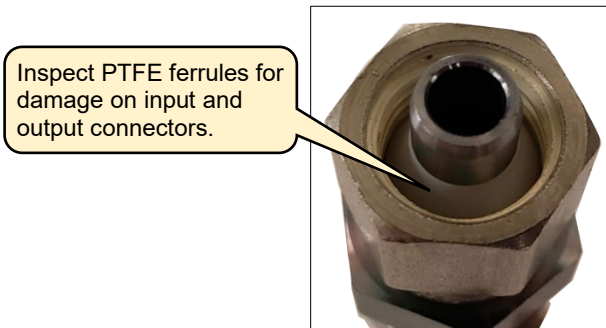


Figure 17: Ferrule Inspection

5.3 Installing the New PTFE Filter



CAUTION

Equipment Damage: To prevent cross-thread damage to the new filter during installation, carefully align the connector nuts with the filter before threading them on. Damaged filter threads can compromise the seal.



CAUTION

When installing the new filter, to ensure proper gas flow direction, make sure the arrow on the filter is pointing away from the back panel of the analyzer as shown in Figure 18.



NOTE

When reattaching 1/4" Swagelok fittings, the nut should be hand-tightened and then turned an additional one flat (60 degrees) of a turn using a wrench.

1. Place an absorbent cloth or paper in the area that will be occupied by the filter and fittings. See Figure 17. This will be used to absorb fluid during the leak test performed after installation of the new filter.
2. Remove new the filter and ferrules from its packaging.
3. Position the new filter between the inlet and outlet fittings, and taking care to prevent cross-threading, attach the nuts to each end. The flow direction arrow on the filter should point away from the back of the analyzer.
4. Using a 9/16" wrench and pliers and the technique shown in Figure 15, tighten the two nuts.

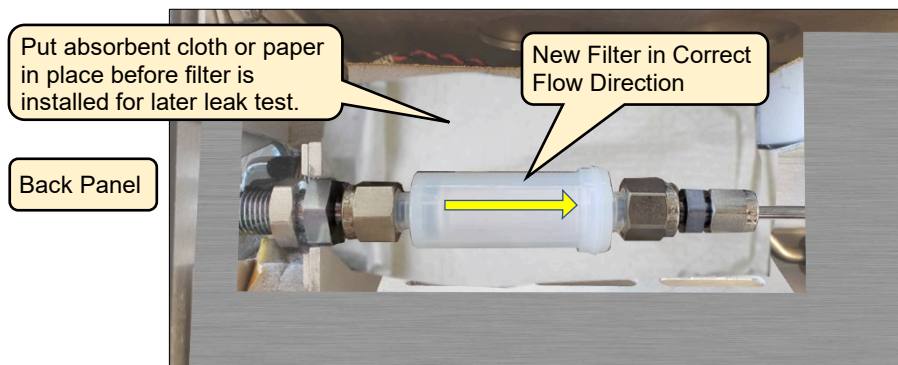


Figure 18: New Filter Installed

5.4 Leak Test after Reassembly

1. With the instrument still turned off, and absorbent cloth or paper under all relevant fittings, connect a tank of dry gas to the analyzer inlet and set the pressure to 2-3 PSIG (Figure 18).



CAUTION

Ensure the absorbent cloth or paper is situated correctly to prevent ingress of leak test solution into the instrument.

2. Invert the Snoop bottle and squeeze to expel any bubbles from the delivery tube. Apply Snoop or an equivalent leak test solution to each fitting that was disconnected, watching for any bubbles to form. If bubbles form, retighten the leaky fitting and retest.
3. When no bubbles form, the system is ready to be used. Wipe away all excess leak test solution and remove the absorbent cloth or paper.

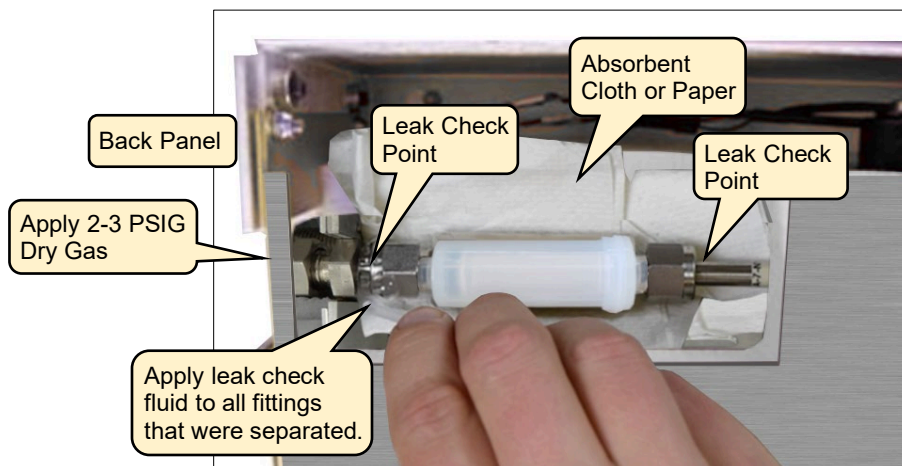


Figure 19: Leak Test After Reassembly – PTFE Filter

5.5 Final Assembly

1. Reposition the foam filter cover and using the 5/8" wrench, tighten the retaining nut on the bulkhead fitting to secure it. The metal edge of the filter cover should be under the foam of the top of the enclosure.
2. Reposition the piece of foam around the input bulkhead fitting.
3. Using the 2 mm hex driver, reattach the analyzer top cover with 3 screws on each side.

6. Externally-Mounted Stainless Steel Particulate Filter Replacement

This procedure applies to PI2910/PI2920 analyzers with externally mounted stainless steel filters.

6.1 Required Parts and Tools

- S1020 Particulate filter kit for input sample line (Replace every 12 months)
- 2 mm Hex driver
- 11/16" open-end wrench
- 9/16" open-end wrench
- Snoop or equivalent leak test solution

6.2 Remove the Old Particulate Filter

1. Shut down the analyzer by following **Section 3, System Shutdown and Preparation**, and move the analyzer to a clean work environment.
2. Loosen the three captive thumbscrews on the filter housing, then carefully remove the filter housing (Figure 19, Figure 20).

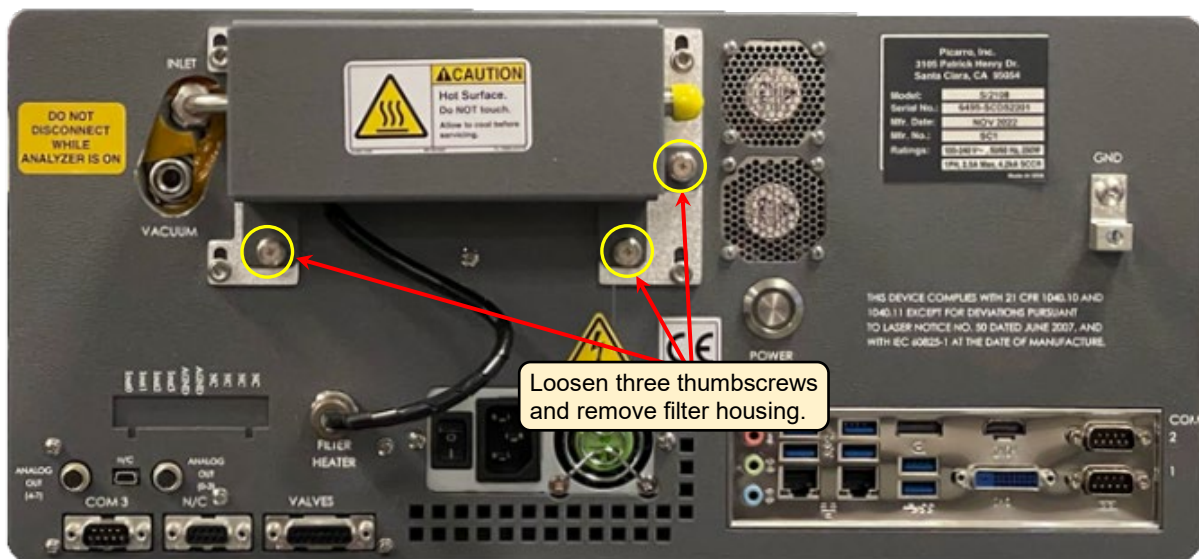


Figure 20: External Filter Housing Screws

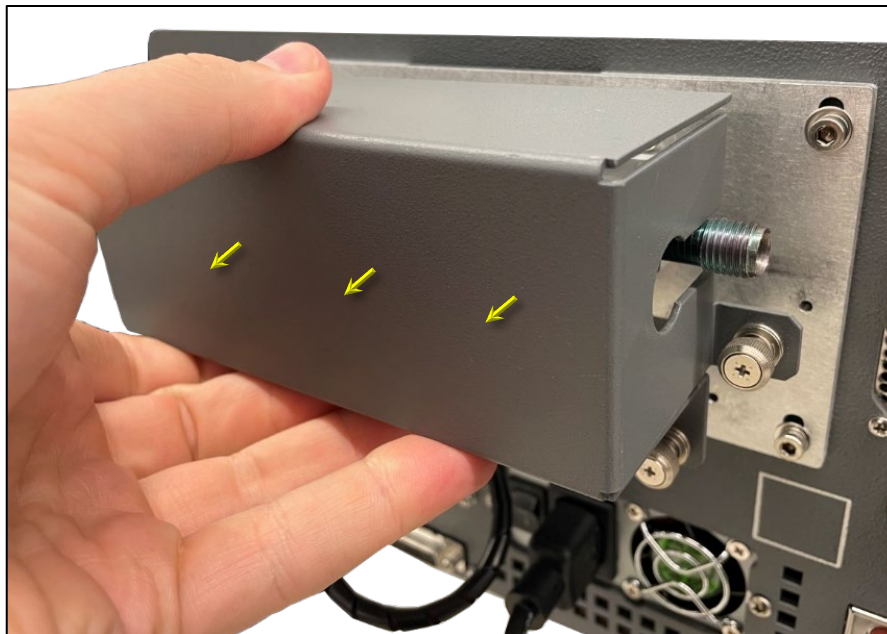


Figure 21: Filter Housing Removal

- Loosen (but do not remove) the two 2mm hex head screws that clamp the **Sliding Swagelok Mounting Block** to the main mounting plate (see Figure 21).

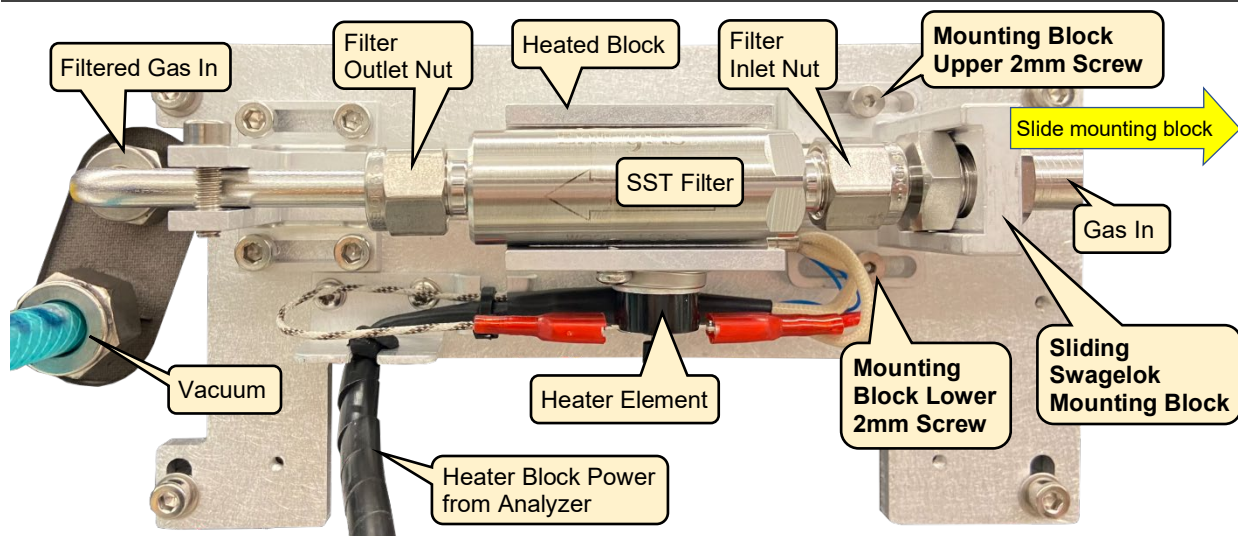


Figure 22: Stainless Steel Filter Mounting Assembly (Filter Housing Removed)

- Using 9/16" and 11/16" open-end wrenches (Figure 22), loosen the right (inlet side) nut *while sliding the **Swagelok Mounting Block** to the right for clearance*, then hand turn the 9/16 nut to remove it completely from the filter inlet.

5. Using 11/16" and 9/16" wrenches, loosen the left (outlet end) nut then hand turn the 9/16 nut to remove it completely from the filter.
6. Remove the filter, noting its flow orientation.

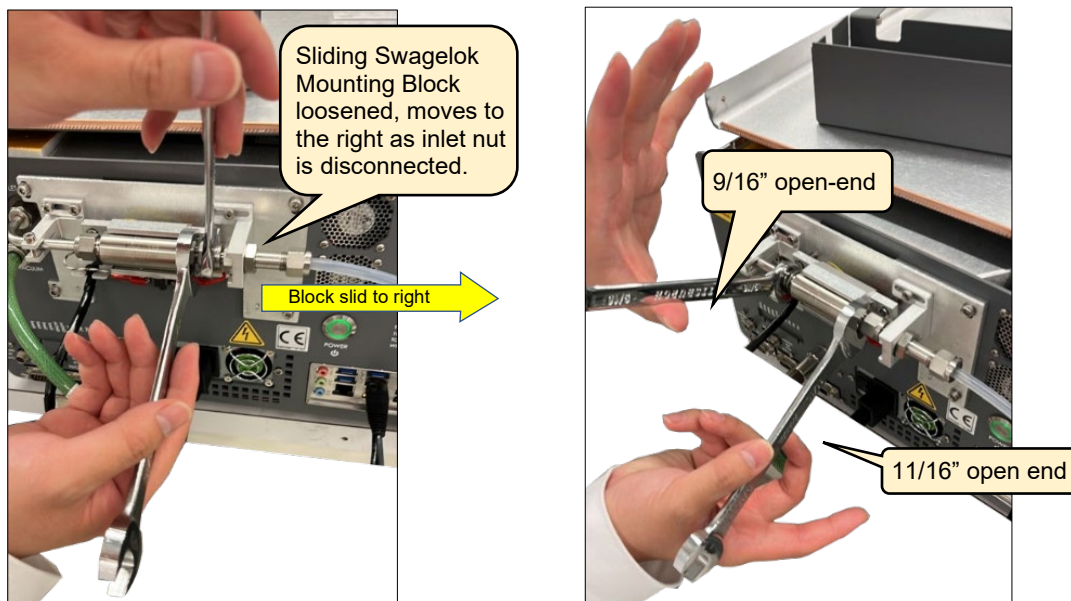


Figure 23: SST Filter Disconnection

6.3 Installing the New Filter

1. Position the new filter between the tube ends and press it into the heater block. Ensure the filter is in full contact with the heater block. The arrow on the filter points to the left side of the analyzer (in the direction of gas flow).

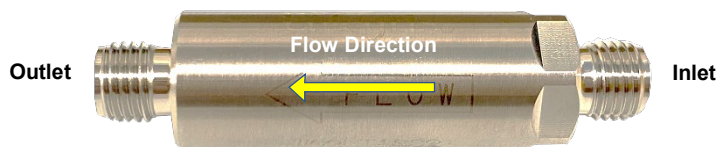


Figure 24: SST Filter Orientation for Correct Gas Flow Direction

2. Carefully align and hand-tighten the left (outlet) nut to be sure it is threaded correctly, then tighten the nut one flat (60 degrees) turn using the 11/16" and 9/16" open-end wrench (Figure 22).



CAUTION

Do not over-tighten the left (outlet) nut on the filter. To ensure proper reassembly using Swagelok fittings, see the following video: [***How to Reassemble Fluid System Tube Fittings Properly***](#). Additionally, it is recommended to use new PTFE ferrules when replacing the filter.

3. Carefully slide the mounting block with the ferrules and nut into position at the filter inlet. Carefully align and hand-tighten the right (inlet) nut to be sure it is threaded correctly, then tighten the nut one flat (60 degrees) turn using the 11/16" and 9/16" open-end wrenches.



CAUTION

Do not over-tighten the left (outlet) nut on the filter. To ensure proper reassembly using Swagelok fittings, see the following video: [How to Reassemble Fluid System Tube Fittings Properly](#). Additionally, it is recommended to use new PTFE ferrules when replacing the filter.

4. Tighten the two 2mm hex screws to secure the sliding swagelok mounting block.

6.4 Leak Test – Externally Mounted Filter

A leak test must be performed after filter replacement. This is done by applying dry gas pressure to the inlet and using Snoop or equivalent leak test fluid to check the fittings. ***The heater element under the filter heater block must be protected from incursion of leak test fluid using absorbent paper or cloth.***

1. Ensure the instrument is still turned off.
2. Place absorbent paper or cloth towels under the inlet and outlet Swagelok fittings to prevent leak test fluid from entering the filter heater element.
3. Connect a tank of dry gas to the analyzer inlet and set the pressure to 2-3 PSIG (Figure 10).



CAUTION

Ensure the absorbent cloth or paper is situated correctly to prevent ingress of leak test solution into filter mounting block heater element.

4. Invert the Snoop bottle and squeeze to expel any bubbles from the delivery tube.
5. Apply Snoop or equivalent leak test solution to each side of the fitting that were disconnected, watching for any bubbles to form. If bubbles form, retighten the leaky fitting and retest.
6. When no bubbles form, the system is ready to be used.
7. Wipe away all excess leak test solution and remove the absorbent cloth or paper.
8. Install the filter housing.

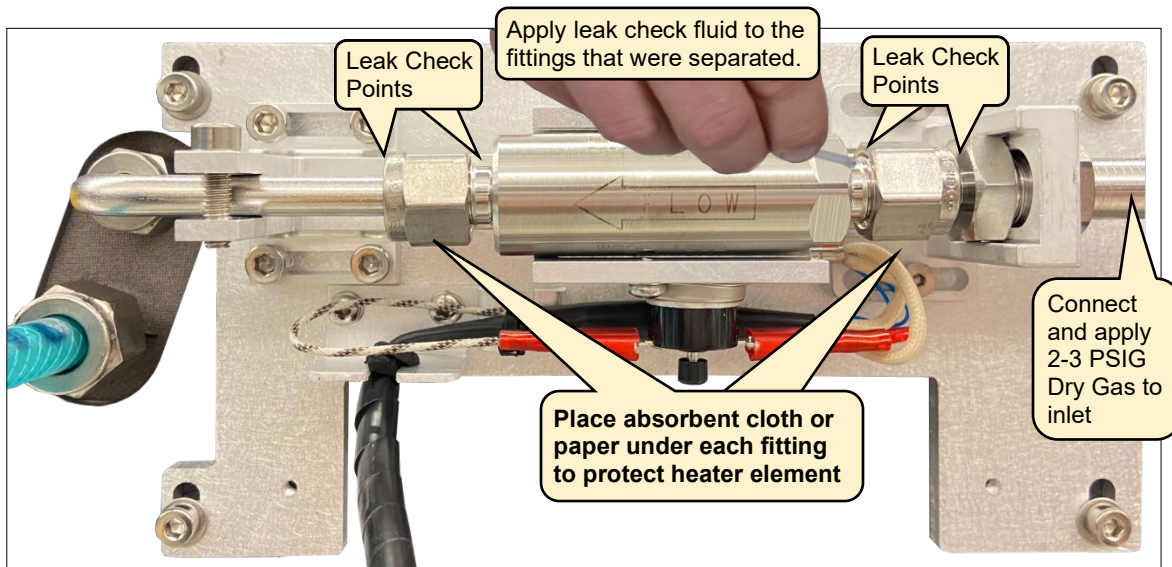


Figure 25: Leak Test After Reassembly – Externally Mounted Filter

7. Externally-Mounted PTFE Particulate Filter Replacement

This procedure applies to analyzers with externally mounted PTFE filters.

7.1 Required Parts and Tools

- S1021 Particulate filter kit for input sample line; includes PTFE filter and PTFE ferrules (Replace every 12 months)
- 2 mm Hex driver
- Vise-Grips or pliers
- 9/16" open-end wrench
- Snoop or equivalent leak test solution

7.2 Remove the Old Particulate Filter

1. Shut down the analyzer by following **Section 3, System Shutdown and Preparation**, and move the analyzer to a clean work environment.
2. Loosen the three captive thumbscrews on the filter housing (Figure 25), then carefully remove the filter housing (Figure 26).

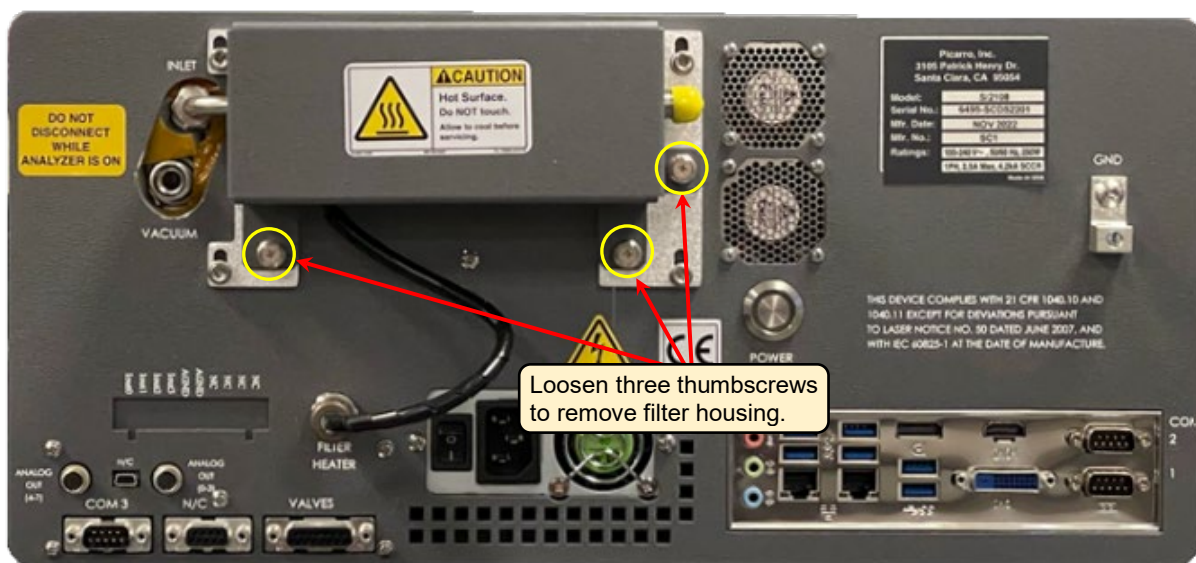


Figure 26: External Filter Housing Screws



Figure 27: Filter Housing Removal

3. Loosen (but do not remove) the two 2mm hex head screws clamping the **Swagelok Mounting Block** to the main mounting plate (Figure 27).
4. Using a 9/16" open-end wrench, loosen the right (inlet side) nut *while sliding the **Mounting Block** to the right for clearance*, then hand turn the 9/16 nut to remove it completely from the filter inlet.

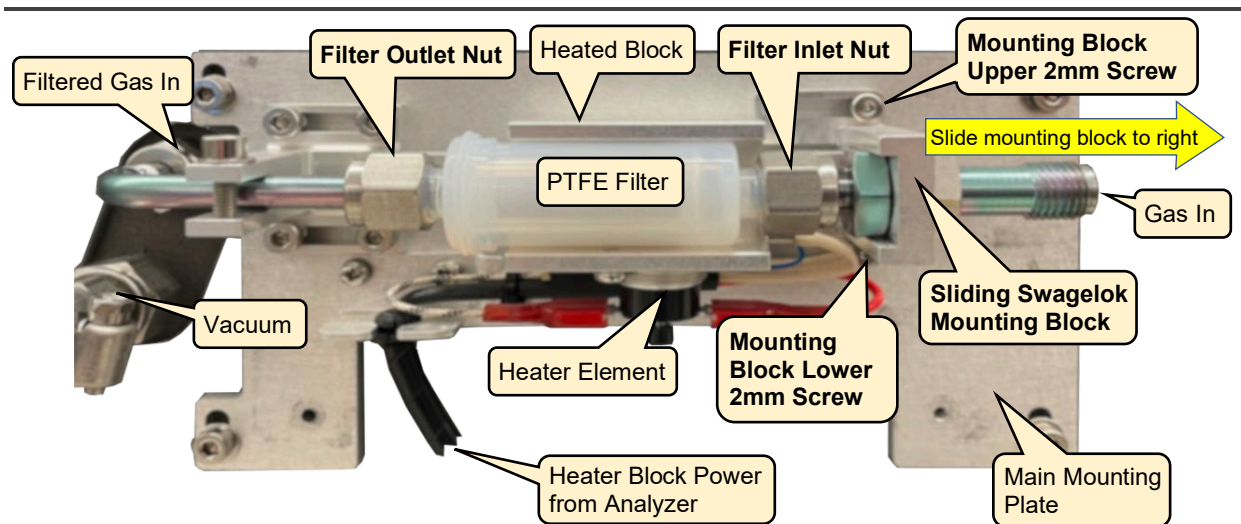


Figure 28: PTFE Filter Mounting Assembly (Filter Housing Removed)

5. Using a 9/16" open-end wrench, loosen the left (outlet end) nut while gently holding the filter body with the pliers (Figure 28), then hand-turn the 9/16 nut to remove it completely from the filter.

- Remove the filter, noting its flow orientation.

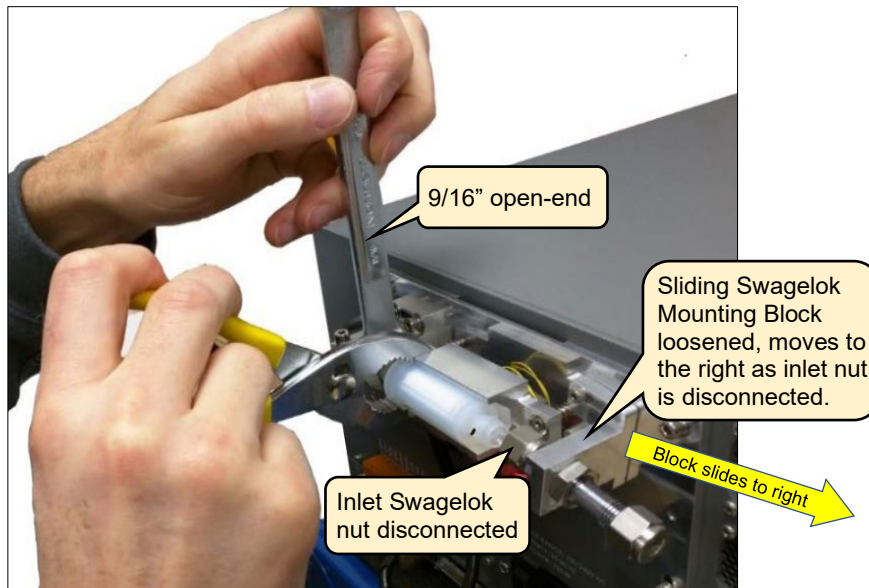


Figure 29: PTFE Filter Disconnection

- Replace the Swagelok ferrules on the filter inlet and outlet tubes. Figure 29: shows the left (filter outlet) tube with ferrules.

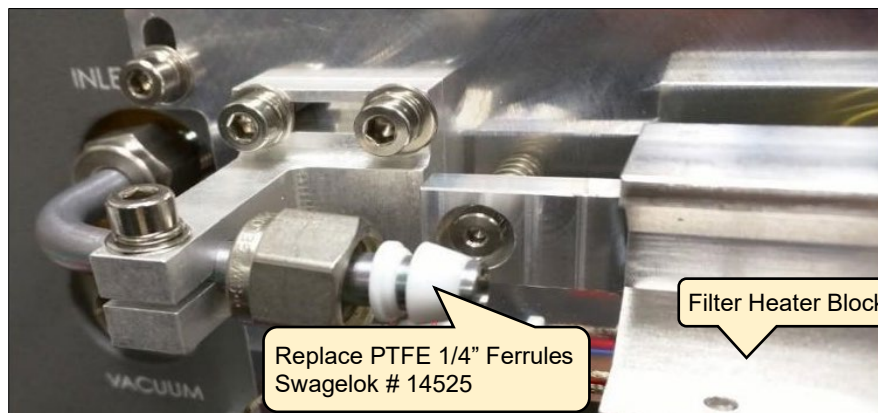


Figure 30: Replacing PTFE Ferrules



CAUTION

Be careful not to cross-thread the nut and filter fitting when installing the new filter. Cross threading can strip the PTFE threads.

7.3 Installing the New Filter

1. Position the new filter between the tube ends and press it into the heater block. Ensure the filter is in full contact with the heater block. The arrow on the filter points to the left side of the analyzer (in the direction of gas flow).

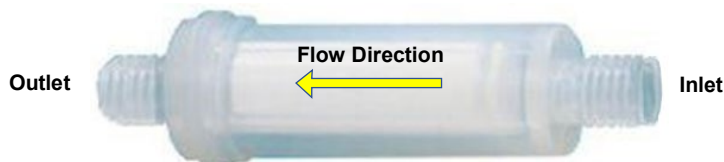


Figure 31: PTFE Filter Orientation for Correct Gas Flow Direction

2. Carefully align and hand-tighten the left (outlet) nut to be sure it is threaded correctly. Use a 9/16" open-end wrench and pliers to tighten (Figure 28).



CAUTION

Do not over-tighten the left (outlet) nut on the filter. One thread on the PTFE filter should be visible. Additionally, it is recommended to use new PTFE ferrules when replacing the filter.

3. Carefully slide the mounting block with the ferrules and nut into position at the filter inlet. Carefully align and hand-tighten the right (inlet) nut using 9/16" open-wrench and pliers.



CAUTION

Do not over-tighten the right (inlet) nut on the filter. One thread on the PTFE filter should be visible. Additionally, it is recommended to use new PTFE ferrules when replacing the filter.

4. Tighten the two 2mm hex screws to secure the sliding swagelok mounting block.
5. Perform a leak test following the same instructions in the previous section **6.4 Leak Test – Externally Mounted Filter**.
6. Install the filter housing.

8. PI2114 PTFE Particulate Filter Replacement

This procedure applies to the PI2114 analyzer.

8.1 Required Parts and Tools

- S1021 Particulate filter kit for input sample line; includes PTFE filter and PTFE ferrules (Replace every 12 months)
- 7/8" open-end wrench
- 9/16" open-end wrench
- Vise-Grips or pliers
- 2mm hex wrench
- Snoop or equivalent leak test solution

8.2 Remove the Old Particulate Filter

1. Shut down the analyzer by following **Section 3, System Shutdown and Preparation** and move the analyzer to a clean work environment.
2. Using a 2 mm hex driver, remove the top lid of the analyzer by removing six M3 x 6 mm socket flathead screws (three screws on each side).

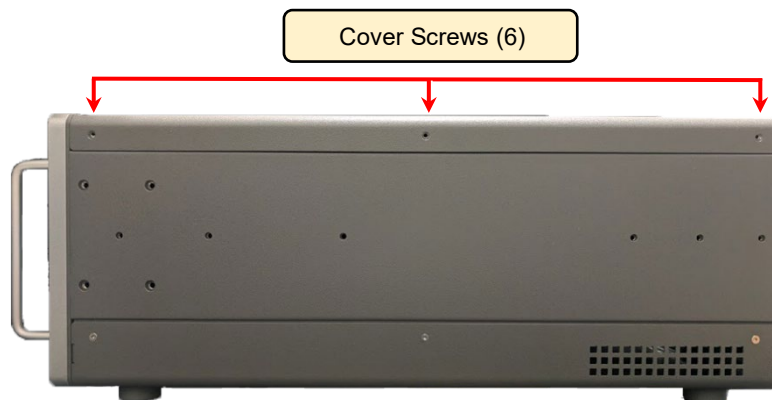


Figure 32: Cover Removal

3. Lift the top cover off the analyzer. This will reveal the bulkhead foam and filter cover.

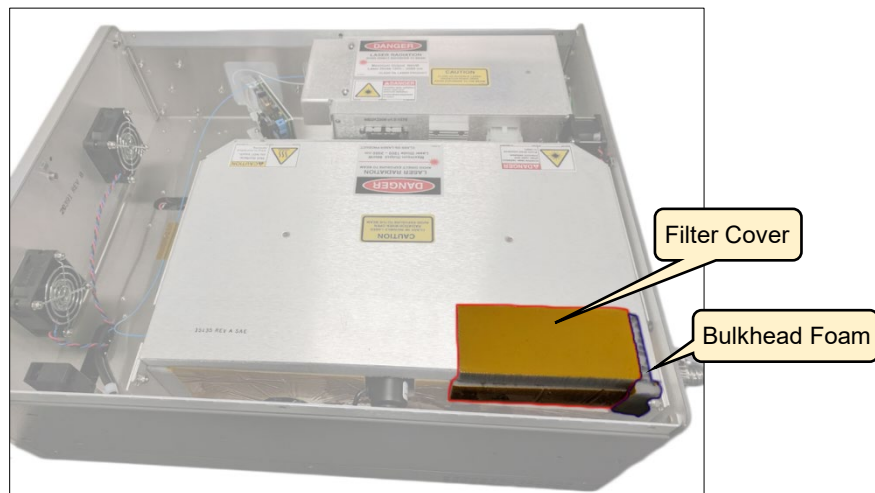


Figure 33: Filter Cover and Bulkhead Foam

4. Carefully slide the bulkhead foam to the side of the analyzer, and then lift it up and out. This will reveal the bulkhead nut.



Figure 34: Removing the Bulkhead Foam

5. Use the 7/8" wrench to loosen the bulkhead nut enough that the filter cover can slide free (about 1 full turn should be enough).

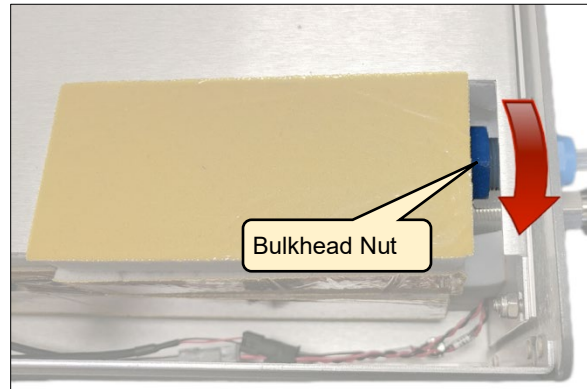


Figure 35: Loosening the Bulkhead Nut

6. With the bulkhead nut loose, slide the filter cover toward the side of the analyzer and lift up to remove it.

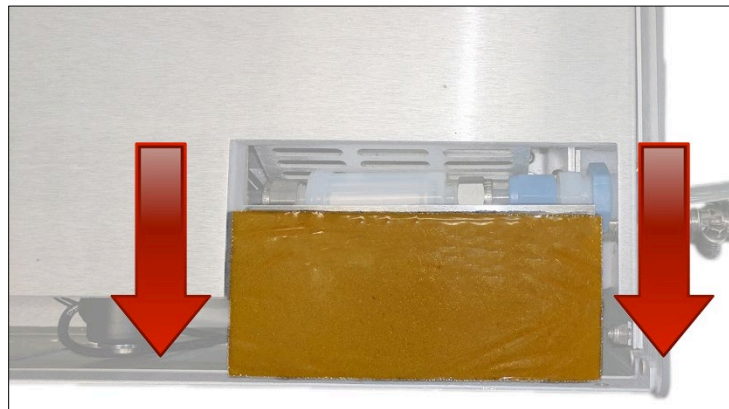


Figure 36: Removing the Filter Cover



Figure 37: Filter Assembly Exposed

7. Use Vise-Grips or pliers to hold the filter while using the 9/16" wrench to unscrew the Output Filter Nut. (Once loosened with the wrench, it may be easier to unscrew the nut by hand.)



CAUTION

When using pliers to hold the filter, grip with just enough pressure to prevent it from turning. Too much pressure can damage the filter.

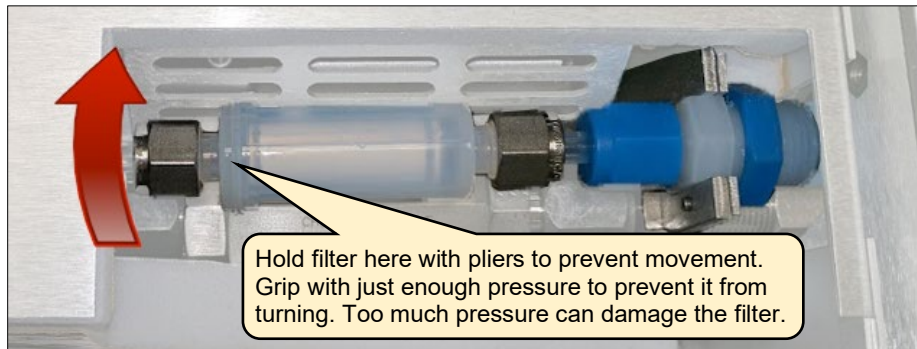


Figure 38: Loosen the Output Filter Nut

8. Use Vise-Grips or pliers to hold the filter while using the 9/16" wrench to unscrew the Input Filter Nut.



Figure 39: Loosen the Input Filter Nut

9. Shift the filter assembly toward the back of the analyzer until there is enough room to pull the filter out. (The Fitting Nut will fit through the Retention Slot, although it may require a little twist to get it oriented correctly.)
10. Pull the filter out and dispose of it appropriately.
11. Inspect the ferrules in both the input and output nuts. If they show signs of wear, they should be replaced before installing the new filter.

8.3 Installing the New Filter

1. Place an absorbent cloth or paper in the area that will be occupied by the filter and fittings. See Figure 41. This will be used to absorb fluid during the leak test performed after installation of the new filter.
2. Remove the new filter from its packaging.
3. Thread the output end of the new filter (the end with the wide flange) into the Output Filter Nut until finger tight. Be careful to avoid cross-threading.



Figure 40: Filter Orientation and Flow Direction

4. Shift the Bulkhead fitting toward the filter and thread the Input Filter Nut onto the input end of the filter until finger tight.
5. Use Vise-Grips or pliers to hold the filter while using the 9/16" wrench to tighten the Input Filter Nut about one flat (60 degrees).
6. Use Vise-Grips or pliers to hold the filter while using the 9/16" wrench to tighten the Output Filter Nut about one flat (60 degrees).
7. Shift the filter assembly so that the bulkhead fitting is approximately flush with the back of the Retention Slot (see Figure 40 below).

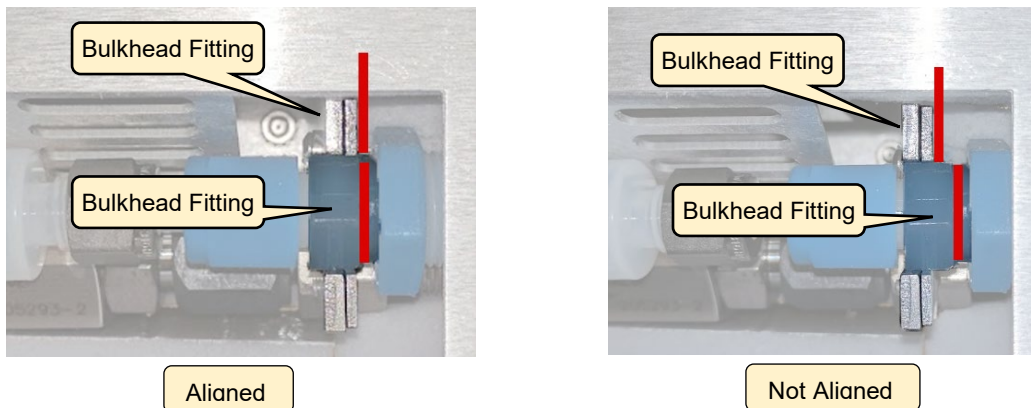


Figure 41: Aligning the Filter Assembly

8.4 Leak Test after Reassembly

1. With the instrument still turned off, and absorbent cloth or paper under all relevant fittings, connect a tank of dry gas to the analyzer inlet and set the pressure to 2-3 PSIG (Figure 41).



CAUTION

Ensure the absorbent cloth or paper is situated correctly to prevent ingress of leak test solution into the instrument.

2. Invert the Snoop bottle and squeeze to expel any bubbles from the delivery tube. Apply Snoop or an equivalent leak test solution to each fitting that was disconnected, watching for any bubbles to form. If bubbles form, retighten the leaky fitting and retest.
3. When no bubbles form, the system is ready to be used. Wipe away all excess leak test solution and remove the absorbent cloth or paper.

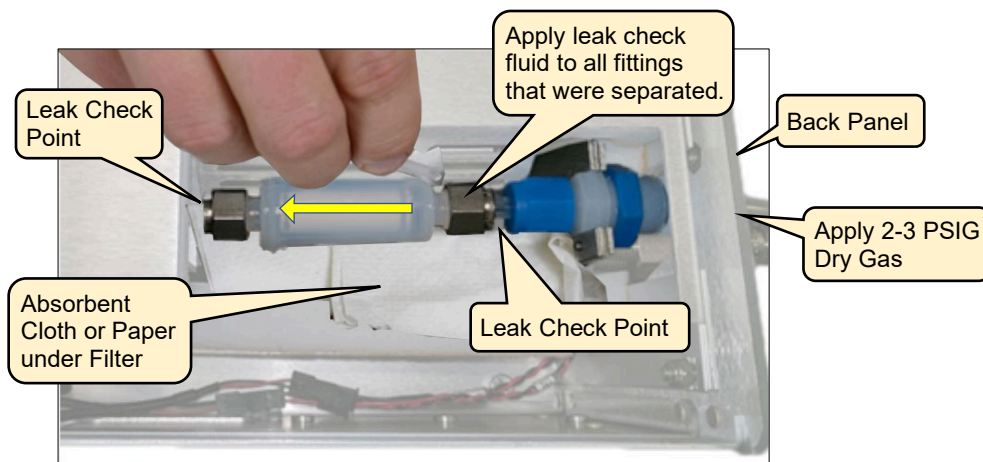


Figure 42: PI2114 Filter – Leak Test After Reassembly – PTFE Filter

8.5 Final Assembly

1. Reposition the filter cover over the filter assembly.
2. Use the 7/8" wrench to retighten the bulkhead nut.
3. Reposition the bulkhead foam around the bulkhead fitting.
4. Using the 2 mm hex driver, reattach the analyzer top cover with 3 screws on each side.).

9. PI5310 Particulate Filter Replacement

9.1 Introduction

There are two user-replaceable filters in the PI5310 analyzer. One is located behind the **Sample** inlet, and another is located behind the **Pressure** inlet. Both are accessible from the back panel by releasing the captive screws and sliding the filter out of its bay within the analyzer. This section describes filter replacement for the Sample and Pressure inlets. Replacement filter kits can be purchased from Picarro.



NOTE

Gasses at the **Sample** inlet are filtered by two in-line, sub-micron particulate filters before the reaching the measurement cavity. The inner filter is **NOT** user replaceable. It is located within a heated pressure-box. If the inner filter fails, contact Picarro for service or repair.

The outer filter (located just behind the Sample inlet) is user-replaceable.



CAUTION

The inner filter (in the sample path) is NOT user replaceable. Do NOT open the analyzer. Inner filters must be replaced by a Picarro certified technician. **USER REPLACEMENT OF THE INNER FILTER OR BREAKING THE ANTI-TAMPER TAPE ON THE INNER FILTER VOIDS THE WARRANTY.**

Symptoms of a Clogged Filter

Filters can become clogged with continual use.

If liquid water is sucked into the inlet line, it may clog the filter and impede the flow (usually for a few days) until it evaporates.

Some symptoms of a clogged filter are:

- The analyzer pressure is low
- Low flow into the analyzer, causing unusual measurements
- Response time is slower than usual

Solutions for Water Incursion

Do NOT turn off the analyzer when a filter is wet or replace a wet filter. Liquid water in the filter can cause condensation on the optics if the analyzer is allowed to cool when the filter is wet.

- Dry the filter by running Clean Dry Air (CDA) through the analyzer. If the analyzer functions normally after drying, a filter replacement is not necessary.
- If drying the filter does not solve the problem, replace the filter.

9.2 Required Parts and Tools

- S3152 Teflon Particulate Filter with ferrule sets (Qty 2)
- 9/16 open end wrench
- Flathead screwdriver for releasing captive screws (if needed).

9.3 Pressure Inlet Port Particulate Filter Replacement

1. Shut down the analyzer by following **Section 3, System Shutdown and Preparation**, and move the analyzer to a clean work environment.
2. Release the captive screws (Figure 42) and slide the filter assembly out of the analyzer filter bay. There may be some resistance as the filter is removed. This is due to the frictional resistance of the male quick-disconnect O-rings within the female receptacle.

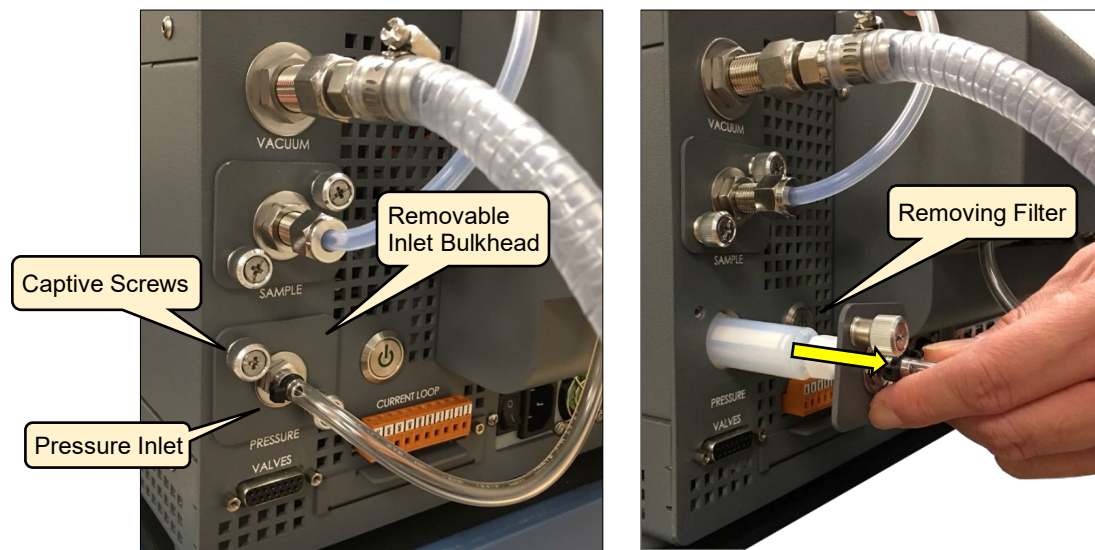


Figure 43: Pressure Inlet Port

3. Figure 43 shows the pressure inlet port filter assembly after removal. It is not necessary to remove the hose from the barbed inlet port.

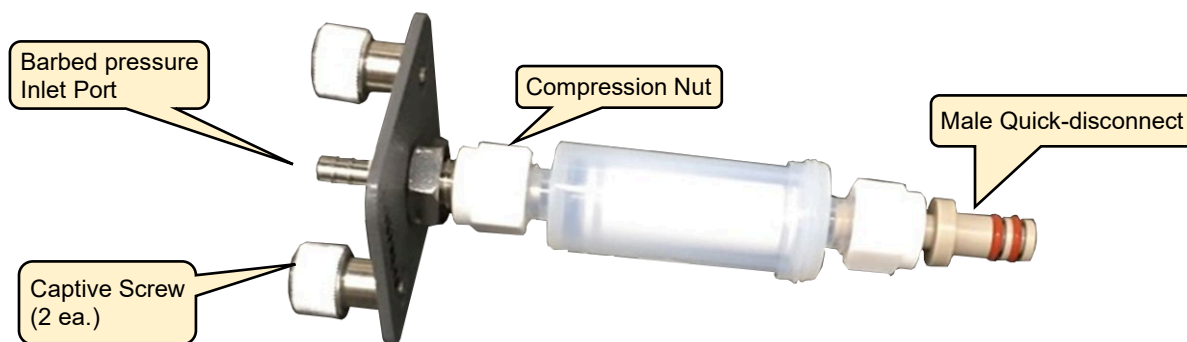


Figure 44: Pressure Inlet Filter Assembly – Removed from Housing

4. Remove the old filter from the bulkhead assembly by loosening the compression nut (Figure 44). Remove the ferrules and discard.



Figure 45: Removing Filter from Pressure Inlet Bulkhead

5. Remove the male quick-disconnect from the filter outlet by loosening the compression nut (Figure 45). Remove the ferrules and discard.

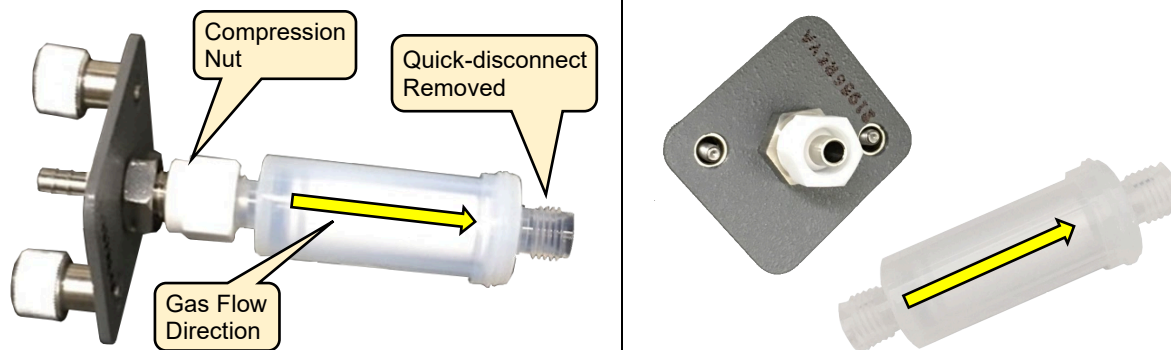


Figure 46: Filter Removed from Pressure Inlet Bulkhead

6. Install the new ferrules onto the bulkhead compression fitting.
7. Attach a new filter to the bulkhead compression fitting.
Ensure the flow direction arrow on the filter is pointing away from the bulkhead compression fitting. Also ensure the tube and ferrules are fully seated into the filter fitting before fully tightening the nut.
8. Tighten the nut on the fitting until the final bit of thread is just showing past the nut (Figure 46).

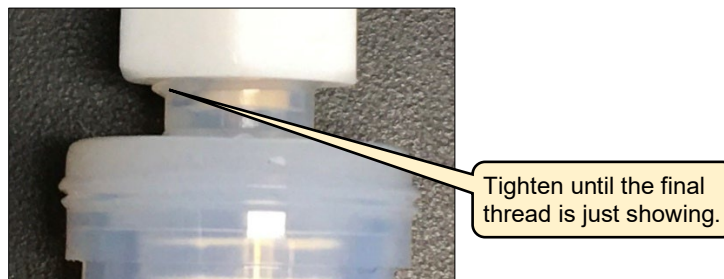


Figure 47: Tightening the Filter Fittings

9. Install the new ferrules onto the quick disconnect fitting.
10. Reinstall the male quick disconnect to the new filter. Ensure the tube and ferrules are fully seated into the filter fitting before fully tightening the nut.
11. Tighten the nut on the fitting until the final bit of thread is just showing past the nut (Figure 46).
12. Slide the completed assembly into the analyzer filter bay and secure the plate by tightening the captive screws.

Note that when the filter assembly is about half an inch from the analyzer chassis, you will meet resistance as the male quick-disconnect enters its receptacle. You will need to firmly push it inward to fully seat the assembly. Then the captive screws can be tightened.

9.4 Sample Inlet Port Particulate Filter Replacement

1. Release the captive screws (Figure 47) and slide the filter assembly out of the analyzer filter bay. There may be some resistance as the filter is removed. This is due to the frictional resistance of the male quick-disconnect O-rings within the female receptacle.

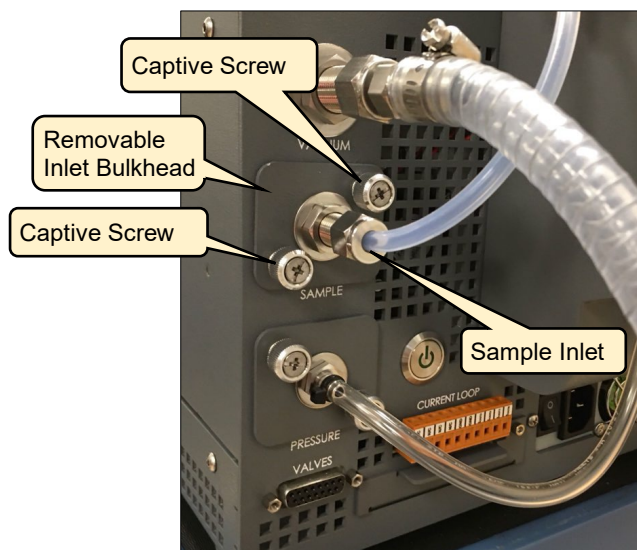


Figure 48: Sample Inlet Port

2. Figure 48 shows the sample inlet filter assembly after removal. It is not necessary to remove the hose from the sample inlet port.

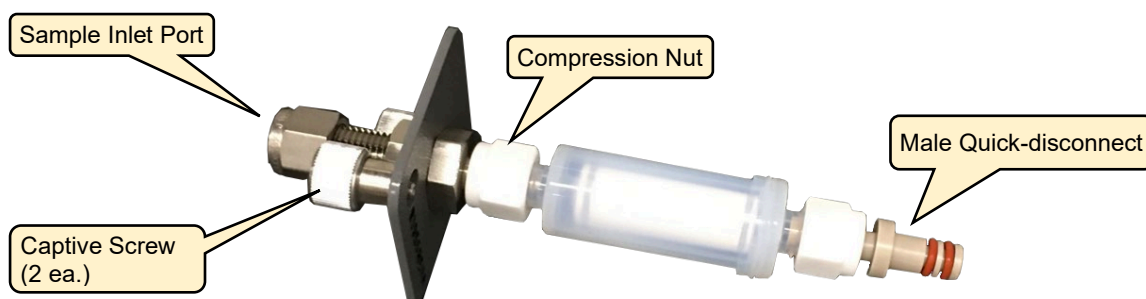


Figure 49: Sample Filter Assembly – Removed from Housing

3. Remove the old filter from the bulkhead assembly by loosening the compression nut (Figure 49). Remove the ferrules and discard.
4. Remove the male quick-disconnect from the filter outlet by loosening the compression nut (Figure 50). Remove the ferrules and discard.



Figure 50: Removing Filter from Sample Inlet Bulkhead

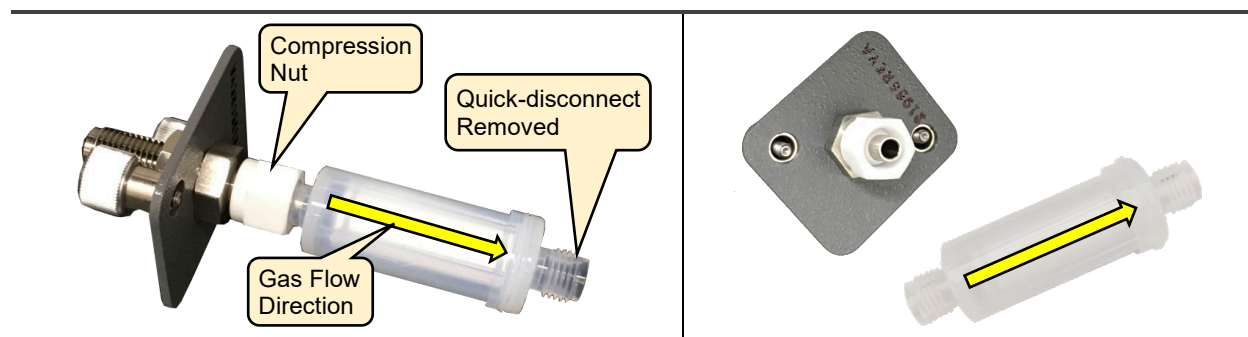


Figure 51: Filter Removed from Sample Inlet Bulkhead

5. Install the new ferrules onto the bulkhead compression fitting.
6. Attach a new filter to the bulkhead compression fitting.
Ensure the flow direction arrow on the filter is pointing away from the bulkhead compression fitting. Also ensure the tube and ferrules are fully seated into the filter fitting before fully tightening the nut.
7. Tighten the nut on the fitting until the final bit of thread is just showing past the nut (Figure 46 above).
8. Install the new ferrules onto the quick disconnect fitting.
9. Reinstall the male quick disconnect to the new filter. Ensure the tube and ferrules are fully seated into the filter fitting before fully tightening the nut.
10. Tighten the nut on the fitting until the final bit of thread is just showing past the nut (Figure 58).
11. Slide the completed assembly into the analyzer filter bay and secure the plate by tightening the captive screws.

Note that when the filter assembly is about half an inch from the analyzer chassis, you will meet resistance as the male quick-disconnect enters its receptacle. You will need to firmly push it inward to fully seat the assembly. Then the captive screws can be tightened.

10. G4301/G4302 Inlet Filter Replacement

The first particulate filter for G4301/G4302 Gas Scouter is mounted externally at the sample inlet.

10.1 Required Parts and Tools

- S1021 Particulate filter kit for input sample line; includes PTFE filter and PTFE ferrules (Replace every 12 months)
- 9/16" open-end wrench

10.2 Replacement Procedure

1. Analyzer shutdown is not required for filter replacement on this model if the replacement is performed fairly quickly.
2. While holding the filter by hand and using a 9/16" wrench, disconnect the filter at the 1/4" Swagelok nut, then immediately install the new filter and tighten.

Make sure the new filter is installed in the proper flow direction.

3. Once the new filter is installed, the analyzer is ready for operation.

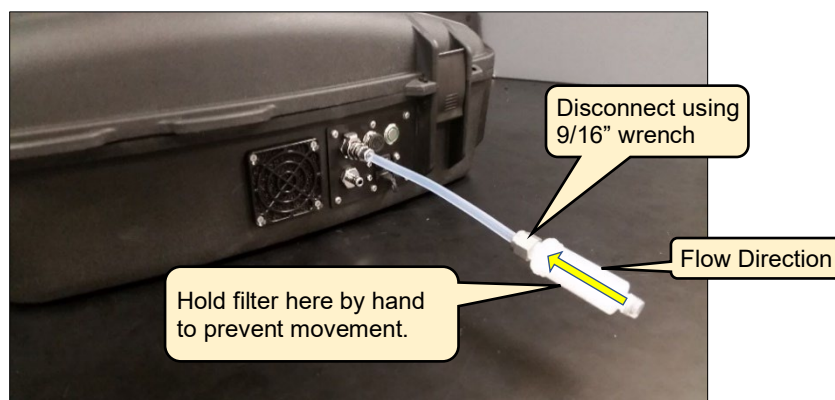


Figure 52: External Particulate Filter Installed