

## **Installation Guide**

**PTV Inlets with CO<sub>2</sub> or LN<sub>2</sub> Cooling on a 6890 GC  
Accessories G2617A, G2618A, G2619A, and G2620A**



**Agilent Technologies**

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## Safety Information

The 6890 Gas Chromatograph (GC) meets the following IEC (International Electrotechnical Commission) classifications: Safety Class 1, Transient Overvoltage Category II, and Pollution Degree 2.

This unit has been designed and tested in accordance with recognized safety standards and designed for use indoors. If the instrument is used in a manner not specified by the manufacturer, the protection provided by the instrument may be impaired. Whenever the safety protection of the 6890 GC has been compromised, disconnect the unit from all power sources and secure the unit against unintended operation.

Refer servicing to qualified service personnel. Substituting parts or performing any unauthorized modification to the instrument may result in a safety hazard. Disconnect the AC power cord before removing covers. The customer should not attempt to replace the battery or fuses in this instrument. The battery contained in this instrument is recyclable.

## Safety Symbols

Warnings in the manual or on the instrument must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions violates safety standards of design and the intended use of the instrument. Agilent Technologies assumes no liability for the customer's failure to comply with these requirements.

## WARNING

A warning calls attention to a condition or possible situation that could cause injury to the user.

## CAUTION

A caution calls attention to a condition or possible situation that could damage or destroy the product or the user's work.



Indicates a hot surface

## Electromagnetic compatibility

This device complies with the requirements of CISPR11. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try one or more of the following measures:

1. Relocate the radio or television antenna.
2. Move the device away from the radio or television.
3. Plug the device into a different electrical outlet, so that the device and the radio or television are on separate electrical circuits.
4. Make sure that all peripheral devices are also certified.
5. Make sure that appropriate cables are used to connect the device to peripheral equipment.
6. Consult your equipment dealer, Agilent Technologies, or an experienced technician for assistance.
7. Changes or modifications not expressly approved by Agilent Technologies could void the user's authority to operate the equipment.

## Recycling the Product

For recycling, send the product to:

Agilent Technologies, Inc.  
2850 Centerville Road  
Wilmington, DE 19808-1610

or

Agilent Technologies Deutschland GmbH  
Hewlett-Packard Strasse 8  
76337 Waldbronn  
Germany

## Sound Emission Certification for Federal Republic of Germany

### Sound Pressure

Sound pressure  $L_p < 65$  dB(A)

During normal operation

At the operator position

According to ISO 7779 (Type Test)

### Schalldruckpegel

Schalldruckpegel  $LP < 65$  dB(A)

Am Arbeitsplatz

Normaler Betrieb

Nach DIN 45635 T. 19 (Typprüfung)

# Installation Guide for PTV Inlets

## Overview

This document contains the procedures for installing PTV Inlets with liquid nitrogen or liquid carbon dioxide in an Agilent 6890 Gas Chromatograph (hereafter referred to as the GC).

Four kits are available. This document covers them all.

**Table 1. PTV Kits**

Kit number	Injection head	Coolant
G2617A	Septumless	Liquid carbon dioxide
G2618A	Septum	Liquid carbon dioxide
G2619A	Septumless	Liquid nitrogen
G2620A	Septum	Liquid nitrogen

Before following these procedures, refer to the safety information below and on the inside front cover.

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**Caution**

Cryogenic liquids can cause very serious burns requiring emergency medical attention. This is especially true with liquid nitrogen, which can cause skin damage equivalent to a serious thermal burn. Use extreme caution when working with these materials.

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**Caution**

Always bleed lines containing cryogenic fluids to atmospheric pressure before separating fittings. Wear safety glasses and cover fittings with a towel when separating them.

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**Parts provided**

## Parts provided

**Table 2. Liquid Carbon Dioxide Cooling Kits, G2617A, G2618A**

Description	Qty.
O-ring, 0.426-inch ID	2
1/8-inch Swagelok nut-tubing, brass	1
1/8-inch Swagelok ferrule set, brass	1
Torx screw M4 x 45, T-20	1
Torx screw M4 x 0.7, 12 mm pan head	1
Modified pneumatics top cover	1
ROM set	1
PTV insulation block	1
PTV modified inlet chassis	1
PTV liquid carbon dioxide cryo assembly (includes valve trap bracket)	1
PTV head assembly	1
PTV septumless head/liquid carbon dioxide (G2617A)	
<b>or</b> PTV septum head/liquid carbon dioxide (G2618A)	
Wrist strap, disposable 4-LG 1-W	1

**Table 3. Liquid Nitrogen Cooling Kits, G2619A, G2620A**

Description	Qty.
O-ring 0.426-inch ID	2
1/8-inch Swagelok nut-tubing, brass	1
1/8-inch Swagelok ferrule set-Brass	1
Torx screw M4 x 45, T-20	1
Torx screw M4 x 0.7, 12 mm pan head	1
Modified pneumatics top cover	1

ROM set	1
Bracket valve trap (G2617-00010)	1
Fastener-optve scr. M4x0.7x20 mm	2
PTV insulation block	1
PTV modified inlet chassis	1
PTV liquid nitrogen cryo assembly	1
PTV head assembly	1
PTV septumless head/liquid nitrogen (G2619A)	
<b>or</b> PTV septum head/liquid nitrogen (G2620A)	
PTV/CFO Liquid nitrogen insulation cover	1
PTV Liquid nitrogen nut plate	1
PTV Liquid nitrogen cell inlet tub	1
Extender cable	1
Wrist strap, disposable 4-LG 1-W	1

**Table 4. Tools Required**

- T-20 Torx screwdriver
- Two 7/16-inch open end wrenches
- Microchip removal tool (Amp 821903-1 or equivalent)
- Needle-nose pliers

## **Preliminary operations**

### **Turn the power off**

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**WARNING**

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Hazardous voltages are present in the instrument whenever the power cord is connected. Avoid a potentially dangerous shock hazard by disconnecting the power cord before working on the instrument.

1. Set the main power line switch in the lower left corner of the front panel to the off position. The push button should be “out”.
2. Disconnect the power cable from its receptacle.
3. Allow time for the oven and heated zones to cool.
4. When the heated zones are cool, turn off all gas supplies.

### **Remove the Automatic Sampler, tray, and bracket (if present)**

If there is an Automatic Liquid Sampler on the GC, it must be removed to gain access to the inlet area. See the sampler manual for details.

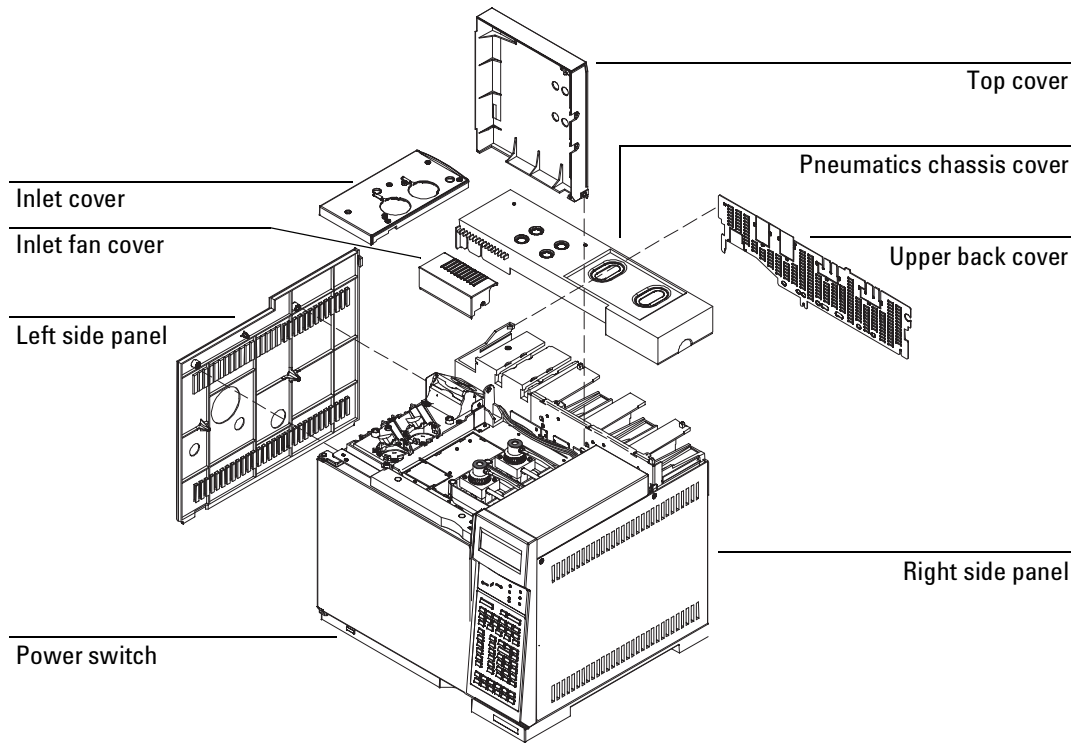
### **Remove the top cover**

Raise the gray plastic top cover (with the holes and ventilation slots) to the vertical position. Examine the hinge in the right rear corner.

- If the hinge is a metal bracket attached to the oven top, pull the clip at its top toward you to release the hinge pin. Push the pin to the left to release the cover. Raise the right side of the cover and remove it.
- If there is no metal hinge bracket, raise the right side of the cover and remove it.

### **Clean out the oven**

Remove columns and hardware associated with both inlets to clear the way for the PTV inlet.



## **Remove the inlet cover**

Remove the blue plastic inlet cover (six captive Torx screws) to expose the inlets and inlet chassis.

## **Remove the inlet fan cover**

The inlet fan is at the rear of the inlet chassis and is protected by a gray plastic cover. The cover is secured by one screw on the right side.

Loosen the screw, raise the right end of the cover, and slide it to the left to remove it.

## **Remove the left and right side panels**

1. Loosen the two captive screws securing the gray plastic left side panel along the top edge.
2. Slide the panel toward the rear of the instrument to disengage the hook at the top, tilt the panel outward, and lift.

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### **Caution**

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The next step exposes static-sensitive parts. Do not touch any of the parts inside the right side panel until specifically instructed to do so.

3. Repeat for the right side panel.

## **Remove the upper back cover**

Remove the upper (three screws) metal back cover of the instrument. Do not remove the lower back cover.

## **Remove the pneumatics chassis cover**

This is the gray plastic cover across the top rear of the GC. It is held by spring clips on the left and right ends. Lift up on each end to release the clips and remove the cover.



## Remove the inlets and pneumatics modules

The PTV inlet must be installed in the front inlet position. If there is an inlet in this position, either move it to the back position or remove it from the GC.

The original inlet chassis must be replaced by a modified one to accommodate the PTV inlet. This requires that all inlets be removed from the inlet chassis. If a back inlet is to be used, and if it is presently in the back position, it is still necessary to remove the inlet from the chassis but it is *not* necessary to remove its pneumatics module.

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### Caution

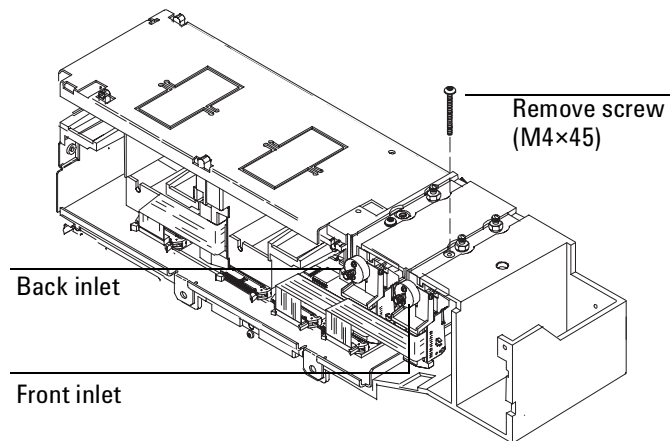
As part of this step and those that follow, you must bend various sections of tubing. Make the bends gradual and avoid kinks.

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### Caution

It is *not necessary* and *not advisable* to separate inlets from their pneumatics modules. Doing so can create leaks. Although handling the inlet and pneumatics module as a unit is awkward, it can be managed.

1. If installed, remove the front inlet from the inlet chassis. See your 6890 GC service documentation for details.



**Remove the inlets and pneumatics modules**

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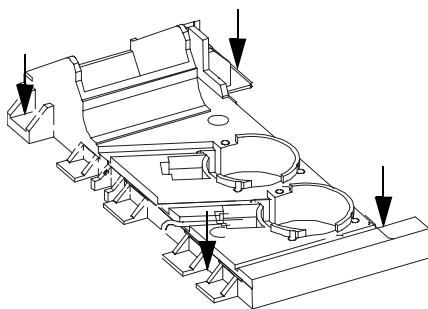
**Caution**

This procedure requires precautions against electrostatic discharge. Use the grounded wrist strap (part no. 9300-1408) and connect it to a bare metal surface of the GC. Failure to heed this caution may result in damage to the instrument or to the PTV assembly.

2. Pneumatics modules are held by a single screw on the top. Remove the screw and slide the module, the inlet, and other attachments out the back of the chassis.
3. If a back inlet is installed, remove it from the chassis. It is not necessary to remove its pneumatics module.

## Replace the inlet chassis

1. Locate the fan at the rear of the inlet chassis and note how its wiring is routed. The fan is held by clips on either side. Press the clips outward to release the fan. Place the fan on top of the oven to the right of the chassis.
2. The chassis is held by four screws, one at each corner. Remove the screws and the chassis.



3. There is a screw on the right side of the old chassis that held the inlet fan cover. Remove this screw and install it on the new chassis provided in the kit.
4. Install the new inlet chassis and secure with the four screws.
5. Examine the fan housing. There is an arrow molded into the body that shows the direction of air flow through the fan. A second arrow shows the direction of rotation. The fan must be installed so that the “air flow” arrow points up.
6. Install the fan in the new chassis. Route the power wiring as noted in step 1. Align the fan with the sloping rear face of the chassis and press it down until the clips engage.

## **Install the back inlet and pneumatics module**

The details of installing the back inlet depend on the inlet type. See your 6890 GC Service documentation for details.

1. If uninstalled, slide the pneumatics module for the back inlet into the “back” position of the pneumatics carrier and secure with the long (M4×45) screw.
2. Install the back inlet in the inlet chassis.

## Install the PTV pneumatics module

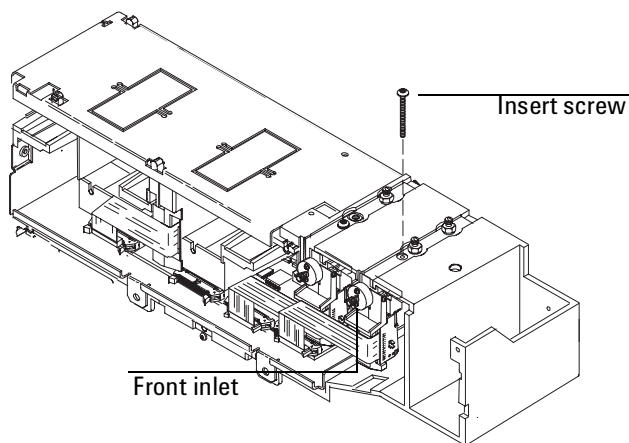
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### Caution

This procedure requires precautions against electrostatic discharge. Use the grounded wrist strap (part no. 9300-1408) and connect it to a bare metal surface of the GC. Failure to heed this caution may result in damage to the instrument or to the PTV assembly.

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1. Open the large bag containing the PTV assembly. Remove the contents and place them on top of the GC, with the inner bag in contact with a bare metal surface (top of the oven or the right side of the pneumatics chassis).
2. Check the large bag for loose parts—the guide cap (septumless head) or the septum retainer (septum head) sometimes come off during shipment.
3. Open the inner bag containing the pneumatics module. Remove the pneumatics module and all its attachments.
4. Slide the module into the “front” position of the pneumatics carrier and secure with the long (M4×45) screw.

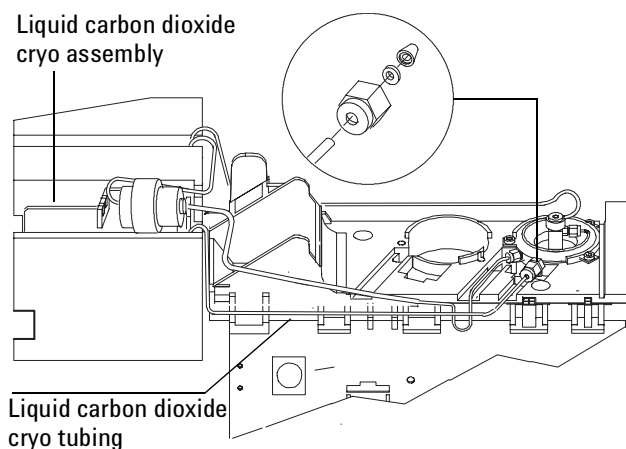


## **Install the PTV inlet**

1. Prepare the front inlet position for the PTV inlet.
  - If the front inlet position was not previously used, it may be covered by a solid metal plate. Cut the webs that hold the plate and remove it. Remove the solid insulation plug under it.
  - If the front inlet position previously contained an inlet, be sure that the formed insulation plug for that inlet has been removed.
2. Locate the PTV insulation block and unwrap it. Place the block in the front inlet position. The top of the block must be about 15 mm (5/8 inch) below the top of the curved ridge on the inlet chassis. If it is higher, remove the plug and check for insulation scraps under it. When the height is satisfactory, remove the block.
3. Install the insulation block on the PTV inlet body. The large slot in the insulation fits over the 1/8-inch tubing on the side of the inlet body.
4. Install the PTV inlet and insulation block in the front inlet position. Orient the inlet so that the tubing and wiring attached to the inlet body are toward the left side of the chassis. Fasten it with the three captive screws.

## Install the liquid carbon dioxide cryo assembly (Accessories G2617A and G2618A only)

1. Slide the cryo assembly into the open-top slot next to the PTV pneumatics module. Secure from the front with the short (M4× 12) screw.



2. Unwind the tubing that is coiled up inside the cryo assembly. Run it over the top of the slot and down the left side of the inlet chassis to the PTV inlet.

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### Caution

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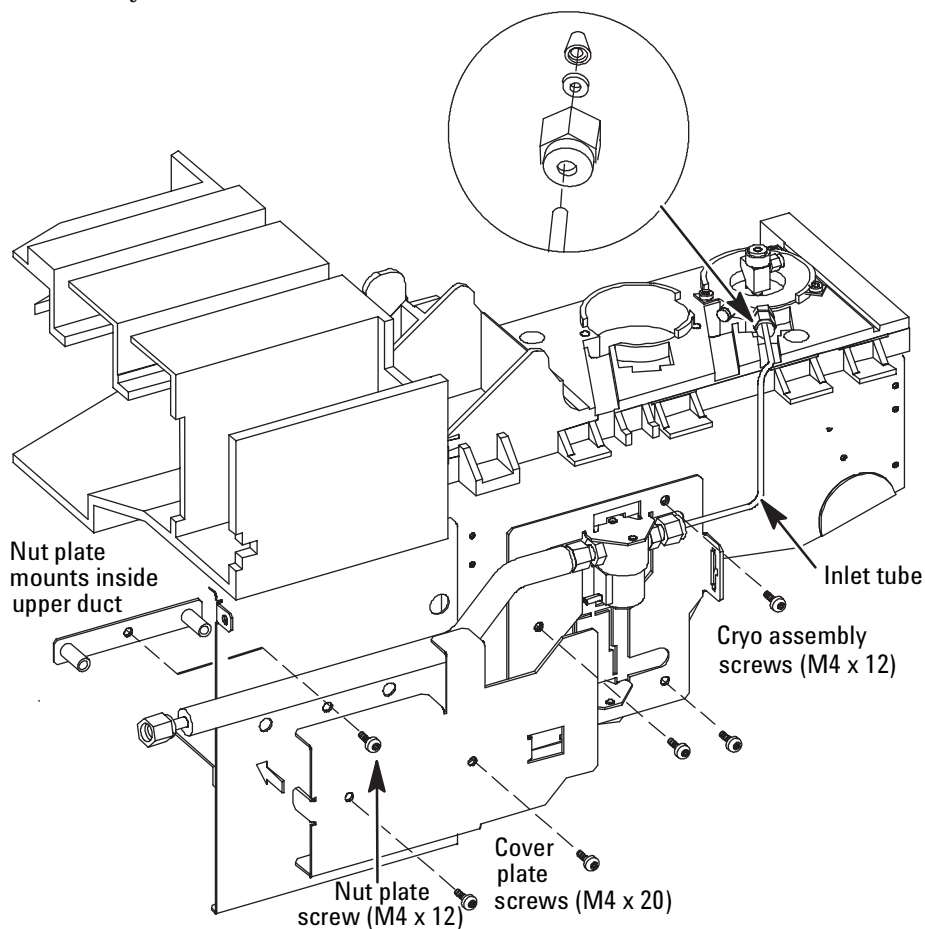
In the next step, use one wrench to support the fitting on the inlet body and one to tighten the nut. Failure to do this could break the fitting on the inlet.

3. Place a brass nut and the brass ferrule set on the end of the cryo tubing as shown. Insert the tubing in the fitting on the left side of the inlet body. Tighten the nut finger tight, then  $\frac{1}{4}$  turn more using two  $\frac{7}{16}$ -inch open end wrenches.
4. Route the tubing along the left side of the inlet chassis. Tuck excess length into the cryo assembly. Check that the tubing rests in the shallow slot on top of the inlet chassis.

## **Install the liquid nitrogen cryo assembly (Accessories G2619A and G2620A only)**

If a liquid nitrogen cryo assembly is already mounted on the oven wall, you must combine the two assemblies into one.

Remove the valve from the new cryo assembly and install it on the old one. You may have to remove the assembly mounting screws to do this. The upper valve serves the PTV inlet; the lower valve serves the cryo focus accessory.





1. Place the assembly against the side of the oven. There are three punched cutouts on the right edge of the lower back panel. Use pliers to break out the appropriate cutouts to accommodate the tubing from the valves.
2. Mount the assembly on the side wall of the oven with three screws. Use care to avoid pinching any wires between the metal plate and the oven wall.
3. Feed the liquid nitrogen inlet tube down through the cutout just behind the 4-pin connector next to the PTV. The end with the double bend goes to the inlet.

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**Caution**

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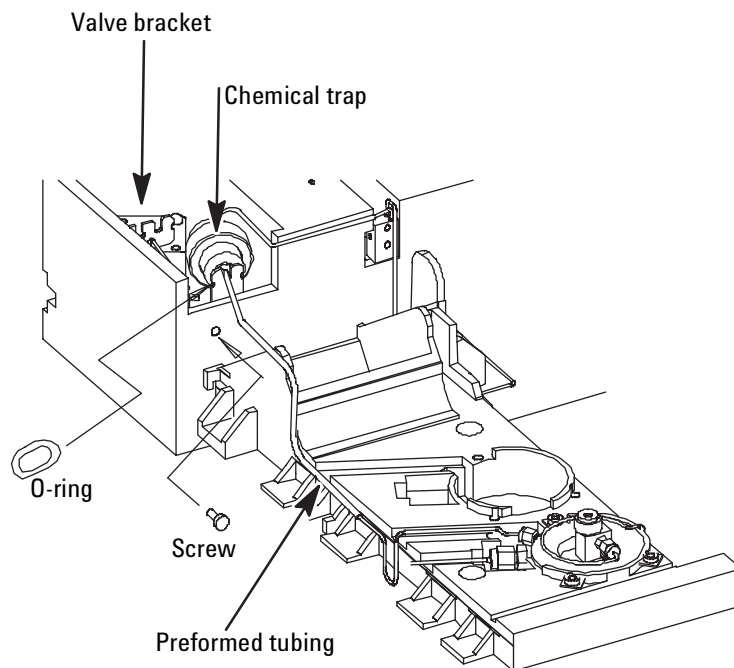
In the next two steps, use one wrench to support the fitting on the inlet body and one to tighten the nut. Failure to do this could break the fitting on the inlet.

4. Place a brass nut and a brass ferrule set on the upper end of the inlet tube as shown. Insert the tube in the fitting on the left side of the inlet body. Tighten the nut finger-tight, then 1/4-turn more using two open end wrenches.
5. Similarly, connect the lower end of the inlet tube to the outlet side of the liquid nitrogen valve.
6. From the back of the instrument, pass the nut plate through the grill into the upper duct. **Hint:** The notch at the right end of the second opening from the bottom helps considerably.
7. Use needle-nose pliers to position the nutplate against the right side of the duct with the standoffs protruding through the holes in the side. Secure the nut plate with an M4×12 screw in the center hole.
8. Place the cover plate over the liquid nitrogen tubing as shown. Secure the two screws (M4×20) and tighten firmly.

## Route the gas tubing

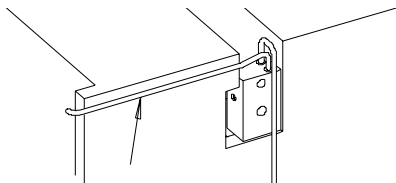
1. **Liquid carbon dioxide accessories G2717A and G2618A.** The valve bracket is already mounted. Go to step 2.

**Liquid nitrogen accessories G2619A and G2620A.** Slide the valve bracket into the open-top slot next to the PTV pneumatics module. Secure from the front with a short (M4×12) screw.



2. Place the chemical trap in the bracket at the front of the cryo assembly. Use an O-ring to hold it in the bracket.
3. The large preformed tubing from the chemical trap goes along the left side of the inlet chassis. Bend the narrow section at the end to lie in the shallow slot leading to the inlet body.
4. The tubing on the other (rear) end of the chemical trap connects to the pneumatics module. This tubing must be just below the top edge of the

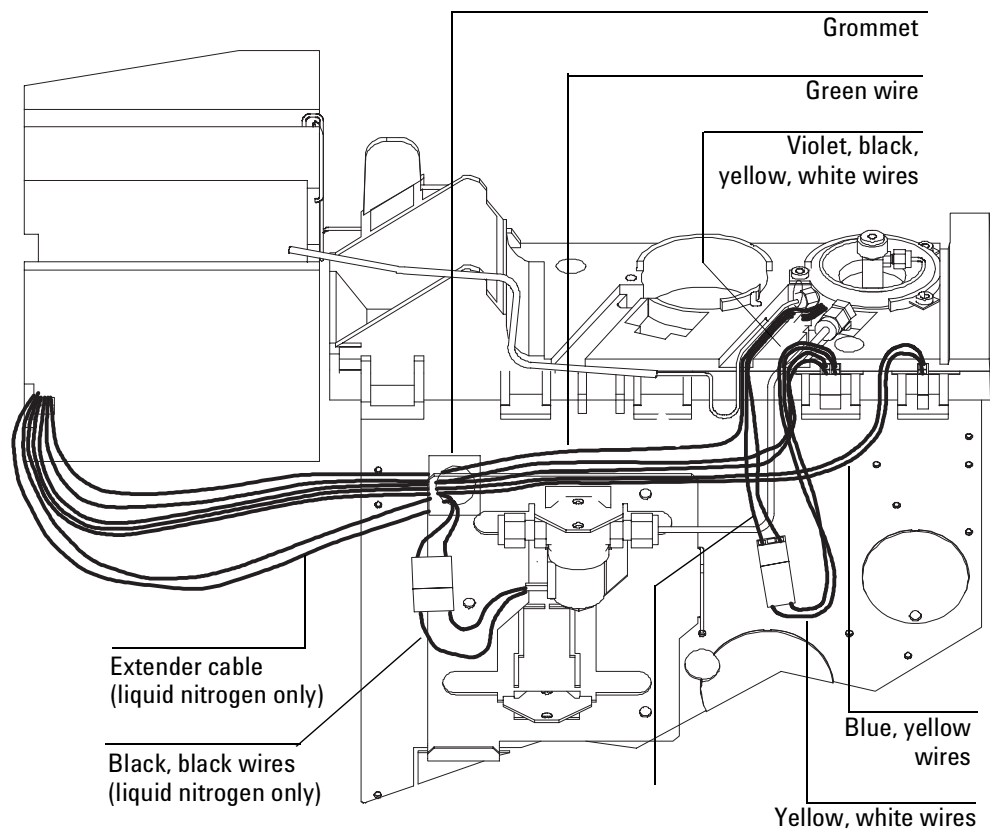
pneumatics chassis. Do not run it any lower than you must, since clearances are very tight in this area.



5. The remaining tubing from the pneumatics module—one tube for the septumless head, two tubes for the septum head—runs along the right side of the inlet chassis.

## Connect the cables

### On the left side of the instrument



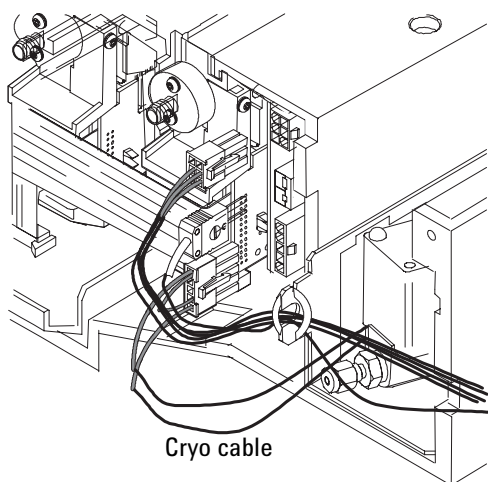
The following connections are all made using the cable assembly that is connected to the PTV pneumatics module.

1. Locate the square 4-pin connector (violet, black, yellow, white). This goes to the second connector from the front of the inlet chassis. Pass the connector up through the cutout that is just behind the connector and plug it in.
2. Follow the yellow and white wires from the 4-pin connector to where they connect to the blue and black wires from the inlet. Disconnect the

cables, pass the blue and black wires and connector down through the same cutout used in step 1, and reconnect them.

3. Locate the 2-pin connector with the blue and yellow wires. Pass this up through the cutout just behind the front connector on the inlet chassis and plug it in.
4. Follow the heavy green wire to the back of the instrument where it plugs into the pneumatics module. Pull the plug off. Route the wire from the inlet, down through the second cutout, to the pneumatics module, and plug it in. It will only go one way (large pin up).
5. **Liquid nitrogen accessories G2619A and G2620A only.** Connect the black, black wires from the valve to the yellow, yellow extender cable. Route the cable so that the other end reaches the back of the pneumatics module.
6. You now have several “loose” wires on the left side of the instrument. Note where the other wires are gathered together at a split grommet near the rear of the instrument. Pull the grommet open and add the PTV wiring to it.

## On the back of the instrument



1. **Liquid carbon dioxide accessories G2617A and G2618A.** There is a 2-wire cable with a 6-pin connector on the back of the cryo assembly. Connect it to the bottom connector on the back of the pneumatics assembly. It will go on in only one direction.  
**Liquid nitrogen accessories G2619A and G2620A.** Connect the free end of the yellow, yellow extender cable to the bottom connector on the back of the pneumatics assembly. It will go on in only one direction.
2. Gather together the wires running to the pneumatics module—except the cable from the cryo assembly or cryo valve—and secure them in the bracket at the top of the assembly with an O-ring.
3. Run the flat ribbon cable from the back of the PTV pneumatics module to the nearest connector on the horizontal pneumatics control board. The cable connects to the board from the top. Be sure that the two connector latches are closed. Gently fold the ribbon cable so that it will lie flat.

## Replace the ROMs

This step depends on which 6890 model and which firmware you have.

- **6890A, serial number less than US00005700.** These instruments are firmware-incompatible with the PTV inlets, unless the ROMs have been replaced as part of some other upgrade.

Determine the revision number of the ROMs on the main board as described below. If the ROMs in this kit are a later revision (higher number), replace the ROMs on the main board with those from the kit.

- **6890A, serial number US00005700 or greater.** These instruments are firmware-compatible with the PTV inlets.

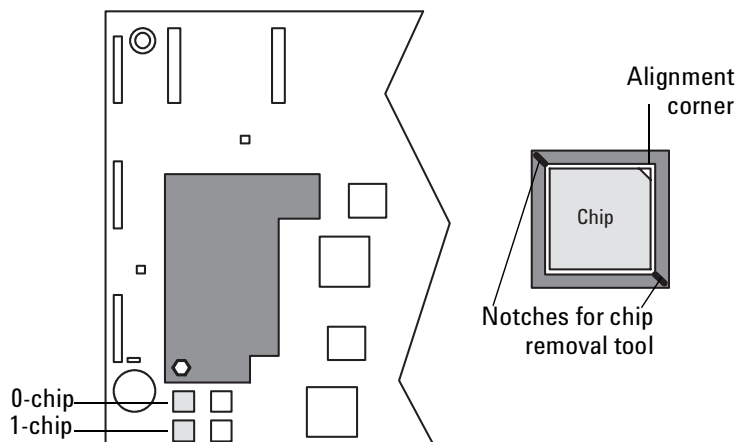
Determine the revision number of the ROMs on the main board as described below. If the ROMs in this kit are a later revision (higher number), replace the ROMs on the main board with those from the kit.

- **6890N.** These instruments do not use ROMs. All firmware versions support the PTV inlets.

### To determine the firmware revision number

On the 6890 keyboard, press [Status], then [Clear].

## To change the ROMs



Examine the right side of the instrument. On the main board, just below the large cutout on the left, are four chip sockets. The two on the left contain the operating programs (firmware) that run the GC.

These two chips must be replaced with new ones that include software for the PTV inlet.

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### Caution

This procedure requires precautions against electrostatic discharge. Use the grounded wrist strap (part no. 9300-1408) and connect it to a bare metal surface of the GC. Failure to heed this caution may result in damage to the instrument or to the PTV assembly.

1. Use a chip removal tool with a gentle rocking/pulling motion to remove the chip in the top left socket.
2. Repeat with the bottom left chip and socket.
3. The new chips are identified by a part number, a version number, and a suffix of either “.0” or “.1”. They are referred to as the 0-chip and the 1-chip respectively.

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### Caution

Before inserting a ROM, make sure that all of the prongs are straight. Use a small flat-bladed screwdriver or needle-nose pliers to straighten the prongs.



4. Note that each chip has one diagonal corner. This corner must be at the top right when the chip is inserted in its socket.
5. Install the 0-chip in the top left socket with the diagonal corner at the top right. Check that all of the prongs are aligned with their slots, then push the chip into the socket until it is firmly seated and level.
6. Similarly, install the 1-chip in the bottom left socket.

## **Closing up**

1. Re-install the inlet fan cover. The left side hooks over a pin on the inlet chassis and the right side is held by a screw.
2. Re-install the left and right side panels. Be sure that the hooks at the top rear corners are engaged.
3. Re-install the upper back cover. Note that the tab on the top edge of the cover must engage the matching slot in the electronics cover and that the top edge of the electronics cover overlaps the top edge of the back cover.
4. Discard the old pneumatics chassis cover. Install the new one that came with the PTV.
5. Check that all the tubing and wiring in the inlet area is in the shallow slots where it belongs. Then install the inlet cover.
6. Re-install the top cover.
7. Restore gas flows and power and check for leaks.





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