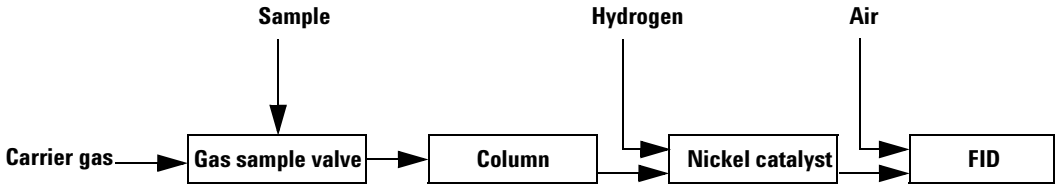
Nickel Catalyst Tube on a 6820 GC, Accessory G4318A

Installation Guide

The Nickel Catalyst tube (NCT) is used with the 6820 Gas Chromatograph (GC) for trace analysis of CO and CO_2 using a Flame Ionization Detector (FID). The gas sample is separated on a column and passed over a hot catalyst which, in the presence of hydrogen, converts any CO and/or CO_2 present to methane. Methane (CH_4) is readily detected by the FID.

Before following this procedure, refer to the safety information at the end of this document.



Requirements

- The accessory is intended to be installed in the back inlet position. If you remove an existing back inlet system to make space, be sure to cap its carrier gas supply.
- Two nut plates, shown installed inside the oven in this procedure, are provided separately with Heated Valve Box kits.

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Parts list

- Nickel catalyst tube (NCT) assembly
- Porapak Q column
- Inlet tube with bulkhead fitting
- Torx screw for attaching flow manifold to the pneumatics carrier
- Insulation cup and insulation
- Top cover and insulation
- Torx screws, swaging nuts and ferrules, and other hardware

Tools

- Electrostatic protection such as a grounded wrist strap
- 7-mm nut driver
- T-20 Torx screwdriver
- Suitable tool to properly cut 1/16-inch stainless steel tubing

Configuration considerations

In installing the NCT, to achieve a standard factory configuration, it may be necessary to move or remove an already existing inlet. For a two-inlet configuration, the factory placement rule is as follows:

- A Purged Packed inlet is always placed in the front location.

Steps

1. Preparing the GC
2. Installing the NCT
3. Connecting the NCT hydrogen supply tube
4. Restoring the GC to operating condition

Preparing the GC

WARNING **Hydrogen (H_2) is both flammable and an explosion hazard when mixed with air in an enclosed space (for example, the oven). In any application using H_2, switch off the supply at its source before working on the instrument.**

WARNING **Hazardous voltages are present in the mainframe when the GC is connected to electrical power. Avoid potentially dangerous shock hazards by disconnecting the power cord before removing side panels.**

1. Switch off electrical power to the GC and disconnect the power cord. Allow time for the oven and heated zones to cool. Then switch off supply gases at their sources.
2. Remove column(s) and any associated hardware from inside the column oven.
3. Lift the hinged GC top cover at its front edge to expose the detector area. Remove the cover by raising it to vertical, lifting its left hinge pin from its bracket, and then sliding the cover to the left to free its right hinge pin.
4. Remove the inlet cover by removing its three screws.
5. If (and only if) an inlet must be removed from the back location, remove two screws along the lower edge of the left side (flow control) panel. Slide the panel slightly to the rear and lift it off.
6. In the same manner, remove two screws along the lower edge of the right side (electronics) panel. Slide the panel slightly to the rear and lift it off.

CAUTION Electronic components can be damaged by static electricity; use a properly grounded static control wrist strap when removing the electronics panel.

7 Remove the back panel by removing two screws at its bottom edge, loosening two screws at its top edge, and the lifting off the two screws.

8 Finally, remove the rear top cover by removing four screws, two at each end.

9 At this time, if necessary to achieve a standard factory configuration, completely remove the back inlet. Carefully store the removed inlet assembly and all associated parts in a safe place for possible future use.

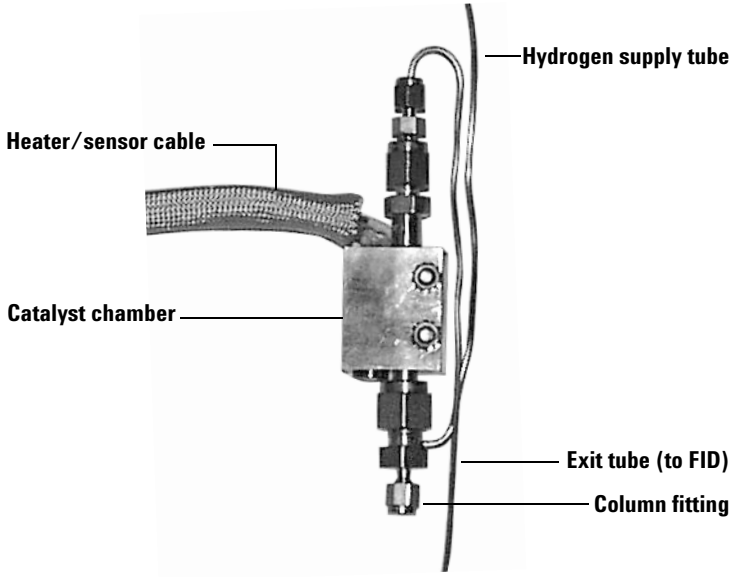
Installing the NCT

These instructions assume you are installing the NCT in the back inlet location:

CAUTION GC insulation is made of refractory ceramic fibers. Ventilate your work area. Wear long sleeves, gloves, safety glasses, and a disposable dust/mist respirator. Dispose of unneeded insulation in a sealed plastic bag.

1 If present, remove the cover plate from the back inlet mounting location and carefully remove pre-cut insulation below it.

2 Prepare the NCT assembly for installation by bending both its hydrogen supply tube and its exit tube along the side of the catalyst chamber.



3 While positioning the NCT into the cavity, use both supplied insulation and removed oven insulation to pack around the bottom and sides of the NCT. The goal is to fill all voids around the NCT body as it is placed into the cavity.

4 Verify the NCT assembly is installed with its column fitting and exit tube inside the oven. Avoid getting insulation inside the exit tube. Feed the heater/sensor cable out the top.

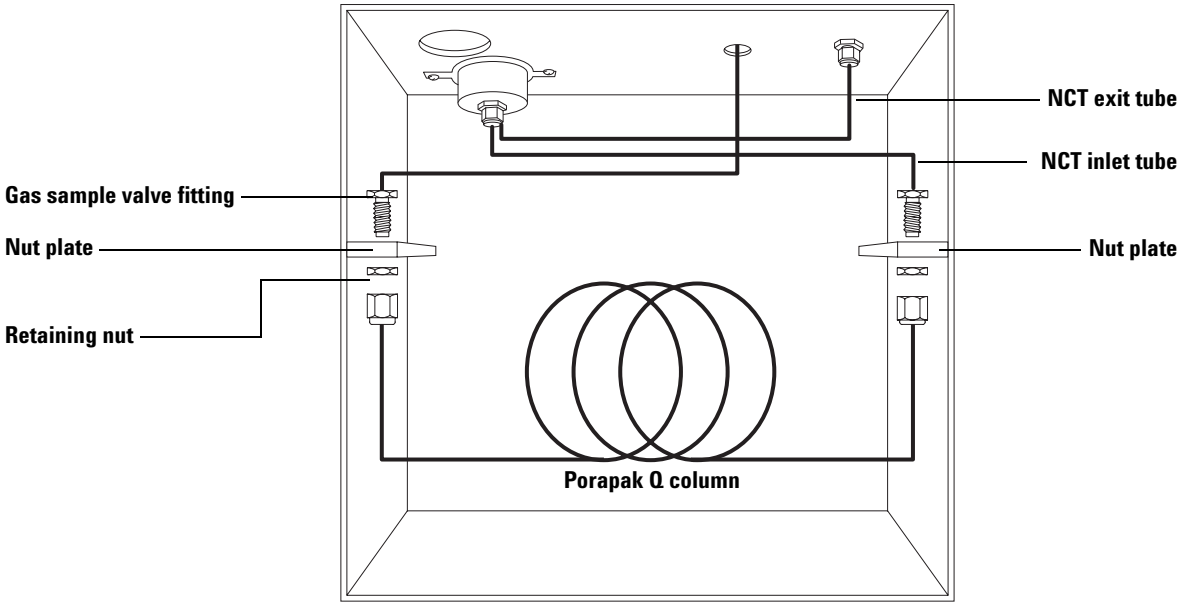
5 Remove the center plug from one of the supplied insulation rings. Place the insulation ring on top of the NCT. Install the cover plate on top of the ring and secure it with three screws.

6 Remove center plugs from the remaining supplied insulation rings. Place the rings inside the insulation cup. Inside the oven, install the cup over both the NCT exit tube and bottom fitting. Again, avoid getting insulation inside the exit tube. Secure the cup to the oven with two screws.

7 From the left side of the GC, connect the NCT heater/sensor plug to the square receptacle closest to the NCT ("BI" for back inlet location).

8 Connect the NCT exit tube to the FID column inlet. Following proper swaging procedures described in the 6820 *Getting Started* manual, assemble a 1/8-inch stainless steel nut with back and front ferrules onto the tube. Insert the tube, ferrules, and nut into the FID base.

9 Tighten the nut finger-tight, then, using two wrenches against each other to avoid twisting the exit tube, tighten the nut an additional 1/2- to 3/4-turn.



10 Install the bulkhead fitting end of the NCT inlet tube to the nut plate on the right side of the oven. Secure with the retaining nut.

11 Connect the NCT inlet tube to the fitting on the bottom of the NCT. Again, following proper swaging procedures described in the 6820 *Getting Started* manual, assemble a 1/8-inch stainless steel nut with back and front ferrules onto the tube. Insert the tube, ferrules, and nut onto the NCT fitting.

12 Tighten the nut finger-tight, then, using two wrenches against each other to avoid twisting the inlet tube, tighten the nut an additional 1/2- to 3/4-turn.

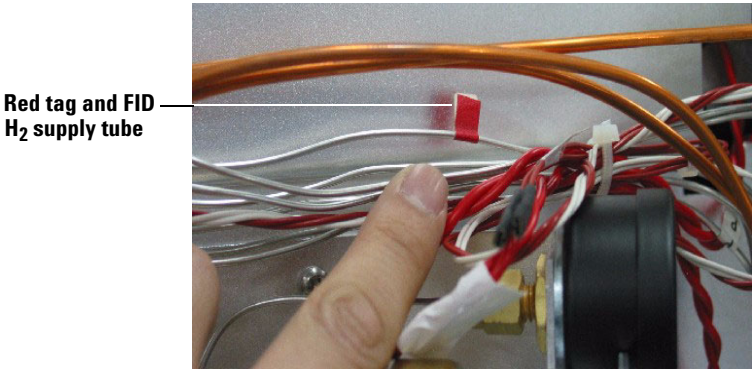
13 Install the Porapak Q column between the gas sample valve fitting on the inlet side of the oven and the NCT inlet tube on the detector side of the oven.

Connecting the NCT Hydrogen Supply Tube

WARNING **Hydrogen (H_2) is both flammable and an explosion hazard when mixed with air in an enclosed space (for example, the oven). In any application using H_2, turn off the supply at its source before working on the instrument.**

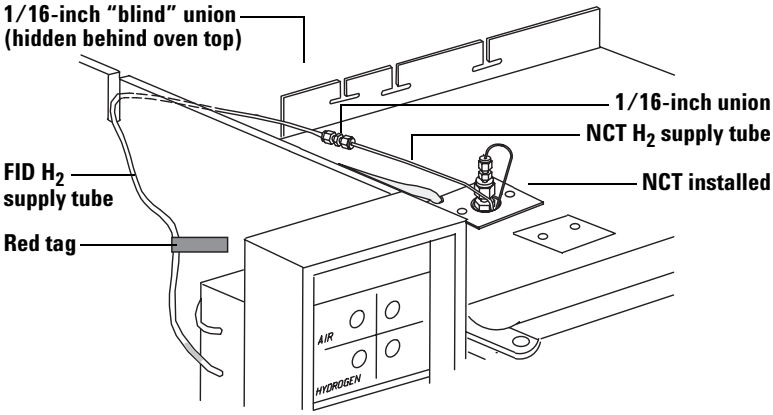
1 At the top of the oven, route the NCT hydrogen supply tube to the area behind the oven top.

2 Verify hydrogen is switched off at its source. Precisely identify the tube used for hydrogen. Starting from the selected FID flow control manifold block, look for a red tag on one of the 3 tubes connected to the block. The tag identifies the hydrogen tube for the given FID.



3 Carefully follow the identified tube into the area behind the oven top and choose a location to cut the tube about midway along its length behind the oven top. Make sure there will be enough free tubing from the FID flow manifold block to easily join to the NCT hydrogen supply tube (step 1). Route the

tubes as needed to be sure they can be joined after the cut is made.



4 Carefully cut the tube such that the end of each resulting portion is open, round, and free of burrs and surface scratches which might prevent proper flow and/or might create leak paths.

5 For the next three steps, if necessary, refer to your *Getting Started* manual for proper swage techniques. Also, in making the described connections, use two wrenches against each other to avoid twisting the tubing:

   a For the tube portion leading to the FID, connect it with a "blind" tube (plugged, part number 07680-81150) by a 1/16-inch union to completely seal the tube.

   b For the tube portion leading from the FID flow manifold block, install a 1/16-inch swage nut, back ferrule, front ferrule, and normal union.

   c Finally, connect the NCT hydrogen supply tube to the union: install a 1/16-inch swage nut, back ferrule, and front ferrule onto the tube, then tighten the assembly into the union.

6 As needed, use cable ties to secure tubing to existing wiring and tubing running behind the oven top.

Restoring the GC to Operating Condition

1. Restore gas supplies and, following leak test procedures described in your *Maintenance and Troubleshooting* manual, check for leaks, particularly at all new connections.
2. Reinstall GC covers and panels.
3. Restore electrical power.
4. Switch off electrical power, then switch it on again to ensure the new configuration is properly retained in GC memory.
5. See your *Operation* manual with respect to properly reconfiguring the GC for the installed NCT.
6. Verify performance by following procedures described in your *Maintenance and Service* manual.

Repacking the Catalyst

The nickel catalyst material can be damaged by exposure to air. If conversion performance becomes significantly degraded, repack the catalyst tube following directions found in your *Maintenance and Service* manual.

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Notices

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Shanghai, 200131 P. R. China

Safety Notices

CAUTION

A **CAUTION** notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a **CAUTION** notice until the indicated conditions are fully understood and met.

WARNING

A WARNING notice denotes a hazard. It calls attention to an operating procedure, practice, or the like that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING notice until the indicated conditions are fully understood and met.

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