

Agilent G3465A, G3466A, G3467A, G3468A CO₂ Cryogenic Cooling and N₂ Cryogenic Cooling

For the Agilent 7890A Gas Chromatograph

Installation Instructions

Parts Supplied

Table 1 Parts supplied

Description	Quantity
LCO ₂ oven cryo valve (G1565A only)	1
LN ₂ oven cryo valve (G1566A only)	1
LCO ₂ oven cryo valve with inlet Cryoblast and LCO ₂ filter (G1567A only)	1
LN ₂ oven cryo valve with inlet Cryoblast (G1568A only)	1
Screw, M4 x 0.7 mm, 12mm (for attaching cryo valve to GC)	2

NOTE

If your oven cryo valve is equipped for “Cryoblast” cooling of a cool on-column capillary inlet ([Figure 3](#) on page 3 or [Figure 4](#) on page 4), and you are also installing a new COC inlet, *stop* here and proceed to instructions which came with your cool on-column capillary inlet. After performing preliminary inlet installation, you will be directed to return here to complete installation of the oven cryo valve and Cryoblast option.

If there is *no* Cryoblast option ([Figure 1](#) on page 2 or [Figure 2](#) on page 2), continue here.



Parts Identification

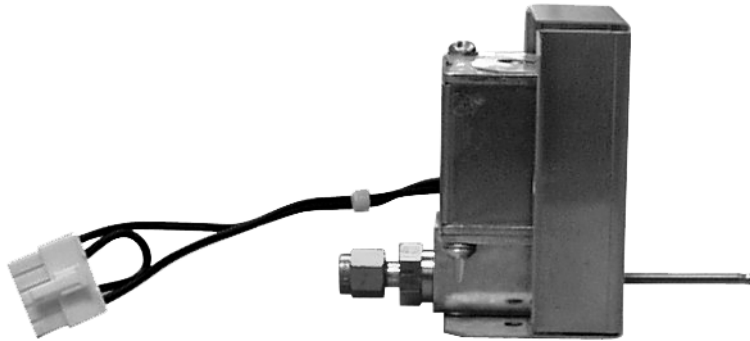


Figure 1 G1565A: LCO₂ oven cryo valve



Figure 2 G1566A: LN₂ oven cryo valve

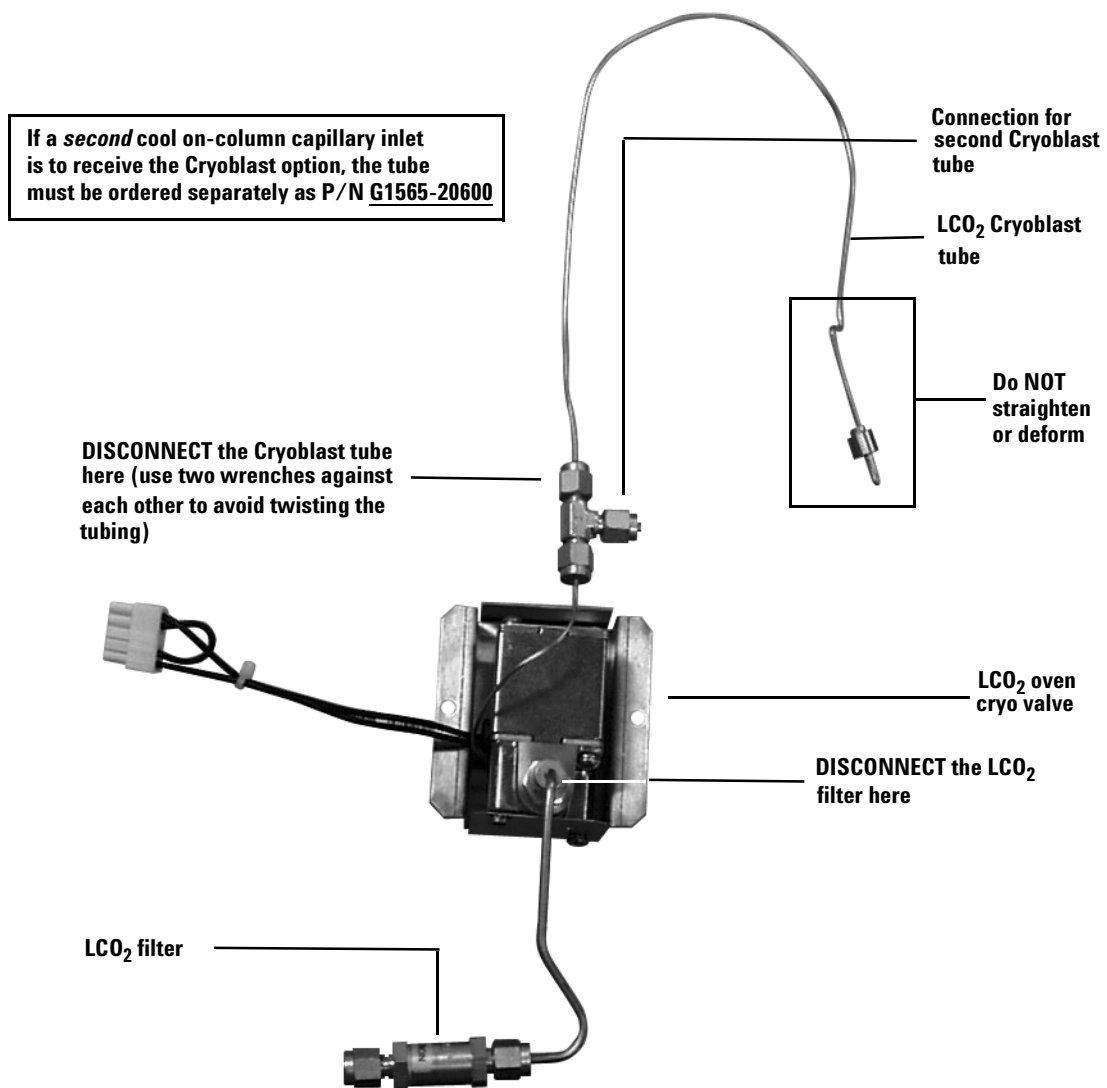


Figure 3 G1567A: LCO₂ oven cryo valve with cool on-column "Cryoblast"

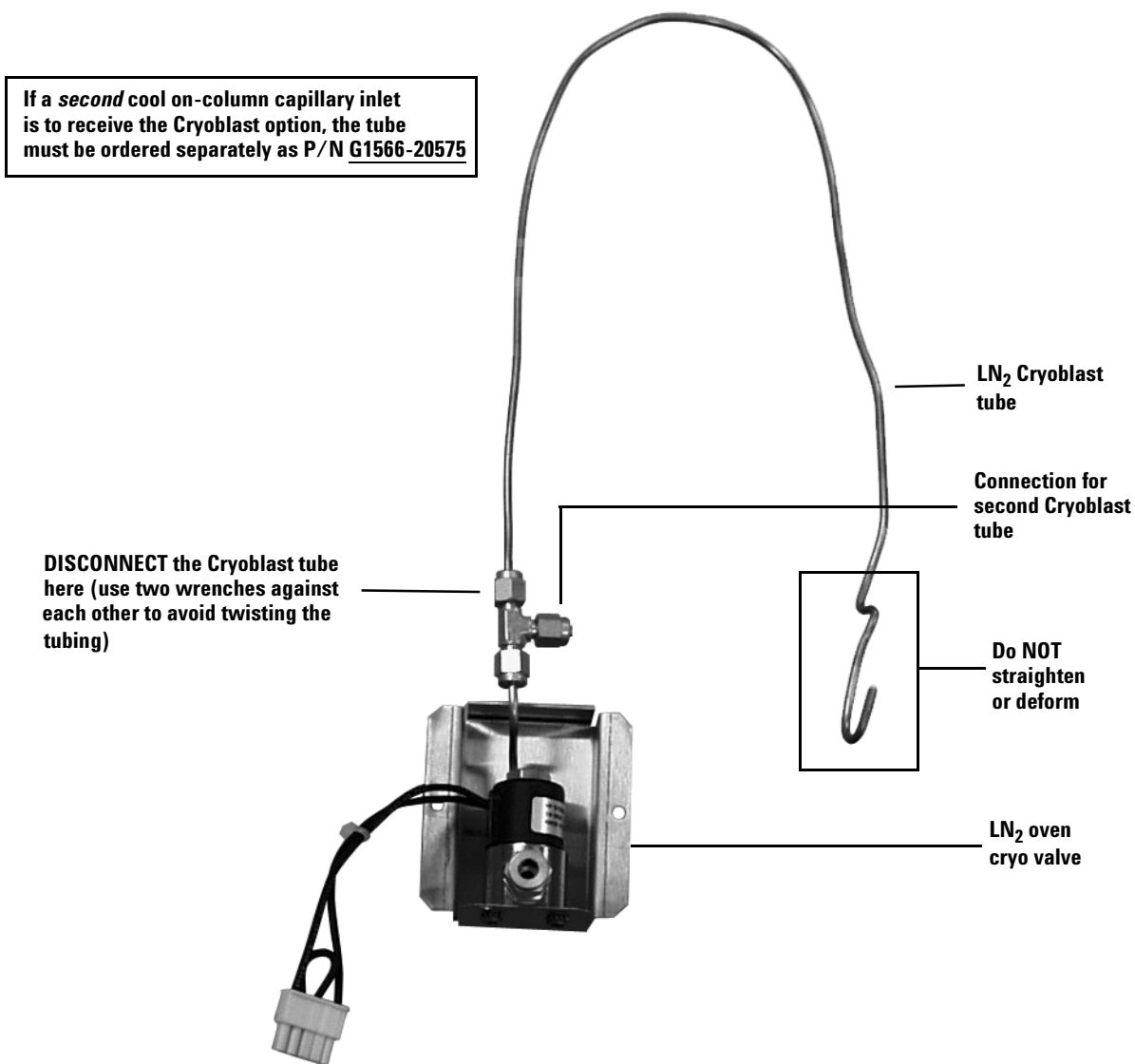


Figure 4 G1568A: LN₂ oven cryo valve with cool on-column "Cryoblast"

Tools Required

- T-20 Torx screwdriver
- Diagonal cutters
- 7/16-inch wrench

Installation Procedure

This document contains procedures for installing cryogenic oven cooling with liquid nitrogen (LN₂) or liquid carbon dioxide (LCO₂) and, optionally, with cryoblast cooling of one or two cool on-column inlets in an Agilent 7890 Gas Chromatograph (hereafter referred to as the GC).

WARNING

Cryogenic liquids can cause very serious burns requiring emergency medical attention. This is especially true with liquid nitrogen (LN₂), which can cause skin damage equivalent to a serious thermal burn. Use extreme caution in working with these materials.

WARNING

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

For additional safety information:

WARNING

Refer to the Safety Manual that came with your Agilent 7890A Gas Chromatograph for hazards that may exist when maintaining your instrument.

Prepare the GC

- 1 If not already done, turn off the GC and unplug its power cord.
- 2 If not already done, remove the left side panel by removing its retaining screw and sliding it rearward while lifting.
- 3 Remove the plastic hole cover from the panel at the cryogenic valve location.

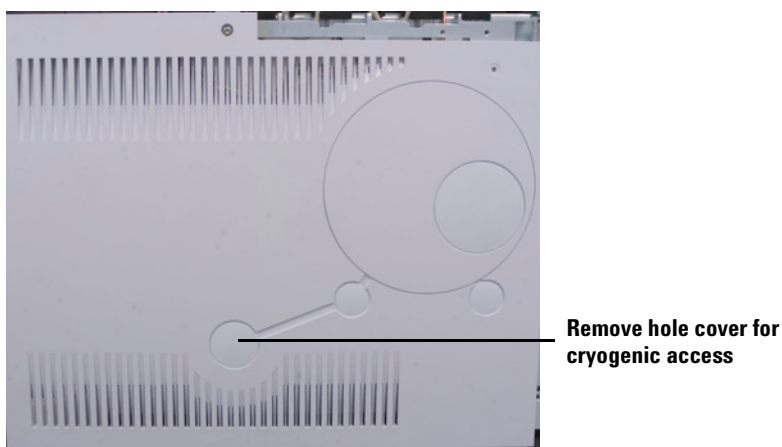


Figure 5 Left side panel, oven cryogenic access hole cover

Prepare the cryo valve for “Cryoblast” installation

If your oven cryo valve is *not* equipped with the “Cryoblast” option for use with a cool on-column capillary inlet (see [Figure 1](#) on page 2 or [Figure 2](#) on page 2), skip this section. Otherwise, perform the following preparation steps:

LCO₂ oven cryo valve (see [Figure 3](#) on page 3):

In the following operations, use two wrenches against each other to avoid twisting tubing:

- 1 Disconnect the Cryoblast tube at its swage connection.
- 2 Straighten the tube *except* where indicated in [Figure 3](#) and set the tube aside for later use.
- 3 Also disconnect the LCO₂ filter at its swage connection to the valve and set it aside for later use.

LN₂ oven cryo valve (see [Figure 4](#) on page 4):

In the following operation, use two wrenches against each other to avoid twisting tubing:

- 1 Disconnect the Cryoblast tube at its swage connection.
- 2 Straighten the tube *except* where indicated in [Figure 4](#) and set the tube aside for later use.

Install the oven cryo valve

- 1 Remove the rectangular sheet metal cutout on the left side of the GC by clipping each of the four nibs with a pair of small diagonal cutters. Have the flat side of the cutters flush with the outside edge of the cutout so the piece

removed has the nibs attached. You may need to file away any burrs remaining on the inside edges of the cutout hole on the GC.

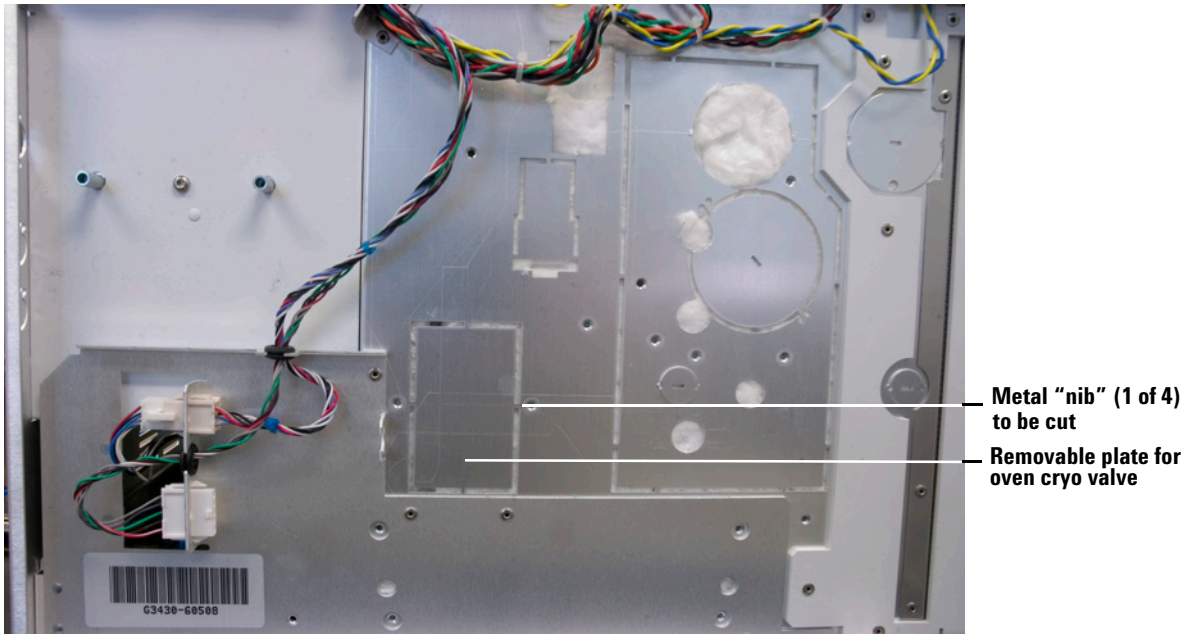


Figure 6 Left side, oven cryo valve location

- 2 Examine the cryogenic valve. Note the location of the nozzle relative to the two mounting holes on the oven side panel. Locate and create a path for the nozzle through the oven insulation and into the oven by piercing the insulation with a screwdriver. Create an access hole large enough that the nozzle can pass into the oven without becoming clogged by insulation fibers.

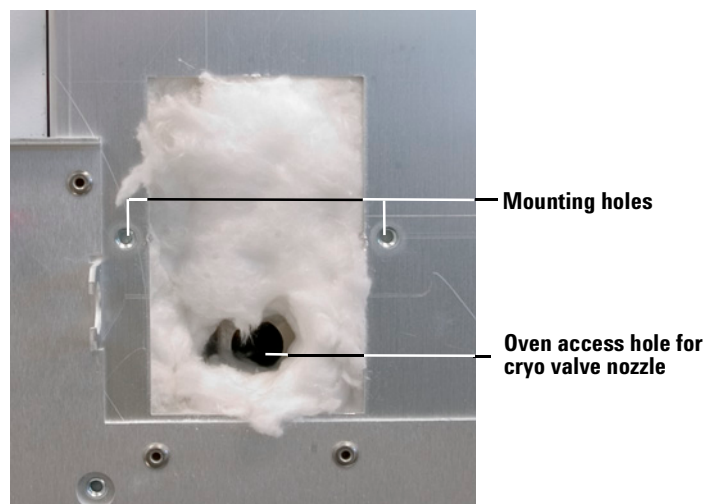


Figure 7 Left side, oven cryogenic valve, nozzle access into oven

- 3 Orient the cryo valve such that its nozzle will pass into the oven interior.

If the valve has the cryoblast option, tubing with the swage T-fitting must point upward and the capped “leg” of the T-fitting itself must point towards the instrument front.

If reorientation of the T-fitting is necessary, do *not* twist tubing to achieve the correct orientation. Instead, loosen swage fittings as needed, reorient the T-fitting, and retighten swage fitting(s). Use two wrenches against each other to avoid twisting tubing:

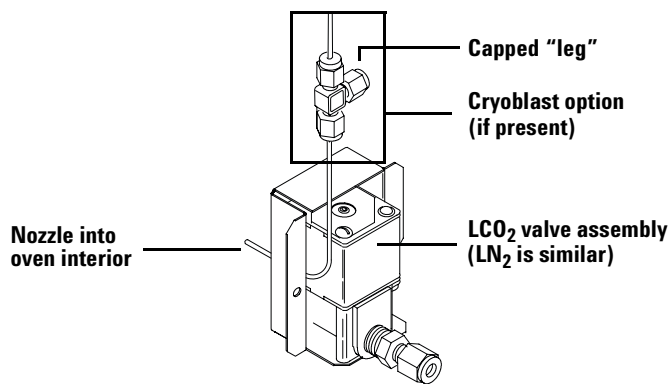


Figure 8 Oven cryo valve mounting orientation

- 4 Press the valve assembly into place, crushing intervening oven insulation, and secure it with two screws tightened evenly to firmness.
- 5 If necessary, cut the supplied grommet so it may be placed over the valve's power cable wires. Work the grommet and contained cable wires into the support location to secure the valve power cable.

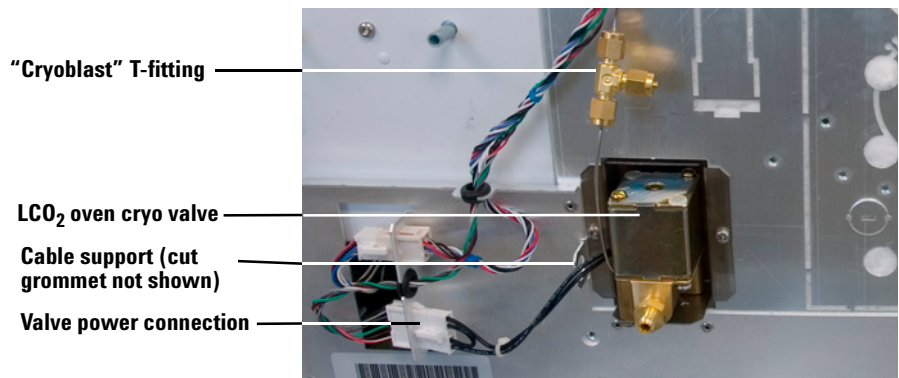


Figure 9 LCO₂ oven cryo valve (with Cryoblast) mounted with power connected (LN₂ is similar)

- 6 Connect the valve power connector fully into its mating connector.

This completes installation of your oven cryo valve. If you are *also* installing the Cryoblast feature for a cool on-column capillary inlet, proceed to the section “Install the Cool On-Column Capillary Inlet “Cryoblast” feature” on page 9”. Otherwise, proceed to “Attach the Cryo Supply Line” on page 15”.

Install the Cool On-Column Capillary Inlet “Cryoblast” feature

NOTE

Instructions in this section assume you have already installed your cool on-column capillary inlet. If *not*, then *stop* here and proceed to instructions which came with your cool on-column capillary inlet. After performing preliminary inlet installation, you will be directed to return here to complete installation of the inlet’s Cryoblast option.

NOTE

Unless otherwise noted, the installation process is the same for both LCO₂ and LN₂ oven cryo valves, and for front or back inlet locations.

Preparation of the inlet

- 1 Remove the septum retaining nut carefully: there is a small septum and very small coil spring held in place by the nut.

NOTE

These parts, especially the coil spring, are easily lost. For their safety, it is recommended that the spring, septum, and septum retainer nut be kept together in a safe place for later reassembly.

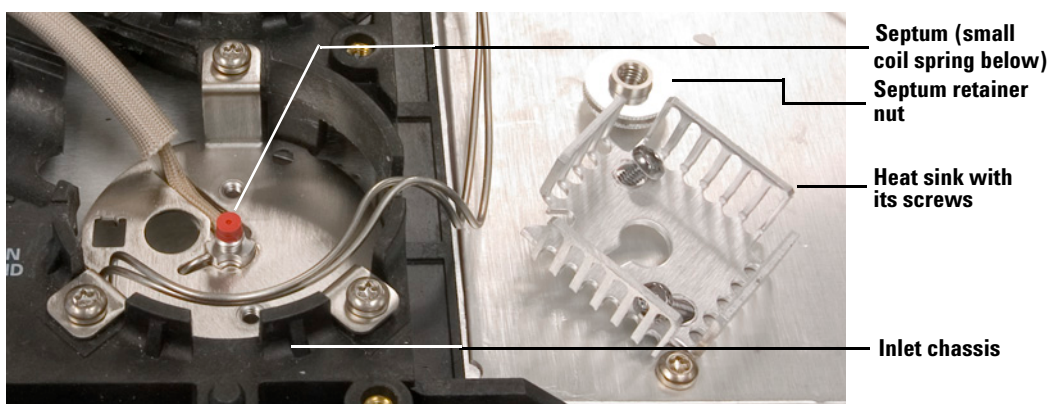


Figure 10 Inlet preparation

- 2 Next, remove the heat sink by removing its two screws.

- 3 *If* the inlet is secured into the inlet chassis, release its three mounting screws and pull it straight upwards enough to expose the full length of the inlet body.
- 4 *If*, as you raise the inlet body, there is a large insulation pad either on the inlet body or in the inlet's mounting hole, it must be carefully removed to preserve its integrity.

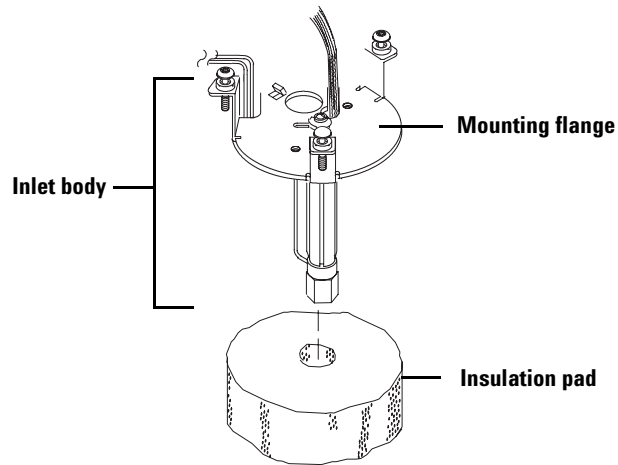


Figure 11 Inlet body and insulation pad

- 5 Carefully inspect both the inlet mounting flange and the end of the Cryoblast tube to be installed:
 - Note the large, round hole in the flange– this is where you will pass through the nozzle end of the Cryoblast tube.
 - Also note the smaller, square hole with a raised metal tab adjacent to the round hole– this is a location and alignment guide. The double right-angle bent portion of the Cryoblast tube must be routed over the square hole and against the tab when installation is complete.
- 6 Install the Cryoblast tube into the opening in the mounting flange, as noted in step 5.

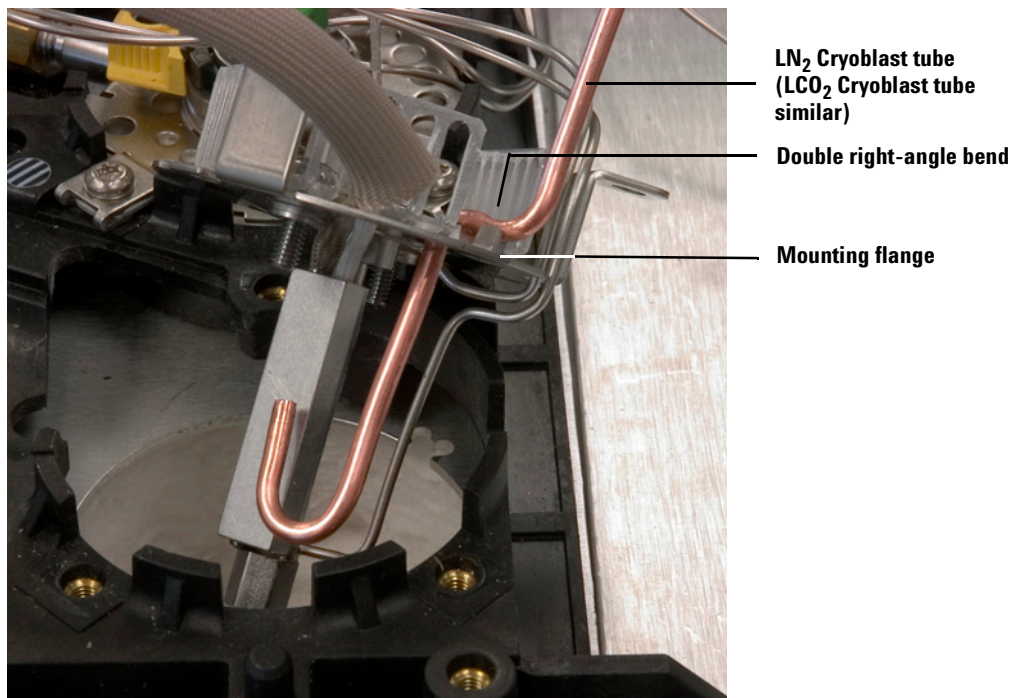
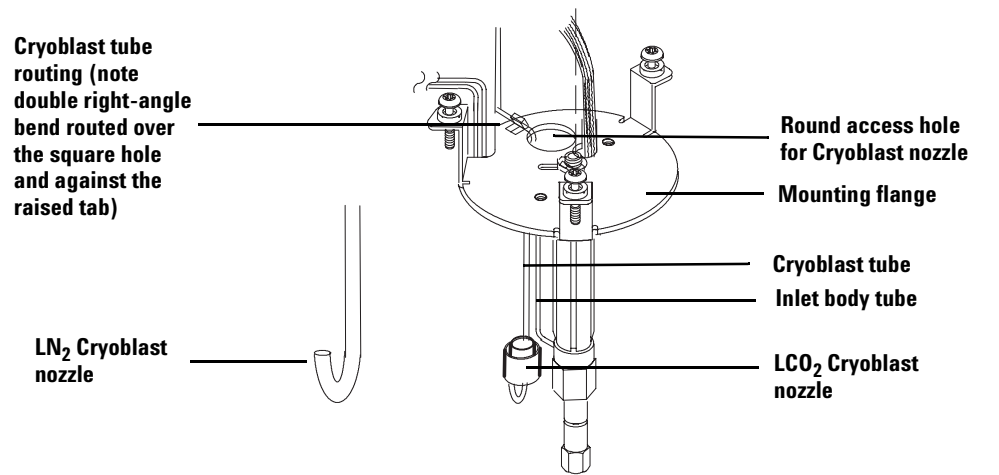


Figure 12 Cryoblast installation, detail

- 7 Carefully work the insulation pad onto both the inlet body and Cryoblast nozzle such that you end with both the Cryoblast tube and the tube on the inlet body in the slit provided in the insulation pad (if two pre-cut slits are present, use one for each tube). Work the pad upwards until it contacts the inlet mounting flange.

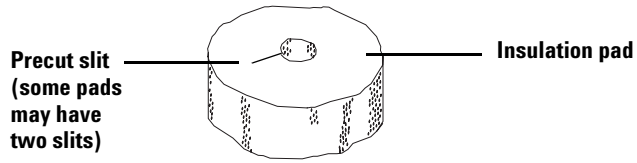


Figure 13 Insulation pad with precut slit(s) for tubing

NOTE

In the next step, maintain control over the Cryoblast tube as you insert and secure the inlet: the tube must *not* be allowed to slip deeper into the inlet cavity than as described in the inspection detail item on [page 10](#), and as shown in [Figure 12](#) on page 11: basically, the tube's double right-angle bend must remain in its described position at all times.

- Lower the inlet into its prepared location with its three screws aligned with the holes in the inlet chassis and its heater/sensor cable sitting in the trough in the inlet chassis. While doing so, mark where to bend the Cryoblast tube into its channel across the inlet chassis.

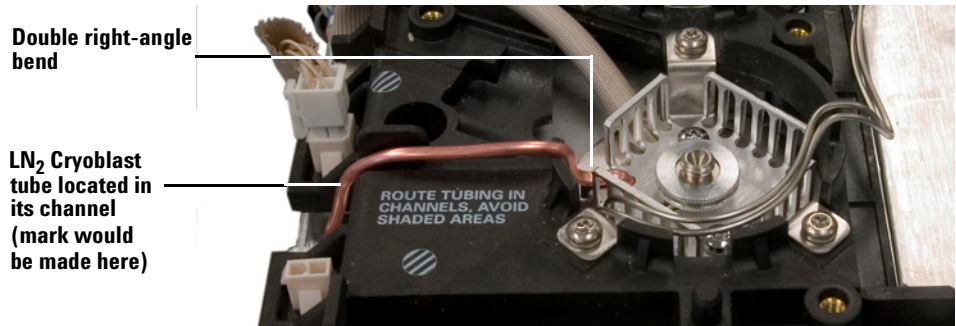


Figure 14 LN₂ Cryoblast tube in its channel (LCO₂ tube similar)

- Remove the inlet and bend the cryo tube at the marked location to pass between the inlet chassis and the GC frame.

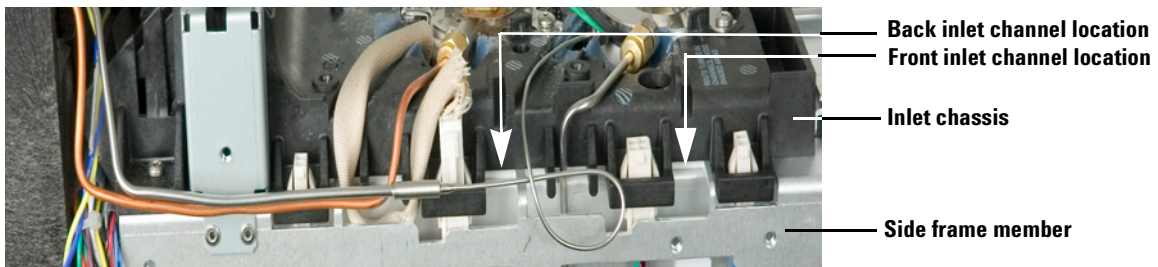


Figure 15 Channel locations for Cryoblast tubes

- 10 Reinsert the inlet while guiding the Cryoblast tube through the channel between the inlet chassis and the GC frame. Again, maintain control over the Cryoblast tube inside the inlet, as noted above.
- 11 Start each mounting screw one at a time to insure the inlet is aligned and screws are properly threaded. Then tighten each screw in turn evenly until snug and the inlet secured.
- 12 From the left side of the GC, locate the inlet's heater/sensor cable and its corresponding connector plug. Tuck the heater/sensor cable underneath the routing tabs at the side of the GC and connect it to the heater connector.

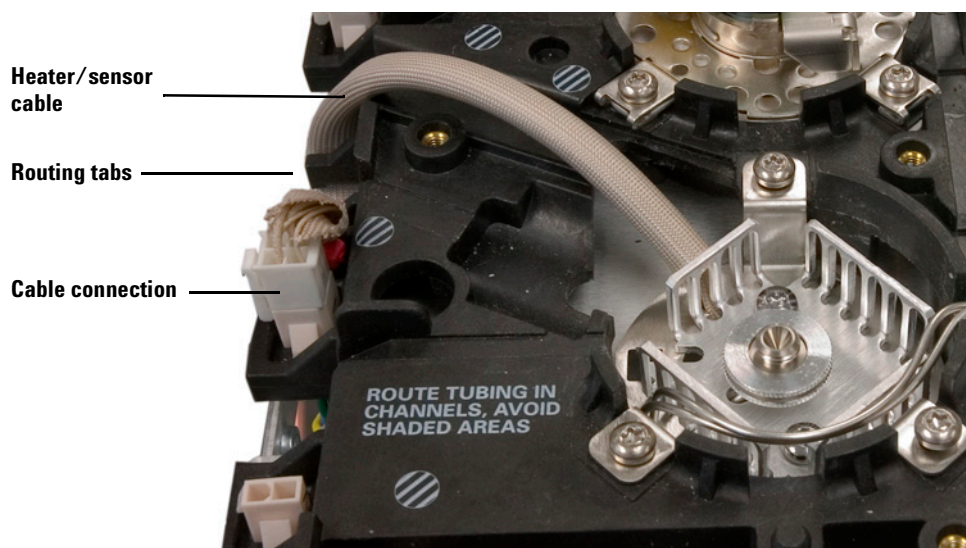
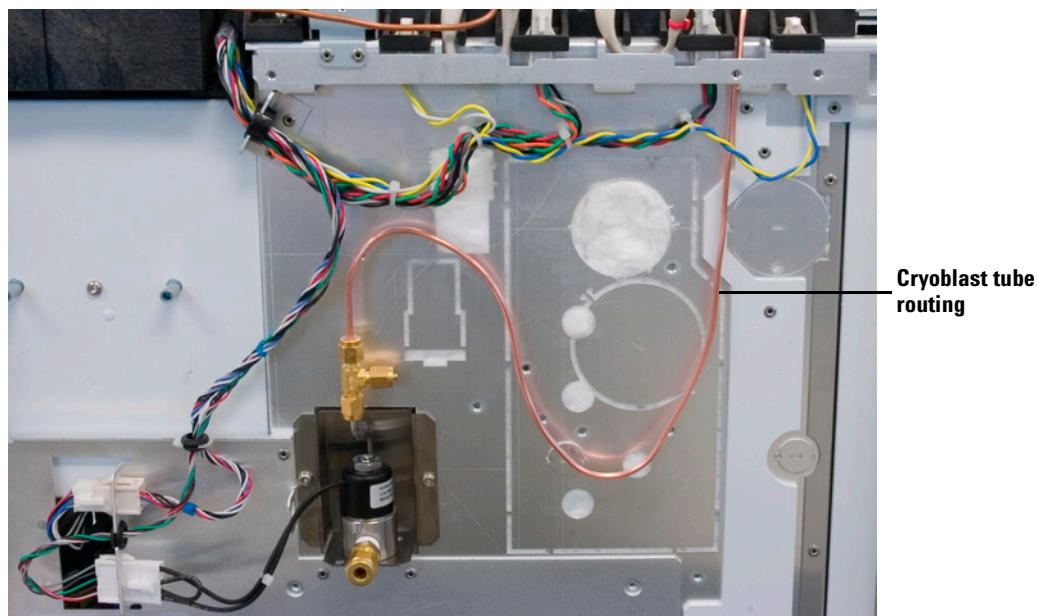


Figure 16 Heater/sensor cable routing and connection

- 13 Referencing [Figure 10](#) on page 9, in the following order, replace the heat sink, coil spring, septum, and septum retaining nut on the inlet.
- 14 Route the Cryoblast tube to the tee attached to the cryo valve.



LN₂ Cryoblast tube routing (LCO₂ similar)

15 Tighten the swage fitting where the Cryoblast tube connects to the T-fitting at the oven cryo valve.

This completes installation of a Cryoblast tube for a cool on-column capillary inlet.

NOTE

If another Cryoblast tube is to be installed into a *second* cool on-column capillary inlet, do it now following the same procedure.

Attach the Cryo Supply Line

- 1 Replace the GC's left side panel. For the LCO₂ oven cryo valve with Cryoblast inlet cooling, reconnect the LCO₂ filter to the valve.

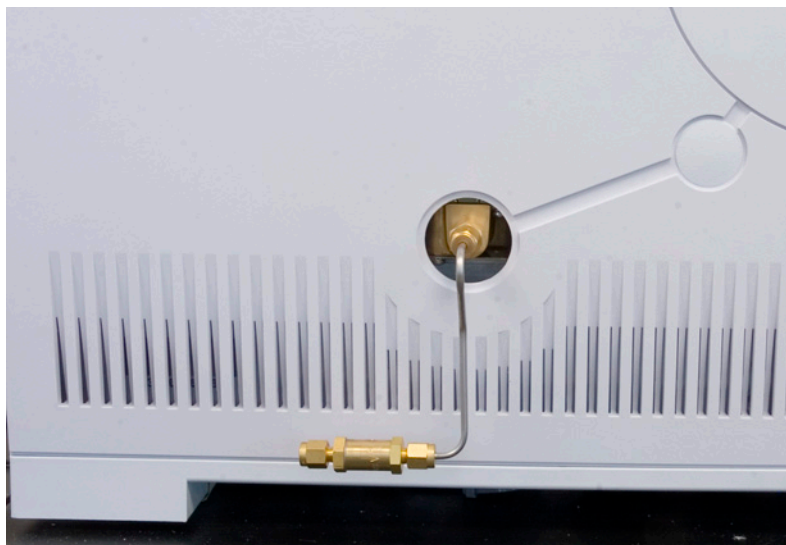


Figure 17 LCO₂ filter installed

WARNING

Cryogenic liquids can cause very serious burns requiring emergency medical attention. This is especially true with liquid nitrogen (LN₂), which can cause skin damage equivalent to a serious thermal burn. Use extreme caution in working with these materials.

WARNING

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

- 2 Connect your cryogenic fluid source, turn on fluid flow, and inspect for leaks. The valve itself should be closed at this time allowing no flow into the oven.

Restore the GC to Operating Condition

If a cool on-column capillary inlet accessory installation is also being done at this time, return now to its installation procedure, *Agilent G3454A 0 – 100 PSI EPC Cool On-Column Capillary Inlet*, and specifically to Step 9 in the section entitled “Install the cool on-column inlet and EPC module”, to complete installation and configuration of the inlet.

- 1 Replace all instrument covers in the reverse order in which they were removed.
- 2 Plug in the GC and turn on its power.
- 3 The oven cryo valve is self-configuring as to both its presence and its type. Methods may need to be created or edited to accommodate new cryogenic cooling parameters.

Warranty

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