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Agilent G3500, G3501, G3502, and G3503 Programmed Temperature Vaporization (PTV) Inlet

For the Agilent 7890A Gas Chromatograph

Installation Instructions

Parts Supplied

Table 1 Liquid Carbon Dioxide (CO_2) Kits G3500 and G3501

Description	Quantity
Captive screw M4 x 0.7 (for single CO_2 cryo bracket)	2
1/8-inch Swagelok ferrule set, brass	1
Machine screw M4 x 0.7 12 mm (for PCB and split vent filter retaining bracket)	3
PTV insulation block	1
PTV inlet chassis	1
PTV liquid CO_2 cryo assembly	1
Single CO_2 cryo bracket	1
PTV head assembly PTV septumless head/liquid CO_2 (G3500A) **or** PTV septum head/liquid CO_2 (G3501A)	1
PTV ship kit	
1/4-inch union brass Swagelok	1
Column form hanger	1
11 mm low bleed septa (septum head only)	5
Wrench, open end, 6 mm	1
Wrench, open end, 5 mm	1
PTV OEM kit	1
Column adapter kit	
Capillary 1/16-in stainless steel tubing with ferrule and nut (for G3500A only)	1
Split vent filter retaining bracket	1
Wrist strap, disposable 4-LG 1-W	1

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Table 2 Liquid Nitrogen (N_2) Kits G3502 and G3503

Description	Quantity
Machine screw M4 x 0.7 12mm (for split vent filter retaining bracket, PCB, N_2 insulation cover, N_2 nut plate, N_2 cryo assembly)	9
Captive screw, M4 x 0.7 (for single CO_2 cryo bracket)	2
Single CO_2 Cryo bracket	1
PTV insulation block	1
PTV inlet chassis	1
PTV liquid nitrogen cryo assembly	1
PTV head assembly PTV septumless head/liquid nitrogen (G3502A) **or** PTV septum head/liquid nitrogen (G3503A)	1
PTV/CFO Liquid nitrogen insulation cover	1
PTV Liquid nitrogen nut plate	1
PTV Liquid nitrogen cryo tubing	1
PTV ship kit	
1/4 union brass Swagelok	1
Column form hanger	1
11 mm low bleed septa (septum head only)	5
Wrench, open end, 6 mm	1
Wrench, open end, 5 mm	1
PTV OEM kit	1
Split vent filter retaining bracket	1
Column adapter kit	
Capillary 1/16-in stainless steel tubing with ferrule and nut (for G3500A only)	1
Wrist strap, disposable 4-LG 1-W	1

Parts Identification

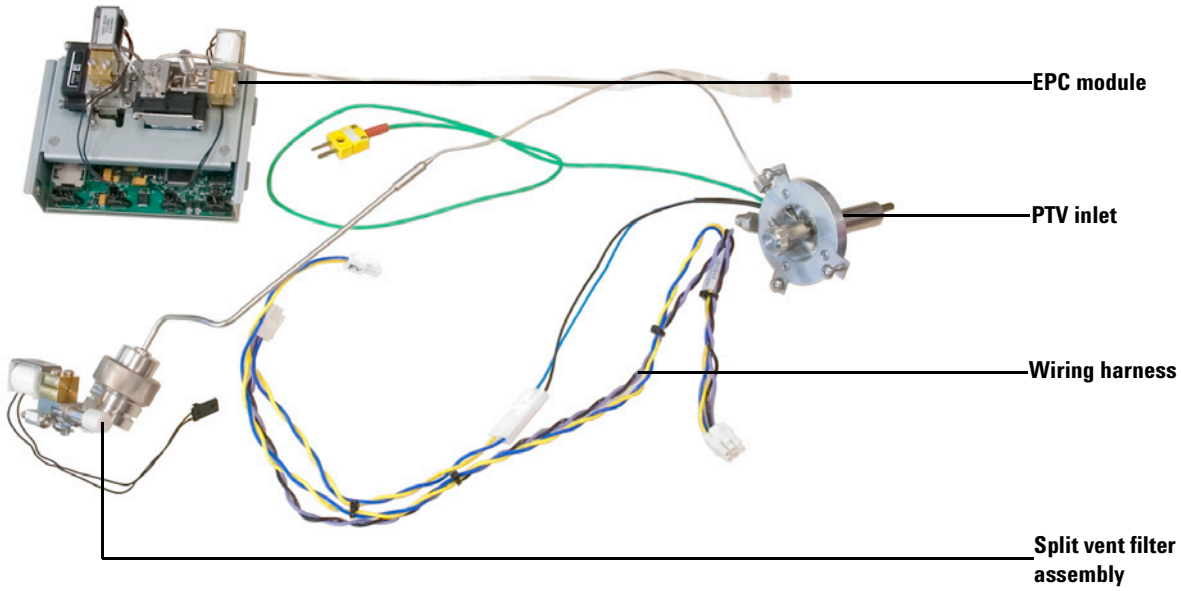

Figure 1 Septumless head PTV parts (board not shown)

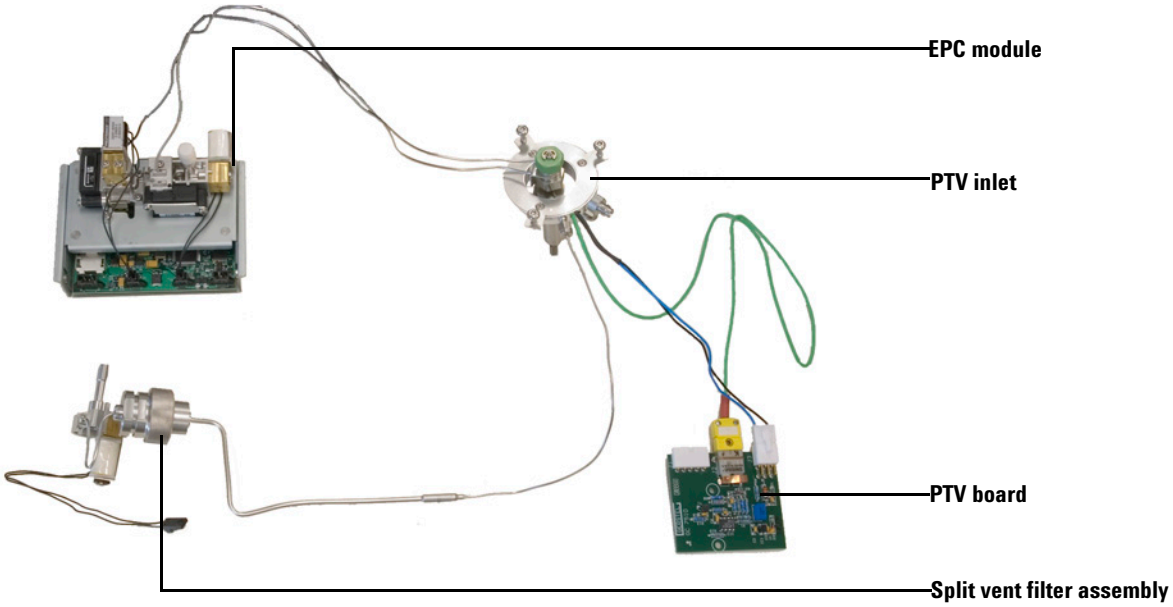

Figure 2 Septum head PTV parts

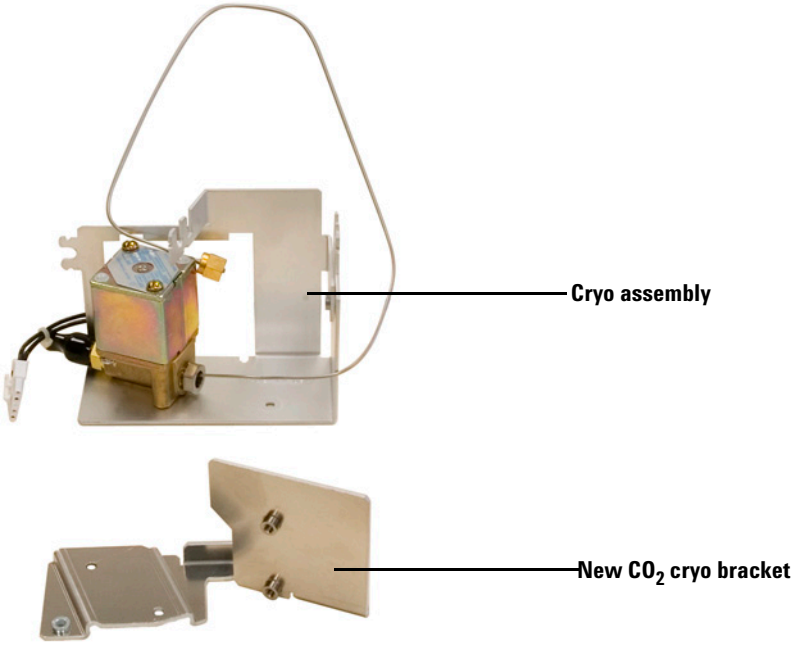

Figure 3 CO_2 cryo assembly with board bracket

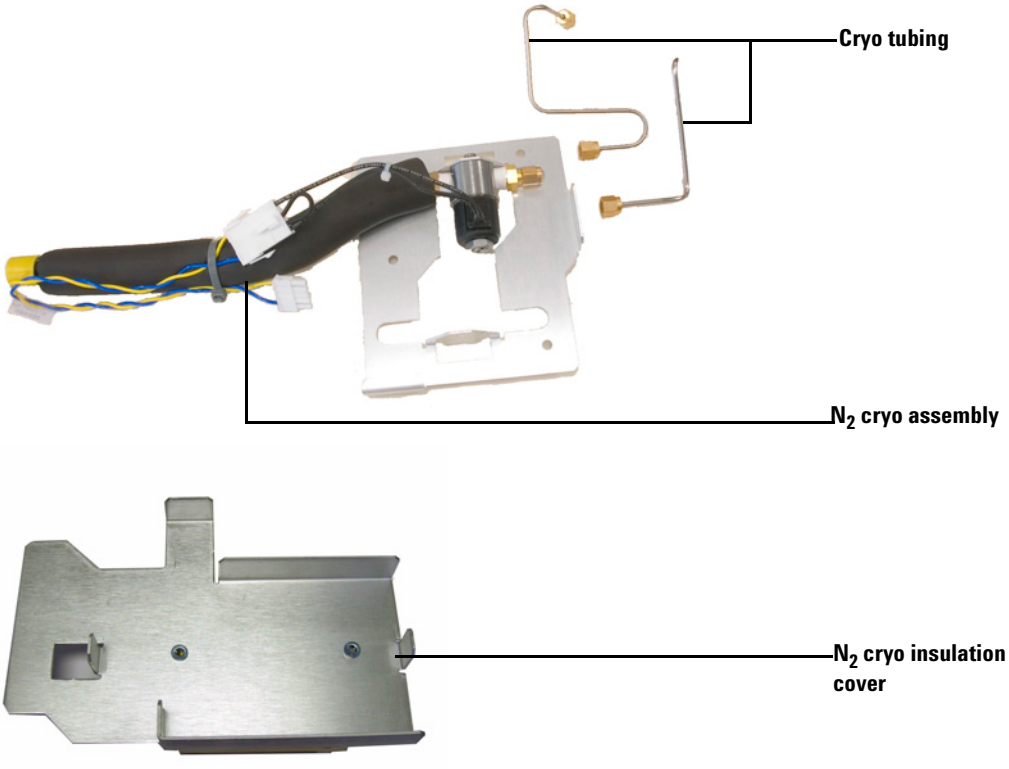

Figure 4 N_2 cryo assembly

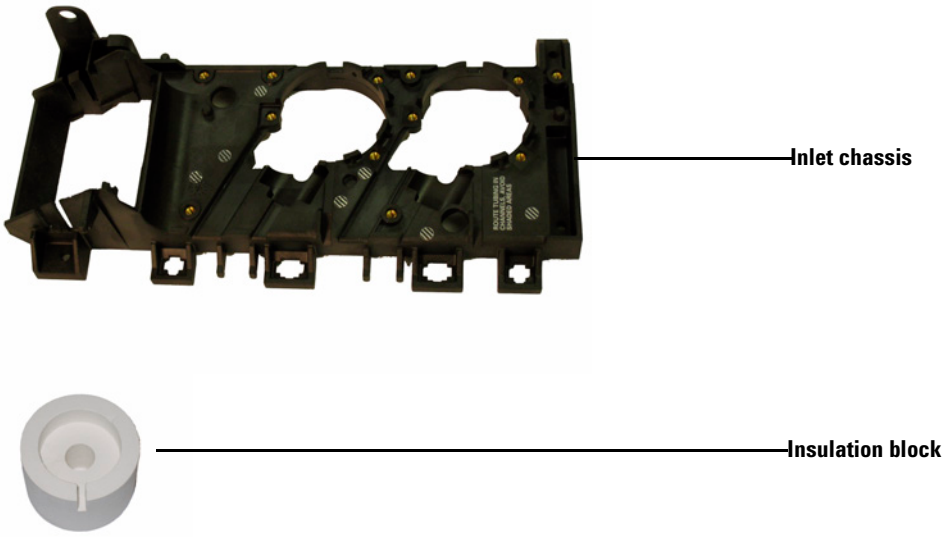

Figure 5 PTV inlet chassis and insulation block

Tools Required

- T-10 and T-15 Torx drivers
- Open-end wrench
- Needle nose pliers
- Diagonal sheet metal cutter

Installation Procedure

This procedure explains how to install the Programmed Temperature Vaporization (PTV) inlet accessory on the Agilent 7890A Gas Chromatograph (GC). This document covers the four available kits.

Table 3

Kit Number	Coolant	Injection Head
G3500	Liquid carbon dioxide (CO_2)	Septumless
G3501	Liquid carbon dioxide (CO_2)	Septum
G3502	Liquid nitrogen (N_2)	Septumless
G3503	Liquid nitrogen (N_2)	Septum

Prepare the GC

1. Turn off the GC and unplug the power cord.
2. Allow time for the oven and heated zones to cool.
3. Turn off all gas supplies.
4. If there is an Automatic Liquid Sampler (ALS) tray installed on the GC, remove it. See ALS User's Guide for instructions.
5. Remove the detector cover by raising the cover vertically and then firmly lifting up on the right side of the cover to free the lid from the hinge pin. Slide the pin out of the hole on the left side hinge and put the cover aside.
6. Clean out the oven, removing all columns and hardware associated with both inlets.
7. Remove the gray plastic inlet cover by loosening the six captive screws.
8. Remove the left side cover by loosening the top screw, sliding the panel towards the rear, and lifting the cover off.
9. Unsnap the pneumatics cover by pressing the black clips on the sides of the cover. Lift the cover up and off.
10. Remove the rear top cover by removing four screws. Gently tilt out the lower cover and ease the top cover to the left until free.
11. Remove the EPC module bracket adjacent to the inlet EPC module area by removing the screw and lifting the bracket off.

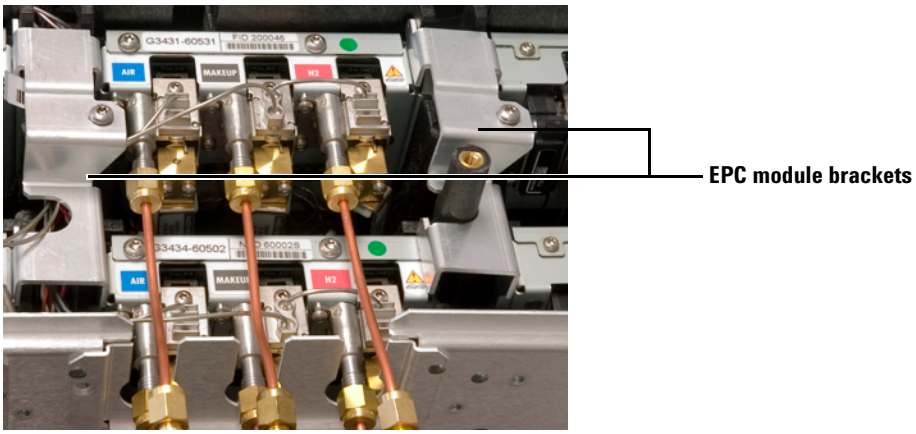

Figure 6 Locating the EPC module brackets

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

Prepare the inlet mounting

1 Choose the position to install your PTV inlet. The PTV inlet can be installed in the front or back inlet position. If an inlet is already installed in your chosen position, remove the inlet, pneumatics module, and all associated tubing and wiring.

   If your chosen inlet position is not used:

   a Remove the round metal cutout at this location using diagonal cutters. Make the cuts so that the metal nubs remain attached to the discarded metal circle.

   b Remove and discard the circular insulation plug.

2 The inlet chassis will be replaced. If an inlet is installed in the other position, remove it so that no inlets are installed in the GC. (The associated pneumatics module does not need to be removed.)

Replace the inlet chassis

1 Record how the wiring of the fan is routed but do not unplug the connections. This fan will be installed in the new chassis.

2 Remove the fan from the old inlet chassis by pressing on the clips and lifting the fan out.

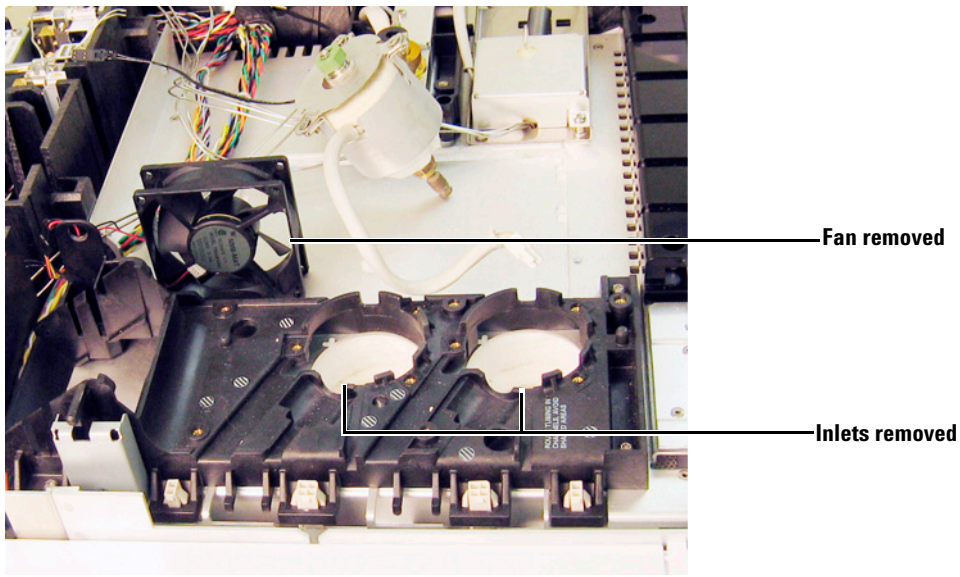

Figure 7 Inlets and fan removed

3 Remove the GC electrical connectors from the inlet chassis by pressing the clips on the connectors and pushing them down, freeing them from the chassis. Record the position and order of the connectors on the chassis.

4 Remove the old inlet chassis by removing the screws in each corner and lifting the chassis off. This chassis will not be used, but the four removed screws with be used to secure the new chassis.

5 Install the new PTV inlet chassis, positioning it similarly to the old chassis alignment with the fan slot to the rear of the GC. Do not screw the chassis down at this time.

6 Align the fan with the sloping rear face of the chassis and so that the direction of the air flow matches the direction of the arrow on the fan body.

7 Route the wiring as recorded in step 1.

8 Press the fan into the chassis until the clips engage.

9 Route the GC connector ends from bottom to top and fit into the slots on the new inlet chassis in the same configuration as before. You may need to lift up the inlet chassis to fit these wires under the GC frame.

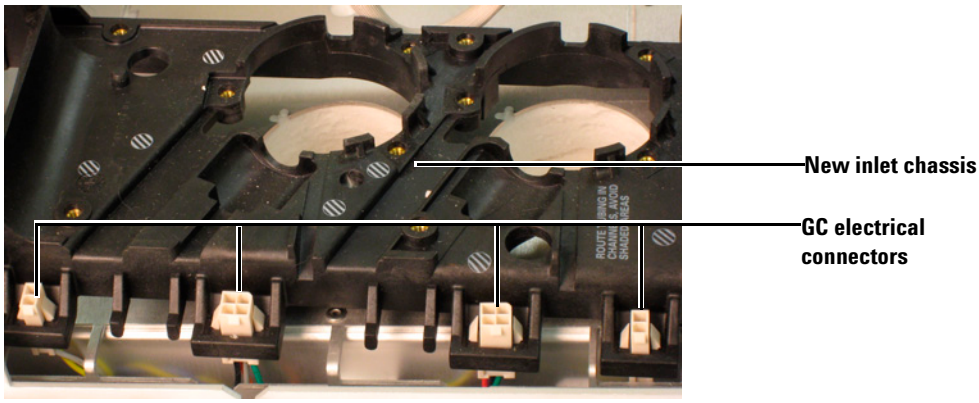

Figure 8 GC connectors routed properly into inlet chassis frame

Install the liquid CO_2 PTV inlet module (septum or septumless head)

If you are installing the liquid N_2 PTV inlet module, skip to "Install the liquid N_2 PTV inlet module (septum or septumless head)" on page 13.

Prepare the cryo assembly (liquid CO_2 PTV only)

1 Remove the solenoid valve from the cryo assembly bracket by removing two screws.

2 Install the solenoid valve on the new bracket using the screws removed in step 1, as shown below.

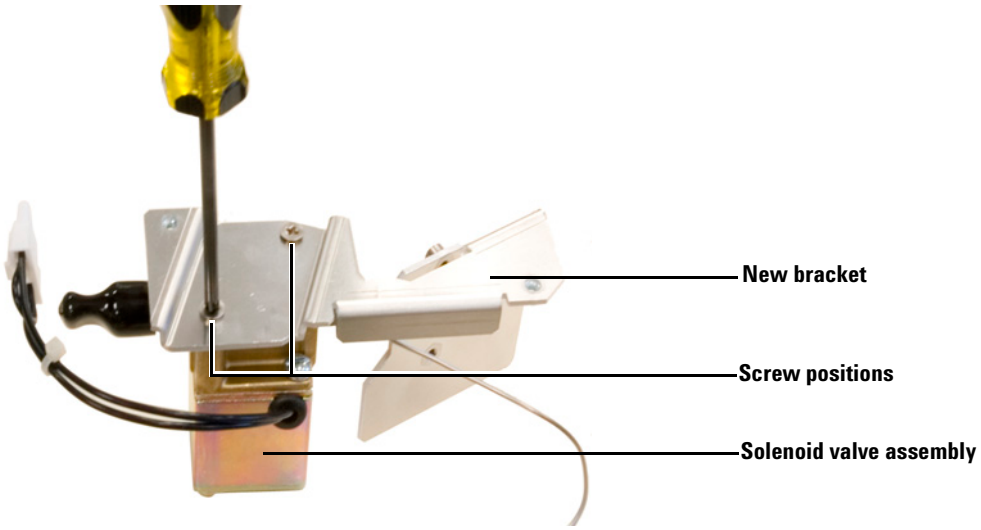

Figure 9 Installing the cryo valve assembly onto the new bracket

3 If necessary, disconnect all electrical connections on the PTV board.

4 Mount the PTV board onto the new cryo assembly bracket using two screws. Plug the solenoid valve control wire into the connector on the PTV board.

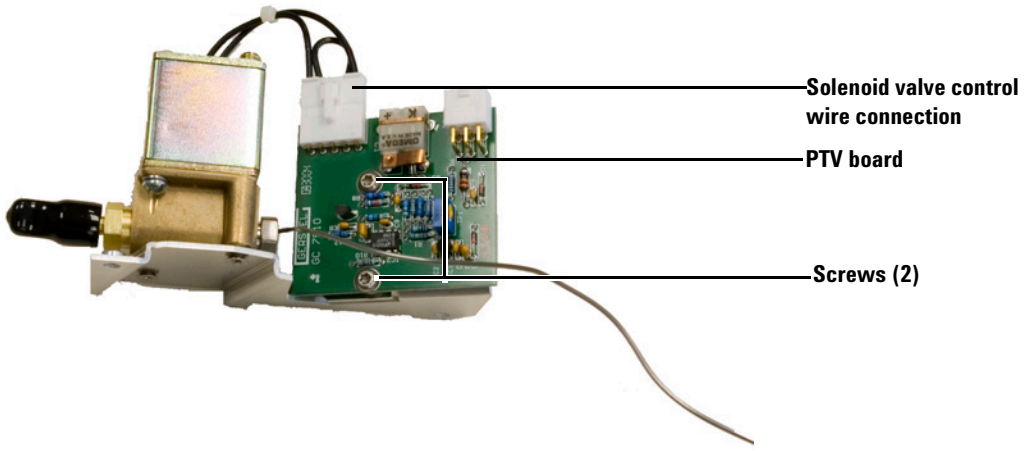

Figure 10 PTV CO_2 cryo and board assembly ready for installation

Position the inlet

1 If installing a septum head PTV inlet, rest the EPC module in the pneumatics area. It will be installed at the end of the procedure.

2 Install the PTV insulation block on the inlet body so that the large slot in the insulation fits over the 1/8-inch tubing on the side of the inlet body.

3 Insert the PTV inlet and insulation block into the desired inlet position in the chassis so that the tubing and wiring are running to the left side of the chassis. See Figure 13 and Figure 14 for proper routing.

Install the split vent filter assembly

1 Install the split vent filter into the housing, making sure that the flat sides on the split vent filter are vertical. The split vent filter will lock into place when properly installed.

2 Align the split vent valve assembly over the two screw holes and secure using two captive screws.

3 Install the split vent filter retaining bracket with one screw to secure the split vent filter.

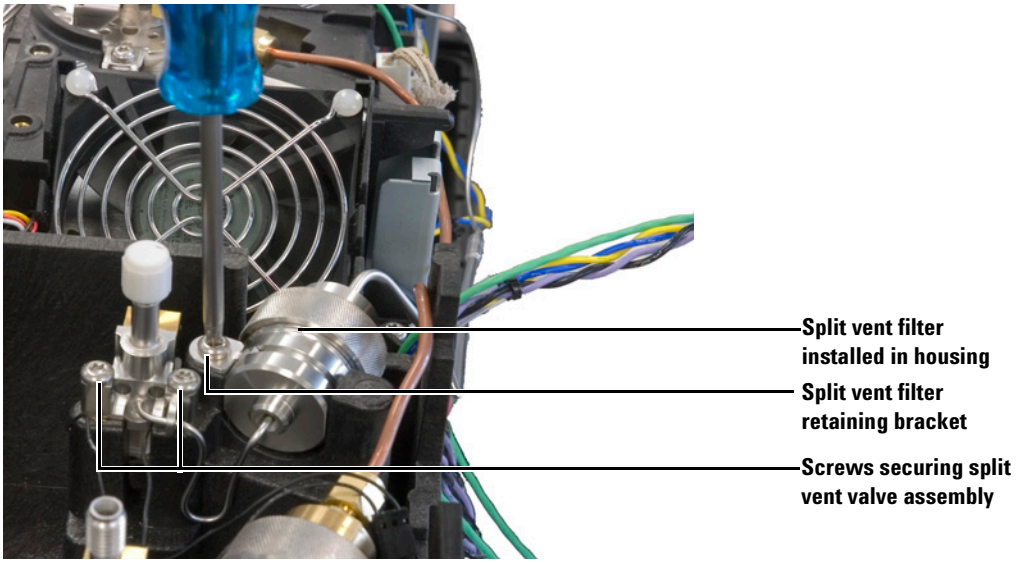

Figure 11 Installing the split vent filter assembly

4 Position the tubing from the split vent assembly to the inlet so that it will not be pinched by the left side cover.

Install the cryo assembly

1 Install the cryo assembly into the position next to the split vent assembly and secure the bracket using two screws.

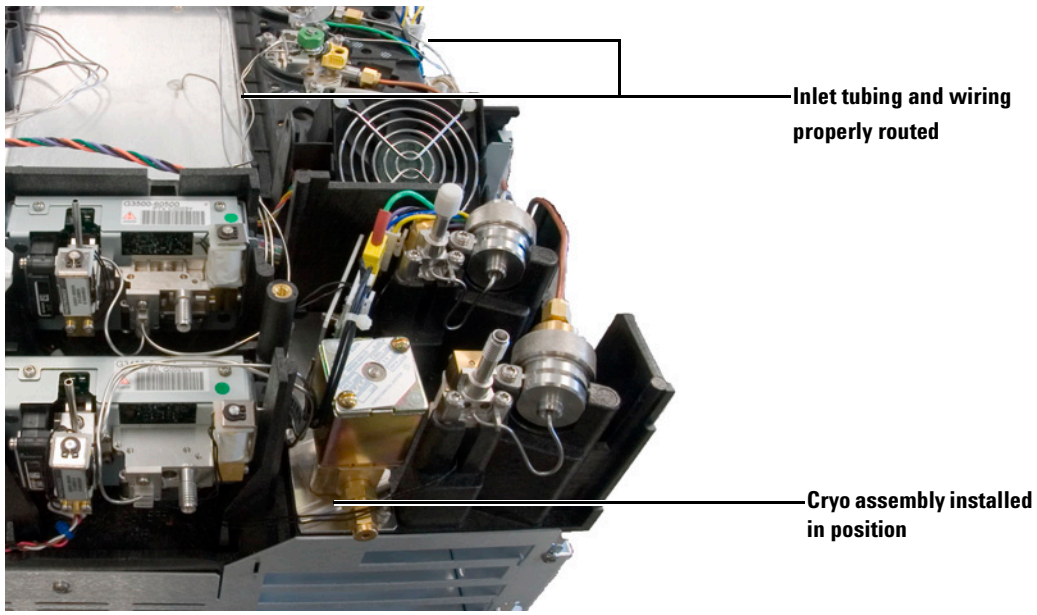

Figure 12 Cryo assembly installed

2 Route the cryo tubing across the left side of the GC. Do not connect the tubing to the inlet until the electrical wires are routed, as described in the following steps.

Route the PTV electrical wiring

1 Disconnect the wiring harness from the inlet heater cable.

2 Route the white connector ends (FI and FV) of the wiring harness up through channels on the GC, plugging them into the appropriate connectors on the inlet chassis. It may be necessary to lift the inlet chassis cover in order to fit the connector ends through the slots. See Figure 13.

3 Route the thermocouple and heater wires from the inlet down through the GC frame. Again, it may be necessary to lift the inlet chassis cover in order to fit the connector ends through the slots.

4 Route the thermocouple wire across the left side of the GC and up under the split vent line.

5 Plug the thermocouple wire into the thermocouple connector on the PTV board, matching positive and negative connectors. See Figure 15.

6 Plug the heater wire connector into the heater connector labeled HTR on the wiring harness. See Figure 13.

7 Route the wiring harness plug labeled PCB across the left side of the GC and up through the channel in the cryo assembly area.

8 Slide the grommet on the left side of the GC out of the sheet metal slot and include all the wires and cables in the grommet. Position the grommet back in the slot.

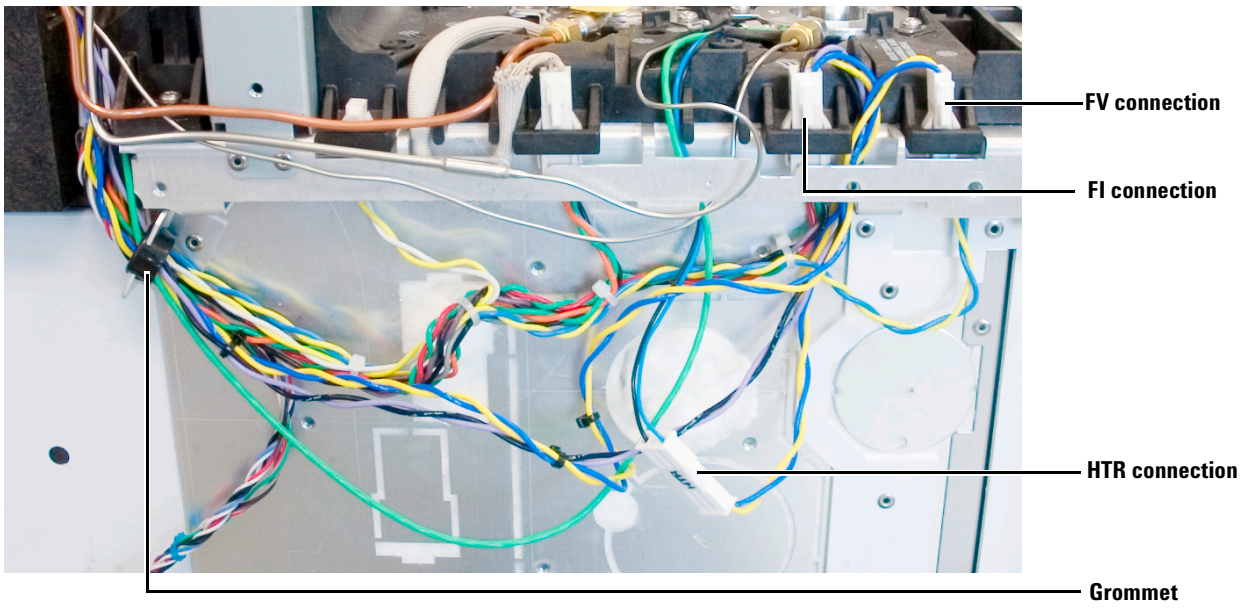

Figure 13 PTV liquid CO_2 electrical wire routing

9 Connect the tubing from the cryo assembly to the CO_2 nozzle on the inlet.

Figure 14 Connecting the cryo assembly tubing to the inlet (septumless head shown)

10 Plug the PCB connector into the front connector on the PTV board.

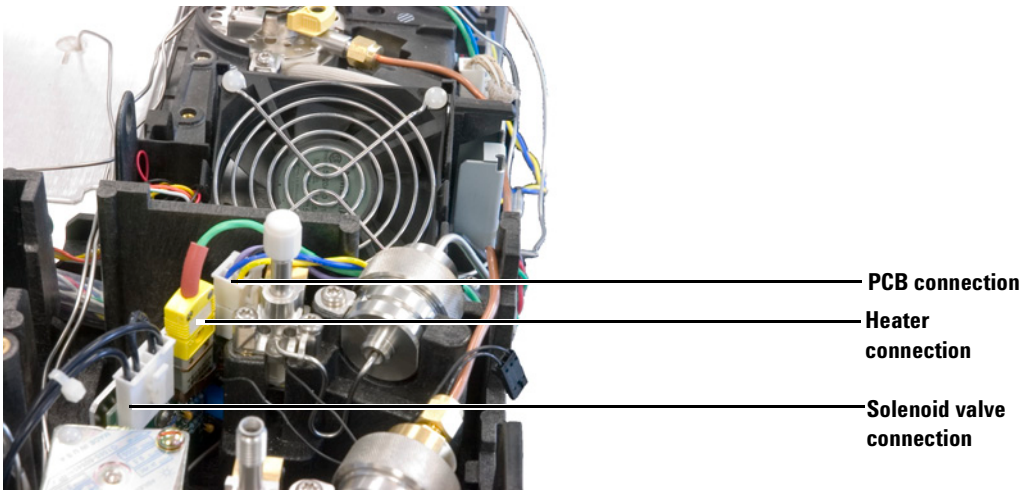

Figure 15 CO_2 assembly board connections

Complete the installation

1 Secure the PTV inlet into place by tightening the three screws.

2 Secure the inlet chassis onto the GC by tightening the four screws on the inlet chassis.

3 To complete the installation of the liquid CO_2 PTV inlet, skip to "Install the EPC module" on page 18.

Install the liquid N_2 PTV inlet module (septum or septumless head)

If you are installing the liquid CO_2 PTV inlet module, skip to "Install the EPC module" on page 18.

Prepare the PTV board (liquid N_2 PTV only)

1 If necessary, disconnect all electrical connections on the PTV board.

2 Install the PTV board onto the new board bracket using two screws, as shown below.

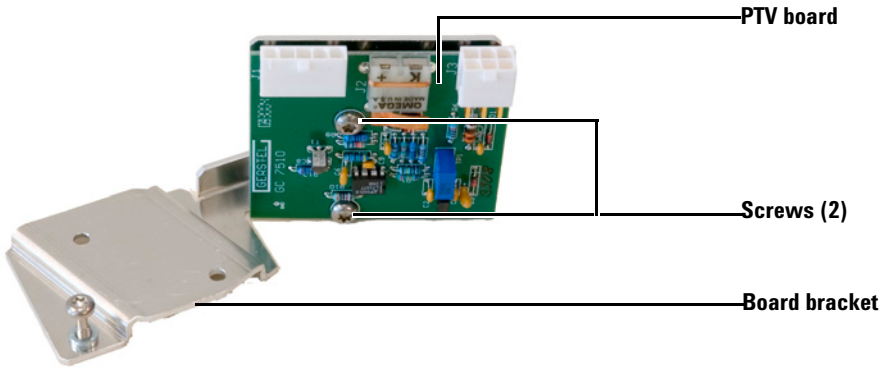

Figure 16 PTV board assembly ready for installation

Position the inlet

1 If installing a septum head PTV inlet, rest the EPC module in the pneumatics area. It will be installed at the end of the procedure.

2 Install the PTV insulation block on the inlet body so that the large slot in the insulation fits over the 1/8-inch tubing on the side of the inlet body.

3 Insert the PTV inlet and insulation block in the chassis so that the tubing and wiring are running toward the left side of the chassis. See Figure 14 for proper routing.

Install the split vent filter assembly

1 Install the split vent filter into the housing, making sure that the flat sides on the split vent filter are vertical. The split vent filter will lock into place when properly installed.

2 Align the split vent valve assembly over the two screw holes and secure using two captive screws.

3 Install the split vent filter retaining bracket with one screw to secure the split vent filter.

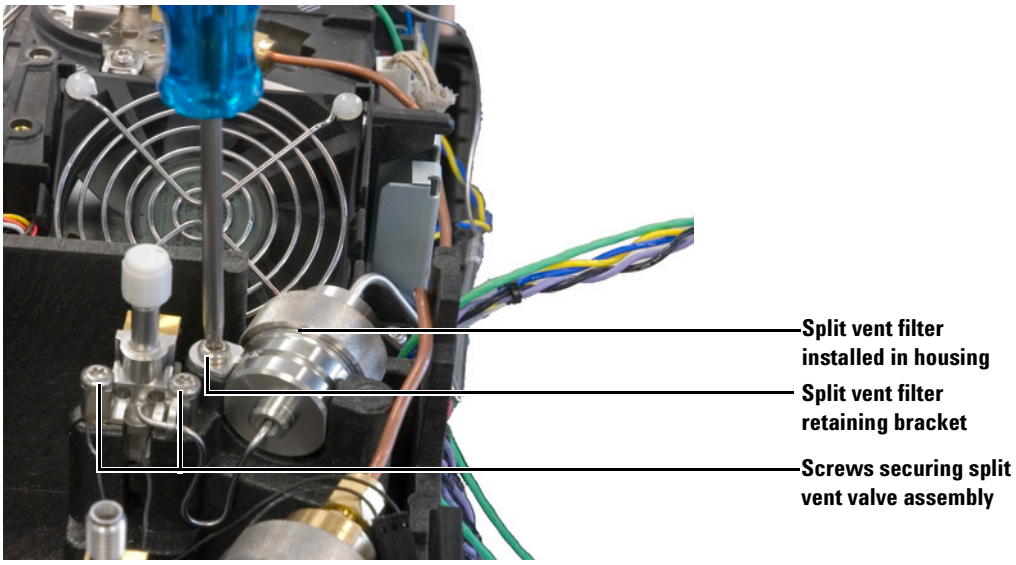

Figure 17 Installing the split vent filter assembly

4 Position the tubing from the split vent assembly to the inlet so that it will not be pinched by the left side cover.

Install the PTV board

Install the PTV board in the position next to the split vent assembly and secure using two screws. See Figure 19 for correct bracket and board orientation.

Install the cryo assembly and route the PTV electrical wiring

1 Unplug the wiring harness from the inlet heater cable.

2 Route the white connector ends (FI and FV) of the wiring harness up through the channels on the GC, plugging them into the appropriate connectors on the inlet chassis. It may be necessary to lift the inlet chassis cover in order to fit the connector ends through the slots. Refer to Figure 13.

3 Route the thermocouple wire and heater wire from the inlet down through the GC frame. Again, you may need to lift up the inlet chassis to fit these wires under the GC frame.

4 Remove the lower rear cover by loosening the two top left screws and removing the three bottom screws.

5 Remove the top round metal cutout on the lower rear cover using the diagonal cutters. Make the cuts so that the metal nubs remain attached to the discarded metal circle.

6 Position the nut plate inside the damper assembly in the rear of the GC. Align nut plate with the screw holes in the left side of the GC and secure with a screw.

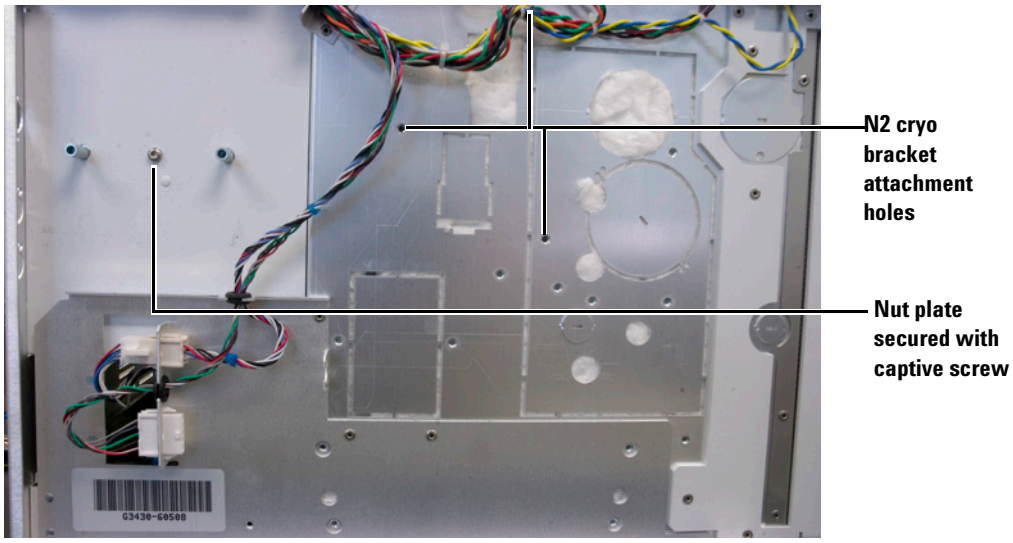

Figure 18 Nut plate installed

7 Replace the lower rear cover.

8 Remove the plastic shipping tie from the cryo assembly to free the cable.

9 Slide the nut end of the insulated tubing of the cryo assembly through the top round cutout on the lower rear cover of the GC.

10 Align the sheet metal plate of the cryo assembly on the left side of the GC and secure with three screws. Refer to Figure 18 for the locations of the screw holes.

11 Route the solenoid valve cable from the cryo assembly and the thermocouple wire from the inlet to the PTV board.

12 Plug the solenoid valve cable into the valve connector on the PTV board. Plug the thermocouple wire into the correct +/- connection on the PTV board.

13 Route the PCB cable from the wiring harness to the PTV board and plug it into the PCB connector on the board.

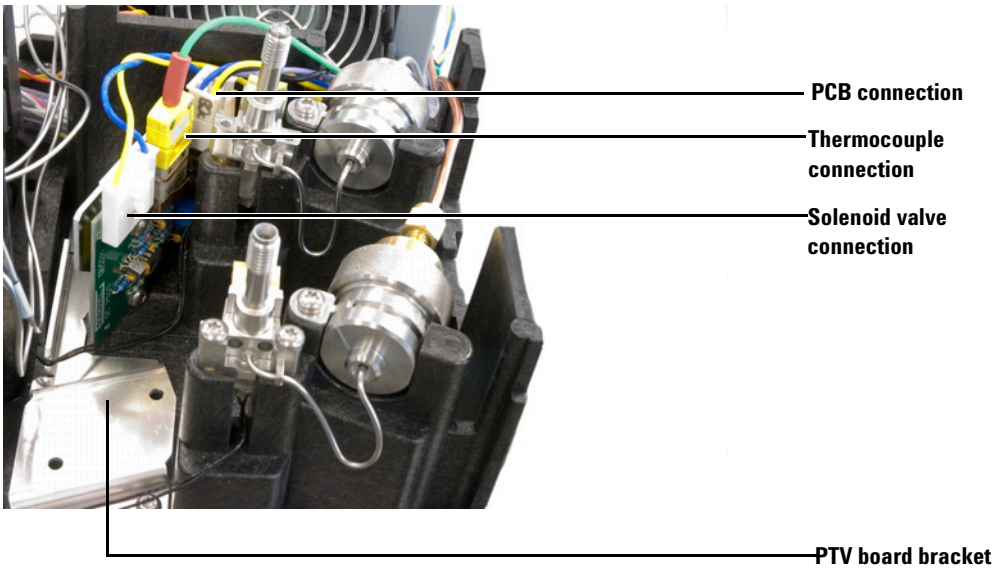

Figure 19 N_2 assembly board connections

14 Slide the grommet on the left side of the GC out of the sheet metal slot and include the thermocouple wire, solenoid valve cable, and PCB cable in the grommet. Position the grommet back in the slot. See Figure 13.

15 Choose the cryo inlet tubing assembly for your inlet position. The back inlet position uses the tubing with a hairpin bend.

16 Route the tubing from the inlet's cryo fitting to the cyro assembly fitting so that the tubing lies flatly against the left side of the GC. See Figure 20.

17 Attach both ends of the cryo tubing using nuts and ferrules.

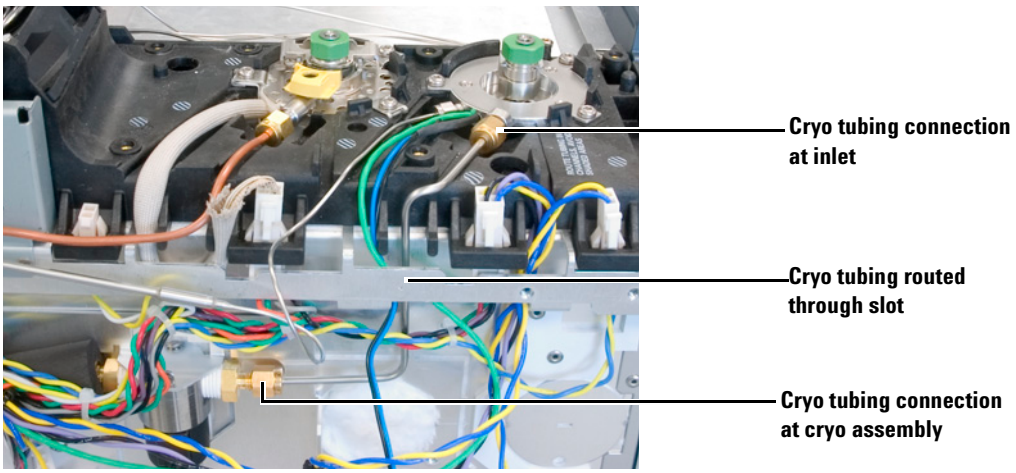

Figure 20 Connecting the cryo assembly to the inlet (septum head, front inlet position)

18 Position the sheet metal insulation cover over the insulated tubing of the cryo assembly and secure the cover with two screws.

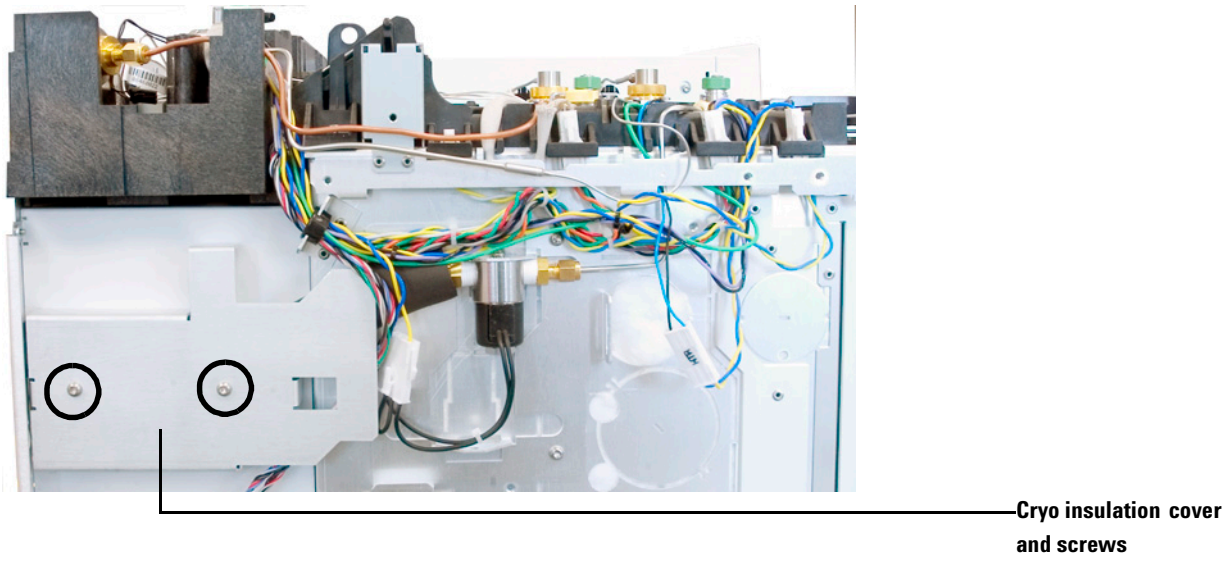

Figure 21 Insulation cover installed

Complete the installation

1 Secure the PTV inlet into place by tightening the three screws.

2 Secure the inlet chassis onto the GC by tightening the four screws on the inlet chassis.

Install the EPC module

1 Position the EPC module over the selected inlet slot in the pneumatics area. The rear inlet slot is for a rear inlet and the front inlet slot is for a front inlet.

2 Connect the communication cable from the GC to the communication connector on the EPC module, and connect the split vent valve wire from the split vent assembly to the split vent valve connector on the EPC module.

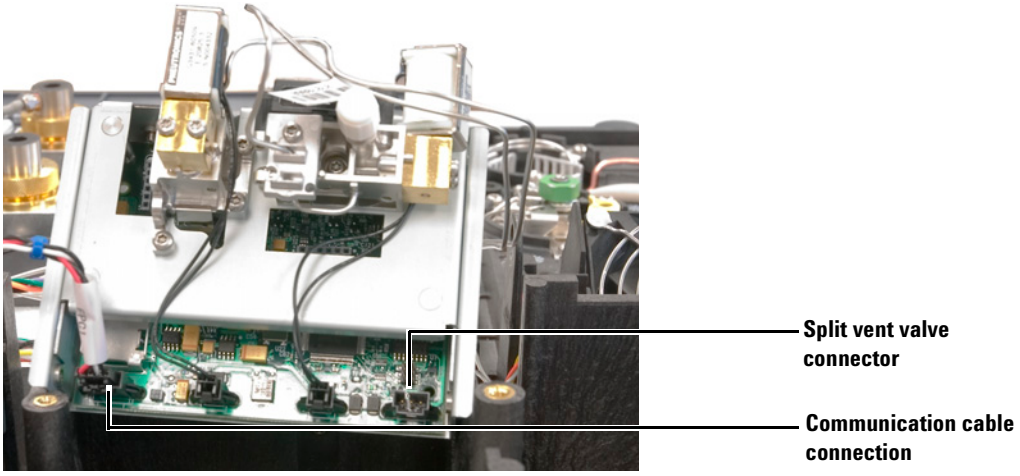

Figure 22 Split vent valve and communication cable connections on EPC module

3 Slide the EPC module into the slot, being careful not to pinch the wires.

4 Attach the EPC module bracket and secure with a screw.

5 If using a septumless head PTV, route the carrier gas tubing from the EPC module to the inlet and secure on the inlet nozzle using the column adapter kit.

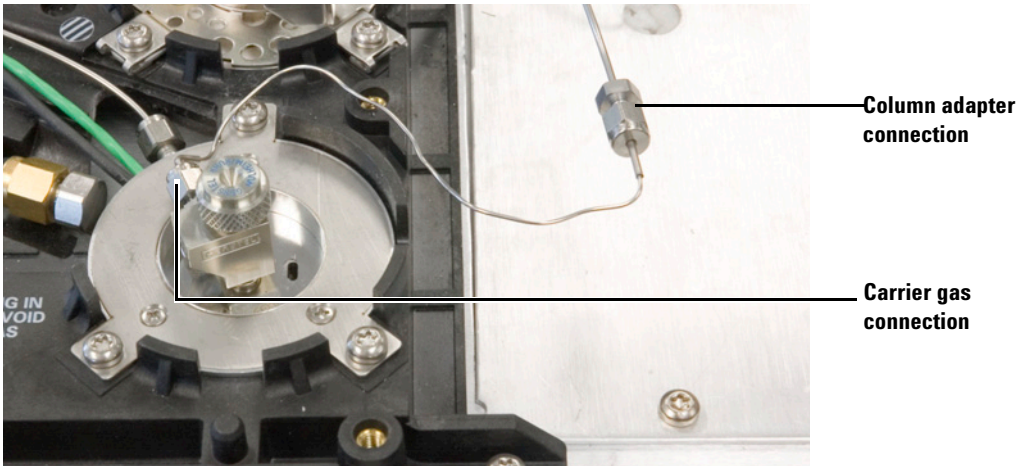

Figure 23 Septumless head PTV inlet and pneumatic tubing installed

If using a septum head PTV, arrange the tubing so that it will not interfere when replacing the GC top cover.

Restore the GC to operating condition

1. Replace all instrument covers in the reverse order that they were removed.
2. Plug in the GC and turn on the power.
3. On the GC keypad, press **[Configure]** then **[Front Inlet]** or **[Back Inlet]**.
4. On the unconfigured parameter, press **[Mode/Type]**.
5. Press **[Enter]**. A caution message will appear instructing you to reboot.
6. Reboot the GC.
   a. Press **[Options]**.
   b. Scroll to **Communications** and press **[Enter]**.
   c. Scroll to **Reboot the GC?** and press **[On/Yes]** twice to reboot the GC and have the changes take effect.
7. Zero the pressure sensors.
   a. On the GC keypad, press **[Options]**.
   b. Scroll to **Calibration** and press **[Enter]**.
   c. Scroll to select the new inlet and press **[On/Yes]**.
8. Connect the source gas lines to the manifold using the provided 1/8-inch nuts and ferrules.
9. Turn on gas pressure and leak-check all fittings
10. Zero the specific flow sensor.
    a. Press **[Options]**, scroll to **Calibration**, and press **[Enter]**.
    b. Scroll to the new PTV module to be zeroed and press **[Enter]**.
    c. Scroll to a zero line and press **[Info]**. The GC will remind you of the conditions necessary for zeroing that specific sensor.
    d. Press **[On/Yes]** to zero or **[Clear]** to cancel.

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