Thermo Scientific

On-Column Injector System

For TRACE 1300/TRACE 1310 Gas Chromatographs

User Guide

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On-Column Injector System (OCI) User Guide

This guide provides the instructions for installing and operating with the On-Column injector (OCI) system for TRACE 1300/TRACE 1310 GC.

Contents

- Introduction
- Auxiliary Gas Module Overview
- Aux Temperature/Cryo Module Overview
- Gas Requirements
- OCI Injection Techniques
- Gas Requirements
- Installing the On-Column Injector System
- Checkout with the On-Column Module

Introduction

The On-Column Injector (OCI) Module is shown in Figure 1.

Figure 1. On-Column Injector Module

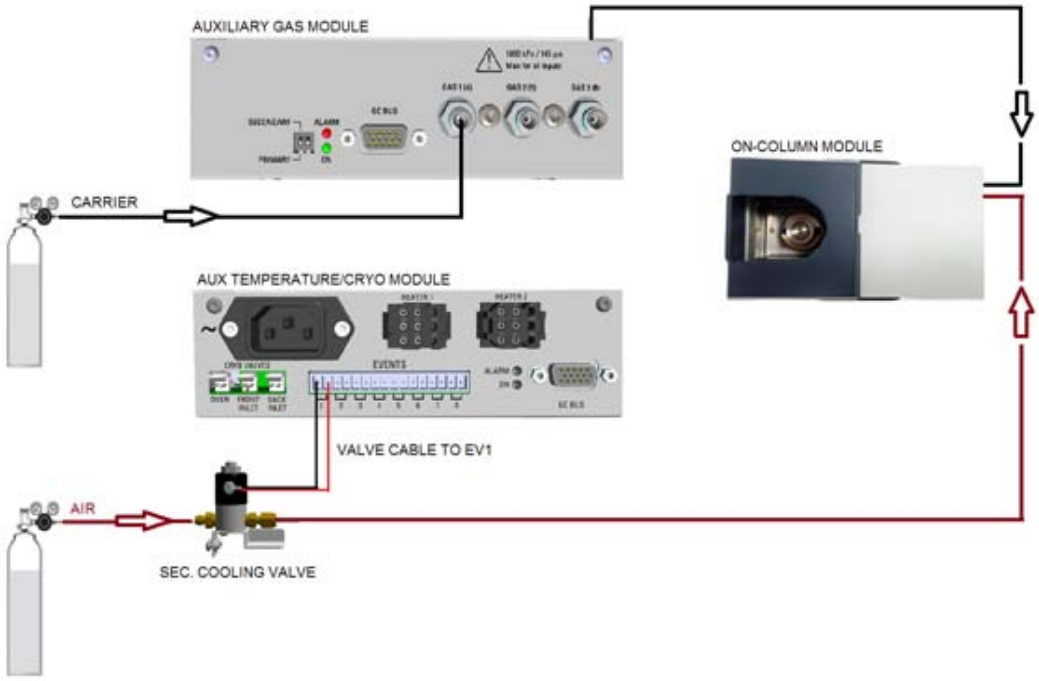
The OCI module can be installed on the front or on the back position into the injector housing of the TRACE 1300/TRACE 1310 GC.

The OCI module includes the injector body and the primary cooling fan. See "Primary Cooling System" on page 5. The control of the **carrier gas** is carried out by the **Auxiliary Gas Module** while the actuation of the secondary cooling (see "Secondary Cooling System" on page 5) is carried out by the **Temperature/Cryo module** through the solenoid valves (24 V, 2 W max) used for the activation of external events. See Figure 2.

Figure 2. Auxiliary Gas Module and Aux Temperature/Cryo Module

Figure 3 shows the assembling of the On-Column injector system.

Figure 3. On-Column Injector System Assembling.

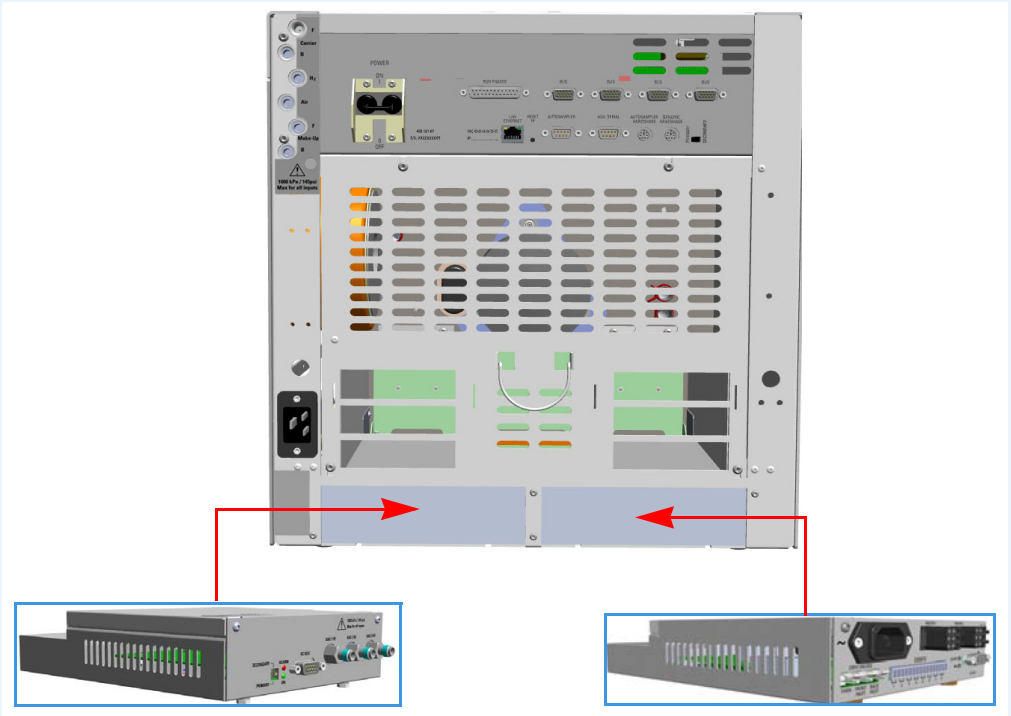


You can install two OCI modules simultaneously. In this case you need:

- a second Secondary Cooling Valve for supplying the air to the second On-Column module. The valve cable must be connected to the event EV2.
- a carrier line AUX GAS 2 for supplying the carrier to the second On-Column module.

Note For convenience, we suggest to install the Auxiliary Gases Module and the Aux Temperature/Cryo Module respectively into the **left** and **right** external module housings located in the back part of the GC. See Figure 4.

Figure 4. External Module Housing



If a housing or both are already busy by other external modules, place the Aux Gases module and/or the Aux Temperature/Cryo module near the GC, in this case the path of the pneumatic and electrical connection may change.

Related topics:

- OCI Module Overview
- "Auxiliary Gas Module Overview" on page 8
- "Aux Temperature/Cryo Module Overview" on page 8

OCI Module Overview

With the on-column injector, you use a syringe to inject a liquid sample directly into the capillary column. The upper part of the injector has a needle guide and a **Merlin Microseal™ High Pressure Valve**. The lower part attaches to the top of the column oven. See Figure 5.

Figure 5. On-Column Injector

IMPORTANT For 0.25 mm or 0.32 mm i.d. column, the 0.53 mm i.d. pre-column must be used. Use the syringe needle gauge 26S, 85 mm length for automatic injections.

The use of the syringe needle 54 mm length is also compatible; in this case a post-injection dwell time of at least 10 seconds is required.

Primary Cooling System

The injection block is kept at ambient temperature by the primary cooling system, which maintains a permanent air flow across the injector body through a special cooling fan.

Secondary Cooling System

A gas stream surrounds the area around the column at the injection point. This gas is normally compressed air (400 kPa inlet pressure). The *secondary cooling* flow keeps the injection zone at a temperature below the solvent boiling point, even when the oven runs at a higher temperature. Elevated oven temperature helps eliminate peak distortion in the chromatogram caused by *flooding effects*.[1]

The secondary cooling system ensures complete and effective sample transfer from the syringe to the column and improves reproducibility. Secondary cooling activates immediately before an injection and remains on after the injection until all of the injected solvent has vaporized.

[1] Journal of Chromatography, 279 (1983) 241–250.

The *secondary cooling time*, which is the duration of secondary cooling during a run, depends on the oven temperature, the volatility of the solvent, and the amount injected, but is normally in the range of 2-3 minutes of pre-injection time to allow the secondary cooling to establish a cold injection zone, and 10-20 seconds of post-injection time. You program the parameters for secondary cooling as timed events through the **Run Table**. Refer to the *TRACE 1300/TRACE 1310 GC User Guide*.

OCI Injection Techniques

On-column injection is the direct, cold injection of a liquid sample into the column at a point within the column oven and under oven temperature control. The oven temperature determines the actual injection temperature. The injector itself is unheated and serves only for inserting the syringe needle into the column without de-pressurizing the column.

Cold on-column injection has a number of advantages over the more traditional hot vaporization techniques, from both a qualitative and quantitative viewpoint. Cold injection prevents losses and changes caused by thermal degradation of components in a hot injector. Direct injection without a hot injector vaporization step avoids heavy component discrimination in the syringe needle. When a sample is injected, a plug of liquid forms in the capillary column. This plug of liquid, if uncontrolled, can cause peak distortion. A *flooding effect* occurs when the column's inlet portion floods with liquid sample, up to several meters. You can prevent this effect and maintain perfect peak shapes by carefully controlling the oven temperature during the injection. Oven temperatures of about 20 °C above the solvent boiling point hasten the vaporization of the liquid sample in the column and thus, prevent flooding effects. When using slightly elevated oven temperatures, secondary cooling must be used to control flooding.

Retention Gaps/Pre-Columns

The term *retention gap* refers to an initial part of the column or pre-column that has a much lower retention than the analytical column. A pre-column is a length of fused silica tubing, usually uncoated, connected between the injector and the analytical column. A pre-column protects the analytical column from particulate material (dirt) injected with the sample. A pre-column, when uncoated, can also function as a retention gap.

We recommend using an uncoated length of pre-column in on-column injection for a number of reasons:

- It protects the analytical column from dirt present in the sample. The effect of dirty samples is magnified in on-column injection because the sample is injected directly into the column system.
- It can function as a retention gap. Uncoated retention gaps can tolerate the presence of liquid flooding through them (the flooding effect). Using a retention gap of fused silica limits the flooded zone to a part of the column where chromatography does not take place.

Solvent vaporization takes place within the uncoated retention gap so liquid sample does not reach the analytical column. This eliminates peak distortion due to flooding. Injection can take place at oven temperatures below the solvent boiling point, if necessary.

- Wide-bore retention gaps allow fully-automated on-column injection in small diameter capillary columns using an autosampler.

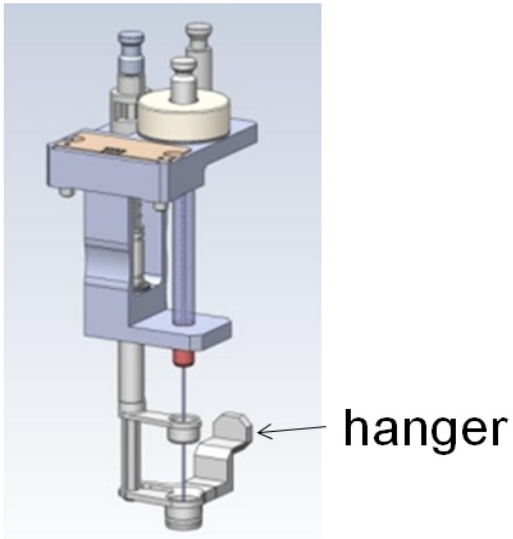
Note Flooding can also occur during splitless injection, especially with injection volumes greater than 1 µL. The use of retention gaps helps control flooding effects in splitless injection.

For optimal cold on-column injection performance, do not start rapidly programming the oven temperature until the solvent vaporization is complete. The sample is injected with the oven temperature below or, with secondary cooling, moderately above the solvent boiling point using a syringe with a needle gauge 23S, 54 mm length.

Manual and Automatic Injections

The manual and automatic injections do not require any actuator. If the automatic injections are carried out through the TriPlus RSH sampler, the hanger mounted on the syringe tool must be removed. See Figure 6.

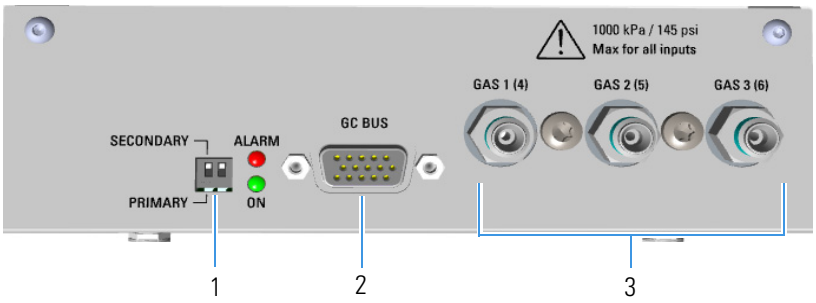
Figure 6. Hanger



Auxiliary Gas Module Overview

The **Auxiliary Gas Module** includes the following connections. See Figure 7

Figure 7. Auxiliary Gas Module Connections

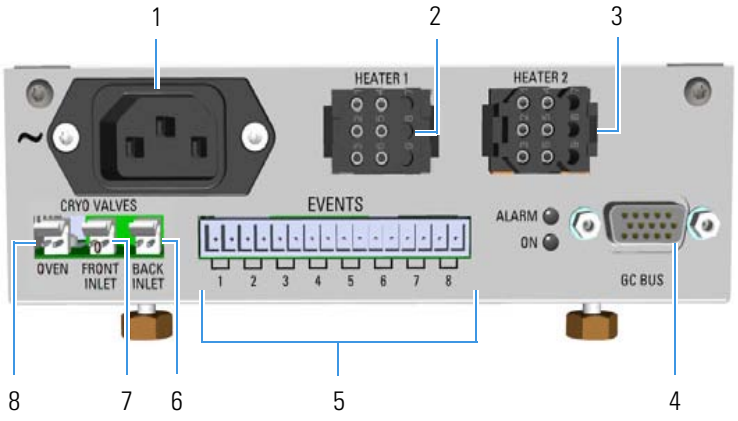


1. Switch marked **Primary/Secondary** used to set two Auxiliary Gas modules simultaneously present, one as Primary, and the other as Secondary. The primary module controls the aux pressures from 1 to 3, while the secondary module controls the aux pressures from 4 to 6. See also the point 3.
2. 15-pin female connectors marked **Bus** for the communication with the GC.
3. Three inlets ports marked **Gas 1 (4)**, **Gas 2 (5)**, and **Gas 3 (6)** for the connection up to three auxiliary carrier gases. If two modules are present, up to six auxiliary carrier gases can be connected. See also the point 1.

Aux Temperature/Cryo Module Overview

The **Aux Temperature/Cryo Module** includes the following connections. See Figure 8.

Figure 8. Aux Temperature/Cryo Module Connections



1. AC input connector.
   The module has a power rating of 120/230 Vac; 50/60 Hz; 355 VA.
2. A 6-pin connector marked **Heater 1** for the connection of the transfer line of a mass spectrometer.

3. A 6-pin connector marked **Heater 2** for the connection of the transfer line of a second mass spectrometer.
4. 15-pin female connectors marked **Bus** for the communication with the GC.
5. A 16-pin connector marked **Events** for the connection of **eight** external solenoid valves (24 V, 2 W max). The valves can be programmed individually during the running of the instrument.
6. A 2-pin connector marked **Back Inlet** for the connection of the solenoid valves for the back PTV/PTVBKF cryogenic system.
7. A 2-pin connector marked **Front Inlet** for the connection of the solenoid valves for the back PTV/PTVBKF cryogenic system.
8. A 2-pin connector marked **Oven** for the connection of the solenoid valves for the Oven cryogenic system.

Four protecting fuses are present inside the module. See Table 1.

Table 1. Aux Temperature/Cryo Module Protecting Fuses

Fuse	Type	Protections
F1	F2A 250V; (5 x 20 mm)	Heater 1
F2	F2A 250V; (5 x 20 mm)	Heater 2
F3	T2A 250V; (5 x 20 mm)	24 V
F4	F1.6A 250V; (5 x 20 mm)	24 V solenoid valves

Gas Requirements

The gases used with the instrument are Helium, Nitrogen, Air, Argon, and Argon/Methane. Other gases are rarely used. You will need a supply of ultra-high purity GC gases.

Note Air used for the activation of the secondary cooling valve could be a non ultra-high purity GC gas but must be oil free.

WARNING Before using gases, carefully read the hazard indications and information reported in the Safety Sheet supplied by the manufacturer referring to the CAS (Chemical Abstract Service) number. It is the user's responsibility to see that all local safety regulations for the use of gases are obeyed.

WARNING All Thermo Fisher Scientific gas chromatographs normally uses an inert gas as carrier gas. If you wish to use hydrogen as a carrier gas, the hydrogen sensor must be installed. Contact a Thermo Fisher Scientific sales representative if you plan to use hydrogen as the carrier gas in your new TRACE 1300/TRACE 1310 GC. If you don't have the hydrogen sensor, you must use an inert carrier gas. Refer to the section **Using Hydrogen with TRACE 1300/TRACE 1310** in the *TRACE 1300/TRACE 1310 GC User Guide*. for details.

CAUTION Secure gas cylinders to an immovable structure or wall. Handle all gases according to local safety regulations.

Do not place gas tanks in the path of the TRACE 1300/TRACE 1310 GC oven exhaust.

WARNING When using hydrogen, be aware that it can flow into the oven and create a fire hazard. Turn off the supply until the GC column is in the inlet. Whenever you use hydrogen, it is critical to test all connections, lines, and valves for leaks before using the instrument. When performing maintenance, be sure to turn off the hydrogen supply.

Installing the On-Column Injector System

This section provides instructions for installing the Auxiliary gas module, the Aux Temperature/Cryo module, the secondary cooling valve, and the OCI injector module on your TRACE 1300/1310 GC.

WARNING This operation must be carried out by authorized and trained Thermo Fisher Scientific Service Field Engineers.

Preliminary Operations

Before starting, the following preliminary operation must be carried out.

1. Put the GC in standby condition.
2. Cool the oven, injectors and detectors to room temperature.
3. Power off the GC.
   a. Push down the power switch (breaker), located at the back of the instrument, to the position O.
   b. Unplug the power cable from the AC Input connector into the back of the GC and from the wall outlet.

CAUTION If the GC is coupled to a TRACE 1310 Auxiliary Oven, unplug the power cable from the AC Input connector into the back of the TRACE 1310 Auxiliary Oven and from the wall outlet.

4. If external modules are present, unplug the power cable from the AC Input connector of each external module, and from the wall outlet.

Getting Started

For properly installing the OCI module system see the following sections:

- "Removing the GC Top Cover" on page 11
- "Removing the GC Left Side Panel" on page 13
- "Removing the GC Right Side Panel" on page 14
- "Removing the GC Back Cover" on page 15
- "Installing the Auxiliary Gas Module" on page 16
- "Installing the Aux Temperature/Cryo Module" on page 20
- "Installing the Secondary Cooling Valve" on page 22
- "Installing the On-Column Injector Module" on page 25
- "Connecting the Supply Gas to the Auxiliary Gas Module" on page 26
- "Connecting the Secondary Cooling and Aux 1 Line to the On-Column Module" on page 27
- "Performing the Electrical Connections" on page 27
- "Replace Panels and Covers" on page 29
- "Installing the Capillary Column to the OCI Injector" on page 29
- "Configuring and Setting the On-Column Module" on page 30

Removing the GC Top Cover

Perform this operation for accessing the internal compartments of the GC.

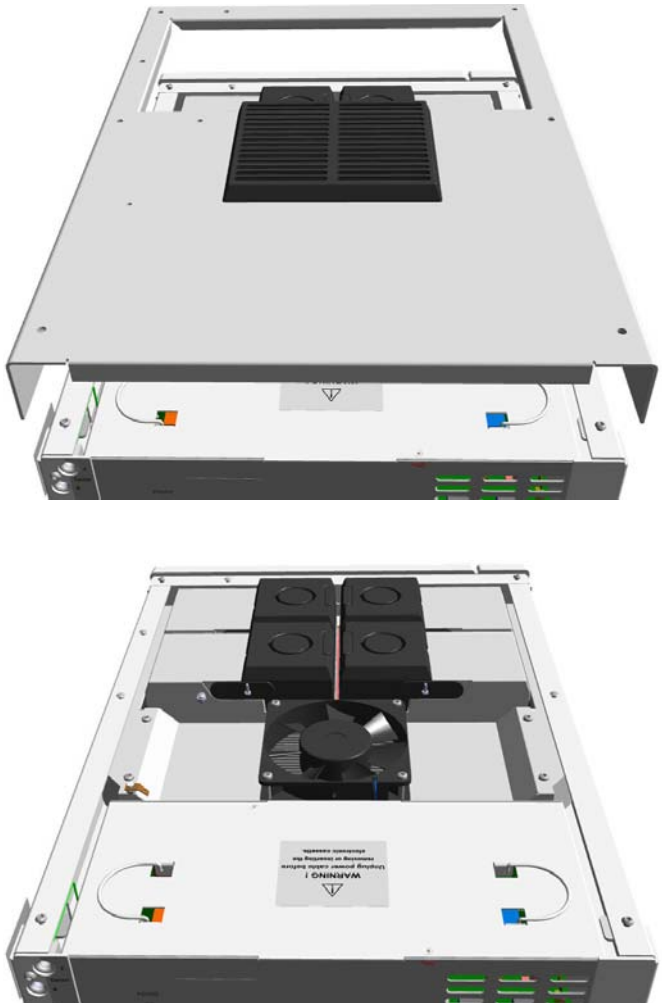
❖ **To remove the top cover accessing the top parts of the GC**

1. Using a T20 Torxhead screwdriver, unscrew the four screws that held it in place. See Figure 9.

Figure 9. Top Cover Removal (1)

2. Lift the top panel up and off the GC. See Figure 10.

Figure 10. Top Cover Removal (2)

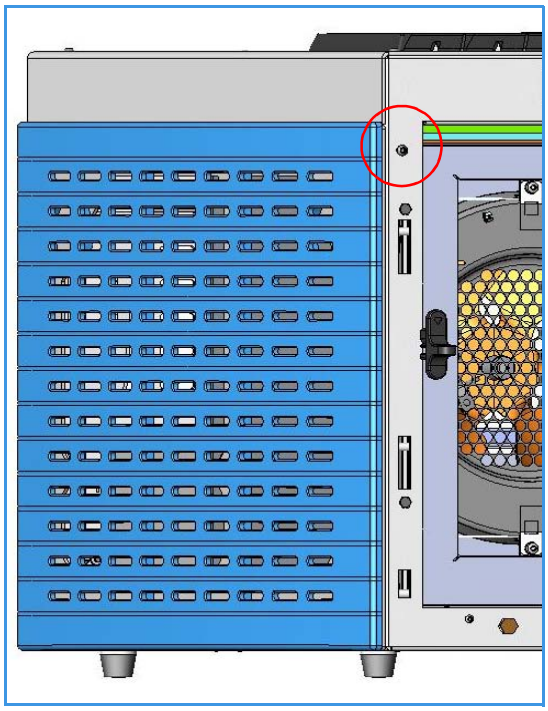


Removing the GC Left Side Panel

❖ **To remove the left side panel with the side panel molded of the GC**

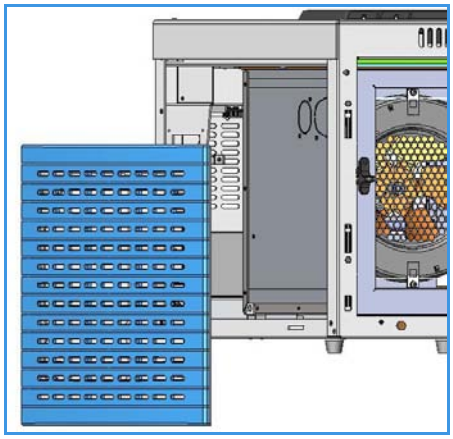
1. Open the front door of the GC. Using a T20 Torxhead screwdriver, unscrew the left side panel screw from the interior front panel. See Figure 11.

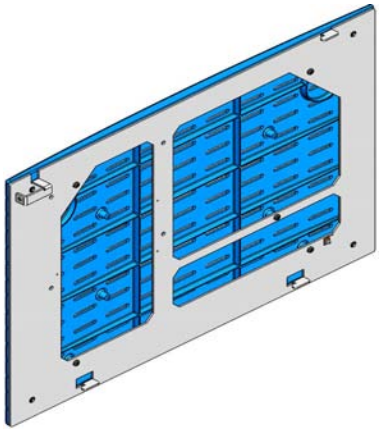
Figure 11. Left Side Panel Fixing Screw



2. Slide the panel towards the back of the instrument up to the stop.
3. Remove the panel pulling it outwards being aware that the ground wire is attached to the panel. See Figure 12.

Figure 12. Left Panel Removal





4. Unplug the ground wire from the panel.

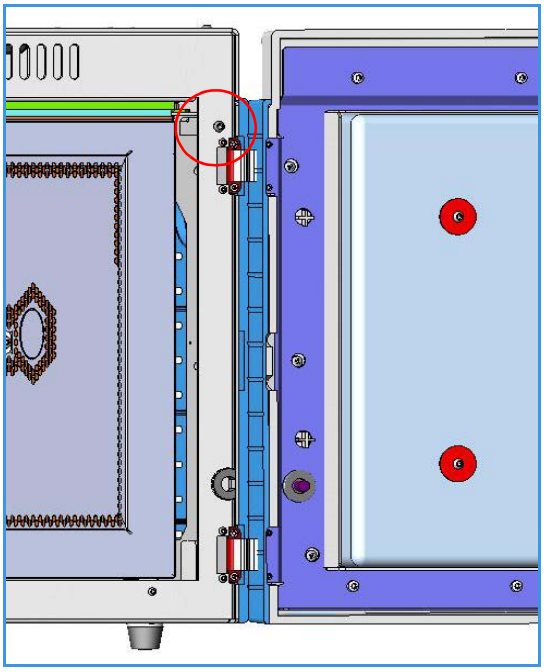
Note Pay attention to the positioning of the ground wire plug, so it can be reconnected in the same way it was removed.

Removing the GC Right Side Panel

❖ **To remove the right side panel with the side panel molded of the GC**

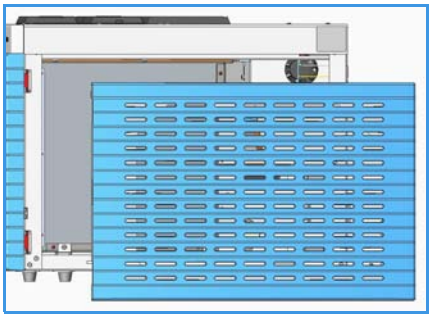
1. Open the front door of the GC. Using a T20 Torxhead screwdriver, unscrew the right side panel screw from the interior front panel. See Figure 13.

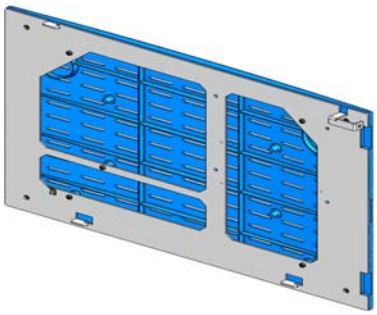
Figure 13. Right Panel Fixing Screw



2. Slide the panel towards the back of the instrument up to the stop.
3. Remove the panel pulling it outwards being aware that the ground wire is attached to the panel. See Figure 14.

Figure 14. Right Panel Removal





4. Unplug the ground wire from the panel.

> **Note** Pay attention to the positioning of the ground wire plug, so it can be reconnected in the same way it was removed.

5. Replace the panel.
   a. Plug the ground wire to the panel.
   b. Reinstall the panel proceeding in the reverse order in which it was removed.

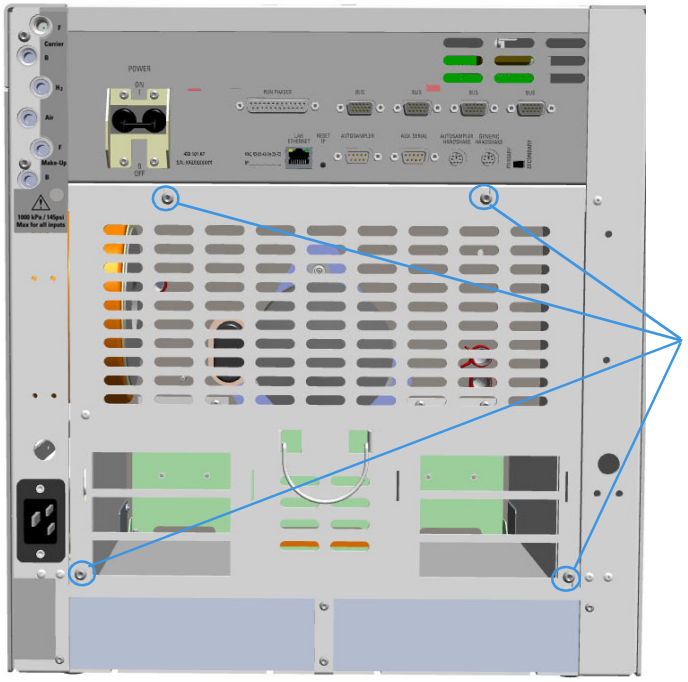
Removing the GC Back Cover

Remove the back cover for accessing the compartment on the back of the GC.

❖ To remove the back cover

1. Using a T20 Torxhead screwdriver, unscrew the four screws that secure the back cover to the GC. See Figure 15.

Figure 15. Back Cover Removal



2. Lift the cover off using the cover handle. Be aware that the ground wire is attached to the back cover.

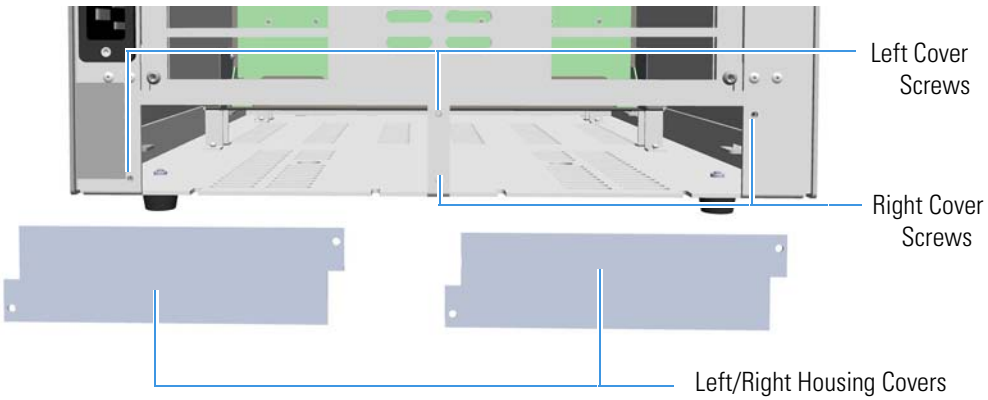
> **Note** Pay attention to the positioning of the ground wire plug, so it can be reconnected in the same way it was removed.

Installing the Auxiliary Gas Module

❖ To install the Auxiliary Gas Module

1. Remove the cover of the external modules housing where installing the module. See Figure 16.

Figure 16. Housing Cover Removal



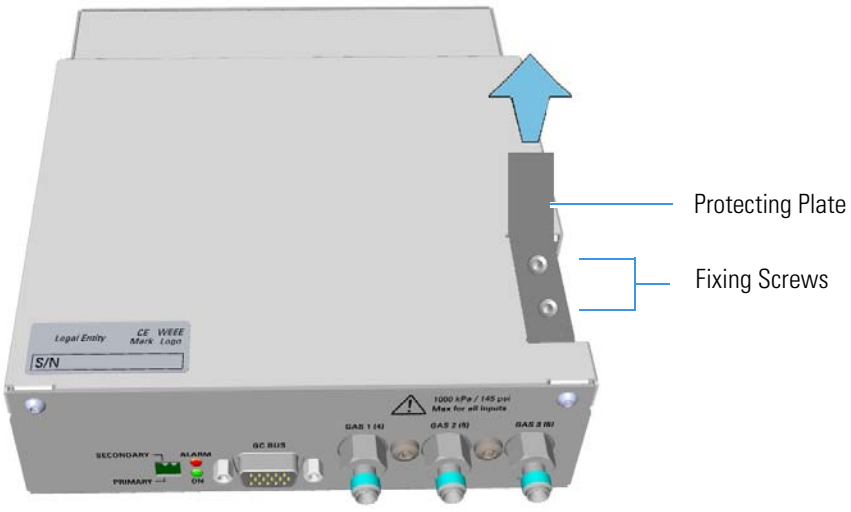
   a. Using a T20 Torxhead screwdriver, unscrew and remove the left or right housing cover screws.

   b. Remove the cover from the housing.

2. Remove the manifold protecting plate

   a. Using a T20 Torxhead screwdriver, unscrew the two fixing screws, and remove the protecting plate from the manifold. Save the protecting plate and the fixing screws.

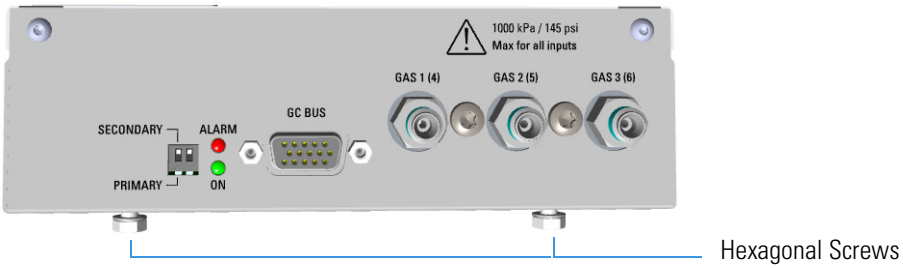
Figure 17. Manifold Protecting Plate



3. Install the module into the housing

   a. Loosen the two hexagonal screws under the module. See Figure 18.

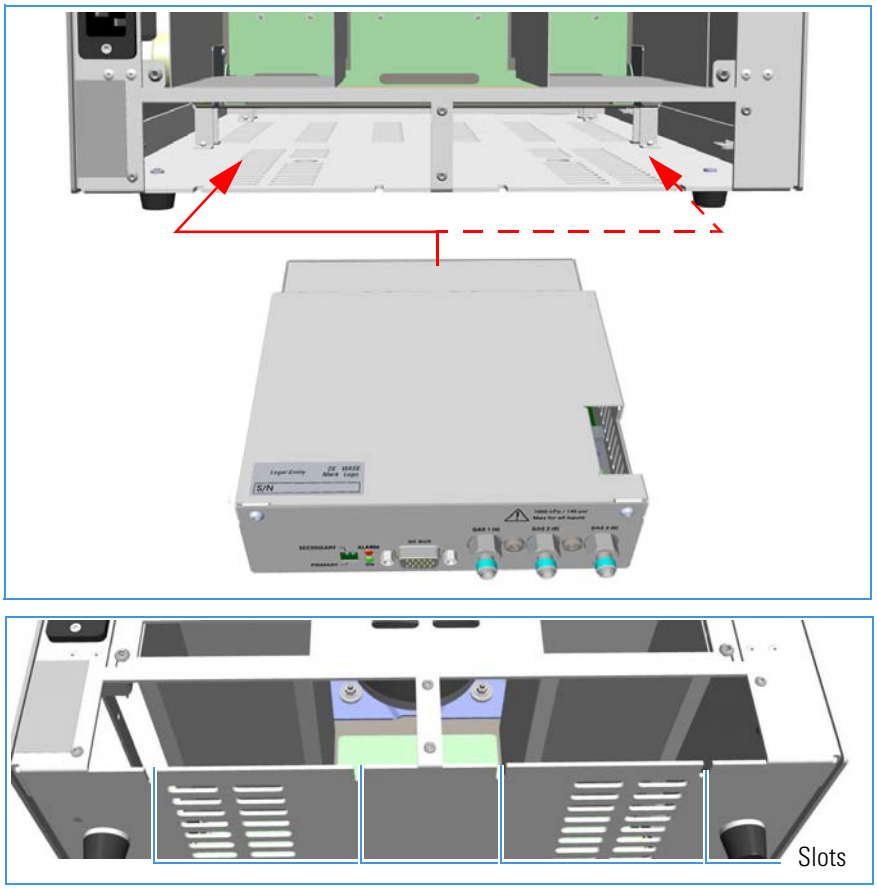
Figure 18. Module Installation (1)



b. Carefully place the module into the left housing. If it is busy by another external module, install the module into the **right** housing.

c. Push the module until the hexagonal screws couple with the slots on the floor of the GC. See Figure 19.

Figure 19. Module Installation (2)

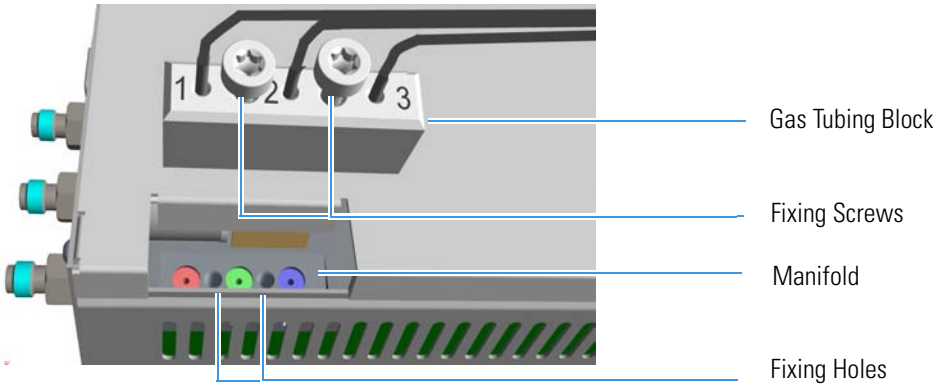


d. Finger-tighten the hexagonal screws slightly, or use a 10-mm wrench.

Note Always keep the hexagonal screws in their place. This allows you an easier removal of the auxiliary module when necessary.

4. Verify that the three brown O-rings are present on the manifold, then connect the gas tubing block to the manifold. Figure 20 shows the gas tubing block and the manifold located into the auxiliary gas module.

Figure 20. Gas Tubing Block and Manifold



a. Carefully guide the gas tubing block on the manifold located into the auxiliary gas module. See Figure 21 if the module is installed on the left, or Figure 22 if the module is installed on the right.

Figure 21. Installation on the Left Side

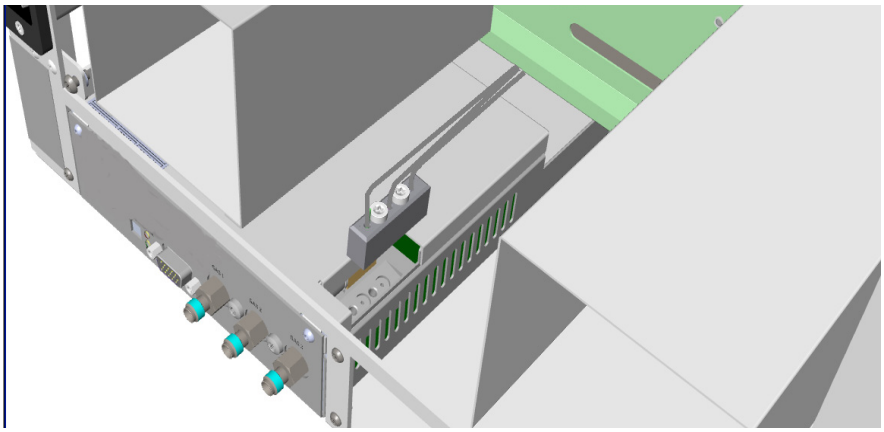
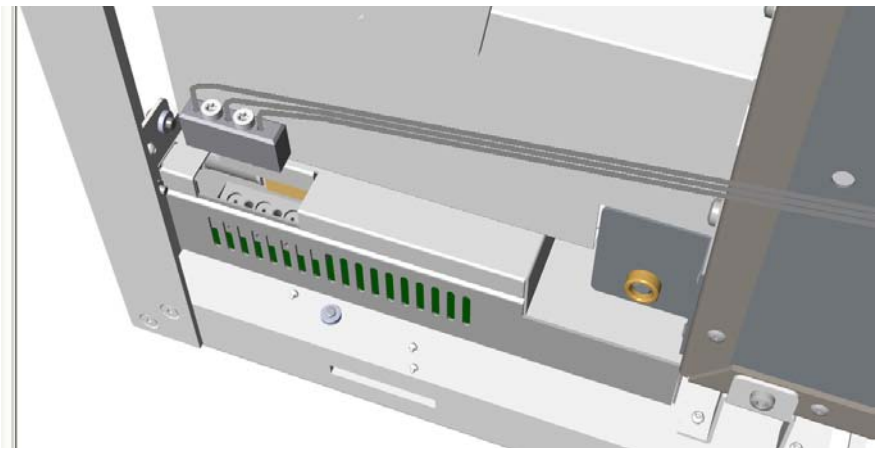


Figure 22. Installation on the Right Side



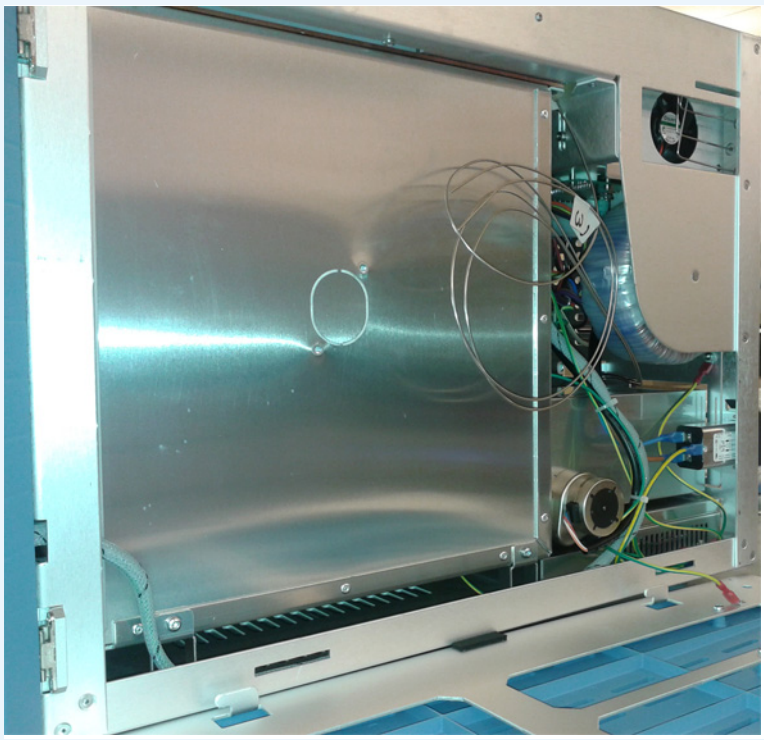
b. Align the fixing screws of the gas tubing block with the corresponding holes on the manifold.

c. Use the T20 Torxhead screwdriver to tighten the two fixing screws without overtightening.

5. .Guide the three gas tubings up to reach the injector module housing on the top of the GC.

Note The three gas tubings coming from the Auxiliary Gas module must be located on the Left side of oven and only **Aux 1** line will be used to supply carrier to the On-Column module.

Figure 23. Gas Tubings Path



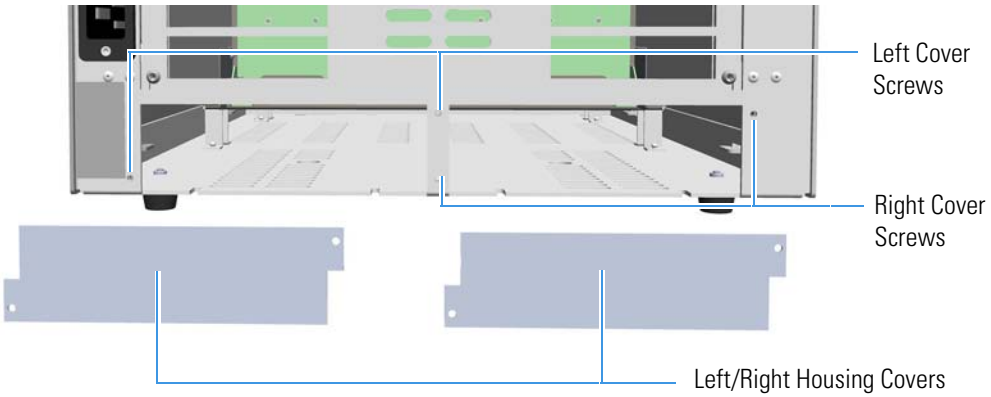
If two On-Column modules are installed, consider also the **Aux 2** line.

Installing the Aux Temperature/Cryo Module

❖ To install the Aux Temperature/Cryo Module

1. Remove the cover of the external modules housing where installing the module. See Figure 24.

Figure 24. Housing Cover Removal



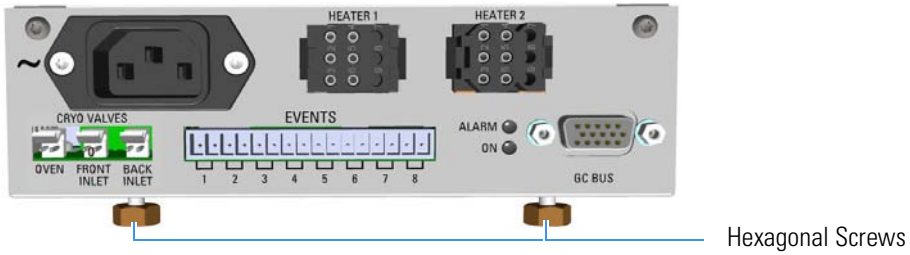
   a. Using a T20 Torxhead screwdriver, unscrew and remove the left or right housing cover screws.

   b. Remove the covers from the housing.

2. Install the module into the housing

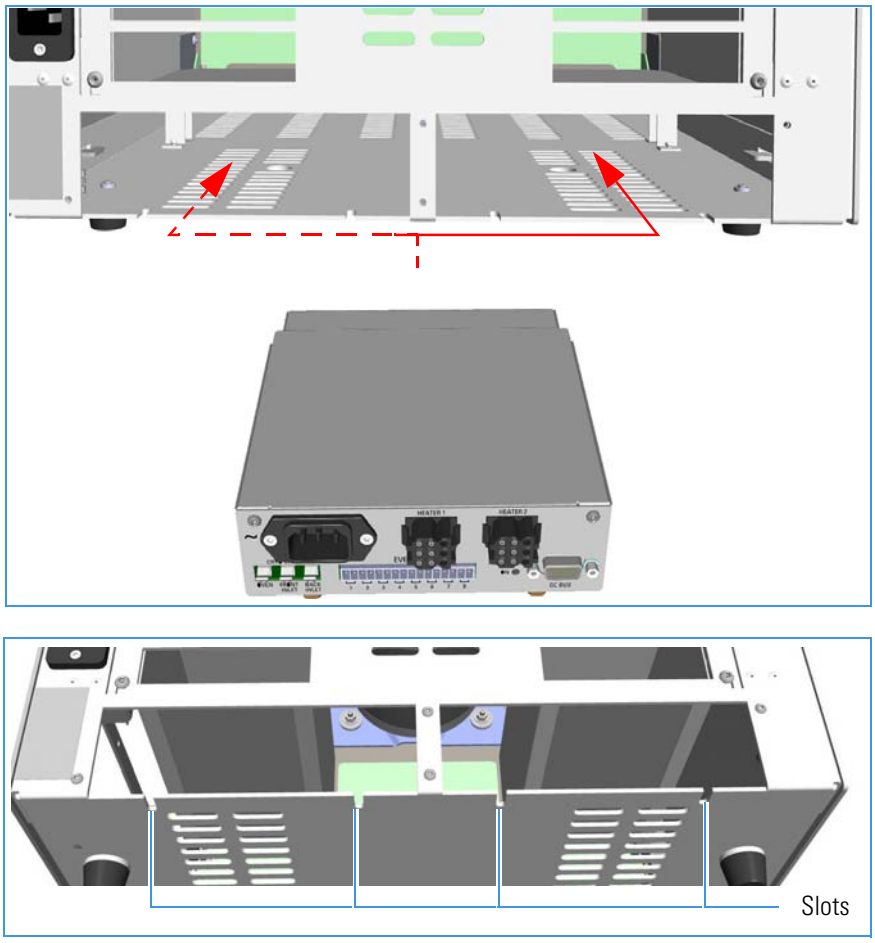
   a. Loosen the two hexagonal screws under the module. See Figure 25.

Figure 25. Module Installation (1)



   b. Place the module into the left or right housing until the hexagonal screws couple the slots on the floor of the GC. See Figure 26.

Figure 26. Module Installation (2)



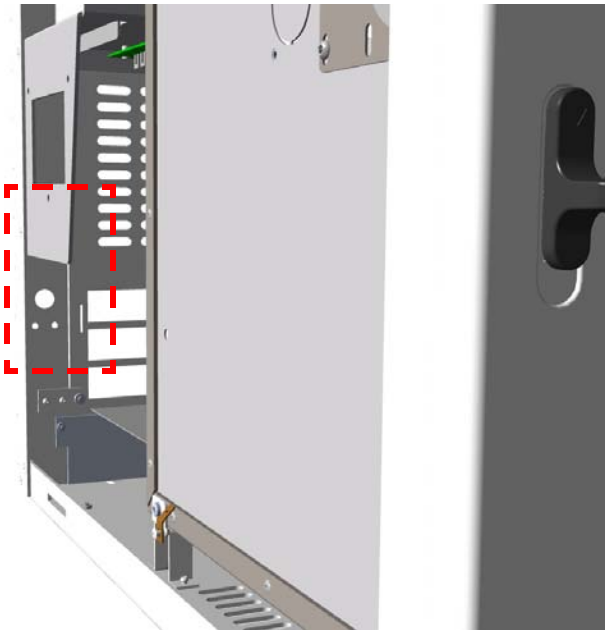
c. Finger-tighten the hexagonal screws slightly, or using a 10-mm wrench.

Note Always keep the hexagonal screws in their place. This allows you an easier removal of the auxiliary module when necessary.

Installing the Secondary Cooling Valve

The secondary cooling solenoid valve must be installed in the proper seat on the back of the GC. See Figure 27.

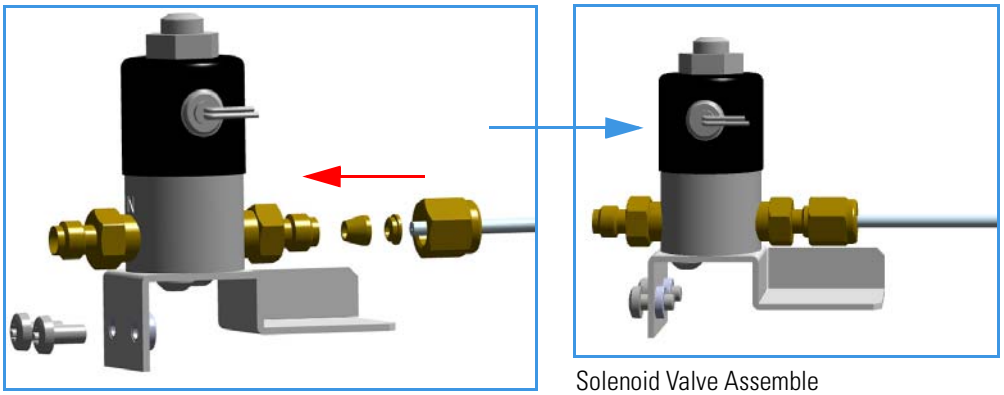
Figure 27. Secondary Cooling Valve Assembly Seat



❖ **To install the secondary cooling valve**

1. With care, take the solenoid valve assembly and remove the two screws from the brackets using a T15 Torxhead screwdriver. These screws are used to fix the bracket on the GC.
2. If not already done, connect the secondary cooling tubing to the solenoid valve using the proper nut and ferrule. Use a 7/16-in. wrench for tightening the fittings. See Figure 28.

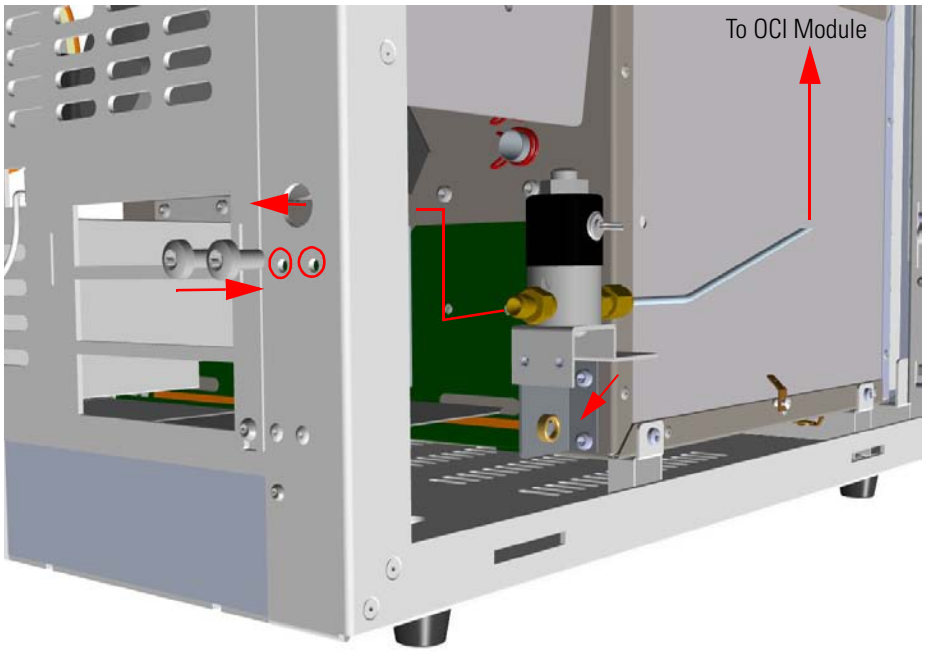
Figure 28. Solenoid Valve Assembly



Solenoid Valve Assemble

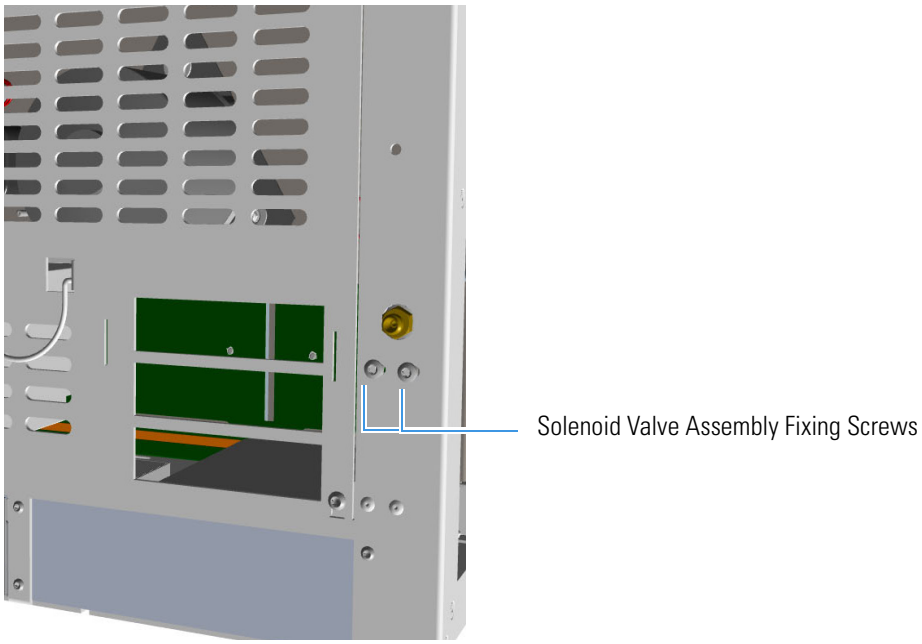
3. Guide the solenoid valve assembly into its seat on the back of the GC, and the secondary cooling tubing up to reach the injector module housing on the top of the GC. See Figure 29.

Figure 29. Installation of the Solenoid Valve Assembly



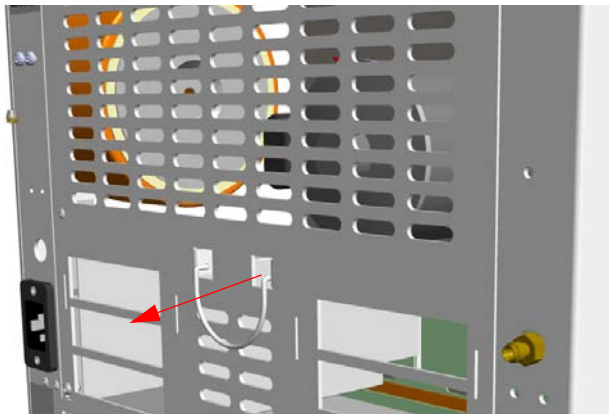
4. Fix the solenoid valve assembly to the back of the GC using the two fixing screws previously removed. See Figure 30.

Figure 30. Solenoid Valve Assemble Fixing



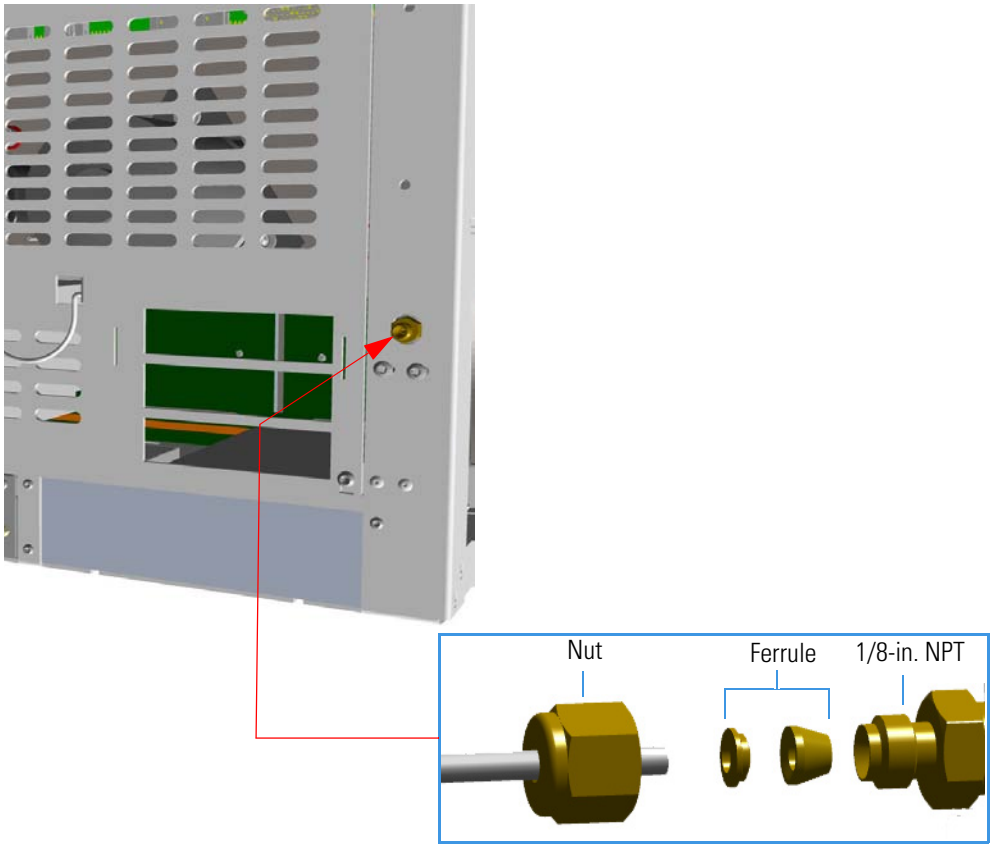
5. Guide the cable of the secondary cooling valve through the slot in the centre of the back panel. See Figure 31.

Figure 31. Solenoid Valve Cable Connection



6. Connect the proper end of the air supply tube to the 1/8-in. NPT connection of the solenoid valve using the proper nut and ferrule. Use a 7/16-in. wrench for tightening the fittings. See Figure 32.

Figure 32. Air Supply Tube Connection



Installing the On-Column Injector Module

❖ To install the On-Column injector module

1. Remove the dummy module from the position where the On-Column injector module will be installed.

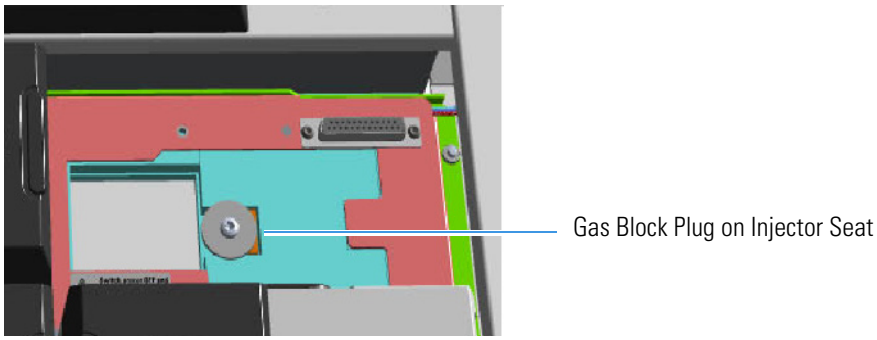
   a. Open the module flap cover.

   b. Using a T20 Torxhead screwdriver, unscrew and remove the two captive fixing screws.

   c. Keeping the dummy module flap cover open, lift up the module from its seat in the injector/detector housing. Place the dummy module on a clean surface.

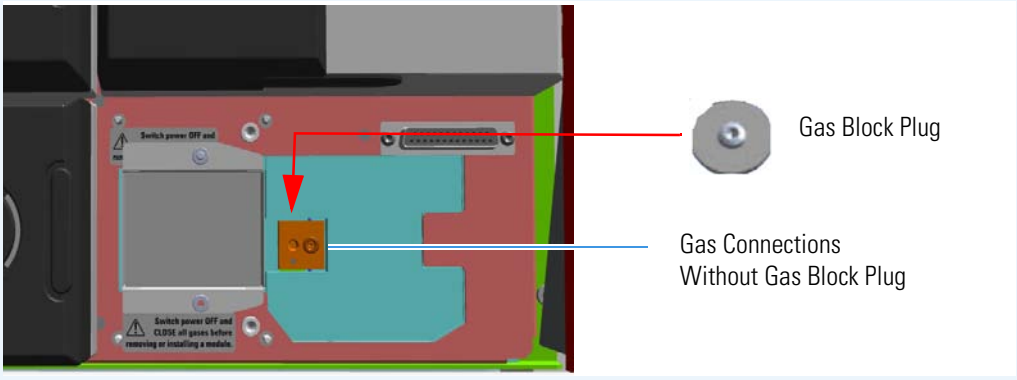
   d. DO NOT REMOVE the gas block plug from the gas connections. See Figure 33. The gas supply is done through the Auxiliary Gas module.

Figure 33. Injector Gas Block Plug



CAUTION In the case you are removing a real injector module instead of a dummy module, you must place and fix the gas block plug on the gas connections using a T20 Torxhead screwdriver. See Figure 34.

Figure 34. Injector Gas Block Plug (2)



2. Plug the On-Column injector module into the main frame.

   a. Open the module flap cover.

b. Keeping the module flap cover open, place the module in its seat.

c. Use a T20 Torxhead screwdriver to tighten the two captive fixing screws without overtightening.

ATTENTION To maintain the correct alignment the screws must be tightened in turn. Tighten each screw only a small amount before moving to the next screw. Repeat until all are secure.

d. Close the module flap cover.

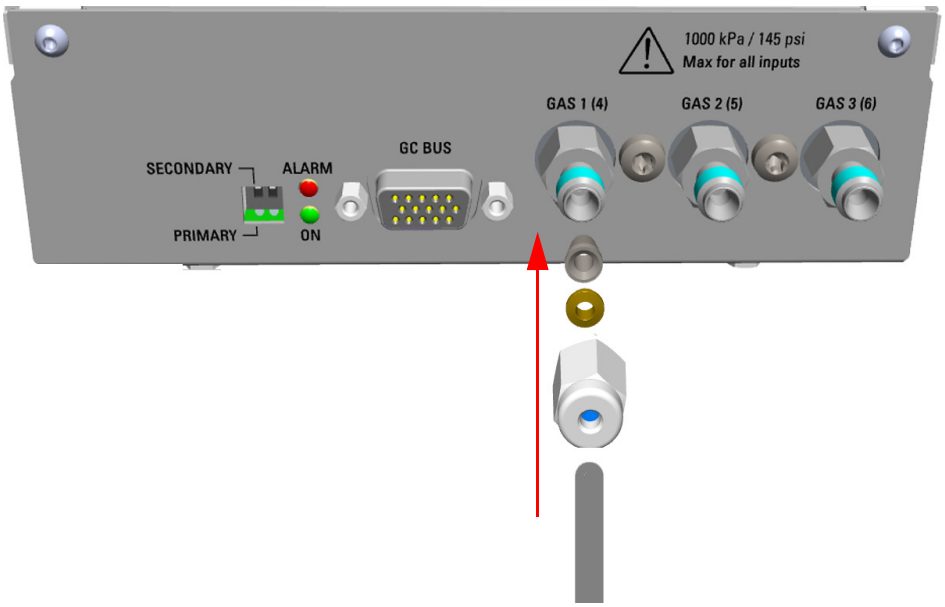
Connecting the Supply Gas to the Auxiliary Gas Module

❖ **To connect the supply gas to the auxiliary Gas Module**

Note Use the 1/8-in. Swagelok fittings provided on the gas inlet ports to connect the gas lines.

1. Connect the gas line to the corresponding inlet port of interest using the appropriate nut and ferrules. Use a 7/16-in. wrench for tightening the fittings. See Figure 35.

Figure 35. Gas Line Connection to the Auxiliary Gas Interface



IMPORTANT The maximum nominal inlet pressure for all the inputs is 1000 kPa (145 psig). The working inlet pressure range is from 400 kPa (58 psig) to 1000 kPa (145 psig).

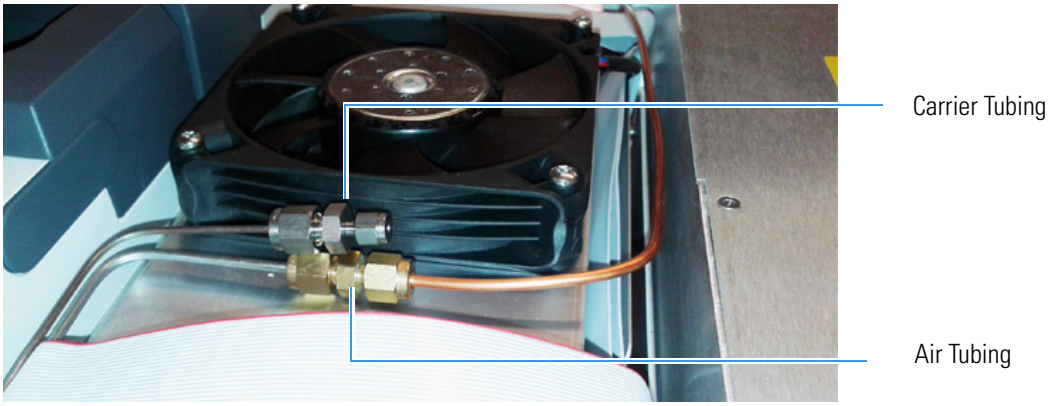
Connecting the Secondary Cooling and Aux 1 Line to the On-Column Module

❖ **To connect the secondary cooling and the aux 1 line to the On-Column module**

1. Connect the air supply coming from the secondary cooling valve to the cooling tubing on the On-Column module by using the union provided.
2. Connect the Aux 1tubing coming from the Auxiliary Gs Module to the carrier gas tubing on the On-Column module by using the union provided.

The result of the operation is shown in Figure 36.

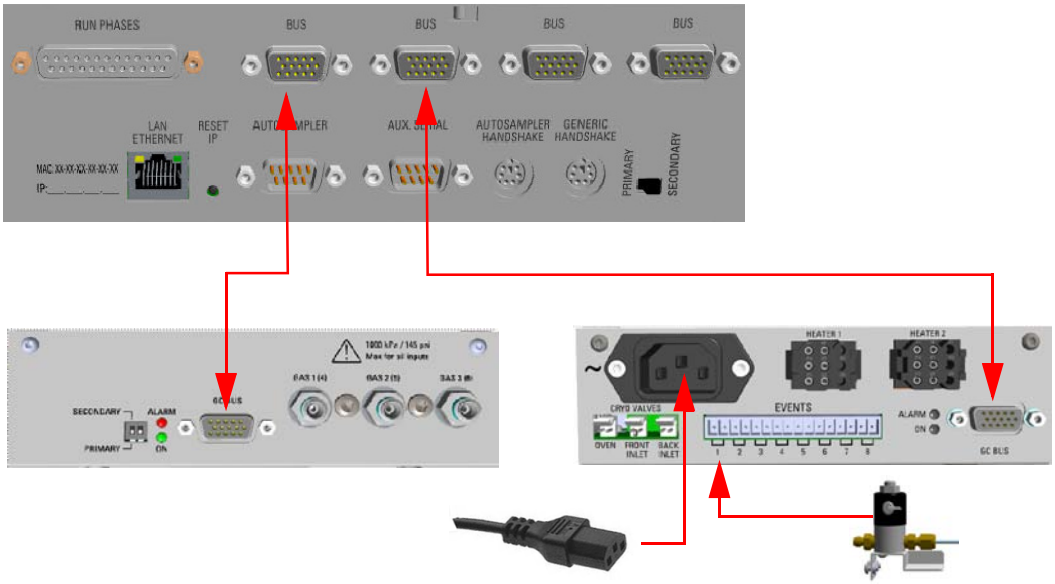
Figure 36. On-Column Module Pneumatic Connections



Performing the Electrical Connections

The electrical connections are schematically shown in Figure 37

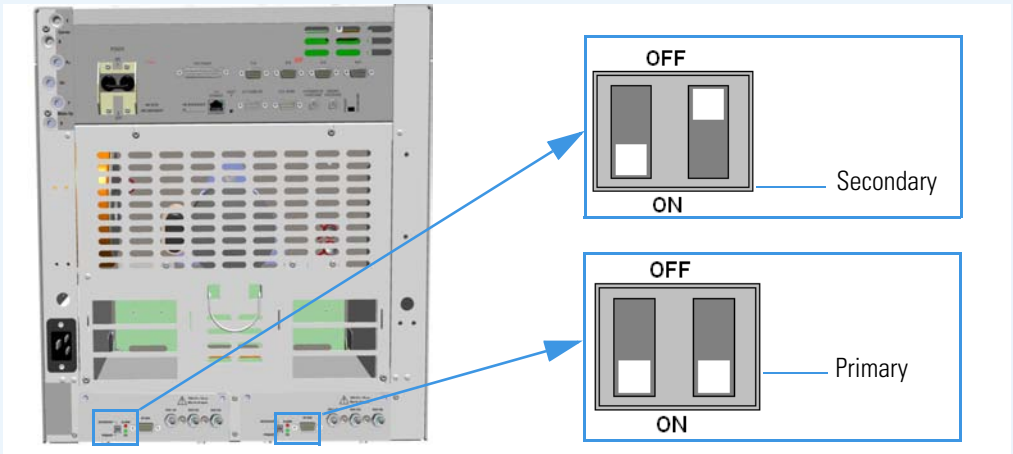
Figure 37. Electrical Connections



❖ To perform the electrical connections

1. Connect the Auxiliary Gas Module.
   a. Using the cable provided, connect the 15-pin female connector marked **GC Bus** on the module to a **Bus** interface on the back of the GC.
   b. Set the switch to **Primary.**

IMPORTANT If two Auxiliary Gas modules are simultaneously present, one must be set as Primary and the other as Secondary by mean of dedicated switch on the back panel. See the example below.



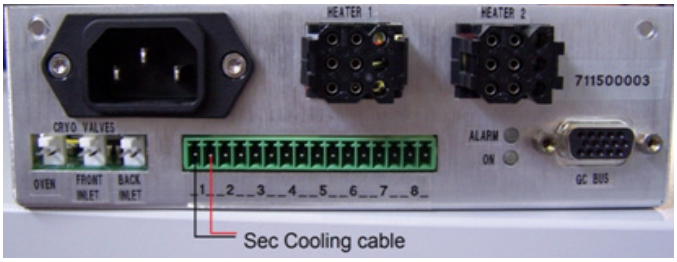
The primary module controls the aux pressures from 1 to 3, while the secondary module controls the aux pressures from 4 to 6.

2. Connect the Aux Temperature/Cryo module

Tip To avoid the contact with the hot air from the vents, it is suggested to gather the electrical cables into cables holder.

   a. Using the cable provided, connect the 15-pin female connector marked **GC Bus** on the module to a **Bus** interface on the back of the GC.
   b. Connect the cable of the secondary cooling valve to the pins marked **1** of the connector marked **Events**. This is the Event **EV1**. Respect the color of the wires. See Figure 38.

Figure 38. Event EV1 Connection



c. Plug the power cable to the AC Input connector on the front of the module and to the wall outlet. The LED marked **On** lights after the GC is powered on.

IMPORTANT The Auxiliary Temperature/Cryo module must be powered at the same power supply voltage required for the GC.

Replace Panels and Covers

1. Replace the left and right side panels and the top and back covers.
   a. Plug the ground wire previously removed into the left and right panels.
   b. Place the left and right panel and attach the screw holding it in place.
   c. Reconnect the ground wire to the back cover terminal.
   d. Replace the back cover proceeding in the reversed order in which they were removed.
   e. Replace the top cover proceeding in the reversed order in which they were removed.

Installing the Capillary Column to the OCI Injector

IMPORTANT For 0.25 mm or 0.32 mm i.d. column, the 0.53 mm i.d. pre-column must be used. Use the syringe needle gauge 23S, 54 mm length for automatic injections, and 50 mm length for manual injections.

For further details about the installation of the column refer to the section **Installing the Column the First Time** in the *TRACE 1300 and TRACE 1310 Hardware Manual*.

Before you begin this sequence, insert the syringe needle into the injector. If you are using a pre-column, connect it to the capillary column using a press-fit or butt connector. Also make sure the column support has been installed in the GC oven.

❖ To install the capillary column to the OCI Injector

Material needed
M8 retaining nut
Backwasher/sleeve for secondary cooling
Graphitized Vespel® ferrule
10 mm wrench

1. Install the column into the GC oven.
   a. Open the front door of the GC.
2. Connect the column to the injector inside the oven.

a. Slide the M8 Vespel® ferrule, the secondary cooling sleeve, and the retaining nut onto the capillary column (or pre-column, if used).

b. Slide the column onto the needle protruding into the column oven, then push the column into the injector as far as it will go.

c. Place the column on the two arms of the rack.

d. Slide the ferrule, the retaining nut, and the secondary cooling sleeve onto the column and tighten the nut onto the injector with a 10 mm wrench until the column is secure. Use no more pressure than is necessary to ensure a good seal.

e. Remove the syringe needle and reinsert it. It should slide easily into the column without friction. If not, repeat the column installation sequence.

3. Open the gas supplies.
4. Power on the GC.
5. Setup the GC.
6. Perform a column leak check.
7. Calibrate the carrier gas flow (column evaluation).
8. Condition the column.
9. Connect the column to the detector inside the GC.

Configuring and Setting the On-Column Module

Configure and enable the On-Column injector module through the user interface of your TRACE 1300/TRCE 1310 GC, or through the Thermo Scientific Chromatography Data System in use. See the following sequences:

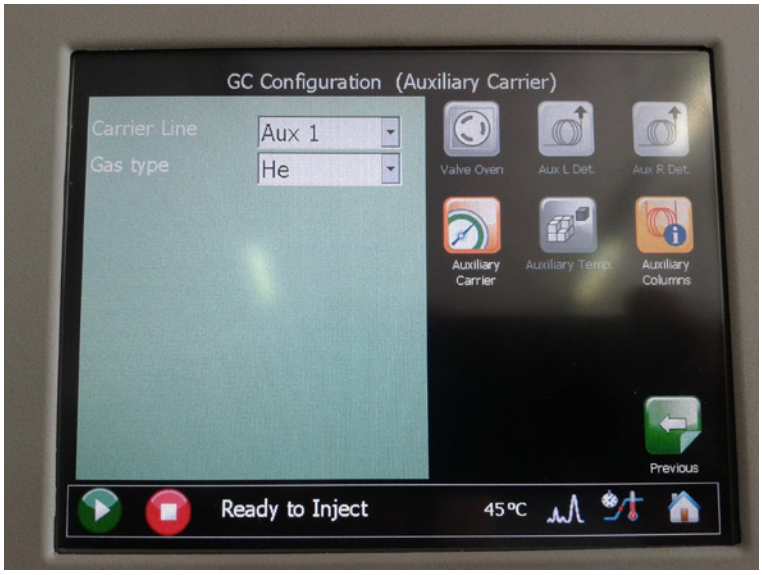
See the following sequences:

- "To configure and set the On-Column module through the touch screen" on page 31
- "To configure the On-Column through the chromatography data system (CDS)" on page 32

❖ To configure and set the On-Column module through the touch screen

1. In the main menu select the Configuration icon, the Configuration menu appears. Select the **Auxiliary Carrier** icon to open the relevant sub-menu. See Figure 39.

Figure 39. Auxiliary Carrier Configuration



- In **Carrier Line** select **AUX 1**.
- In **Gas type** select the gas used as carrier gas. The choices are He, H_2, and N_2.

2. In the main menu select the **Instrument control** icon. The Instrument Control menu appears. In the Instrument Control menu, select the **Auxiliary Carrier** icon to open the relevant sub-menu. Set the **parameters** values, see the example of Figure 40.

Figure 40. Auxiliary Carrier Instrument Control

- **Carrier line** — Select the auxiliary carrier line **Aux 1**.
- **Flow mode** — Defines the auxiliary carrier gas control mode to use: **Constant Flow**, **Constant Pressure**, **Programmed Flow**, and **Programmed Pressure**. Each mode activates or deactivates the dedicated parameters.

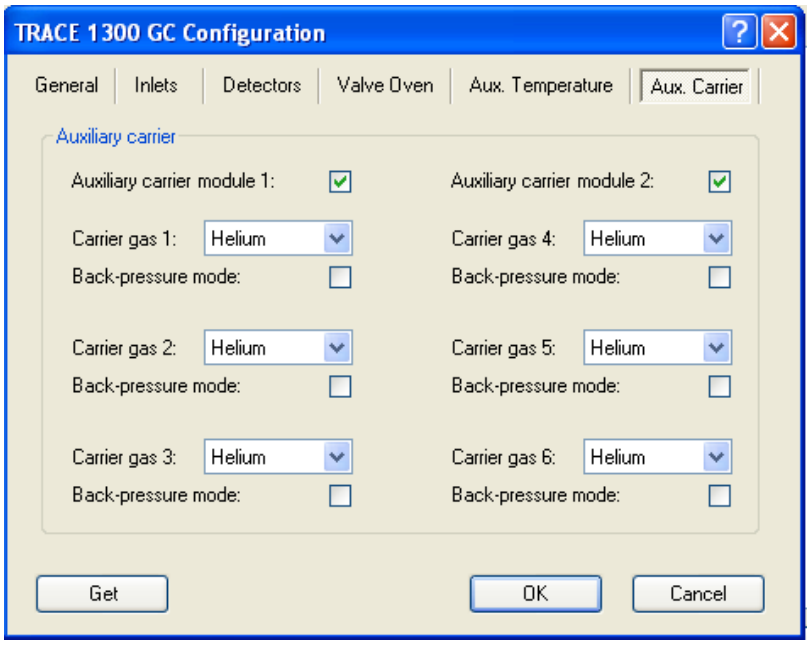
3. .In the Instrument Control menu, select the **Run Table** icon to open the relevant sub-menu and program the secondary cooling timing. See the example of Figure 41.

Figure 41. Run Table

❖ **To configure the On-Column through the chromatography data system (CDS)**

1. In the **Configuration** window select the **Auxiliary Carrier** tab. See Figure 42.

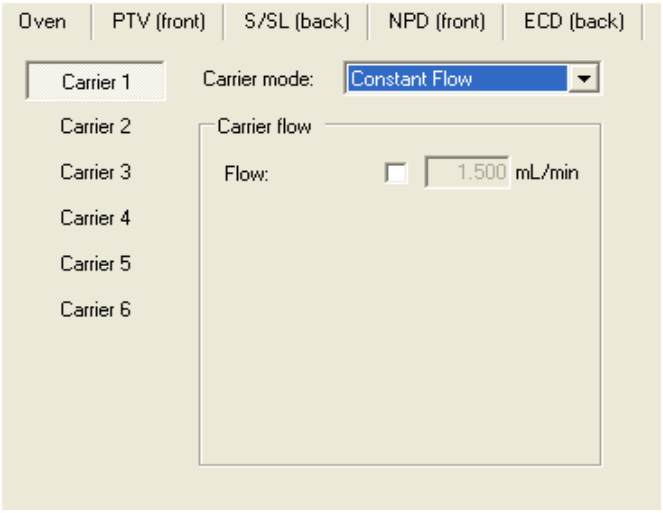
Figure 42. Auxiliary Carrier Tab



- **Auxiliary Control Module 1** — Select this check box to enable the setting for the auxiliary control module and options installed on your TRACE 1300/TRACE 1310 GC.
  - **Carrier Gas 1** — Select the type of the carrier gas in use for the selected auxiliary carrier line 1. The choices are He, H_2, and N_2.
  - **Back-pressure mode** — Select the corresponding check box if you want operating in back-pressure mode.

2. Edit the Method Parameters selecting the **Auxiliary Carrier** page. See Figure 43.

Figure 43. Auxiliary Carrier Page



Defines the carrier gas parameters of the auxiliary Carrier Gas module.

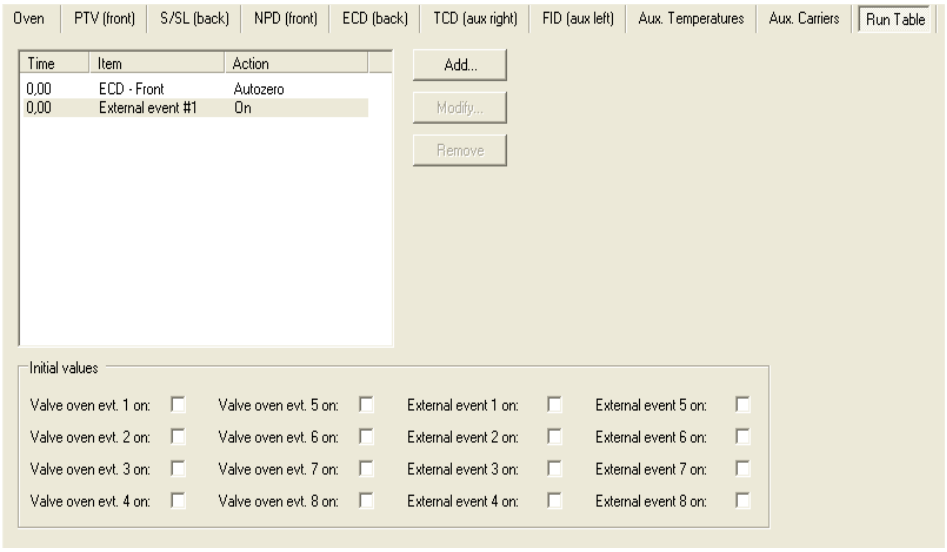
- Select **Carrier 1**.
- Defines the auxiliary carrier gas control mode to use: **Constant Flow**, **Constant Pressure**, **Programmed Flow,** and **Programmed Pressure**. Each mode activates or deactivates the dedicated parameters.
  - **Constant Flow** — Use this field to set up flow when the **Constant flow** carrier mode has been selected.
  - Select the **Flow** check box to enable the Flow field.
    Enter a value in the range of 0.1-100 mL/min. If you clear the check box, the field is disabled and the graph becomes a horizontal line at a flow rate of zero.
  - **Constant Pressure** — Use this field to set up pressure when the **Constant pressure** carrier mode has been selected.
  - Select the **Pressure** check box to enable the Pressure field.
    Enter a value in the range of 5-1000 kPa (0.725-145 psi; 0.05-10 bar). If you clear the check box, the field is disabled and the graph becomes a horizontal line at zero pressure.

– **Programmed Flow** — Use this field to set up a flow program when **Programmed Flow** carrier mode has been selected.

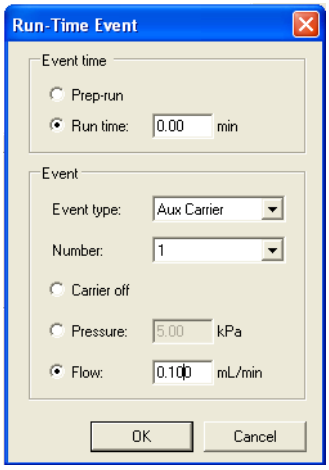
– **Programmed Pressure** — Use this field to set up a flow program when **Programmed Pressure carrier** mode has been selected.

3. Program the secondary cooling timing selecting the **Run Table** page. See the example of Figure 44.

Figure 44. Run Table Page



- Select **Aux Carrier event** to activate the associated fields. In the Aux Carrier field, set the default condition for up to six auxiliary carrier lines.



The options are summarized in Table 2.

Table 2. Aux Carrier Event Options

Option	Details
Number	Select the number of the auxiliary carrier line in the range of 1-6.
Carrier off	Check this radio button to turn off the auxiliary carrier of the selected line.
Pressure	Check this radio button to set the desired pressure for the auxiliary carrier of the selected line.
Flow	Check this radio button to set the desired flow for the auxiliary carrier of the selected line.

Checkout with the On-Column Module

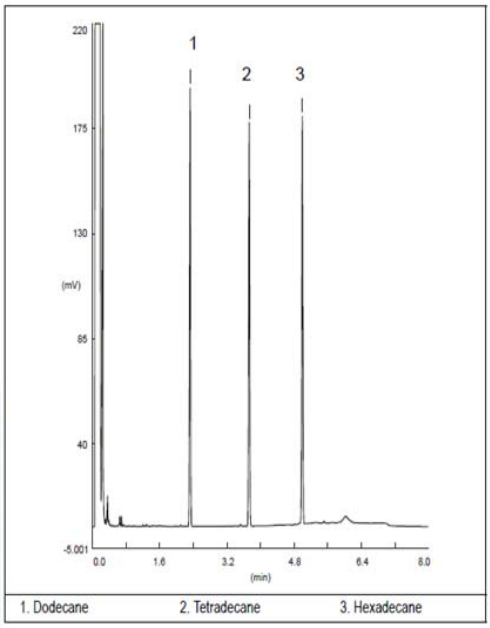
Figure 45 shows the parameters setting for the checkout using the On-Column injector with the Thermo Scientific Flame Ionization Detector (FID), and the resulting chromatogram.

The test mixture used (PN 33819020) consists of three components in n-hexane:

- Dodecane; 20 µg/mL
- Tetradecane; 20 µg/mL
- Hexadecane; 20 µg/mL

Figure 45. Checkout

Parameters Setting	
Gases	Carrier Gas: Helium = 30 kPa Constant Pressure Hydrogen = 35 ml/min Air = 350 ml/min Make-up Gas: Nitrogen = 40 ml/min
Oven Program	Initial Temperature = 70 °C Initial Time = 1 minute Ramp 1 = 20 °C/minute Final Temperature = 200 °C Final Time = 1 minute
Injector	Secondary Cooling = 0.2 minutes
Detector	Base Temperature = 250 °C
Injected Volume	1 µl of Test Mixture



Note For the checkout with others Thermo Scientific detectors use the appropriate text mixture. Refer to the *TRACE 1300/TRACE 1310 User Guide* for details.