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TRACE 1310 Auxiliary Oven

Instruction Manual

Additional Section of the TRACE 1300/1310 Gas Chromatographs Hardware Manual & User Guide

31715011 Revision H • August 2019

ThermoFisher SCIENTIFIC

Published by Thermo Fisher Scientific S.p.A., Strada Rivoltana 20090 Rodano-Milan, Italy
Tel: +39 02 95059303; Fax: +39 02 95059388

Release history: First Edition, released October 2013 *"Original Instructions"*
Second Edition, released January 2014; Third Edition, released March 2015;
Fourth Edition, released January 2016; Fifth Edition, released May 2017; Sixth Edition, released April 2018;
Seventh Edition, released August 2018; Eighth Edition, released August 2019.

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Reader's Survey

TRACE 1310 Auxiliary Oven Instruction Manual, PN 31715011, Revision F

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
The manual is well organized.	1	2	3	4	5
The manual is clearly written.	1	2	3	4	5
The manual contains all the information I need.	1	2	3	4	5
The instructions are easy to follow.	1	2	3	4	5
The instructions are complete.	1	2	3	4	5
The technical information is easy to understand.	1	2	3	4	5
Examples of operation are clear and useful.	1	2	3	4	5
The figures are helpful.	1	2	3	4	5
I was able to operate the system using this manual.	1	2	3	4	5

fold

If not, please comment below. Attach additional sheets if necessary.

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Declaration

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Thermo Fisher Scientific is the manufacturer of the instrument described in this manual and, as such, is responsible for the instrument safety, reliability and performance only if:

- installation
- re-calibration
- changes and repairs

have been carried out by authorized personnel and if:

- the local installation complies with local law regulations
- the instrument is used according to the instructions provided and if its operation is only entrusted to qualified trained personnel

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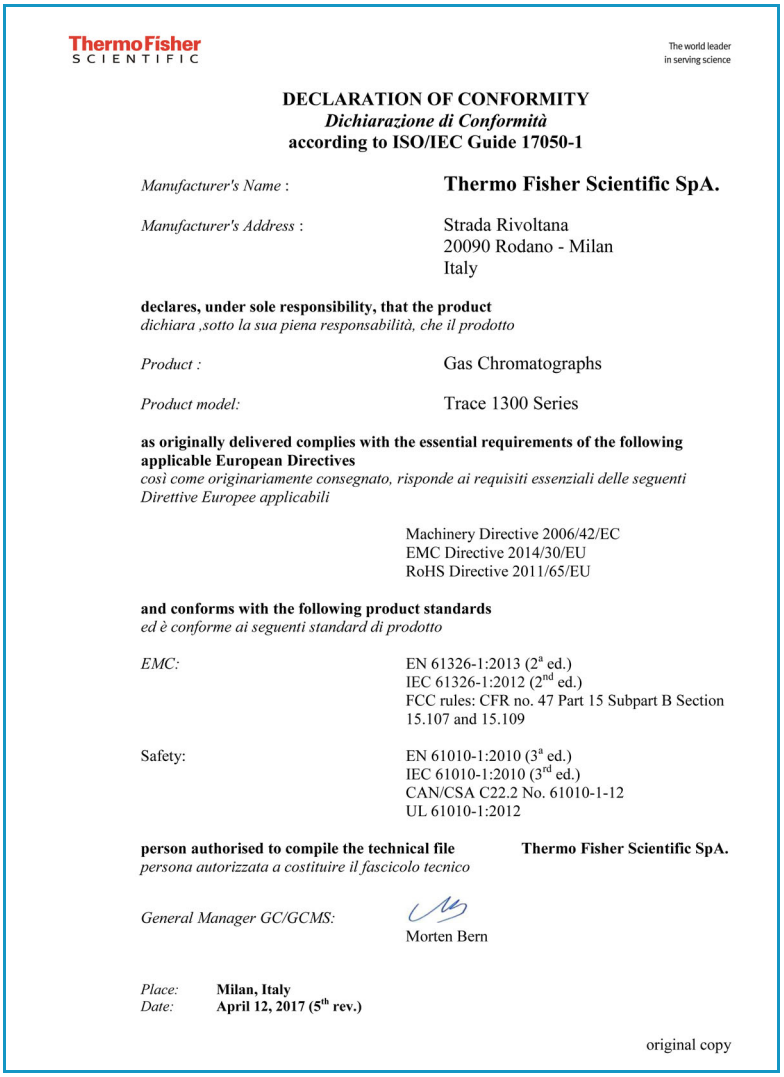
Thermo Fisher Scientific performs complete testing and evaluation of its products to ensure full compliance with applicable domestic and international regulations. When the system is delivered to you, it meets all pertinent electromagnetic compatibility (EMC) and safety standards.



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Dichiarazione di Conformità
according to ISO/IEC Guide 17050-1

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Manufacturer's Address : Strada Rivoltana
20090 Rodano - Milan
Italy

declares, under sole responsibility, that the product
dichiara ,sotto la sua piena responsabilità, che il prodotto

Product : Gas Chromatographs

Product model: Trace 1300 Series

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così come originariamente consegnato, risponde ai requisiti essenziali delle seguenti Direttive Europee applicabili

Machinery Directive 2006/42/EC
EMC Directive 2014/30/EU
RoHS Directive 2011/65/EU

and conforms with the following product standards
ed è conforme ai seguenti standard di prodotto

EMC: EN 61326-1:2013 (2ª ed.)
IEC 61326-1:2012 (2nd ed.)
FCC rules: CFR no. 47 Part 15 Subpart B Section 15.107 and 15.109

Safety: EN 61010-1:2010 (3ª ed.)
IEC 61010-1:2010 (3rd ed.)
CAN/CSA C22.2 No. 61010-1-12
UL 61010-1:2012

person authorised to compile the technical file **Thermo Fisher Scientific SpA.**
persona autorizzata a costituire il fascicolo tecnico

General Manager GC/GCMS:
Morten Bern

Place: **Milan, Italy**
Date: **April 12, 2017 (5th rev.)**

original copy

IMPORTANT: Class A equipment is intended for use in an industrial environment. In others environments there may be potential difficulties in ensuring electromagnetic compatibility, due to the conducted as well as radiated disturbances.

FCC Compliance Statement

THIS DEVICE COMPLIES WITH PART 15 OF THE FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS: (1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE, AND (2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED, INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION.

CAUTION Read and understand the various precautionary notes, signs, and symbols contained inside this manual pertaining to the safe use and operation of this product before using the device.

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Notice on the Susceptibility to Electromagnetic Transmissions

Do not use radio frequency transmitters, such as mobile phones, in close proximity to the instrument.

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China EEP Hazardous Substances Information

产品中有害物质的名称及含量
China EEP Hazardous Substances Information

部件名称 Component Name	有害物质 Hazardous Substances (TRACE 13x0)					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
(主机:背部接线电路板) Base Unit: PCBA BACKPLANE	X	O	O	O	O	O
(主机：炉箱电路板) Base Unit: PCBA OVEN CPU	X	O	O	O	O	O
(主机: 主控电路板) Base Unit: PCBA CPU	X	O	O	O	O	O
(主机：存储器电路板) Base Unit: PCBA MEMORY	X	O	O	O	O	O
(主机：接口电路板) Base Unit: PCBA EXTERNAL INTERFACE	X	O	O	O	O	O
(主机：电源供应电路板) Base Unit: PCBA POWER SUPPLY	X	O	O	O	O	O
(主机：显示屏控制电路板) Base Unit: PCBA RSR798	X	O	O	O	O	O
(主机：液晶显示屏) Base Unit: DISPLAY LCD	X	O	O	O	O	O
(分流/不分流进样器电路板) PCBA's MODULE SSL	X	O	O	O	O	O
(程序升温进样器电路板) PCBA's MODULE PTV	X	O	O	O	O	O
(火焰离子化检测器电路板) PCBA's MODULE FID	X	O	O	O	O	O
(电导检测器电路板) PCBA's MODULE ECD	X	O	O	O	O	O
(氮磷检测器电路板) PCBA's MODULE NPD	X	O	O	O	O	O
(热导检测器电路板) PCBA's MODULE TCD	X	O	O	O	O	O
(火焰光度检测器电路板) PCBA's MODULE FPD	X	O	O	O	O	O
(辅助温度模块电路板)PCBA's MODULE AUXILIARY TEMPERATURE	X	O	O	O	O	O
(辅助气体模块电路板) PCBA MODULE AUXILIARY GASES	X	O	O	O	O	O
(模拟输出接口电路板) PCBA MODULE AOI	X	O	O	O	O	O
(脉冲放电检测器电路板) PCBA's MODULE PDD	X	O	O	O	O	O
(通用检测器接口电路板) PCBA MODULE GDI	X	O	O	O	O	O
(辅助炉箱电路板) PCBA's AUXILIARY OVEN	X	O	O	O	O	O
(机加工件) MACHINED PARTS	O	O	O	O	O	O
(模具) MOLDED PARTS	O	O	O	O	O	O
(钣金件) SHEETMETAL PARTS	O	O	O	O	O	O
(电机组件) ELECTROMECHANICAL ASSEMBLIES	O	O	O	O	O	O
(电缆组件) CABLE ASSEMBLIES	O	O	O	O	O	O
(标签) LABELS	O	O	O	O	O	O

本表格依据SJ/T11364的规定编制 This table is compiled according to SJ/T 11364 standard.

O: 表示该有害物质在该部件所有均质材料中的含量均在GB/T26572规定的限量要求以下.
Indicates that the concentration of the hazardous substance in all homogeneous materials for the part is below the relevant threshold of the GB/T 26572 standard.

X: 表示该有害物质至少在该部件的某一均质材料中的含量超出GB/T26572规定的限量要.
Indicates that the concentration of the hazardous substance in at least one homogenous material of the part is above the relevant threshold of the GB/T 26572 standard.

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WEEE Directive

2012/19/EU

Thermo Fisher Scientific is registered with B2B Compliance (B2Bcompliance.org.uk) in the UK and with the European Recycling Platform (ERP-recycling.org) in all other countries of the European Union and in Norway.

If this product is located in Europe and you want to participate in the Thermo Fisher Scientific Business-to-Business (B2B) Recycling Program, send an email request to weee.recycle@thermofisher.com with the following information:

- WEEE product class
- Name of the manufacturer or distributor (where you purchased the product)
- Number of product pieces, and the estimated total weight and volume
- Pick-up address and contact person (include contact information)
- Appropriate pick-up time
- Declaration of decontamination, stating that all hazardous fluids or material have been removed from the product

For additional information about the Restriction on Hazardous Substances (RoHS) Directive for the European Union, search for RoHS on the Thermo Fisher Scientific European language websites.

IMPORTANT This recycling program is **not** for biological hazard products or for products that have been medically contaminated. You must treat these types of products as biohazard waste and dispose of them in accordance with your local regulations.

Directive DEEE

2012/19/EU

Thermo Fisher Scientific s'est associé avec une ou plusieurs sociétés de recyclage dans chaque état membre de l'Union Européenne et ce produit devrait être collecté ou recyclé par celle(s)-ci. Pour davantage d'informations, rendez-vous sur la page www.thermoscientific.fr/rohs.

WEEE Direktive

2012/19/EU

Thermo Fisher Scientific hat Vereinbarungen mit Verwertungs-/Entsorgungsfirmen in allen EU-Mitgliedsstaaten getroffen, damit dieses Produkt durch diese Firmen wiederverwertet oder entsorgt werden kann. Weitere Informationen finden Sie unter www.thermoscientific.de/rohs.

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Preface

This manual is an additional section of the Thermo Scientific™ TRACE™ 1300 and TRACE™ 1310 gas chromatographs Hardware Manual (PN 31715002) and User Guide (PN 31715003).

This manual contains information for installing and using the Thermo Scientific™ TRACE™ 1310 Auxiliary Oven.

This manual is organized as follows:

- Chapter 1, "Site Preparation," describes how to prepare your site before the Thermo Scientific Field Service Engineer arrives to install the TRACE 1300/TRACE 1310 GC + TRACE 1310 Auxiliary Oven.
- Chapter 2, "TRACE 1310 Auxiliary Oven Overview," provides a detailed overview of the TRACE 1310 Auxiliary Oven configurations.
- Chapter 3, "Components Installation," provides instructions for installing and configuring the optional components such as valves, auxiliary gas modules, auxiliary detectors, secondary oven, methanizer, and others, in the TRACE 1310 Auxiliary Oven. The instructions for wiring and coupling the TRACE 1310 Auxiliary Oven to the TRACE 1300/TRACE 1310 GC are also detailed.
- Chapter 4, "Operation," provides brief instruction for configuring and operating with the TRACE 1310 Auxiliary Oven through the GC touch screen and the chromatography data system.
- Chapter 5, "Maintenance & Troubleshooting," provides instructions for performing a maintenance on the TRACE 1310 Auxiliary Oven and to remedy any potential analytical problems.
- Chapter 6, "Ordering Parts," contains part numbers for all the kits or spare parts available for your TRACE 1310 Auxiliary Oven.

About Your System

Thermo Scientific systems provide high-caliber gas chromatography (GC) instrumentation.

GC represents a powerful analytical separation technique. Complex mixtures of individual compounds can be injected into the GC, either manually or by using an autosampler, and then separated the eluate for presentation to the detector. The detector generates signals of the GC eluate and its components. These signals are then processed by a Thermo Scientific Chromatography Data System for qualitative identification, as well as accurate and precise quantification of the individual compounds present in the sample.

IMPORTANT Thermo Scientific systems are designed to optimize the separation and detection capabilities of GC by providing high performance analytical capabilities for both research and routine applications. More information on the use of this system can be found in related documentation sources and by using the provided contact information.

WARNING Thermo Scientific systems operate safely and reliably under carefully controlled environmental conditions. Using the equipment in a manner not specified by the manufacturer might impair the protections provided by the equipment. If you maintain a system outside the specifications listed in this guide, failures of many types, including personal injury or death, might occur. The repair of instrument failures caused by operation in a manner not specified by the manufacturer is specifically excluded from the Standard Warranty and service contract coverage.

WARNING Operation of this system requires the use of chemical substances with different hazard specifications. Before using any chemicals, please read the hazard indications and information reported in the Safety Sheet supplied by the manufacturer referring to the relevant CAS (Chemical Abstract Service) number.

Power Rating

TRACE 1310 Auxiliary Oven

- 120/230 Vac, 50/60 Hz, 650VA

WARNING The TRACE 1310 Auxiliary Oven must be powered at the same line voltage of the main GC system.

Detailed instrument specifications are in the Product Specifications or Product Brochure.

Contacting Us

There are several ways to contact Thermo Fisher Scientific for the information you need.

❖ **To find out more about our products**

Go to http://www.thermofisher.com for information about our products.

❖ **To get local contact information for sales or service**

Go to http://www.unitylabservice.com/en/home.html

Related Documentation

In addition to this manual, Thermo Scientific provides the following documents for the TRACE 1300 and TRACE 1310.

TRACE 1300 and TRACE 1310 Document Set, PN 31715000

- *TRACE 1300 and TRACE 1310 Preinstallation Requirements Guide,* PN 31715001
- *TRACE 1300 and TRACE 1310 Hardware Manual*, PN 31715002
- *TRACE 1300 and TRACE 1310 User Guide,* PN 31715003
- *TRACE 1300 and TRACE 1310 Spare Parts Guide*, PN 31715004

To suggest ways we can improve the documentation, follow this link to complete our Reader's Survey.

Safety Alerts and Important Information

Make sure you follow the precautionary notices presented in this guide. Safety and other special notices appear in boxes and include the following:

WARNING Highlights hazards to humans or the environment. This is the general warning safety symbol and safety alert word to prevent actions that could cause personal injury. Each **WARNING** safety alert is preceded with this safety symbol and another appropriate safety symbol (see "Safety Symbols and Signal Words" on page xviii) Then it is followed with an appropriate safety precautionary message. When you see a safety alert on your instrument or in the publications, please carefully follow the safety instructions before proceeding.

CAUTION Highlights actions that might cause personal injury or instrument damage. We use it to highlight information necessary to prevent personal injury or damage to software, loss of data, invalid test results, or to information that is critical for optimal system performance. A **CAUTION** safety alert is always preceded with an appropriate safety symbol (see "Safety Symbols and Signal Words" on page xviii). It is followed with an appropriate safety precautionary message. When you see a safety alert on your instrument or in the publications, please carefully follow the safety instructions before proceeding.

IMPORTANT Highlights information necessary to prevent damage to software, loss of data, or invalid test results, or it might contain information that is critical for optimal performance of the system.

Note Emphasizes important information about a task.

Tip Provides information that can make a task easier.

Safety Symbols and Signal Words

All safety symbols are followed by **WARNING** or **CAUTION**, which indicates the degree of risk of personal injury and/or instrument damage. Cautions and warnings are followed by a descriptor, such as **BURN HAZARD**. A **WARNING** is intended to prevent improper actions that could cause personal injury. A **CAUTION** is intended to prevent improper actions that might cause personal injury and/or instrument damage. You find the following safety symbols on your instrument and/or in this guide:

Symbol	Descriptor
	**BIOHAZARD:** Indicates that a biohazard *will*, *could*, or *might* occur.
	**BURN HAZARD:** Alerts you to the presence of a hot surface that *could* or *might* cause burn injuries.
	**ELECTRICAL SHOCK HAZARD:** Indicates that an electrical shock *could* or *might* occur.
	**FIRE HAZARD:** Indicates a risk of fire or flammability *could* or *might* occur.
	**EXPLOSION HAZARD.** Indicates an explosion hazard. This symbol indicates this risk *could* or *might* cause physical injury.
	**FLAMMABLE GAS HAZARD.** Alerts you to gases that are compressed, liquefied or dissolved under pressure and can ignite on contact with an ignition source. This symbol indicates this risk *could* or *might* cause physical injury.
	**GLOVES REQUIRED:** Indicates that you must wear gloves when performing a task or physical injury *could* or *might* occur.

	**CLOTHING REQUIRED.** Indicates that you should wear a work clothing when performing a task or else physical injury *could* or *might* occur.
	**BOOTS REQUIRED.** Indicates that you must wear boots when performing a task or else physical injury *could* or *might* occur.
	**MATERIAL AND EYE HAZARD.** Indicates you must wear eye protection when performing a task.
	**HAND AND CHEMICAL HAZARD:** Indicates that chemical damage or physical injury *could* or *might* occur.
	**HARMFUL.** Indicates that the presence of harmful material *will, could, or might* occur.
	**INSTRUMENT DAMAGE:** Indicates that damage to the instrument or component *might* occur. This damage might not be covered under the standard warranty.
	**LIFTING HAZARD.** Indicates that a physical injury *could* or *might* occur if two or more people do not lift an object.
	**MATERIAL AND EYE HAZARD:** Indicates that eye damage *could* or *might* occur.
	**READ MANUAL:** Alerts you to carefully read your instrument's documentation to ensure your safety and the instrument's operational ability. Failing to carefully read the documentation *could* or *might* put you at risk for a physical injury.
	**TOXIC SUBSTANCES HAZARD:** Indicates that exposure to a toxic substance could occur and that exposure *could* or *might* cause personal injury or death.
	**LASER HAZARD.** Indicates that exposure to a laser beam *will*, *could*, or *might* cause personal injury.
	**RADIOACTIVE HAZARD.** Indicates that the presence of radioactive material *could or might* occur.
	For the prevention of personal injury, this general warning symbol precedes the **WARNING** safety alert word and meets the ISO 3864-2 standard. In the vocabulary of ANSI Z535 signs, this symbol indicates a possible personal injury hazard exists if the instrument is improperly used or if unsafe actions occur. This symbol and another appropriate safety symbol alerts you to an imminent or potential hazard that *could cause personal injury*.

Instrument Markings and Symbols

The following table explains the symbols used on Thermo Fisher Scientific instruments. Only a few of them are used on the TRACE 1310 Auxiliary Oven. Those that are used are designated by an asterisk.

Table 1. Instrument Marking and Symbols (Sheet 1 of 2)

	Symbol	Description
		Direct current
*		Alternating current
		Both direct and alternating current
		Three-phase alternating current
		Earth (ground) terminal
		Protective conductor terminal
		Frame or chassis terminal
		Equipotentiality
*		On (supply)
*		Off (supply)
		Equipment protected throughout by DOUBLE INSULATION or REINFORCED INSULATION (Equivalent to Class II of IEC 536)
*		Instruction manual symbol affixed to product. Indicates that the user must refer to the manual for specific **WARNING** or **CAUTION** information to avoid personal injury or damage to the product.
		Caution, risk of electric shock
*		Caution, hot surface
*		Caution, biohazard
		In-position of a bistable push control
		Out-position of a bistable push control

Table 1. Instrument Marking and Symbols (Sheet 2 of 2)

	Symbol	Description
		Jack socket
*		Symbol in compliance to the Directive 2012/19/EU on Waste Electrical and Electronic Equipment (WEEE) placed on the European market after August, 13, 2005.

Hydrogen Safety Precautions

Hydrogen is a colorless, odorless, highly flammable gas with the molecular formula H_2 and an atomic weight of 1.00794, making it the lightest element. Hydrogen gas presents a hazard as it is combustible over a wide range of concentrations; at ambient temperature and pressure, this ranges from about 4% to 74.2% by volume.

Hydrogen has a flash point of - 423 °F (- 253 °C) and an auto-ignition temperature of 1,040 °F (560 °C). It has a very low ignition energy and the highest burning velocity of any gas. If hydrogen is allowed to expand rapidly from high pressure, it can self-ignite. Hydrogen burns with a flame that can be invisible in bright light.

WARNING - EXPLOSION HAZARD The use of hydrogen as a carrier gas is dangerous. Hydrogen is potentially explosive and must be used with extreme care. Any use of hydrogen gas must be reviewed by appropriate health and safety staff and all installations of hydrogen systems must be performed to applicable codes and standards. Thermo Fisher Scientific assumes no liability for the improper use of hydrogen as a carrier gas.

Before you begin using hydrogen, you should conduct a risk assessment based on the quantity of hydrogen to be used and the conditions of your laboratory. You should ask yourself:

"What hydrogen hazards associated with this project are most likely to occur?"

"What hydrogen hazards associated with this project have the potential to result in the worst consequences?"

- Try to reduce or eliminate the higher risks by using the proper ventilation to remove hydrogen gas before an ignitable concentration can accumulate. You should also consider purging the hydrogen to further reduce hazards and ensure anyone who will be working with hydrogen has basic hydrogen safety training.
- As with laboratory safety in general, be sure to wear safety glasses, laboratory coats, gloves, etc. Typically there are no specific requirements for gaseous hydrogen, other than eye protection when working with a compressed gas. If working with liquid (cryogenic) hydrogen, insulated gloves and protective shoes should be worn in addition to eye protection.
- You should post "No Smoking" and "No Open Flames" signs to identify hydrogen sources and cylinders. Maintain, inspect and leak-test all hydrogen sources regularly.

- All hydrogen shutoff valves should be clearly marked and permanent hydrogen piping should be labeled as such at the supply or discharge point and at regular intervals along its length. Where hydrogen gas piping passes through a wall, the piping should be labeled on both sides of the wall.
- There should also be contingency plans in place should an incident occur.
- The site emergency response team, as well as the local fire department, should know the location of all hydrogen storage tanks.

Using Hydrogen with TRACE 1300/TRACE 1310

The use of hydrogen as a carrier gas or as fuel gas for certain flame detectors requires the operator's strict attention and compliance with special precautions due to the hazards involved.

WARNING - EXPLOSION HAZARD Hydrogen is a dangerous gas that, when mixed with air, might create an explosive mixture. The use of hydrogen as a carrier gas requires the operator's extreme caution. Special precautions must be taken because of the risk of explosion. The gas chromatograph must be equipped with a hydrogen sensor if you use hydrogen as a carrier gas.

Never use hydrogen as carrier gas in your TRACE 1300/TRACE 1310 system unless your oven has a hydrogen sensor installed. Thermo Fisher Scientific FSEs are not authorized to install or repair any instrument using hydrogen as a carrier gas unless the instrument is equipped with the appropriate sensor.

If your oven does not have a hydrogen sensor already installed, contact your Thermo Fisher Scientific sales representative. To comply with instrument safety requirements, a Thermo Fisher Scientific FSE or authorized service personnel should install the sensor into your TRACE 1300/TRACE 1310.

Hydrogen is a dangerous gas, particularly in an enclosed area when it reaches a concentration corresponding to its lower explosion level (4% in volume). An explosion hazard could develop in the oven when hydrogen is used as a carrier gas if oven elements are not perfectly connected to each other, or if the connection materials are worn out, broken, or otherwise faulty.

Use the following safety precautions when using hydrogen:

- Ensure that all hydrogen cylinders comply with the safety requirements for proper use and storage. Hydrogen cylinders and delivery systems must comply with local regulations.
- Make sure the gas supply is turned completely off when connecting hydrogen lines.
- Perform a leak test to ensure that the hydrogen lines are leak-tight before using the instrument. Repeat this test to eliminate all leaks.
- Ensure your TRACE 1300/TRACE 1310 has a Thermo Fisher Scientific hydrogen sensor installed. A hydrogen sensor continuously monitors the hydrogen level in the oven.

Hydrogen Connection Guidelines

Use the following guidelines to safely connect hydrogen to your system:

- **Piping**—Hydrogen must be delivered to equipment using appropriate piping and be done in such a way as to pose essentially no hazard to end-users. Piping systems for the delivery of hydrogen should be designed and installed by a person qualified by specific training and experience with hydrogen piping systems.

  Stainless steel is usually recommended because it is a safe, cost-effective material. Piping of *black iron* or copper must not be used, as the pipe can become brittle with age. Elastomeric/plastic tubing of various plastics and polymers should not be used, unless the tubing is approved for use with hydrogen. If elastomeric/plastic tubing is used for hydrogen gas delivery, the tubing should be tested for hydrogen permeability to minimize leakage.

  The hydrogen piping system must be flexible enough to endure routine thermal expansion and contraction. The system should also include considerations for the most severe condition of temperature and pressure expected during service. Piping and supports must be able to withstand static loading introduced by such things as ice and snow; and dynamic loading from high wind and earthquake.

  Caution should be used if burying hydrogen piping. Proper controls should be used to protect against damage and corrosion, and also to prevent Hydrogen from entering a building if there is any leakage.

- **Fittings**—All fittings must be of the proper type approved or designed for use with hydrogen gas. Use as few fittings as possible to minimize the potential for leaks. After installation, ensure that leak testing is carried out prior to system use, and on a regular basis.

  There must be no PTFE tape or other things like *plumber's putty* used to enhance a seal, as this actually is a detriment to a good seal. Ideally the best installation would use stainless steel tubing with appropriate gas-tight fittings.

  Welding is usually preferred for joints in hydrogen piping systems since welding provides a better connection and reduces the potential for leaks compared to mechanical fittings. Soft solder joints are not permitted for hydrogen systems (due to the low melting point of soft solder and its potential for brittle failure at cryogenic temperatures). Brazed joints are permitted, but such joints should be protected against the possibility of external fire.

  Tubing connections should be clamped to barbed or press-fit type connections. Hose clamps or *jubilee clamps* must not be used.

- **Valves**—All valves must be suitable for hydrogen service and for the specific operating conditions. Valves, including regulators, must not be used for hydrogen, unless they are designed and identified for such a use. Ball valves are often chosen because of their superior leak tightness through the valve seat. Pneumatic operators are usually chosen for remotely operated valves so that potential ignition sources (electricity) are remote from the valve.

Manual shutoff valves should be provided near each point of use, within immediate reach. If a hydrogen cylinder or hydrogen generation system is located within immediate reach, a separate point-of-use shutoff valve is usually not necessary.

Line regulators that have their source away from the point of use should have a manual shutoff valve near the point of use.

An emergency gas shutoff device in an accessible location outside the use area should be provided in addition to the manual point-of-use valve in each educational and instructional laboratory space that has a piped gas supply system.

If necessary, the piping system should have uninterruptible pressure relief. The pressure relief system should be designed to provide a discharge rate sufficient to avoid further pressure increase and should vent to a safe location outside or to a ventilation system exhaust.

Purchasing Hydrogen

Use the following guidelines when purchasing hydrogen:

- Hydrogen Generator—Because it minimizes the amount of hydrogen present and reduces the degree of hazard, a hydrogen generator (also called an electrolyzer) is the safest way to purchase hydrogen in the quantity used in gas chromatography/mass spectroscopy systems.

  However, to minimize the degree of hazard, operate the hydrogen generator only in a non-explosive environment because hydrogen buildup can be ignitable. Thus, your ventilation system for the room or lab hood where the hydrogen generator operates must maintain an air exchange rate at least two orders of magnitude greater than the maximum hydrogen production rate of the hydrogen generator. Follow the manufacturers' directions about proper use and maintenance of the regulator.

  To prevent the possibility of releasing hydrogen, set the hydrogen generator to shut down if:

  – There is a loss of flow to the ventilation system

  – A hydrogen detector alarms at 25% of the lower flammable limit of hydrogen in air.

  Vent the oxygen exhausted by the electrolyzer to the outside as well.

- Hydrogen Cylinder—Hydrogen can be delivered in standard laboratory gas bottles or cylinders. These cylinders have a limited amount of hydrogen in them and are a safe way to transport and store hydrogen. Always secure, compressed hydrogen gas cylinders, like all compressed gas cylinders, in an upright position, ideally with a non-combustible chain or cable. If the cylinder falls over, the valve can fall off, causing the pressurized cylinder to take off like a rocket, leading to the release of hydrogen and possibly an explosion, severe injury, or death. Never crack a hydrogen cylinder valve to remove dust or dirt from fittings prior to attaching a regulator, as there is a risk of self-ignition.

Properly Storing Hydrogen

Storing and handling compressed hydrogen gas and cryogenic liquid hydrogen present potential health and safety hazards. Using proper storage and handling techniques is essential to maintaining a safe work environment.

Use the following guidelines when storing hydrogen:

- Store spare hydrogen gas cylinders outside and away from doors, windows, building air intake vents, structures, and vehicle routes. This precaution applies when the hydrogen is or is not in use. Indoor storage of spare hydrogen cylinders has special requirements, which are beyond the scope of this document. Documentation for each vessel should include a description of the vessel, a list of available drawings or other documents, the most recent inspection results, and the responsible person's name.
- Prevent spare cylinders from toppling by wrapping them with chains. The chains should also be protected against corrosion and excessive heat.
- Separate spare hydrogen cylinders from oxidizing gases (such as oxygen) with a 5 ft. (1.5 m) tall fire barrier with a half-hour fire rating or place the cylinders at least 20 ft. (6 m) apart.
- When moving hydrogen cylinders:
  - Remove the regulator and replace the cylinder valve cap before moving.
  - Move cylinders on cylinder carts or with other appropriate transport devices.
  - Never roll or drop a cylinder and never lift a cylinder by its protective cap.
- Bulk hydrogen systems include either gaseous or liquid hydrogen in fixed installations; in some gas systems a semi-permanent trailer (tube trailer) can be used. Storage vessels for compressed hydrogen gas or liquid hydrogen should be designed, constructed, tested, and maintained in accordance with applicable codes and standards. Bulk hydrogen systems represent a level of complexity again which is beyond the scope of this document; however some general guidelines are provided.
- The bulk hydrogen storage system should not be located beneath electric power lines, close to other flammable gases/liquids, or close to public areas. It should be readily accessible to authorized personnel and delivery equipment, but protected from physical damage or tampering.
- As liquid hydrogen systems also have a cryogenic hazard, additional safety considerations for the use of cryogenic liquids might be necessary.

Hydrogen Safety Codes, Standards and References

The following list of safety codes, standards, and references is in no way an exhaustive list. In fact, there may be federal, state, or local codes that apply to your specific location. Check with all appropriate agencies with jurisdiction before installing or using a hydrogen system.

- Air Products Safetygram #4 Gaseous Hydrogen
- ANSI/AIAA standard for hydrogen safety guidelines is AIAA G-095-2004, Guide to Safety of Hydrogen and Hydrogen Systems
- ASME B31.1, Power Piping Code
- ASME B31.3, Process Piping Code
- ASME B31.8, Gas Transmission and Distribution Systems
- BCGA Code Of Practice CP4 Industrial Gas Cylinder Manifolds and Gas Distribution Pipework
- BCGA Code Of Practice CP33 The Bulk Storage of Gaseous Hydrogen at Users' Premises
- CGA G-5, Hydrogen
- CGA G-5.4, Standard for Hydrogen Piping Systems at Consumer Locations
- CGA G-5.5, Hydrogen Vent Systems
- CGA G-5.6, Hydrogen Pipeline Systems
- CGA G-5.8, High Pressure Hydrogen Piping Systems at Consumer Locations.
- FM Global Property Loss Prevention Data Sheets 7-50: Compressed Gases in Cylinders
- FM Global Property Loss Prevention Data Sheets 7-91: Hydrogen
- IGC Doc 121/04/E, Hydrogen Transportation Pipelines System Design Features
- NASA
- NSS 1740.16 Safety Standard For Hydrogen And Hydrogen Systems Guidelines for Hydrogen System Design, Materials Selection, Operations, Storage, and Transportation
- NFPA 52, Vehicular Fuel Systems Code
- NFPA 55, Standard for the Storage, Use, and Handling of Compressed Gases and Cryogenic Fluids in Portable and Stationary Containers, Cylinders, and Tanks, 2005 Edition
- NFPA 68, Standard on Explosion Protection by Deflagration Venting
- NFPA 70, National Electrical Code
- NFPA 497, Recommended Practice for the Classification of Flammable Liquids, Gases, or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas
- NFPA 13, Standard for the Installation of Sprinkler Systems
- NFPA 45, Standard on Fire Protection for Laboratories Using Chemicals

- NFPA 55, Standard for the Storage, Use, and Handling of Compressed Gases and Cryogenic Fluids in Portable and Stationary Containers, Cylinders, and Tanks
- NFPA 68, 2007 Standard on Explosion Protection by Deflagration Venting
- NFPA 69, Standard on Explosion Prevention Systems
- NFPA 91, Standard for Exhaust Systems for Air Conveying of Vapors
- NFPA 255, Standard Method of Test of Surface Burning Characteristics of Building Materials
- OSHA 29CFR1910.103 1910.103 Hydrogen

Hazardous Substances Precautions

WARNING Before using hazardous substances (toxic, harmful, etc.), please read the hazard indications and information reported in the applicable Material Safety Data Sheet. Use Personal protection according to the safety requirements.

Venting Toxic Gases

When analyzing toxic compounds be aware that during the normal operation of the GC some of the sample may be vented outside the instrument through the inlet and detector exits; therefore the exhaust gases must be vented to a fume hood. Consult local Environmental and Safety Regulations for instructions in exhausting fumes from your system.

1

Site Preparation

This chapter describes how to prepare your site before the Thermo Scientific Field Service Engineer arrives to install the TRACE 1300/TRACE 1310 GC + TRACE 1310 Auxiliary Oven.

Contents

- Introduction
- Workbench & Space Requirements
- Lighting Requirements
- Power Requirements
- LAN Network Requirements
- Environment Requirements
- Gas Equipment Requirements
- Receiving Instruments
- What Happens Next?

Note In addition to the information in this chapter, you must also obey the building and safety rules and regulations for construction that apply in your area.

CAUTION For more details about the preparation of the site, refer to the *TRACE 1300/TRACE 1310 Preinstallation Requirements Guide P/N 31715001, Revision C.*

Introduction

The TRACE 1310 Auxiliary Oven is a factory configured temperature controlled enclosure attached to the right side of the TRACE 1300/1310 GC. See Figure 1.

Figure 1. TRACE 1300/1310 GC and TRACE 1310 Auxiliary Oven

On-site installation is related to the gas plumbing defined by the application or accompanying diagram.

Entrance Requirements

Use the following guidelines to make sure the entrance to your site will allow delivery of the TRACE 1300/1310 GC and TRACE 1310 Auxiliary Oven.

1. Ensure the width of your delivery door opening is at least 81 cm (32 in.).
2. Make sure you have enough room to move boxes around corners, into elevators, or through doorways. The table below contains the dimensions and weight of shipping boxes, so that you can make accommodations.

Table 1. Shipping Box Dimensions and Weight

Box Contents	Depth		Width		Height		Mass	
	cm	in.	cm	in.	cm	in.	kg	lbs
TRACE 1310 Auxiliary Oven with pallet	78.4	30.9	52.4	20.6	74.4	29.3	65	143
TRACE 1300/1310 GC + TRACE 1310 Auxiliary Oven with pallet	92.4	36.6	83.4	32.8	74.4	29.3	150	330
Accessories	These modules, such as the computer, monitor, and optional instruments are shipped in their own boxes. They could be smaller or bigger and weigh less or more than the TRACE 1310 Auxiliary Oven box.							

Workbench & Space Requirements

Use the following guidelines to make sure you have enough space for the TRACE 1300/1310 GC and TRACE 1310 Auxiliary Oven. See Table 2.

1. Ensure you have adequate workbench space for the system. Use the information in the table below to configure the workbench. Be sure to leave at least 30 cm (12 in.), of extra space around the instrument for operators to work besides it and in front of it. Keep in mind that the TRACE 1300/TRACE 1310 GC oven vents to the rear. Any material exposed to the oven exhaust must be able to withstand repeated exposure to temperatures of up to 450 °C (842 °F).

Table 2. Workbench and Space Requirement

Instrument	Depth		Width		Height		Mass	
	cm	in.	cm	in.	cm	in.	kg	lbs
TRACE 1300 GC + TRACE 1310 Auxiliary Oven	60	24	74.5	29	45	18	95[2-3]	209[2-3]
TRACE 1310 GC + TRACE 1310 Auxiliary Oven	67[1]	26	74.5	29	45	18	95[2-3]	209[2-3]
Computer[3, 4]	48	19	20	8	43	17	12	27
Monitor[3]	16	7	46	18	32	13	4	8
Keyboard[3]	23	9	46	18	5	2	1	2

[1] The touch screen protrudes 7 cm from the front of the TRACE 1310 GC.

[2] The mass of the GC is intended without injector/detector modules. The mass of each injector/detector module is 0.8 kg (1.77 lbs).

[3] The Auxiliary Oven width is 30 cm (12-in.) while its height and depth are the same of the GC. The mass of the Auxiliary Oven is intended with all the options installed.

2. Supply a 1-in. i.d. hose to a fume hood or other suitable exhaust port. Consult local Environmental and Safety Regulations for instructions in exhausting fumes from your system.

Allow at least 30 cm (12 in.) of clearance behind the instrument. This space allows for venting of the hot exhaust, clearance of the gas lines, electrical connections, access to power switch, and horizontal movement of the TriPlus RSH/TriPlus “Y” axis arm.

3. Make sure you have at least 92 cm (3 ft.) of clearance above the system. This space allows room for optional accessories (such as autosamplers) and proper heat dissipation.

Make sure your workbench can support the instrument. Keep in mind, additional instruments add to the total weight.

Ensure that your work area is stable and free of vibration from nearby equipment. It is a sensitive instrument.

Lighting Requirements

Use the following guidelines to check the lighting of your site:

1. Ensure that your work area is properly lit. You may need an overhead lamp to light your work area.
2. You may need a small, high-intensity lamp when you clean the instrument.

Power Requirements

Use the following guidelines to ensure your site is equipped with enough power to support the system.

1. Test the power source quality in your laboratory to offset line voltage problems. Improving power source quality is a complex task best handled by a company or consultant specializing in that field. Contact your regional Thermo Scientific Customer Service office for assistance in locating a power consultant. Having a poor quality power source degrades the system performance. Here are some examples of poor power source quality:
    - Harmonic Distortion is a high-frequency disturbance that appears as distortion of the fundamental sine wave. Total harmonic distortion should be less than 6%.
    - Sags are constant low line voltage, which cause the system to function erratically or not at all.
    - Slow changes are gradual, long-term changes in average root mean square (RMS) voltage level, with typical durations greater than 2 s.
    - Surges are constant high line voltage, which cause overheating and component failure. Sags and surges are slow changes in average root mean square (RMS) voltage level, with typical durations between 50 ms and 2 s.

- Transients, even of a few microseconds duration cause electronic devices to fail or to degrade and significantly shorten their lives. Transients (or impulses) are brief voltage excursions of up to several thousand volts with durations less than 50 ms.

2. If your laboratory's power source does not meet the previous requirement, you need to get a UPS (Uninterruptible Power Supply) or power line conditioner. UPS system must produce high-quality distortion-free power within our specifications.

   A power line conditioner is more suitable for conditions in which a laboratory's power has sags, harmonic distortion, surges and transients. In this situation, a power line conditioner will maintain a smooth and steady power source to the instrument so that your data will be unaffected by a power surge.

3. Use Table 3 to determine how many circuits and wall outlets you need and for a list of maximum current and power consumption. Keep in mind:

   a. Power must be single phase.

   b. Wall outlets must have earth-ground hard-wired to the main panel.

   c. Included power cords are at least 2 m (9 ft.) long.

   d. Look at your Customer Sales Order to determine if the instrument is 120 Vac or 230 Vac, because it cannot be re-configured once your field service engineer arrives.

   e. Contact your local Customer Service office to discuss power cord sets concerns.

Table 3. System Power Requirements

Equipment	Max. Current (A) at 120 Vac	Max. Current (A) at 230 Vac	Max. Power (VA)
TRACE 1300 GC	16	10	2000
TRACE 1310 GC	16	10	2000
TRACE 1310 Auxiliary Oven	6	3	650

Note The 230 Vac power cord terminates to bare wires. Inform your local Customer Service office as to your plug type so they can bring the proper power cord or plug.

4. Make sure you have at least three (3) separate circuits. They should be within 2 m (6 ft.) of the instrument.

   For example, use one circuit for the TRACE 1300/TRACE 1310 GC, one circuit for the TRACE 1310 Auxiliary Oven, one circuit for the mass spectrometer, and one circuit for the data system and any options. But, do not connect the TRACE 1300/TRACE 1310 GC and mass spectrometer to the same circuit. The extra outlets are for additional options.

5. Make sure that the instruments you plug in do not exceed the maximum circuits and current rating.

LAN Network Requirements

The connection between the TRACE 1300/TRACE 1310 GC and the Thermo Scientific data system must be carried out via Local Area Network (LAN).

Your lab must be provided with one or more RJ-45 wall outlet. To connect your system to your site's LAN network, you must have a shielded twisted pair network cable provided.

In the case a LAN is missing, the instrument could be connected directly to the LAN inlet on the PC by using the red cable.

Note We are not responsible for connecting to or establishing communication with your site LAN network. The FSE will test the system's ability to communicate on a mini-hub or LAN switch only (preferable).

Environment Requirements

The classification of the instrument includes the following Environmental Conditions.

- Indoor use only.
- Altitude up to 2000 meters.
- Temperature from 15 to 35 °C.
- Maximum relative humidity between 40% and 80%.
- Voltage variations not exceeding percentage of the nominal value.
- Transients according to installation categories **II**.
- Degree of pollution according to IEC 664 (3.7.3) **2**.
- Protection degree **IP00**

The TRACE 1300/TRACE 1310 GC + TRACE 1310 Auxiliary Oven operates in an environment where normally only non-conductive pollution occurs, but in which temporary conductivity due to condensation must be expected. This is a Pollution Degree 2 environment, as specified in International Standard EN 61010-1: 1993 and subsequent amendments.

Use the following guidelines to ensure your site has the proper environmental conditions for the system:

1. Ensure that your room temperature is 5-40 °C (41-104 °F). The analytical performance is only confirmed for temperatures between 15-35 °C (59-95 °F). For best performance, the operating temperature should be constant. Use the table below to calculate the amount of heat your system will generate and ensure your air-conditioning system can handle that amount of heat.

Table 4. Maximum Heat Output

	Instrument	Heat Output (in Btu hr-1)	Heat Output (in W)
Standard Equipment	TRACE 1300/TRACE 1310 GC [120 Vac]	6830	2000
	TRACE 1300/TRACE 1310 GC [230 Vac]	6830	2000
	TRACE 1310 Auxiliary Oven [120/230 Vac]	2220	650
	Computer[1]	1365	400
	Monitor[1]	85	25

[1] Power requirements vary by manufacturer.

2. Ensure that the relative humidity in your laboratory is between 40 and 80%, with no condensation. A temperature and humidity monitor in your laboratory helps ensure that the climate is within these specifications.

3. Ensure that the air in your site is free of excess **particulate matter**.

   For reference, the air should contain fewer than 100,000 particles (larger than 5 µm) per cubic meter. If the concentration is larger than this amount, dust can accumulate on electronic components. This accumulation reduces their ability to cool off properly and could cause them to overheat. If your environment is particularly dusty, we recommend that you purchase the optional dust filter for your system.

4. Ensure that your site is free of electrostatic discharge (ESD), which may damage the electronic components of your system. Ensure your static has been discharged before touching internal components of the instrument. ESD can damage sensitive components, resulting in premature failures.

   Take the following precaution to prevent electrostatic discharge:

   - Use a static-dissipating floor covering (such as tile or conductive linoleum) in the room housing your instrument.
   - Use laboratory chairs covered with natural fibers or other static-dissipating material.
   - Wear laboratory coats and clothing made from natural fibers or other static-dissipating material.
   - Do not place polystyrene (foam) cups or packing materials on the instrument.

Gas Equipment Requirements

Use the following guidelines to make sure you have the gas supplies for your system ready far in advance of installation. You will need a supply of ultra-high purity GC gases.

Receiving Instruments

When you receive the TRACE 1300/TRACE 1310 GC + TRACE 1310 Auxiliary Oven system:

1. Inspect the boxes for damage when the instrument arrives. Our instruments are shipped by electronic equipment carriers who specialize in the handling of delicate equipment. Occasionally, however, equipment is inadvertently damaged in transit. If you notice evidence of external damage, do not refuse shipment. Instead, call Customer Service.
2. Once you have finished inspecting your shipment, move the cartons to a protected location, preferably the installation site. Leave the boxes as complete as possible and do not unpack or open the boxes without our Field Service Engineer (FSE) present. Doing otherwise may void your warranty or order.
3. Complete the Installation Request Form located at the front of this guide and forwards it to Customer Support.

What Happens Next?

After the Installation Request Form is received, Customer Support will contact you to schedule the installation of your system. It is important to confirm that all the requirements on the form are met BEFORE the Field Service Engineer arrives.

The Field Service Engineer will install the system and confirm that all performance tests pass.

2

TRACE 1310 Auxiliary Oven Overview

This chapter provides a detailed overview of the TRACE 1310 Auxiliary Oven configurations.

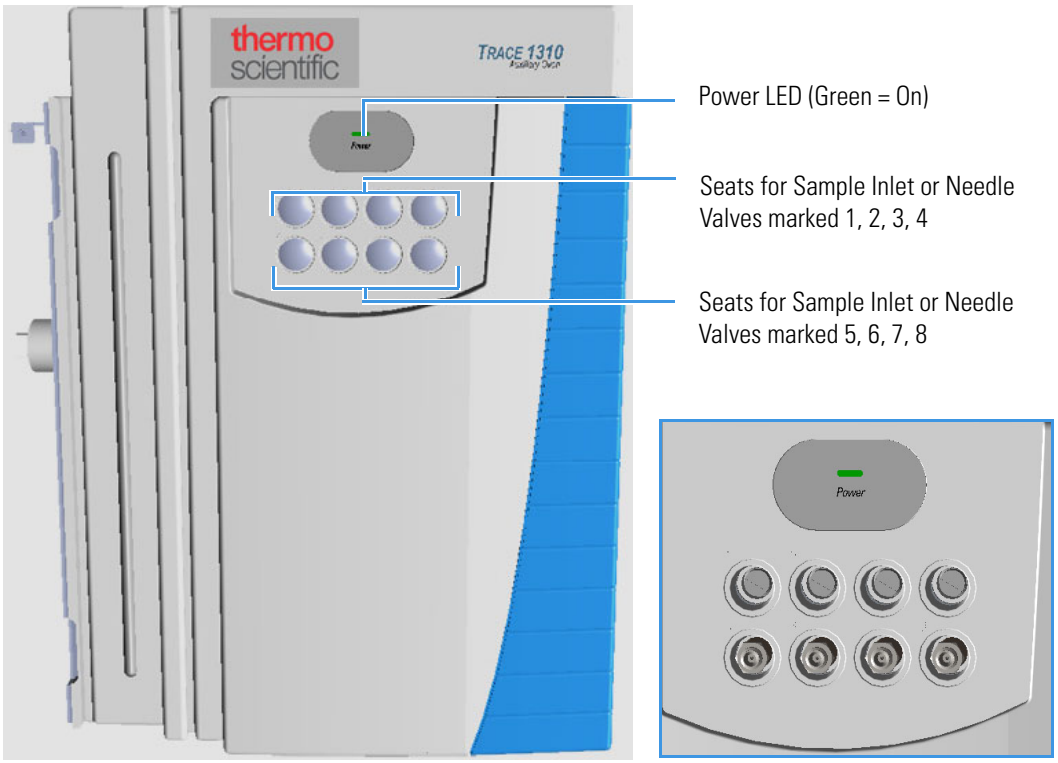
Contents

- Front View
- Top View
- Back View
- Right View
- Left View
- Internal View
- Main Oven
- Label Location on the Instrument
- Tools Needed

Front View

Figure 2 shows the components located on the **front** panel.

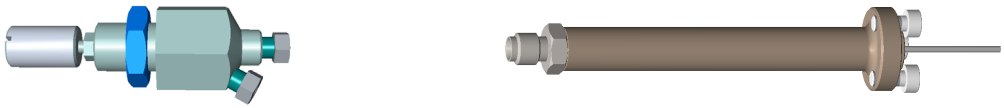
Figure 2. TRACE 1310 Auxiliary Oven Front View



The components are:

- The **power LED** with a small inlay located on the front is the user interface.
  - When the LED lights **Green** the TRACE 1310 Auxiliary Oven is powered **On**
- **Eight seats** marked **1**, **2**, **3**, **4** and **5**, **6**, **7**, **8** for the installation of up to eight **heated** needle valves, or up to eight sample inlet fittings. See Figure 3.

Figure 3. Needle Valve and Sample Inlet Fitting with Extension



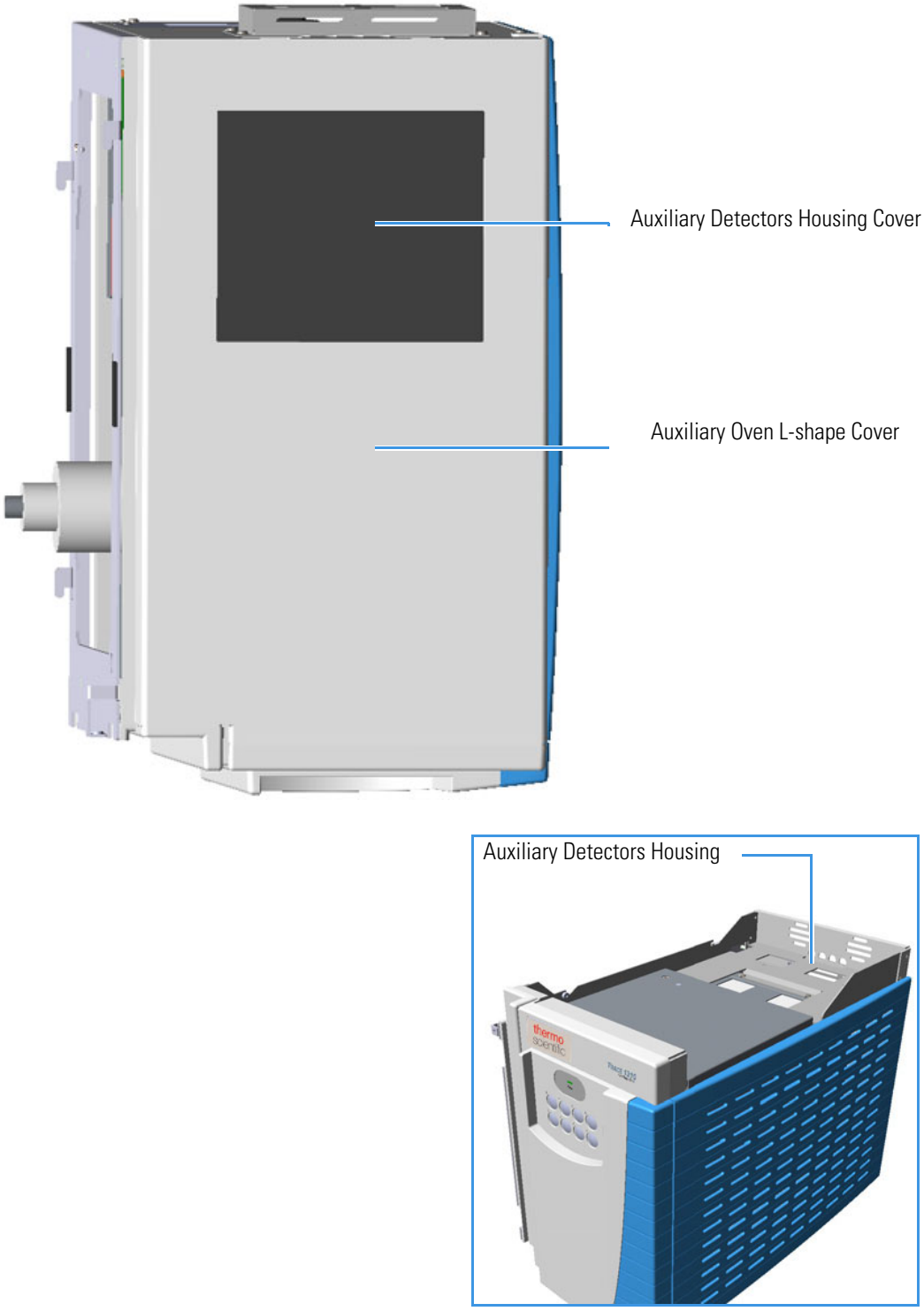
Needle Valve

Sample Inlet Fitting with Extension

Top View

Figure 4 shows the components located on the **top** of the TRACE 1310 Auxiliary Oven.

Figure 4. TRACE 1310 Auxiliary Oven Top View



The components are:

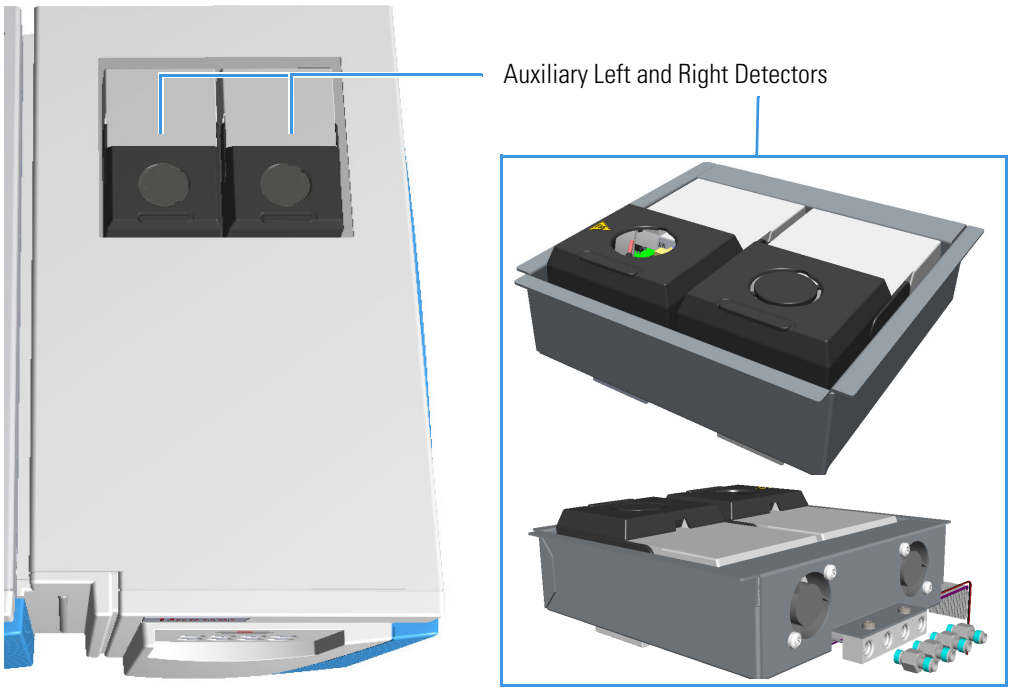
- The **Auxiliary detectors housing** where up to two of the same detectors modules used in the main GC can be optionally installed obtaining a configuration with a maximum of four detectors: two installed into the GC and two into the Auxiliary Oven.

  The detectors housing is accessible removing the L-shape cover of the Auxiliary Oven.

  IMPORTANT Before installing the auxiliary detector modules, the black cover of the detector housing must be removed unscrewing the four fixing screws from the L-shape cover.

  The detectors installed into the TRACE 1310 Auxiliary Oven are identified as **Aux L** and **Aux R**.
  The example in Figure 5 shows both the left and right auxiliary detectors installed into the proper housing.

Figure 5. Auxiliary Left and Right Detectors



If the TRACE 1310 Auxiliary Oven is configured with a single detector module, a dummy module is inserted instead of the missing detector module.
Each position has its own electrical and gas connections.

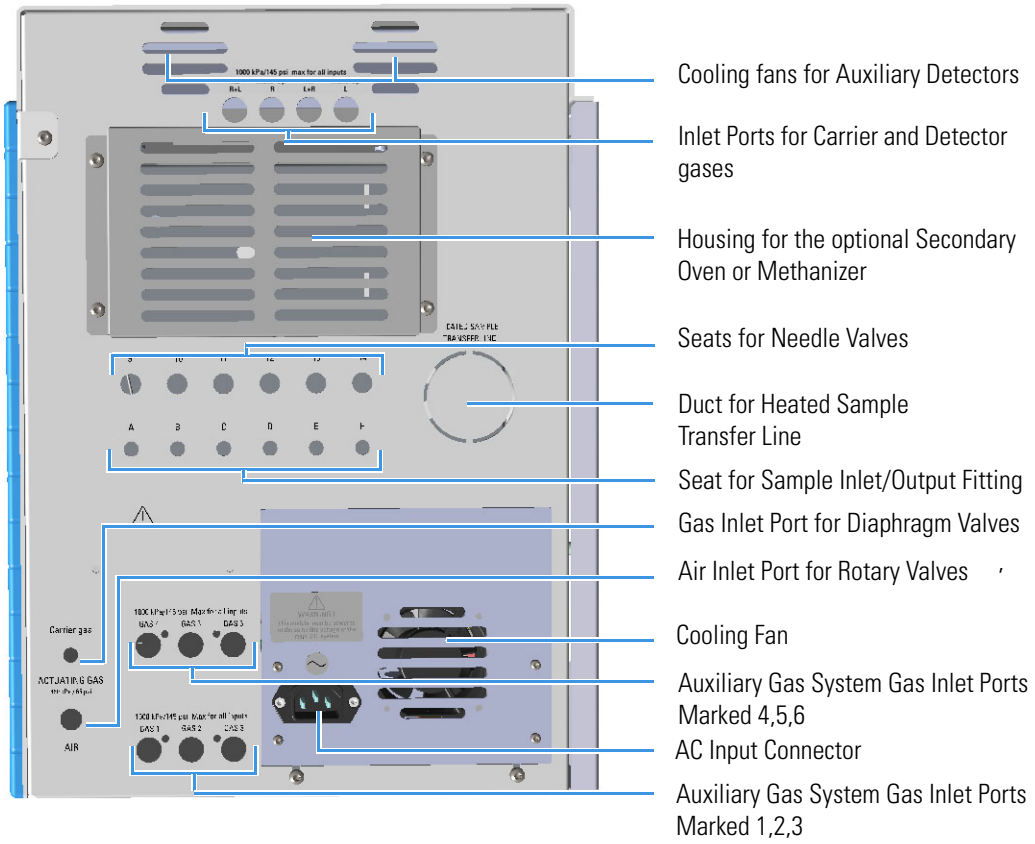
Note When a dummy module is installed, its gas connection is closed by a plug.

When the detector module is correctly installed and fixed into its own site, the fitting for the column connection protrudes into the interior of the main oven through the top wall. See "Main Oven" on page 24.

Back View

Figure 6 shows the components located on the **back** of the TRACE 1310 Auxiliary Oven.

Figure 6. TRACE 1310 Auxiliary Oven Back View



The components are:

- Four inlet ports for carrier gas and auxiliary detector gases marked **H2 R+L**, **Make-Up R**, **Air L+R**, and **Make-Up L**.
- Up to two fans for the cooling of the auxiliary detectors.
- Six seats marked **9**, **10**, **11**, **12**, **13**, and **14** for the installation of unheated needle valves.
- Six seats marked **A**, **B**, **C**, **D**, **E** and **F** for the installation of sample inlet/outlet fittings.
- A duct for the connection of a heated sample transfer line.
- An **ACTUATING GAS** inlet port for the carrier flow connection marked **Carrier Gas** for the actuation of the AFP™ diaphragm valves. The inlet pressure is 450 kPa; 65 psi.
- An **ACTUATING GAS** inlet port for the actuating flow connection marked **AIR** for the actuation of the VICI ® rotary valves, VICI ® valves for liquid sample (ASFVO), or both. The inlet pressure is 450 kPa; 65 psi.

- An optional **secondary column oven** or an optional **methanizer** installed instead of the optional secondary column oven.
- Up to six pressure channels by using up to two **Auxiliary Gas** system. The three lower inlet ports are marked **Gas 1**, **GAS 2**, **GAS 3**, while the three upper inlet ports are marked **Gas 4**, **GAS 5**, **GAS 6**.

CAUTION A maximum of two Auxiliary Gas modules can be housed either in the GC or in the Auxiliary Oven.

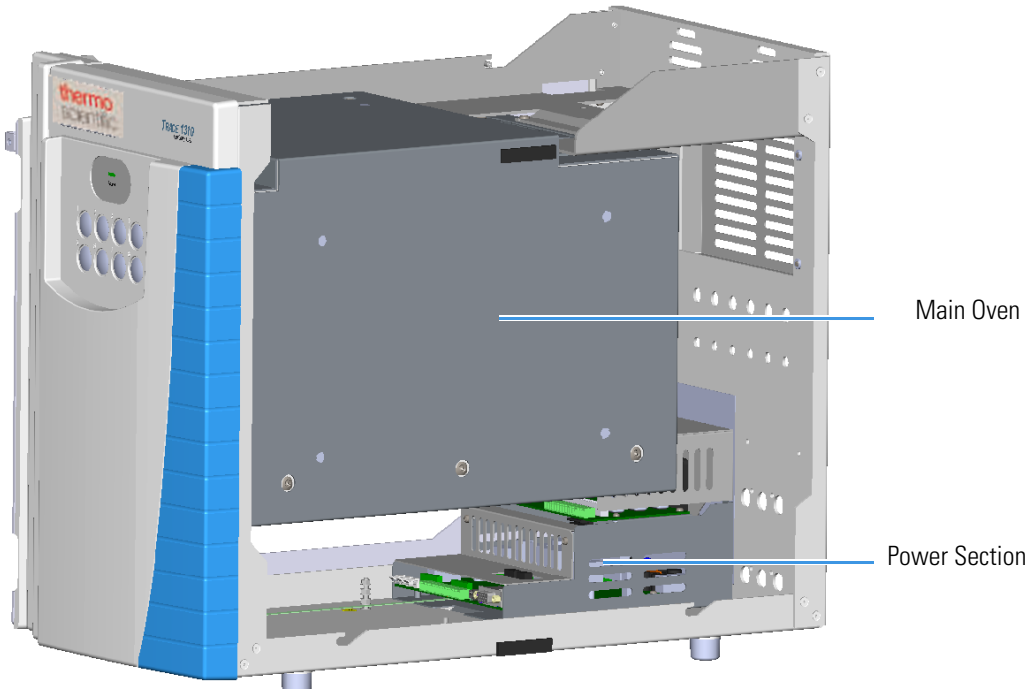
- A fan for the cooling of the TRACE 1310 Auxiliary Oven.
- AC input connector marked for the connection of the TRACE 1310 Auxiliary Oven to the mains through the power cable.
  The power rating is: 120/230 Vac, 50/60 Hz, 650 VA.

WARNING The TRACE 1310 Auxiliary Oven must be powered at the same line voltage of the main GC system.

Right View

Figure 7 shows the components located on the **right side** of the module when the L-shape cover is removed. For details see ""Internal View" on page 16".

Figure 7. TRACE 1310 Auxiliary Oven Right View



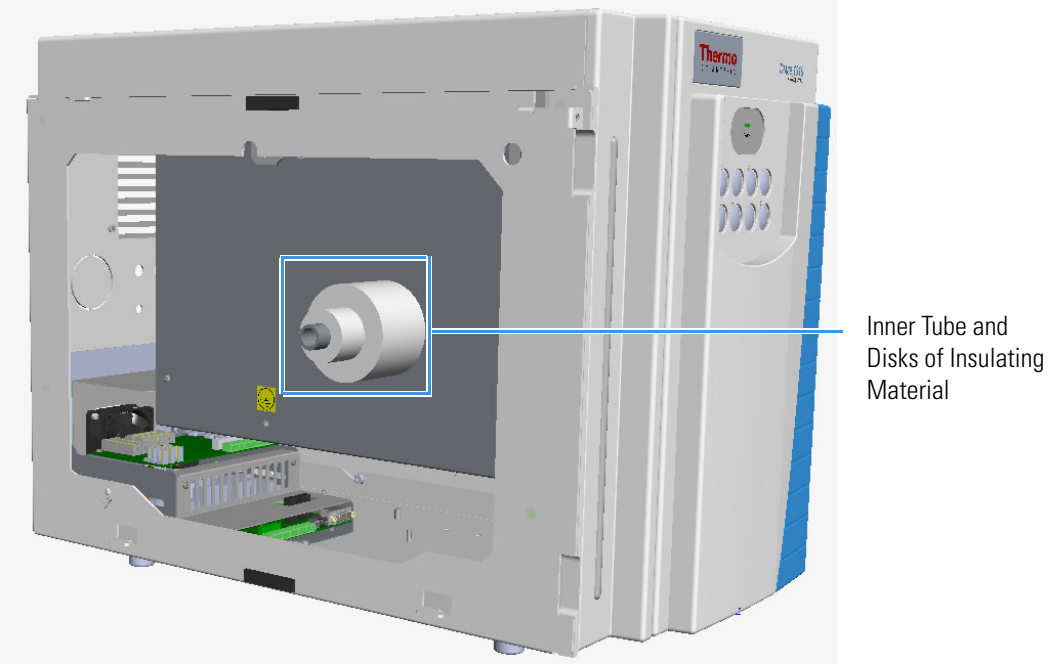
Left View

The **left side** of the TRACE 1310 Auxiliary Oven is factory hooked and fixed to the right side of the GC.

This part of the module includes the inner tube that protrudes into the GC oven for pneumatic connections between the two units.

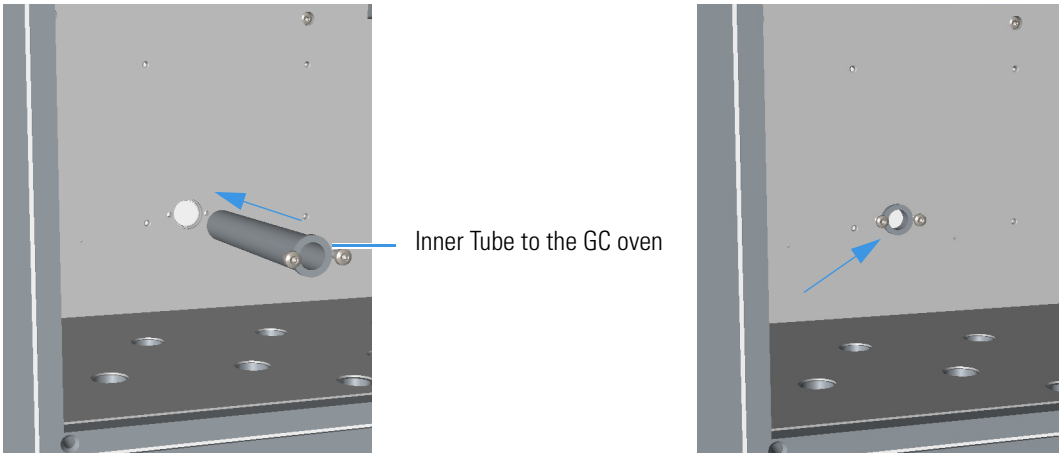
Figure 8 shows the left side of the module before the assembling.

Figure 8. TRACE 1310 Auxiliary Oven Left View



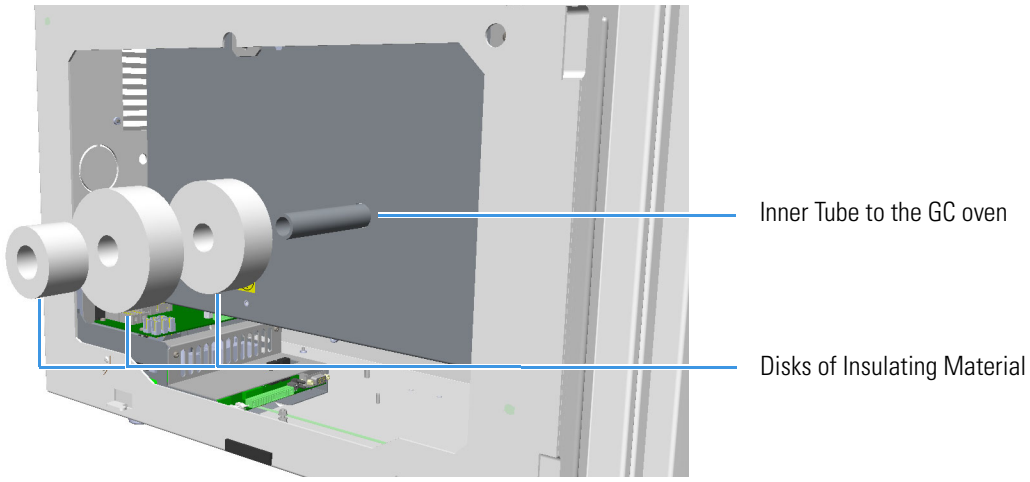
The inner tube to the GC oven is inserted and fixed into the passing hole provided in the wall of the main oven as shown in Figure 9.

Figure 9. Inner Tube to the GC Oven



The biggest insulating material disks are placed on the inner tube that protrudes from the wall of the main oven as shown in Figure 10. The smallest disk will be placed on the inner tube from the interior of the GC oven. See also "Coupling the TRACE 1310 Auxiliary Oven to the GC" on page 106.

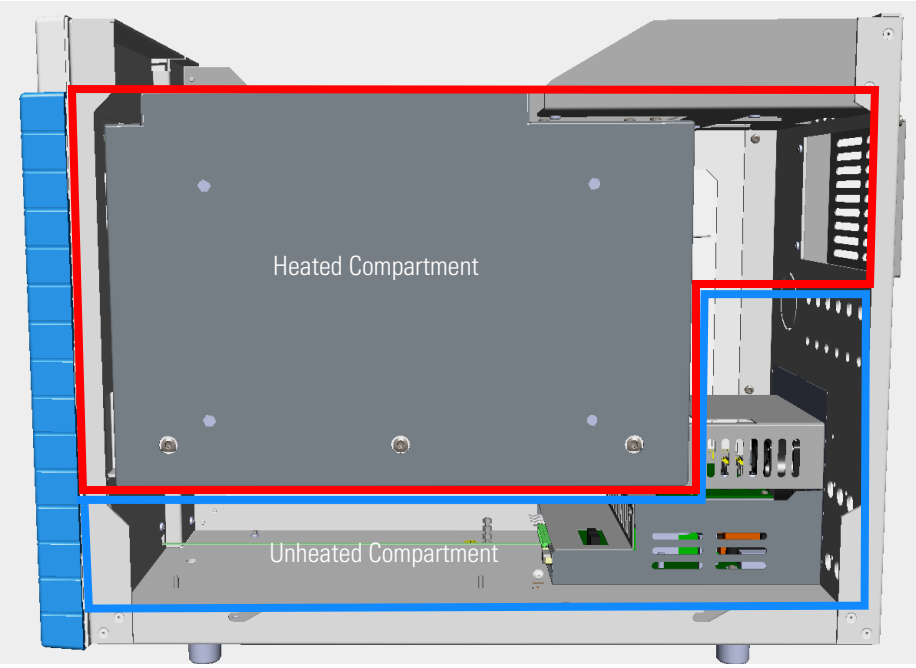
Figure 10. Placing Insulating Disks



Internal View

This section describes the components located inside the TRACE 1310 Auxiliary Oven in the maximum configuration. The interior of the Auxiliary Oven is divided into two compartments: **heated** and **unheated**. See Figure 11.

Figure 11. TRACE 1310 Auxiliary Oven Compartments

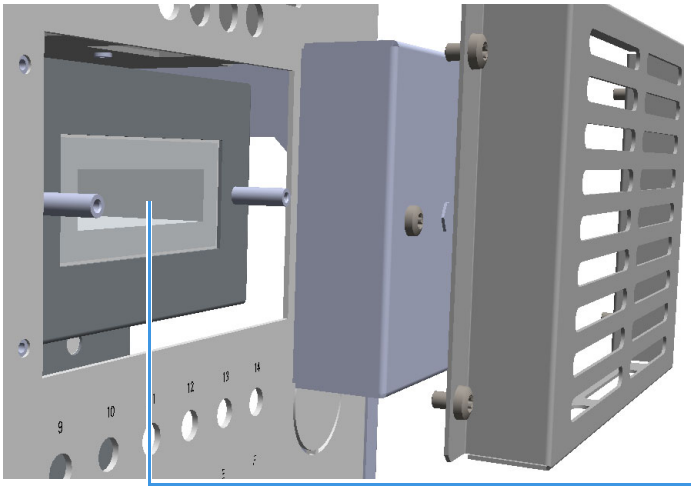


The Heated Compartment

The **heated** compartment includes:

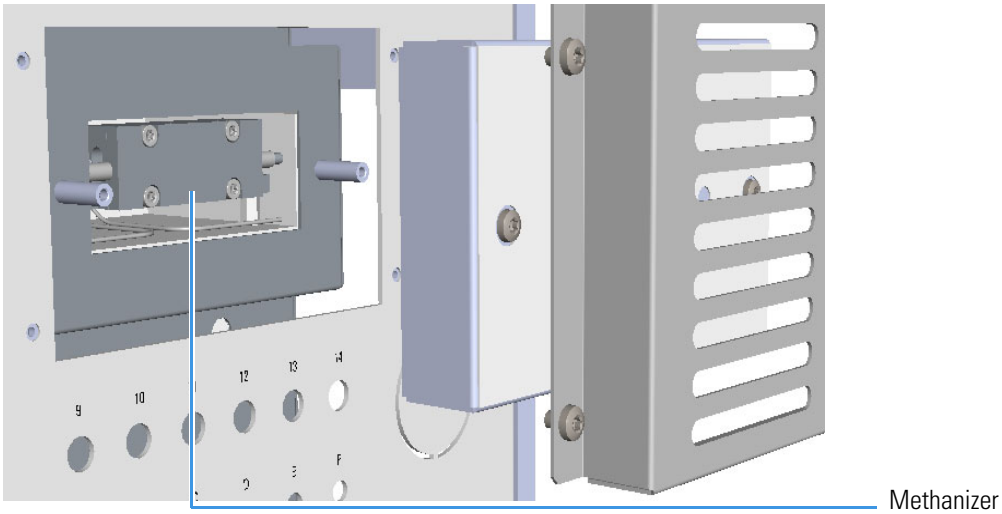
- The **main oven**. The working temperature is up to 250 °C if configured as Valve Oven, or up to 300 °C if configured as HT Valve Oven. See "Main Oven" on page 24 and Chapter 4, "Operation," for details.
- An optional **secondary oven** is accessible from the back removing its cover. See Figure 12. This option is required to keep the analytical column at lower temperature for applications using HT valves. The working temperature is up to 250 °C.

Figure 12. Optional Secondary Oven



- An optional **methanizer** installed instead of the optional secondary column oven. See Figure 13. The working temperature is up to 400 °C

Figure 13. Methanizer



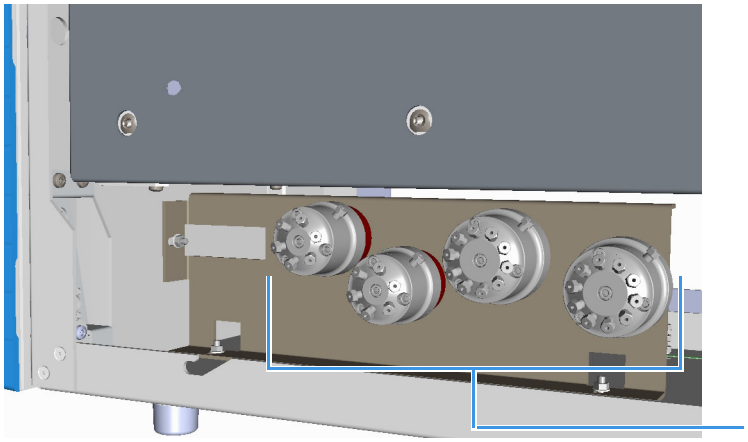
- **Analytical Columns** can be installed according to the application.

The Unheated Compartment

The **unheated** compartment includes:

- Up to four unheated 6-port and/or 10-port valves mounted on the proper bracket. See the example in Figure 14.

Figure 14. Unheated Valves



You can install the unheated valves in the following configurations:

– Up to four diaphragm valves. See the example in Figure 15 on page 18.

– Up to four rotary valves. See the example in Figure 16 on page 19.

– Up to two valves for liquid samples (each valves requires the proper rotary valve for the actuation, and the proper solenoid manifold). See the example in Figure 17 on page 19.

Figure 15. Unheated Membrane Valves

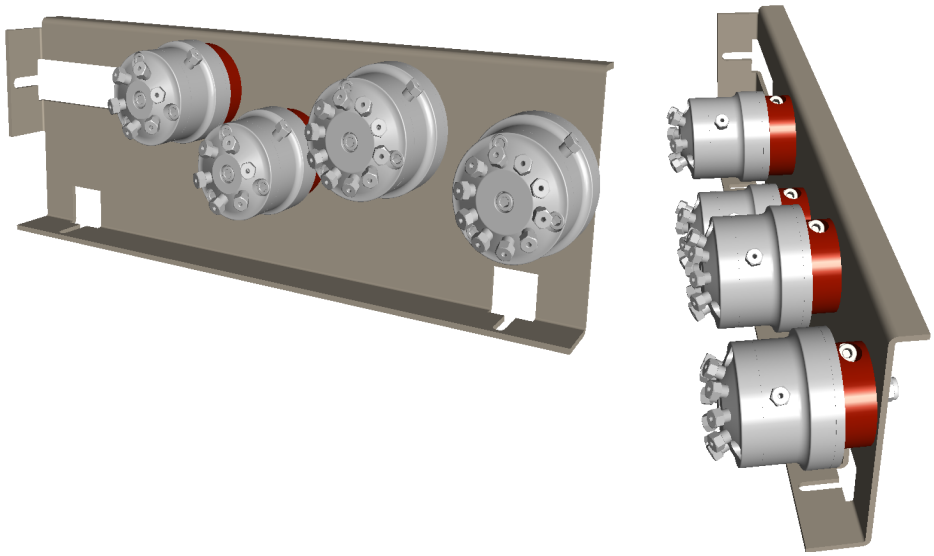


Figure 16. Unheated Rotary Valves

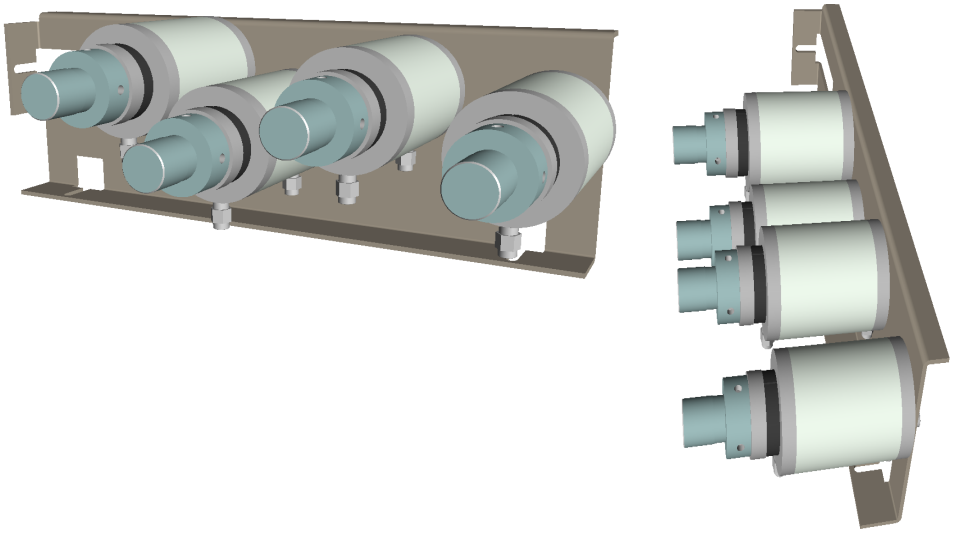
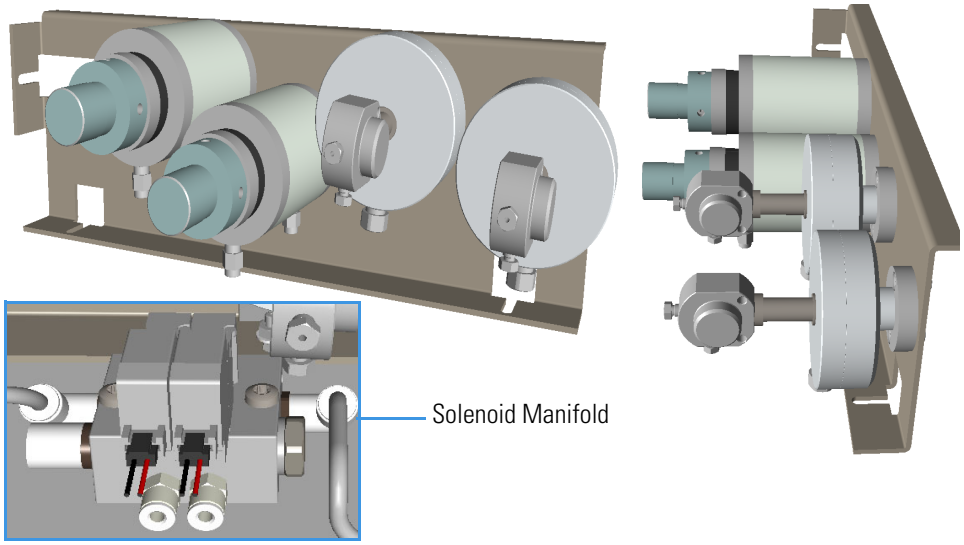
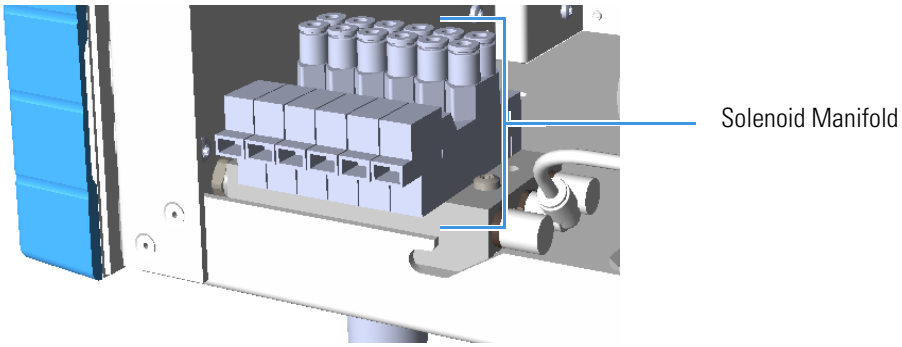


Figure 17. Unheated Valves for Liquid Sample



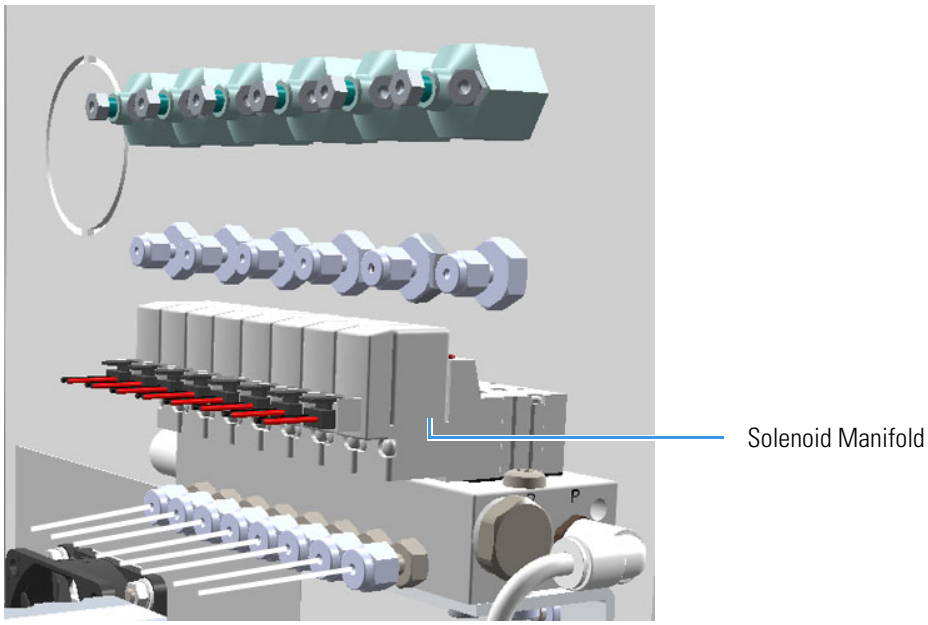
- A Solenoid manifold placed on the front floor for the pneumatic and electrical connections of up to six rotary valves. See Figure 18.

Figure 18. Solenoid Manifold for Rotary Valves



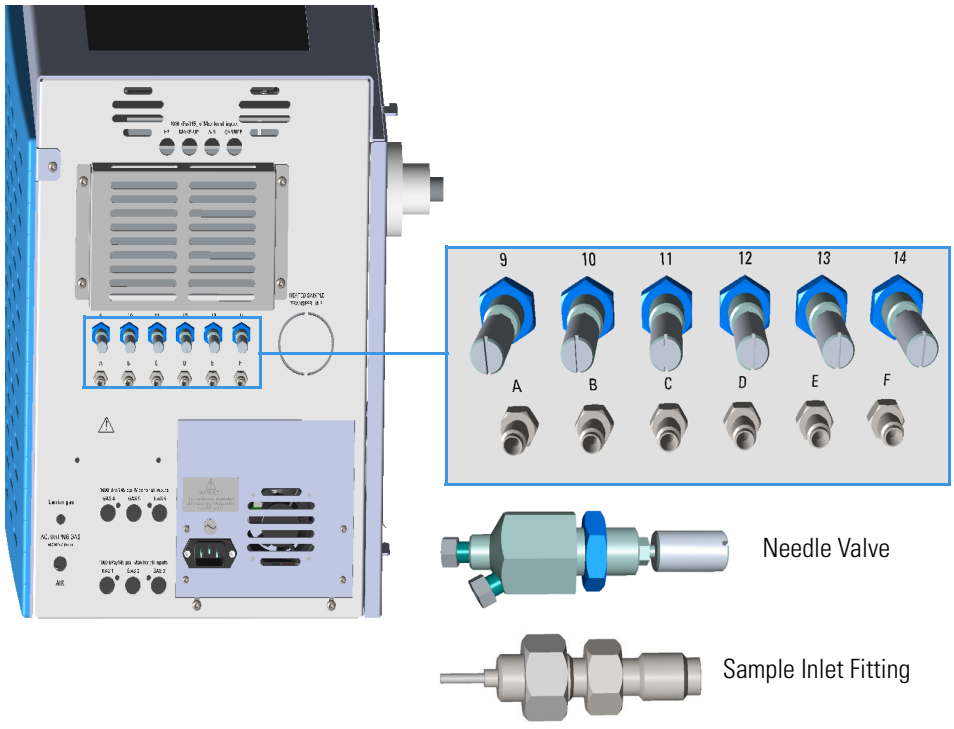
- A Solenoid manifold for the pneumatic and electrical connections of up to eight diaphragm valves. See Figure 19.

Figure 19. Back Solenoid Manifold for Diaphragm Valves

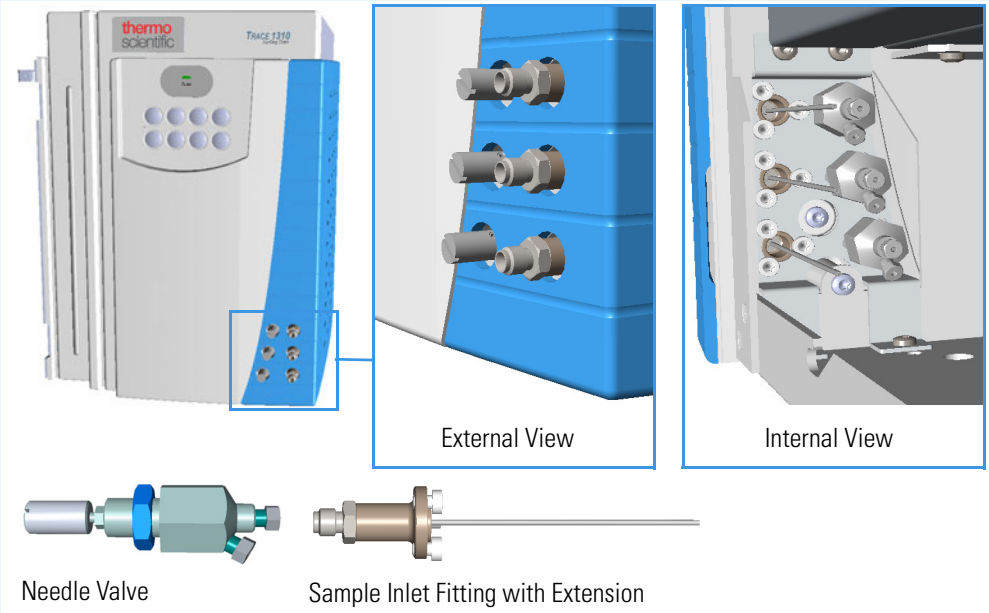


- Up to six **unheated needle valves**, and up to six **sample inlet fittings** mounted on the back of the instrument. See Figure 20

Figure 20. Unheated Needle Valve and Sample Inlet Fitting



Note Optionally it is possible mounting up to three unheated needle valves and sample inlet fittings on the front of the instrument if required.



- Up to six optional **pressure channels** by using up to two **Auxiliary Gas** modules. See Figure 21 and Figure 22.

Figure 21. Primary Auxiliary Gas Module

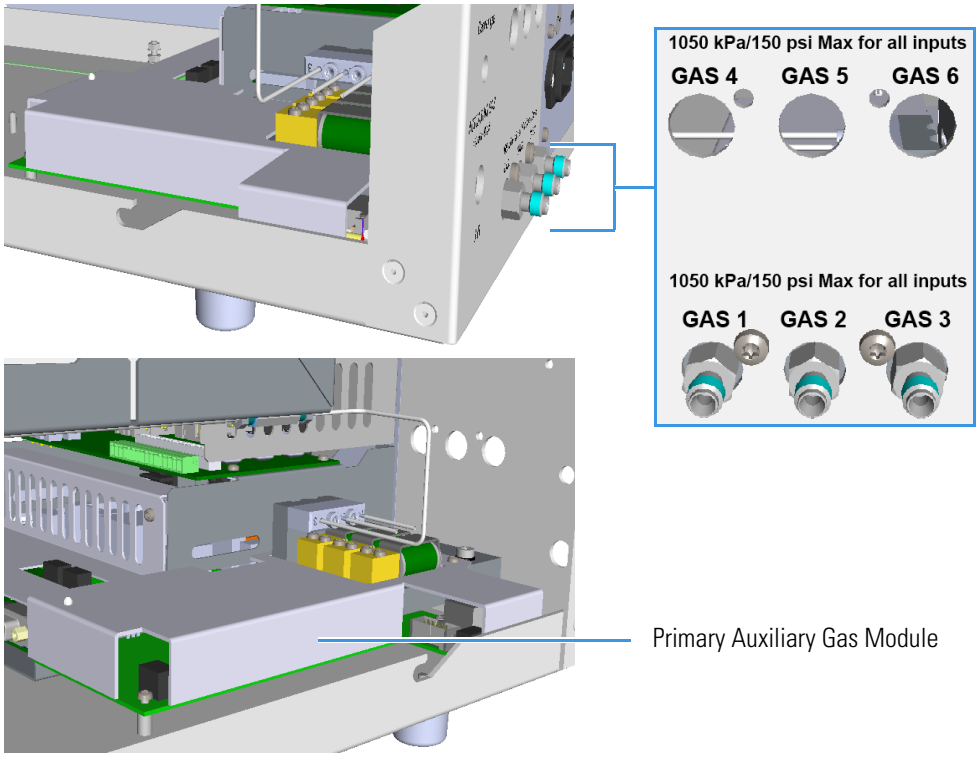
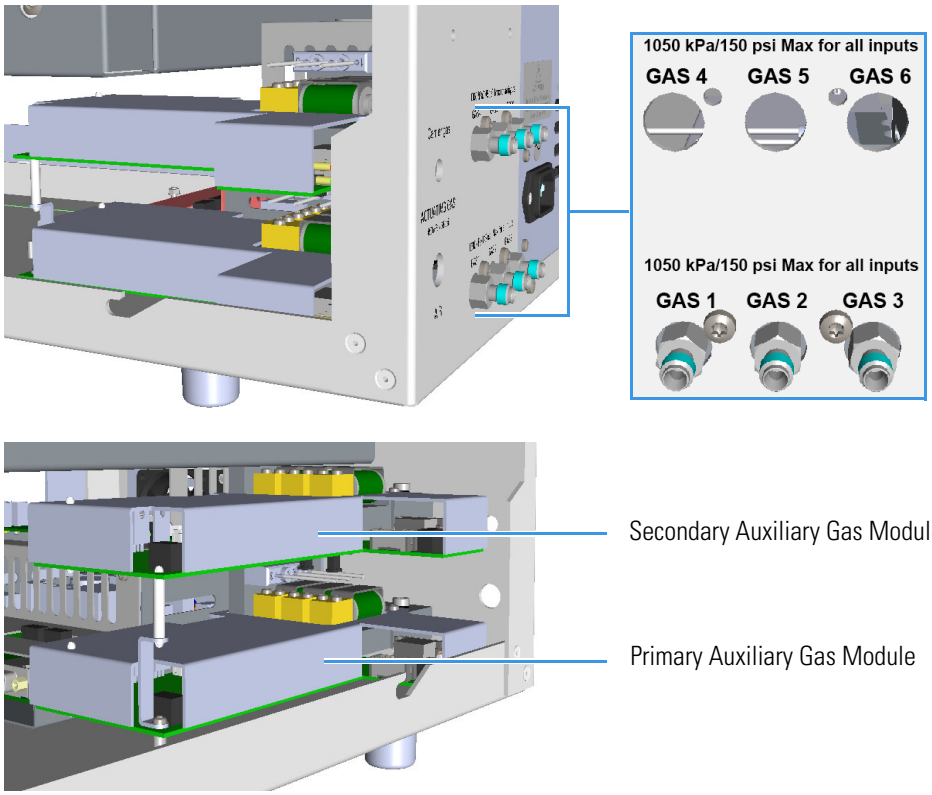
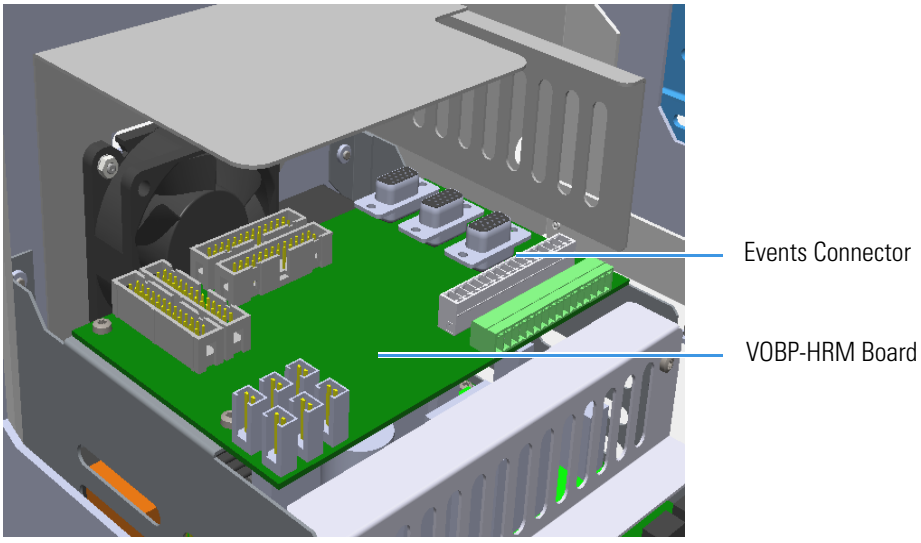


Figure 22. Primary and Secondary Auxiliary Gas Modules



- Eight **valve time events** available on the VOBP-HRM board located over the power section of the TRACE 1310 Auxiliary Oven. See Figure 23.
  The events can be up to 16 if an Aux Temperature/Cryo module is also installed in the GC.

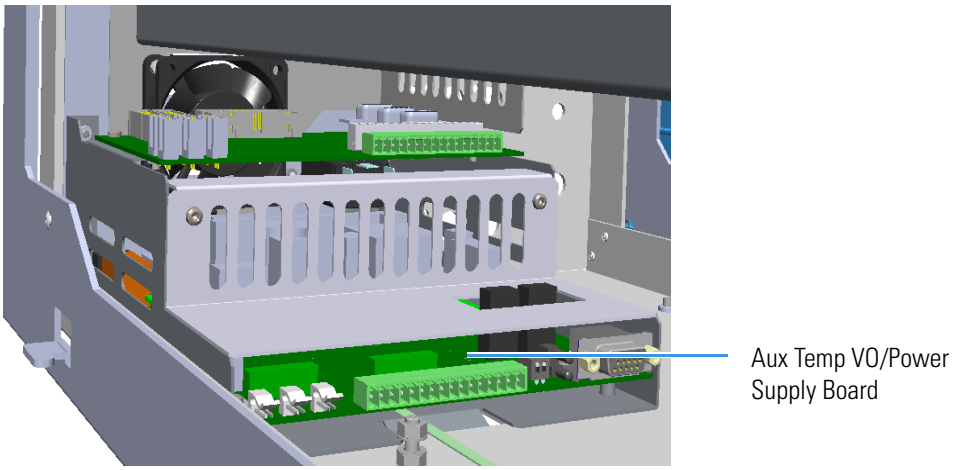
Figure 23. External Event Connector



- **Power** section. See Figure 24.

This section consist of the Aux Temp VO/Power Supply board. See Figure 24.

Figure 24. Power Section

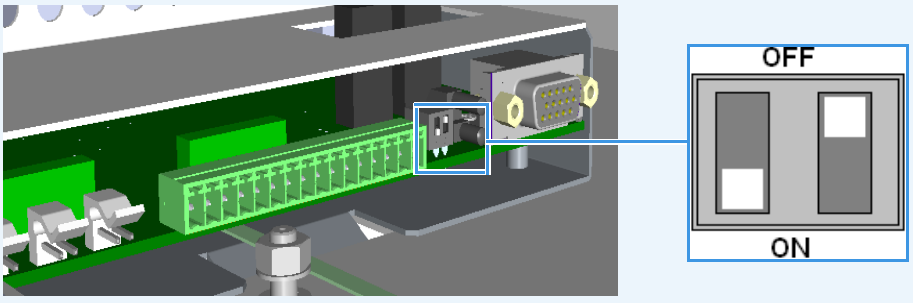


Four protecting fuses are present on the Aux Temp VO/Power Supply board. See Table 5.

Table 5. Protecting Fuses

Fuse	Type	Protections
F1	F5A 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

CAUTION The **Aux Temp VO/Power Supply board** must be properly configured so that the GC system recognizes the presence of the TRACE 1310 Auxiliary Oven. For that purpose verify that the **configuration switches** on the board are set as follows:



Main Oven

The main oven is accessible removing the L-shape cover that covers the top and the right side of the TRACE 1310 Auxiliary Oven. See Figure 25.

Figure 25. TRACE 1310 Auxiliary Oven L-shape Cover

To access the interior of the main oven remove the L-shape cover that covers the top and the right side of the heated main oven by unscrewing the five fixing screws (two on the top and three on the right side. See Figure 26.

Figure 26. Main Oven Fixing Screws

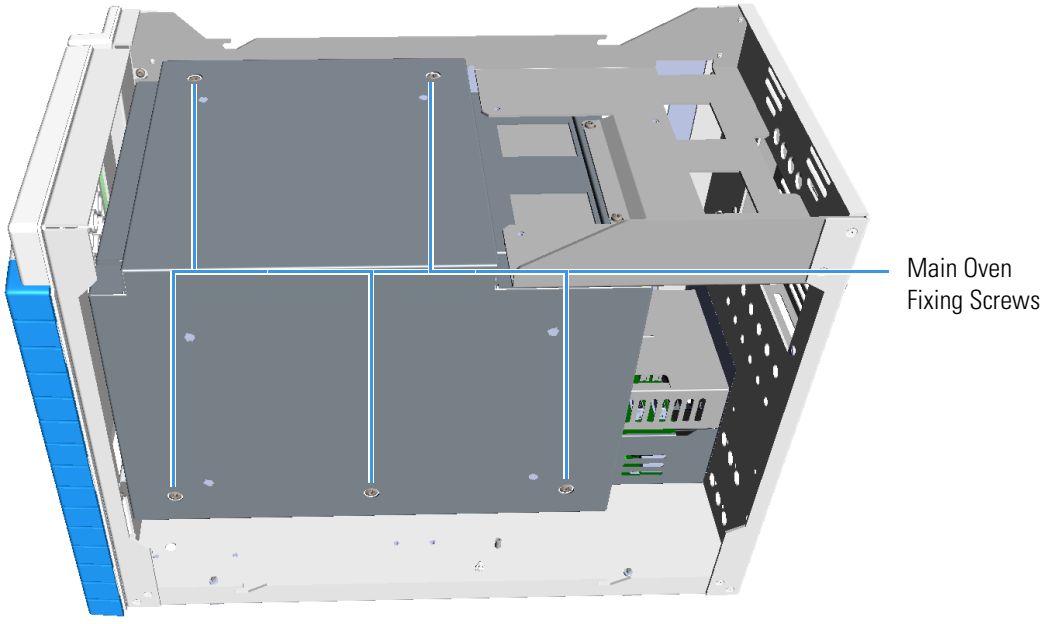


Figure 27 shows the interior of the main oven, the valve mounting holes for the installation of the valves, and the holes for the passage of the tubes.

Figure 27. Main Oven Holes Layout (1)

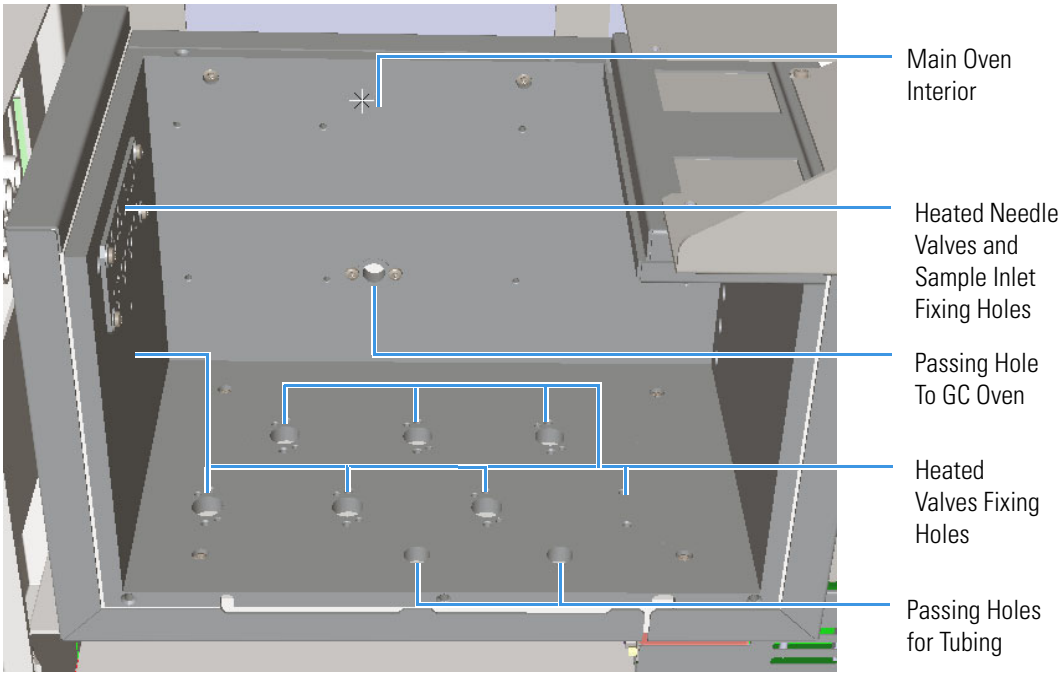
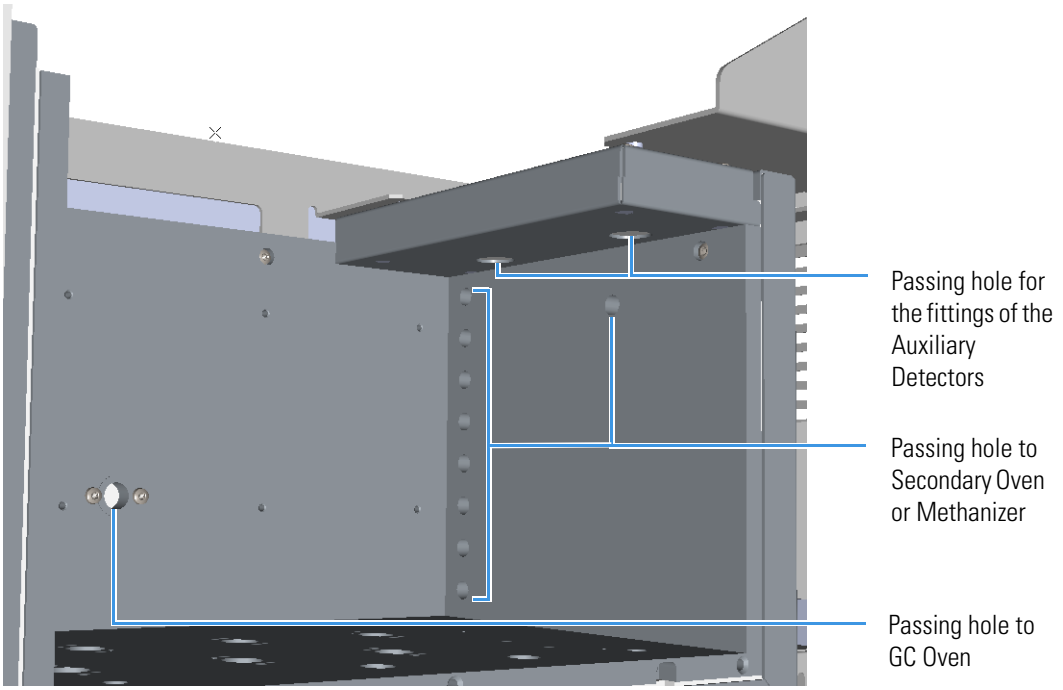


Figure 28 shows the holes through which the fitting for the column connection of each auxiliary detector protrudes into the interior of the main oven, the passing hole to the GC oven, and the passing holes to the optional secondary oven or methanizer.

Figure 28. Main Oven Holes Layout (2)



The main oven can contain up to **eight** sampling **diaphragm valves** (AFP™) or up to **six rotary valves** (VICI®), up to **eight** heated needle valves and up to **eight** heated sample inlet fittings accessible from the front side for sample transfer directly into the heated zone. See the example in Figure 29, Figure 30, and Figure 31.

Figure 29. Rotary Valves

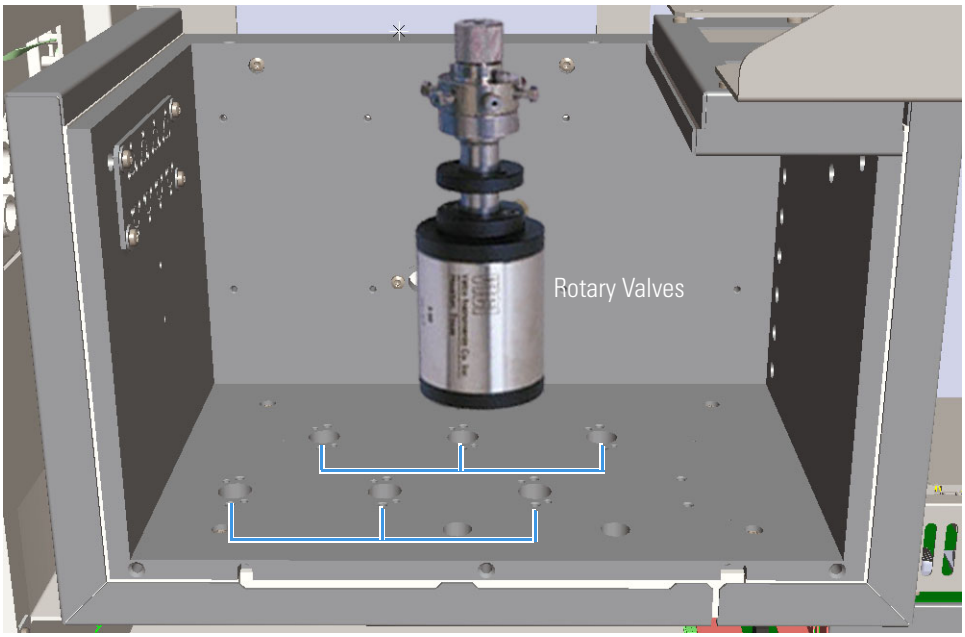
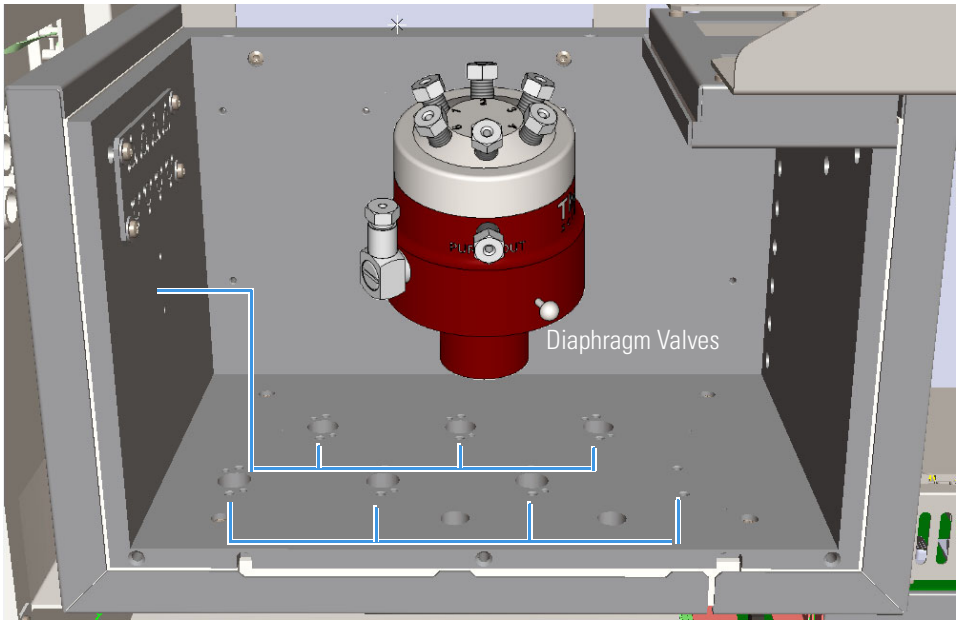


Figure 30. Diaphragm Valves



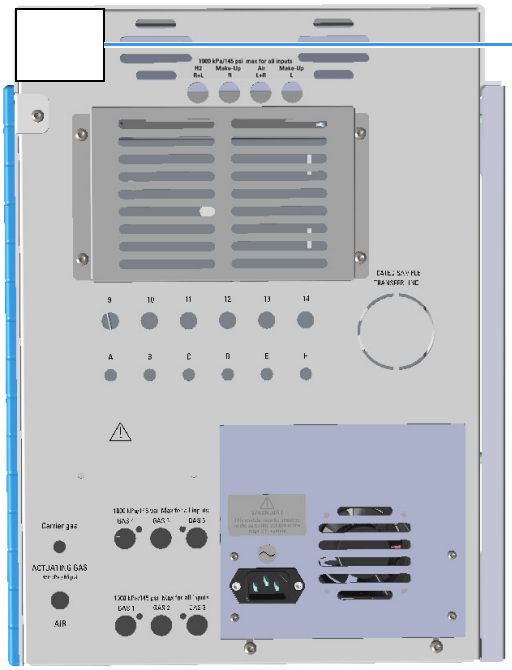
Note For convenience Figure 29 and Figure 30 show 6-port rotary and diaphragm valves. Rotary and diaphragm valves with ten ports are also available.

Figure 31. Heated Needle Valves and Sample Inlet Fittings

Label Location on the Instrument

The following illustrations show the location of the labels attached on the TRACE 1310 Auxiliary Oven.

Figure 32. TRACE 1310 Auxiliary Oven: Serial Number Label



TRACE 1310 Auxiliary Oven Serial Number and Electrical Data Labels

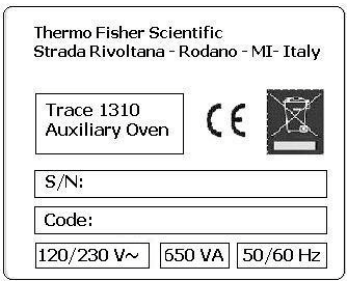
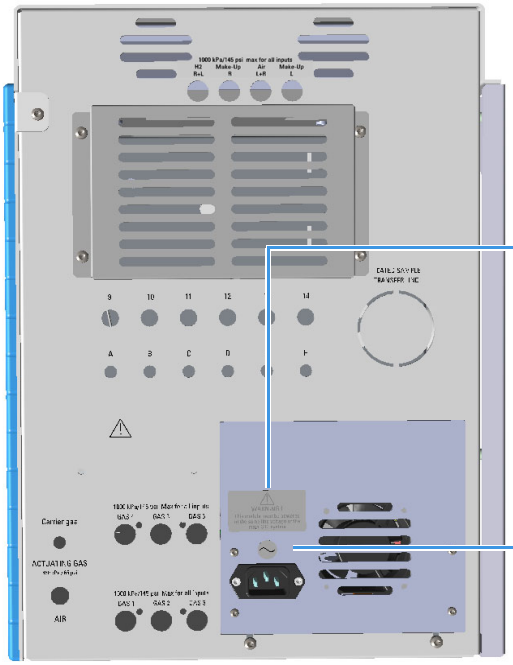
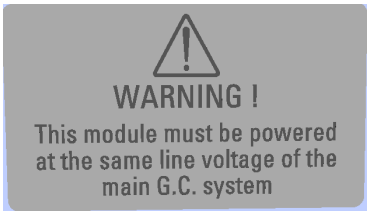


Figure 33. Power Supply: Alert Label



Alert Label



Alternating Current Label

Figure 34. Detector Auxiliary Modules: Hot Surface and Alert Labels

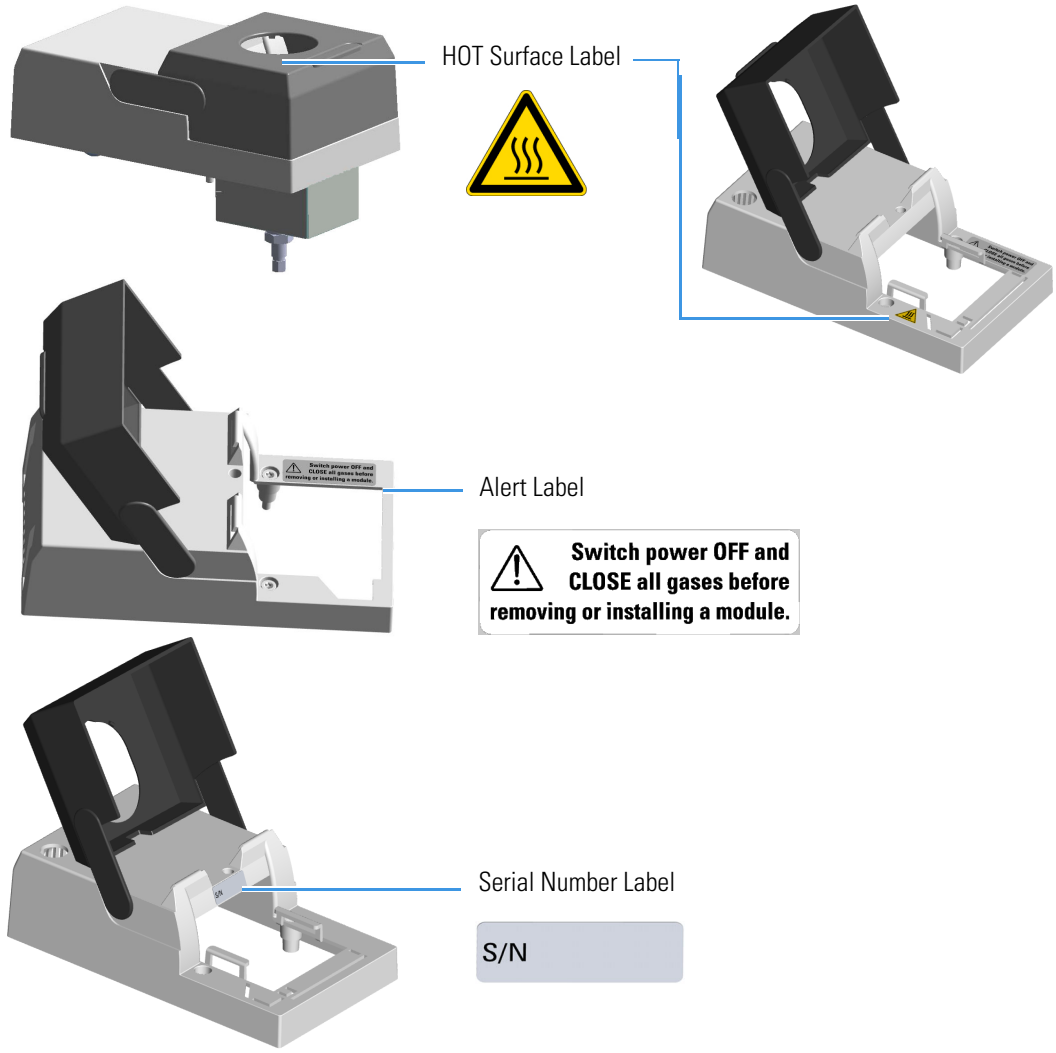


Figure 35. Secondary Oven and Methanizer: Hot Surface and Ground Labels

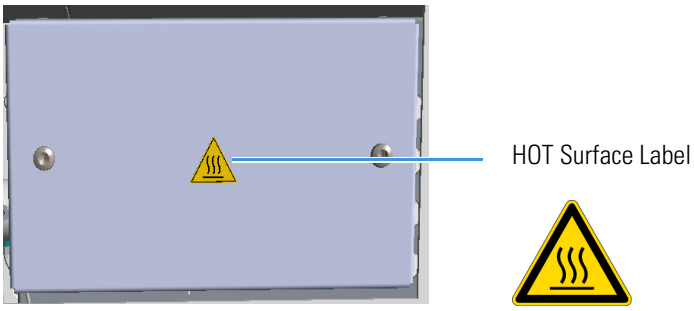


Figure 36. TRACE 1310 Auxiliary Oven Protective Conductor Terminal Label

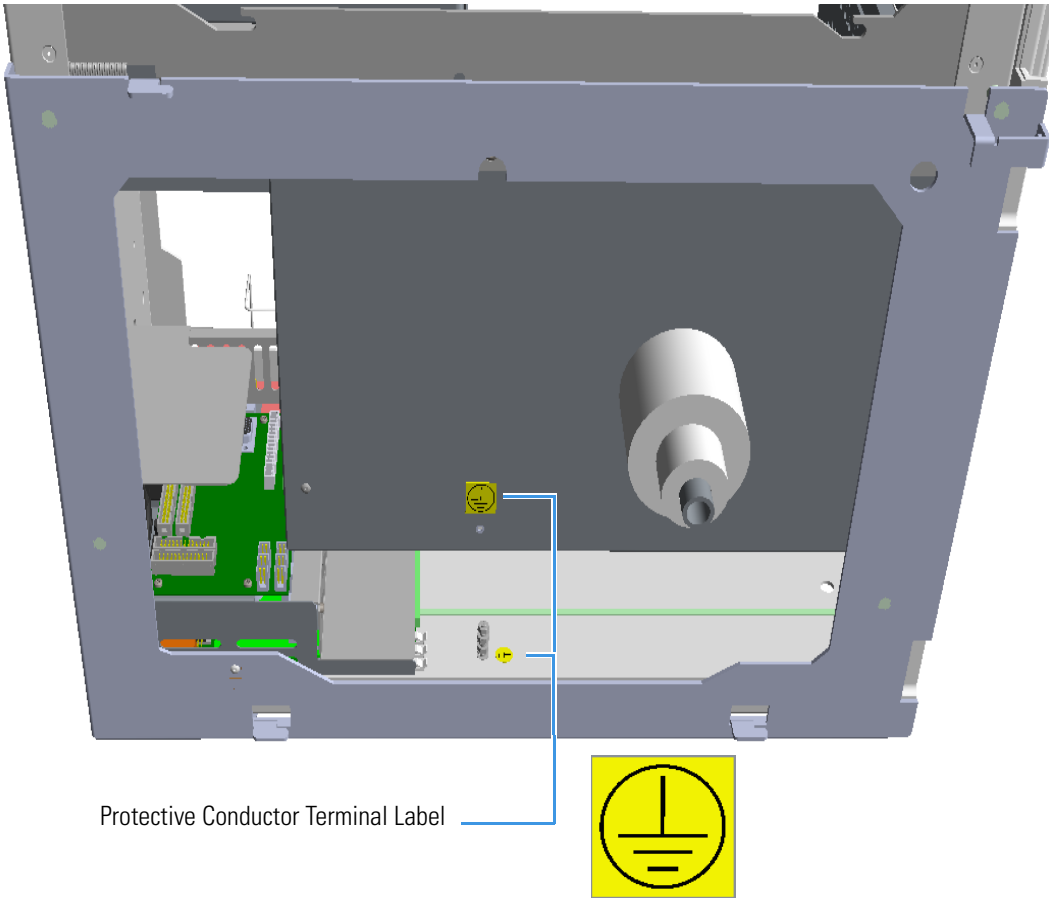


Figure 37. Secondary Oven and Methanizer: Protective Conductor Terminal Labels

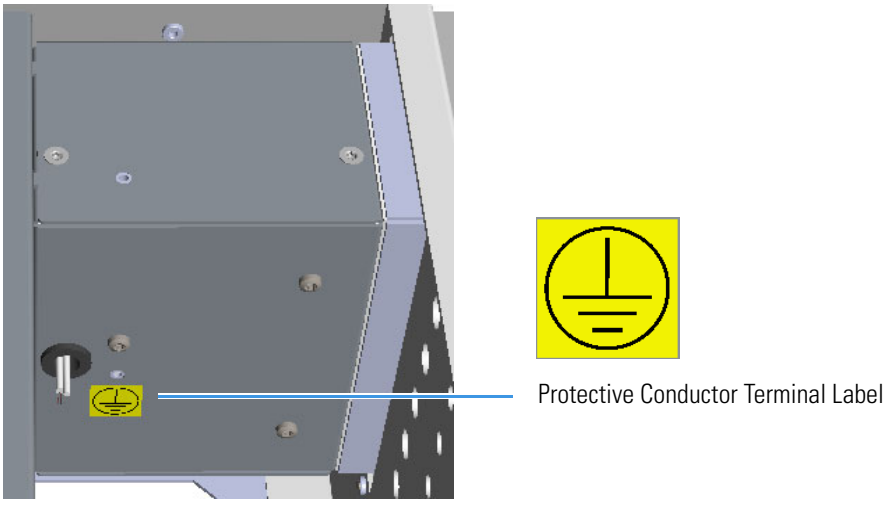
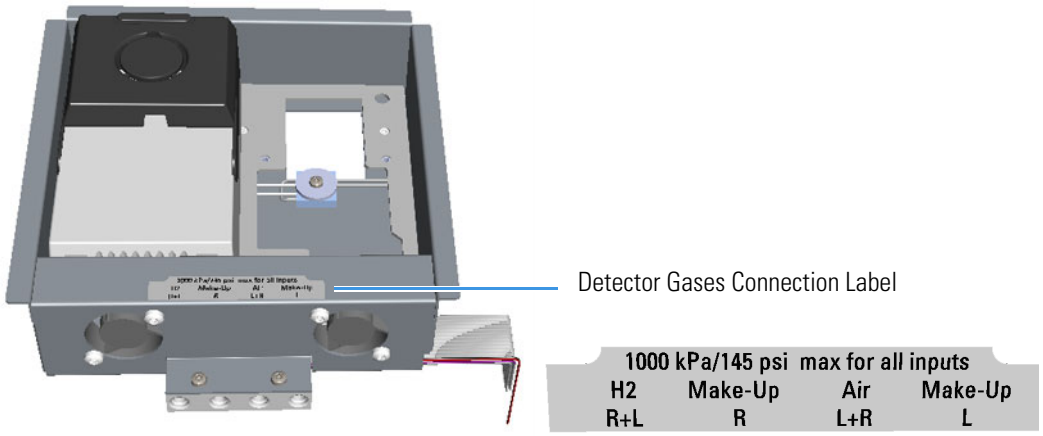


Figure 38. Auxiliary Detector Housing



Tools Needed

The tools needed for installing the components into the TRACE 1310 Auxiliary Oven are listed in Table 6.

Table 6. Tools Required (Sheet 1 of 2)

Tool	Interested Components
T30 Torxhead screwdriver	Main oven cover fixing screws
T25 Torxhead screwdriver	M5 screws of the Auxiliary Gas module (for example: the screw that plug the split inlet).
T20 Torxhead screwdriver	All the accessible M4 screws
T20 Torxhead L-shape wrench	All the inaccessible M4 screws (for example: to fix the solenoid valve manifold on the roof.
T10 Torxhead L-shape wrench	Auxiliary Gas board
T8 Torxhead L-shape wrench	Mixer (Tee fitting) installation on the Methanizer assemble
1/4- 5/16-in. open-end wrench	Valve head nuts
5/8-in. open-end wrench	Valco® needle valves
7/16-in. open-end wrench	Fittings crossing and 1/8-in. nuts
1/2-in. open-end wrench	Fitting nut on the rear panel
7-mm combo open-end wrench	Unheated valves and valves for liquid samples (ASFVO) on the plate
8-mm combo open-end wrench	Unheated membrane valves on the plate, and M5/10-32 fittings
3/8-in. Allen wrench	Actuator of the rotary valve

Table 6. Tools Required (Sheet 2 of 2)

Tool	Interested Components
3/16-in. Allen wrench	Dowel of the clamp ring for both the cdiaphragm valve, and valve for liquid sample
5/32-in. Allen wrench	Clamp ring of the diaphragm valve
9/64-in. Allen wrench	Clamp ring of the valve for liquid sample

3

Components Installation

This chapter provides instructions for installing and configuring the optional components such as valves, auxiliary gas modules, auxiliary detectors, secondary oven, methanizer, and others, in the TRACE 1310 Auxiliary Oven, and the instructions for wiring and coupling the TRACE 1310 Auxiliary Oven to the TRACE 1300/TRACE 1310 GC.

Contents

- Installing the Valves
- Installing Valves and Fittings into the Main Oven
- Installing Valves and Fittings in the Unheated Compartment
- Plumbing Valves and System
- Configuring the Valves
- Installing the Auxiliary Gas Modules
- Installing the Auxiliary Detectors Assembly
- Installing the Secondary Oven Assembly
- Installing the Methanizer Assembly
- Installing a Heated Sample Transfer Line
- Wiring the TRACE 1310 Auxiliary Oven to the GC
- Coupling the TRACE 1310 Auxiliary Oven to the GC

CAUTION These operations must be carried out by authorized and trained Thermo Fisher Scientific Service Field Engineers.

Installing the Valves

This section provides instruction for installing and configuring the valves in the TRACE 1310 Auxiliary Oven.

Note Before starting, cool the TRACE 1310 Auxiliary Oven to 50 °C or cooler. Do not turn the GC off.

The heated section of the TRACE 1310 Auxiliary Oven accepts standard VICI® gas actuated valves with 3-inch standoff. The unheated section will accommodate VICI® gas actuated valves without standoff.

CAUTION Be careful not to mix actuators with valves that have different numbers of ports, as the actuator movement for each valve can be different.

Related topics:

- "Installing Valves and Fittings into the Main Oven" on page 34
- "Installing Valves and Fittings in the Unheated Compartment" on page 49
- "Installing an Unheated Valve for Liquid Samples into the Unheated Compartment" on page 63

Installing Valves and Fittings into the Main Oven

This section provides the instruction to install valves and sample inlet fittings into the main oven.

Related topics:

- "Installing the Needle Valves and the Sample Inlet Fittings into the Main Oven" on page 34
- "Installing the Rotary Valves into the Main Oven" on page 40
- "Installing the Diaphragm Valves in The Main Oven" on page 46

Installing the Needle Valves and the Sample Inlet Fittings into the Main Oven

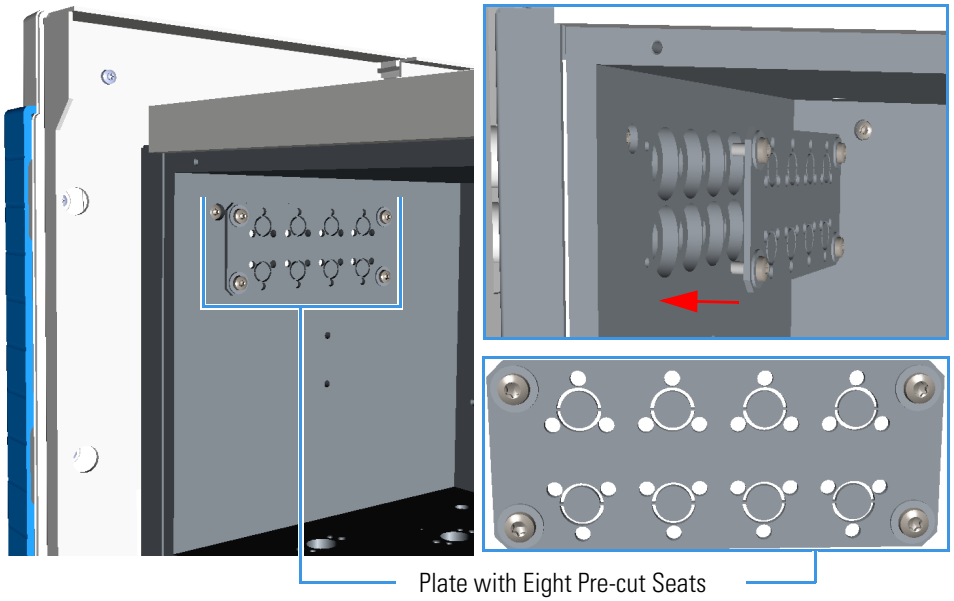
❖ **To install a needle valve and the sample inlet fitting into the main oven**

Note The following example considers the installation of a needle valve into the seat **1** and the sample inlet fittings into the seat **5**.

Note The sample inlet fittings (**PN 19071014**) are capable of permitting the introduction of the sample up to a temperature of 100 °C. If you need to heat the sample inlet at higher temperature than 100 °C before entering the main oven, the kit **PN 19071022** is required. See "Bulkhead Connectors for High Temperature" on page 38.

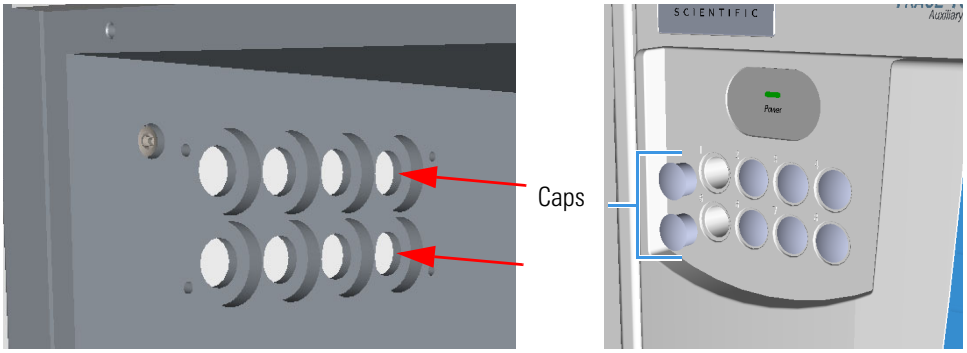
1. Remove the plate with the eight pre-cut seats from the wall of the main oven.
   a. Using a cross-head screwdriver unscrew the four fixing screws of the plate.
   b. Remove the plate. See the example in Figure 39.

Figure 39. Needle Valve and Sample Inlet Fitting Installation (1)



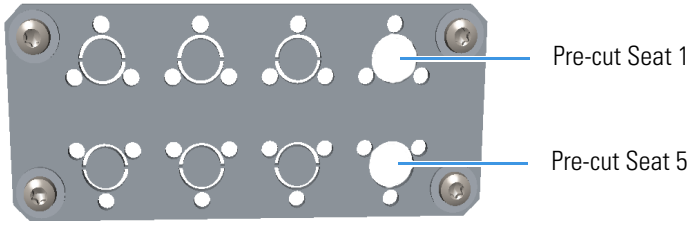
   c. Using a pencil or other tool, push into the corresponding holes **1** and **5** for removing the relevant caps. See the example in Figure 40.

Figure 40. Needle Valve and Sample Inlet Fitting Installation (2)



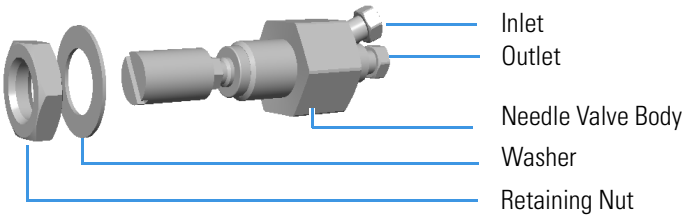
   d. Using a cutter remove the pre-cut seats **1** and **5** from the plate. See Figure 41.

Figure 41. Needle Valve and Sample Inlet Fitting Installation (3)



2. Mounting the needle valve on the plate.
   a. Remove the retaining nut and the washer from the needle valve body. See Figure 42.

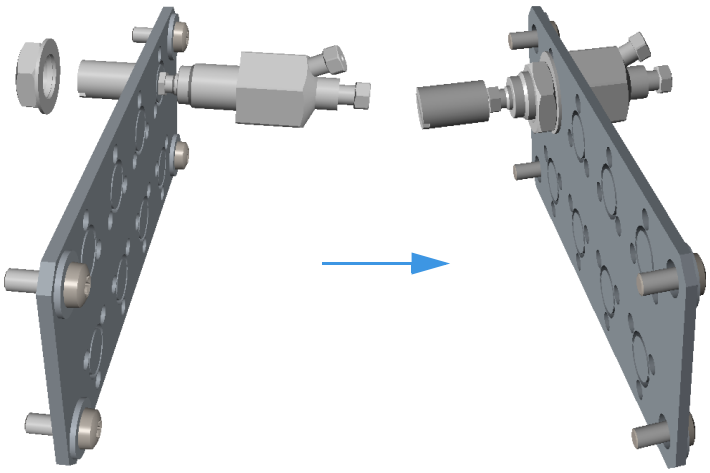
Figure 42. Needle Valve and Sample Inlet Fitting Installation (4)



> **Note** Before mounting the needle valve on the plate, we suggest removing the nuts and ferrules from the inlet and outlet ports for facilitating the connection of the inlet and outlet tubing to the needle valve.

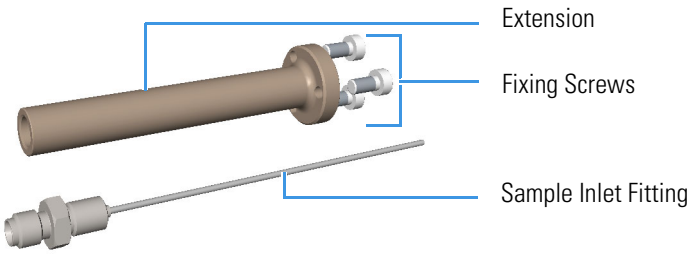
   b. Insert the needle valve body into the seat 1 of the plate.
   c. Thread the retaining nut on the needle valve body interposing the washer.
   d. Use your fingers to tighten the retaining nut until it starts to grip the plate. Tighten the retaining nut a quarter turn using the proper wrench. See Figure 43.

Figure 43. Needle Valve and Sample Inlet Fitting Installation (5)



3. Mounting the sample inlet fitting on the plate.
   a. Prepare the sample inlet fitting with the proper extension and fixing screws. See Figure 44.

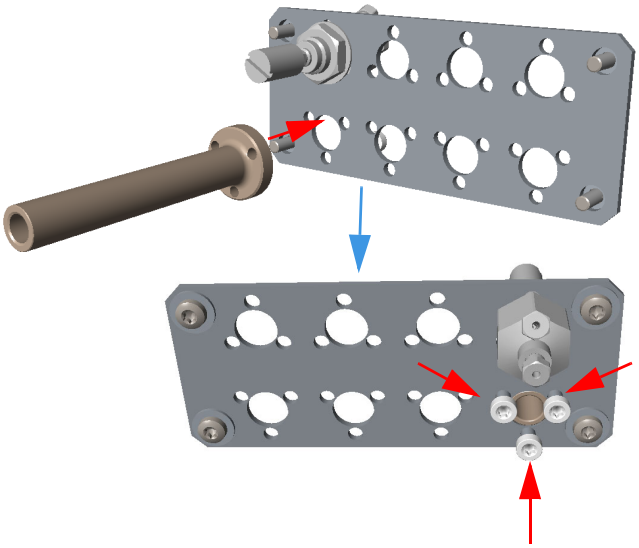
Figure 44. Needle Valve and Sample Inlet Fitting Installation (6)



b. Mount the extension on the seat 5 of the plate by matching its fixing holes to the fixing holes on the plate.

c. Insert the three fixing screws into the corresponding fixing holes, then tighten the screws using the proper Torxhead key or screwdriver. See Figure 43.

Figure 45. Needle Valve and Sample Inlet Fitting Installation (7)



d. Carefully insert and screw the sample inlet fitting into the extension. See Figure 47 and Figure 47.

Figure 46. Needle Valve and Sample Inlet Fitting Installation (8)

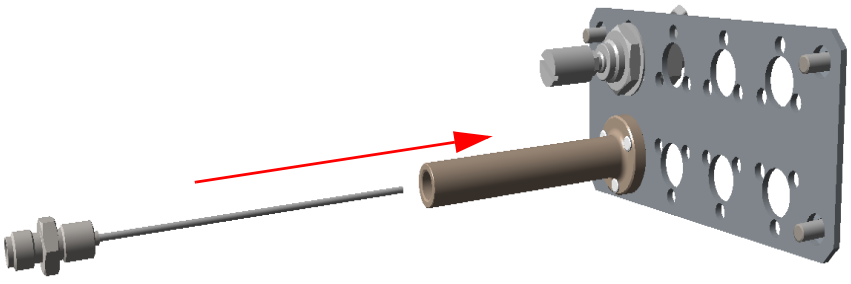
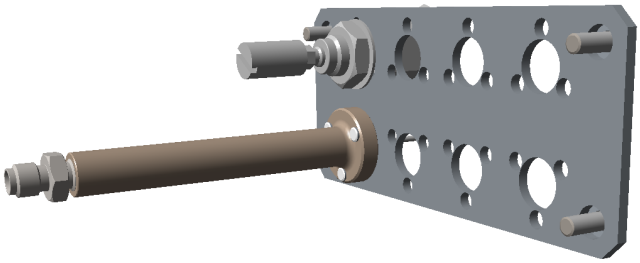
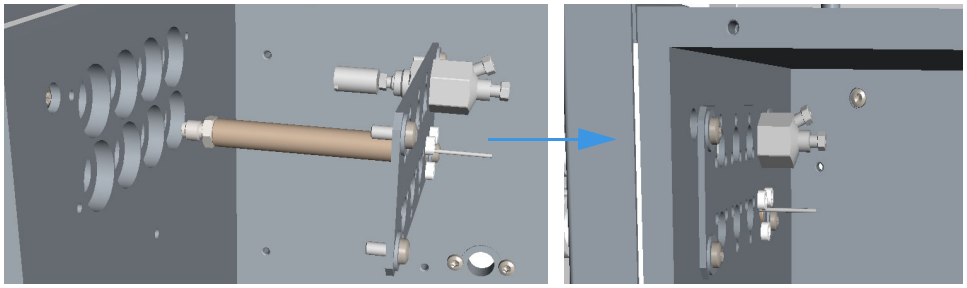


Figure 47. Needle Valve and Sample Inlet Fitting Installation (9)



4. Reinstall the plate on the wall of the main oven.
   a. Using a cross-head screwdriver screw the four fixing screws of the plate. See Figure 48.

Figure 48. Needle Valve and Sample Inlet Fitting Installation (10)



Bulkhead Connectors for High Temperature

The bulkhead connectors for high temperature (PN 19071022) allows to heat the sample inlet at high temperature (up to 200 °C) before entering into the main oven.

For installing the sample inlet fittings for high temperature, follow the same procedure previously described for installing the standard sample inlet fittings. See "To install a needle valve and the sample inlet fitting into the main oven" on page 34.

To compare the parts to replace see Figure 49 and Figure 50.

Figure 49. Standard Sample Inlet Fitting

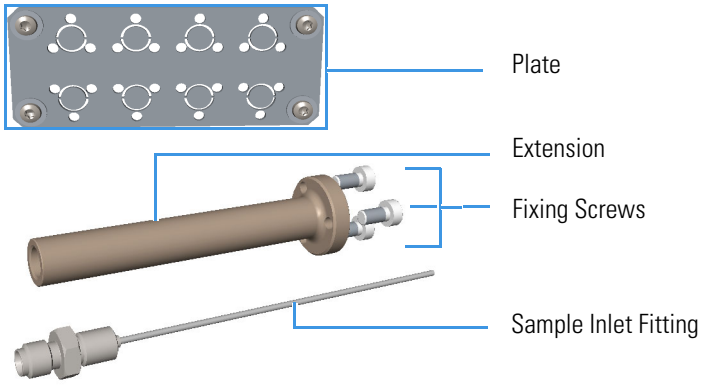
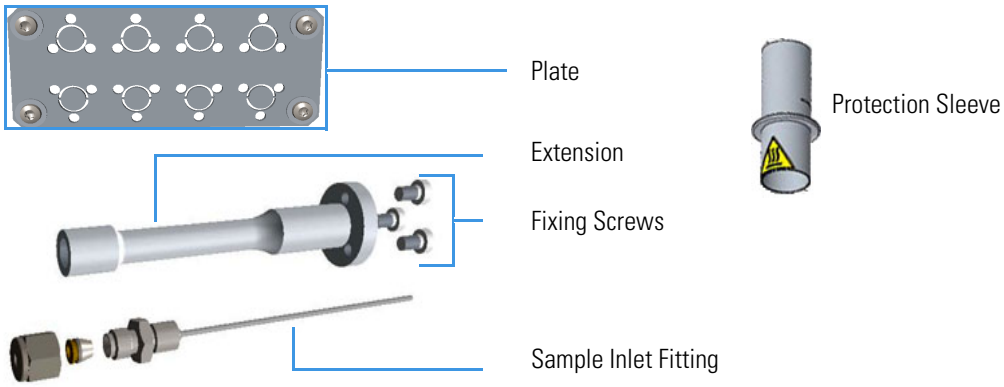
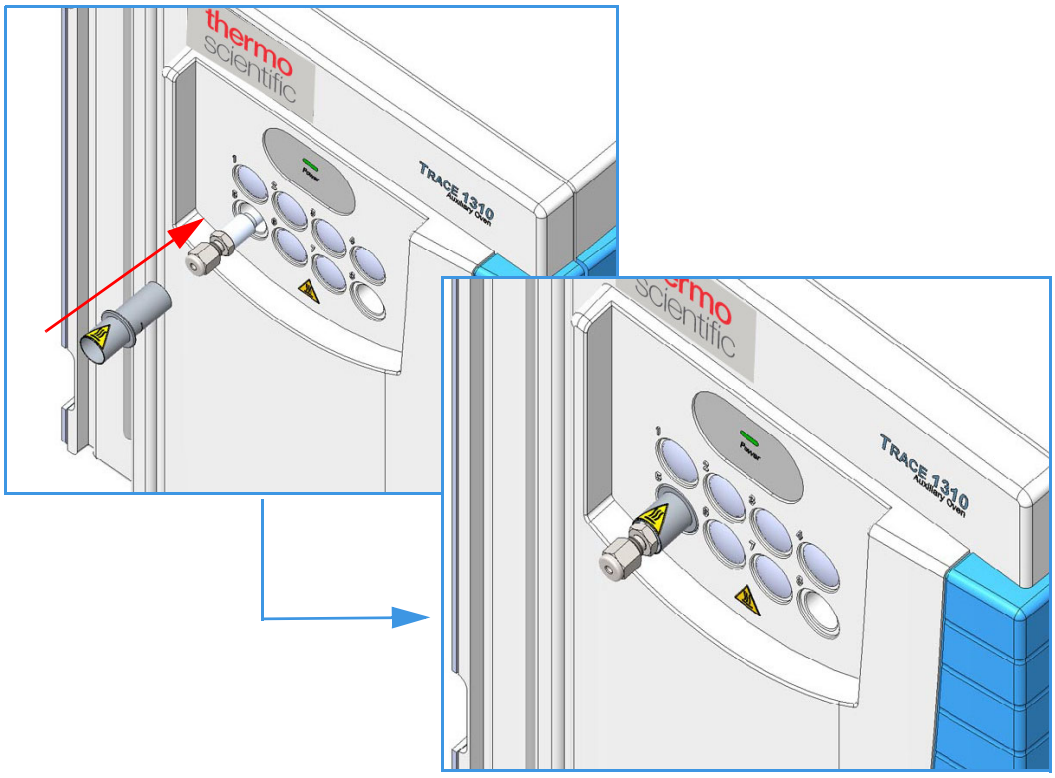


Figure 50. Sample Inlet Fitting for High Temperature



At the end of the installation of the sample inlet fittings for high temperature, place the protection sleeve on the connector that protrudes the front of the TRACE 1310 Auxiliary Oven. See Figure 51.

Figure 51. Protection sleeve



WARNING-BURN HAZARD During the runs the protective sleeve may be hot. Do not touch it to avoid burns. Allow it to cool to room temperature before touching it.

Installing the Rotary Valves into the Main Oven

❖ **To install a rotary valve into the main oven**

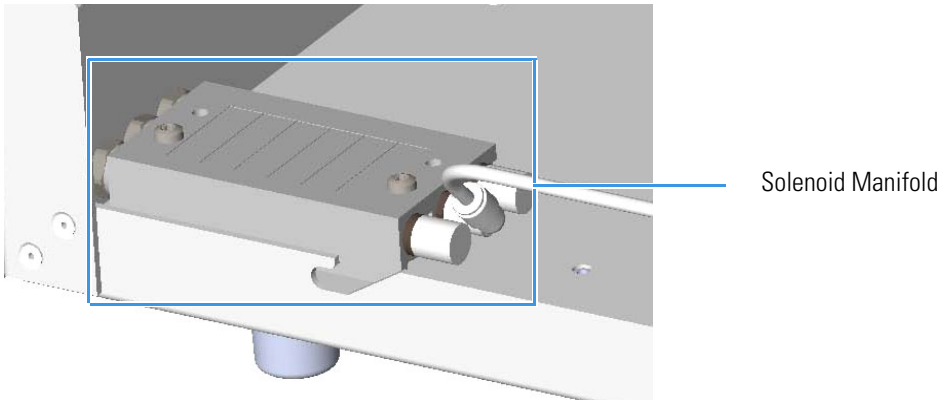
Installing valves consists of the following steps:

- Installing the solenoid valves
- Disassembling the rotary valve and actuator
- Installing the rotary valve and standoff
- Connecting gas lines from the solenoid to the actuator
- Installing the actuator to the valve standoff

CAUTION Turn the actuator gas off before you start these procedures.

1. Installing the solenoid valves.
   a. Install the solenoid manifold on the floor of the unheated compartment. See the example of Figure 52.

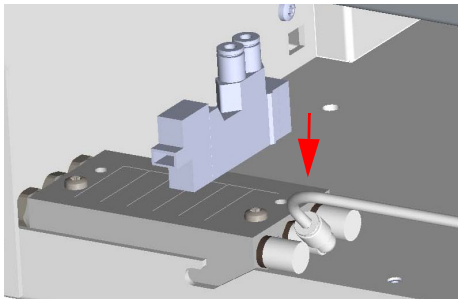
Figure 52. Rotary Valve Installation (1)



   b. Remove the rectangular-shaped cap from the manifold using the phillips screwdriver.
   c. Secure the solenoid valve to the under plate using the two screws supplied with the valve. See Figure 53.

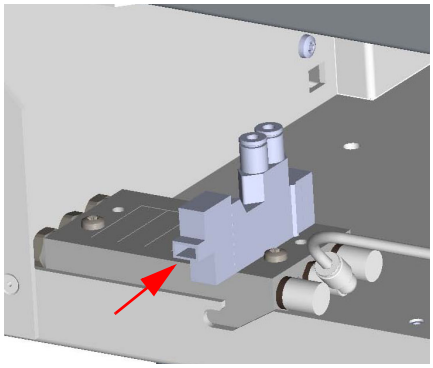
CAUTION Tighten the screws evenly, taking care that the solenoid gasket rests on all surfaces to prevent leaks.

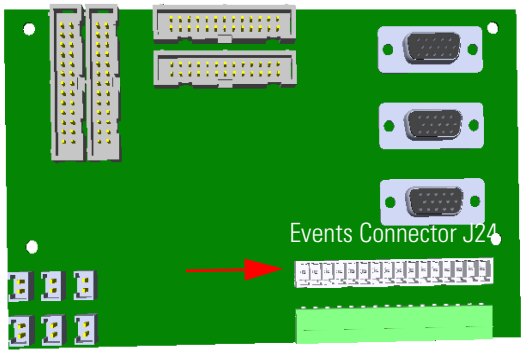
Figure 53. Rotary Valve Installation (2)



d. Connect the cable from the solenoid valve to the proper timed event output jack of the **Events** connector marked **J24** on the VOBP-HRM board located over the power section. See Figure 54.

Figure 54. Rotary Valve Installation (3)



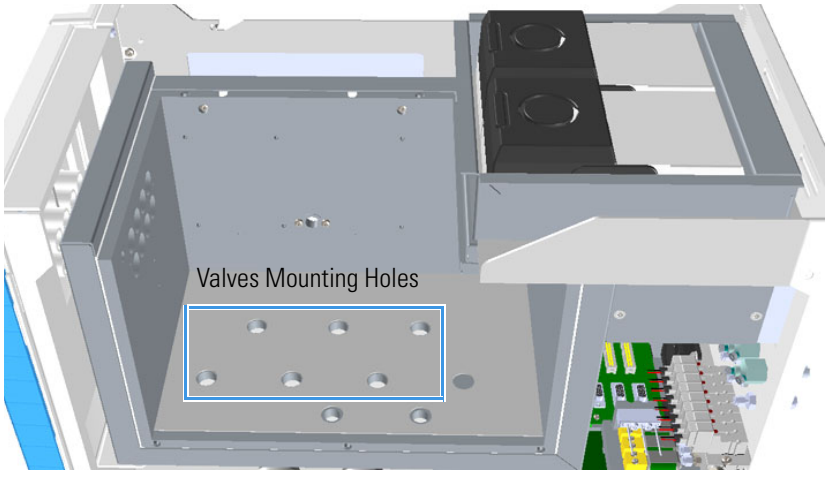


2. Disassemble the rotary valve and actuator.

Note Valves are usually installed starting from the mounting hole closest to the back of the TRACE 1310 Auxiliary Oven.

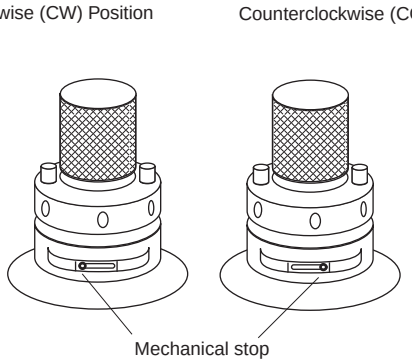
a. Remove any insulation found in the valve mounting hole. The valve mounting hole is located in the floor of the main oven. See Figure 55.

Figure 55. Main Oven Holes Layout (1)



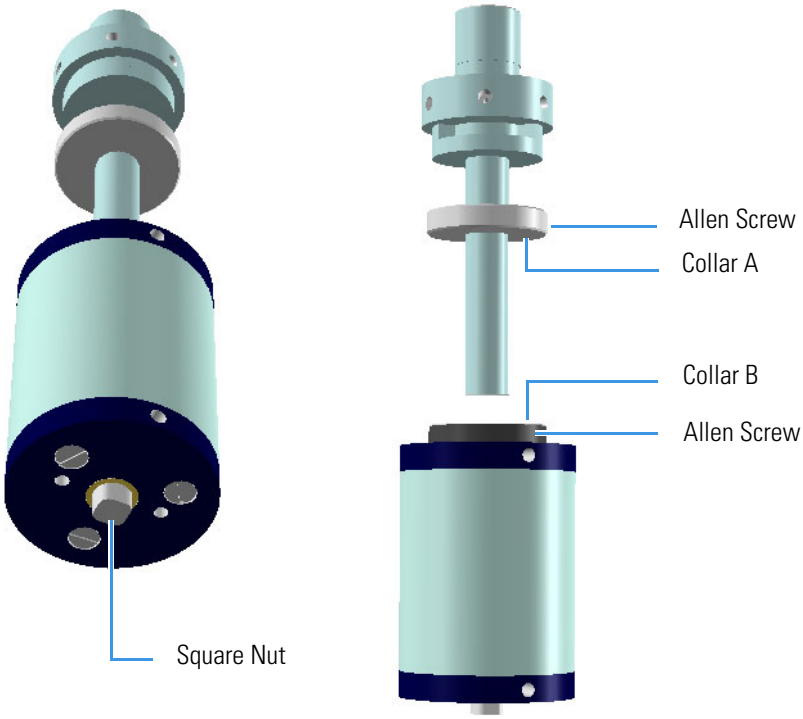
b. Inspect the valve and actuator making sure the valve is in the counter clock wise (CCW) position. The CCW position is when the mechanical stop is in the position noted in Figure 56.

Figure 56. Mechanical Stop Positions for both CW and CCW



If the valve is not in the CCW position, locate the **square nut** on the opposite end of the actuator. See Figure 57.

Figure 57. Valve Separation



c. Using a 5/16” or 8 mm wrench, rotate the nut to the CCW position.

d. Once the valve is in the CCW position, separate the actuator from the valve and standoff by loosening the Allen screw in **collar B**. See Figure 57.

CAUTION Be careful to pull the actuator away from the valve standoff by gripping the standoff but without rotating the actuator or the valve.

Note Handle the valve and standoff with care so the two pieces do not separate.

e. Remove the **collar A** attached to the valve standoff by loosening the screw that secures the collar to the valve standoff. This collar mounts to the heater block of the TRACE 1310 Auxiliary Oven. See Figure 57.

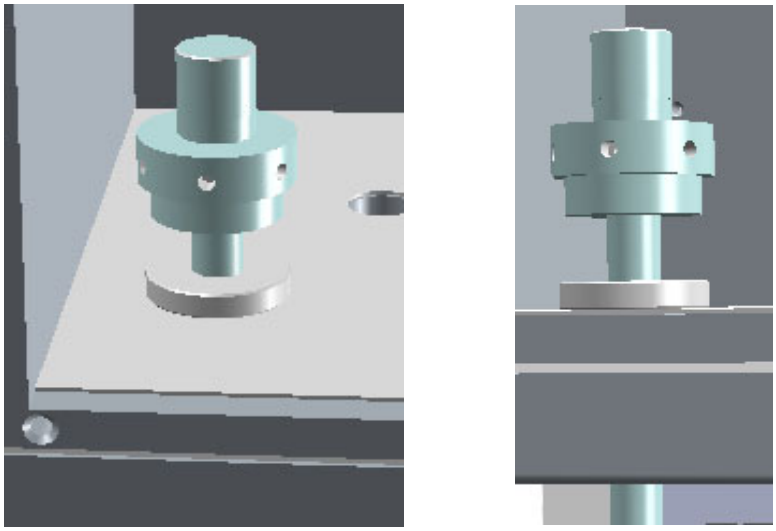
3. Installing the rotary valve and standoff.

   a. Locate the desired valve position in the main oven and place the **collar A** over the hole in the main oven. See Figure 58.

   b. Secure the collar using two M 4 x10 mm screws. Be sure the 7/64" set screw in the collar is accessible from the outer edge of the TRACE 1310 Auxiliary Oven.

   c. Grip the valve standoff by the standoff only, and slide it through the collar allowing it to extend into the lower valve compartment.

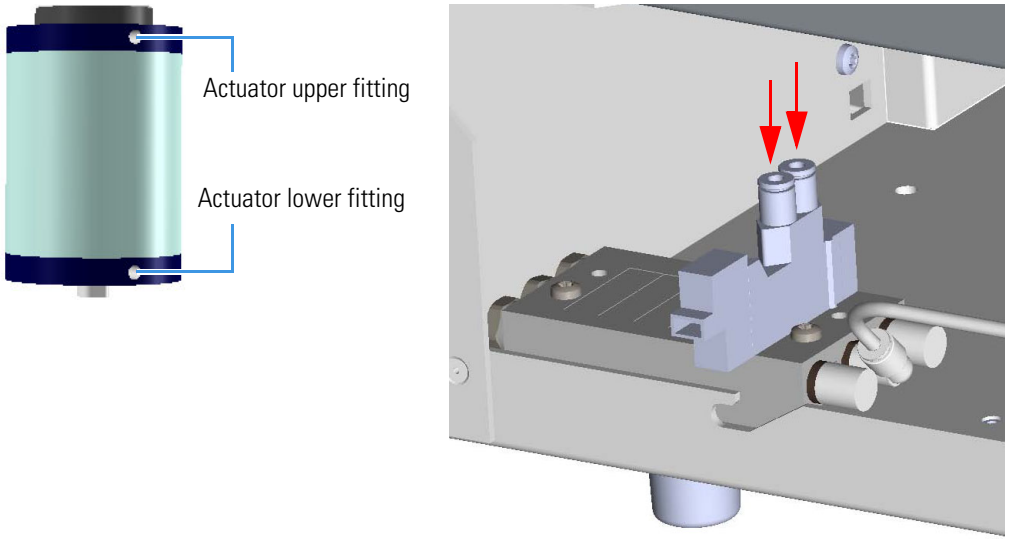
Figure 58. Valve Installation



4. Connecting gas lines from the solenoid valve manifold to the actuator.

Note Gas lines are much easier to connect to the actuator if the connection is made before the actuator is assembled to the valve.

Figure 59. Actuator and Solenoid Valves Manifold Edges



With reference to Figure 59 proceed as follows:

a. Locate the nylon tubing supplied in the kit and cut it into two equal 12-in. pieces.

b. Push one of the tube pieces into the lower fitting on the actuator assembly, making sure it passes through the ferrule in the actuator fitting. Tighten the nut and ferrule using a 3/8-in. open end wrench. Use a backup 3/8-in. open end wrench on the mating piece that is screwed into the actuator.

c. Place the other end of the tubing into the valve solenoid fitting located on the outside edge of the solenoid manifold by pushing the tubing firmly into the fitting. It should automatically seal in place.

d. Turn the actuator gas supply on. This line should now be pressurized.

e. Verify there are no major leaks in the fittings.

> **Note** Applying pressure to this side of the actuator will ensure that the actuator stays in the CCW position.

f. Take the other piece of nylon tubing and place it in the upper fitting on the actuator. Be sure the tube passes through the ferrule in the fitting. Tighten the fitting using the 3/8-inch open end backup wrench.

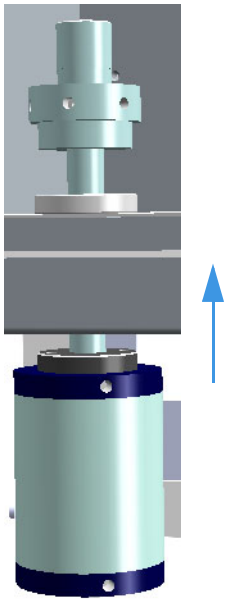
g. Connect the opposite end to the solenoid fitting.

> **Note** The tubing can be released from the solenoid by pushing down on the solenoid fitting and pulling out on the tubing at the same time.

5. Installing the actuator to the valve standoff.

   a. Carefully fit the actuator into the valve standoff being sure not to rotate the valve. See Figure 60.

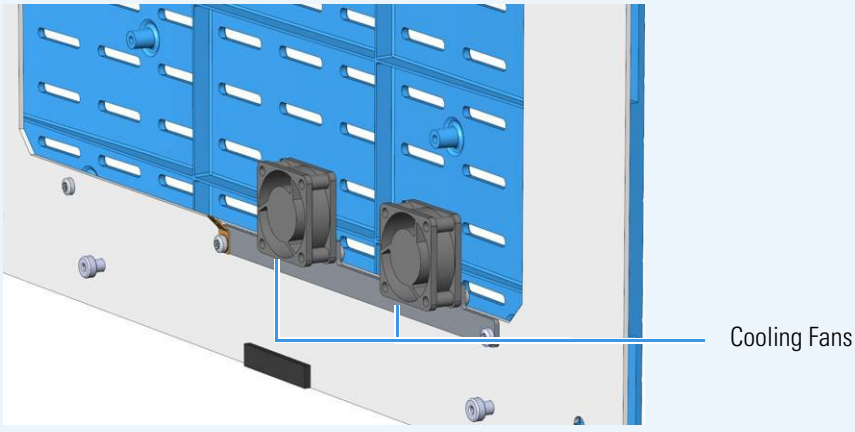
Figure 60. Actuator Installation (1)



b. Once the two square fittings on the actuator and valve are coupled, tighten the collar on the valve. Be sure this fitting is very tight so the actuator will not rotate on the valve standoff.

c. Slide the valve and actuator assembly up or down to the desired location and tighten the upper collar to hold the valve and actuator in place.

IMPORTANT The installation of the **Valve Actuator Cooling Kit** (PN 19071023) is recommended to preserve maximum actuators lifetime when TRACE 1310 Auxiliary Oven is used at high temperature, between 150 °C and 270 °C.



For temperature above 270 °C High temperature actuators are recommended and the cooling fans must not be used.

For further details refer to the **Valve Actuator Cooling Kit Installation Note.**

Installing the Diaphragm Valves in The Main Oven

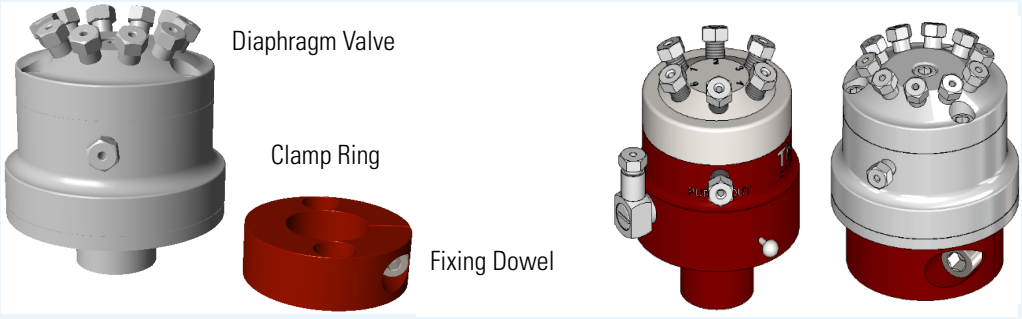
❖ **To install a diaphragm valve in the main oven**

Installing valves consists of the following steps:

- Installing the solenoid valve
- Installing the diaphragm valve
- Connecting the gas line

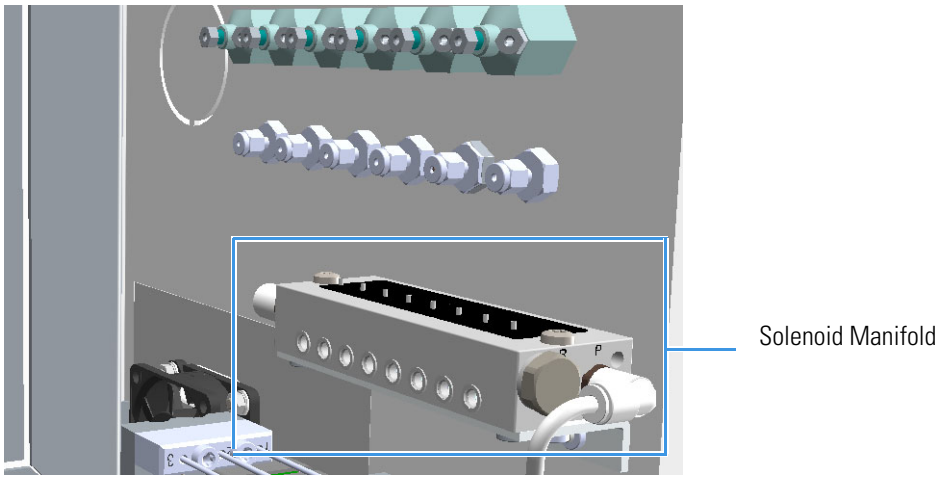
CAUTION Turn the actuator gas off before you start these procedures.

Note The installation of the diaphragm valve requires the use of the fixing clamp ring.



1. Installing the solenoid valve.
   a. Install the solenoid manifold on the rear wall of the valve compartment. See the example of Figure 61.

Figure 61. Diaphragm Valve Installation (1)

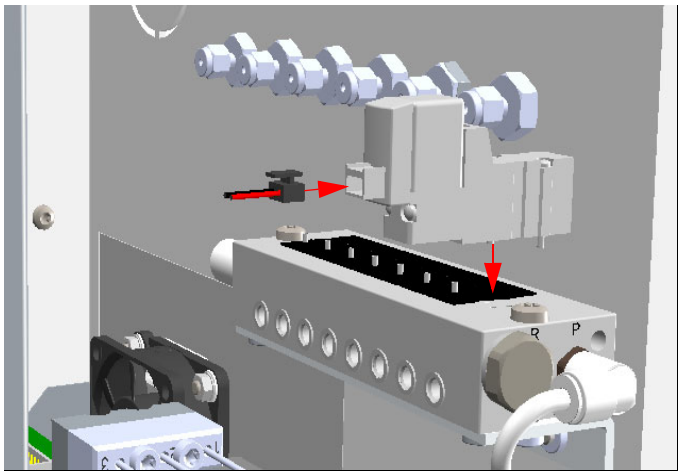


b. Remove the rectangular shaped cap from the manifold using the #0 phillips screwdriver.

c. Secure the solenoid valve to the under plate using the two screws supplied with the valve. See Figure 62.

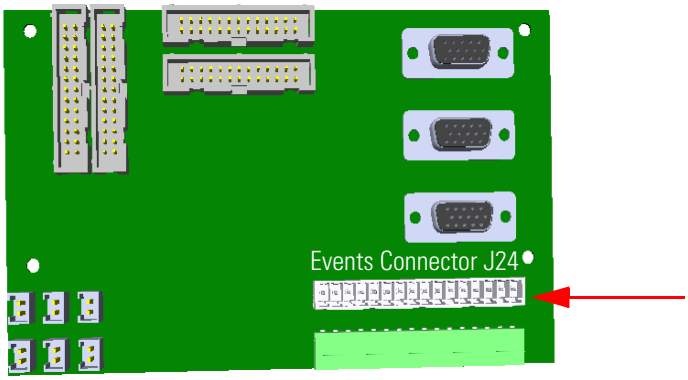
CAUTION Tighten screws evenly, taking care that the solenoid gasket rests on all surfaces to prevent leaks.

Figure 62. Diaphragm Valve Installation (2)



d. Connect the cable from the solenoid valve to the proper timed event output jack of the **Events** connector marked **J24** on the VOBP-HRM board located over the power section. See Figure 63.

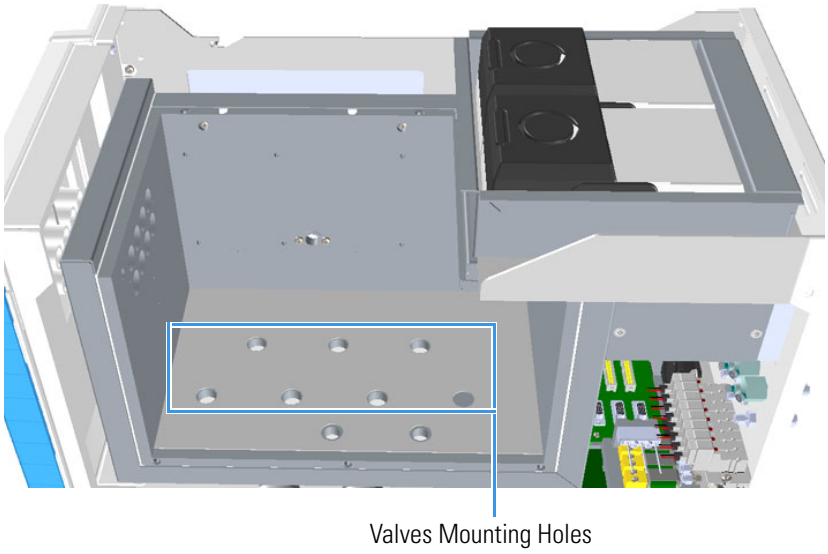
Figure 63. Diaphragm Valve Installation (3)



2. Installing the valve.

a. Remove any insulation found in the valve mounting hole. The valve mounting hole is located in the floor of the main oven. See Figure 64.

Figure 64. Main Oven Holes Layout (1)

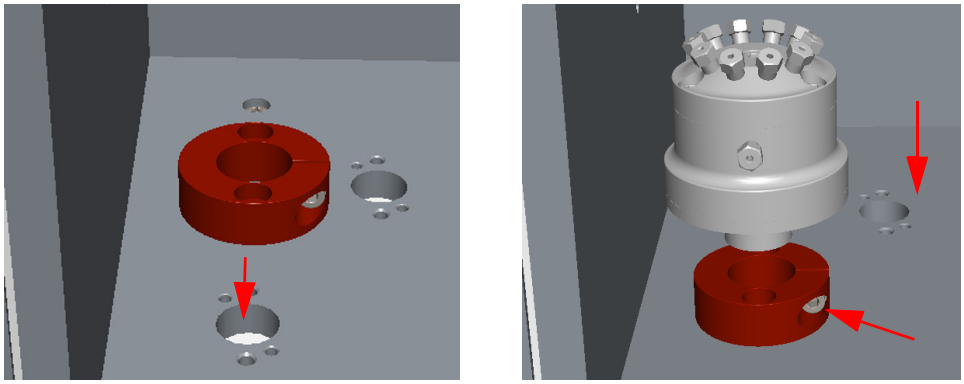


b. Locate the desired valve position in the main oven and place the **clamp ring** over the hole in the main oven, then secure the clamp ring with the two screws provided.

c. Loosen the dowel on the clamp ring, then insert the valve into the clamp ring.

d. Secure the valve tightening the dowel. See Figure 65.

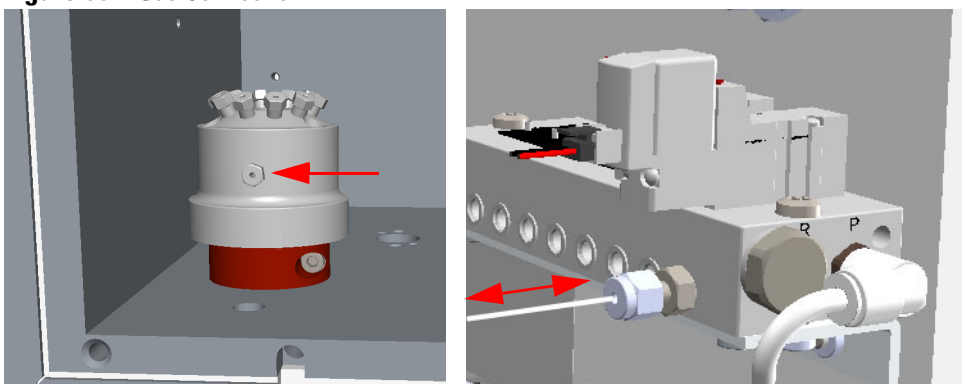
Figure 65. Installing Diaphragm Valve



3. Connecting the gas line.

   a. By using the proper nuts and ferrules, connect the gas line from the solenoid valve manifold to the diaphragm valve. See Figure 66.

Figure 66. Gas Connection



4. Testing the valve.
   a. Configure the valve and rotate it clockwise and counter-clockwise.
   b. Ensure that the valve moves freely in both directions.
   c. Inspect the valve stop when the valve is in both positions to ensure that the stop is at the movement limit on each side.

Installing Valves and Fittings in the Unheated Compartment

This section provides the instructions to install valves and sample inlet fittings in the unheated compartment.

Related topics:

- "Installing the Needle Valves and the Sample Inlet Fittings into the Unheated Compartment" on page 49
- "Installing an Unheated Rotary Valve into the Unheated Compartment" on page 55
- "Installing an Unheated Diaphragm Valve into the Unheated Compartment" on page 59
- "Installing an Unheated Valve for Liquid Samples into the Unheated Compartment" on page 63

Installing the Needle Valves and the Sample Inlet Fittings into the Unheated Compartment

This section provides the instructions to install a needle valve and a sample inlet fitting on the back or on the front panel of the TRACE 1310 Auxiliary Oven.

Related Topics:

- "To install a needle valve and the sample inlet fitting into the back unheated compartment" on page 50

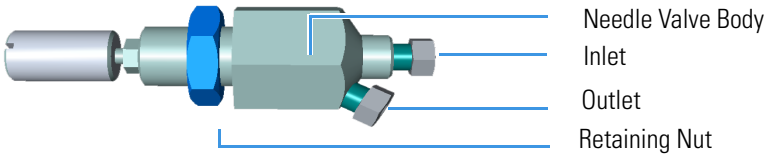
- "To install a needle valve and the sample inlet fitting into the front unheated compartment" on page 51

❖ To install a needle valve and the sample inlet fitting into the back unheated compartment

Note The following example considers the installation of a needle valve into the seat 9 and the sample inlet fittings into the seat A.

1. Mounting the needle valve on the back panel.
   a. Remove the retaining nut from the needle valve body. See Figure 67.

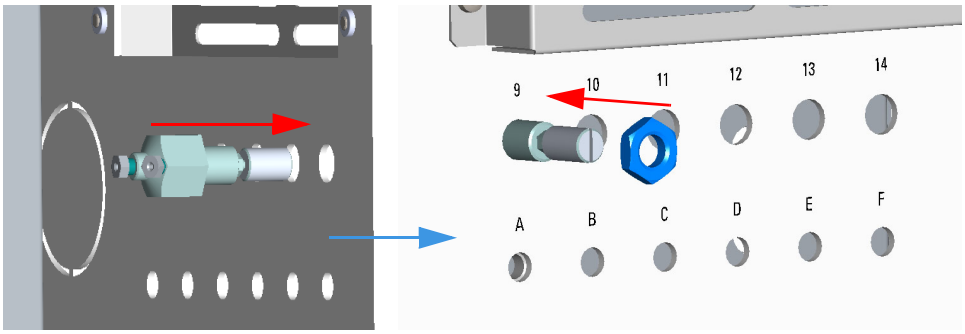
Figure 67. Needle Valve and Sample Inlet Fitting Installation (1)



Note Before mounting the needle valve on the plate, we suggest removing the nuts and ferrules from the inlet and outlet ports for facilitating the connection of the inlet and outlet tubing to the needle valve.

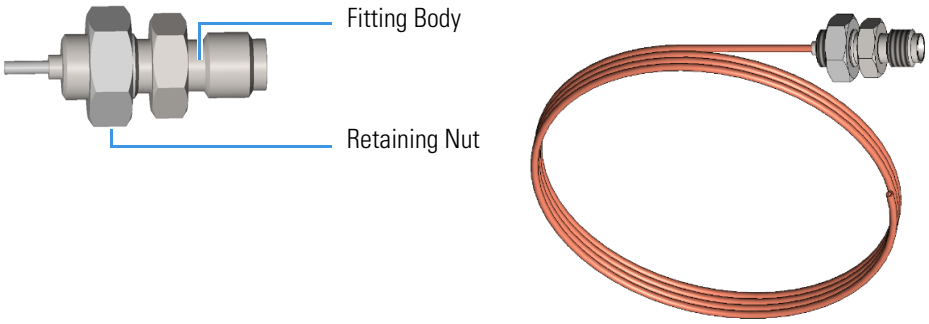
   b. Insert the needle valve body into the seat 9 of the back panel.
   c. Thread the retaining nut on the needle valve.
   d. Use your fingers to tighten the retaining nut until it starts to grip the back panel. Tighten the retaining nut a quarter turn using a proper wrench. See Figure 68.

Figure 68. Needle Valve and Sample Inlet Fitting Installation (2)



2. Mounting the sample inlet fitting on the back panel.
   a. Remove the retaining nut from the fitting body. See Figure 69.

Figure 69. Needle Valve and Sample Inlet Fitting Installation (3)

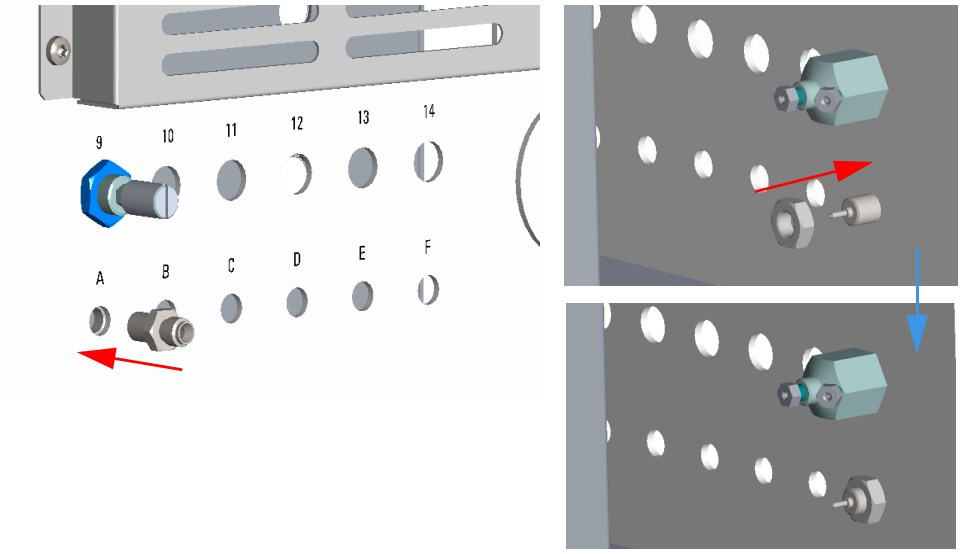


b. Insert the sample inlet fitting into the seat A of the back panel.

c. Thread the retaining nut.

d. Use your fingers to tighten the retaining nut until it starts to grip the panel. Tighten the retaining nut a quarter turn using a proper wrench. See Figure 70.

Figure 70. Needle Valve and Sample Inlet Fitting Installation (2)



❖ To install a needle valve and the sample inlet fitting into the front unheated compartment

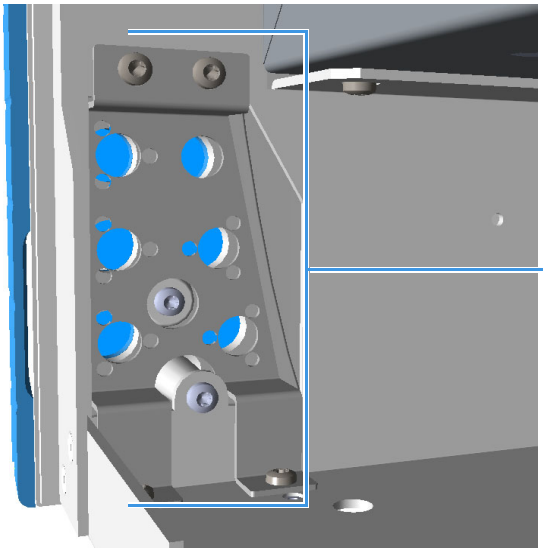
Note This is an optional procedure for mounting up to three unheated needle valves and sample inlet fittings on the front of the instrument.

1. Remove the plate with the six seats from the frontal wall on the left lower corner of the unheated compartment.

   a. Using a cross-head screwdriver unscrew the four fixing screws of the plate.

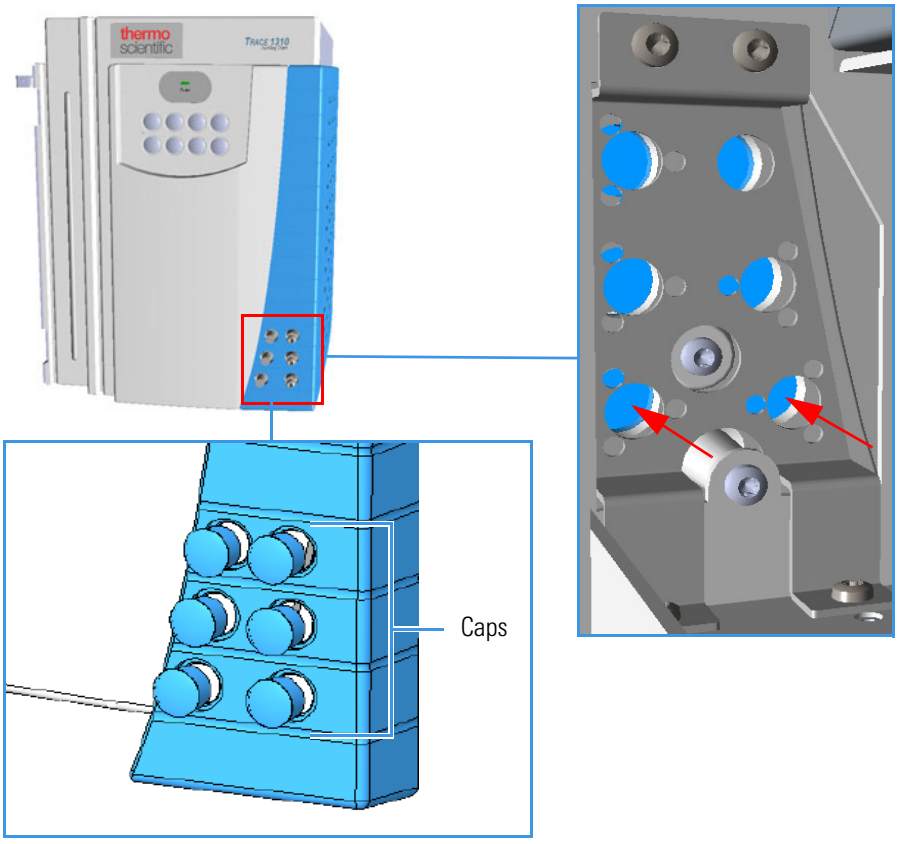
   b. Remove the plate. See the example in Figure 71.

Figure 71. Needle Valve and Sample Inlet Fitting Installation (1)



c. Using a pencil or other tool, push into the corresponding holes the for removing the relevant caps. See the example in Figure 72.

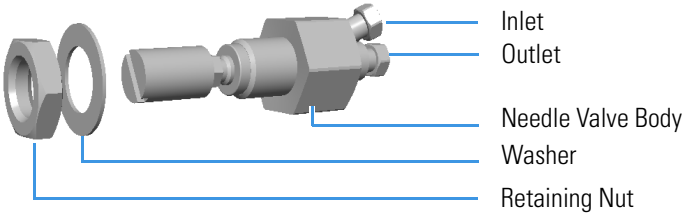
Figure 72. Needle Valve and Sample Inlet Fitting Installation (2)



2. Mounting the needle valve on the plate.

a. Remove the retaining nut and the washer from the needle valve body. See Figure 73.

Figure 73. Needle Valve and Sample Inlet Fitting Installation (3)



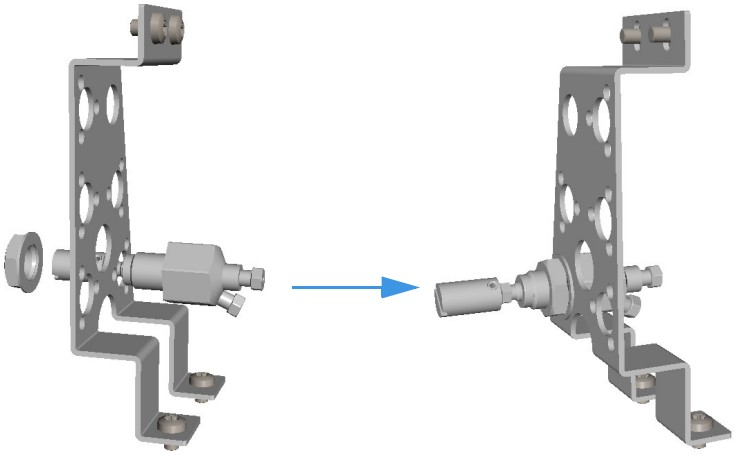
Note Before mounting the needle valve on the plate, we suggest removing the nuts and ferrules from the inlet and outlet ports for facilitating the connection of the inlet and outlet tubing to the needle valve.

b. Insert the needle valve body into the desired seat of the plate.

c. Thread the retaining nut on the needle valve body interposing the washer.

d. Use your fingers to tighten the retaining nut until it starts to grip the plate. Tighten the retaining nut a quarter turn using the proper wrench. See the example in Figure 74.

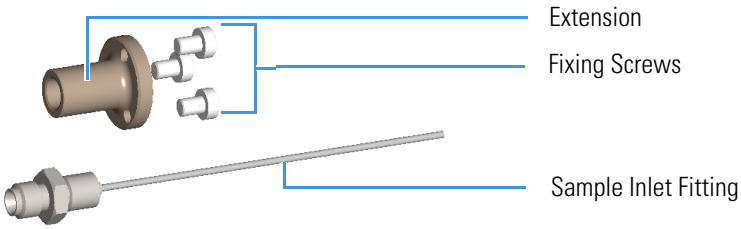
Figure 74. Needle Valve and Sample Inlet Fitting Installation (4)



3. Mounting the sample inlet fitting on the plate.

a. Prepare the sample inlet fitting with the proper extension and fixing screws. See Figure 75.

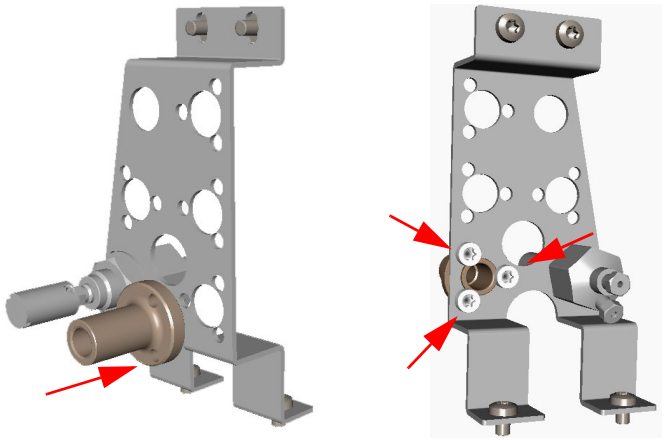
Figure 75. Needle Valve and Sample Inlet Fitting Installation (5)



b. Mount the extension on the desired seat of the plate by matching its fixing holes to the fixing holes on the plate.

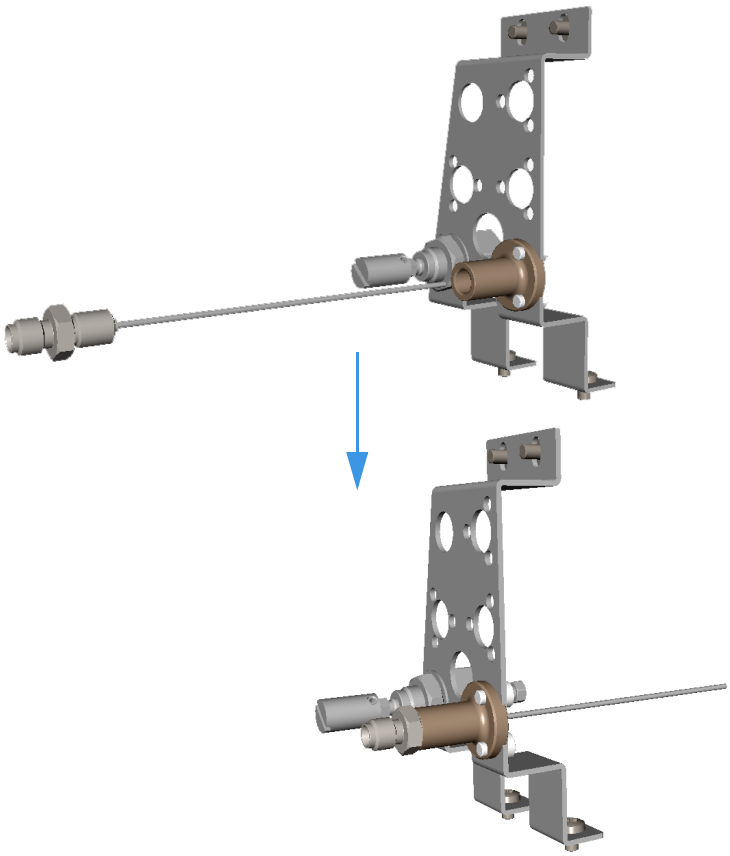
c. Insert the three fixing screws into the corresponding fixing holes, then tighten the screws using the proper Torxhead key or screwdriver. See Figure 76.

Figure 76. Needle Valve and Sample Inlet Fitting Installation (6(



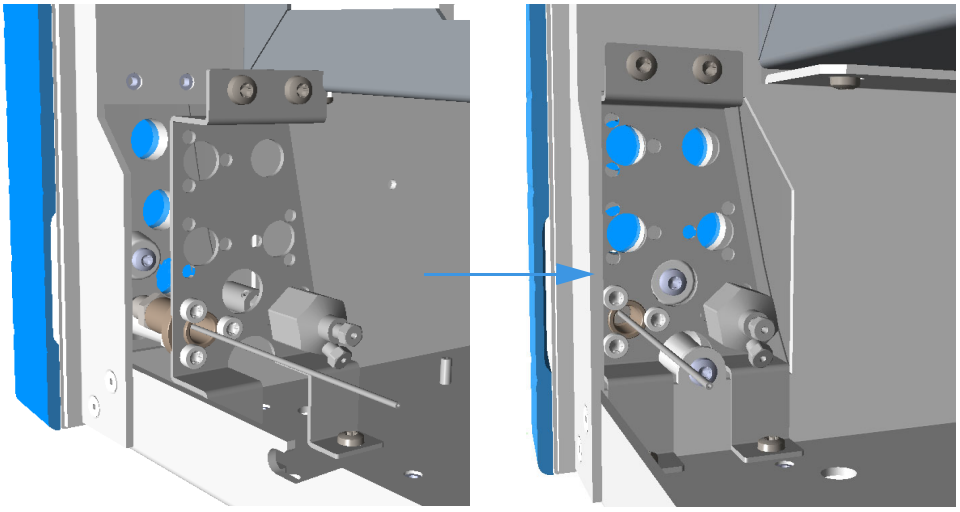
d. Carefully insert and screw the sample inlet fitting into the extension. See Figure 47.

Figure 77. Needle Valve and Sample Inlet Fitting Installation (7)



4. Reinstall the plate on the frontal wall of the unheated compartment.
   a. Using a cross-head screwdriver screw the four fixing screws of the plate. See Figure 78.

Figure 78. Needle Valve and Sample Inlet Fitting Installation (8)



Installing an Unheated Rotary Valve into the Unheated Compartment

❖ **To install a rotary valve in the unheated compartment**

Installing valves in the unheated compartment consists of the following steps:

- Installing the valve on the mounting bracket
- Installing the assemble into the unheated compartment under the main oven
- Installing the solenoid valve
- Connecting gas line

CAUTION Turn the actuator gas off before you start these procedures.

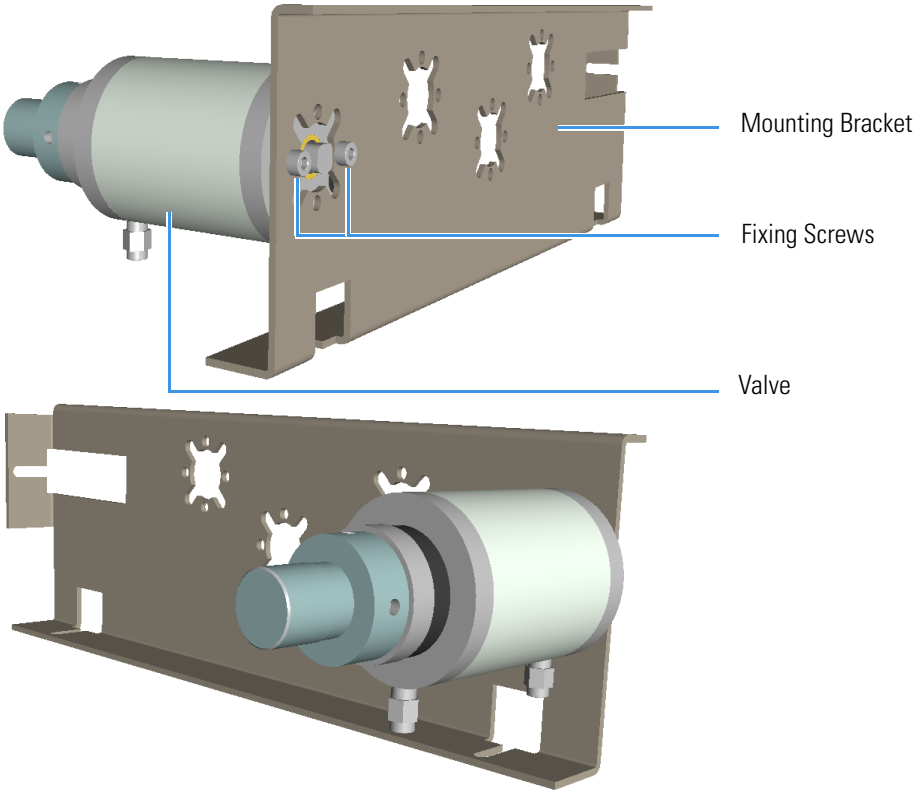
1. Install the valve on the mounting bracket

   The unheated valve assembly will require the mounting bracket, included as part of the assembly.

   a. Choose the mounting holes in the bracket that will allow the actuator and the valve to be oriented in a favorable direction.

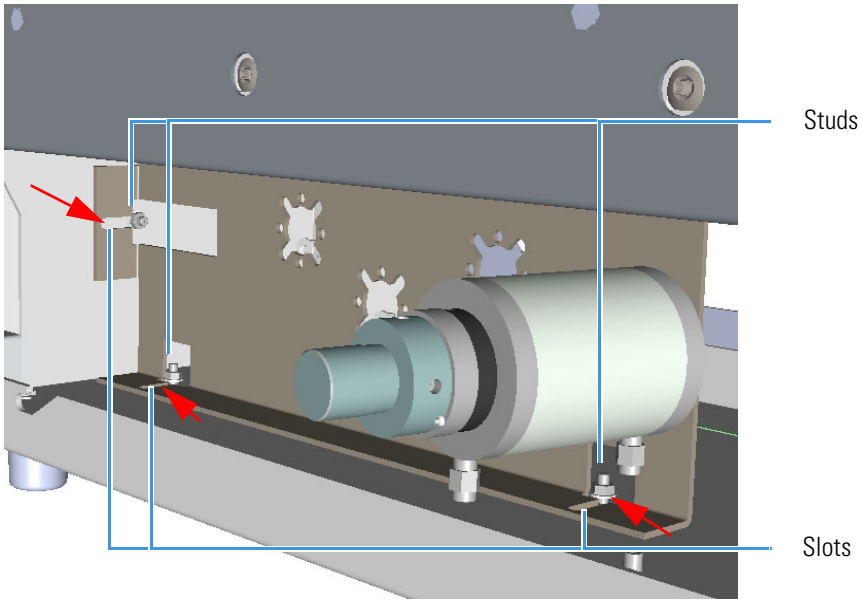
   b. Fix the valve to the bracket by using the two fixing screws. See Figure 79.

Figure 79. Unheated Rotary Valve Installation (1)



2. Install the assembly into the unheated compartment under the main oven.
   a. Install the bracket into the unheated compartment pay attentions to meet the fixing slots on the bracket to the three studs located as shown in Figure 80.

Figure 80. Unheated Rotary Valve Installation (2)

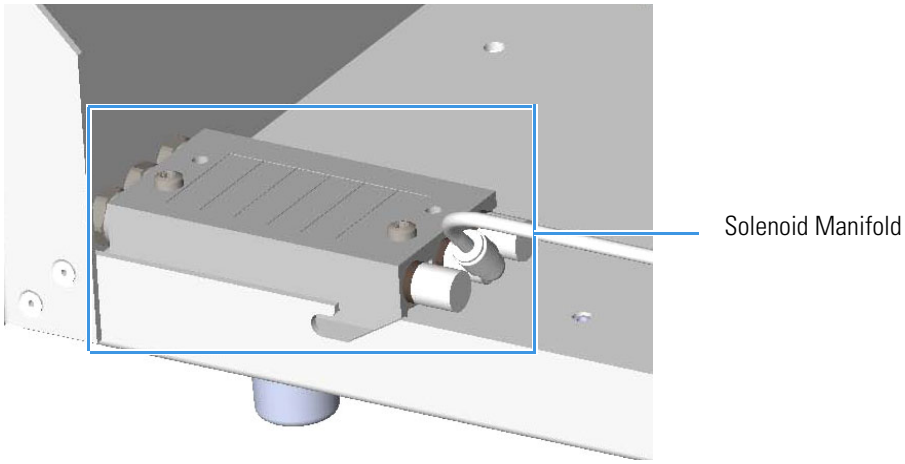


b. Push the bracket against the studs, then secure the assembly tightening the studs.

3. Install the solenoid valves.

a. Install the solenoid manifold on the floor of the unheated compartment. See the example of Figure 81.

Figure 81. Unheated Rotary Valve Installation (3)

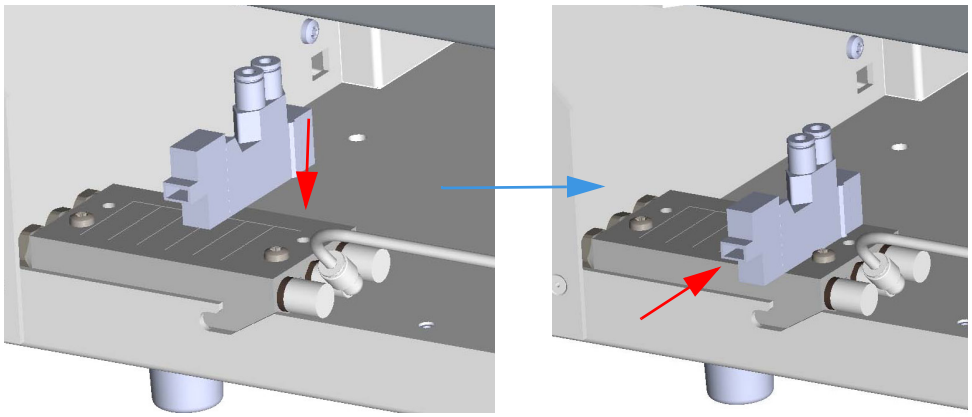


b. Remove the rectangular shaped cap from the manifold using the Phillips screwdriver.

c. Secure the solenoid valve to the under plate using the two screws supplied with the valve. See Figure 82.

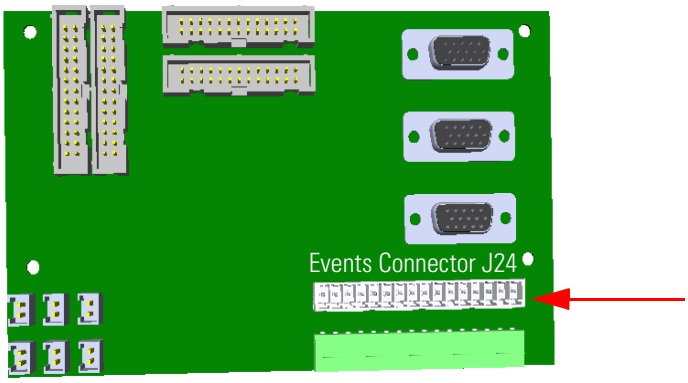
CAUTION Tighten screws evenly, taking care that the solenoid gasket rests on all surfaces to prevent leaks.

Figure 82. Unheated Rotary Valve Installation (4)



d. Connect the cable from the solenoid valve to the proper timed event output jack of the **Events** connector marked **J24** on the VOBP-HRM board located over the power section. See Figure 83.

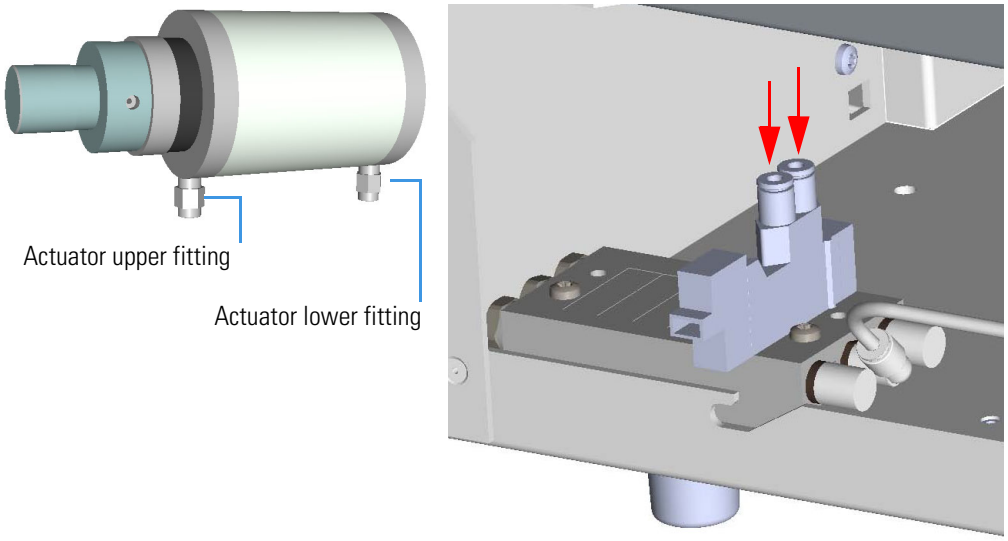
Figure 83. Unheated Rotary Valve Installation (5)



4. Connect gas lines from the solenoid valve manifold or the actuator.

Note Gas lines are much easier to connect to the actuator if the connection is made before the actuator is assembled to the valve.

Figure 84. Unheated Rotary Valve Installation (4)



With reference to Figure 84 proceed as follows:

a. Locate the nylon tubing supplied in the TRACE 1310 Auxiliary Oven kit and cut it into two equal 12-in. pieces.

b. Push one of the tube pieces into the lower fitting on the actuator assembly, making sure it passes through the ferrule in the actuator fitting. Tighten the nut and ferrule using a 3/8-in. open end wrench. Use a backup 3/8-in. open end wrench on the mating piece that is screwed into the actuator.

c. Place the other end of the tubing into the valve solenoid fitting located on the outside edge of the solenoid manifold by pushing the tubing firmly into the fitting. It should automatically seal in place.

d. Turn the actuator gas supply on. This line should now be pressurized.

e. Verify there are no major leaks in the fittings.

Note Applying pressure to this side of the actuator will ensure that the actuator stays in the CCW position.

f. Take the other piece of nylon tubing and place it in the upper fitting on the actuator. Be sure the tube passes through the ferrule in the fitting. Tighten the fitting using the 3/8-inch open end backup wrench.

g. Connect the opposite end to the solenoid fitting

Note The tubing can be released from the solenoid by pushing down on the solenoid fitting and pulling out on the tubing at the same time.

Installing an Unheated Diaphragm Valve into the Unheated Compartment

❖ **To install a diaphragm valve in the unheated compartment**

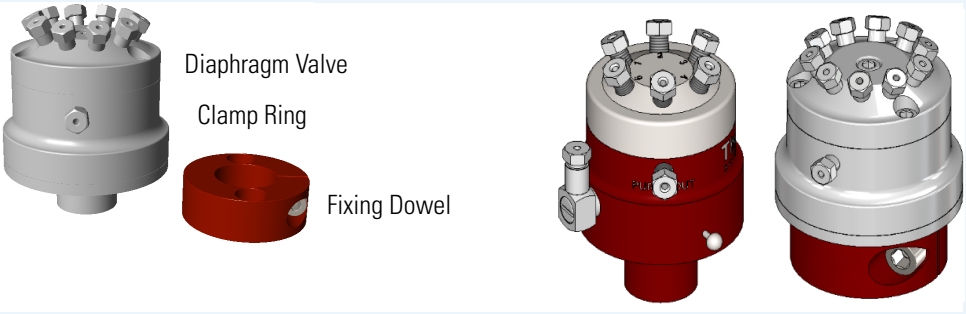
Installing valves in the unheated compartment consists of the following steps:

- Installing the valve on the mounting bracket
- Installing the assemble into the unheated compartment under the main oven
- Installing the solenoid valve
- Connecting gas line

Proceed as follows:

1. Installing the valve on the mounting bracket.

Note The installation of the diaphragm valve requires the use of the fixing clamp ring.

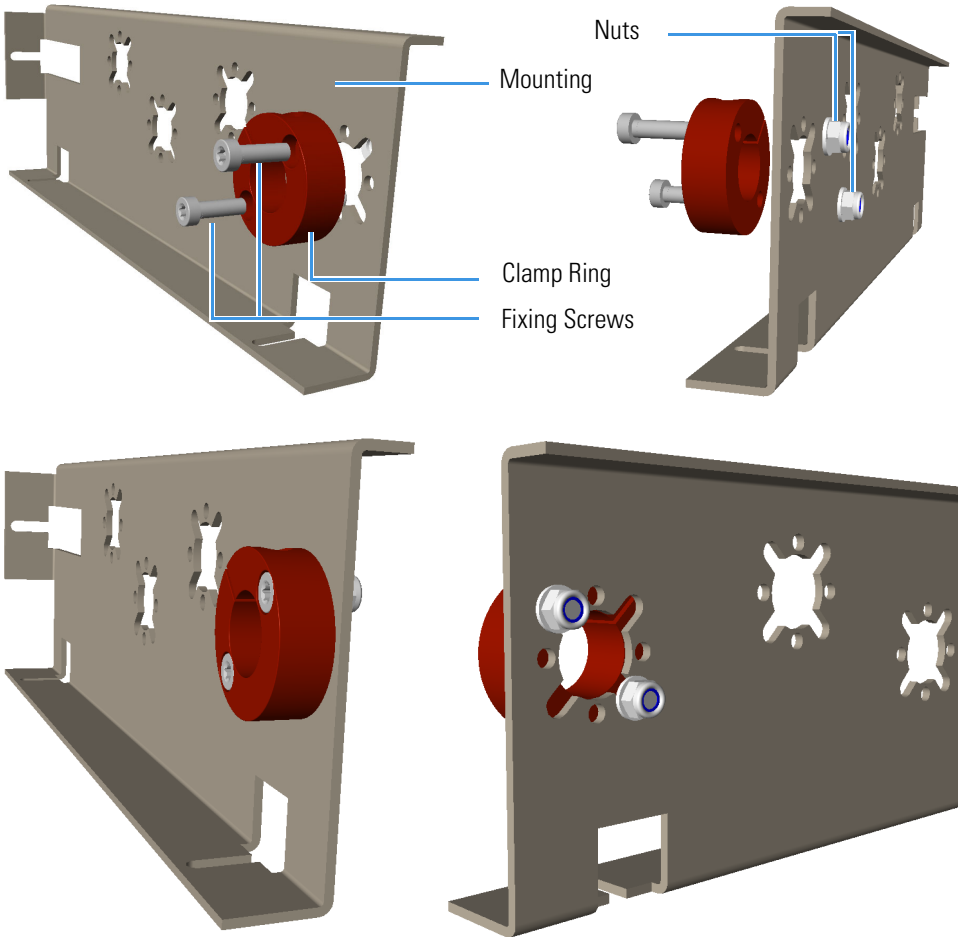


The unheated valve assembly will require the mounting bracket, included as part of the assembly.

a. Choose the mounting holes in the bracket that will allow the valve to be oriented in a favorable direction.

b. Place the **clamp ring** over the hole on the bracket, then secure the clamp ring using the two screws and nuts provided. Take loose one of the two nuts allowing the dowel to tighten the clamp ring. See Figure 85.

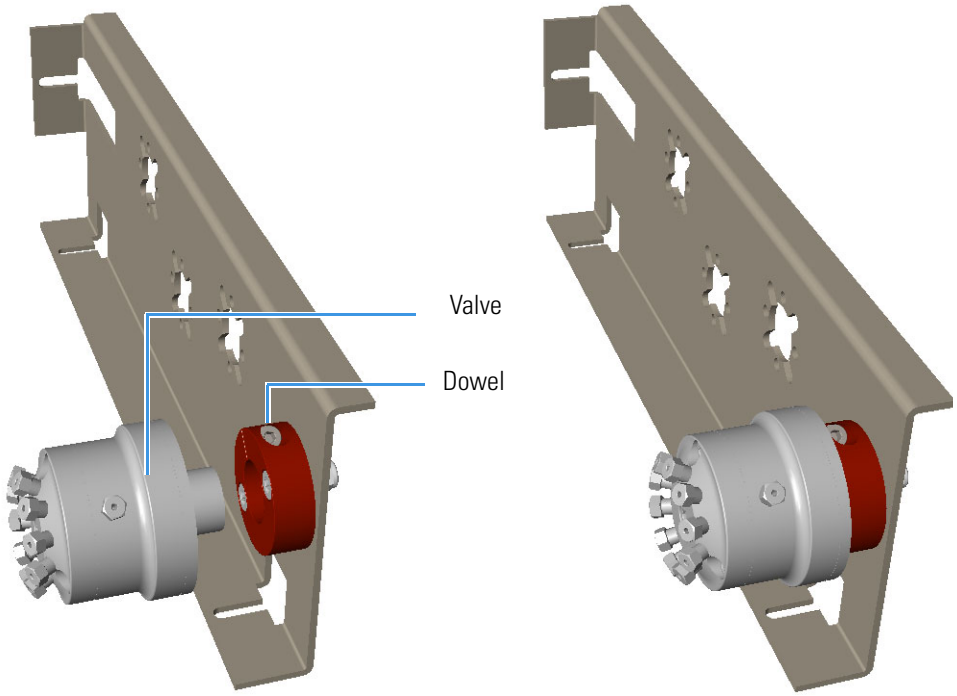
Figure 85. Unheated Diaphragm Valve Installation (1)



c. Loosen the dowel on the clamp ring, then insert the valve into the clamp ring.

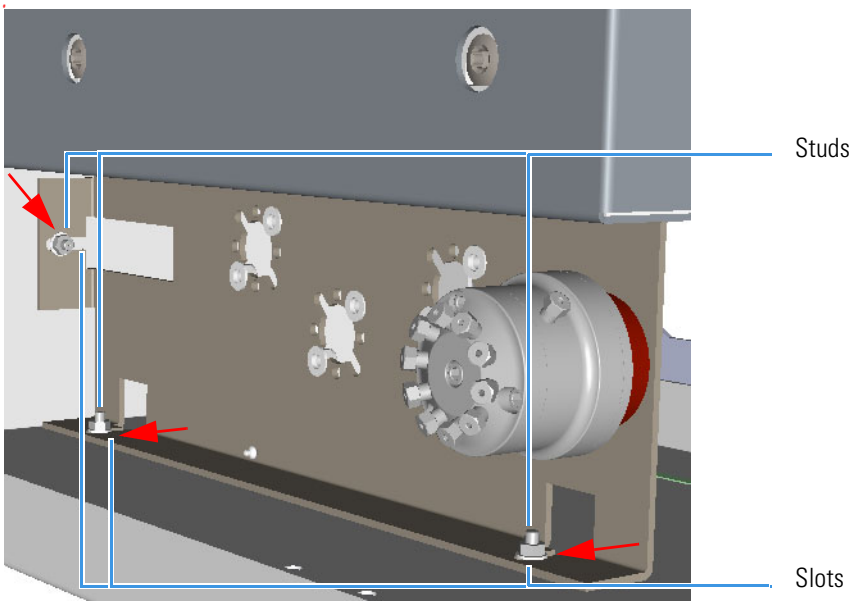
d. Secure the valve tightening the dowel. See Figure 86.

Figure 86. Unheated Diaphragm Valve Installation (2)



2. Install the assembly into the unheated compartment under the main oven.
   a. Install the bracket into the unheated compartment, paying attentions to meet the fixing slots on the bracket to the three studs located as shown in Figure 87.

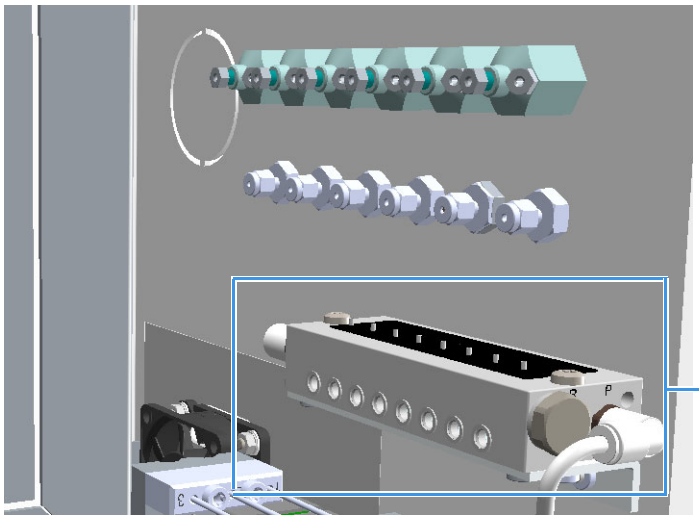
Figure 87. Unheated Diaphragm Valve Installation (2)



   b. Push the bracket against the studs, then secure the assembly by tightening the studs.
3. Install the solenoid valve.

a. Install the solenoid manifold on the rear wall of the valve compartment. See the example of Figure 88.

Figure 88. Unheated Diaphragm Valve Installation (3)

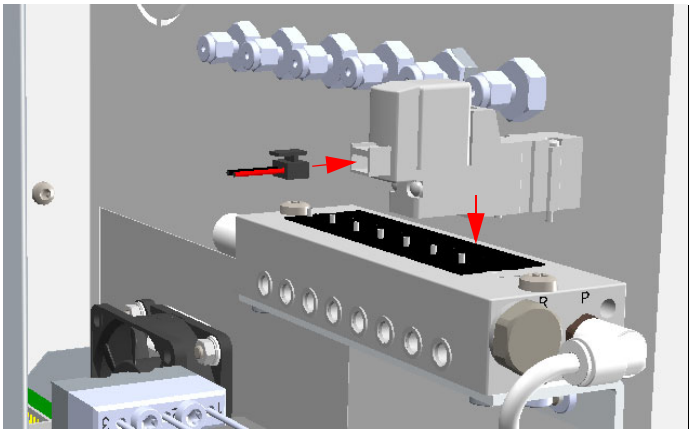


b. Remove the rectangular-shaped cap from the manifold using the #0 phillips screwdriver.

c. Secure the solenoid valve to the under plate using the two screws supplied with the valve. See Figure 89.

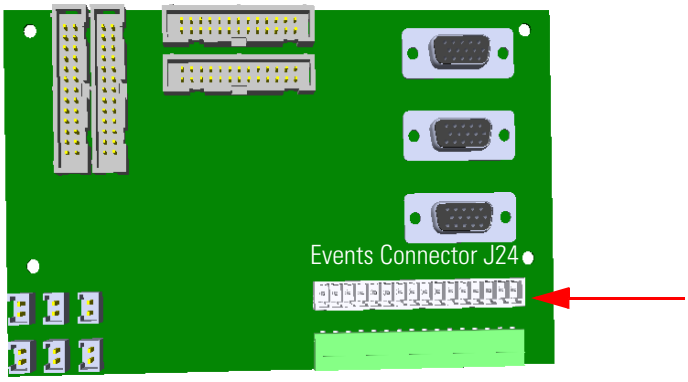
CAUTION Tighten screws evenly, taking care that the solenoid gasket rests on all surfaces to prevent leaks.

Figure 89. Unheated Diaphragm Valve Installation (4)



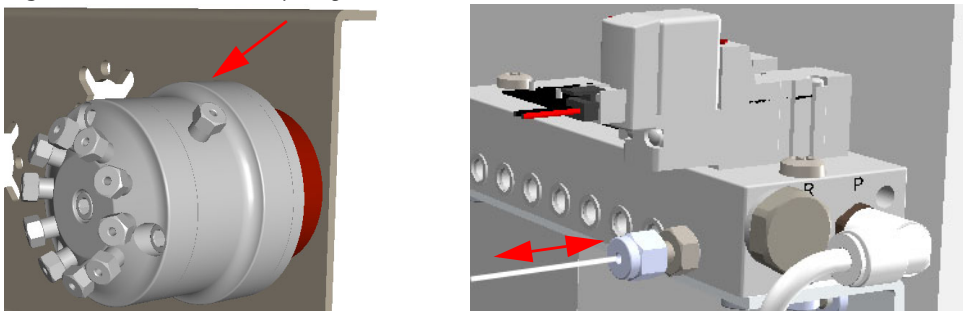
d. Connect the cable from the solenoid valve to the proper timed event output jack of the **Events** connector marked **J24** on the VOBP-HRM board located over the power section. See Figure 90.

Figure 90. Unheated Diaphragm Valve Installation (5)



4. Connecting the gas line.
   a. By using the proper nuts and ferrules connect the gas line from the solenoid valve manifold to the diaphragm valve. See Figure 91.

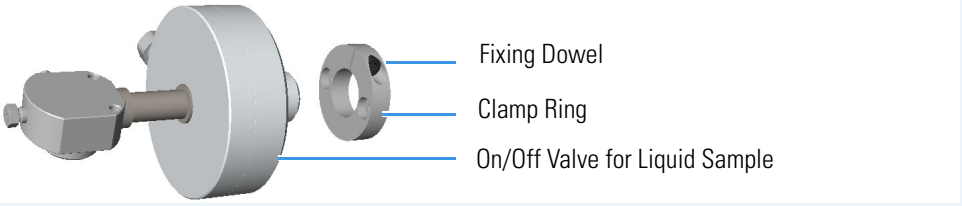
Figure 91. Unheated Diaphragm Valve Installation (6)



Installing an Unheated Valve for Liquid Samples into the Unheated Compartment

❖ **To install a valve for liquid samples in the unheated compartment**

Note The installation of the On/Off valve for liquid samples requires the use of the fixing clamp ring and the proper rotary valve for the actuation.



Installing valves in the unheated compartment consists of the following steps:

- Installing the rotary valve on the mounting bracket
- Installing the On/Off valve for liquid samples on the mounting bracket
- Installing the assemble into the unheated compartment under the main oven

- Installing the solenoid valve manifolds
- Connecting gas lines from the solenoid valve manifold to the actuator of the rotary valve
- Connecting gas lines from the solenoid manifold to the On/Off valve for liquid sample).

Proceed as follows:

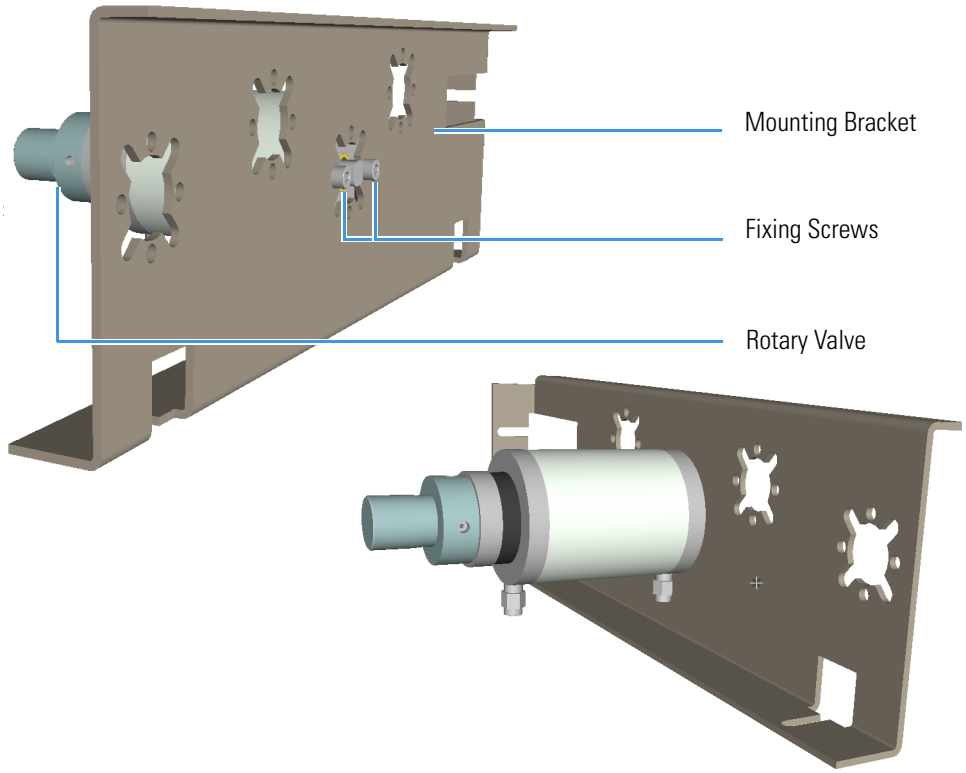
1. Installing the rotary valve on the mounting bracket.

   The unheated valve assembly will require the mounting bracket, included as part of the assembly.

   a. Choose the mounting holes in the bracket that will allow the actuator and the valve to be oriented in a favorable direction.

   b. Fix the valve to the bracket by using the two fixing screws. See Figure 92.

   Figure 92. Unheated Valve for Liquid Samples Valve Installation (1)

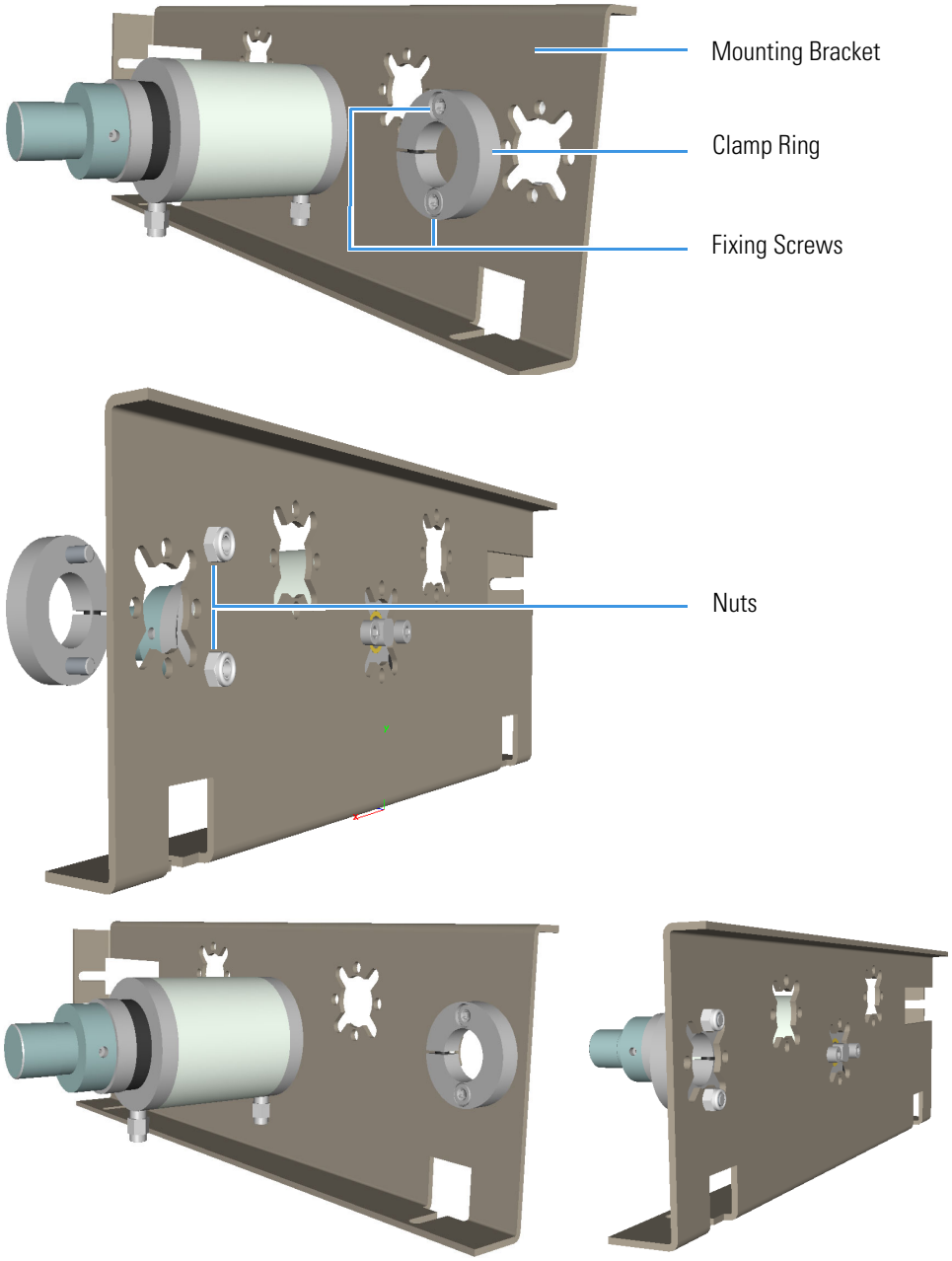


2. Install the On/Off valve for liquid samples on the mounting bracket.

   a. Choose the mounting holes in the bracket that will allow the valve to be oriented in a favorable direction.

   b. Place the **clamp ring** over the hole on the bracket, then secure the clamp ring using the two screws and nuts provided. Loosen one of the two nuts allowing the dowel to tighten the clamp ring. See Figure 93.

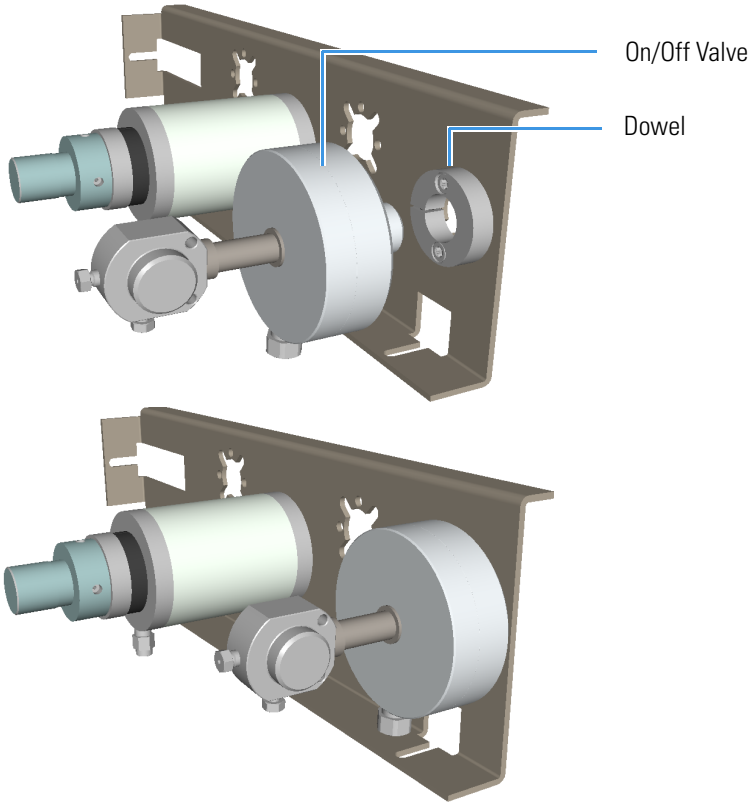
Figure 93. Unheated Valve for Liquid Samples Valve Installation (2)



c. Loosen the dowel on the clamp ring, then insert the valve into the clamp ring.

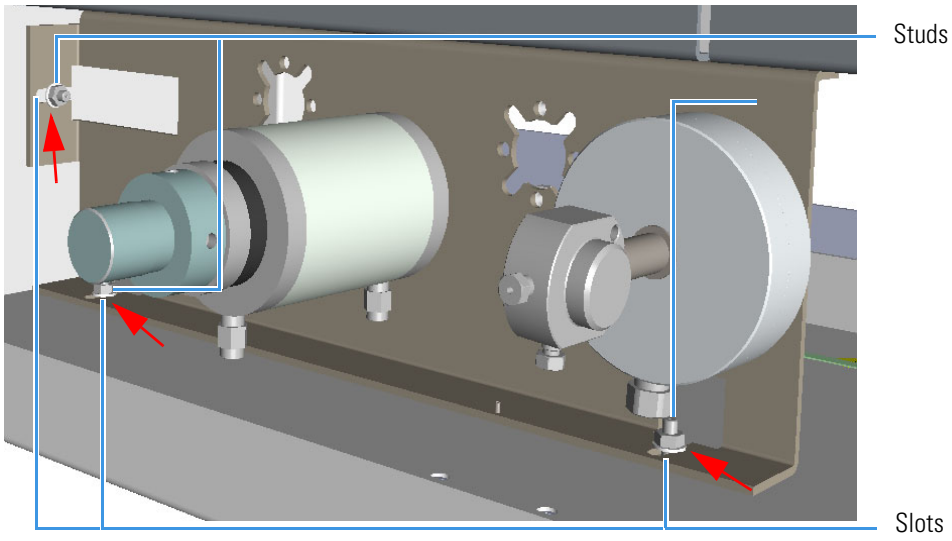
d. Secure the valve tightening the dowel. See Figure 94.

Figure 94. Unheated Valve for Liquid Samples Valve Installation (3)



3. Install the assembly into the unheated compartment under the main oven.
   a. Install the bracket into the unheated compartment, paying attentions to meet the fixing slots on the bracket to the three studs located as shown in Figure 95.

Figure 95. Unheated Valve for Liquid Samples Valve Installation (4)

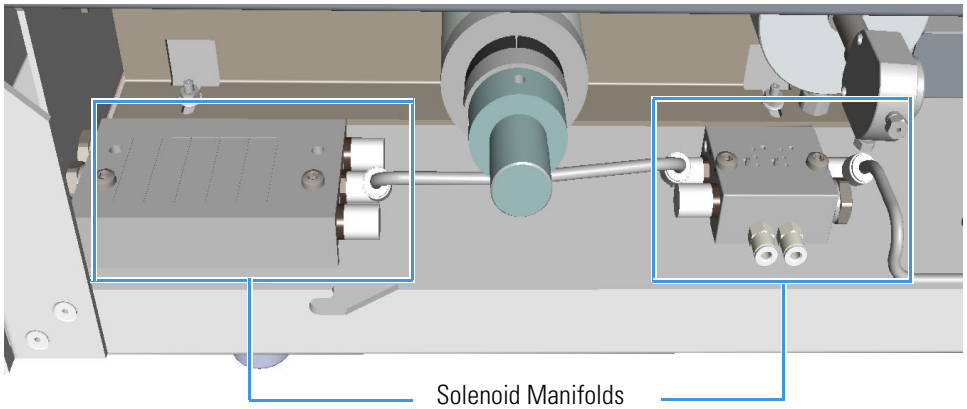


   b. Push the bracket against the studs, then secure the assembly by tightening the studs.

4. Installing the solenoid valves.

   a. Install the solenoid manifold for the actuation of the valves on the floor of the unheated compartment. See the example of Figure 96.

Figure 96. Unheated Valve for Liquid Samples Valve Installation (5)



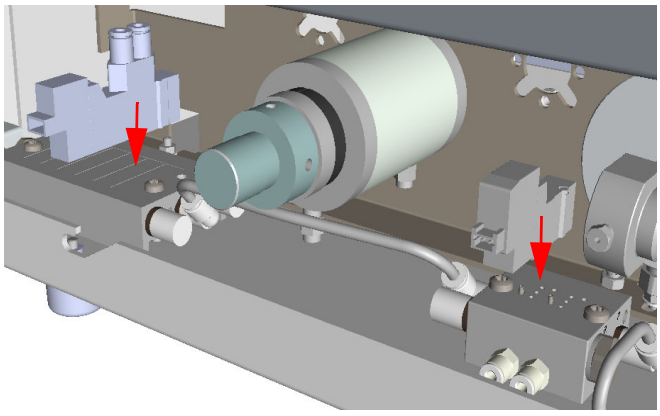
Note The solenoid manifold for the liquid sample valve could have two solenoid valves already mounted. See Figure 17 on page 19. Use the solenoid valve of interest.

   b. Remove the rectangular-shaped cap from the manifold using the phillips screwdriver.

   c. Secure the solenoid valve to the under plate using the two screws supplied with the valve See Figure d.

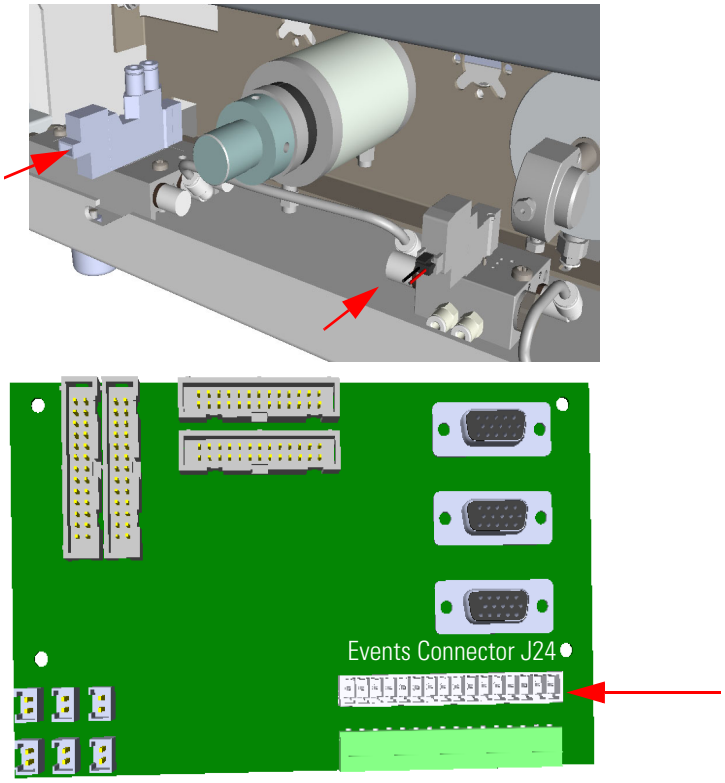
CAUTION Tighten screws evenly, taking care that the solenoid gasket rests on all surfaces to prevent leaks.

Figure 97. Unheated Valve for Liquid Samples Valve Installation (6)



   d. Connect the cables from the solenoid valves to the proper timed event output jack of the **Events** connector marked **J24** on the VOBP-HRM board located over the power section. See Figure 98.

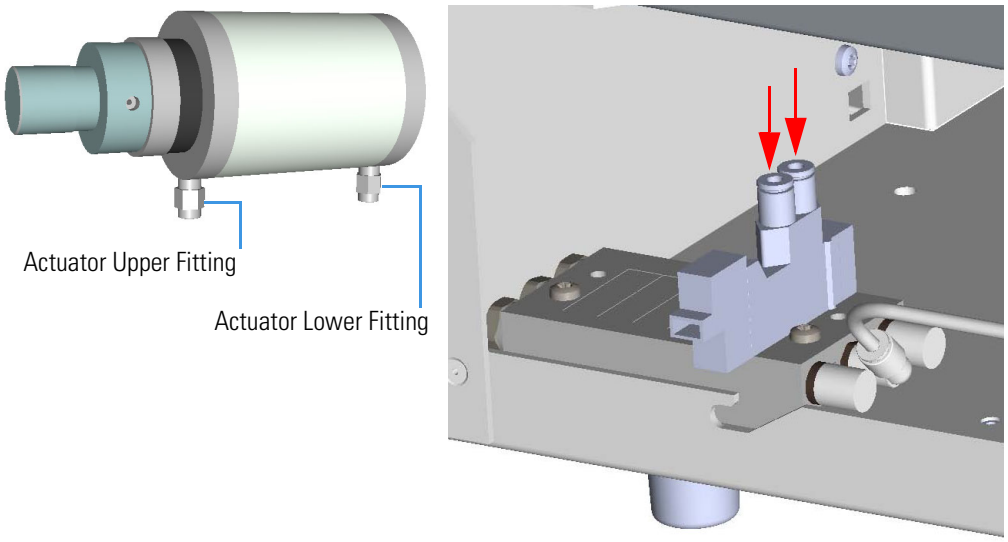
Figure 98. Unheated Valve for Liquid Samples Valve Installation (7)



5. Connecting gas lines from the solenoid valve manifold to the actuator of the rotary valve.

   With reference to Figure 99 proceed as follows:

Figure 99. Unheated Valve for Liquid Samples Valve Installation (8)



   a. Locate the 4 mm nylon tubing supplied in the TRACE 1310 Auxiliary Oven kit and cut it into two equal 12-in. pieces.

b. Push one of the tube pieces into the lower fitting on the actuator assembly, making sure it passes through the ferrule in the actuator fitting. Tighten the nut and ferrule using a 3/8-in. open end wrench. Use a backup 3/8-in. open end wrench on the mating piece that is screwed into the actuator.

c. Place the other end of the tubing into the valve solenoid fitting located on the outside edge of the solenoid manifold by pushing the tubing firmly into the fitting. It should automatically seal in place.

d. Turn the actuator gas supply on. This line should now be pressurized.

e. Verify there are no major leaks in the fittings.

> **Note** Applying pressure to this side of the actuator will ensure that the rotary actuator stays in the CCW position.

f. Take the other piece of nylon tubing and place it in the upper fitting on the actuator. Be sure the tube passes through the ferrule in the fitting. Tighten the fitting using the 3/8-in. open end backup wrench.

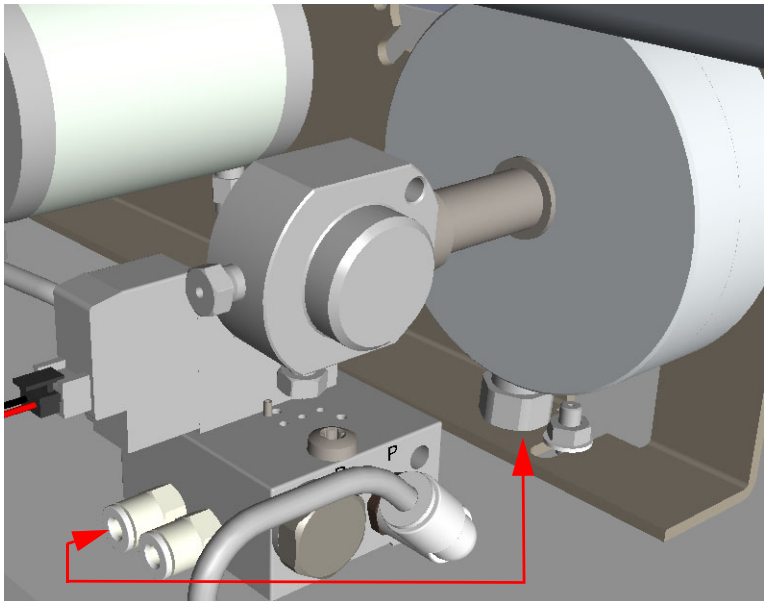
g. Connect the opposite end to the solenoid fitting.

> **Note** The tubing can be released from the solenoid by pushing down on the solenoid fitting and pulling out on the tubing at the same time.

6. Connect gas lines from the solenoid valve manifold to the On/Off valve for liquid sample bu using a piece of 1/8-in. tubing.

With reference to Figure 100 proceed as follows:

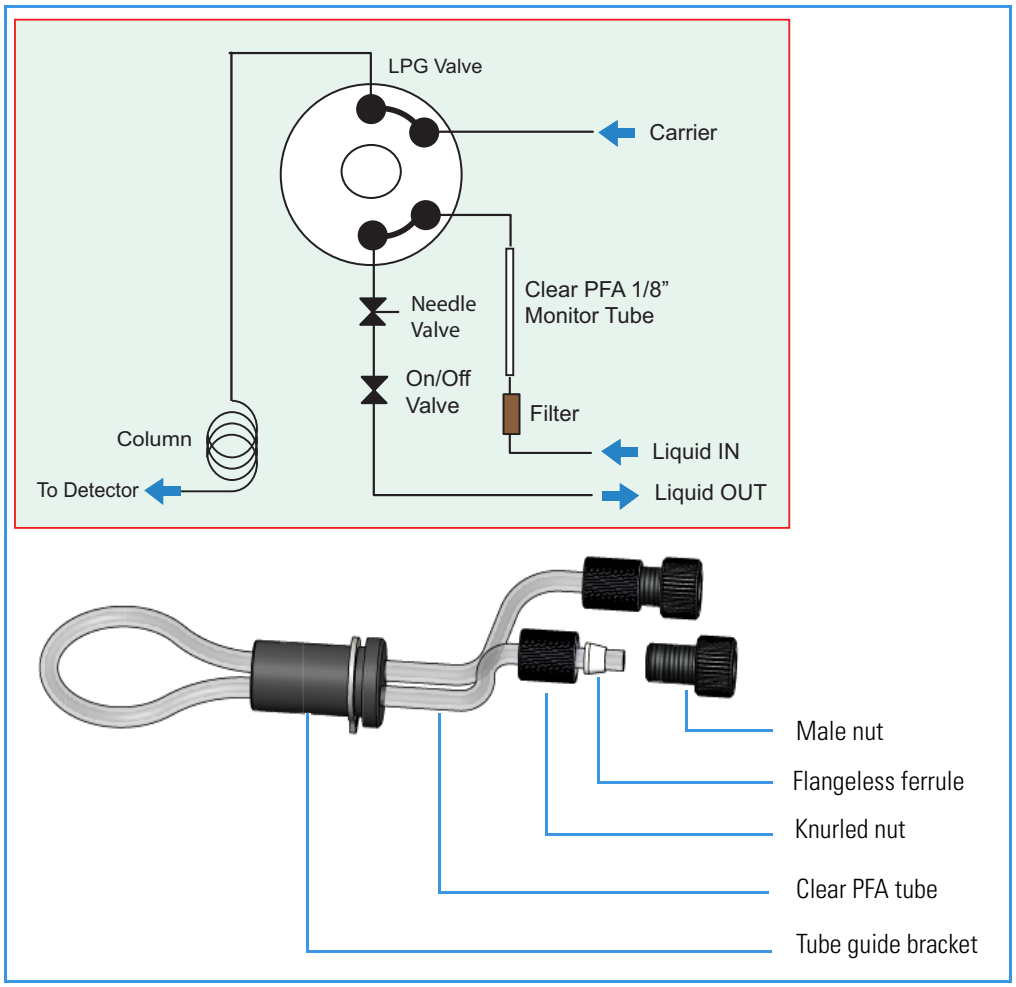
Figure 100. Unheated Valve for Liquid Samples Valve Installation (9)



a. Connect the proper outlet port of the actuator gas (air) to the inlet port of the actuator gas of the valve.

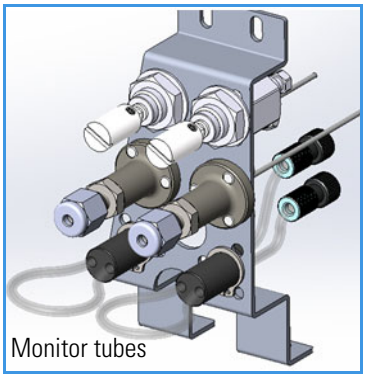
7. Fix and connect the **monitor tube** (kit PN 19071016).
Figure 101 shows a schematic example of the connection of the clear PFA 1/8" monitor tube to the LPG valve.

Figure 101. Connecting Monitor Tube (1)



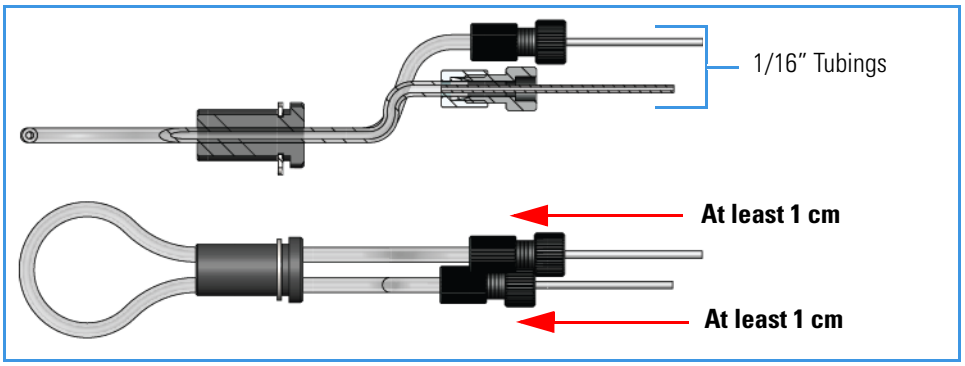
a. Install the tube and fix its guide bracket on the basic unit. See the example of Figure 102.

Figure 102. Connecting Monitor Tube (2)



b. The tubing 1/16” coming from the LPG valve and from the filter are to be inserted at **least 1 cm** into each end of the clear PFA 1/82 monitor tube. See Figure 103.

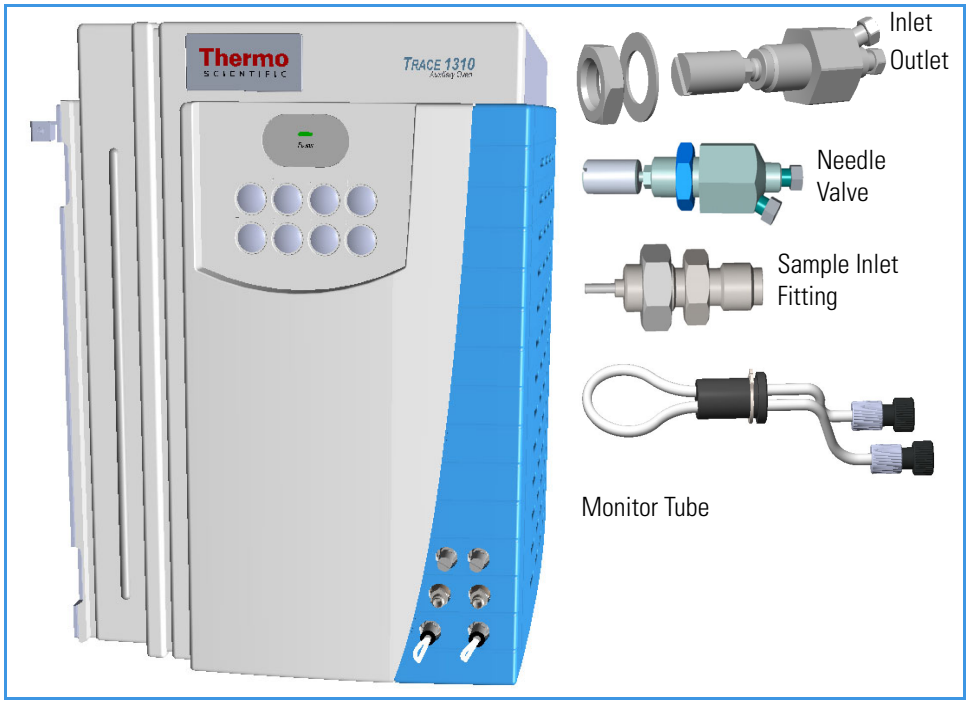
Figure 103. Connecting Monitor Tube (3)



The system can be rated up to 500 PSI (34.5 bar; 3450 kPa) PFA tubing pressure rating.

Figure 104 shows an example of sample inlet fittings and a needle valve mounted on the basic unit.

Figure 104. Example of Sample Inlet Fittings and Needle Valve



Plumbing Valves and System

Carry out the valve and system plumbing according to the appropriate plumbing diagram for your system setup.

Configuring the Valves

The valves in the TRACE 1310 Auxiliary Oven are gas-actuated. The valves are controlled by solenoid valves that are turned on and off by timed events. Each solenoid valve uses one timed event. Once a valve occupies a timed event, this timed event is removed from the list of external events that can be added to a run table. You can configure a valve to be a gas sampling valve or a switching valve.

Gas Sampling Valves

Gas sampling valves have two positions: **Load** and **Inject**.

Switching Valves

Switching valves have two positions: **On** and **Off**. Switching valves are plumbed so that the counter-clockwise position is **Off** and the clockwise position is **On**.

Testing the Valves

❖ **To test the valves**

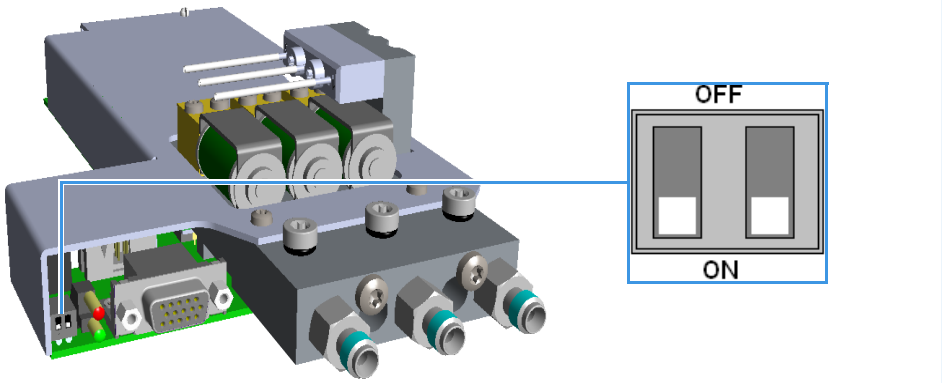
1. Configure the valve and rotate it clockwise and counter-clockwise.
2. Ensure that the valve moves freely in both directions.
3. Inspect the valve stop when the valve is in both positions to ensure that the stop is at the movement limit on each side.

Installing the Auxiliary Gas Modules

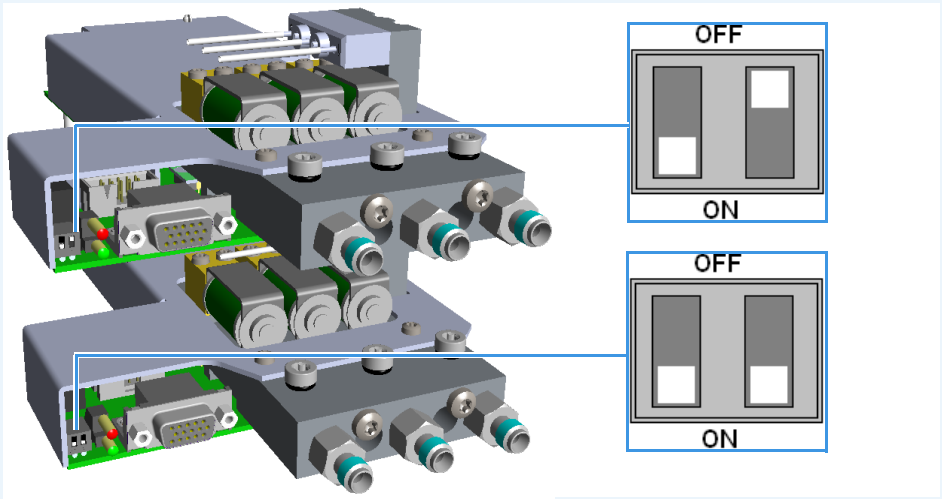
This section provides instruction for installing a single and a double auxiliary gas module into the TRACE 1310 Auxiliary Oven.

CAUTION Before installing an auxiliary gas module make sure that the configuration switches are properly set:

- Single auxiliary gas module (Gas 1, Gas 2, and Gas 3): set the module as "**primary**":



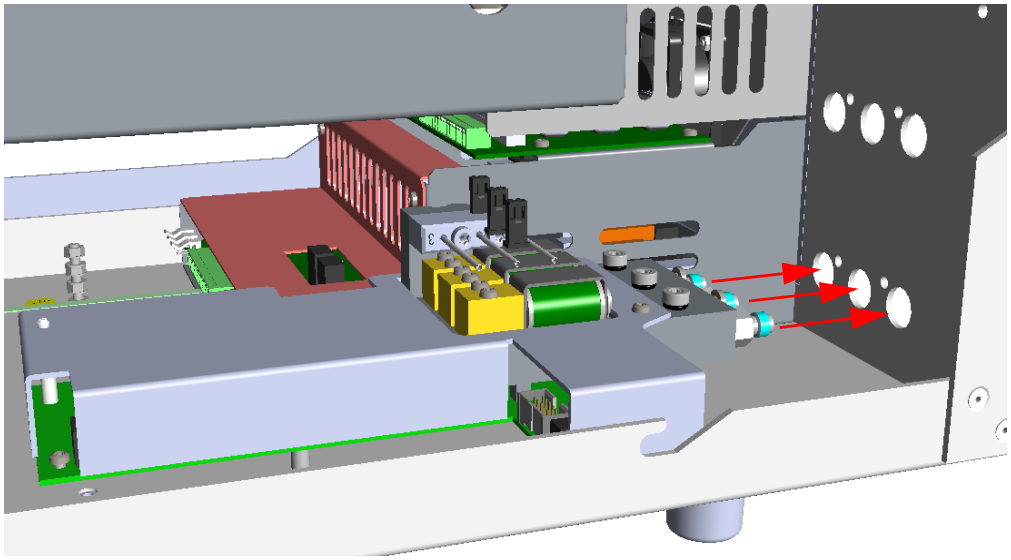
- Double auxiliary gas module (Gas 1, Gas 2, Gas 3, Gas 4, Gas 5, and Gas 6): set the second module as "**secondary**":



❖ To install a single auxiliary gas module

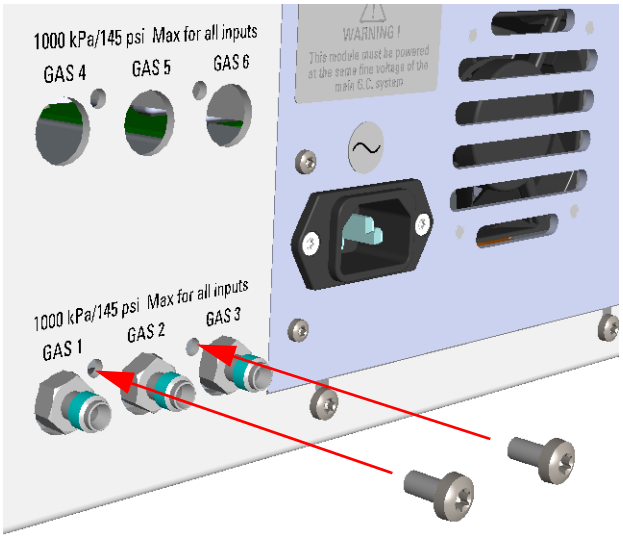
1. Place the auxiliary gas module on the floor of the unheated compartment. Guide and push the module towards the back until the three gas inlet fittings protrude from the back panel through the three lower holes. See Figure 105.

Figure 105. Auxiliary Gas Module Installation (1)



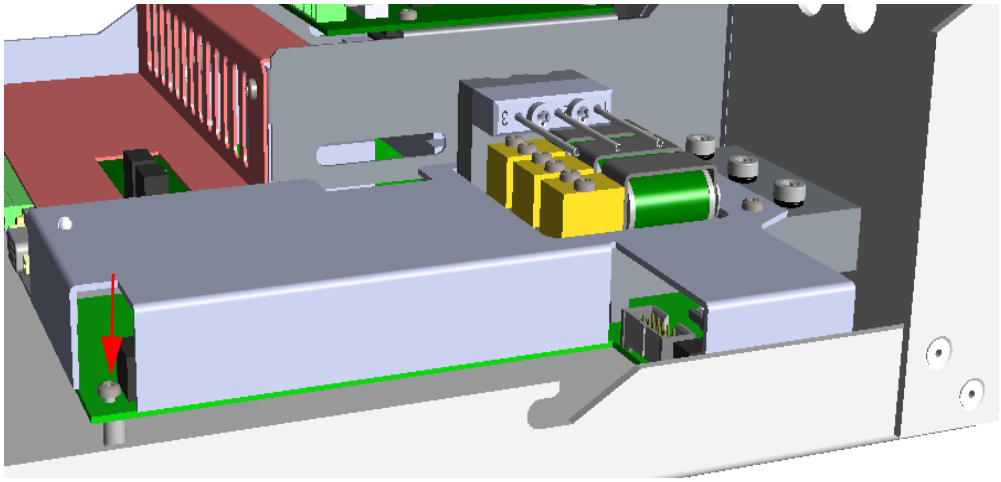
2. Fix the module to the back panel by using the two fixing screws provided. See Figure 106.

Figure 106. Auxiliary Gas Module Installation (2)



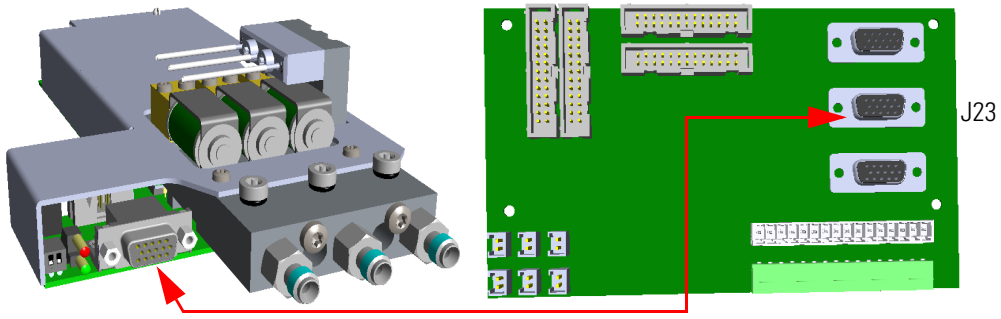
3. Fix the module to the floor of the unheated compartment. See Figure 107.

Figure 107. Auxiliary Gas Module Installation (3)



4. Using the cable provided connect the 15-pin female **BUS** connector on the module to the connector marked **J23** on the VOBP-HRM board. See Figure 108.

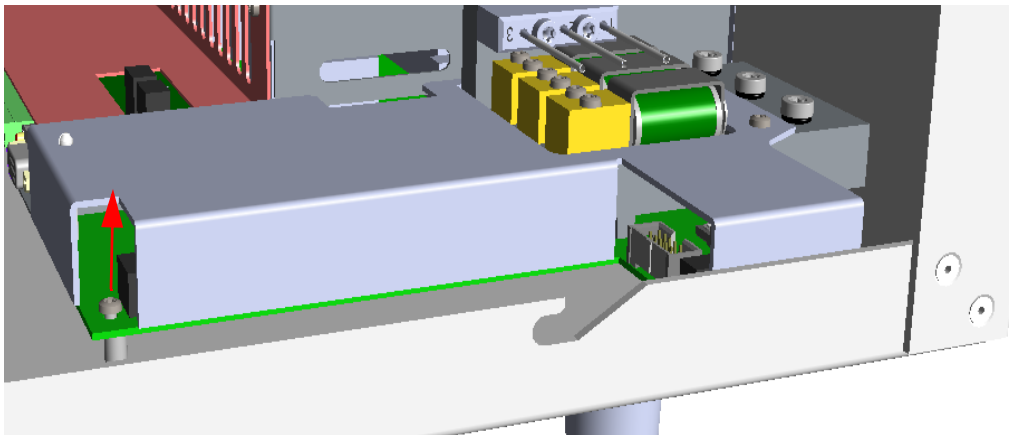
Figure 108. Auxiliary Gas Module Installation (4)



❖ To install the second auxiliary gas module

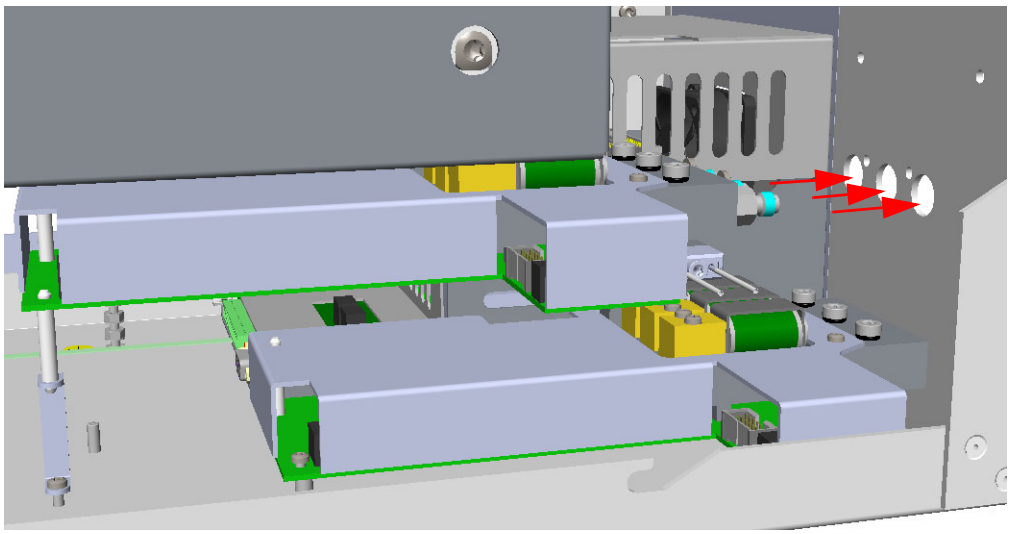
1. Undo the screw that fixes the primary module to the floor of the unheated compartment. See Figure 109.

Figure 109. Second Auxiliary Gas Module Installation (1)



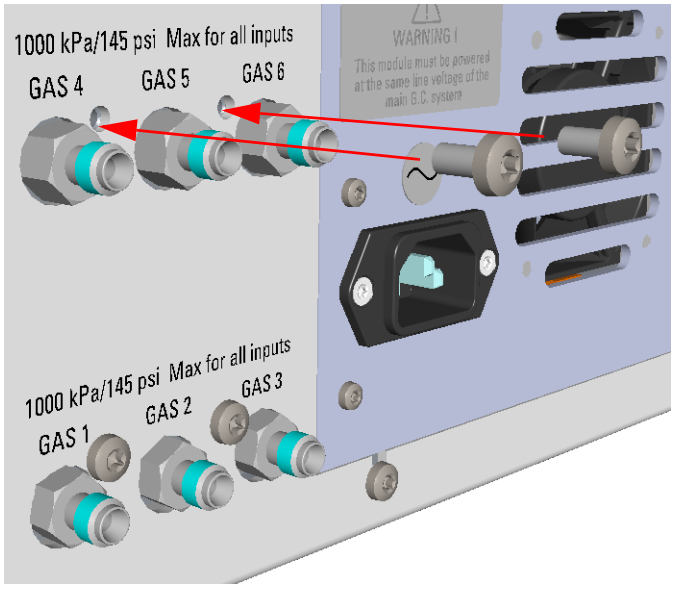
2. Place the second auxiliary gas module over the primary module. Guide and push the second module towards the back until the three gas inlet fittings protrude from the back panel through the three upper holes. See Figure 110.

Figure 110. Second Auxiliary Gas Module Installation (2)



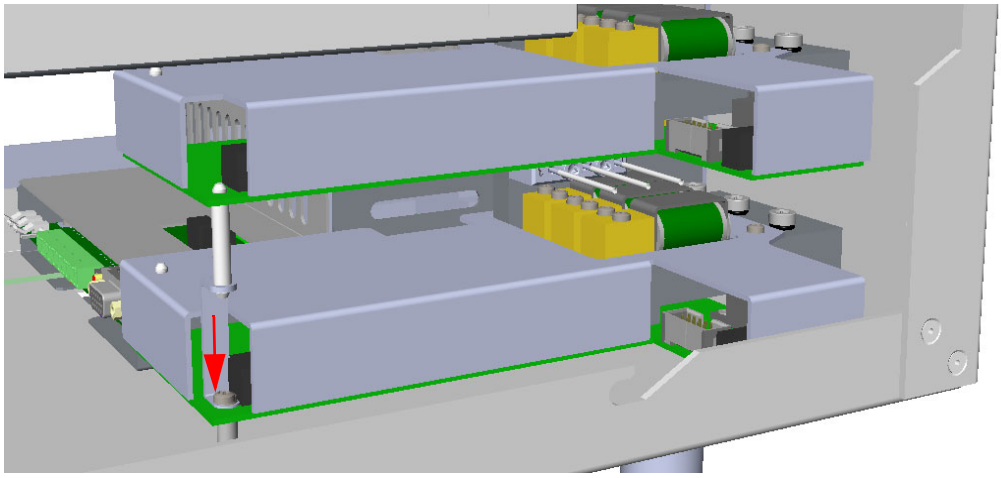
3. Fix the module to the back panel by using the two fixing screws provided. See Figure 111.

Figure 111. Second Auxiliary Gas Module Installation (3)



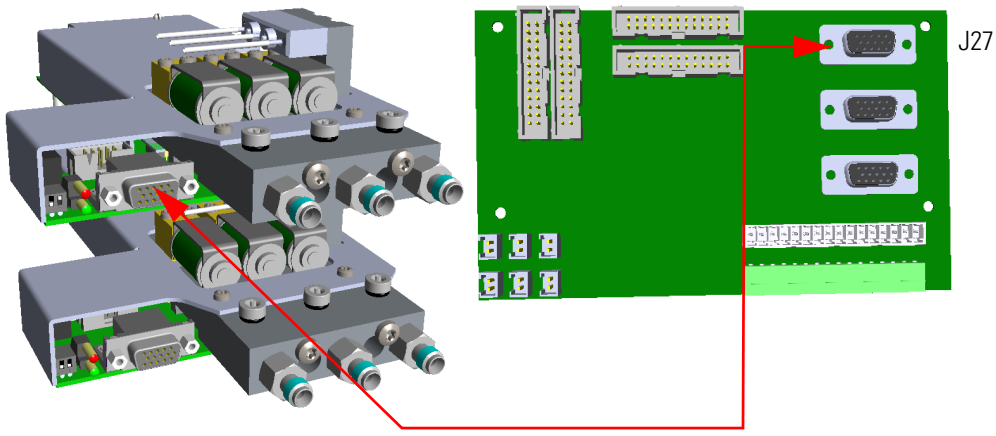
4. Fix the second module to the floor of the unheated compartment. See Figure 112.

Figure 112. Second Auxiliary Gas Module Installation (4)



5. Using the cable provided connect the 15-pin female **BUS** connector on the module to the connector marked **J27** on the VOBP-HRM board. See Figure 113.

Figure 113. Second Auxiliary Gas Module Installation (5)



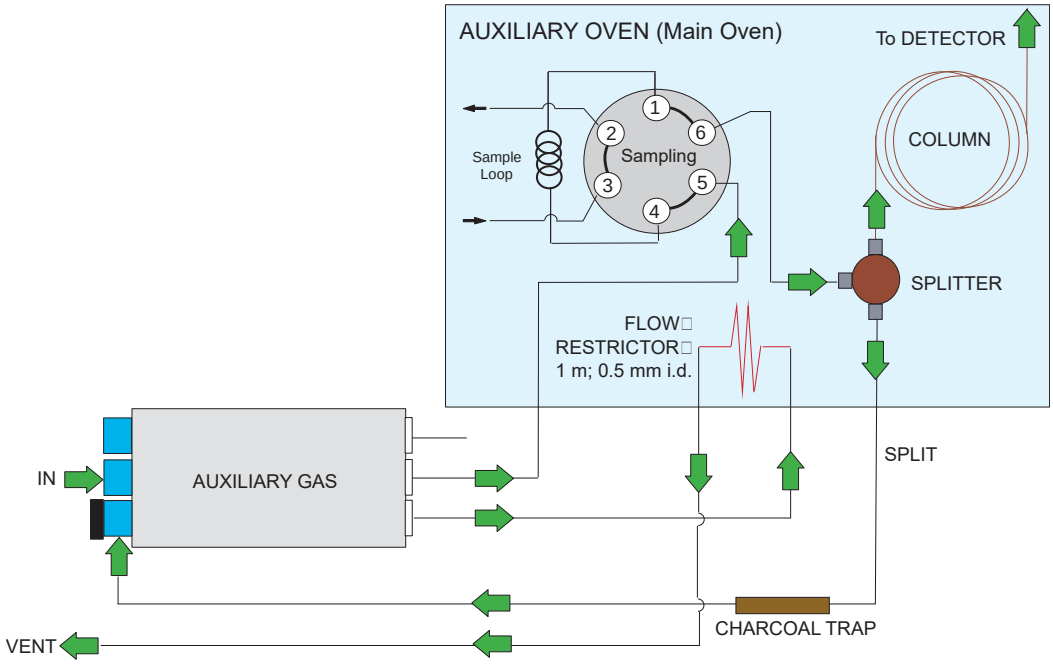
Special Use of the Auxiliary Gas Module for Controlling the Split Flow

The auxiliary carrier module provides three pressure channel controls, but each channel can be also used as flow controller by adding a flow restrictor.

A particular case is using one of the channels for controlling split flow from a splitter. See the pneumatic circuit in Figure 114 on page 78.

This application requires the installation of the kit **P/N 19071018**.

Figure 114. Pneumatic Circuit

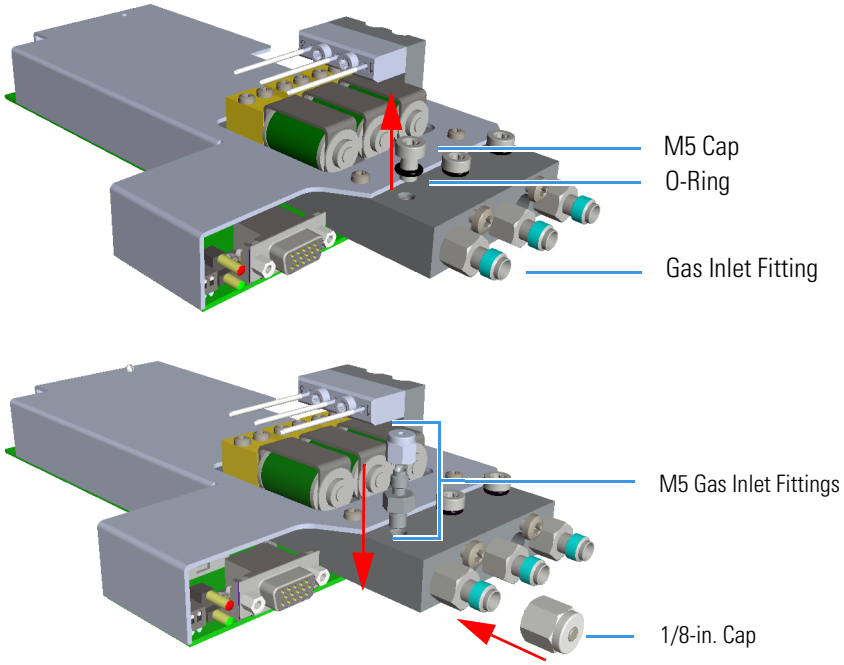


❖ To install the split fitting option

This operating sequence provides instruction for installing the split option kit P/N 19071018 into the TRACE 1310 Auxiliary Oven.

1. Power off the GC and the TRACE 1310 Auxiliary Oven.
2. Remove the L-shape cover of the Auxiliary Oven.
3. Remove the L-shape cover of the main oven to access its interior.
4. Modify the gas inlet port of the channel for controlling split flow by plugging the gas inlet fitting with the provided 1/8-in.cap.
5. Replacing the M5 cap with a M5 gas inlet fittings. See the example in Figure 115.

Figure 115. Channel Modification



6. You can position the splitter and flow restrictor at your convenience inside the TRACE 1310 Auxiliary Oven according to the pneumatic circuit in Figure 114.

   Figure 116, Figure 117, and Figure 118 shown an example of installation of the kit in three views. The components of the kit are highlighted in yellow.

Figure 116. Example of Kit Installation - First View

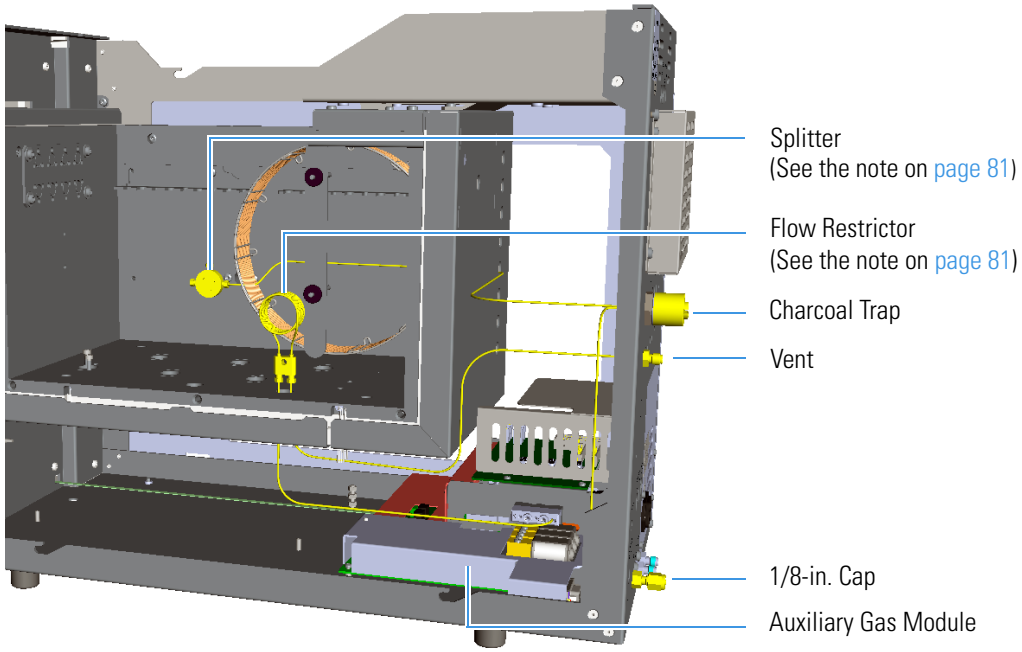


Figure 117. Example of Kit Installation - Second View

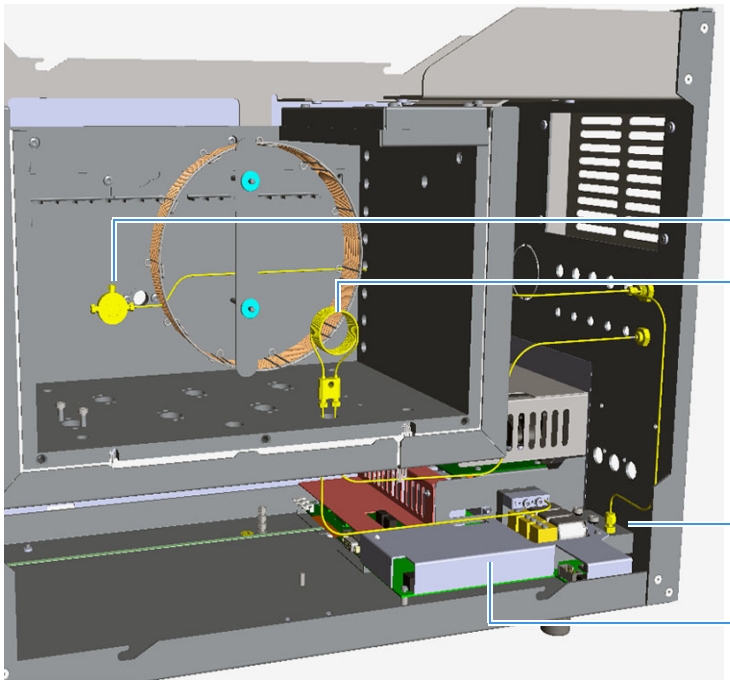
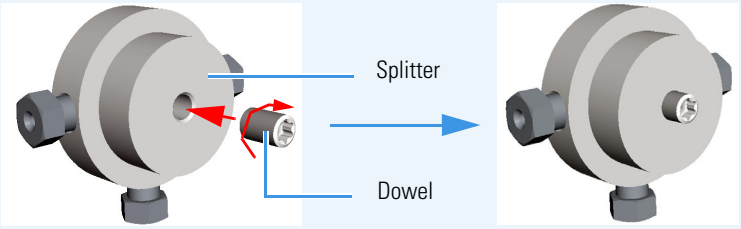


Figure 118. Example of Kit Installation - Third View

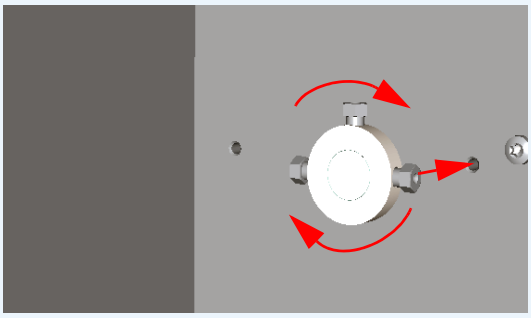
Note It is important that the flow restrictor is installed inside the aux oven and kept at regulated temperature. This will guarantee the flow stability.

Note Installation of the splitter:

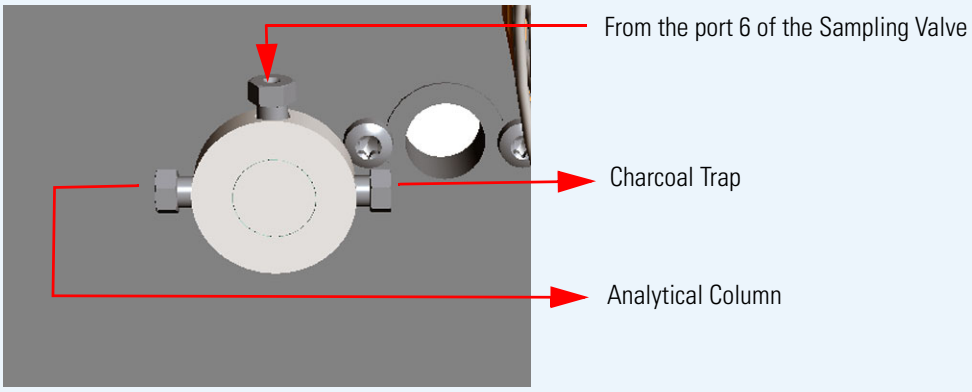
The previous figures shown an example of installation of the splitter into the main oven. You can place the splitter in a position that you feel more convenient based on the system configuration. If you want to install the splitter on a wall of the main oven as shown in the figures, proceed as follows:
Screw the dowel provided into the central hole of the splitter using a T8 Torxhead wrench. Stop the screwing of the dowel when it starts to grip the mixer; the dowel must protrude few millimeters from the central hole of the splitter, do not overtighten.



Screw the splitter into a hole provided on the wall of the main oven



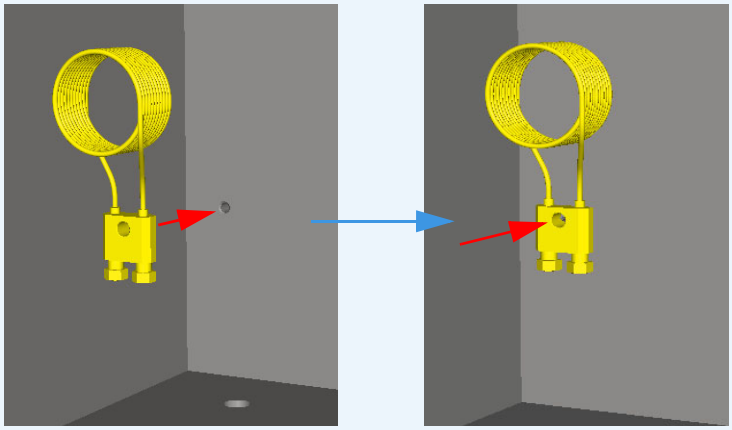
Connect the splitter to the pneumatic circuit according to the scheme on page 78.



CAUTION To install the capillary column to the splitter, replace the steel ferrule inside the splitter with the appropriate Vespel® ferrule provided with the kit.

Note Installation of the flow restrictor:

The previous figures shown an example of installation of the flow restrictor into the main oven. The flow restrictor can be secured to the holes available.

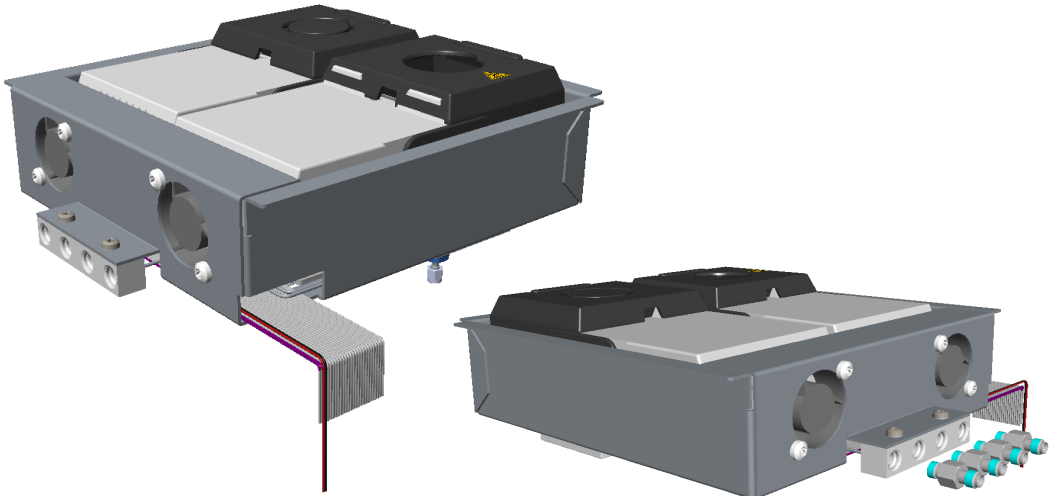


Connect the flow restrictor to the pneumatic circuit according to the scheme on page 78.

Installing the Auxiliary Detectors Assembly

This section provides instructions for installing the auxiliary detectors assemble into the detector housing. See Figure 119.

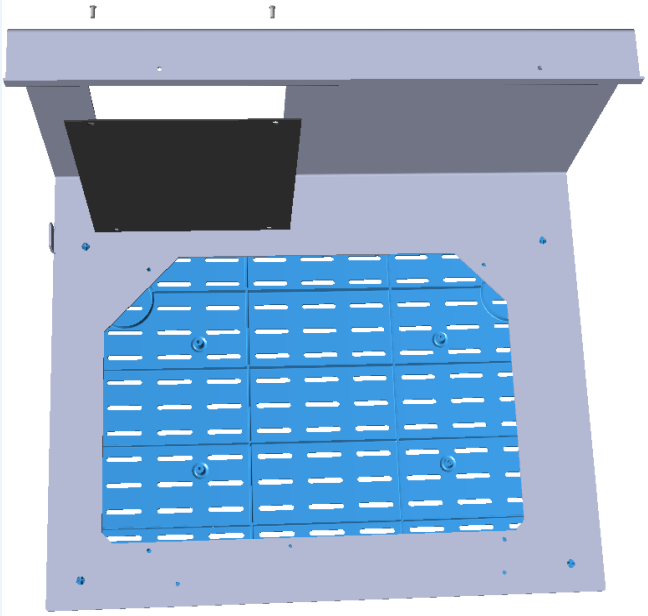
Figure 119. Auxiliary Detectors Assembly



Note Figure 119 to Figure 123 show both the left and right auxiliary detectors installed into the assembly. If only a auxiliary detector is required, the assembly will be shipped with a detector seat empty.

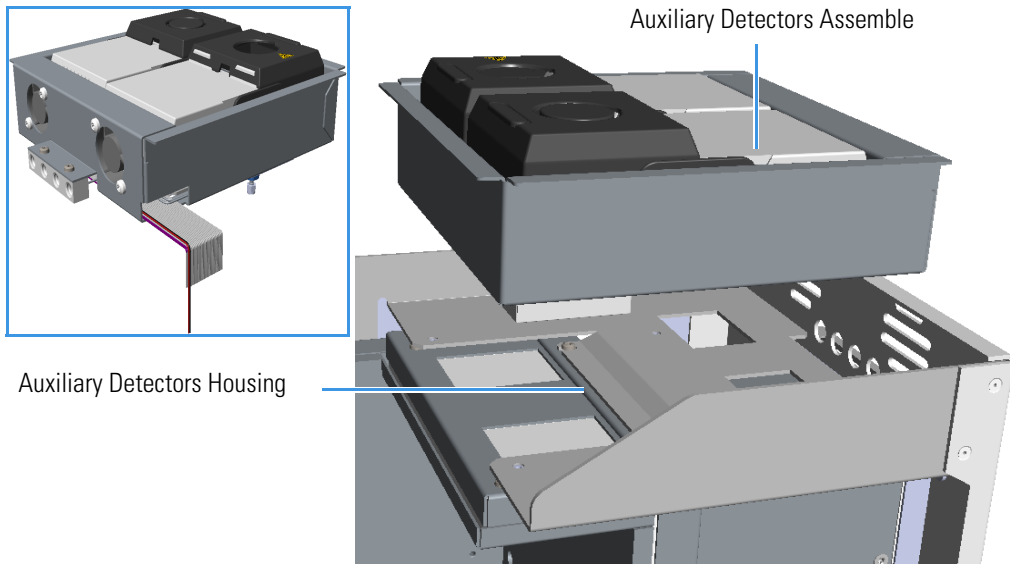
❖ To install the auxiliary detectors

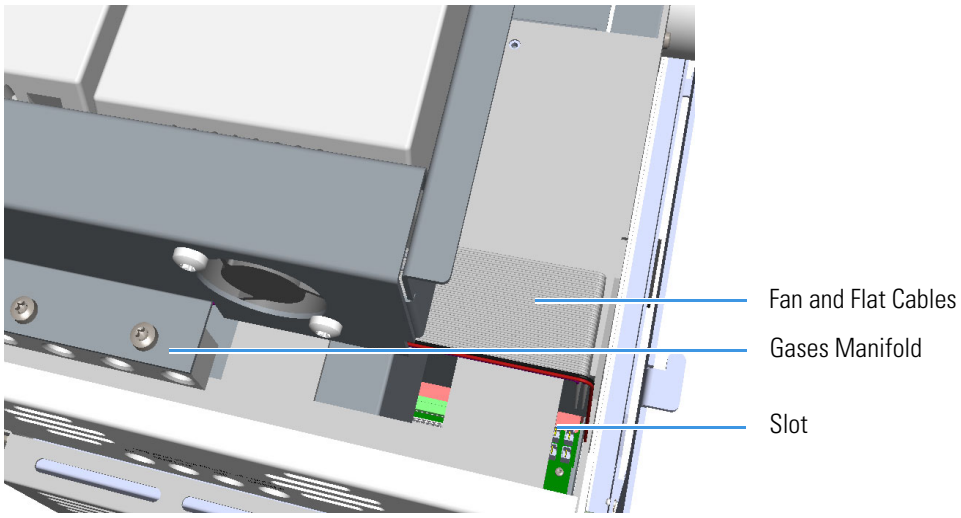
Note Before starting make sure to remove the detector housing cover from the Auxiliary Oven L-shape Cover.



1. Insert the auxiliary detector assembly into the auxiliary detector housing making sure to properly guide the flat cables and the fan cables into the slot provided on the chassis up to reach the VOBP-HRM board. See Figure 120.

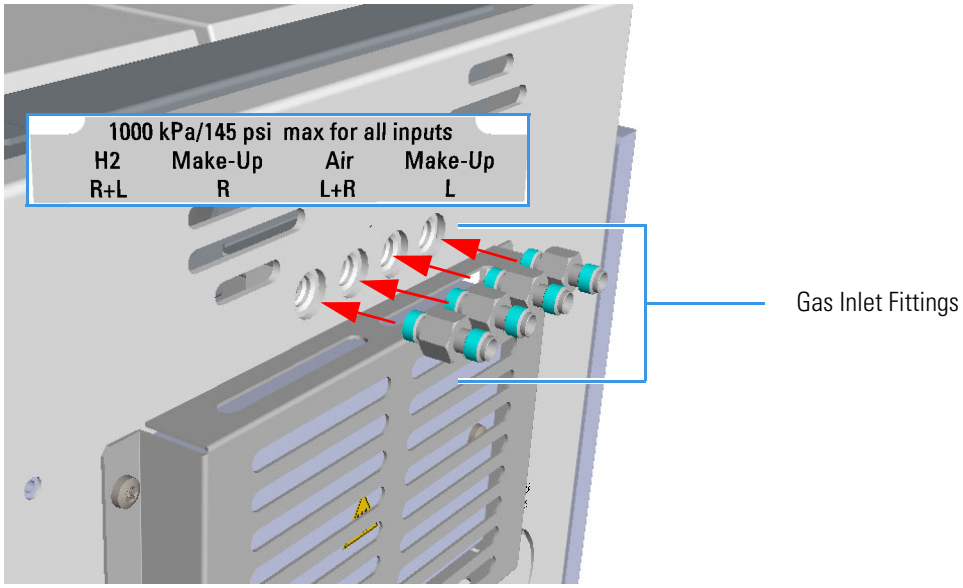
Figure 120. Auxiliary Detectors Installation (1)





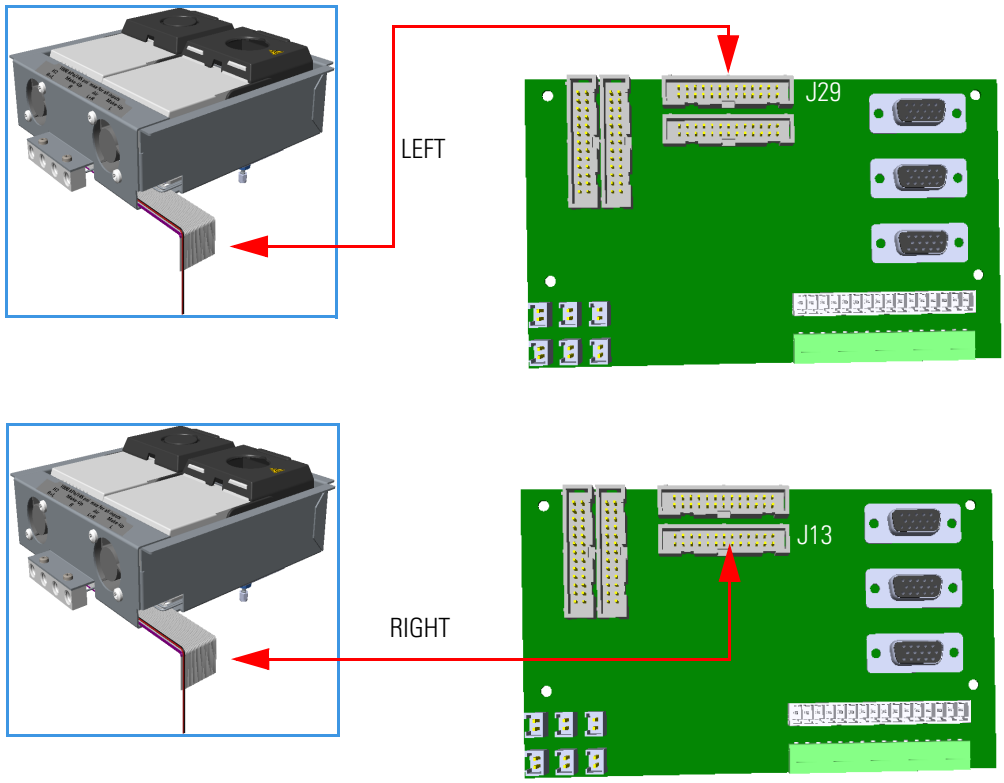
2. From the back panel of the TRACE 1310 Auxiliary Oven, connect the gas inlet fittings into the gas inlet ports for carrier and detector gases on the gases manifold. See Figure 121.

Figure 121. Auxiliary Detectors Installation (2)



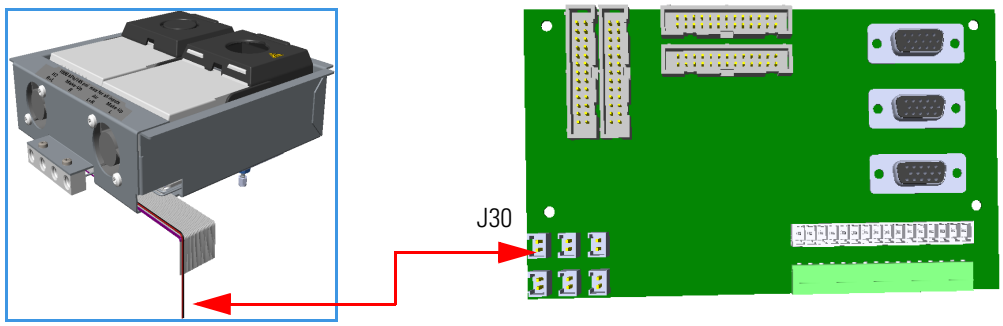
3. On the VOBP-HRM board connect the flat cable of the left and right detectors respectively to the connectors marked **J29** and **J13**. See Figure 122.

Figure 122. Auxiliary Detectors Installation (3)



4. On the VOBP-HRM board connect the cables of the left and right fans to the connector marked **J30**. See Figure 123.

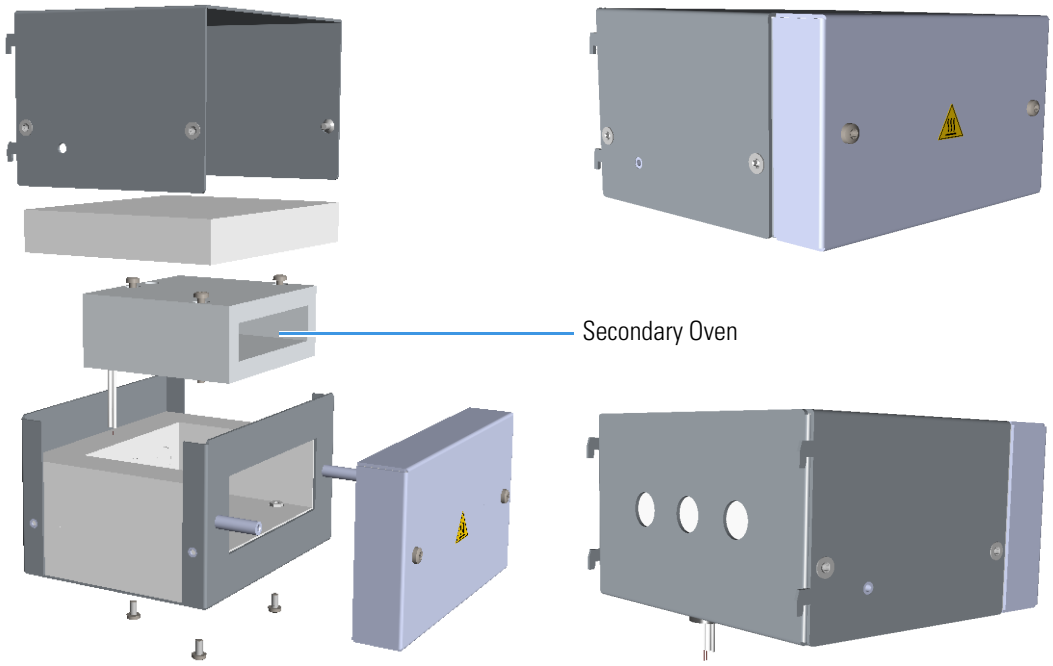
Figure 123. Auxiliary Detectors Installation (4)



Installing the Secondary Oven Assembly

This section provides instruction for installing the secondary oven assembly into the TRACE 1310 Auxiliary Oven.The secondary oven is pre-mounted into a metal box. See Figure 124.

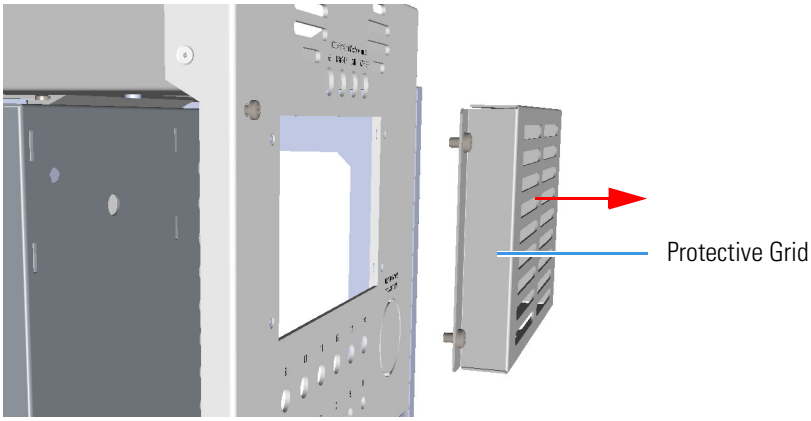
Figure 124. Secondary Oven Assemble



❖ **To install the secondary oven assembly**

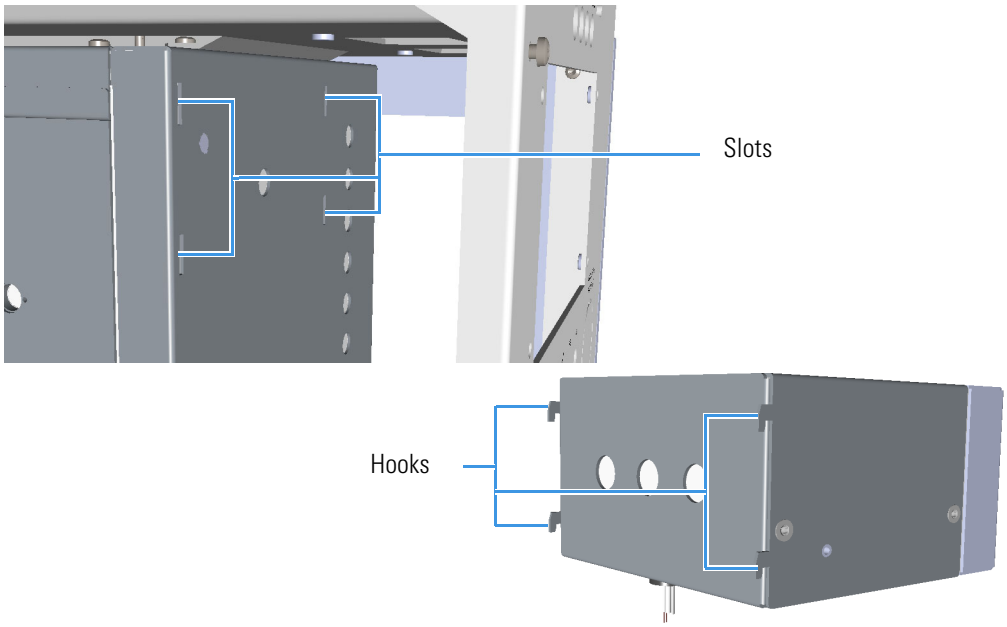
1. Remove the protective grid from the back panel unscrewing the four fixing screws. See Figure 125.

Figure 125. Secondary Oven Installation (1)



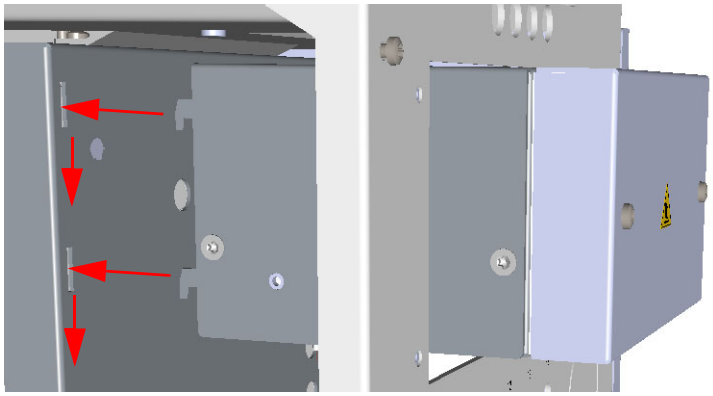
2. Look for the four slots on the back wall of the main oven, and for the four hook on the back of the secondary oven assembly. See Figure 126.

Figure 126. Secondary Oven Installation (2)



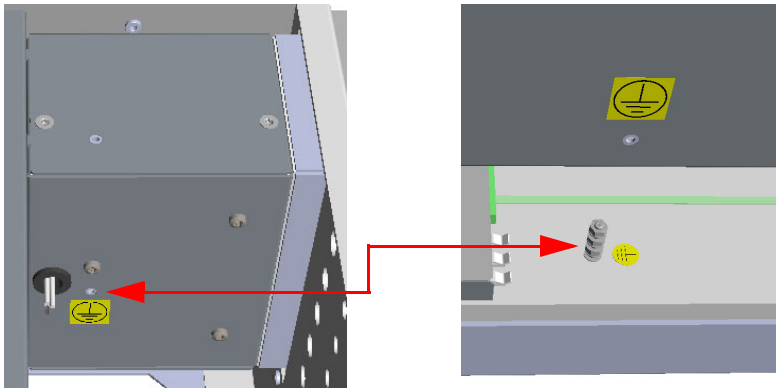
3. Insert and push the secondary oven assembly into the back of the instrument until the four hooks enter into the relevant slot, then hook the assembly pushing it downwards. See Figure 127.

Figure 127. Secondary Oven Installation (3)



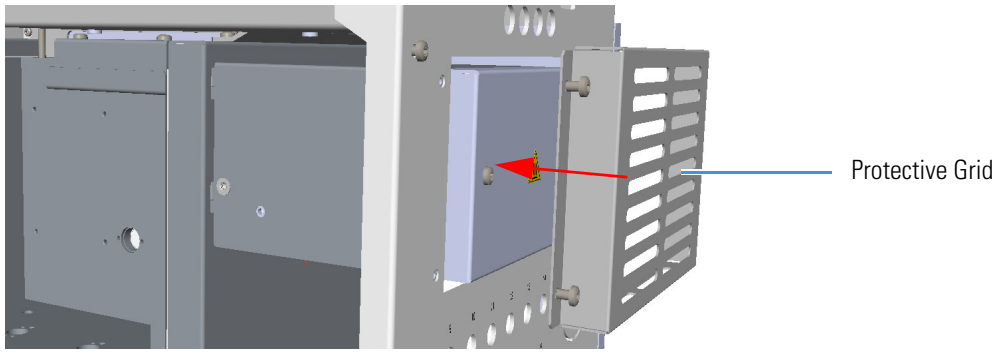
4. Connect the ground wire on the bottom of the assembly using the proper fixing screw, then connect the other end of the wire to the common ground point on the chassis of the instrument. See Figure 128.

Figure 128. Secondary Oven Installation (4)



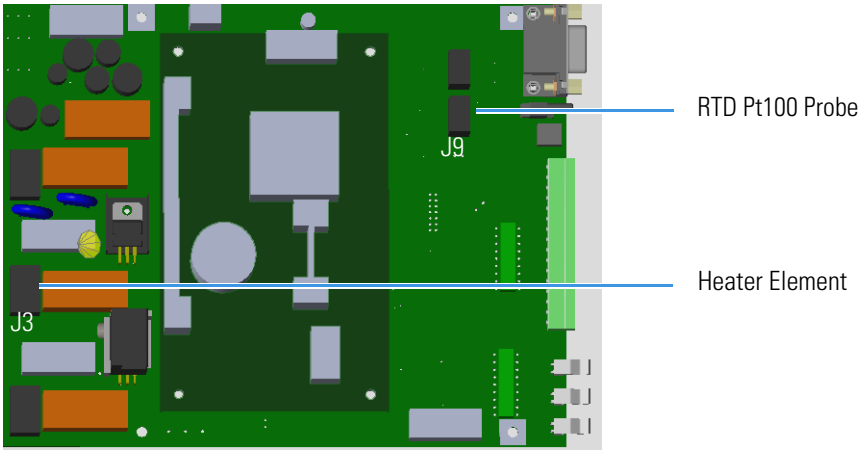
5. Remount and fix the protective grid. See Figure 129.

Figure 129. Secondary Oven Installation (5)



6. Connect the cables of the heater element and of the RTD Pt100 probe respectively to the connectors marked **J3** and **J9** on the Aux Temp VO/Power Supply board.
See Figure 130.

Figure 130. Secondary Oven Installation (6)

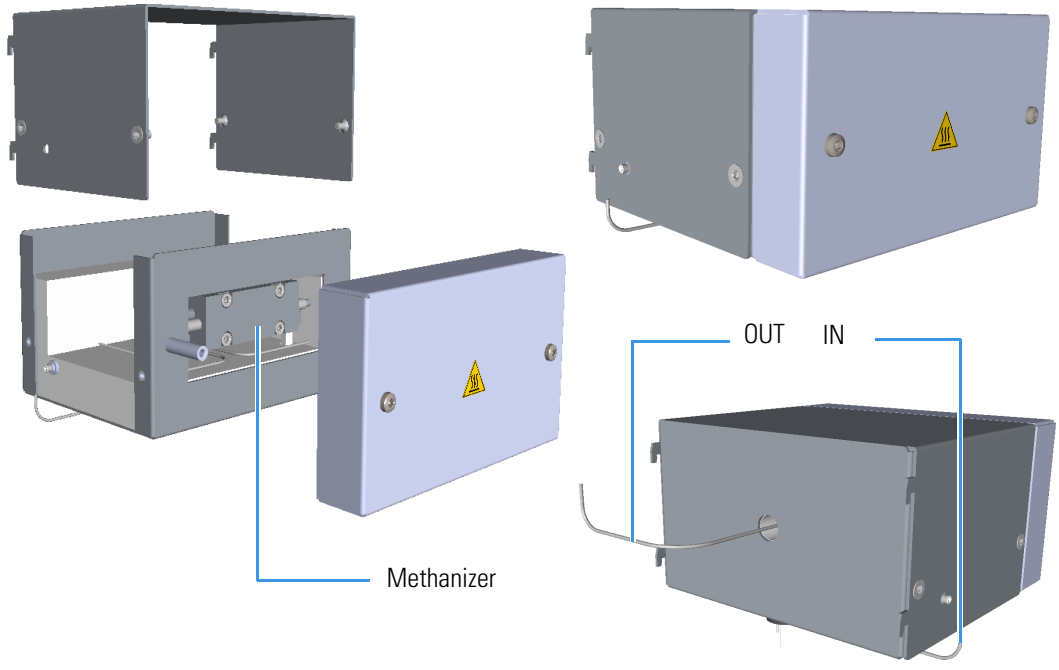


Installing the Methanizer Assembly

This section provides instruction for installing the methanizer assembly PN 19071008 into the TRACE 1310 Auxiliary Oven.

The methanizer is pre-mounted into a metal box. See Figure 131.

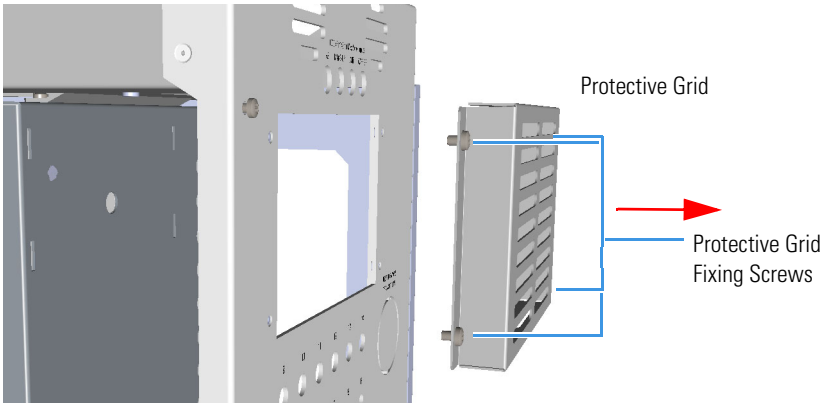
Figure 131. Methanizer Assembly



❖ **To install the methanizer assembly**

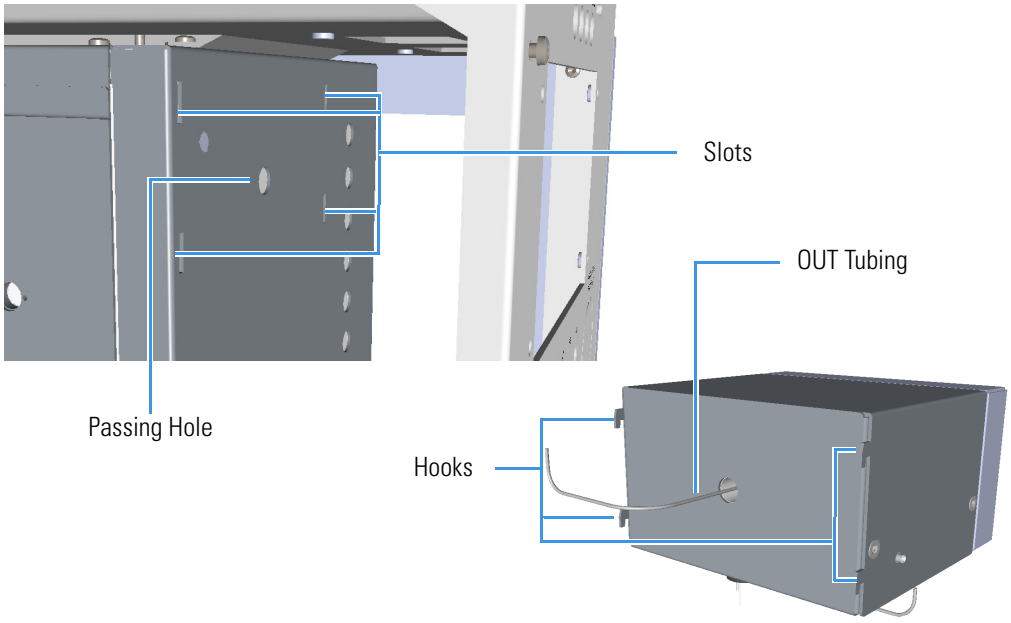
1. Remove the protective grid from the back panel by unscrewing the four fixing screws. See Figure 132.

Figure 132. Methanizer (1)



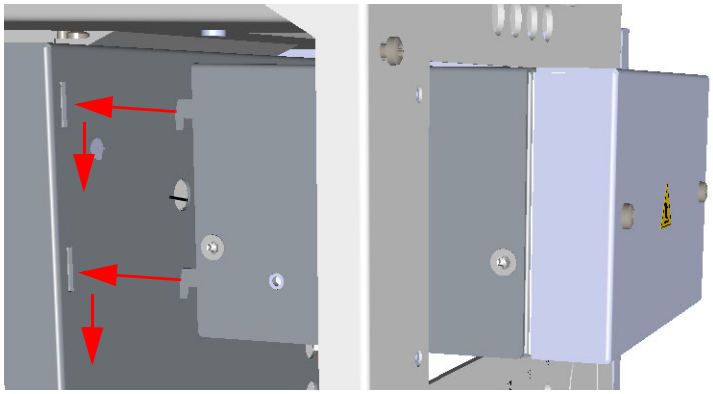
2. Look for the four slots and for the hole on the back wall of the main oven, and for the four hooks on the back of the methanizer assembly. See Figure 133.

Figure 133. Methanizer Installation (2)



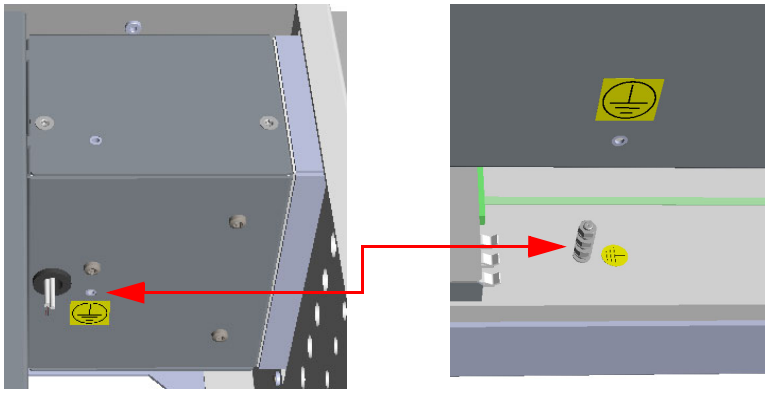
3. Insert the methanizer assembly into the back of the instrument, paying attention to guide the OUT tubing into the passing hole provided on the back wall of the main oven
4. Push the assembly until the four hooks enter into the relevant slot, then hook the assembly pushing it downwards. See Figure 134.

Figure 134. Secondary Oven Installation (3)



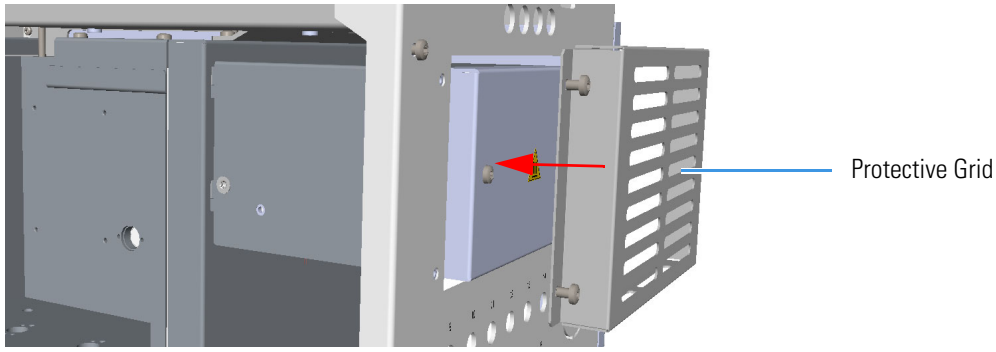
5. Connect the ground wire on the bottom of the assembly using the proper fixing screw, then connect the other end of the wire to the common ground point on the chassis of the instrument. See Figure 135.

Figure 135. Methanizer Installation (4)



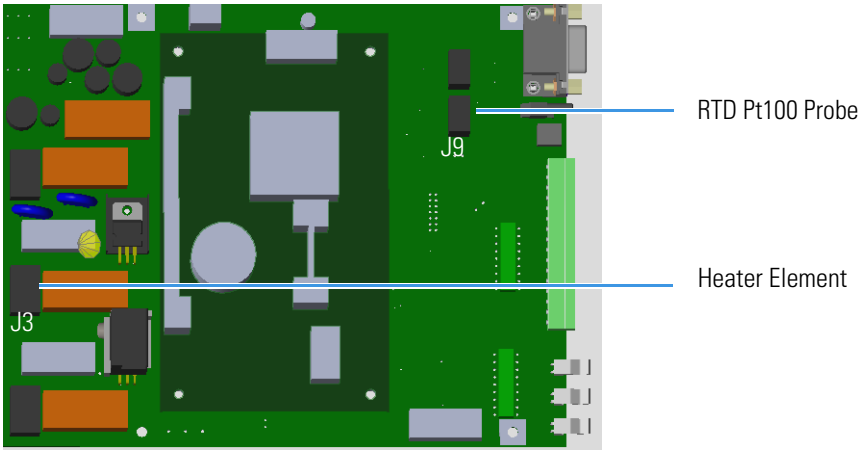
6. Remount and fix the protective grid. See Figure 136.

Figure 136. Methanizer Installation (5)



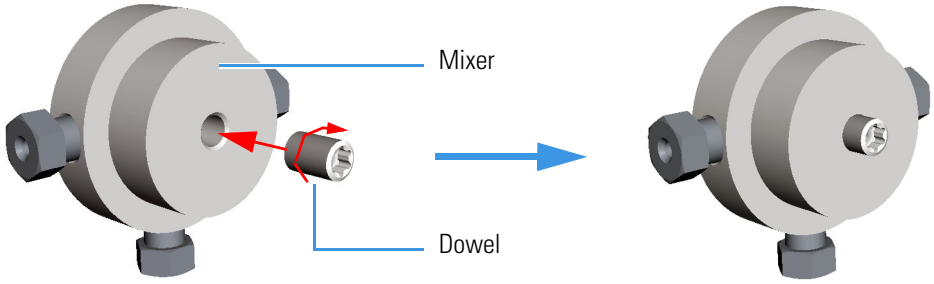
7. Connect the cables of the heater element and of the RTD Pt100 probe respectively to the connectors marked **J3** and **J9** on the Aux Temp VO/Power Supply board. See Figure 137.

Figure 137. Methanizer Installation (6)



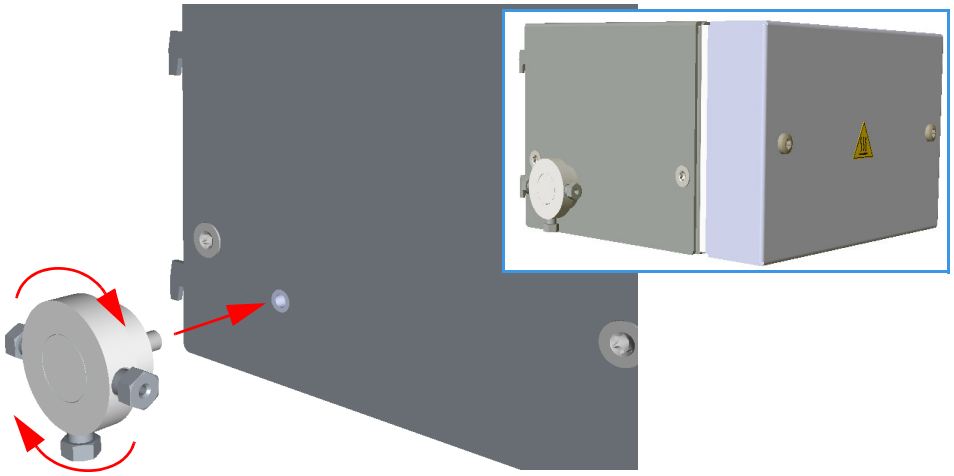
8. Fix the mixer on the left wall of the methanizer assembly.
   a. If not already done, screw the dowel provided into the central hole of the mixer using a T8 Torxhead wrench. Stop the screwing of the dowel when it starts to grip the mixer; the dowel must protrude few millimeters from the central hole of the mixer, do not overtighten. See Figure 138.

Figure 138. Mount the Mixer (1)



   b. Screw the mixer into the hole provided on the left wall of the methanizer assembly. See Figure 139.

Figure 139. Mount the Mixer (2)



Methanizer Pneumatic Circuit

The methanizer device is used to determine low concentrations of carbon monoxide (CO) and carbon dioxide (CO2) obtained by converting these gases into methane, making them pass on a catalytic bed kept at a temperature of 350 °C.

Determination of the total quantity of methane developed is carried out using the Flame Ionization Detector (FID).

The methanizer consists of an aluminium block that includes a metal tube filled with a nickel-base catalyst kept in place by a quartz wool.

The block is heated to the reaction temperature.

The catalyst must be swept by a constant flow of hydrogen.

The hydrogen flow passing through the catalyst allows the reduction of carbon monoxide and carbon dioxide into methane according to the following reaction.

$$CO_2 + H_2 \Rightarrow 350°C/Cat \Rightarrow CO + H_2O$$

$$CO + H_2 \Rightarrow 350°C/Cat \Rightarrow CH_4 + H_2O$$

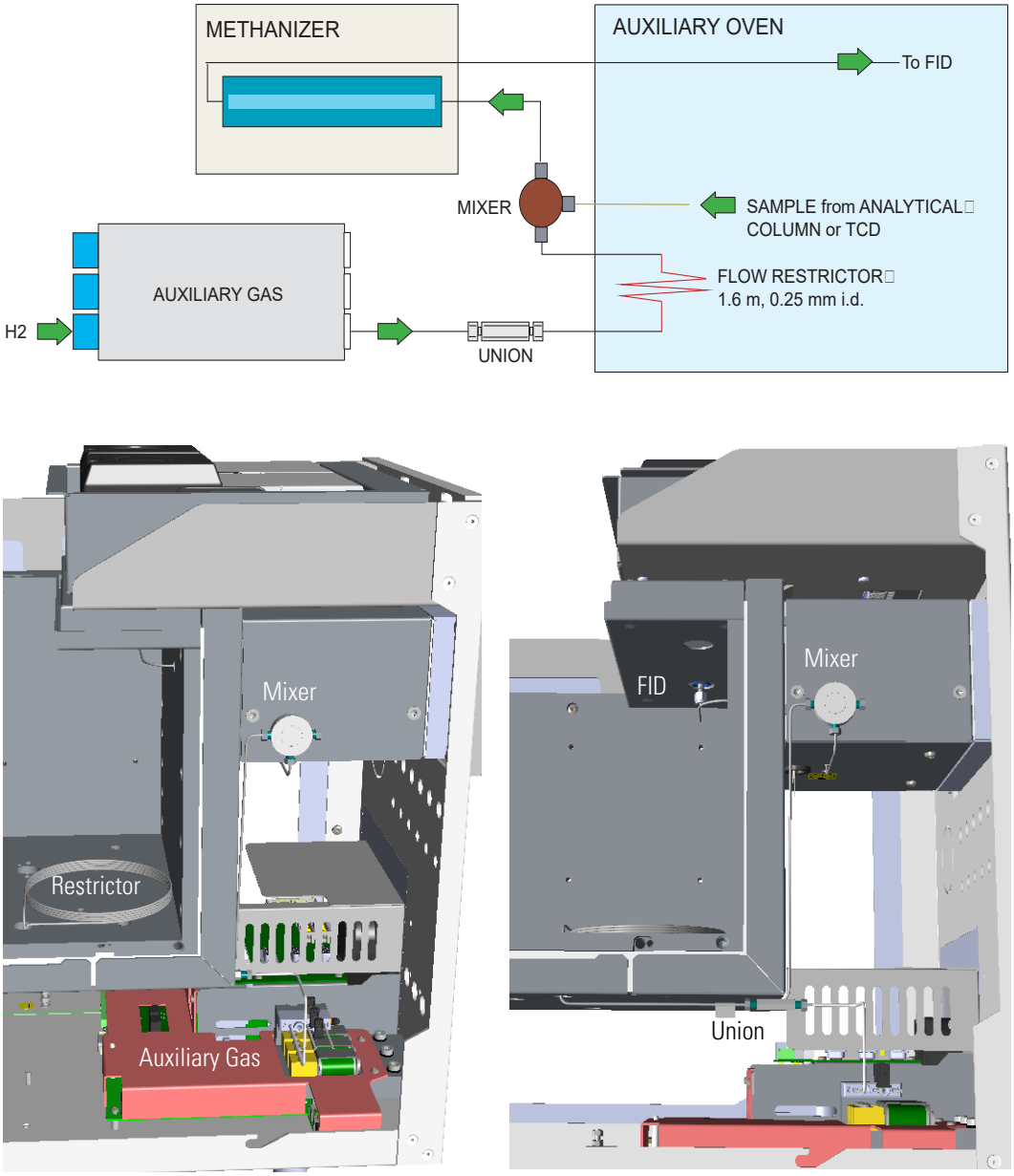
WARNING Hydrogen is a dangerous gas that when mixed with air may generate an explosive mixture.

The use of hydrogen requires the operator's strict attention and compliance with special precautions due to the hazard involved.

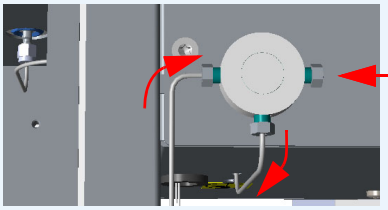
Leak test carefully all connections before operating the instrument.

The methanizer device pneumatic circuit is schematically represented in Figure 140.

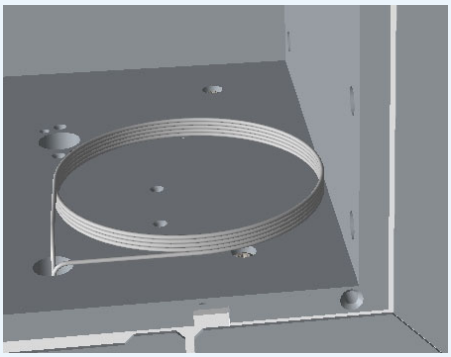
Figure 140. Methanizer Pneumatic Circuit (2)

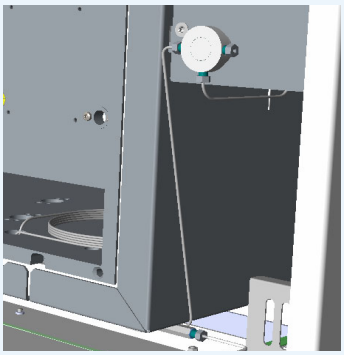


Note The **mixer** has the purpose of mixing the hydrogen with the sample. Figure 140 shows the mixer anchored to the methanizer assembly. This is the best positioning to facilitate the connection of the fittings.



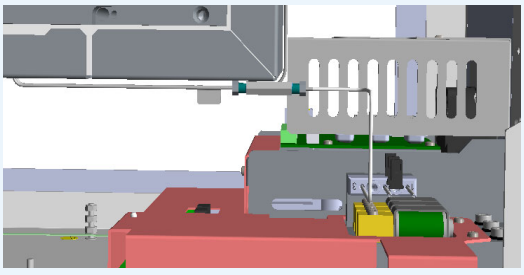
The **restrictor** is placed on the line of the hydrogen. When installing it, try to minimize the length of the tubing out the main oven. A metal label indicates the column ID value that must be set in the **Auxiliary Column** page.



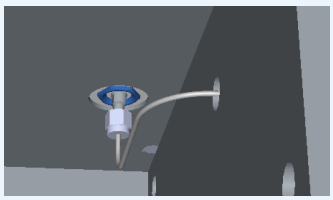


The hydrogen comes from a line of the **Auxiliary Gas** module connected to the restrictor through an union.

WARNING No fitting where hydrogen flows may be installed into the main oven.



The outlet of the methanizer is connected to the **FID** detector (installed on the TRACE 1310 Auxiliary Oven or on the GC), using the adapter for packed column. Figure 140 shows a FID installed on the TRACE 1310 Auxiliary Oven.



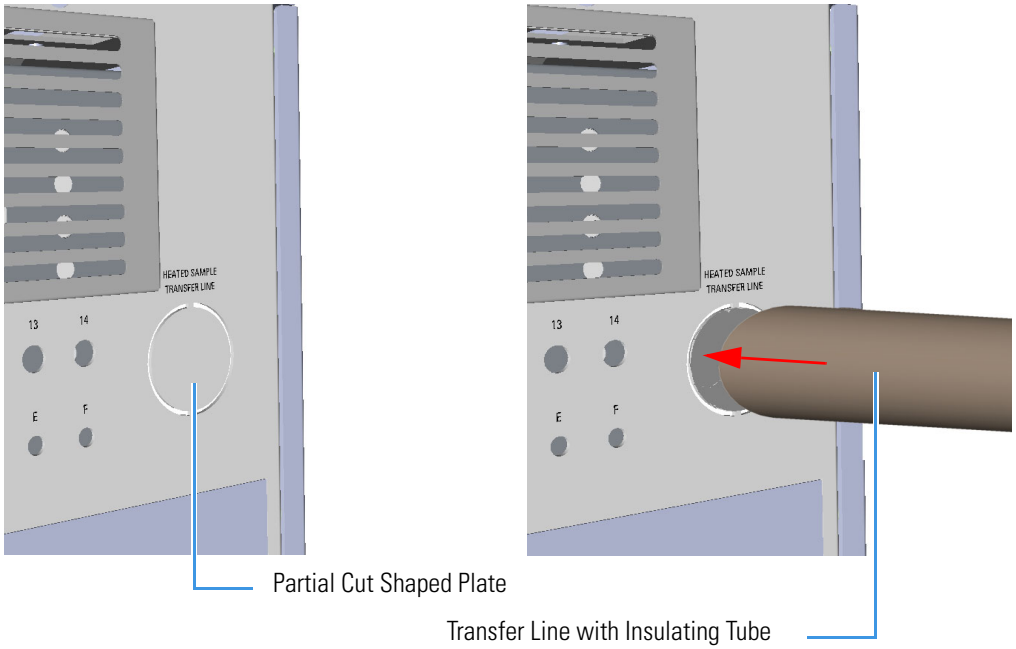
Installing a Heated Sample Transfer Line

This section provides the instructions for installing a heated sample transfer line into the main oven.

❖ To install a heated sample transfer line

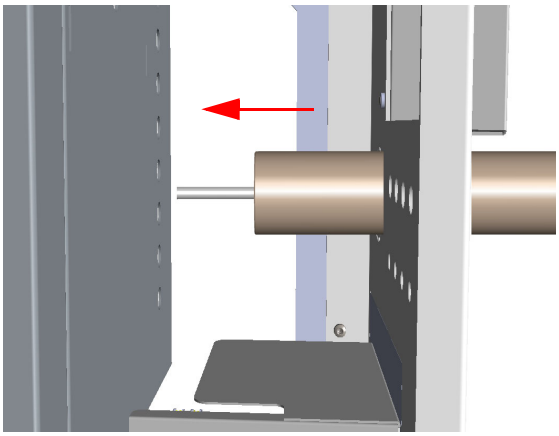
1. Remove the partial cut shaped plate marked **Heated Sample Transfer Line** from the back panel of the instrument. Carefully insert the transfer line and its insulator tube into the duct carried out. See Figure 141.

Figure 141. Installing a Heated Sample Transfer Line (1)



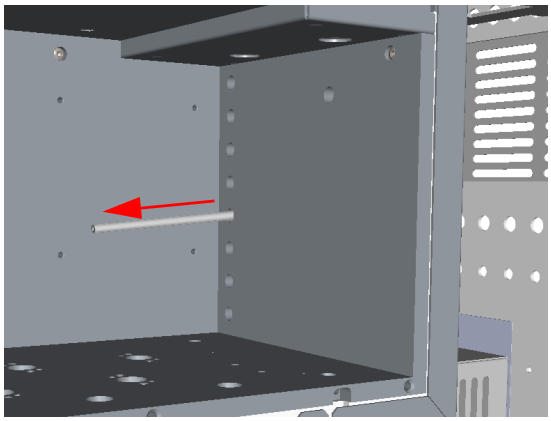
2. Push the transfer line and its insulator tube into the rear of the instrument up to reach the main oven. See Figure 142.

Figure 142. Installing a Heated Sample Transfer Line (2)



3. Guide the transfer line into the main oven through a convenient hole on the wall of the main oven. See Figure 143.

Figure 143. Installing a Heated Sample Transfer Line (3)



Wiring the TRACE 1310 Auxiliary Oven to the GC

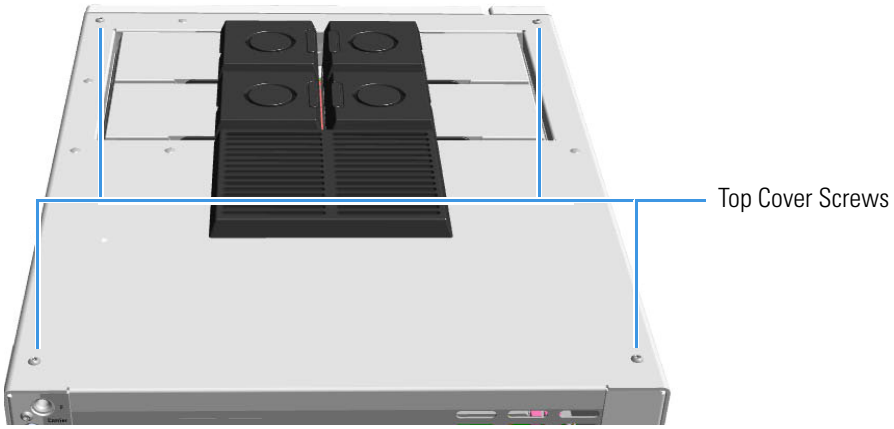
This section provides the instructions for wiring the TRACE 1310 Auxiliary Oven with the GC.

❖ **To wire the Valve Oven to the GC**

CAUTION Before starting ensure that the GC is powered off and the power cable is unplugged from the AC Input connector into the back of the GC and from the wall outlet.

1. Remove the top cover of the GC.
   a. Using a T20 Torxhead screwdriver, unscrew the four screws that held it in place. See Figure 144 and Figure 145.

Figure 144. Top Cover Removal (1)

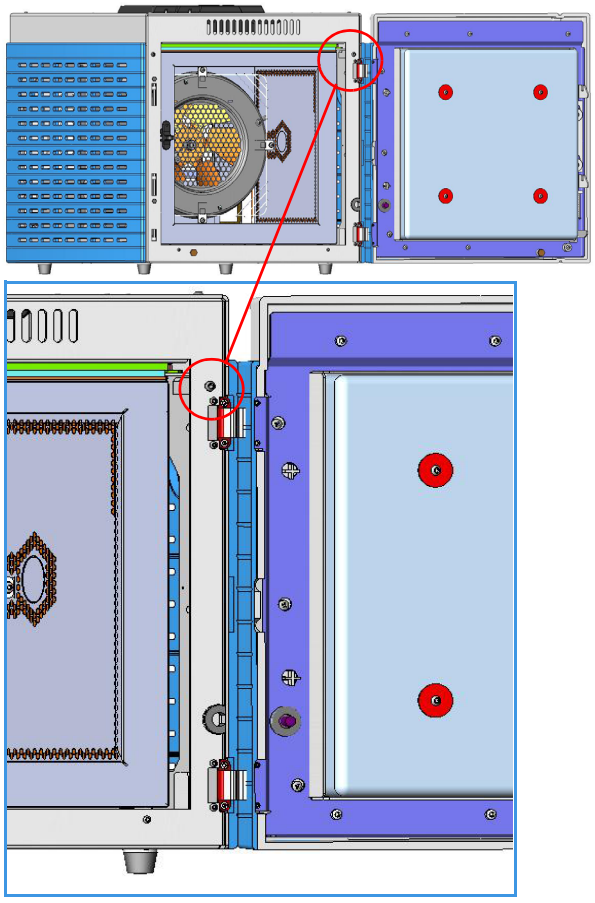


   b. Lift the top panel up and off the GC.

2. Remove the right panel of the GC.

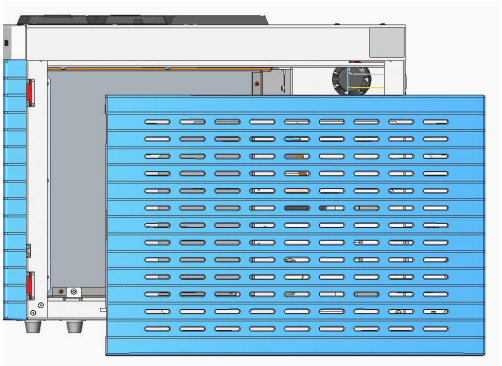
   a. Open the front door of the GC. Using a T20 Torxhead screwdriver, unscrew the right side panel screw from the interior front panel. See Figure 145.

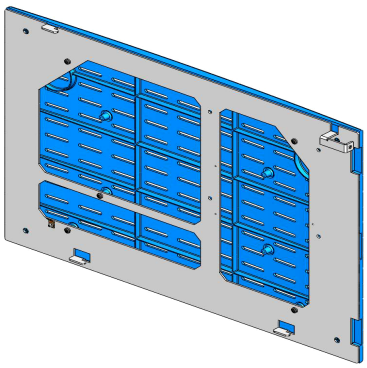
Figure 145. Right Panel Fixing Screw



   b. Slide the panel towards the back of the instrument up to the stop. Remove the panel by pulling it outwards being aware that the ground wire is attached to the panel. See Figure 146.

Figure 146. Right Panel Removal





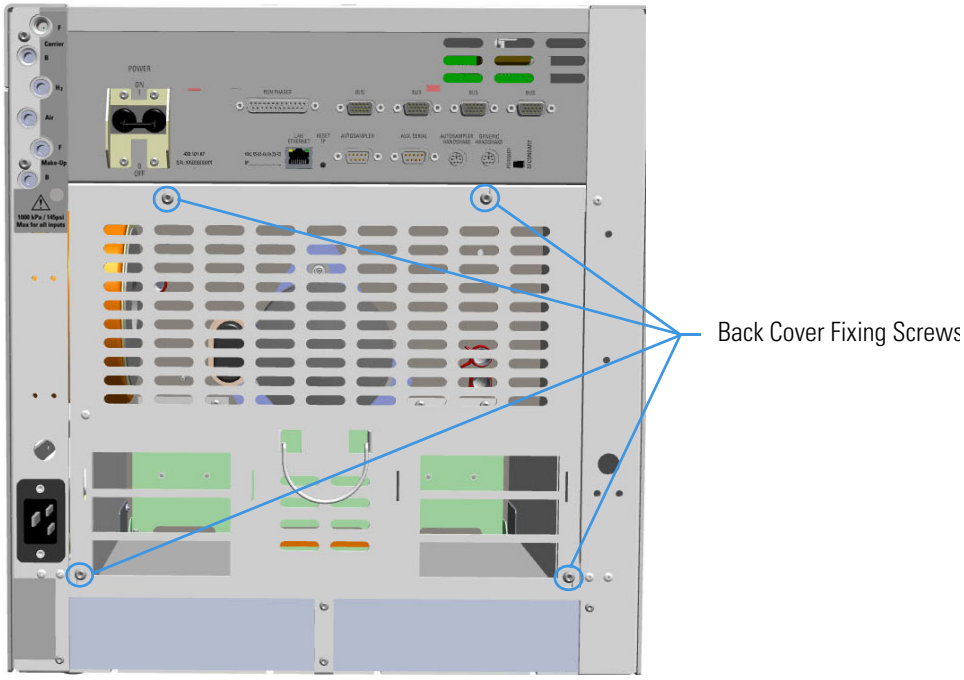
c. Unplug the ground wire from the panel.

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

3. Remove the back cover of the GC.

a. Using a T20 Torxhead screwdriver, unscrew the four fixing screws that secure the back cover to the GC. See Figure 147.

Figure 147. Back Cover Removal



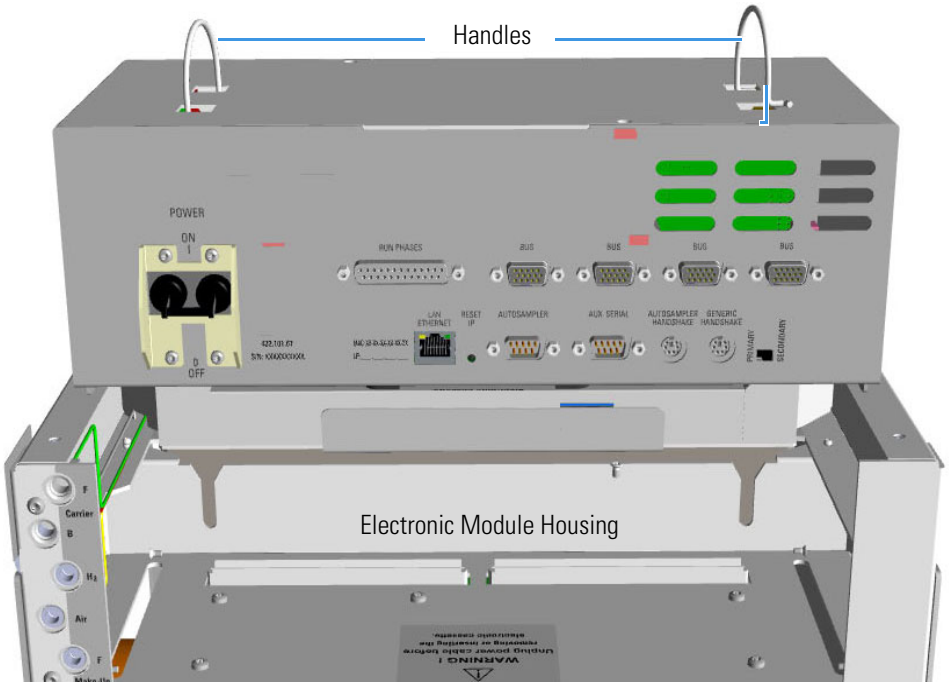
b. Lift the cover off using the cover handle. Be aware that the ground wire is attached to the back cover.

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

4. Remove the Electronic Module from the GC.

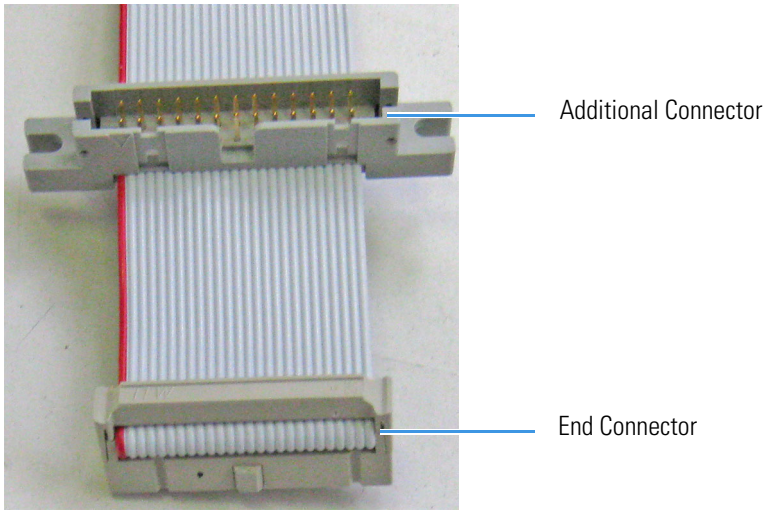
a. Using the two handles on the top cover of the electronic module, pull out the module from its housing. See Figure 148.

Figure 148. Electronic Module Extraction



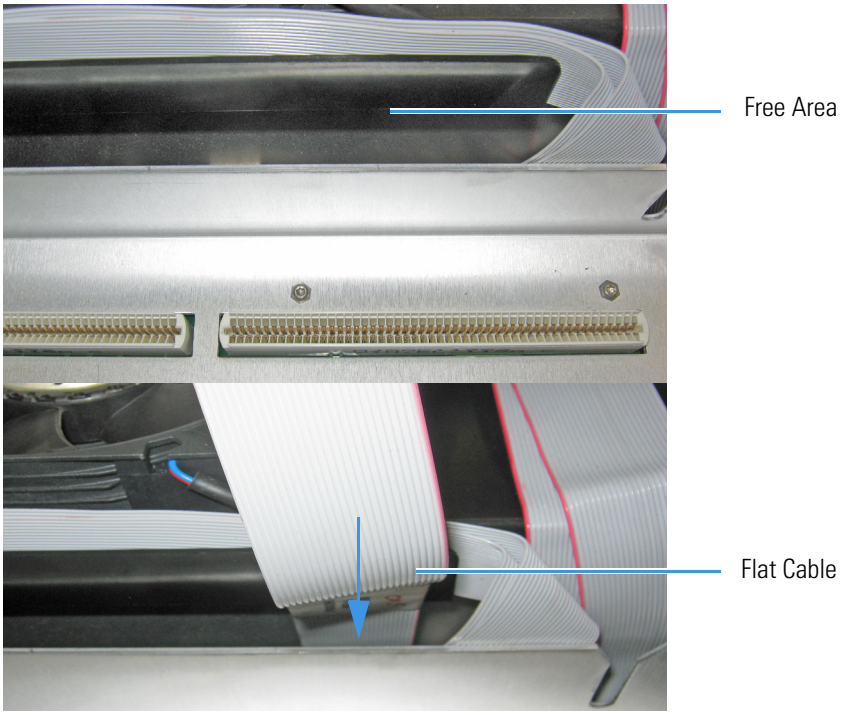
5. Guide the TRACE 1310 Auxiliary Oven flat cables with additional connector into the back compartment of the GC. See Figure 149.

Figure 149. Auxiliary Oven Flat Cable



a. Guide the flat cables into the back compartment of the GC through the free area between the oven and the housing of the electronic module. See Figure 150.

Figure 150. Placing TRACE 1310 Auxiliary Oven Flat Cables



6. Disconnect the detector rear and injector rear flat cables.

   a. Disconnect the flat cable from the connector **J5** marked **DET.REAR** on the backplane board of the GC.

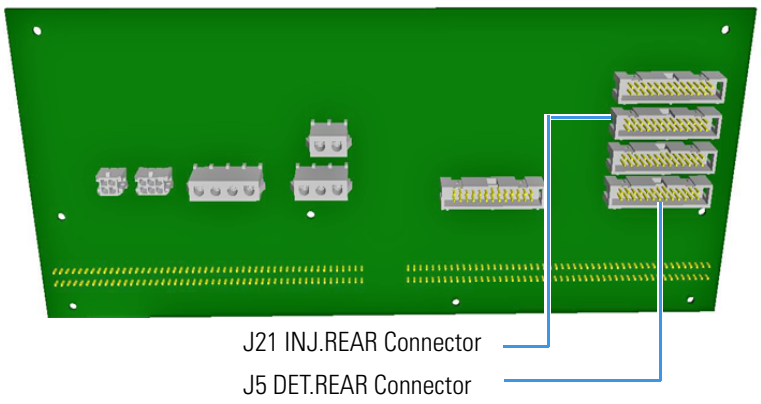
   IMPORTANT Label this cable as **DET** to avoid a wrong connection.

   b. Disconnect the flat cable from the connector **J21** marked **INJ.REAR** on the backplane board of the GC.

   IMPORTANT Label this cable as **INJ** to avoid a wrong connection.

   See the example in Figure 151.

Figure 151. GC Backplane Board Layout



7. Connect the TRACE 1310 Auxiliary Oven flat cables provided instead of the detector rear and injector rear flat cables.

   a. Connect the end connector of the first flat cable to the connector **J5** marked **DET.REAR** on the backplane board of the GC.

   IMPORTANT Label this cable as **DET** to avoid a wrong connection.

   Connect the detector rear flat cable connector, previously disconnected from the connector **J5**, to the additional connector on the first flat cable.

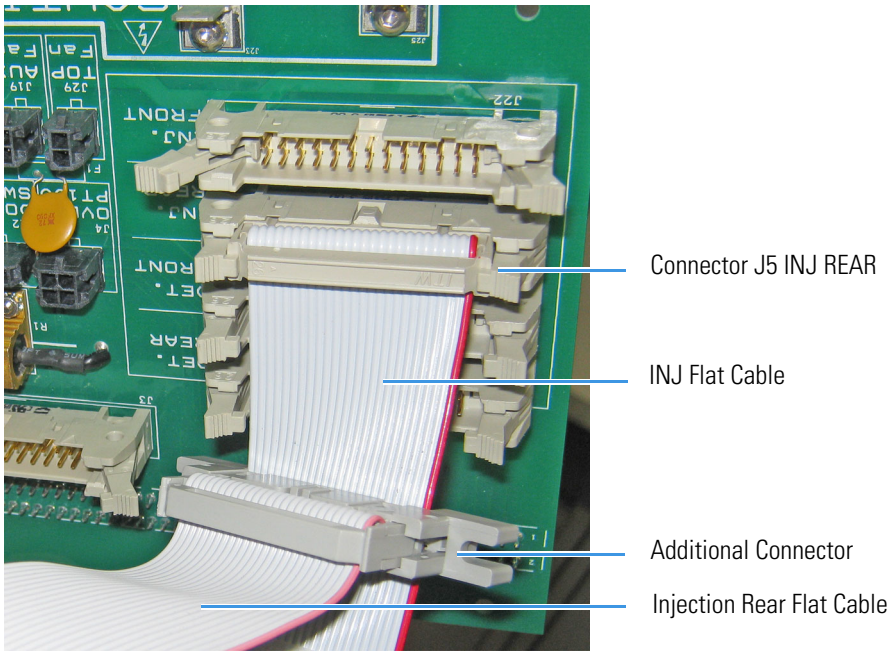
   b. Connect the end connector of the second flat cable to the connector **J5** marked **DET.REAR** on the backplane board of the GC.

   IMPORTANT Label this cable as **DET** to avoid wrong connection.

   Connect the injector rear flat cable connector, previously disconnected from the connector **J21**, to the additional connector on the second flat cable.

   The example in Figure 152 shows the **INJ** flat cable connected to the connector **J21 INJ.REAR** on the backplane board, and the connection of the injection rear flat cable to the additional connector.

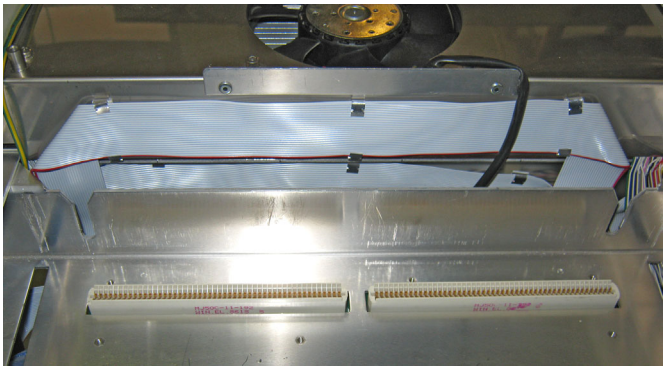
   Figure 152. TRACE 1310 Auxiliary Oven Flat Cable Connections



8. Guide the other ends of the INJ and DET Auxiliary Oven flat cables out the GC.

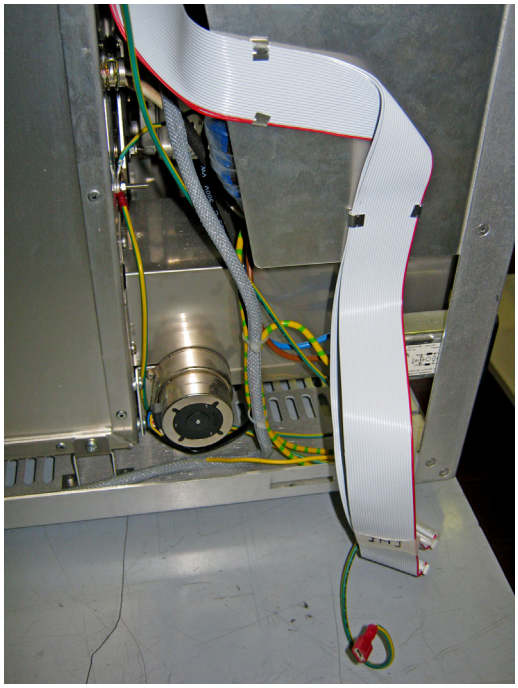
   a. Carefully, bend and place the flat cables along the wall the oven, then fix the cables properly. See Figure 153.

Figure 153. Fixing INJ and DET TRACE 1310 Auxiliary Oven Flat Cables (1)



b. Carefully guide the **INJ** and **DET** flat cables out the GC. See Figure 154.

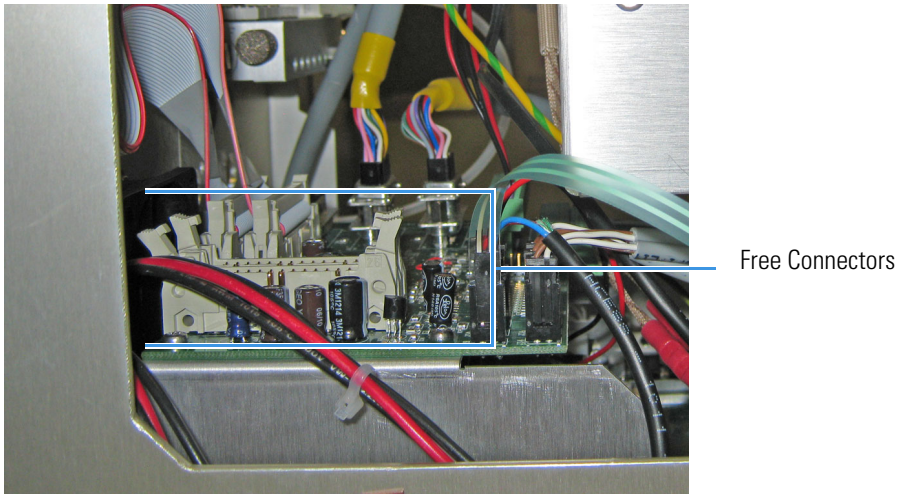
Figure 154. Fixing INJ and DET Auxiliary Oven Flat Cables (2)



9. Guide and connect the INJ and DET Auxiliary Oven flat cables into the TRACE 1310 Auxiliary Oven.

   a. On the left back corner of the TRACE 1310 Auxiliary Oven locate the two free connectors on the board mounted over the power section. See Figure 155.

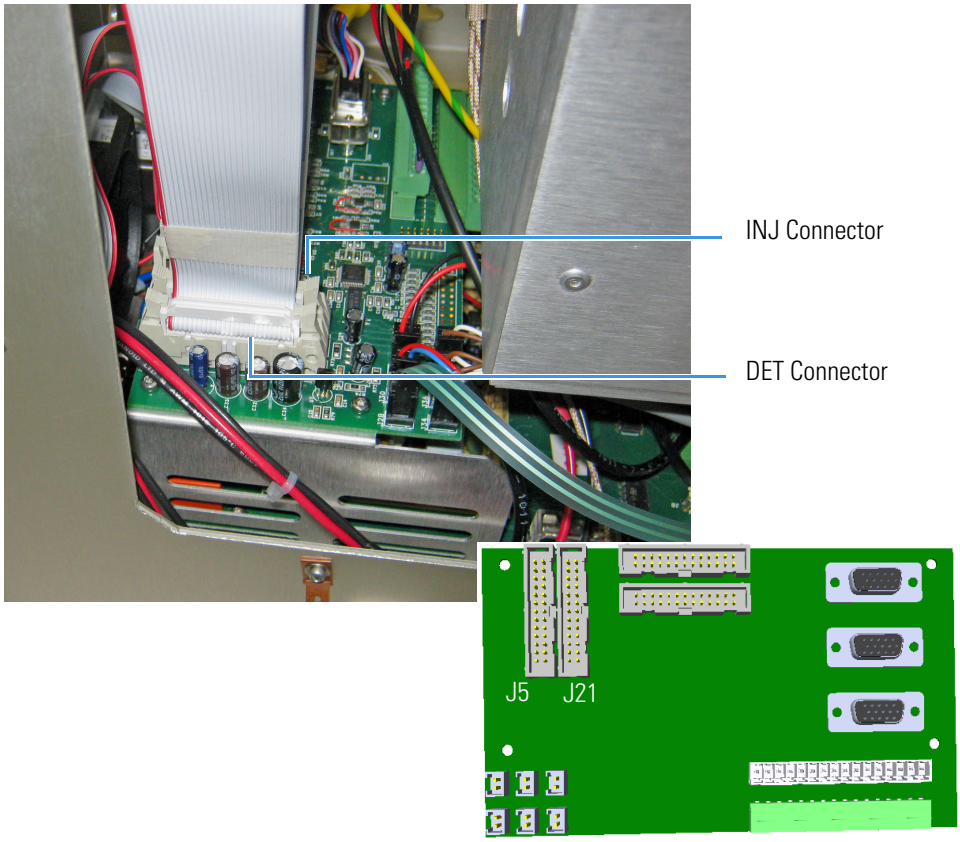
Figure 155. TRACE 1310 Auxiliary Oven Connectors (1)



b. Connect the **INJ** flat cable to the internal connector marked **J21** on the VOBP-HRM board.

c. Connect the **DET** flat cable to the external connector on the marked **J5** on the VOBP-HRM board. See the example in Figure 156.

Figure 156. TRACE 1310 Auxiliary Oven Connectors (2)



10. Reinstall the Electronic Module.
    a. Guide the electronic module into its housing.
    b. Push down the module. Be sure to plug the terminal contacts of the mother board into the two slots of the backplane board. See Figure 157 and Figure 158.

Figure 157. Electronic Module Re-installation (1)

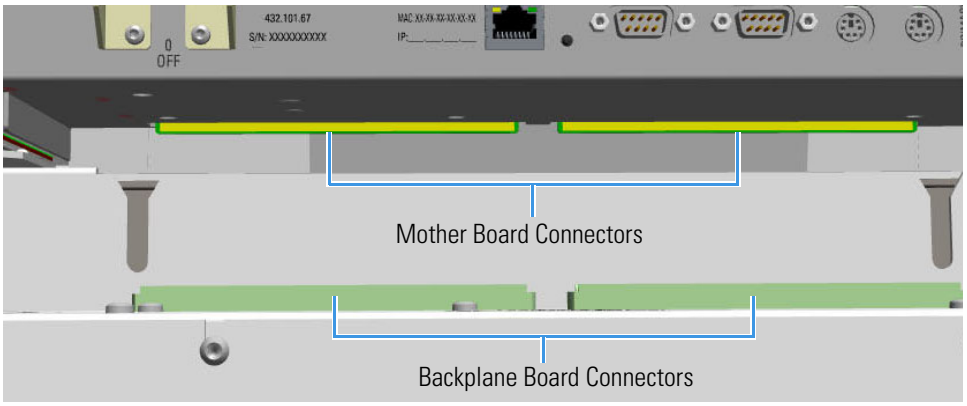
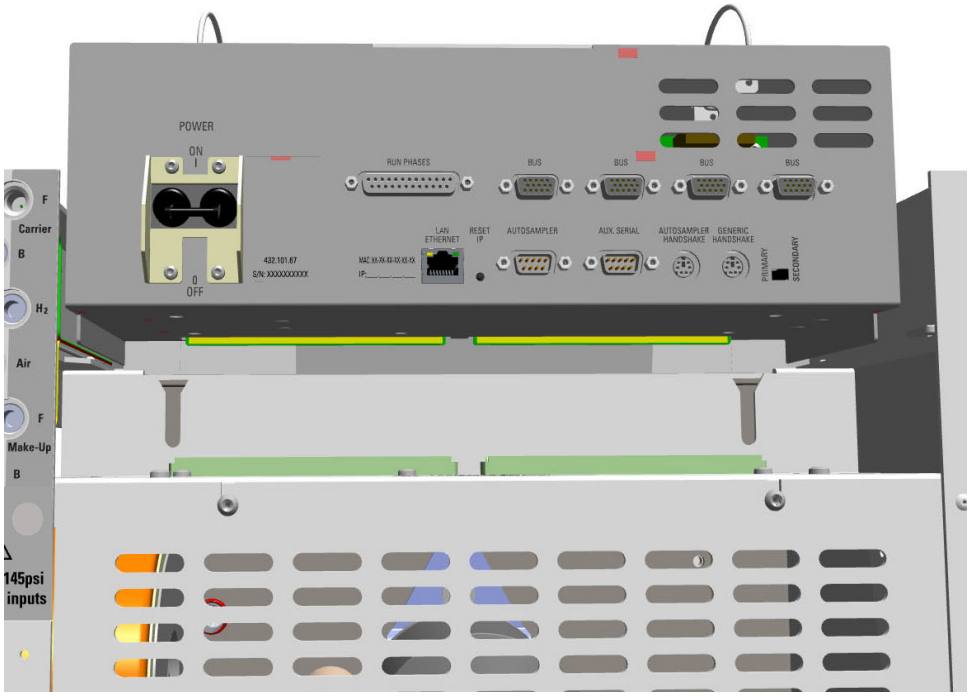


Figure 158. Electronic Module Re-installation (2)



11. Replace the back and top covers of the GC.
    a. Reconnect the ground wire to the back cover terminal.
    b. Replace the back and top cover proceeding in the reverse order in which it was removed.

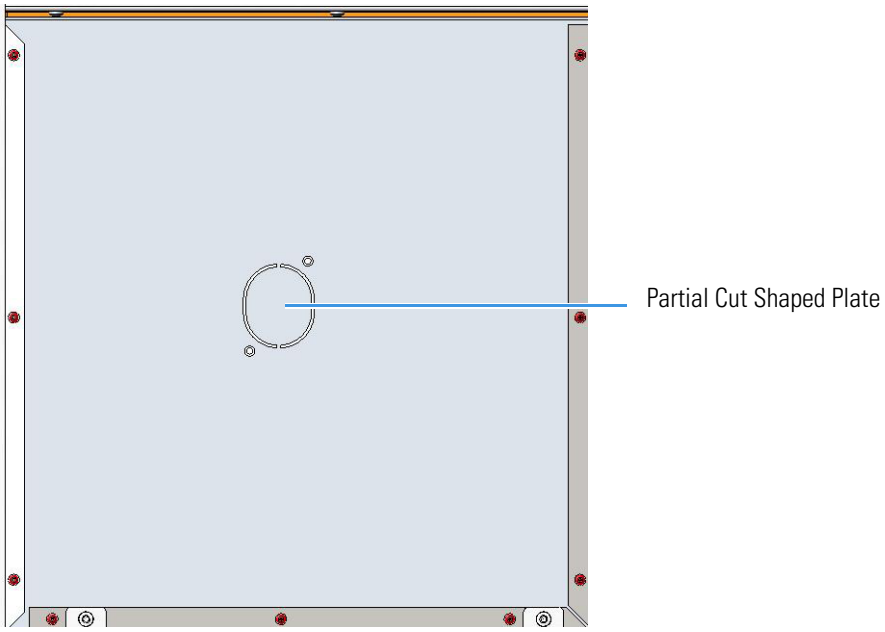
Coupling the TRACE 1310 Auxiliary Oven to the GC

❖ To couple the TRACE 1310 Auxiliary Oven to the GC

This section provides the instructions for coupling the TRACE 1310 Auxiliary Oven with the GC.

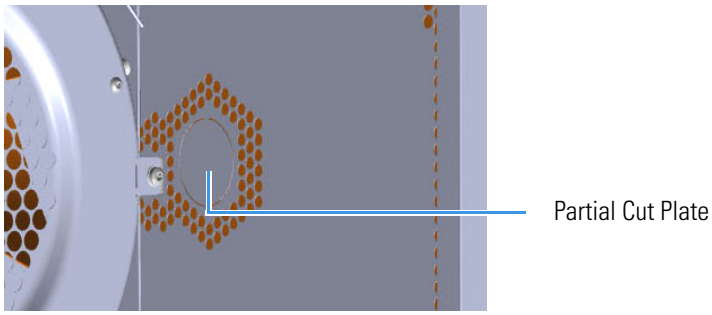
1. Prepare the duct for the insertion of the TRACE 1310 Auxiliary Oven inner tube into the GC oven.
   a. Remove the partial cut shaped plate from the exterior right wall of the GC oven box to access the insulating material. See Figure 159.

Figure 159. Perform the Duct (1)



   b. Using a knife or similar tool, gently cut the insulating material following the track.
   c. Save the removed insulating material in a safe place because it could be reused.
   d. On the right side wall in the interior of the oven, remove the partial cut plate from the corresponding duct. See Figure 160.

Figure 160. Perform the Duct (2)



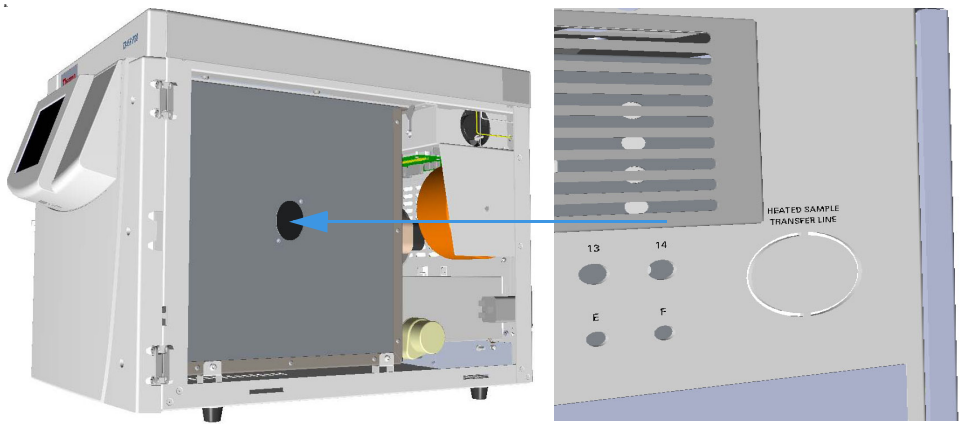
2. Insert inner tube into the GC oven.

CAUTION Before proceeding, ensure that:

- The inner tube to the GC oven has been inserted into the passing hole provided in the wall of the main oven but not completely fixed. See Figure 9 on page 15.
- The biggest disks of insulating material are placed on the inner tube protruding from the wall of the main oven. See Figure 10 on page 16.

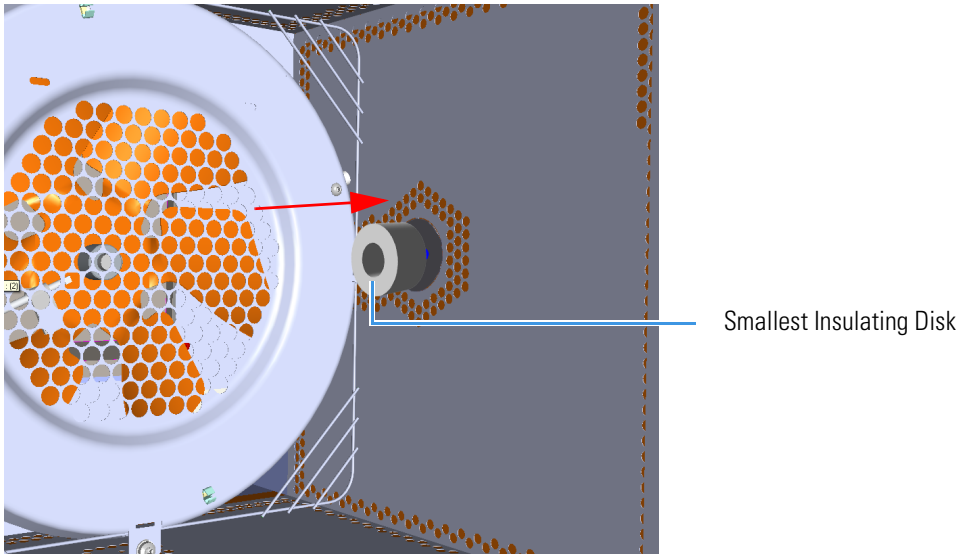
3. Carefully couple the TRACE 1310 Auxiliary Oven as a right panel ensuring that the inner tube assembly penetrates into the right wall of the GC through the duct previously prepared. See Figure 161.

Figure 161. Coupling Valve Oven Module and GC (1)



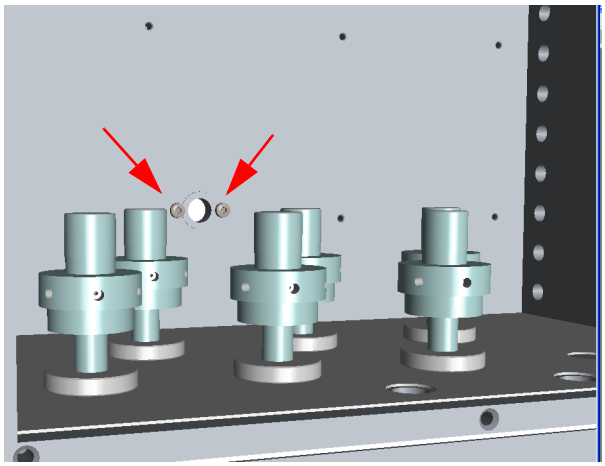
4. From the interior of the GC oven, place the smallest insulating disk on the inner tube, then push the insulating disk into the duct. See Figure 162.

Figure 162. Coupling Valve Oven Module and GC (2)



5. Into the main oven fix completely the inner tube to the GC oven tightening the two fixing screws. See the example in Figure 163.

Figure 163. Coupling Valve Oven Module and GC (3)



4

Operation

This chapter provides brief instructions for configuring and operating with the TRACE 1310 Auxiliary Oven through the GC touch screen and the chromatography data system.

Contents

- Operating Through the GC Touch Screen
- Operating Through the CDS

Operating Through the GC Touch Screen

This section contains instructions to configure your Valve Oven and to edit the parameters through the touch screen of the GC. For more details refer the *TRACE 1300/TRACE 1310 User Guide*.

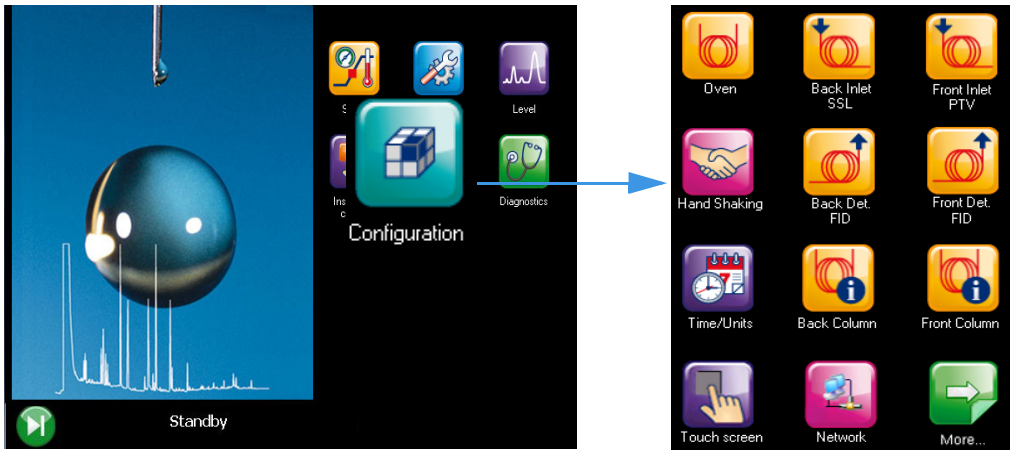
See the related operating sequences:

- To configure the TRACE 1310 Auxiliary Oven through the GC touch screen
- To edit TRACE 1310 Auxiliary Oven parameters through the GC touch screen

❖ To configure the TRACE 1310 Auxiliary Oven through the GC touch screen

1. Press the **Configuration** icon on the touch screen main menu to configure the TRACE 1310. See Figure 164.

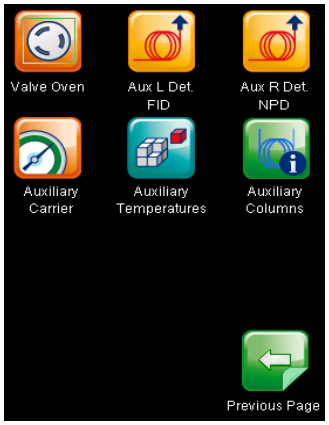
Figure 164. Touch Screen Main Menu: Configuration



The icon 

appears to access the second page of the Configuration menu when additional modules are installed. See Figure 165.

Figure 165. Configuration Menu

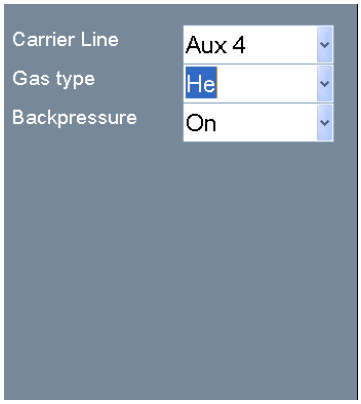


To return the previous page press the icon 

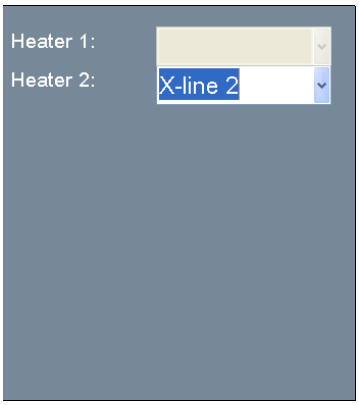
2. Press the **Valve Oven** icon to configures the heating zones of the TRACE 1310 Auxiliary Oven.

3. Press the **Aux L Det/Aux R Det** for configuring the auxiliary detector module installed into the left/right position on the TRACE 1310 Auxiliary Oven. The configuration menu is the same as the detector modules installed in front and back position on the GC.

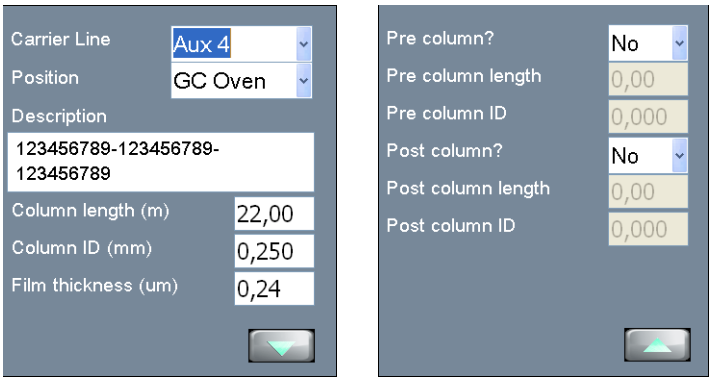
4. Press the **Auxiliary Carrier** icon for setting the parameters for the auxiliary gas modules. This menu includes both the Auxiliary Gas modules. One of them will be mounted inside the TRACE 1310 Auxiliary Oven, and the other into the GC.



5. Press the **Auxiliary Temperature** icon for configuring the heater zones of the Auxiliary Temperature module.



6. Press the **Auxiliary Column** for detailing the auxiliary column if in use.



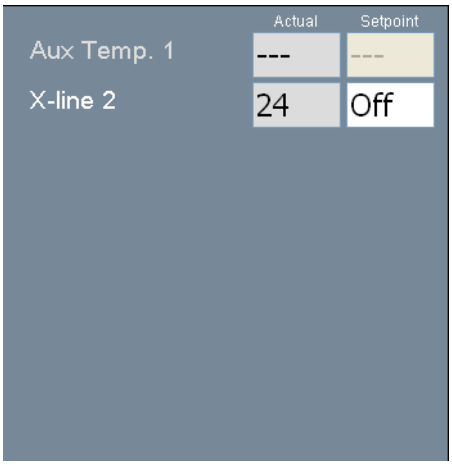
❖ To edit TRACE 1310 Auxiliary Oven parameters through the GC touch screen

1. Press the **Instrument Control** icon on the touch screen main menu for programming the parameters in the analytical method. See Figure 166.

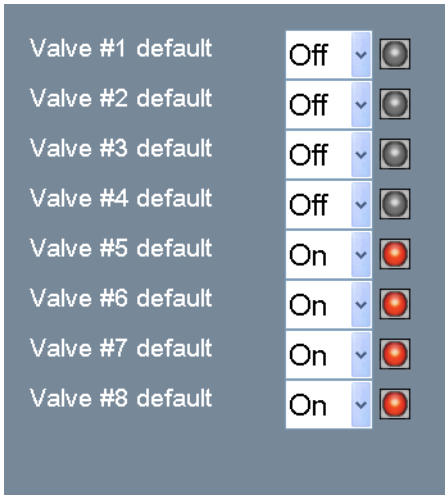
Figure 166. Touch Screen Main Menu: Instrument Control

2. Press the **Aux L Det/Aux R Det** icon for programming the detector modules if installed into the left/right position on the TRACE 1310 Auxiliary Oven. The configuration menu is the same of the detector modules installed in front and back position on the GC.

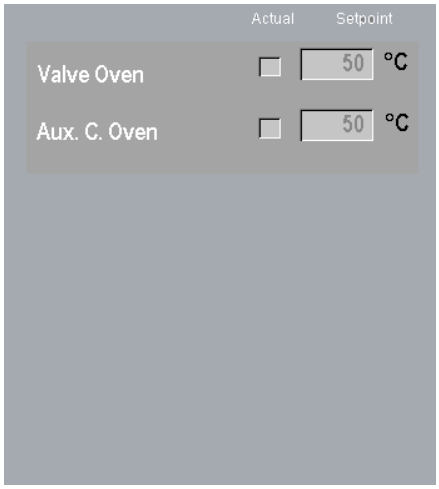
3. Press the **Auxiliary Temperature** icon for defining the temperature parameters for the external auxiliary temperature modules set in the configuration.



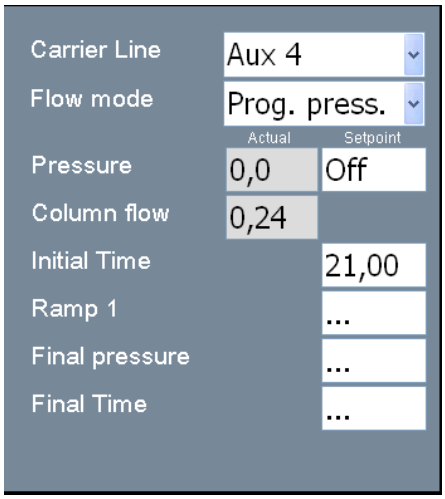
4. Press the **Valves** icon for setting On or Off the external valves connected to the Aux Temperature Module.



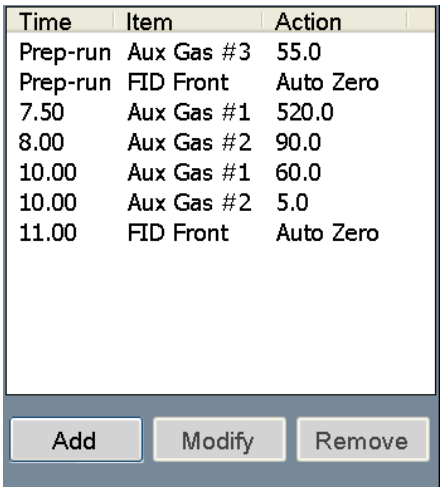
6. Press the **Valve Oven** for setting the auxiliary temperatures of the TRACE 1310 Auxiliary Oven.



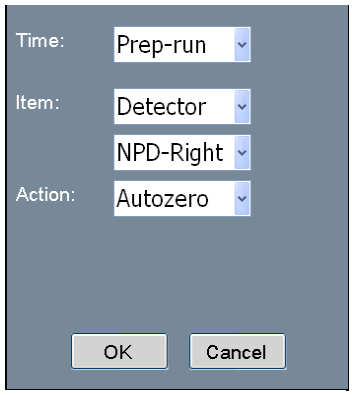
7. Press the **Aux Carrier** for setting the auxiliary carrier lines selected.

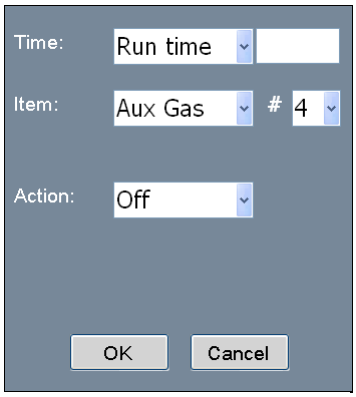


8. Press the **Run Table** for setting detectors, valves, and external events to occur at the Prep-run or during a run.



Events displayed on the Run Table page are from selections made in the **Run-Time Event** screen. The **Add** button opens the **Run-Time Event** screen.





Operating Through the CDS

This section contains instruction to configure your Valve Oven and to edit the parameters through Xcalibur, Chrom-Card, ChromQuest, or Chromeleon Chromatography Data System. For more details refer the relevant Manuals and Help Files.

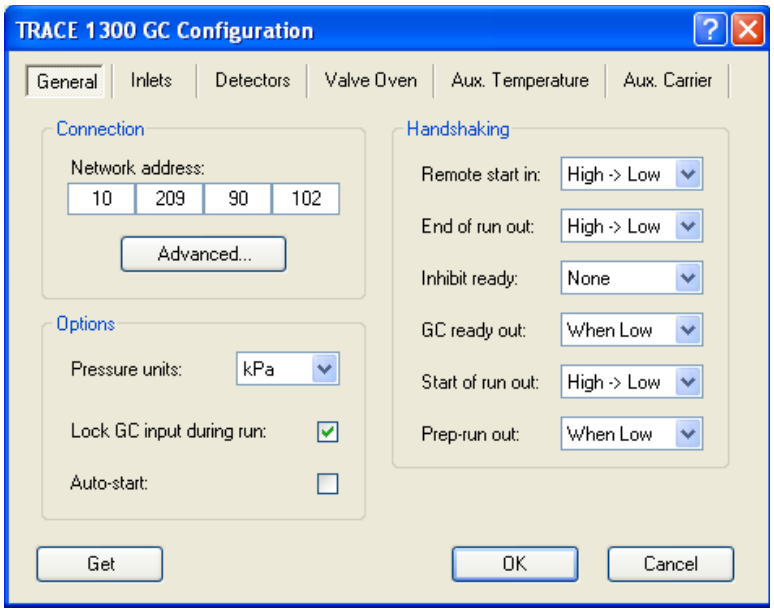
See the related operating sequences:

- To configure the TRACE 1310 Auxiliary Oven through the CDS
- To edit TRACE 1310 Auxiliary Oven parameters through the CDS

❖ To configure the TRACE 1310 Auxiliary Oven through the CDS

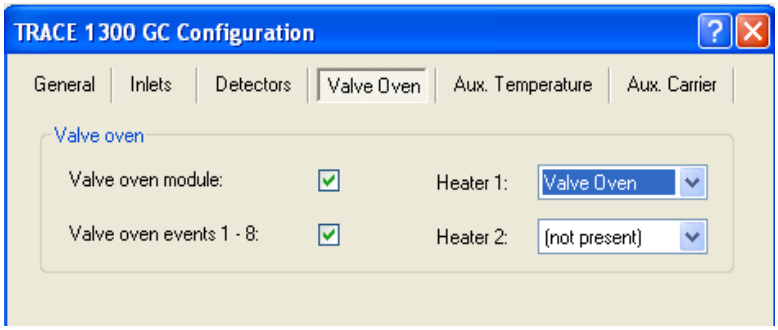
1. Run your Chromatography Data System, then open the TRACE 1300 Configuration window. See the example of Figure 167.

Figure 167. Example of Configuration Window



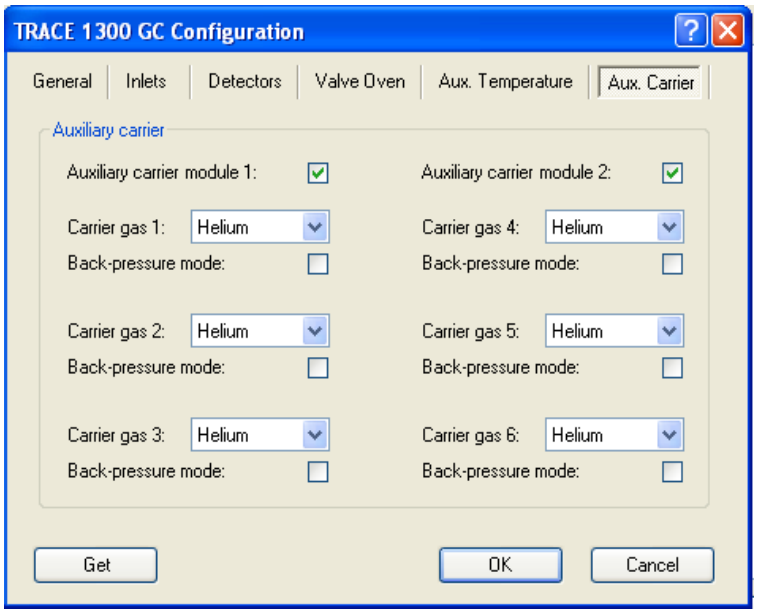
2. Select the **Valve Oven** tab for configuring your TRACE 1310 Auxiliary Oven. See the example of Figure 168.

Figure 168. Configuration Window: Valve Oven Tab



3. Select the **Auxiliary Carrier** tab to configure and use an Auxiliary Carrier interface. See the example of Figure 169.

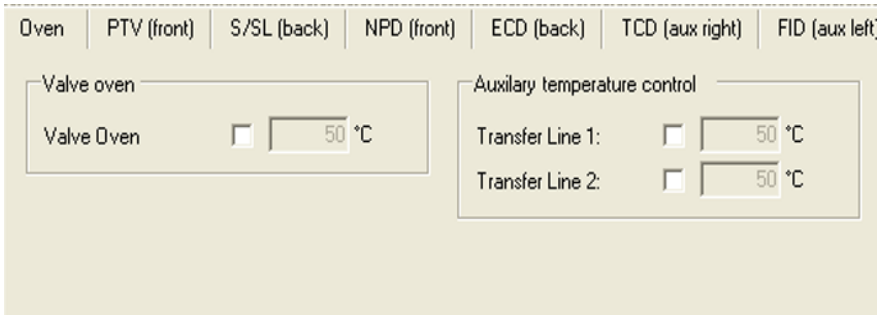
Figure 169. Configuration Window: Auxiliary Carrier Tab



❖ To edit TRACE 1310 Auxiliary Oven parameters through the CDS

1. Select the **Auxiliary Temperature** page for defining the temperature parameters of the external auxiliary temperature modules selected in the Instrument Configuration. See the example Figure 170.

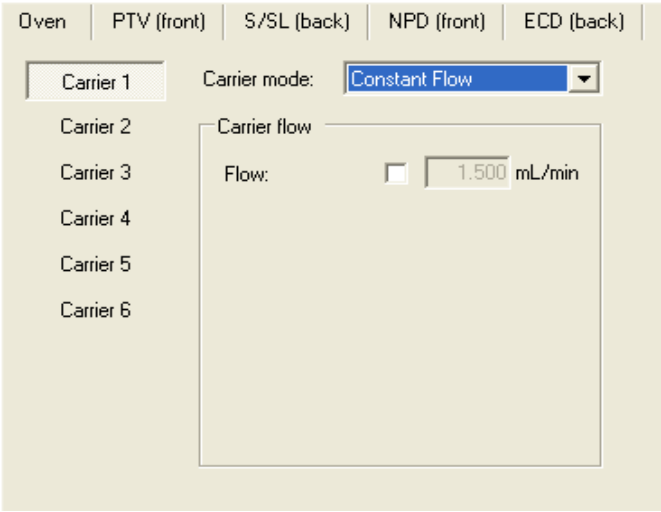
Figure 170. Auxiliary Temperature Page



- Select the **Valve Oven** options accordingly: Valve Oven, HT Valve Oven, Aux Column Oven, Aux Heater 3, Aux Heater 4, or Methanizer.

2. Select the **Auxiliary Carrier** page for defining the carrier gas parameters of the auxiliary Carrier Gas modules. Up to six auxiliary carrier lines from **Carrier 1** to **Carrier 6** can be selected. See the example of Figure 171.

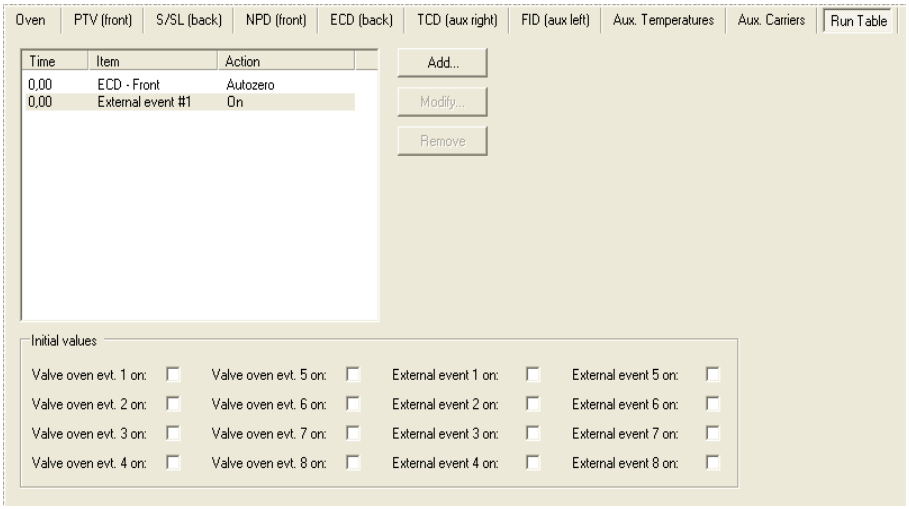
Figure 171. Auxiliary Carrier Page



- For each carrier gas line define 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. Select the **Run Table** page for setting up detector, valve, and external events to occur at the Prep-run or during a run. See the example of Figure 172.

Figure 172. Run Table Page



- The events displayed on the Run Table page are from selections made in the **Run-Time Event** screen.

5

Maintenance & Troubleshooting

This chapter provides instructions for performing a maintenance on the TRACE 1310 Auxiliary Oven and to remedy any potential analytical problems.

Contents

- Read Me First
- Maintenance Supplies and Tools
- Powering On the TRACE 1310 Auxiliary Oven
- Shutting Down the TRACE 1310 Auxiliary Oven
- Cleaning the Instrument Externally
- Replacing the Column into the Secondary Oven
- Maintaining the Methanizer
- Troubleshooting

Read Me First

The instrument will be generally serviced by Thermo Fisher Scientific authorized technical personnel for all the warranty period or, after the warranty expires, possibly according to a Programmed Service Contract. For more information contact your local Thermo Fisher Scientific office.

WARNING If, for technical reasons, it is necessary to work on parts of the machine that may involve hazardous operations (moving parts, components under voltage, and so on). Thermo Fisher Scientific authorized Technical Support must be called. This situation can be identified because the access to these moving parts is possible only using a particular tool, and because the concerned removable protective covers have a warning symbol that draws the operator's attention to the specific warnings included in the documentation accompanying the instrument. In case the work must be carried out by the operator, and the latter must prove to be adequately trained to perform the specific maintenance operation.

There are only a few TRACE 1310 Auxiliary Oven components that require routine maintenance, depending on the quantity and types of samples you are running. A frequently used instrument will, of course, require more maintenance than an instrument that is rarely used.

- **External Cleaning** — The GC needs to be cleaned when it gets dirty. See the section "Cleaning the Instrument Externally" on page 123.
- **Column** — You may need to replace the column installed into the secondary oven when your performance degrades and troubleshooting indicates that the column needs maintenance. That may mean that end of the column needs to be trimmed or the column needs to be replaced. See "Replacing the Column into the Secondary Oven" on page 125.
- **Detector modules** — You may need to install, replace or maintain an auxiliary detector module. Refer to the *TRACE 1310/TRACE 1310 Hardware Manual*.
- **Methanizer** — The methanizer does not usually require maintenance. However, the replacement of the metal tube containing the nickel-base catalyst is required when the catalyst results exhausted. See "Maintaining the Methanizer" on page 127.
- **Valves** — Perform the maintenance of the valves referring to the relevant manual.

Maintenance Supplies and Tools

To perform routine maintenance on the TRACE 1310 Auxiliary Oven, you will need the following supplies and tools.

- Wrench, open-end, 1/4-in. and 5/16-in., 1/8-in.
- Wrench, 3/8-in.
- Allen wrench, 3/16-in., 5/32-in., 9/64 in.

- Flathead screwdriver
- Crosshead screwdriver
- T30 Torxhead screwdriver
- T25 Torxhead screwdriver
- T20 Torxhead screwdriver
- T8 Torxhead screwdriver
- Electronic flowmeter (Thermo Scientific GFM Pro Flowmeter, or equivalent)
- Electronic leak detector (Thermo Scientific GLD Pro, or equivalent)
- Tweezers (or thin needle-nose pliers) or forceps
- Gloves, heat-resistant (for handling hot parts)

Cleaning Stainless Steel Components

To clean stainless steel components, you will need:

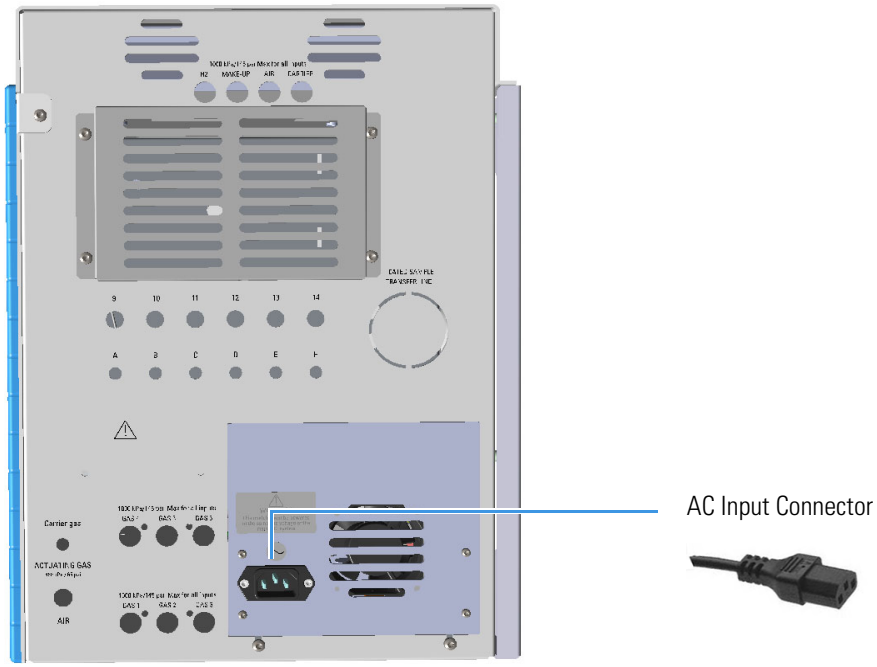
- Acetone, reagent grade (or other suitable polar solvent)
- Applicators, cotton-tipped
- De-ionized water
- Detergent (Alconox, Micro, or equivalent)
- Gas, clean and dry (N2 or He)
- Gloves, clean, lint- and powder-free, latex or nitrile

Powering On the TRACE 1310 Auxiliary Oven

❖ **To power on the TRACE 1310 Auxiliary Oven**

1.)Verify that all the connections have been properly done.
2. Open the supply gases.
3. Plug the power cable to the AC Input connector (Main socket) on the TRACE 1310 Auxiliary Oven, and to the wall outlet. See Figure 173.

Figure 173. TRACE 1310 Auxiliary Oven Power On



4. If auxiliary detectors are installed, be sure the carrier gas flowing through the column and the detector gases flowing through the detector.
5. Power on the GC.
   a. If external modules are present, plug the power cable to the AC Input connector of each module, and to the wall outlet.
   b. Flip up the power switch, located on the back side of the GC, to the On (up) position marked **I**.

Shutting Down the TRACE 1310 Auxiliary Oven

❖ **To shut down the GC and the TRACE 1310 Auxiliary Oven**

1. Cool down the GC.

   Note By pressing the **Maintenance** button, the GC cool down is automatically carried out.

2. If you do not plan to replace the column or perform maintenance on the GC, you do not have to lower the injector temperature.
3. Turn off the carrier gas supply at the tank.
4. Push down the power switch (breaker), located at the back of the instrument, to the position **O** (down).
5. If external modules are present, unplug the power cable from the AC Input connector of each module, and from the wall outlet.
6. If present, power-off the autosampler by switching off the main power switch, or by unplugging the power cable from the AC input connector, and from the wall outlet.
7. Power-off all the remaining instruments.

Cleaning the Instrument Externally

Normal usage of the TRACE 1310 Auxiliary Oven can cause the exterior to get dirty.

WARNING It is your responsibility to avoid that dangerous liquids, materials or both, seeping inside the GC during operation and maintenance.

Solvent must not be used. Do not spray on electrical parts.

❖ **To clean the instrument externally**

1. Place the GC in stand-by condition.
2. Press the **Maintenance** button to cool down the GC, or switch off the heated zones manually.
3. Power off the GC and the TRACE 1310 Auxiliary Oven.
   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 on the back of the GC, and from the wall outlet.

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

4. Unplug the power cable from the AC Input connector on the back of the TRACE 1310 Auxiliary Oven, and from the wall outlet.

5. Externally clean the instrument with a soap and water solution, or with a household non-abrasive product.

   - Pay special attention when cleaning the back side of the instrument. Do not spray, but clean using a cloth imbued with the same substance.
   - Carefully avoid seeping of the products used inside the instrument, particularly when cleaning the grid of the back panel.
   - If you just suspect that a substance used for cleaning or a product submitted to analysis has penetrated inside the instrument, immediately shut down the instrument, and call an authorized customer support engineer for proper actions. The service engineer must be fully informed on the nature of the concerned substance.
     In the event that a hazardous material is spilled on or in the instrument, clean the spill according to the procedures reported in the Material Data Sheet for that substance.

6. Dry with a clean cloth.

7. If external modules are present, plug the power cable to the AC Input connector of each module, and to the wall outlet.

8. Power on the GC and the TRACE 1310 Auxiliary Oven.

   a. Plug the power cable to the AC Input connector into the back of the GC and to the wall outlet.

   b. Flip up the power switch (breaker) to the position I.

   c. Set the normal injector, detector and GC working conditions.

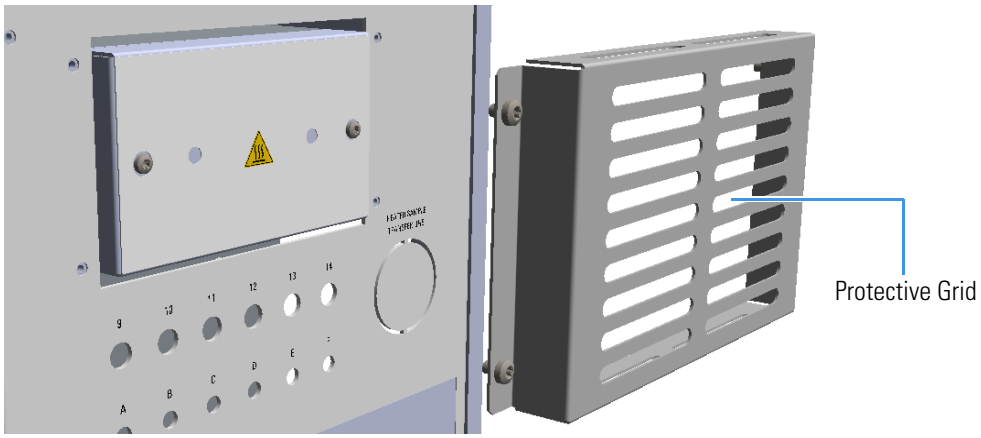
Replacing the Column into the Secondary Oven

This section provides instructions for replacing the column installed into the secondary oven.

❖ **To replace the column**

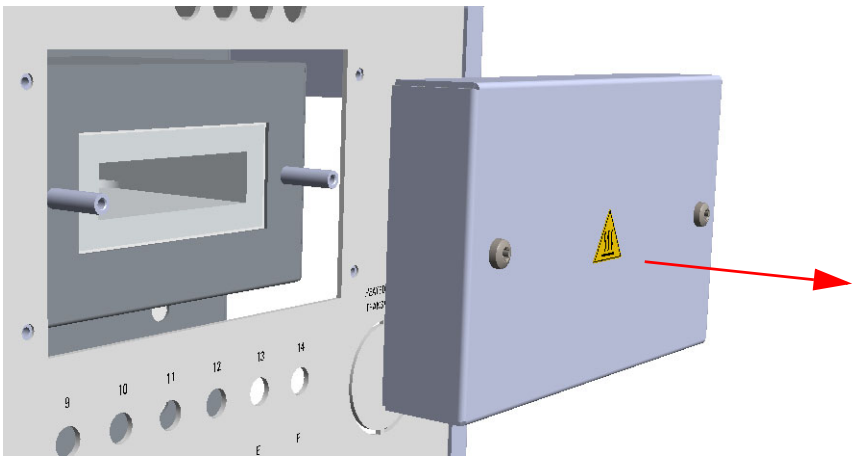
1. Power off the GC and the TRACE 1310 Auxiliary Oven. See "Shutting Down the TRACE 1310 Auxiliary Oven" on page 123.
2. Remove the L-shape cover of the Auxiliary Oven.
3. Remove the L-shape cover of the main oven to access its interior.
4. Remove the protective grid from the back panel of the instrument by unscrewing the four fixing screws. See Figure 178.

Figure 174. Column Replacement (1)



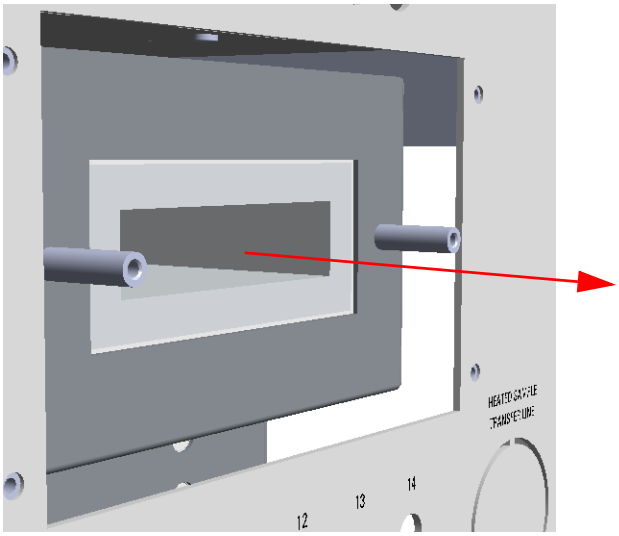
5. Disconnect the ends of column from the components at which the column is connected.
6. Remove the front panel of the secondary oven assembly. See Figure 175.

Figure 175. Column Replacement (2)



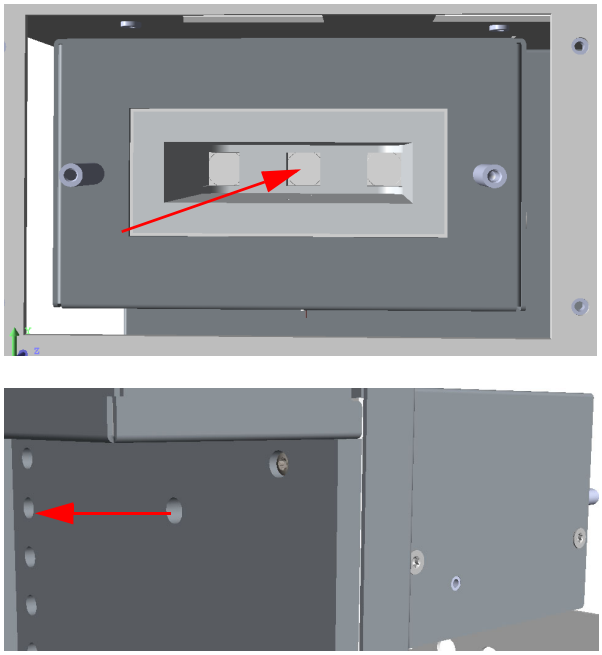
7. Carefully remove the column and its end from the secondary oven. See Figure 176.

Figure 176. Column Replacement (3)



8. Replace the column with a new one guiding its end into the main oven through the proper hole. See Figure 177.

Figure 177. Column Replacement (4)



9. Reinstall the front panel of the secondary oven assembly in the reverse order in which it was removed.
10. Connect the ends of the new column to the components at which the column was connected in the reverse order in which it was removed.
11. Restart the GC and the TRACE 1310 Auxiliary Oven.

Maintaining the Methanizer

This section provides instructions for replacing the methanizer when the when the catalyst results exhausted.

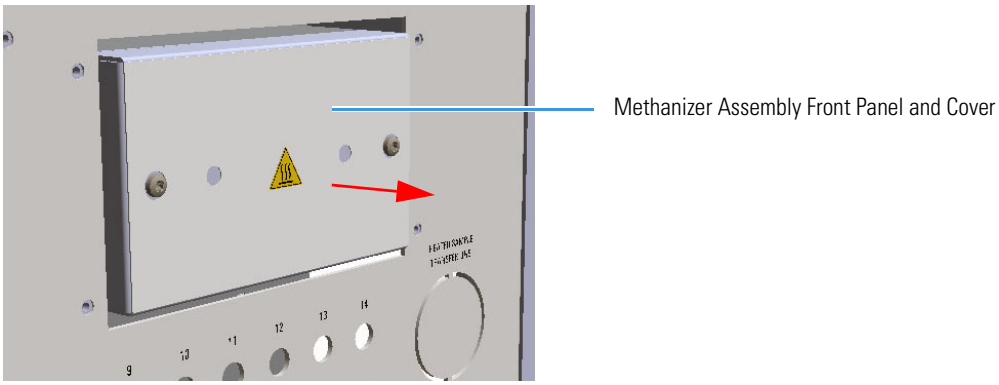
❖ To replace the methanizer metal tube containing the catalyst

1. Power off the GC and the TRACE 1310 Auxiliary Oven. See "Shutting Down the TRACE 1310 Auxiliary Oven" on page 123.
2. Remove the protective grid from the back panel of the instrument undoing the four fixing screws. See Figure 178.

Figure 178. Methanizer Maintenance (1)

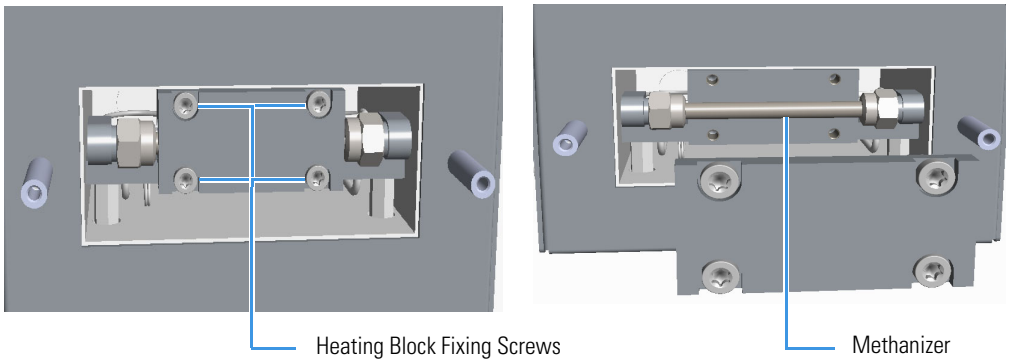
3. Remove the front panel and cover of the methanizer assembly undoing the relevant fixing screws. See Figure 179.

Figure 179. Methanizer Maintenance (2)



4. Open the heating block of the methanizer by removing the four fixing screws to access the methanizer metal tube containing the catalysts. See Figure 180.

Figure 180. Methanizer Maintenance (3)

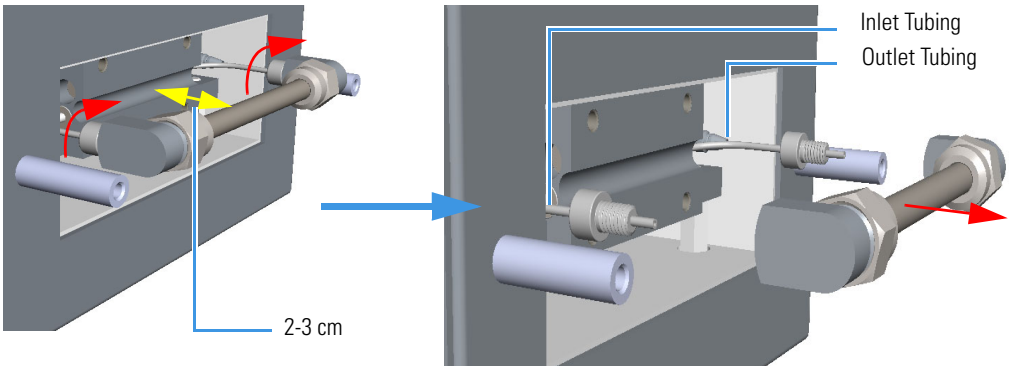


5. Carefully extract the methanizer until it protrudes about 2-3 cm from the box, as permitted by the length of the inlet and outlet tubings connected to it.

   Do not force the extraction of the methanizer more than the suggested distance.

6. Using a 1/4 in. wrench, disconnect the fittings of the inlet and outlet tubings from the methanizer, then remove it. See Figure 181.

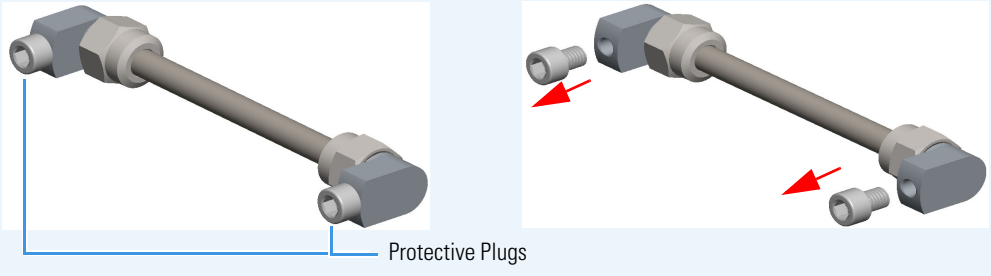
Figure 181. Methanizer Maintenance (4)



7. Replace the methanizer with a new one.

Note The connecting ports of the new methanizer are protected by two finger-tightened plugs. Remove the plugs manually before connecting the inlet and outlet tubings to the methanizer. See Figure 182.

Figure 182. Metal Tube Protective Plugs



   a. Connect the inlet and outlet tubings to the connecting ports of the methanizer without overtightening the fittings.

Note Because the methanizer is not polarized, it is indifferent to which ports you connect the inlet and outlet tubings.

8. Before reinserting the methanizer into the heating block, perform a leak test. See "Performing a Leak Test" on page 129.
9. At the end of the leak test, carefully reinsert the methanizer into the heating block and close it by using the four fixing screws.
10. Reinstall the front panel and the cover of the methanizer assembly.
11. Reinstall and fix the protective grid.
12. Restart the GC and the TRACE 1310 Auxiliary Oven.
13. Activate the catalyst. See "Catalyst Activation" on page 129.

Performing a Leak Test

❖ To perform a leak test

1. Turn on the hydrogen flow.
2. Check the metal tube connections with a handheld electronic leak detector to find possible leaks.

Catalyst Activation

IMPORTANT Perform the activation of the catalyst when the methanizer is installed the first time, and when the methanizer temperature, the flow of hydrogen, or both remain off for a period of time.

❖ To activate the catalyst

Before starting this procedure do the following:

- Turn off the flame of the FID.
- Set the required carrier gas flow rate (helium or nitrogen).
- Set the injector temperature to 100 °C.
- Set the column oven temperature to 40 °C.
- Set the detector temperature to 250 °C.

CAUTION During the catalyst activation, hydrogen is discharged to the atmosphere. Therefore the user must take all necessary precautions concerning the use of gases involved danger of explosion or fire, as provided by the Safety Regulations applicable in the country where the instrument is used.

To activate the catalyst proceed as follows:

1. Set the hydrogen flow to 30 mL/min.
2. Increase the methanizer temperature (Aux 1 Zone) to 150 °C.
3. Maintain the methanizer at this temperature for about one hour.
4. Increase the methanizer temperature to 380 °C.
5. Let hydrogen flow through the catalyst for approximately two hours to ensure the complete reduction.
6. At the end of the activation the catalyst can be repeatedly used without further treatment.

Troubleshooting

This section helps you to find and correct potential problems when using the TRACE 1310 Auxiliary Oven.

The most common problem associated with valves and plumbing are **leaks**, **valves not switching properly**, and **valves not plumbed correctly**.

Leak Testing

Leak testing requires studying plumbing diagrams and system configurations.

Identify all gas sources leading into the flow path to be leak tested. Determine if the gas sources are either a common source or if they are at the same bottle pressure.

Be sure all components in the sample path will withstand the pressure being applied to the system.

Be sure all possible gas outlets are blocked. This will require knowing how to identify the various flow paths throughout the valve system to be sure vents are blocked or bypassed.

Note Leak should be detected using an electronic leak detector (Thermo Scientific GLD Pro, or equivalent).

Refer to the TRACE 1300/1310 manuals, for leak test suggestions and the necessary hardware required to pressure check a plumbing system.

In case of problems, see Table 7 for the possible causes and remedies.

Table 7. Leak Testing for Valves

Symptom	Possible Cause	Possible Remedy
Valve leaking between ports.	Defective rotor.	Replace rotor or valve.
Valve leaking around rotor.	Valve rotor not seating properly.	Tighten rotor.
	Rotor defective.	Replace rotor.
Leaking out valve ports	Ferrule not seating.	Replace ferrule.

Valve Switching

VICI® valves contain a rotor that is turned by the actuator. This rotor channels the gas between the various ports of the valve. If the rotor is not being switched properly, a flow path may be partially or fully blocked, or leaks may occur between valve ports.

Each valve contains a mechanical stop that should reach an extreme when the valve is rotated in the clockwise or counterclockwise direction.
Close inspection of the valve will indicate if the valve is being switched to its limits.
Actuator pressure should be 420 kPa (60psig) to 630 kPa (90 psig).

In case of problems, see Table 8 for the possible causes and remedies.

Table 8. Causes and Remedies for Improper Valve Switching

Possible Cause	Possible Remedy
Low actuator line pressure.	Increase line pressure.
Solenoid not actuating.	Verify timed event is set correctly.
	Check voltage at solenoid valve.
	Replace defective solenoid valve.
Actuator leaking.	Replace actuator.
Valve event not set correctly.	Check valve event configuration and event in the run table.

Valve Plumbing

Verify the valve and system plumbing conforms to the appropriate plumbing diagram for your system setup. Trace the plumbing from port to port to insure all connections are made properly.

Methanizer Analytical Troubleshooting

Table 9 lists the most common anomalies with the relevant diagnosis and remedy when the methanizer device is used.

Table 9. Methanizer Analytical Troubleshooting

Symptom	Diagnosis	Remedy
No peaks at all.	Column broken or disconnected.	Check the column and connections.
	Defective electrometer or amplifier.	Replace the electrometer or the amplifier.
	FID flame is out.	Light the flame.
	Poor or missing electrical connections.	Check the cables connections.
CO or CO_2 peaks not present in the chromatogram.	Methanizer temperature not correct.	Set the correct temperature.
	Catalyst exhausted.	Replace the metal tube containing the catalysts.

Ordering Parts

This chapter contains part numbers for all the kits or spare parts available for your TRACE 1310 Auxiliary Oven.

Use Table 10 to order new kits or spare parts for your TRACE 1310 Auxiliary Oven.

Table 10. Ordering information for new kits and spare parts (Sheet 1 of 2)

Description	Part number
Kits	
TRACE 1310 Auxiliary Oven - Detector Seat Kit	19071006
TRACE 1310 Auxiliary Oven - Column Oven Kit	19071007
TRACE 1310 Auxiliary Oven - Methanizer Kit	19071008
TRACE 1310 Auxiliary Oven - Manifold Kit for Valco® Rotary Valves	19071009
TRACE 1310 Auxiliary Oven - Manifold Kit for Diaphragm (Membrane) Valves	19071010
TRACE 1310 Auxiliary Oven - Solenoid Valve for Valco® Rotary Valves	19071011
TRACE 1310 Auxiliary Oven - Solenoid Valve for Diaphragm (Membrane) Valves	19071012
TRACE 1310 Auxiliary Oven - Solenoid Valve for On/Off LPG Valves	19071013
TRACE 1310 Auxiliary Oven - Bulkhead Connector for Sample In/Out Heated Zone	19071014
TRACE 1310 Auxiliary Oven - Bulkhead Connector for Sample In/Out Unheated Zone	19071015
TRACE 1310 Auxiliary Oven - Monitor Tube for LPG Valve	19071016
TRACE 1310 Auxiliary Oven - Capillary Column Retaining Kit	19071017
TRACE 1310 Auxiliary Oven - Split Fitting Kit for Auxiliary Gas	19071018
TRACE 1310 Auxiliary Oven - Bulkhead Connector Kit for Sample In/Out at High Temperature	19071022
TRACE 1310 Auxiliary Oven - Valve Actuator Cooling Kit	19071023

Table 10. Ordering information for new kits and spare parts (Sheet 2 of 2)

Description	Part number
TRACE 1310 Auxiliary Oven - LPG Installation Kit	19071100
TRACE 1310 Auxiliary Oven - One Valco® Rotary Valve Installation Kit	19071200
TRACE 1310 Auxiliary Oven - One Diaphragm (Membrane) Valve Installation Kit	19071300
Spare Parts	
TRACE 1310 Auxiliary Oven - Methanizer Tube	27609925
TRACE 1310 Auxiliary Oven - PT100 550 mm VO TRC1300	23043772
TRACE 1310 Auxiliary Oven - PT100 300 mm VO TRC1300	23043723
TRACE 1310 Auxiliary Oven - Heater VO TRC1300	23043725
TRACE 1310 Auxiliary Oven - Heater Column Oven TRC1300	23043726
TRACE 1310 Auxiliary Oven - Fan 60 mm VO TRC1300	23043728
TRACE 1310 Auxiliary Oven - Fan 40 mm VO TRC1300	23043729
TRACE 1310 Auxiliary Oven - Aux Gas Board VO TR1300	29903501
TRACE 1310 Auxiliary Oven - Proportional Valve VO TR1300	40516160
TRACE 1310 Auxiliary Oven - Aux Tube Assy VO TR1300	25904060
TRACE 1310 Auxiliary Oven - VOBP-HRM Board VO TR1300	23661128
TRACE 1310 Auxiliary Oven - Aux Temp Board VO TR1300	23661060
TRACE 1310 Auxiliary Oven - LED Plate VO TR1300	23043730
TRACE 1310 Auxiliary Oven - 3-way Solenoid Valve VO TR1300	40517105
TRACE 1310 Auxiliary Oven - 5-way Solenoid Valve VO TR1300	40519029
TRACE 1310 Auxiliary Oven - Needle Valve 1/16-in.	40527097
TRACE 1310 Auxiliary Oven - Bulkhead fitting 5/16-20	35008441