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Thermo Scientific

TriPlus 500

Hardware Manual

Headspace Sampler

31716107 Revision E October 2023

ThermoFisher SCIENTIFIC

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General Lab Equipment. Not for Clinical, Patient, or Diagnostic Use.

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Reader's Survey

TriPlus 500 Headspace Sampler Hardware Manual, PN 31716107, Revision E

	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

Manufacturer: Thermo Fisher Scientific

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
- recalibration, and
- changes and repairs

have been carried out by authorized personnel and if:

- the local installation complies with local law regulations
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- 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.

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- Machinery Directive: 2006/42/EC
- EMC Directive: 2014/30/EU
- RoHS Directive: 2011/65/EU and (EU) 2015/863

… and conforms with the following product standards:

Compliant with applicable directives:

- Machinery Directive: 2006/42/EC
- EMC Directive: 2014/30/EU
- RoHS Directive: 2011/65/EU and (EU) 2015/863

Compliant with product standards:

EMC

– EN 61326-1:2013, IEC 61326-1:2012
– FCC rules: CFR no. 47 Part 15 Subpart B Section 15.107 and 15.109

Safety

– EN 61010-1:2010, IEC 61010-1:2010
– EN 61010-2-010: 2014, IEC 61010-2-010: 2014 (TriPlus 500 HS only)
– EN 61010-2-081: 2015, IEC 61010-2-081: 2015
– UL 61010-1:2012/R:2016-04
– UL 61010-2-010:2015 (TriPlus 500 HS only)
– UL 61010-2-081:2015
– CAN/CSA C22.2 No. 61010-1:2012/U2:2016-04
– CAN/CSA C22.2 No. 61010-2-010:2015 (TriPlus 500 HS only)
– CAN/CSA C22.2 No. 61010-2-081:2015

Note This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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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.

ATTENTION Lisez et comprenez les différentes précautions, ainsi que les signes et symboles de ce manuel relatifs à l'utilisation sûre de ce produit, avant d'utiliser le dispositif.

Notice on Lifting and Handling of Thermo Scientific Instruments

For your safety, and in compliance with international regulations, the physical handling of this Thermo Fisher Scientific instrument ***requires a team effort*** to lift and/or move the instrument. This instrument is too heavy and/or bulky for one person alone to handle safely.

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Notice on the Proper Use of Thermo Scientific Instruments

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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.

-Original-

EU Declaration of Conformity

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Thermo Fisher Scientific S.p.A.
Via San Bovio 3
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Italy

We hereby declare that the following products

Designation:	**Autosampler**
Model:	**Thermo Scientific TriPlus 500 HS**

fulfill all the relevant requirements of the following directives:

Low Voltage Directive	**2014/35/EU**
Electromagnetic Compatibility Directive	**2014/30/EU**
RoHS Directive	**2011/65/EU and (EU) 2015/863**

The following relevant harmonized standards were used:

EN 61010-1:2020-03	**EN 61326-1:2013-07**

Person authorized to compile the technical file:

Giacinto Zilioli
(Director, Strategic Projects)
Thermo Fisher Scientific S.p.A.

Signature

Milan, March 24, 2023

Date

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-Original-

UK Declaration of Conformity

UK CA

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Italy

Declares, under sole responsibility, that products

Designation:	**Autosampler**
Model:	**Thermo Scientific TriPlus 500 HS**

as originally delivered complies with the essential requirements of the following applicable UK Regulations:

Electrical Equipment (Safety) Regulations	**2016**
Electromagnetic Compatibility Regulations	**2016**
The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (ROHS) Regulations	**2012**

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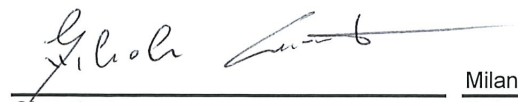
Giacinto Zilioli
(Director, Strategic Projects)
Thermo Fisher Scientific S.p.A.



Signature

Milan, April 5, 2023

Date

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WEEE Directive
2012/19/EU

This product is required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2012/19/EU. It is marked with the following symbol:

This symbol indicates that the equipment must not be thrown into general waste and should be collected separately and processed in accordance with local and state requirements.

Thermo Fisher Scientific is registered with one or more recycling/disposal companies in the UK and 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.

WEEE Directive
2012/19/EU

Thermo Fisher Scientific has contracted with one or more recycling or disposal companies in each European Union (EU) Member State, and these companies should dispose of or recycle this product. See www.thermofisher.com/rohsweee for further information on Thermo Fisher Scientific's compliance with these Directives and the recyclers in your country.

Directive DEEE
2012/19/EU

Thermo Fisher Scientific s'est associé avec une ou plusieurs compagnies de recyclage dans chaque état membre de l'union européenne et ce produit devrait être collecté ou recyclé par celles-ci. Davantage d'informations sur la conformité de Thermo Fisher Scientific à ces directives, les recycleurs dans votre pays et les informations sur les produits Thermo Fisher Scientific qui peuvent aider la détection des substances sujettes à la directive RoHS sont disponibles sur www.thermofisher.com/rohsweee.

WEEE Direktive
2012/19/EU

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Preface

This manual contains information for installing and maintaining, the Thermo Scientific™ TriPlus™ 500 Headspace Sampler (TriPlus 500 HS) and its devices.

This manual is intended for Thermo Fisher Scientific Service Engineers and frequent or new TriPlus 500 HS users who are experienced at using automated systems to run existing analytical methods.

This manual is organized as follows:

- Chapter 1, "TriPlus 500 Headspace Sampler Overview," provides an overview of the TriPlus 500 HS and its devices.
- Chapter 2, "Installing the TriPlus 500 HS," provides the instruction for installing and coupling a TriPlus 500 HS to a TRACE 1300 Series GC.
- Chapter 3, "Upgrading Equipment," provides the instructions for upgrading a TriPlus 500 HS with the available devices.
- Chapter 4, "Instrument Checkout," provides the instructions to check instrument analytical performance after the installation has been completed.
- Chapter 5, "Performing Routine Maintenance," provides instructions for performing routine maintenance on a TriPlus 500 HS.
- "Glossary," contains definitions of terms used in this guide. It also includes abbreviations, acronyms, metric prefixes, and symbols.

Contents

- About Your System
- Power Rating
- Contacting Us
- Related Documentation
- Safety and Special Notices
- Instrument Markings and Symbols
- Safety Information and Warnings

About Your System

Thermo Fisher Scientific systems operate safely and reliably under carefully controlled environmental conditions.

If the equipment is used in a manner not specified by the manufacturer, the protections provided by the equipment might be impaired. 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 Thermo Scientific systems operate safely and reliably under carefully controlled environmental conditions. If the equipment is used in a manner not specified by the manufacturer, the protections provided by the equipment might be impaired. 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.

AVERTISSEMENT Les systèmes Thermo Fisher Scientific fonctionnent de manière sûre et fiable dans des conditions ambiantes minutieusement régulées. La protection fournie par l'équipement peut être entravée si ce dernier est utilisé d'une manière non spécifiée par le fabricant. Si vous maintenez un système en dehors des spécifications listées dans ce guide, des défaillances de types divers sont possibles, pouvant notamment entraîner des blessures, voire la mort. La réparation des défaillances d'instruments liées à une utilisation non conforme aux spécifications du fabricant est expressément exclue de la garantie standard et de la couverture prévue par un contrat de maintenance.

Power Rating

TriPlus 500 HS alone:

- 100-240 Vac; 600 W; 50/60 Hz

Vial Loader

- 24 Vdc through a portable external power supply, level VI efficiency

  Input 100-240 Vac; 50/60 Hz; 1.3 A — Output 24 Vdc; Power 90 W; 3.75 A

WARNING You must only use the portable external power supply furnished with the instrument by Thermo Fisher Scientific.

ADVERTISSEMENT Vous ne devez utiliser que l'alimentation externe portable fournie avec l'instrument par Thermo Fisher Scientific.

Detailed instrument specifications are in the Product Specifications Sheet.

Related Documentation

In addition to this guide, Thermo Scientific™ provides the following documents for TriPlus 500 HS.

- *TriPlus 500 Headspace Sampler Preinstallation Requirements Guide*, PN 31716105
- *TriPlus 500 Headspace Sampler User Guide*, PN 31716106
- *TriPlus 500 Headspace Sampler Spare Parts Catalog*, PN 31716108

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

Safety and Special Notices

Make sure you follow the precautionary notices presented in this manual. The safety and other special notices appear in boxes.

Special Notices

Notices includes the following:

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

Note Emphasizes important information about a task.

Tip Helpful 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 for personal injury, instrument damage, or both. Cautions and warnings are following by a descriptor, such as **BURN HAZARD**. A **WARNING** is intended to prevent improper actions that could cause personal injury. Whereas, a **CAUTION** is intended to prevent improper actions that might cause personal injury, instrument damage, or both. You can find the following safety symbols on your instrument, or in this manual:

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.
	**HAND AND CHEMICAL HAZARD:** Indicates that chemical damage or physical injury *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.
	**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*.

Tous les symboles de sécurité sont suivis des mots **AVERTISSEMENT** ou **ATTENTION**, qui indiquent le degré de risque de blessures personnelles, de dommages à l'instrument, ou des deux. Les mentions « Attention » et les avertissements sont suivis d'un descripteur. Un **AVERTISSEMENT** vise à empêcher des actions inappropriées pouvant entraîner des blessures personnelles. Une mention **ATTENTION** vise à empêcher des actions inappropriées pouvant entraîner des blessures personnelles ou des dommages à l'instrument. Vous pouvez trouver les symboles de sécurité suivants sur votre instrument ou dans ce guide.

Symbol	Descriptor
	**RISQUE BIOLOGIQUE :** indique qu'un risque biologique va, peut ou pourrait survenir.
	**RISQUE DE BRÛLURE :** vous avertit de la présence d'une surface chaude qui peut ou pourrait entraîner des blessures par brûlure.
	**RISQUE D'ÉLECTROCUTION :** indique qu'un choc électrique peut ou pourrait survenir.
	**RISQUE D'INCENDIE :** indique qu'un risque d'incendie ou d'inflammabilité peut ou pourrait survenir.

	**RISQUE DE GAZ INFLAMMABLE :** vous avertit que des gaz sont comprimés, liquéfiés ou dissous sous pression et qu'ils peuvent s'enflammer au contact d'une source d'inflammation. Ce symbole indique que ce risque peut ou pourrait entraîner une blessure physique.
	**GANTS REQUIS :** indique que vous devez porter des gants pour effectuer une tâche, sans quoi une blessure physique peut ou pourrait survenir
	**RISQUE PHYSIQUE ET CHIMIQUE :** indique que des dommages chimiques ou une blessure physique peuvent ou pourraient survenir.
	**DOMMAGES À L'INSTRUMENT :** indique que l'instrument ou le composant pourrait subir des dommages. Ces dommages pourraient ne pas être couverts pas la garantie standard.
	**RISQUE SOULÈVEMENT :** indique qu'une blessure physique peut ou pourrait survenir si un objet n'est pas soulevé par deux personnes ou plus.
	**RISQUE MATÉRIEL ET YEUX :** indique que des dommages aux yeux peuvent ou pourraient survenir.
	**CONSULTER LE MANUEL :** vous avertit de lire attentivement la documentation de votre instrument afin de garantir votre sécurité et la capacité opérationnelle de l'instrument. Ne pas lire attentivement la documentation peut ou pourrait vous exposer à un risque de blessure physique.
	**RISQUE DE SUBSTANCES TOXIQUES :** indique que l'exposition à une substance toxique peut survenir et que l'exposition peut ou pourrait entraîner des blessures personnelles ou la mort.
	**RISQUE RADIOACTIF :** indique qu'une exposition à des matériaux radioactifs peut ou pourrait survenir.
	Pour prévenir les blessures personnelles, ce symbole général d'avertissement précède le mot **AVERTISSEMENT**et est conforme à la norme ISO 3864-2. Dans le vocabulaire des signes ANSI Z535, ce symbole indique un risque de blessures personnelles si l'instrument est utilisé de manière inappropriée ou en cas d'actions dangereuses. Ce symbole et un autre symbole de sécurité approprié vous avertissent d'un risque imminent ou potentiel pouvant entraîner des blessures personnelles.

Instrument Markings and Symbols

Table 1 explains the symbols used on Thermo Fisher Scientific instruments. Only a few of them are used on TriPlus 500 HS, which are annotated with an asterisk below.

Table 1. Instrument Marking and Symbols

	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)
		Fuse
*		Instruction manual symbol affixed to product. Indicates that the you 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
*		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.

Safety Information and Warnings

This safety guide raises awareness of potential safety issues and general points for consideration for Thermo Fisher Scientific representatives during installation, and repair of TriPlus 500 HS, or parts of it (following the life cycle principle), as well as for the end user of TriPlus 500 HS in the lab during the learning phase, and in routine work.

General Considerations

- Before a unit is put to use, consult the TriPlus 500 HS manuals and related documents under all circumstances.
- Changes or modifications to this unit not expressly approved by the party responsible for compliance, could void your authority to operate the equipment.
- Be aware that if the equipment is used in a manner not specified by the manufacturer, the protective and safety features of the equipment might be impaired.
- The repair of instrument failures caused by operation in a manner not specified by the manufacturer is expressly excluded from the standard warranty and service contract coverage.
- When for technical reasons it is necessary to work on instrument parts which might involve a potential hazard (moving parts, components under voltage, and so on.) contact the Thermo Fisher Scientific authorized representative.

Routine maintenance operations can be performed by a Thermo Fisher Scientific representative. Alternatively they can be performed by a trained operator. Routine maintenance can be performed according to the instructions reported in Chapter 5, “Performing Routine Maintenance.”

Electrical Hazards

Every analytical instrument has specific hazards. Be sure to read and comply with the following precautions. They ensure the safety and long-term use of your TriPlus 500 HS.

The installation over-voltage category is Level II. The Level II category pertains to equipment receiving its electrical power from the local level, such as an electrical wall outlet.

The power line and the connections between TriPlus 500 HS and other instruments, used in the configuration setup of the total analytical system, must maintain good electrical grounding. Poor grounding represents a danger for the operator, and might seriously affect the performance of the instrument.

Do not connect TriPlus 500 HS to power lines that supply devices of a heavy duty nature, such as motors, refrigerators and other devices that can generate electrical disturbances.

Use only fuses of the type and current rating specified. Do not use repaired fuses, and do not short-circuit the fuse holder. The supplied power cord must be inserted into a power outlet with a protective earth (ground) contact. When using an extension cord, make sure that the cord also has an earth contact.

If the supplied power cord does not fit the local electrical socket and a replacement or adapter has to be purchased locally, make sure that only a certified power cord is used. Any power cord used must be certified by the appropriate local authorities.

Do not to leave any cable connecting TriPlus 500 HS and the chromatographic system, or the power cord close to heated zone, such as the injector or detector heating blocks, or the GC hot air vents.

Always replace any cable showing signs of damage with another one provided by the manufacturer. Safety regulations must be respected.

Do not change the external or internal grounding connections. Tampering with or disconnecting these connections could endanger you and damage the TriPlus 500 HS.

The instrument is properly grounded in accordance with these regulations when shipped. To ensure safe operation, do not make any changes to the electrical connections or the instrument's chassis.

Do not turn the instrument on if you suspect that it has incurred any type of electrical damage. Instead, disconnect the power cord and contact a Thermo Fisher Scientific representative for a product evaluation. Do not attempt to use the instrument until it has been evaluated. Electrical damage might have occurred if TriPlus 500 HS shows visible signs of damage, exposure to any liquids or has been transported under severe stress.

Damage can also result if the instrument is stored for prolonged periods under unfavorable conditions: for example, subjected to heat, moisture, and so on. Ensure that the power supply/controller unit is always placed in a clean and dry position. Avoid any liquid spills in the vicinity.

Before attempting any type of maintenance work, always disconnect the power cords from the power supply if optional devices are installed. Capacitors inside the instrument might still be charged also if the instrument is turned off.
To avoid damaging electrical parts, do not disconnect an electrical assembly while power is applied to TriPlus 500 HS. After the power is turned off, wait approximately 30 seconds before you disconnect an assembly.

The instrument includes a number of integrated circuits. These circuits might be damaged if exposed to excessive line voltage fluctuations, power surges or electrostatic charges, or both.

The power supply for TriPlus 500 HS has the symbols **I/O** on the label for the power switch to indicate On/Off. It is important that the power On/Off switch is accessible to unplug the AC power cord from the power supply/wall outlet in case of emergency.

Other Hazards

Danger of crushing to fingers and hands. To avoid injury keep your hands away from moving parts during operation. Turn off the power to TriPlus 500 HS if you must reach inside a mechanically powered system with moving parts.

To avoid injury, observe safe laboratory practice when handling solvents, changing tubing, or operating the TriPlus 500 HS. Know the physical and chemical properties of the solvents you use. See the Safety Data Sheets (SDS) from the manufacturer of the solvents being used.

When using TriPlus 500 HS, follow the generally accepted procedures for quality control and method development.

Do not operate on the instrument components that form part of the work area of TriPlus 500 HS when it is in motion.

Do not use vials without a sealing cap. Vapor phase from organic solvents can be hazardous and flammable. Acidic vapor phase can cause corrosion to critical mechanical parts.

Use high quality vials and closures as depending on the application conditions, high pressure can build up in the vial. Do not reuse headspace vials. Repeated heating of reused vials may increase the chance of vial breaking.

Hazardous Substances Precautions

WARNING Before using hazardous substances (toxic, harmful, and so on), please read the hazard indications and information reported in the applicable Material Safety Data Sheet (MSDS). Use personal protective equipment according to the safety requirements.

AVERTISSEMENT Avant d'utiliser des substances dangereuses (toxiques, nocives, etc.), veuillez lire attentivement les indications et informations relatives au risque reprises sur la fiche de données de sécurité adéquate. Utilisez un équipement de protection individuelle conformément aux exigences de sécurité.

Biological Hazard Warning Note

In laboratories where samples with potential biological hazards are handled, the user must label any equipment or parts which might become contaminated with biohazardous material.

The appropriate warning labels are included with the shipment of the instrument. It is the user's responsibility to label the relevant parts of the equipment.

When working with biohazardous materials, you are responsible for fulfilling the following mandatory requirements:

- Providing instructions on how to safely handle biohazardous material.
- Training operators must to be aware of potential hazards.
- Providing personal protective equipment.
- Providing instructions for what to do if operators are exposed to aerosols or vapors during normal operation (within the intended use of the equipment) or in case of single fault situations such as a broken vial. The protective measures must consider potential contact with the skin, mouth, nose (respiratory organs), and eyes.
- Providing instructions for decontamination and safe disposal of relevant parts.

WARNING The user or operator is responsible for the safe handling of hazardous chemicals or biological compounds including (but not limited to) bacterial or viral samples and the associated waste, according to international and local regulations.

AVERTISSEMENT L'utilisateur ou l'opérateur est responsable de la manipulation sûre des composés chimiques et biologiques dangereux, y compris, sans s'y limiter, les échantillons bactériens ou viraux et les déchets associés, conformément aux réglementations internationales et locales.

Venting Toxic Gases

When analyzing toxic compounds, be aware that during the normal operation of the GC some of the sample might be vented outside the instrument through the split and purge flow vents; therefore, be sure to vent the exhaust gases to a fume hood. Consult local environmental and safety regulations for instructions in exhausting fumes from your system.

Maintenance

Any external cleaning or maintenance must be performed with TriPlus 500 HS turned off and the power cord disconnected.

Avoid using solvents and spraying on electrical parts. For the removal of potentially dangerous substances (toxic, harmful, and so on) read the hazard indications and information reported in the Safety Data Sheet (SDS) supplied by the manufacturer referring to the relevant CAS (Chemical Abstract Service) number. Use proper protective gloves.

When working with hazardous materials such as radioactive, biologically hazardous material, and so on, it is important to train all operators how to respond in case of spills or contamination.

Depending on the class of hazardous material, the appropriate measures have to be taken immediately. Therefore, the chemicals or solvents needed for decontamination have to be on hand.

Any parts of the equipment which can potentially be contaminated, such as the sample vial tray, and so on, must be cleaned regularly. The waste solvent from cleaning and any hardware which requires to be disposed of has to be properly eliminated with all the necessary precautions, abiding by national and international regulations.

When preparing for decontamination, ensure that the solvent or chemical to be used will not damage or react with the surface, dye (color) of the instrument, table or other nearby objects. If in doubt, please contact your Thermo Fisher Scientific representative to verify the compatibility of the type or composition of solvents with TriPlus 500 HS.

Disposal

Do not dispose of this equipment or parts thereof unsorted in municipal waste. Follow local municipal waste regulations for proper disposal provisions to reduce the environmental impact of waste electrical and electronic equipment (WEEE). European Union customers: Call your local customer service representative responsible for TriPlus 500 HS for complimentary equipment pick-up and recycling.

IMPORTANT The customer has to ensure that TriPlus 500 HS has not been contaminated by any hazardous chemical or biological compounds including (but not limited to) bacteria or viruses.

Any part which had direct contact with the analytical sample must be identified and must undergo an appropriate decontamination procedure prior to shipping for disposal.

Potentially dangerous components are vials and trays. Any critical parts sent for disposal must be handled according to national laws for hazardous compounds.

The customer and the service engineer are fully responsible for enforcing these requirements. Thermo Fisher Scientific will hold the representative, customer responsible, or both, if these regulations are not observed.

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

1

TriPlus 500 Headspace Sampler Overview

This chapter provides an overview of the TriPlus 500 Headspace Sampler and its devices.

Contents

- Instrument Basics
- Label Locations on the Instrument
- Incubation Group
- Sampling Path
- Pneumatic Connections
- Electrical Connections
- Status Panel

Instrument Basics

The TriPlus 500 Headspace Sampler (TriPlus 500 HS) consists of a 12-vial capacity configuration (TriPlus 500 HS-12), upgradeable to 120-vial capacity with the addition of a vial loader, a tray holder, and three removable 40- vial trays (TriPlus 500 HS-120). The TriPlus 500 HS-120 can be further extended to 240-vial capacity with an additional tray holder and three, 40-vial trays on the top of the GC.

See Figure 1 and Figure 2.

Figure 1. TriPlus 500 HS-12 Coupled with a TRACE 1600 GC

Figure 2. TriPlus 500 HS-120 Coupled with a TRACE 1610 GC

The TriPlus 500 HS-12 includes:

- **Sample Carousel** — A **12-seat** rotating carousel for 10 mL and 20/22 mL vials.
- **Incubation Oven** — A heated box including a 12-seat rotating oven carousel and mechanisms for shaking and transferring the vial. See "Incubation Group" on page 8.
- **Sampling Path** — Includes an electrically actuated 6-port gas sampling valve, a sampling needle, and the GC column interface. See "Sampling Path" on page 9.
- **Pneumatic Connections** — Connect the supplies of carrier gas and auxiliary gas. See "Pneumatic Connections" on page 10.
- **Electrical Connections**— Includes electrical supply and communications ports to the GC optional devices. See "Electrical Connections" on page 11.
- **Status Panel** — Consists of three light emitting diodes (LED) showing the current status of the instrument. See "Status Panel" on page 12.

Note The TriPlus 500 HS-12 can be upgraded to a 120-sample-vial capacity at any time by adding the Vial Loader and the tray holder with three, 40-vial trays.

TriPlus 500 Vial Loader includes:

- **Vial Loader** — One tray holder with three, 40-vial trays.
- **Vial Loader** — A robotic arm with a magnetic gripper that transfers the vials from each of the vial trays to the 12-position sample carousel, and vice-versa. The **Vial Loader** controls optional devices such as the **Barcode Reader** and **Heated/Cooled Tray** (Chiller).

Note The sampling capacity of the **TriPlus 500 HS-12** can be increased to **240 vials** by adding another tray holder with three, 40-vial trays placed on the back part of a TRACE 1600 Series GC top cover.

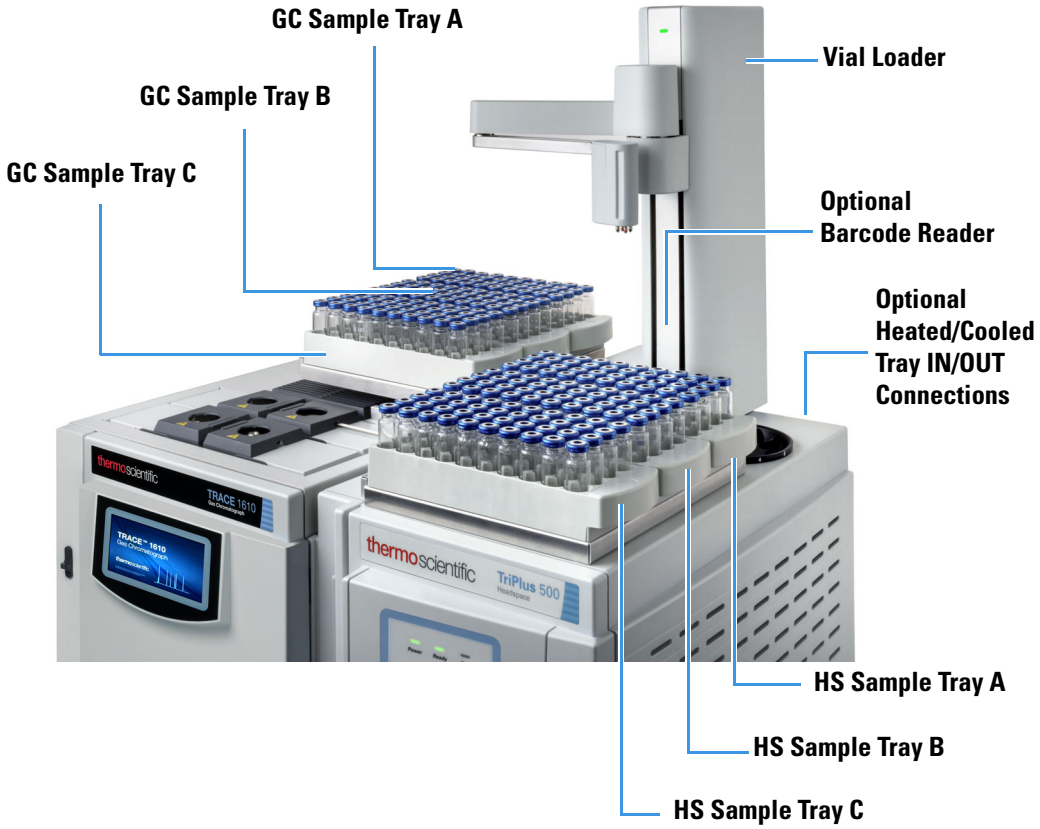
Each sample tray has its own identification initials according to its position on the TriPlus 500 HS, on the GC, or on both. This allows for proper management of the vials during the sample sequence.

CAUTION DO NOT PLACE a vial into the 12-position rotating carousel when using the Vial Loader and the vial trays. The Vial Loader carries one vial at a time into the predefined position 1 of carousel, while the other eleven positions are all potentially used for vial recovering.

ATTENTION NE PLACEZ PAS de flacon dans le carrousel rotatif à 12 positions lorsque vous utilisez le chargeur de flacon et les plateaux pour flacons. Le chargeur de flacon transporte un flacon à la fois dans la position 1 prédéfinie du carrousel, tandis que les onze autres positions sont potentiellement utilisées pour la récupération des flacons.

Figure 3 shows an example of sampling system.

Figure 3. Example of the Sampling System at the Maximum Configuration



For details see the following sections:

- "Installing the Vial Loader" on page 60
- "Installing the Vial Trays" on page 72
- "Installing the Barcode Reader" on page 87
- "Installing the Heated/Cooled Tray" on page 89

Label Locations on the Instrument

Figure 4, Figure 5, and Figure 6 show the locations of the labels attached to the TriPlus 500 HS, Vial Loader, and Barcode Reader.

Figure 4. Label locations on the TriPlus 500 HS

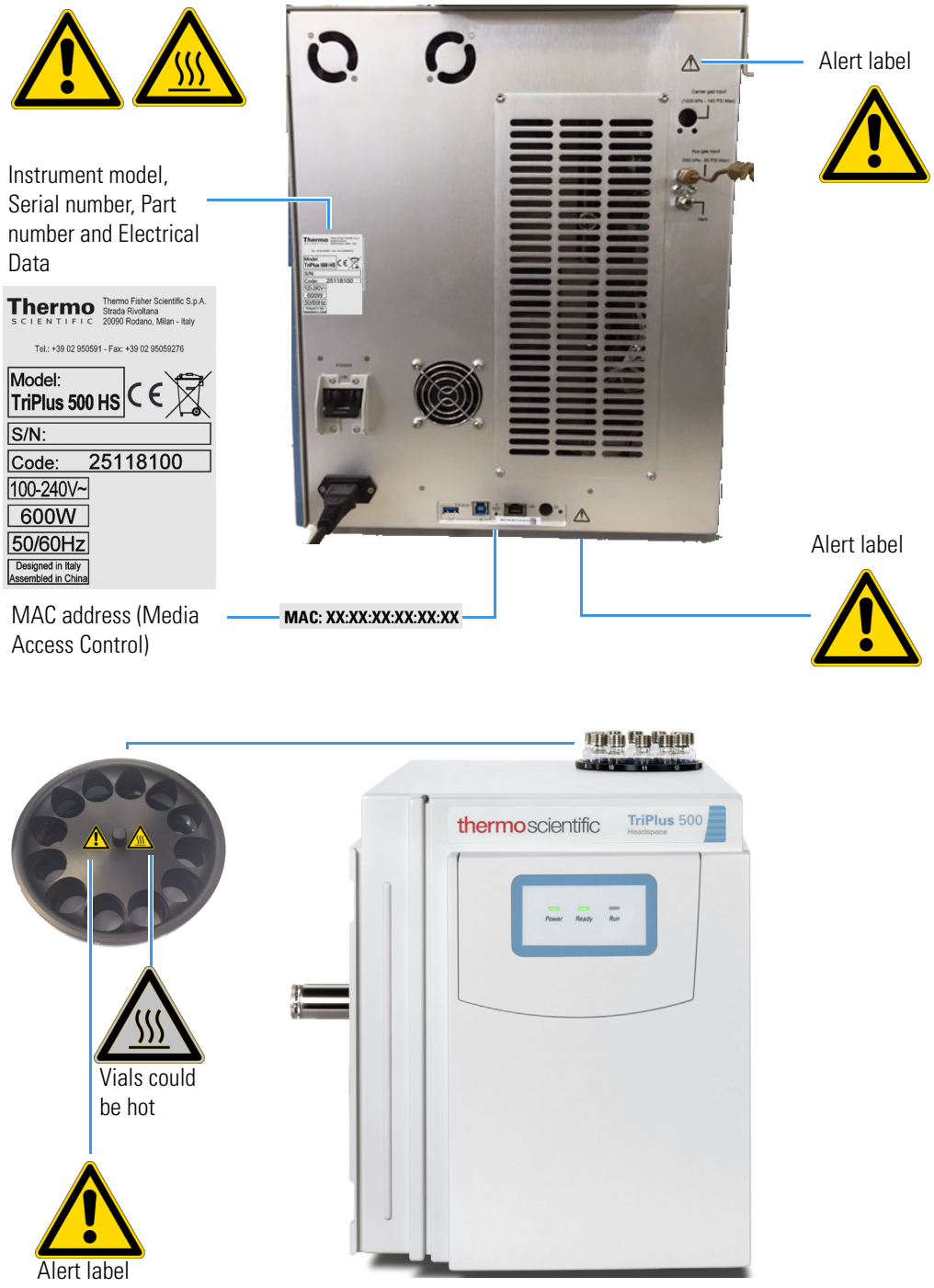


Figure 5. Label locations on the Vial Loader

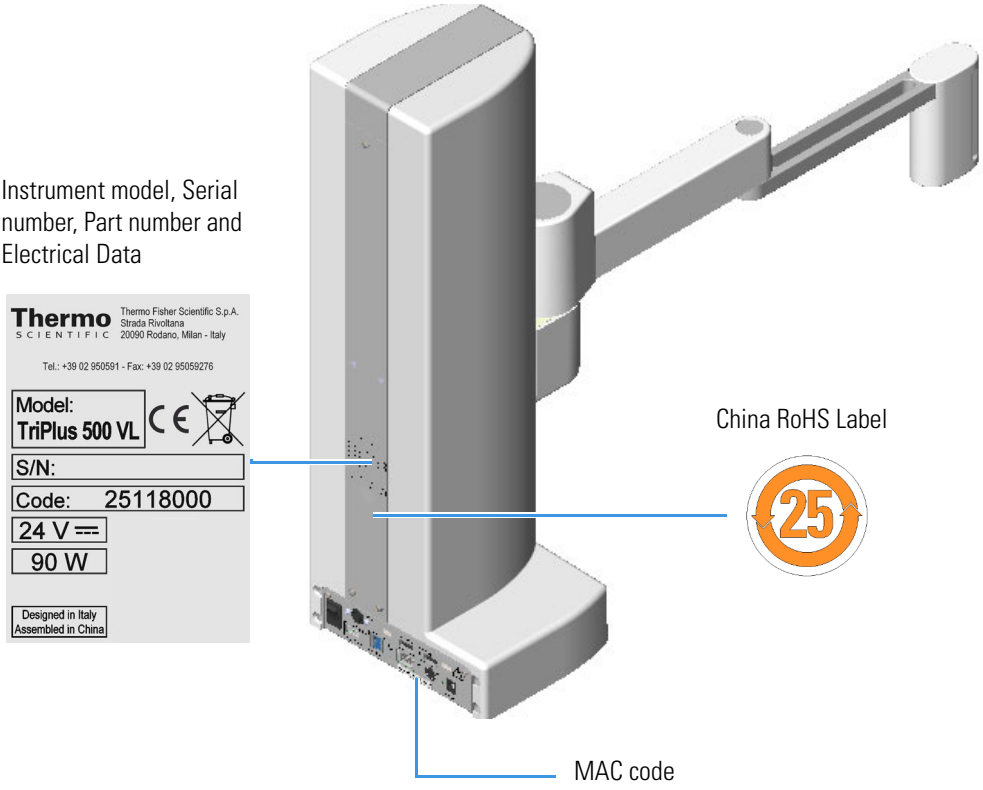
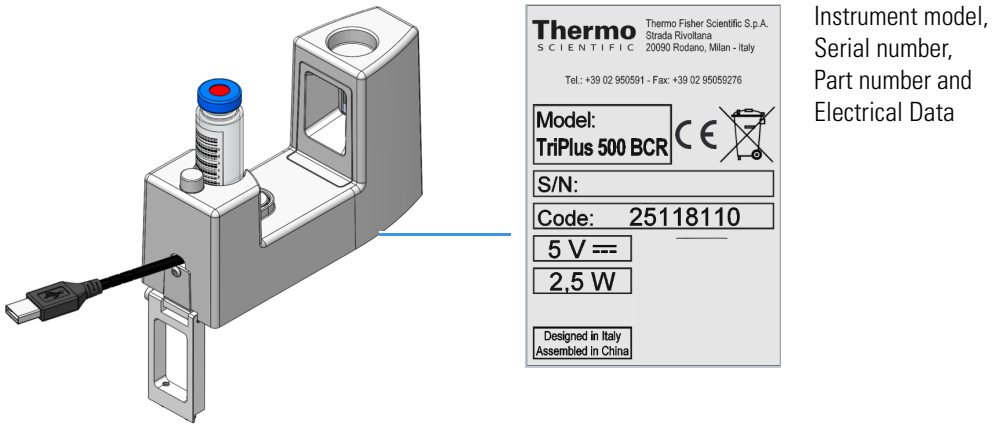


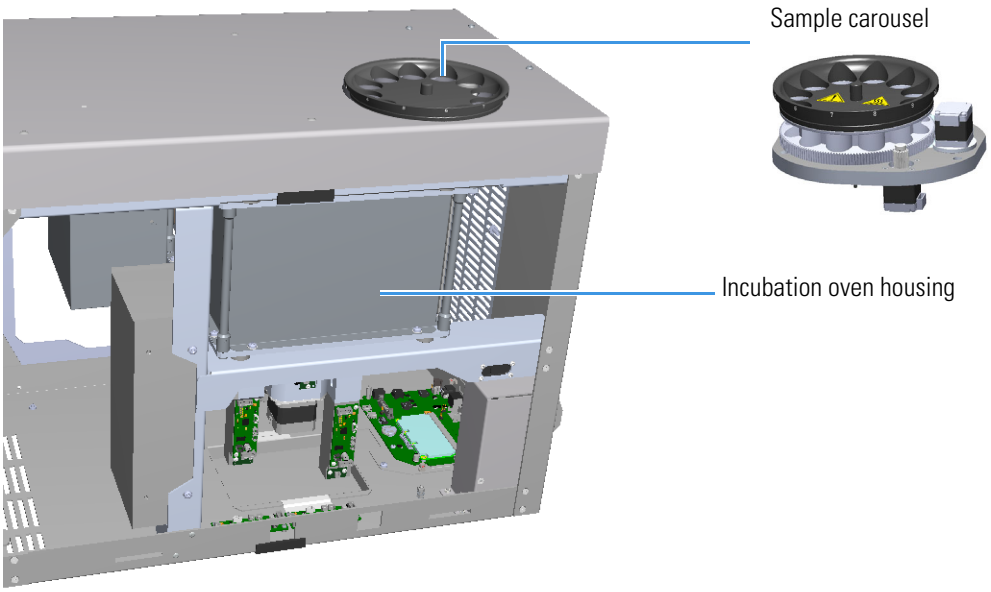
Figure 6. Label location on the Barcode Reader



Incubation Group

The Incubation Group includes the **Sample Carousel** and the **Incubation Oven**. See Figure 7.

Figure 7. Incubation Group



Sample Vial Carousel

The sample vial carousel consists of a **12-seat** rotating carousel, numbered from **1** to **12**, for the vial housing.

The carousel includes a mechanism for the automatic introduction and extraction of a vial into and from the **incubation oven** through the **incubation door**.

The incubation door has two positions: **Open** and **Closed**.

- **Open** — The door is open during the vial introduction and extraction into and from the incubation oven.
- **Closed** — The door normally remains in this position except when a vial is introduced or extracted from the oven.

Incubation Oven

The incubation oven consists of a heated box including a **12-seat** rotating oven carousel.

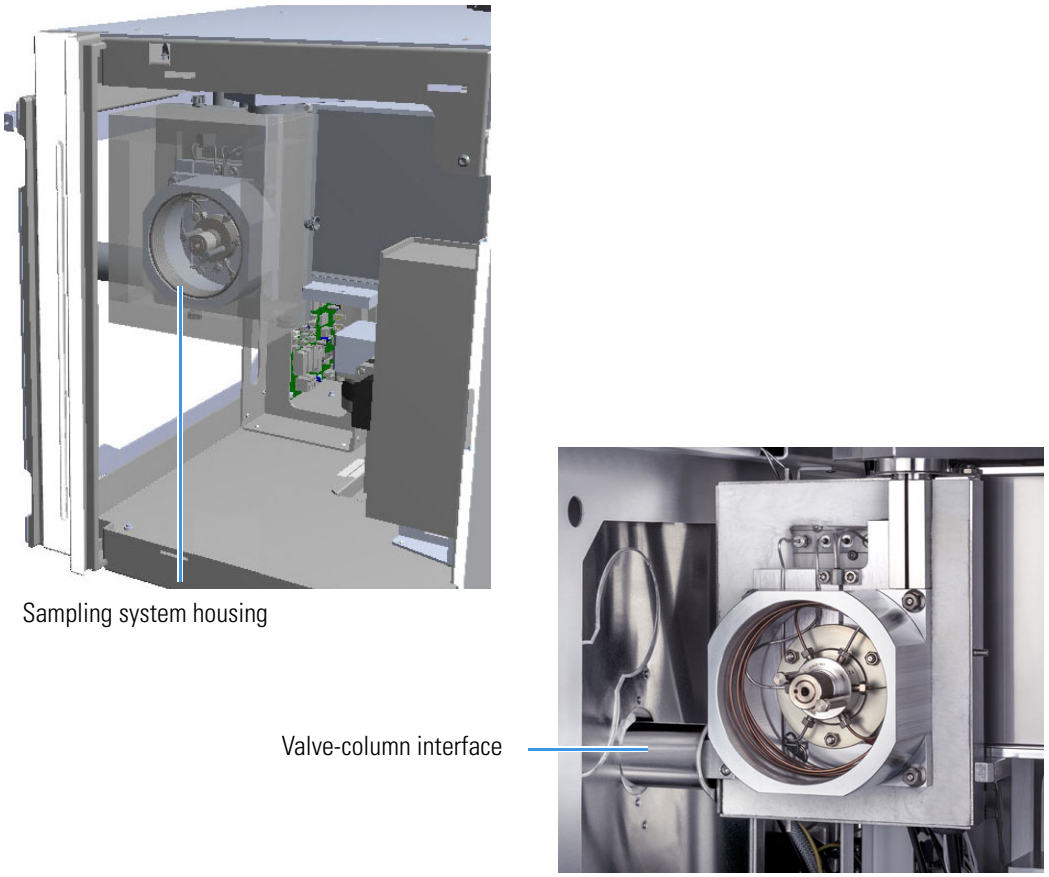
The vials are accurately thermostatted up to 300 °C and a fan provides a constant and uniform temperature. The vials are automatically inserted into the oven carousel from the sample vial carousel and can be shaken during the equilibration phase through the movements of the carousel.

Two motor-driven levers lift the vials out of the incubation carousel for sampling when they are placed in correspondence with the sampling needle, or for their recovery when they are placed under the inlet/outlet hole of the incubation oven.

Sampling Path

The sampling path consists of an electrically actuated 6-port sampling valve equipped with a deactivated stainless steel sample loop, a sampling needle, and the valve-column interface. The valve assembly ends with a deactivated splitter, placed inside an insulating metal box, for the connection to the analytical column into the oven of the GC. See Figure 8.

Figure 8. Sampling System



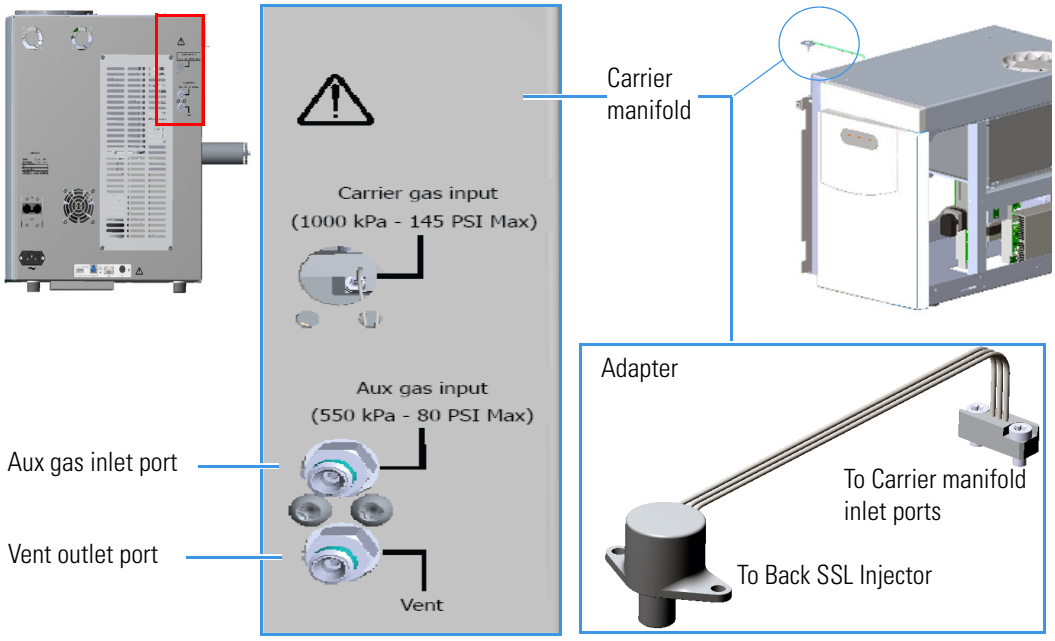
The sampling valve group is protected by a thermally insulated metal box. The valve is heated up to 225 °C with the standard factory-installed valve. An optional high temperature valve is available to heat the valve in range from 150 °C up to 300 °C. A wide range of sample loops allows injection of different volumes of samples. The sample loop is installed between ports **3** and **6** of the sampling valve.

The standard volume of the loop is **1.0 mL**. The following optional sample loops are available: 25 µL, 50 µL, 100 µL, 500 µL, and 3 mL.

Pneumatic Connections

The pneumatic interface includes the inlet and outlet ports for the connections to the sampling path and the external devices. See Figure 9.

Figure 9. Pneumatic Interface



The pneumatic interface includes:

- A manifold for connecting the carrier gas coming from the Back SSL injector module on the GC through a dedicated adapter.

  Note See Chapter 2, "Installing the TriPlus 500 HS," on page 13 for installing and connecting the adapter between the Back SSL injector module on the GC and the TriPlus 500 HS.

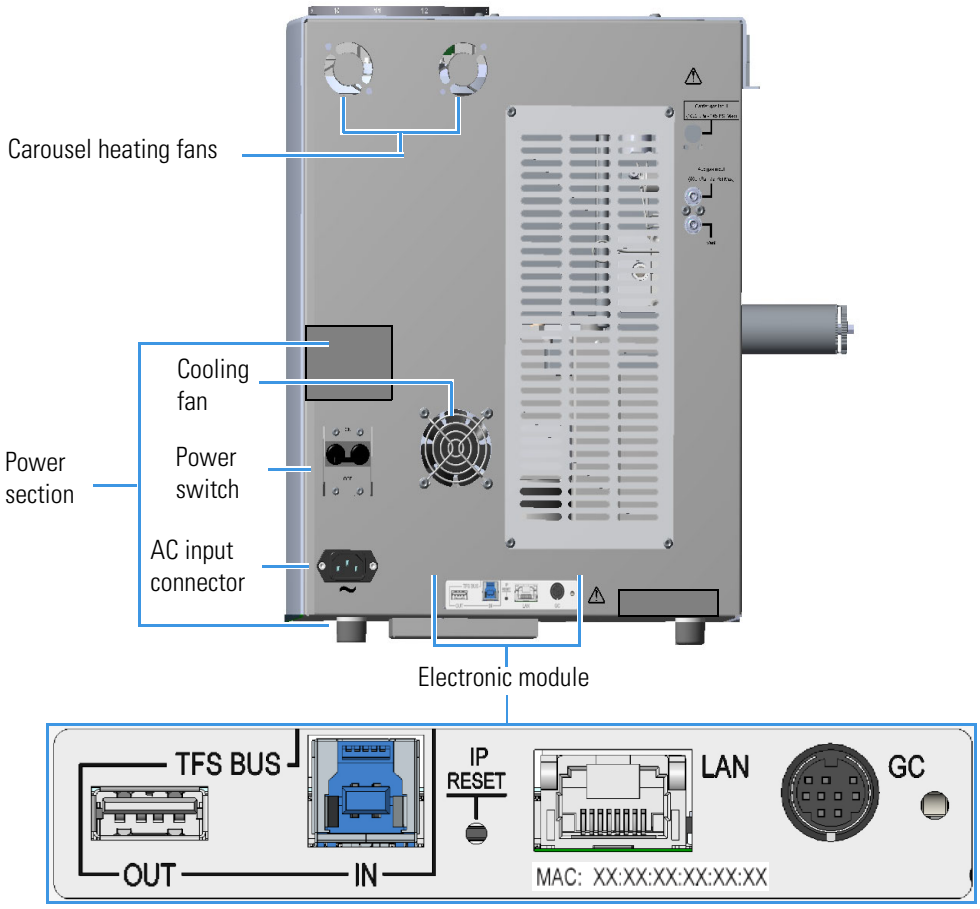
- An inlet port marked **Aux gas input** (**550 kPa - 80 PSI Max**) for connecting the auxiliary gas supply from the cylinder.
- An outlet port marked **Vent** for connecting the HS sampler to an exhaust device.

  Note **Carrier gas input** connection will be used for future applications.

Electrical Connections

The electrical interface includes the **power section** and the **electronic module** to make electrical and communication connections among the HS sampler and the external devices. See Figure 10.

Figure 10. Electrical Interface



The power section includes:

- The Power Switch marked **Power** to turn the instrument On/Off.
  - Position ON = instrument powered On
  - Position OFF = instrument powered Off
- AC Input connector (Main socket) for connecting the power cable to the HS sampler and the wall outlet.

  The power rating is: 100-240 Vac, 50/60 Hz; 600 W

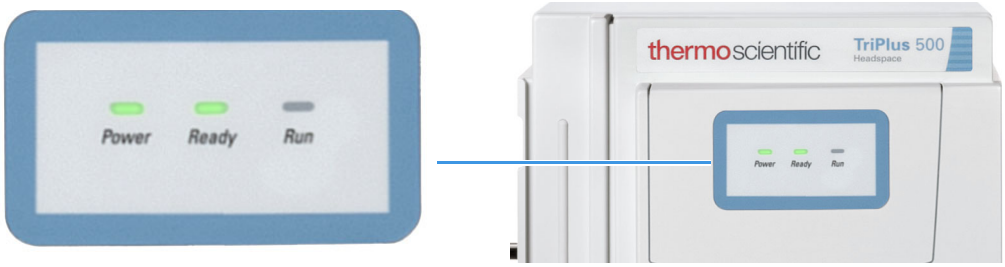
The TriPlus 500 HS electronic module includes:

- Two ports marked **TFS BUS (IN)** and **TFS BUS (OUT)** for the interconnection with the units of the TriPlus 500 HS such as the Vial Loader.
- A RJ45 connector marked **LAN** for connecting to the network.
- A button marked **IP Reset** for resetting the IP address.
- Press the **IP Reset** button for more than 0.5 seconds to reset the Web server credentials to the default settings. A single beep will be audible.
- Press the **IP Reset** button for more than 4 seconds to reset the network configuration to the default settings. Three beeps will be audible.
- A 9-pin connector marked **GC** to synchronize the HS sampler with the GC (Ready In/Out and Start In/Out signals). See the **Autosampler** connector on the back of the TRACE 1300 Series GC.

Status Panel

The Status Panel consists of three light emitting diodes (LED), on the front door of the TriPlus 500 HS, showing the instrument's current status. See Figure 11.

Figure 11. Status Panel



The three LEDs are:

- **Power** — When the LED lights are **green**, the HS sampler is powered on.
- **Ready** — When the LED lights are **green**, the HS sampler is in **Ready** condition. When the LED blinks **orange** the HS sampler is in **Not Ready** condition.
- **Run** — When the LED lights are **blue**, the HS sampler is running an analysis.

2

Installing the TriPlus 500 HS

This chapter provides instructions for installing and coupling a TriPlus 500 HS to a TRACE 1300/1600 Series GC.

Contents

- Preliminary Information
- TriPlus 500 HS Installation Compatibility with Autosamplers for Liquids
- Who Performs the Installation
- Coupling a TriPlus 500 HS to a TRACE 1300/1600 Series GC
- Making the Gas Supply Plumbing Connections
- Making Electrical Connections
- Configuring LAN Communication
- Connecting the Analytical Column
- Performing the Leak Test
- Instrument Start-up

Preliminary Information

This section provides preliminary information before installing and connecting the TriPlus 500 HS and electrical requirements.

TriPlus 500 HS Installation Compatibility with Autosamplers for Liquids

Table 1. TriPlus 500 HS Compatibility with Autosamplers for Liquids

Instrument	AI 1610	AS 1610	TriPlus RSH/100 LS
TriPlus 500 HS 12-vial	✓	✓	✓
TriPlus 500 HS 120-vial	✓	✓*	X
TriPlus 500 HS 240-vial	✓	X	X

* This configuration requires the GC tray holder to be installed and cannot be operated with the HS tray holder.

Instrument Configurations

- AI 1610 and TriPlus 500 HS 12-vial
  - AI 1610: P/N 25117580
  - TriPlus 500 HS: P/N 25118100
- AI 1610 and TriPlus 500 HS 120-vial
  - AI 1610: P/N 25117580
  - TriPlus 500 HS: P/N 25118100 and 25118000
- AI 1610 and TriPlus 500 HS 240-vial
  - AI 1610: P/N 25117580
  - TriPlus 500 HS: P/N(s) 25118100, 25118000, and 25118200
- AS 1610 and TriPlus 500 HS 12-vial
  - AS 1610: P/N 25117590
  - TriPlus 500 HS: P/N 25118100
- AS 1610 and TriPlus 500 HS 120-vial
  - AS 1610: P/N 25117590
  - TriPlus 500 HS: P/N 25118100, 25118000, and 25118200

Who Performs the Installation

Your TriPlus 500 HS will be installed by an authorized and trained Thermo Fisher Scientific Field Service Engineer (FSE), who will verify the instrument operation.

If, for any reason, your system is not installed by a Thermo Fisher Scientific FSE, you should ensure that the following operations are performed.

Use the **Standard Outfit** checklist accompanying the instrument to verify that all items have been received.

Verify Site Preparation

Before installing a TriPlus 500 HS, your laboratory must be in accordance with the guidelines and requirements described in the *TriPlus 500 Headspace Sampler Preinstallation Requirements Guide*.

Unpacking the TriPlus 500 HS

CAUTION This operation must be carried out by a Thermo Fisher Scientific Field Service Engineer (FSE).

ATTENTION Cette opération doit être effectuée par un ingénieur de maintenance sur site (FSE) de Thermo Fisher Scientific.

After inspecting the exterior of the shipping container for damage, carefully unpack the instrument and do the following:

Check the contents of each box against the packing list to verify the shipment is complete, then inspect each item for damage.

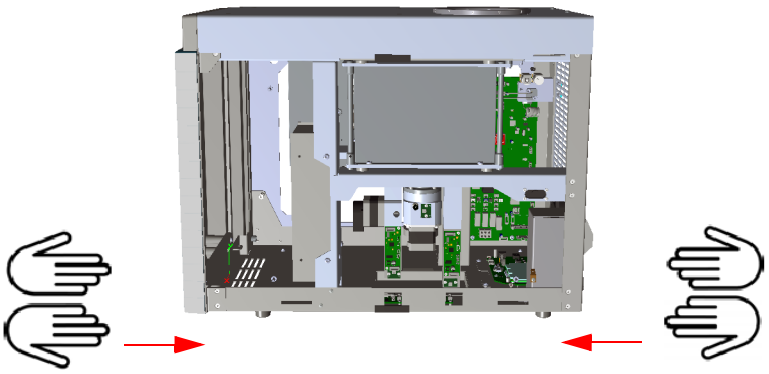
If equipment is damaged, keep the box and its equipment in its existing condition and immediately notify the carrier. Submit a damage claim directly to the carrier, and send a copy (including any shortage claim) to your authorized Thermo Fisher Scientific sales representative.

Do not return any equipment to the dealer or the factory without prior Thermo Fisher Scientific authorization.

Placing the TriPlus 500 HS

Place the TriPlus 500 HS on the workbench allowing free access to electrical connections and gas lines.

LIFTING HAZARD The TriPlus 500 HS weighs approximately 24.5 kg (54 lb) when unpacked. Pay attention when lifting the instrument onto the workbench. At least TWO people should perform this operation, each standing on front/back side of the instrument and putting their hands near its supporting feet.



You should already have prepared your laboratory according to the space requirements specified in the *TriPlus 500 Headspace Sampler Preinstallation Requirements Guide*. The gas and power supplies should have been made accessible. Optional equipment should be placed near the HS sampler to be easily connected.

Coupling a TriPlus 500 HS to a TRACE 1300/1600 Series GC

This section provides instructions to couple a TriPlus 500 HS to a TRACE 1300/1600 Series GC.

The operation requires the following steps:

- Shutting down the TRACE 1300/1600 Series GC
  See "Shutting Down a TRACE 1300/1600 Series GC" on page 17.
- Removing the GC right side panel
  See "Removing the GC Right Side Panel" on page 18.
- Installing the side panel shield
  See "Installing the Side Panel Shield" on page 21.
- Removing the partial cut plate of pre-shaped duct from the right wall of the oven
  See "Removing the Partial Cut Plates from the Right Wall of the GC Oven" on page 19.
- Coupling TriPlus 500 HS to the GC
  See "Coupling the TriPlus 500 HS to the TRACE 1300/1600 Series GC" on page 22.
- Installing the adapter gas tubing block on the Back SSL injector
  See "Installing the Adapter Gas Tubing Block on the Back SSL Injector" on page 30.

Shutting Down a TRACE 1300/1600 Series GC

❖ **To shut down the GC**

1. Put the GC in standby condition.
2. Cool the oven, injectors and detectors to room temperature.

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

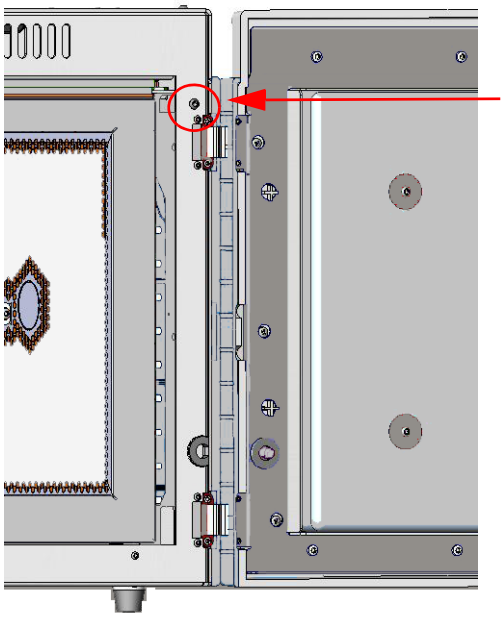
3. Power off the GC.
   a. Push down the power switch (breaker), located at the back of the instrument, to the position **O**.
   b. Unplug the power cable from the AC Input connector into the back of the GC and from the wall outlet.
4. If external modules are present, unplug the power cable from the AC Input connector of each external module, and from the wall outlet.

Removing the GC Right Side Panel

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

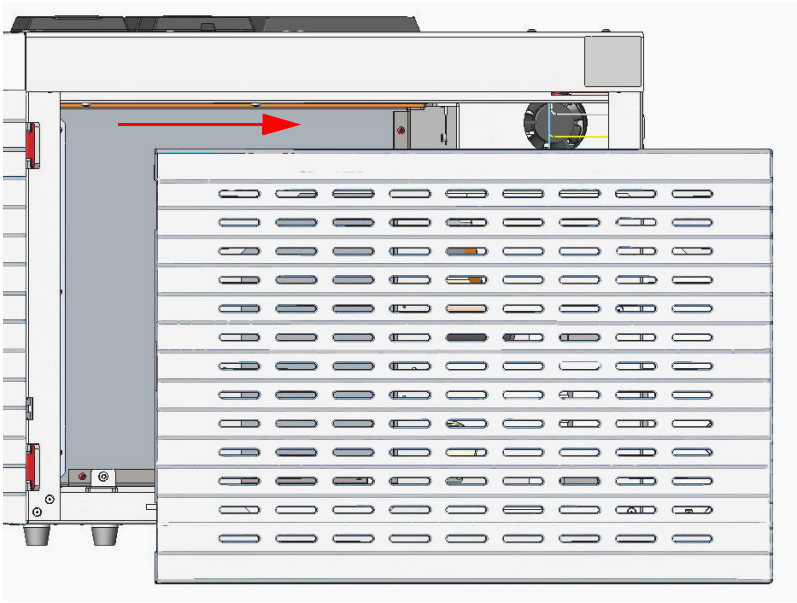
1. Remove the right panel.
   a. Open the front door of the GC. Using a T20 Torx head screwdriver, unscrew the right side panel screw from the interior front panel. Save the screw as it will be needed later. See Figure 12.

Figure 12. Right Side Panel Fixing Screw



   b. Slide the panel towards the back of the instrument up to the stop.
   c. Remove the panel pulling it outwards being aware that the ground wire is attached to the panel. See Figure 13.

Figure 13. Right Side Panel Removal



d. Unplug the ground wire from the panel.

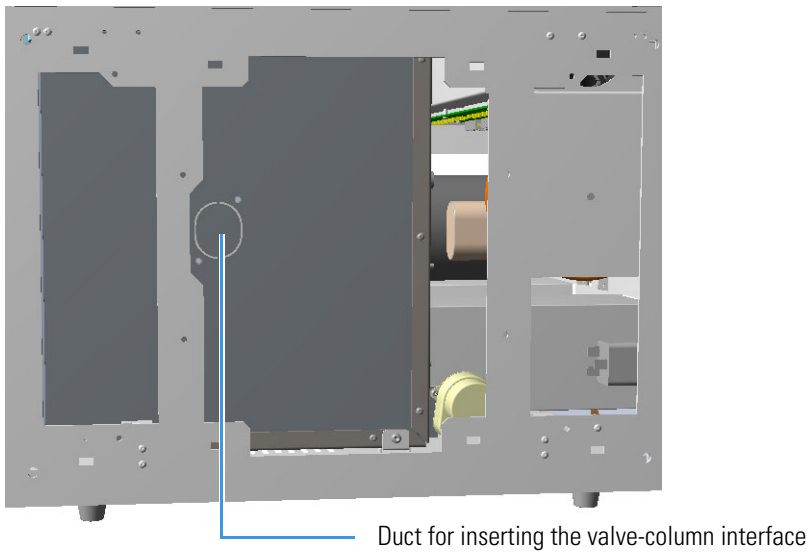
> **Note** The right panel will be mounted on the right side of TriPlus 500 HS Pay attention to the positioning of the ground wire plug.

Removing the Partial Cut Plates from the Right Wall of the GC Oven

❖ **To remove the partial cut plates from the right wall of the GC oven**

1. On the exterior wall of the oven box, remove the partial cut plate and pre-shaped plug of insulating material from the duct provided. See Figure 14.

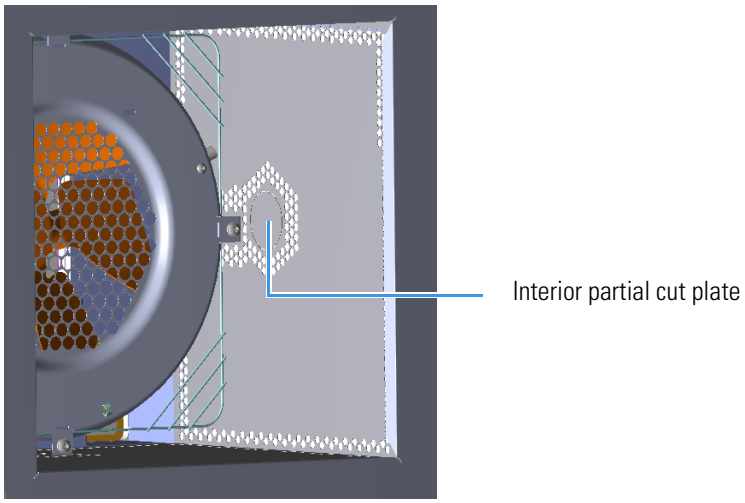
Figure 14. Pre-shaped Plug Removal



IMPORTANT Save the pre-shaped plug of insulating material in a safe place because it could be reused.

2. On the interior of the oven box remove the partial cut plate from the corresponding duct. See Figure 15.

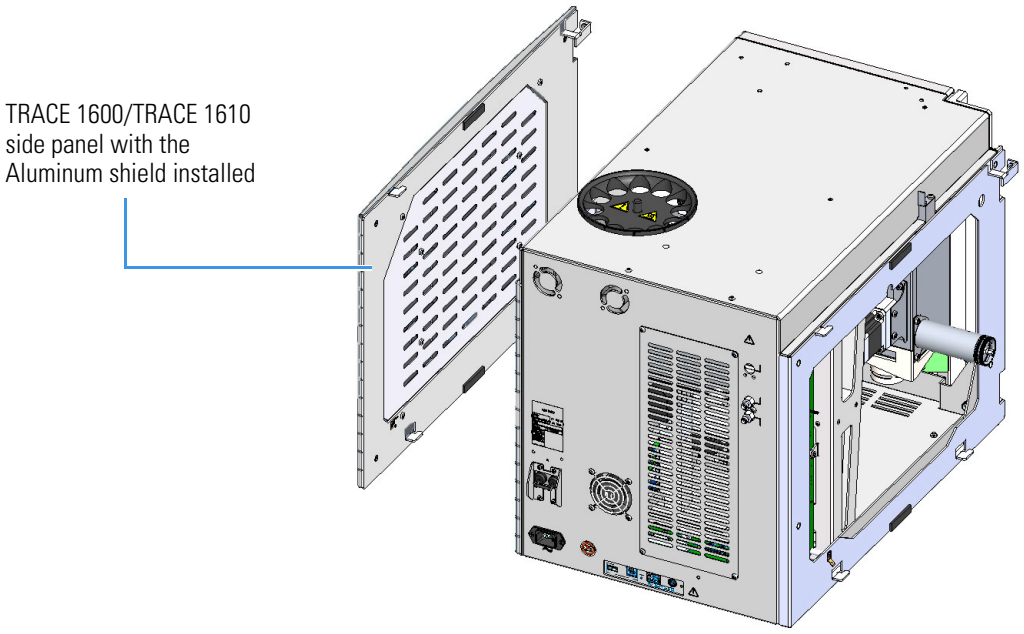
Figure 15. Interior Duct for the Coupling with TriPlus 500 HS



Installing the Side Panel Shield

❖ **To install the TRACE 1300/1600 Series GC right side panel and shield on the TriPlus 500 HS**

Figure 16. Side Panel Installation



1. Remove the right-hand side panel from the TRACE 1300/1600 Series GC. Refer to your TRACE Series GC Hardware Manual for more information about removing the right-hand side panel.

CAUTION The Aluminum shield must be installed in the TRACE 1300/1600 Series GC right-hand side panel prior to installation on a TriPlus 500 HS.

ATTENTION Le blindage en aluminium doit être installé dans le panneau latéral droit TRACE 1300 / 1600 avant son installation sur un TriPlus 500 HS.

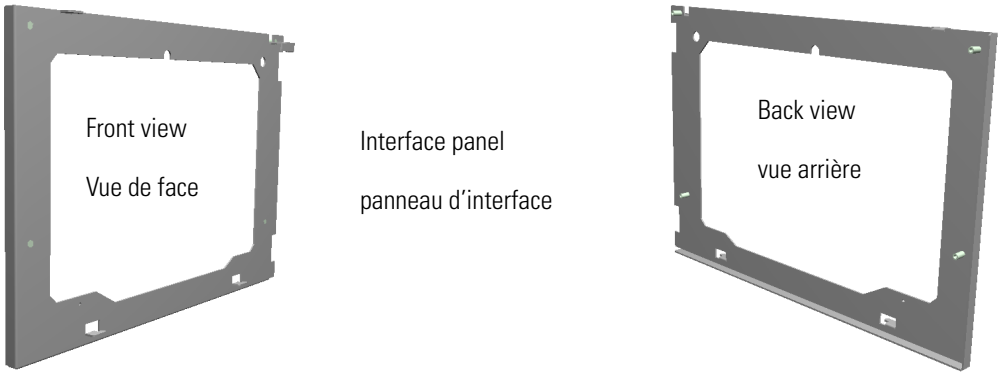
2. Remove the Aluminum shield and four screws from the TriPlus 500 HS standard outfit.
3. Insert the Aluminum shield into the GC right-hand side panel and tighten with the four screws from the TriPlus 500 HS standard outfit.
4. Remove the interface panel from the right-hand side of the TriPlus 500 HS.
5. Attach the GC right-hand side panel to the TriPlus 500 HS.

Coupling the TriPlus 500 HS to the TRACE 1300/1600 Series GC

❖ To couple the TriPlus 500 HS to the TRACE 1300/1600 Series GC

CAUTION Before coupling the two instruments, it is necessary to remove the interface panel from the right hand side of TriPlus 500 HS and mount it on the right hand side of the TRACE 1300/1600 Series GC.

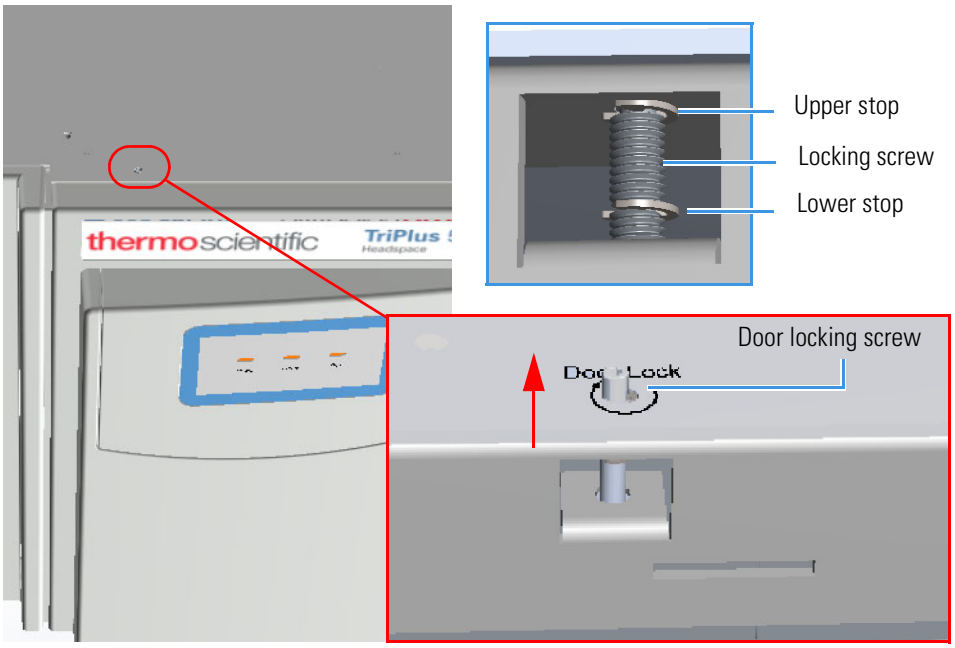
ATTENTION Avant de coupler les deux instruments, il est nécessaire de retirer le panneau d'interface situé sur le côté droit du TriPlus 500 HS et de le monter sur le côté droit du TRACE GC, série 1300.



Complete the following steps:

1. Place the HS sampler on the right hand side of the TRACE 1300/1600 Series GC.
2. Remove the front door of the HS sampler.
   a. From the top cover unscrew the front door locking screw until it protrudes the top cover up to reach the upper stop. See Figure 17.

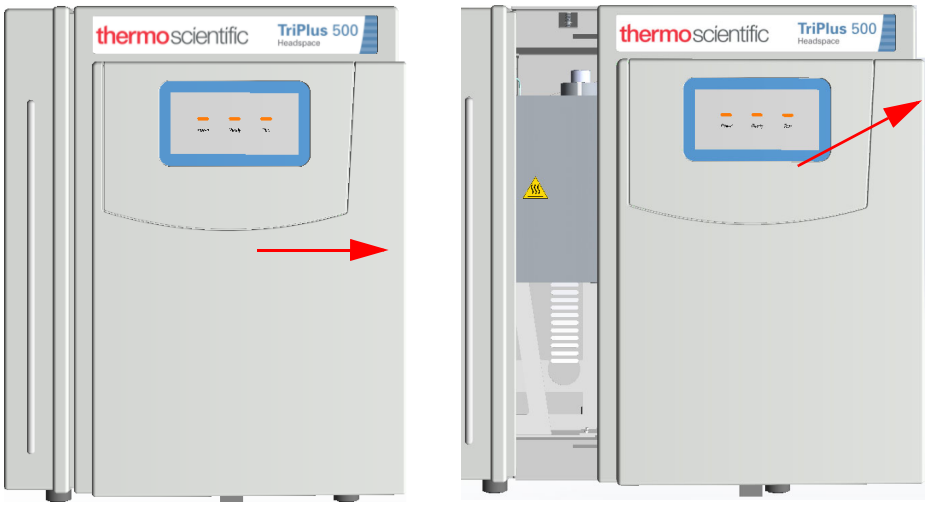
Figure 17. Front Door Removal (1)



b. Slide the front door towards the right of the instrument up to unhook it being aware that the Status Panel cable is attached to the panel.

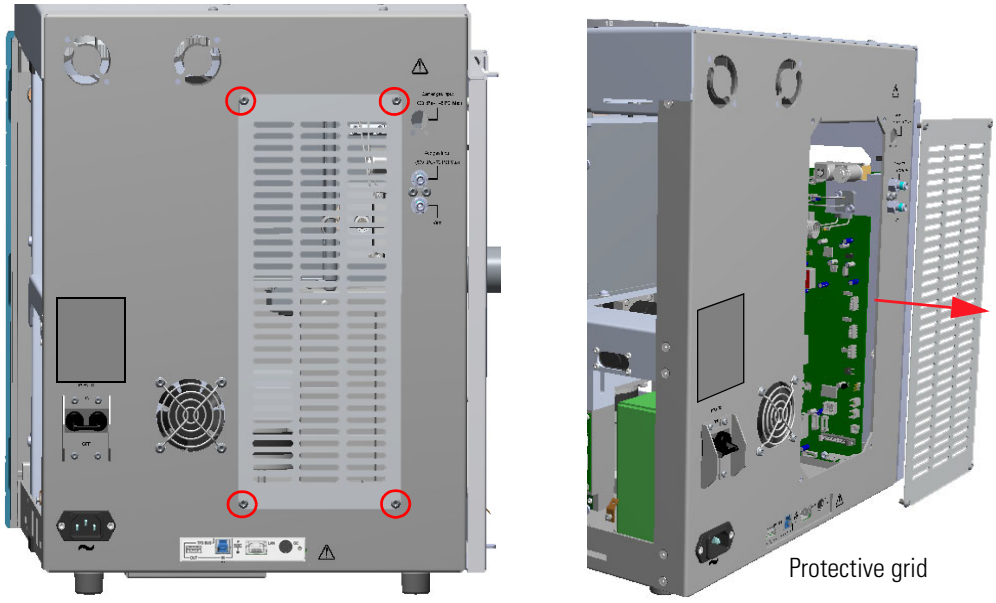
c. Disconnect the Status Panel cable, then remove the front door by pulling it away from the chassis. See Figure 18.

Figure 18. Front Door Removal (2)



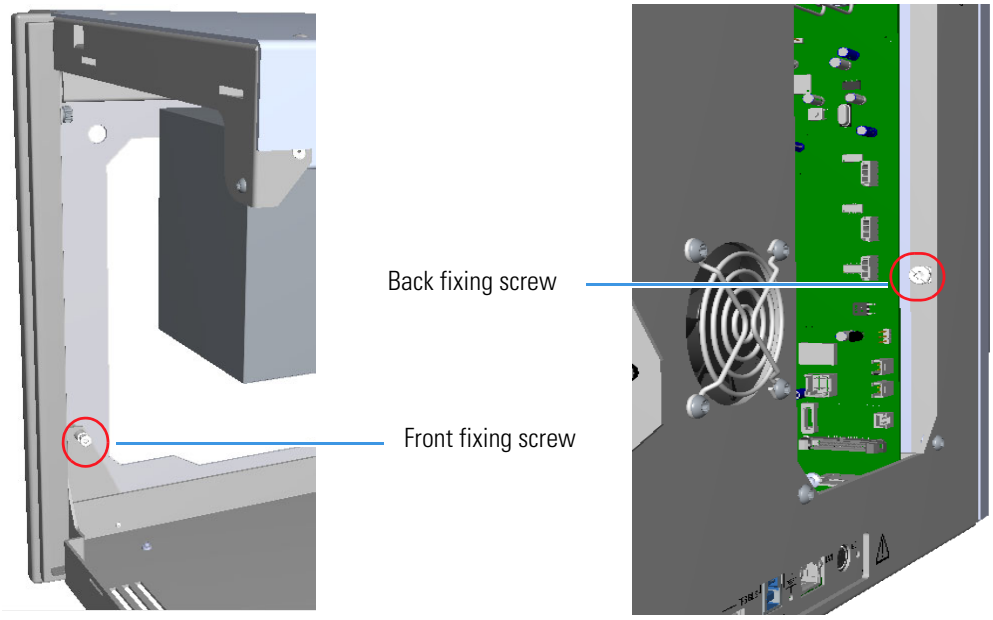
3. On the back panel of the HS sampler remove the protective grid unscrewing the four fixing screws. See the red circles in Figure 19.

Figure 19. GC-TriPlus 500 HS Coupling (1)



4. Manually remove the front and back internal screws that fix the interface panel to the left wall of the HS sampler. See the red circles in Figure 20. The screws will be reused later.

Figure 20. GC-TriPlus 500 HS Coupling (2)



5. Remove the interface panel and hook it on the right side of the TRACE 1300/1600 Series GC instead of the right panel that was previously removed. See Figure 21 and Figure 22.

Figure 21. GC-TriPlus 500 HS Coupling (3)

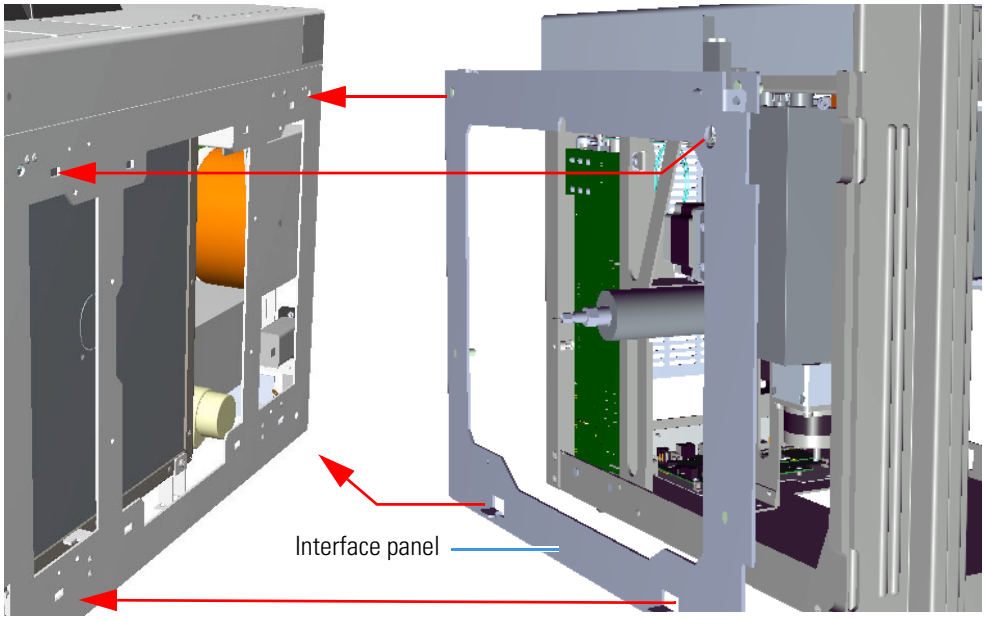
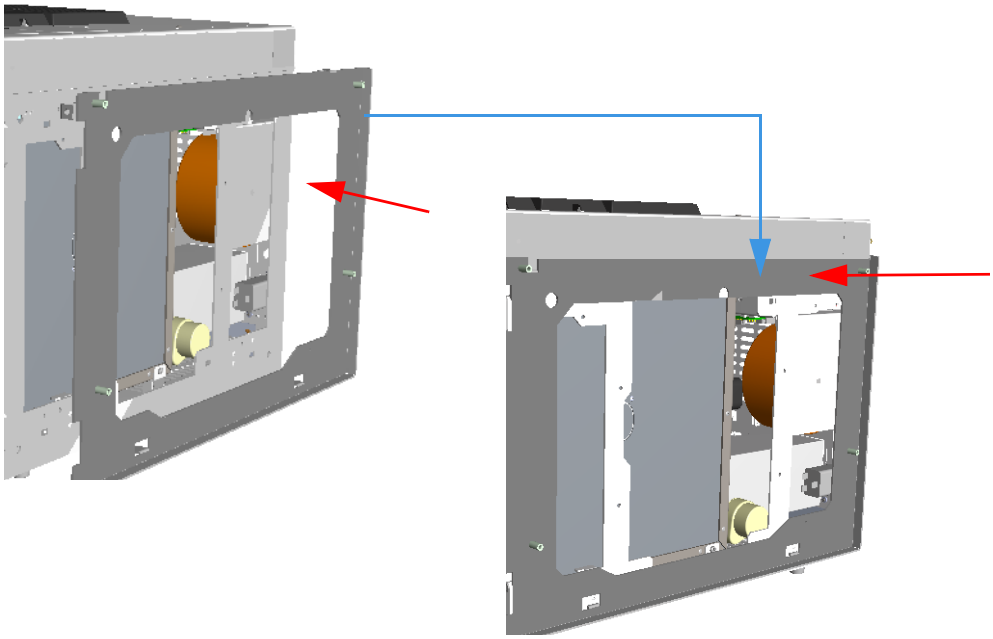
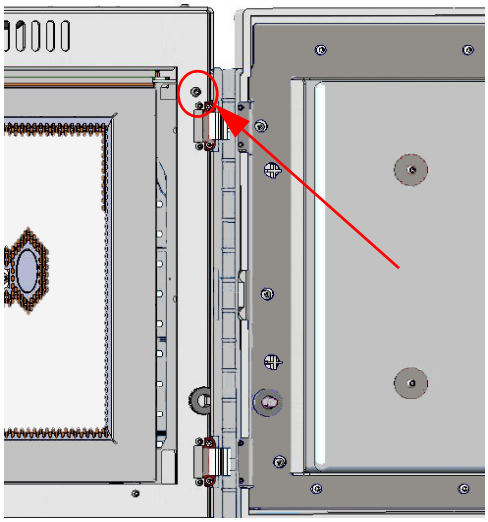


Figure 22. GC-TriPlus 500 HS Coupling (4)



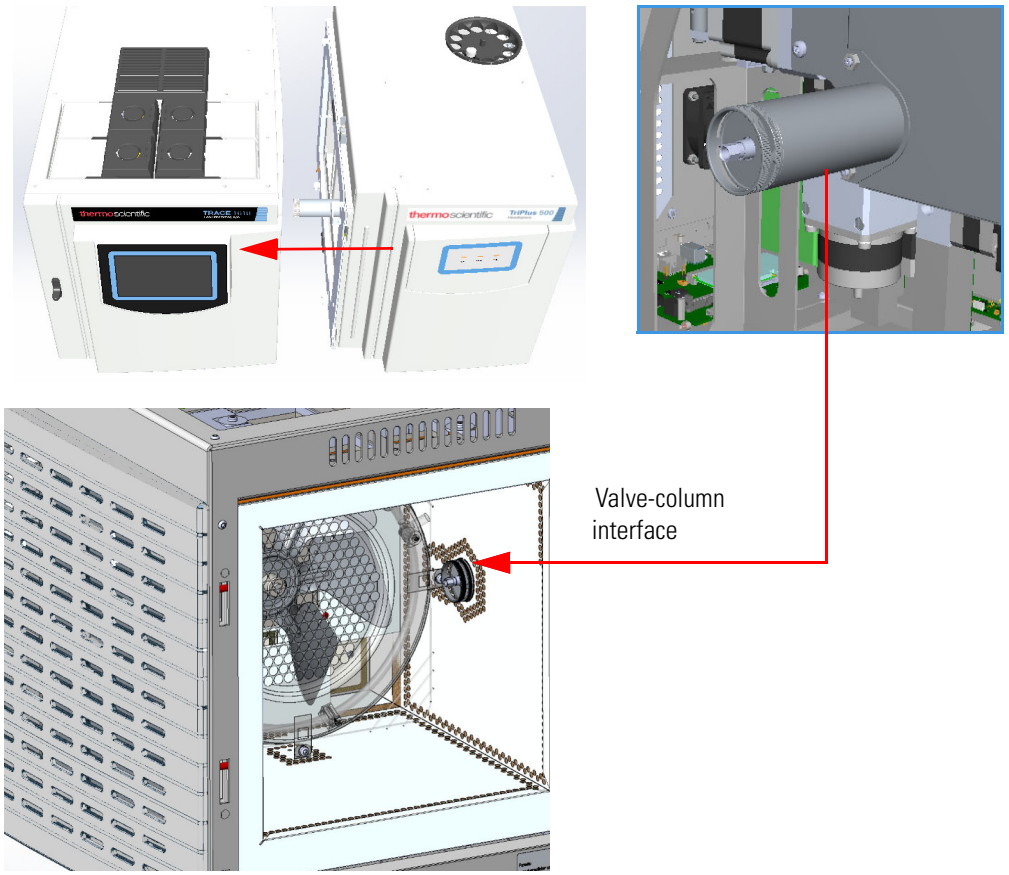
6. Connect to the interface panel the ground wire previously disconnected from the right hand side of the GC.
7. Open the front door of the GC. Using a T20 Torx head screwdriver, fix the interface panel screwing the right side panel screw, which was previously removed, to the interior front panel. See the red circle in Figure 23.

Figure 23. GC-TriPlus 500 HS Coupling (5)



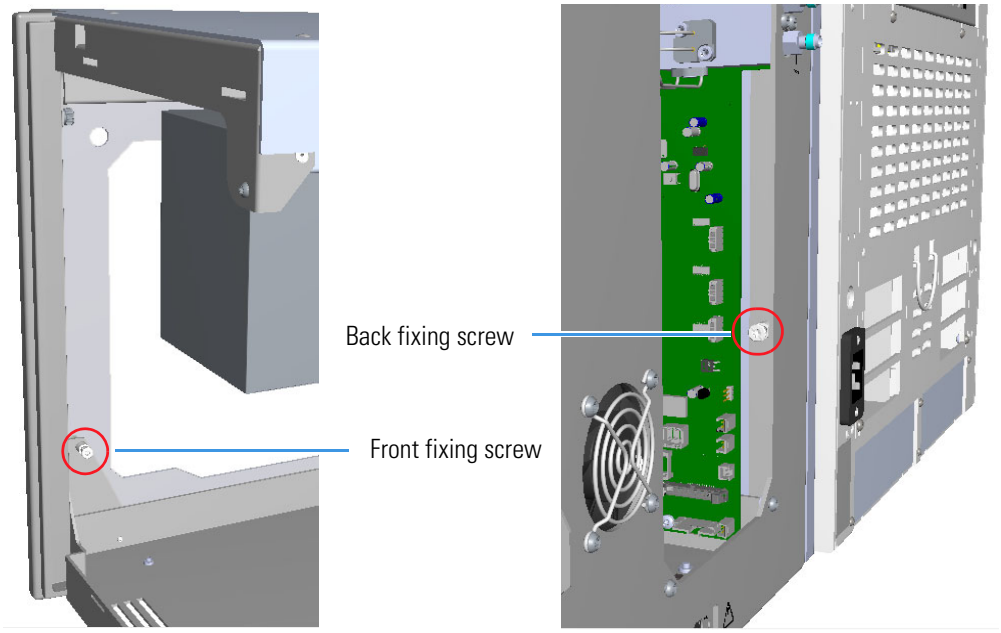
8. Place the HS sampler on the right hand side of the TRACE 1300/1600 Series GC.
9. Shift the HS sampler toward the GC to introduce the valve-column interface into the oven of the GC through the duct provided. See Figure 24.

Figure 24. GC-TriPlus 500 HS Coupling (6)



10. Fix the HS sampler to the interface panel by manually screwing the front and back internal screws previously removed and saved. See the red circles in Figure 25.

Figure 25. GC-TriPlus 500 HS Coupling (7)

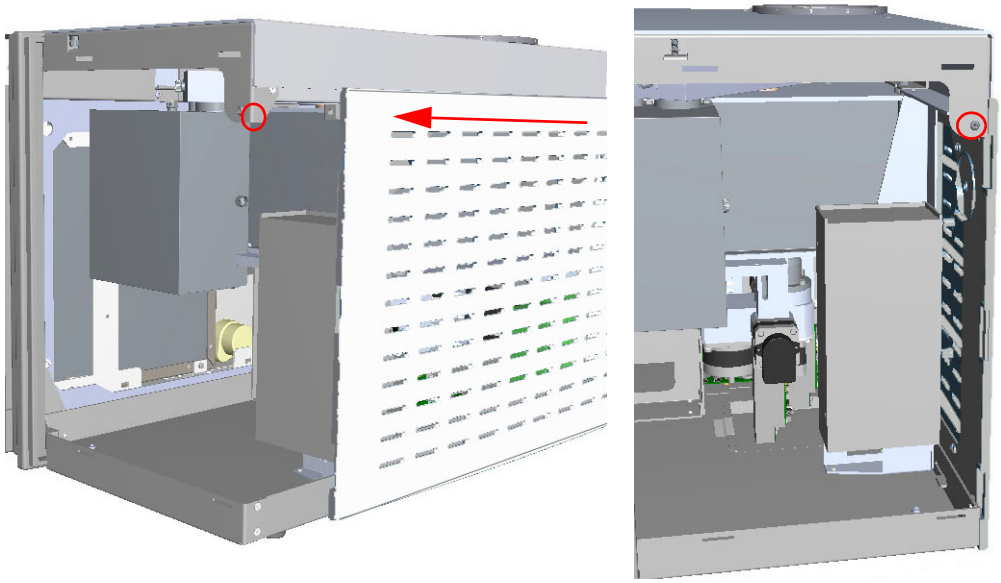


11. Reinstall the protective grid on the back panel of the HS sampler by screwing in the four fixing screws. See the red circles in Figure 26.

Figure 26. GC-TriPlus 500 HS Coupling (8)

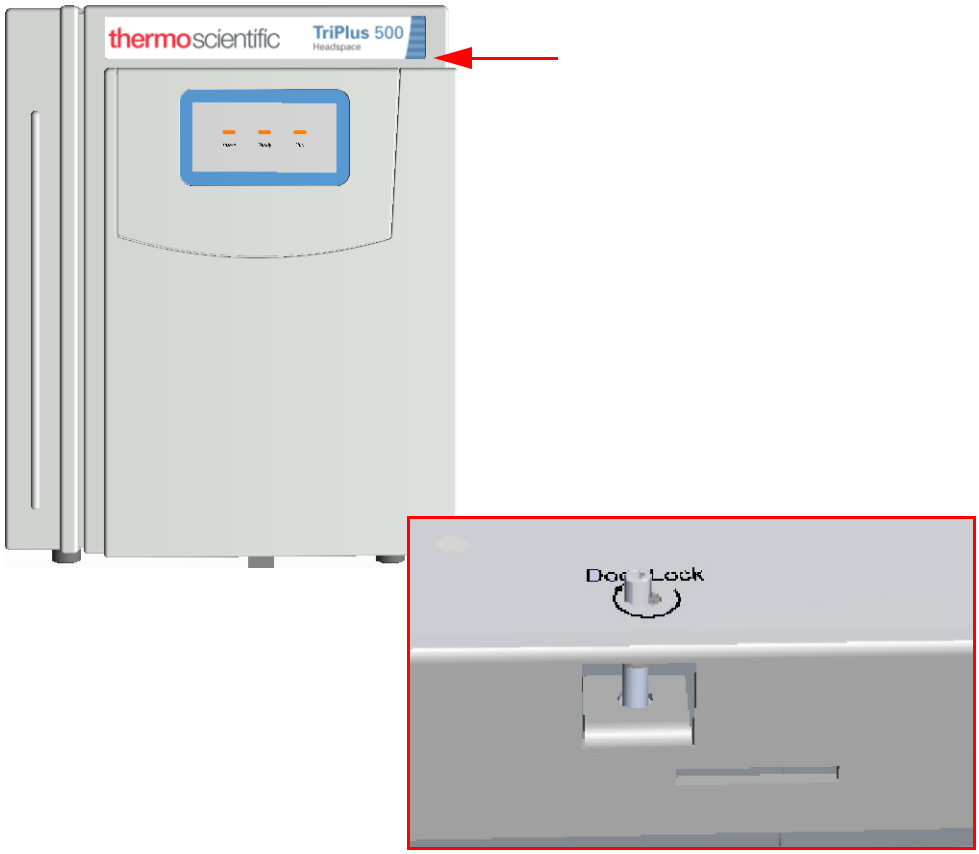
12. On the right hand side of the HS sampler install the right panel, previously removed from the GC, and fix it screwing the fixing screw on the front. See the red circles in Figure 27.

Figure 27. GC-TriPlus 500 HS Coupling (9)



13. Reinstall the front door of TriPlus 500 HS.
    a. Slide the front door towards the left of the instrument up to connect it paying attention to reconnect the Status Panel cable.
    b. Fix the front door screwing the door locking screw. See Figure 28.

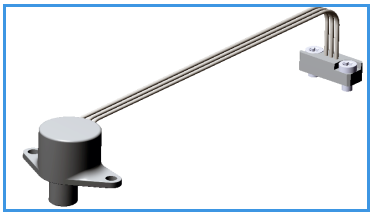
Figure 28. GC-TriPlus 500 HS Coupling (10)



Installing the Adapter Gas Tubing Block on the Back SSL Injector

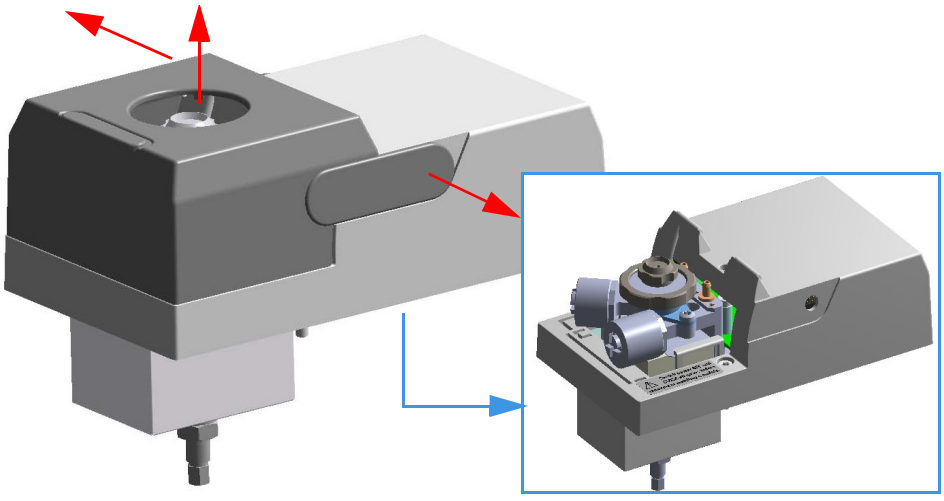
This operation supplies the TriPlus 500 HS with the carrier gas and the split flow coming from the Back SSL injector. Removing the SSL body assembly is required.

❖ To install the adapter gas tubing block on the Back SSL injector

Materials needed	
Adapter gas tubing block provided in the standard outfit	
T20 Torx head screwdriver	

1. Remove the Back SSL injector module from its seat on the TRACE 1300/1600 Series GC.
   a. Into the GC oven unscrew the capillary column retaining nut, then remove the analytical column with its ferrule from the bottom of the injector.
   b. Open the Back SSL injector module flap cover.
   c. Using a T20 Torx head screwdriver, unscrew the three captive fixing screws.
   d. Keeping the module flap cover open, lift up the module from its seat into the injector housing. Place the Back SSL injector module on a clean surface.
   e. Remove the module flap cover. See Figure 29.

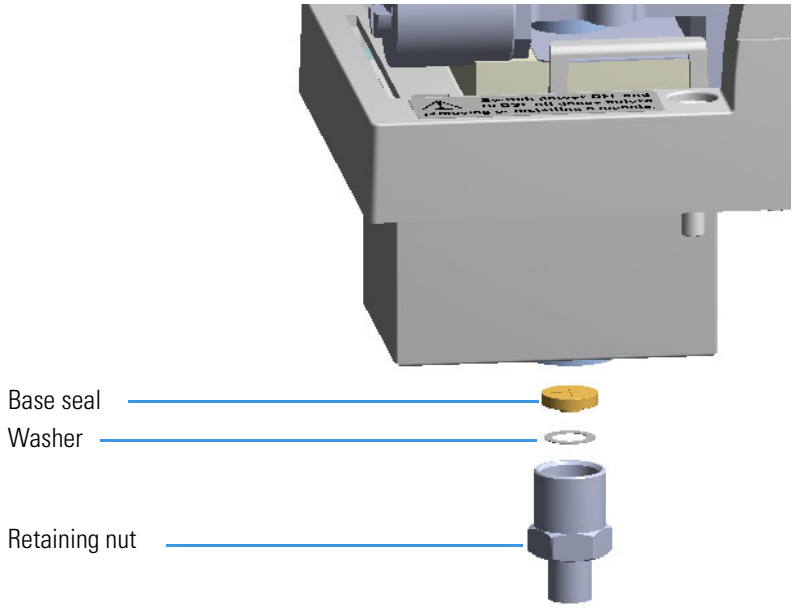
Figure 29. Module Flap Cover Removal



2. Remove the bottom parts of the injector.

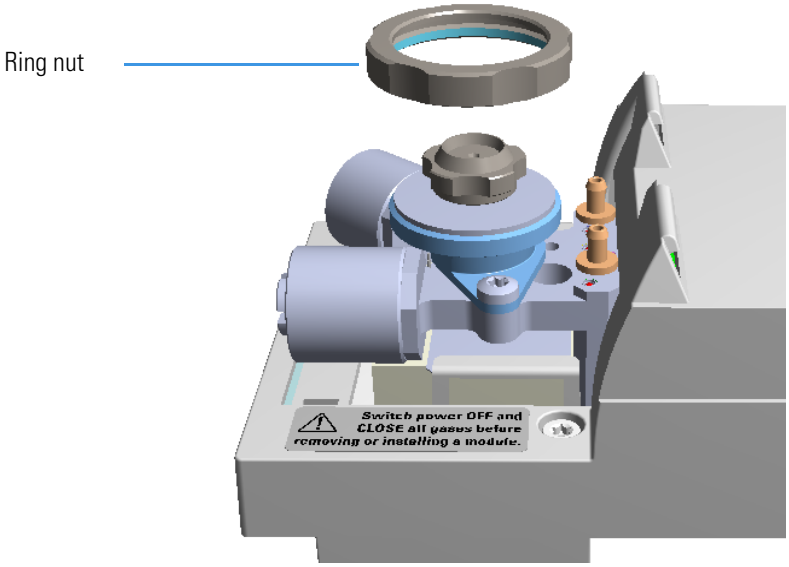
a. Unscrew the **retaining nut** with the **washer** and the b**ase seal** and store them in a safe place. See Figure 30.

Figure 30. Back SSL Injector Bottom Parts Removal



3. Remove the top parts of the injector and the injector body.
   a. Unscrew the ring nut and store it in a safe place. See Figure 31.

Figure 31. Back SSL Injector Top Parts Removal (1)

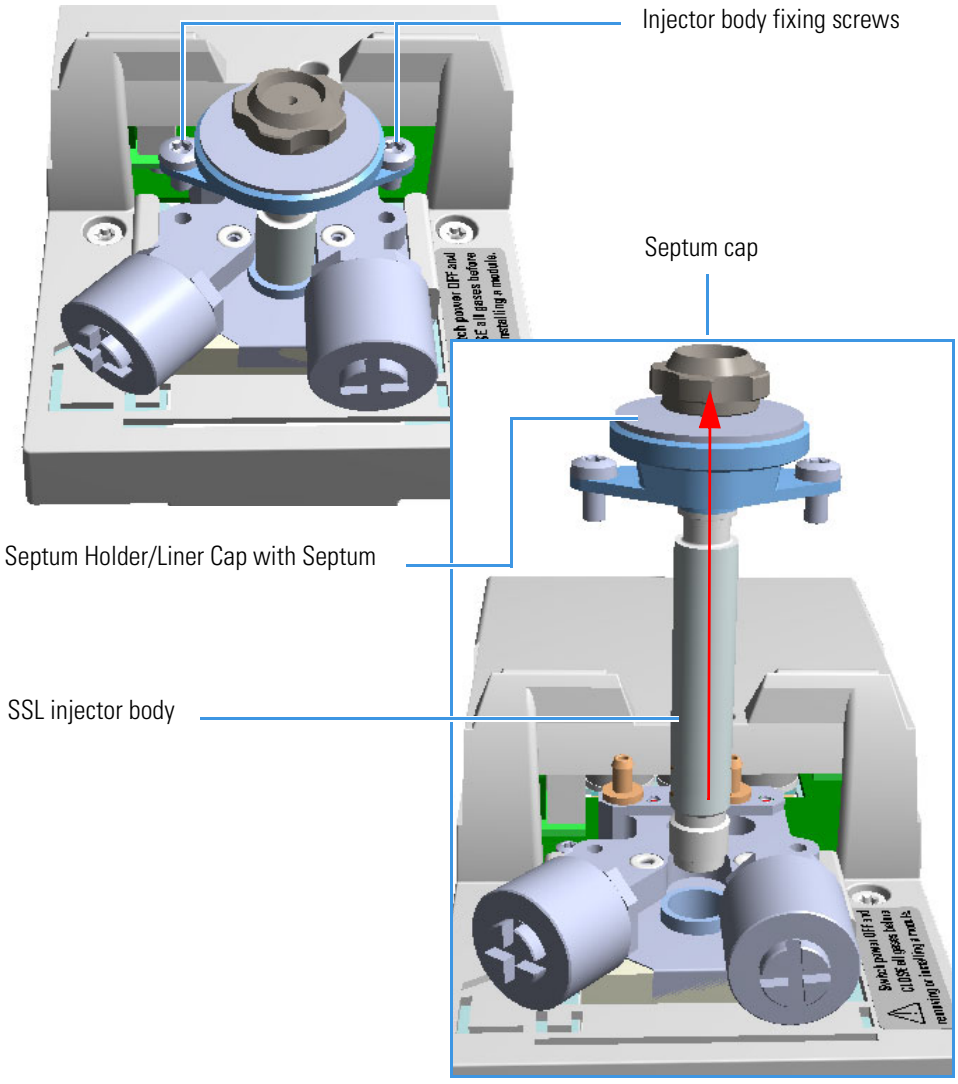


   b. Using a T20 Torx head screwdriver, loosen the two injector body fixing screws.

c. Extract the **septum cap**, the **septum holder/liner cap with septum** and the **injector body** containing the **liner** and relative **liner seal** as a whole group and store it in a safe place. See Figure 32.

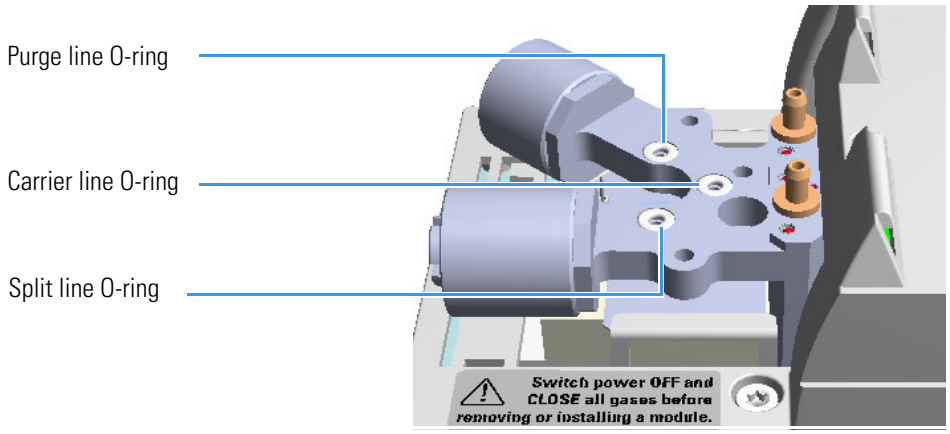
All the components removed will be reused to restore the SSL injector for liquid injection.

Figure 32. Back SSL Injector Top Parts Removal (2)



d. **Do not remove the carrier, split and purge lines O-rings**. See Figure 33.

Figure 33. Back SSL Injector Body Removal (3)



4. Install the adapter gas tubing block on the Back SSL injector module.

WARNING Ensure the purge, carrier, and split line O-rings are placed into their seats on the gas connections. See Figure 33.

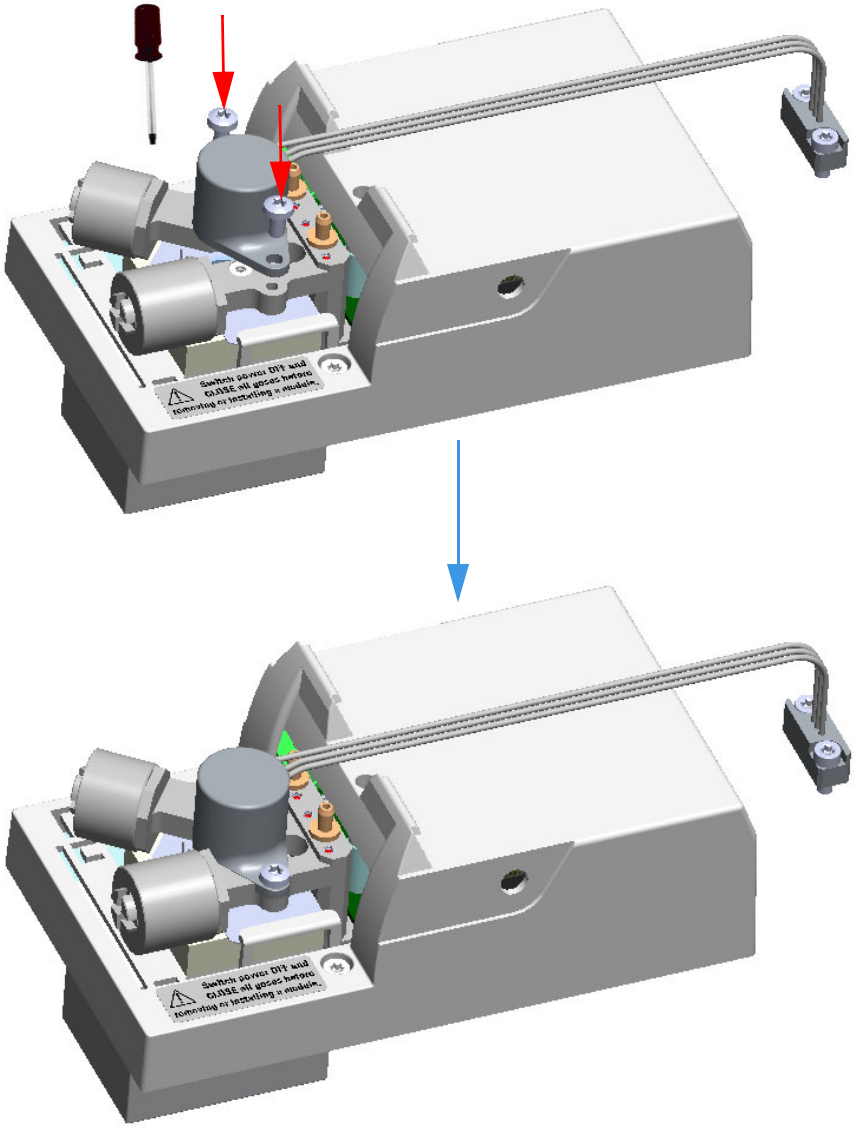
Do not install the adapter gas tubing block if O-rings are missing.

AVERTISSEMENT Assurez-vous que les joints toriques de purge, de porteur et de ligne à débit divisé sont placés dans leurs logements sur les connexions de gaz. Voir Figure 33.

N'installez pas le bloc de tuyaux de gaz de l'adaptateur si des joints toriques sont manquants.

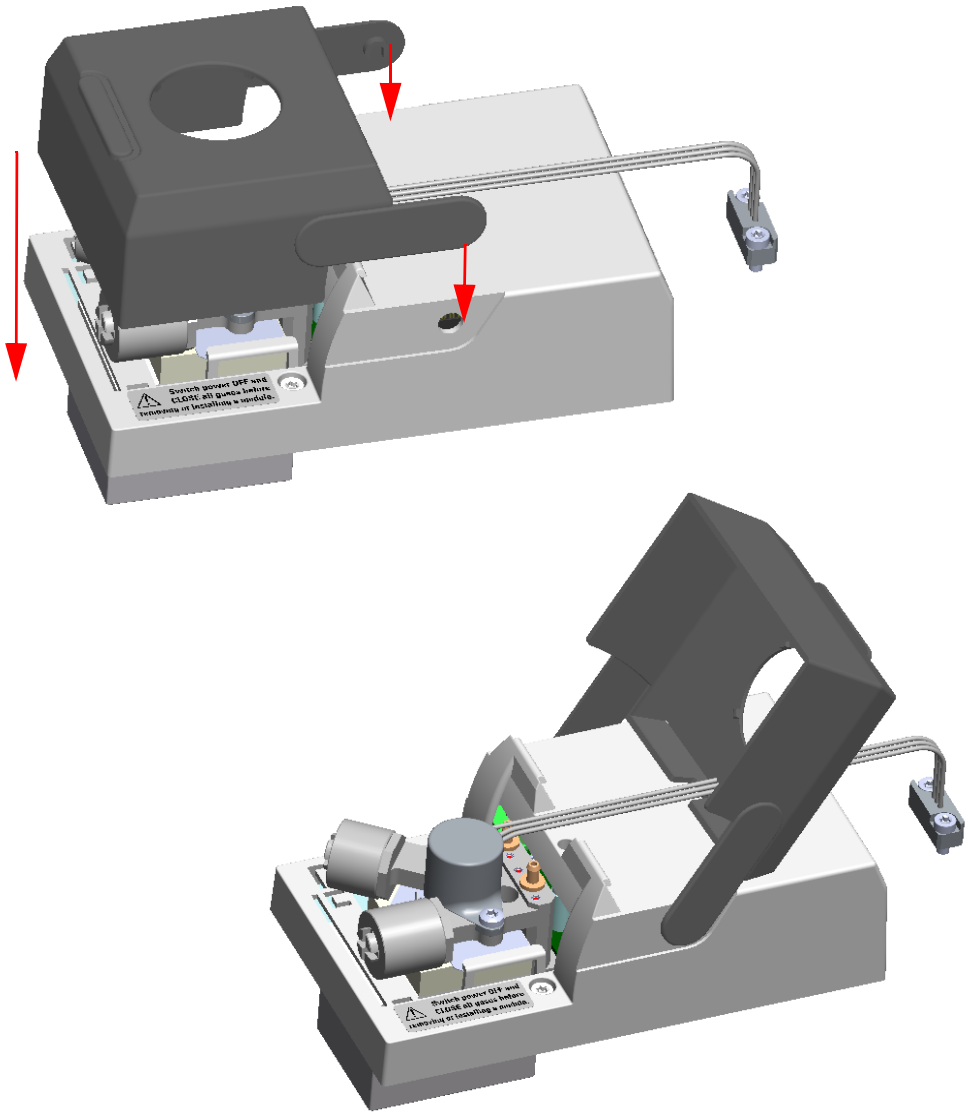
a. Insert the adapter into the injector body housing and fix it using the two injector body fixing screws previously removed. See Figure 34.

Figure 34. Adapter Gas Tubing Block Mounting



5. Reinstall the module flap cover. See Figure 35.

Figure 35. Module Flap Cover reinstallation



6. Keeping the module flap cover open, place the module in its seat. Be sure to insert the 25-pin male connector, on the bottom of the module, into the 25-pin female connector on the injector seat of the injector housing.

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

ATTENTION Pour maintenir un alignement correct, les vis doivent être serrées à tour de rôle. Ne serrez que légèrement chaque vis avant de passer à la vis suivante. Répétez l'opération jusqu'à ce que tout soit sécurisé.

Note To restore the SSL Injector for liquid injections see the section "Restoring the SSL Injector for Liquid Injections" on page 121.

Making the Gas Supply Plumbing Connections

This section provides instructions for making the gas supply plumbing connections.

Building the Auxiliary Gas Line

Building the gas supply line from the supply cylinder to the TriPlus 500 HS includes connecting the gas line to the supply tanks and installing any traps or filters on the line if required.

To properly connect the gas line to the gas tank, you will need the following materials:

- 1/8 in. diameter (gas lines longer than 3 m [10 ft])
- 1/8 in. stainless steel tubing, properly cleaned
- a tubing cutter
- connecting nuts and relevant ferrules
- two wrenches

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

AVERTISSEMENT Fixez les bouteilles de gaz auxiliaires à une structure ou à une paroi inamovible. Manipulez tous les gaz conformément aux réglementations de sécurité locales.

Use the following procedure to connect regulators and tubing to the gas supply tank:

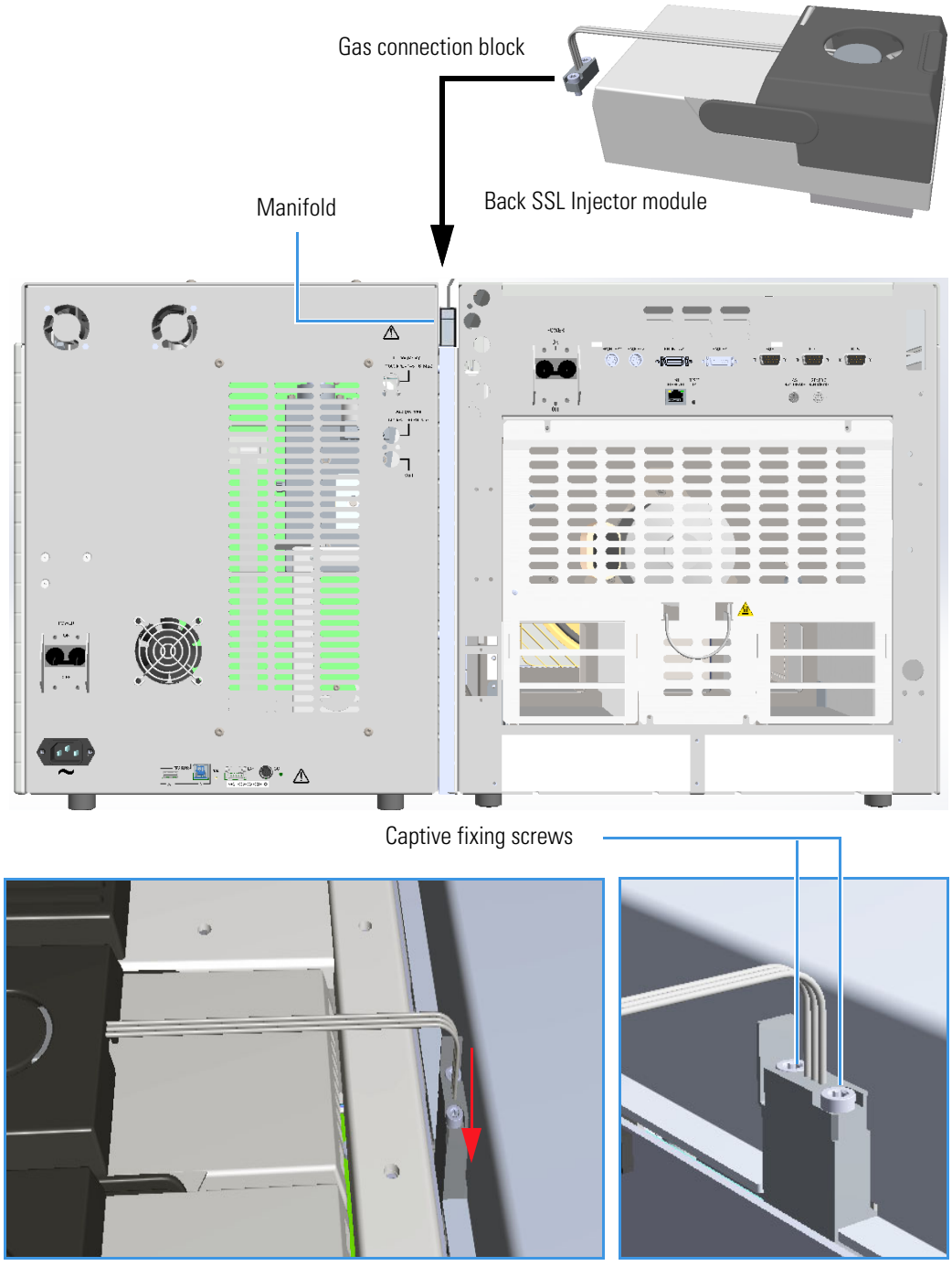
❖ **To regulate and connect tubing**

1. Make sure the initial supply valves are turned off.
2. Connect the regulator to the gas supply tank. Use an open-ended wrench or adjustable wrench to tighten the regulator connection.
3. Determine the length of tubing you need. Use only enough tubing to connect the instrument to the gas cylinders, but allow enough slack in case the instrument should be moved at least 40 cm (16 in.) from other equipment. This allows enough room to perform system maintenance.
4. Use a tubing cutter to cut the tubing.

Connecting Carrier, Split and Purge Gas Lines

The carrier, split and purge gas lines, coming from the Back SSL injector module previously modified (see the section "Coupling the TriPlus 500 HS to the TRACE 1300/1600 Series GC" on page 22), must be connected to the manifold marked **Carrier** on the top left side of the HS sampler and fix by screwing the two captive fixing screws. See Figure 36.

Figure 36. Carrier and Split Lines Connection (1)



Purging Auxiliary Gas Line

We recommend purging the lines any time you make a cut in the tubing during the gas line assembly process. This will clear them of any debris from the cut. You should also purge the completely assembled auxiliary gas line before you connect the gas supply to the HS sampler. Use the following procedure to purge the auxiliary gas line:

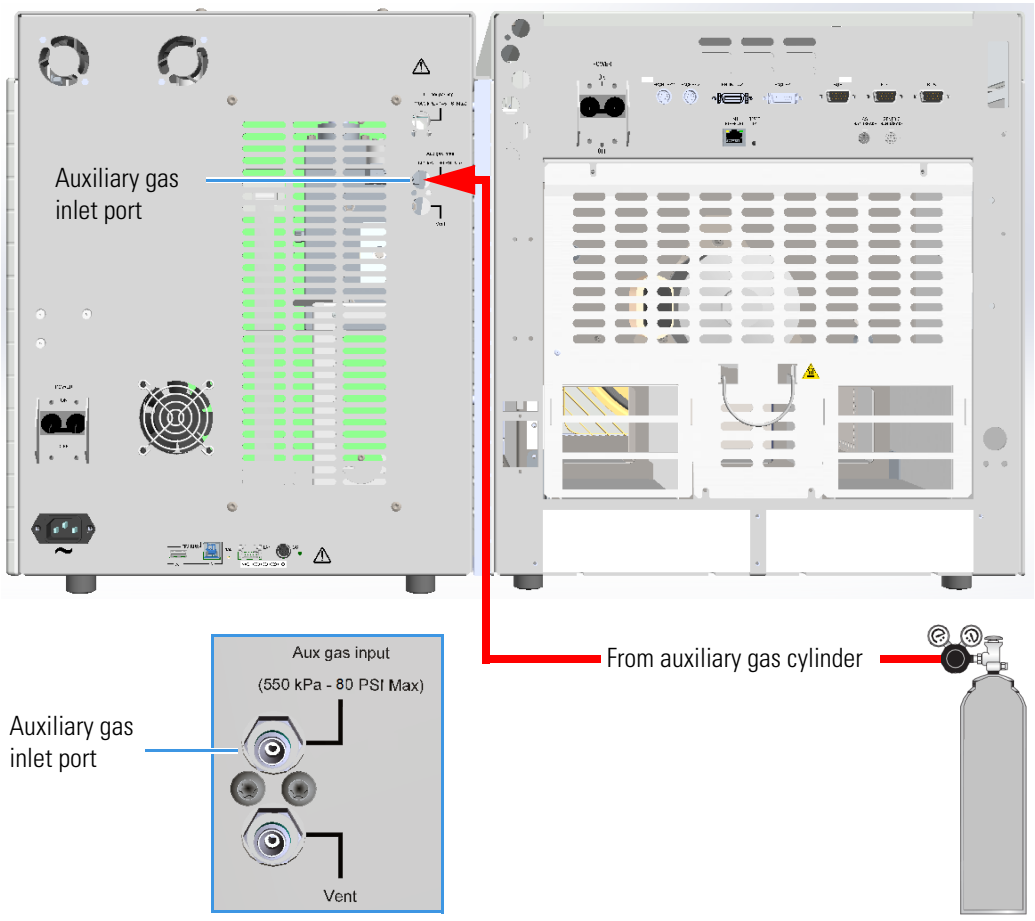
❖ **To purge the auxiliary gas line**

1. Turn the gas supply on, and set the pressure to 35 kPa (0.35 bar, 5 psig).
2. Allow the line to purge for 10 minutes.
3. Turn off the gas supply.

Connecting the Auxiliary Gas Line

The auxiliary gas supply line must be connected to the inlet port marked **Aux Gas** on the instrument back panel using the proper ferrule and fittings.

Figure 37. Auxiliary Gas Connection



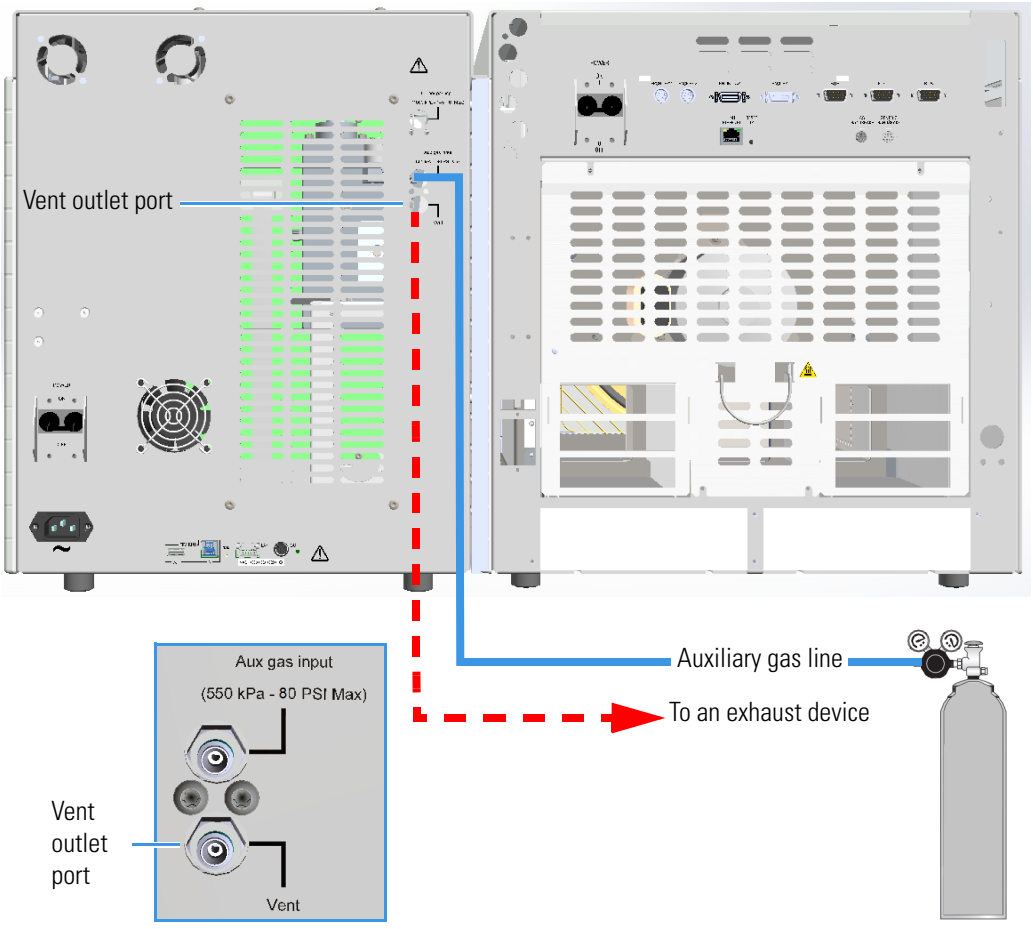
CAUTION The maximum pressure of the auxiliary gas to supply the TriPlus 500 HS is 550 kPa (5.5 bar, 80 psi). A minimum inlet pressure of 300 kPa of the auxiliary gas in required to supply the TriPlus 500 HS.

ATTENTION La pression maximale du gaz auxiliaire pour alimenter le TriPlus 500 HS est de 550 kPa (5,5 bar, 80 psi). Une pression d'entrée minimale de 300 kPa du gaz auxiliaire est nécessaire pour alimenter le TriPlus 500 HS.

Connecting Vent Line

The vent line must be connected to the outlet port marked **Vent** on the instrument back panel using the proper fitting. See Figure 38.

Figure 38. Vent Line Connection



CAUTION In case of toxic compounds, make sure to vent the exhaust gases to a fume hood or other exhausting device. Consult local Environmental and Safety Regulations for instructions in exhausting fumes from your system.

ATTENTION En cas de composés toxiques, assurez-vous de ventiler les gaz d'échappement vers une hotte d'aspiration ou un autre dispositif d'évacuation. Consultez vos réglementations locales relatives à l'environnement et à la sécurité pour obtenir des informations sur la manière d'évacuer les vapeurs de votre système.

Making Electrical Connections

This section explains the electrical connections of the TriPlus 500 HS.

CAUTION The power line and the connections among the instruments must maintain good electrical grounding. Poor grounding represents a danger for the operator and may seriously affect the instrument performance.

Do not connect the TriPlus 500 HS to lines feeding devices of a heavy duty nature, such as motors, UV lamps, refrigerators, and other devices that can generate disturbances.

If other instruments, such as a computer or printer, have to be connected to the same electrical line as the TriPlus 500 HS, ensure the electrical line is capable of withstanding the electrical consumptions by calculating the total absorption.

ATTENTION La ligne électrique et les connexions entre les instruments doivent maintenir une bonne mise à la terre électrique. Une mauvaise mise à la terre représente un danger pour l'utilisateur et peut affecter sérieusement les performances de l'instrument.

Ne connectez pas le TriPlus 500 HS à des appareils d'alimentation robustes tels que des moteurs, des lampes UV, des réfrigérateurs et d'autres appareils susceptibles de générer des perturbations.

Si d'autres instruments, tels qu'un ordinateur ou une imprimante, doivent être connectés à la même ligne électrique que le TriPlus 500 HS, assurez-vous que la ligne électrique est capable de supporter les consommations électriques en calculant l'absorption totale.

Making Electrical Connections between the TriPlus 500 HS and a TRACE 1600/1610 GC

❖ **To make the electrical connections between the TriPlus 500 HS and a TRACE 1600/1610 GC**

See Figure 39 and Figure 40.

Figure 39. Electrical Connections to TRACE 1600/1610 GC (1)

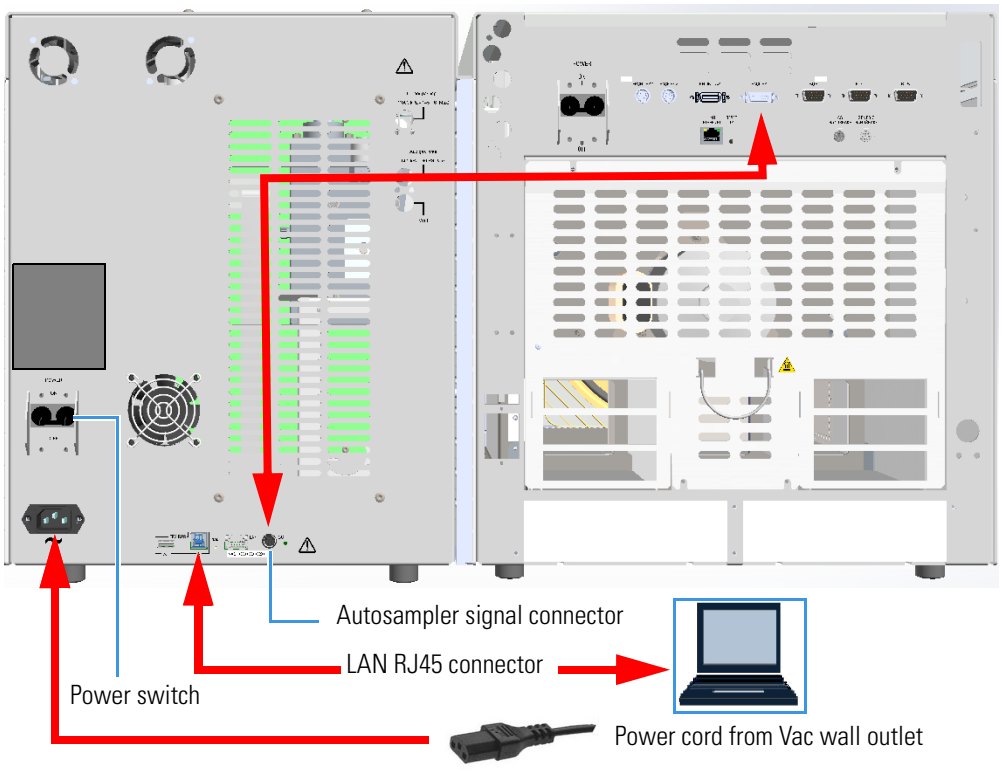
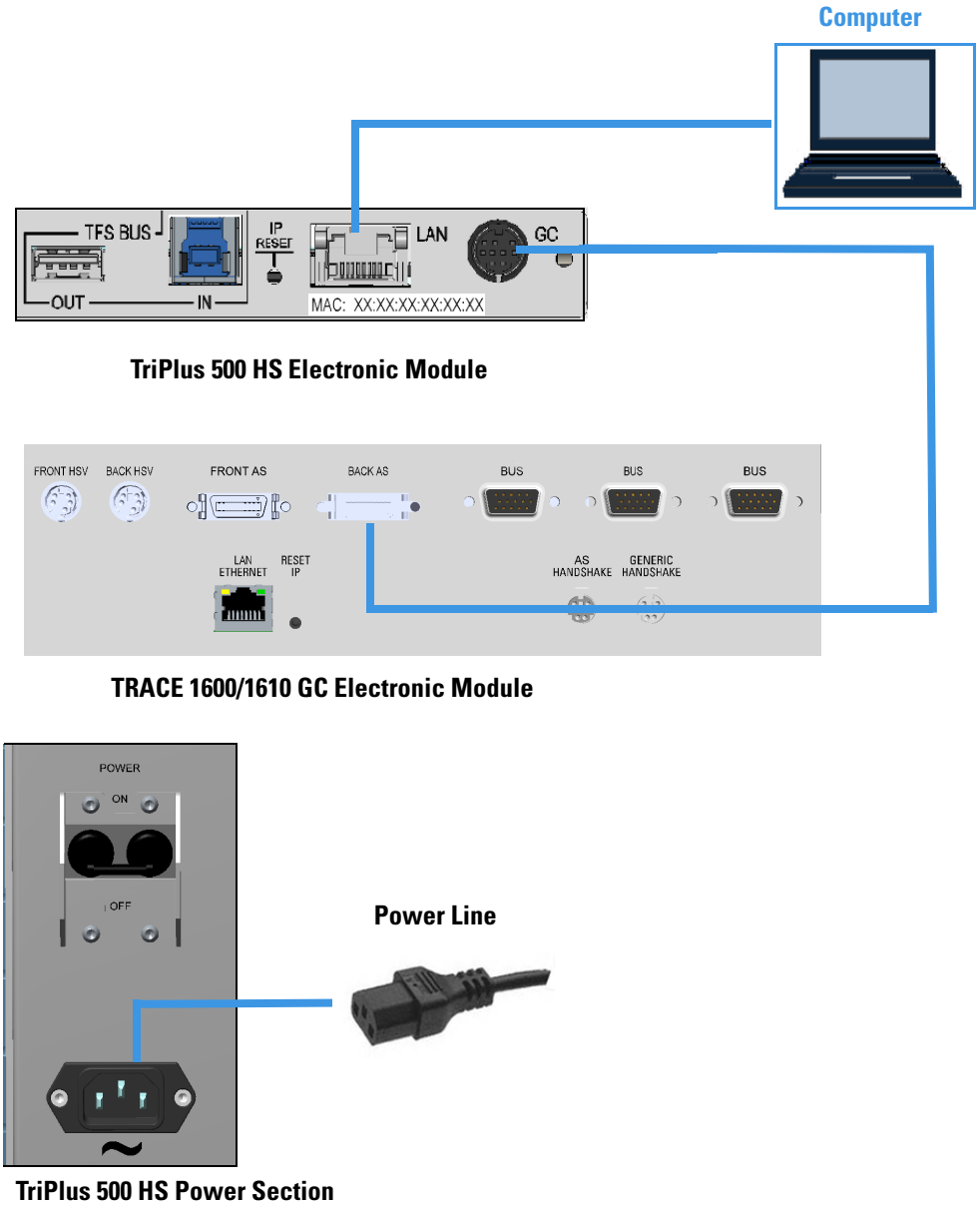


Figure 40. Electrical Connections to TRACE 1600/1610 GC (2)



1. Connect the Mini Delta connector to the **BACK AS** Mini Delta connector on the GC.
2. Connect the 9-pin connector to the **GC** connector on the TriPlus 500 HS.
3. Connect the power cable to the AC Input connector (Main socket) on the HS sampler, and to the wall outlet.

Making Electrical Connections between the TriPlus 500 HS and a TRACE 1300/1310 GC

❖ **To make the electrical connections between the TriPlus 500 HS and the TRACE 1300/1310 GC**

See Figure 39 and Figure 40.

Figure 41. Electrical Connections to TRACE 1300/1310 (1)

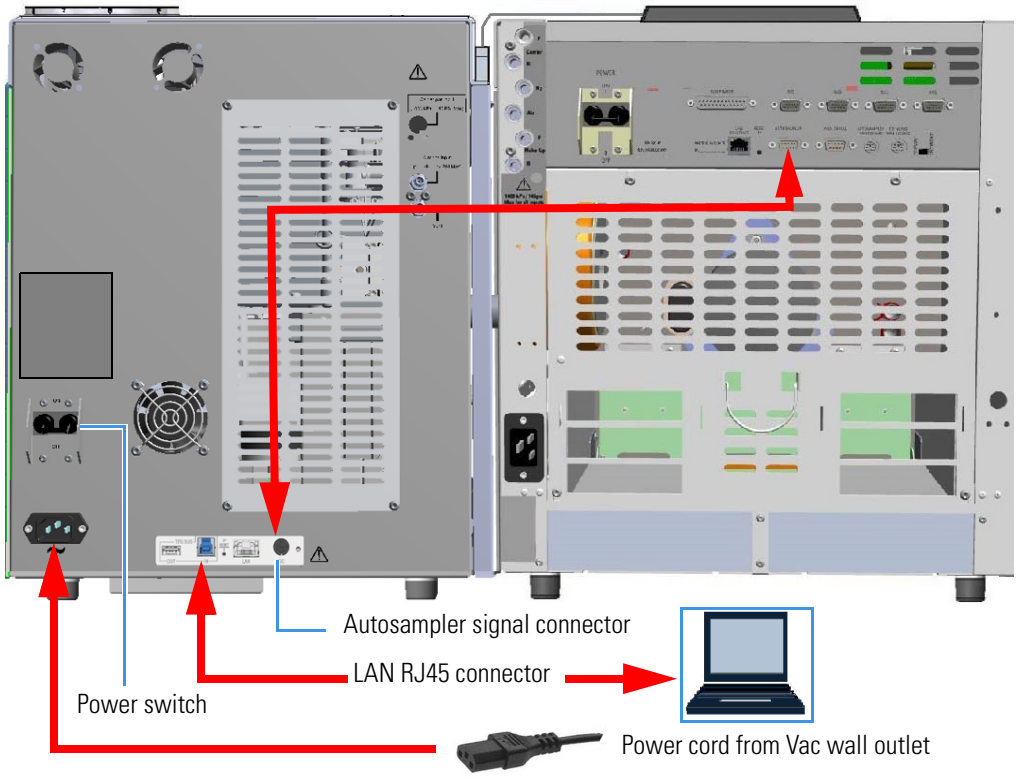
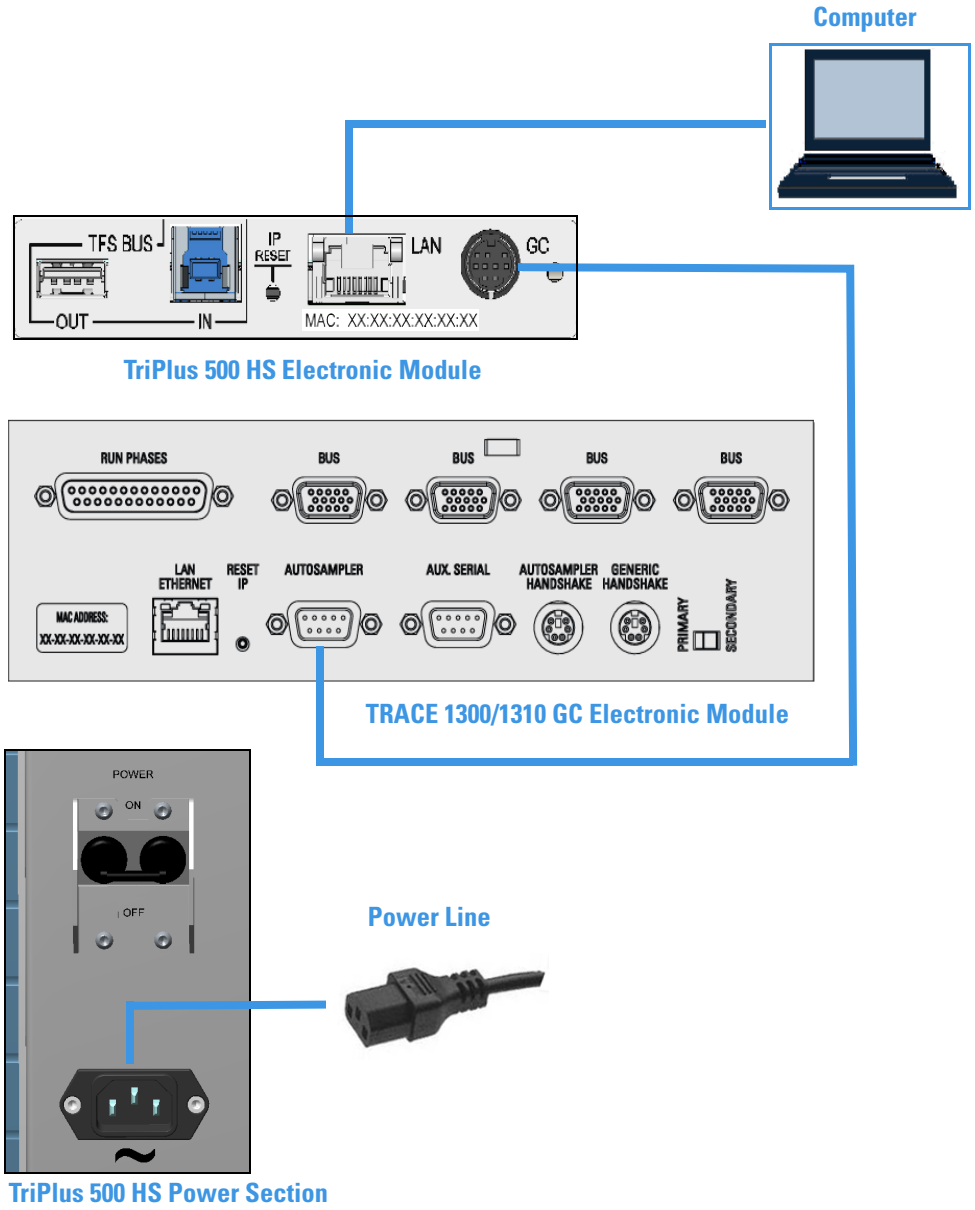


Figure 42. Electrical Connections to TRACE 1300/1310 (2)



1. Connect the signal cable of the TriPlus 500 HS to the connector marked **Autosampler** on the back panel of the TRACE 1300 Series GC.

Note If another device is connected to the **Autosampler** connector, you can connect the TriPlus 500 HS to the **Aux Serial** connector.

2. Using the LAN cable, connect a desktop or laptop PC directly to the RJ45 connector marked LAN/Ethernet on the back of TriPlus 500 HS.

3. Connect the power cable to the AC Input connector (Main socket) on the HS sampler, and to the wall outlet.

Configuring LAN Communication

This section provides instructions for configuring the IP and LAN communication port for the TriPlus 500 HS. See "Making the LAN Setup" on page 45. Before making the LAN setup, please read the following note.

Note IP Address —The TriPlus 500 HS is shipped from the factory with Dynamic Host Configuration Protocol (DHCP) enabled. If the DHCP is unable to acquire an IP address from the server it will use the following default settings:

- The default static IP address is 169.254.250.4.
- The default netmask is 255.255.255.0.
- The default gateway is 169.254.250.1.
- The port is a number given by the network administrator - for example 2551.

To change the default settings, contact your LAN administrator.

- **Reset Button** — To reset the LAN parameters (IP address, communication port, etc.) to the default settings, insert a small screwdriver into the hole, then push the reset button for at least four seconds.
- **Network Cable** — A standard **GREY** cable is required to connect the TriPlus 500 HS to local area network connection.

Making the LAN Setup

❖ **To set the LAN communication**

1. Using the LAN cable, connect the RJ45 connector marked LAN on the back of the TriPlus 500 HS to the RJ45 connector of a desktop or laptop PC or to a LAN switch.
2. Power on the TriPlus 500 HS by placing the power switch in the On (up) position marked **I**.
3. Power on the PC.
4. Start the **GC and AS Service Tools** program to begin the installation on the PC. Follow the instructions step by step to complete the installation.

Note Use the **GC and AS Service Tools** program to set the **LAN** Communication parameters, and updating the **Firmware** version on the GC.

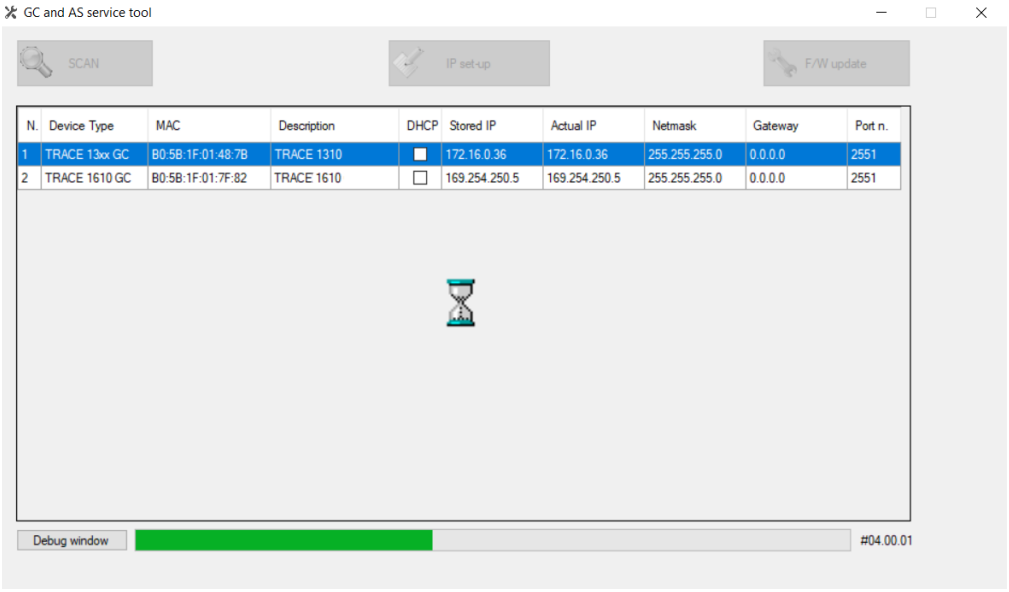
Updating the **Firmware** version on the GC must be carried out by a Thermo Fisher Scientific authorized technical personnel.

Visit http://www.gc-gcms-customersupport.com/WebPage/Share/Default.aspx to contact your local Thermo Fisher Scientific office or affiliate GC-GC/MS Customer Support

5. Run the **GC and AS Service Tools** program. Click the icon on your desktop or select **Start > Program > GC and AS Service Tool**.

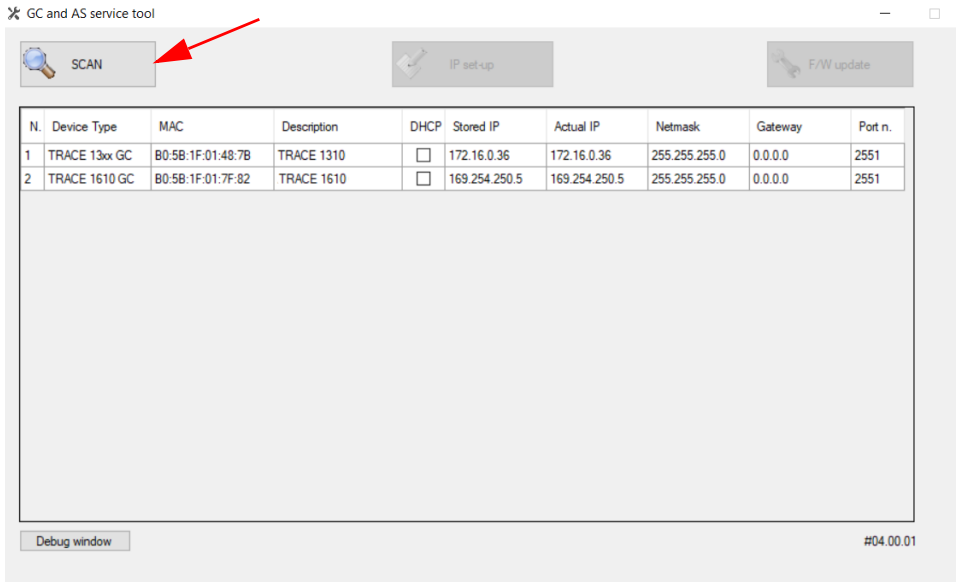
6. The system starts scanning for equipment powered on and connected to the LAN. During this process, the three buttons on the top of the page are disabled. See Figure 43.

Figure 43. Scanning for Instruments



7. When the scan is complete, all the equipment powered on and connected to the LAN is displayed. Only the **SCAN** button is enabled. See the example in Figure 44.

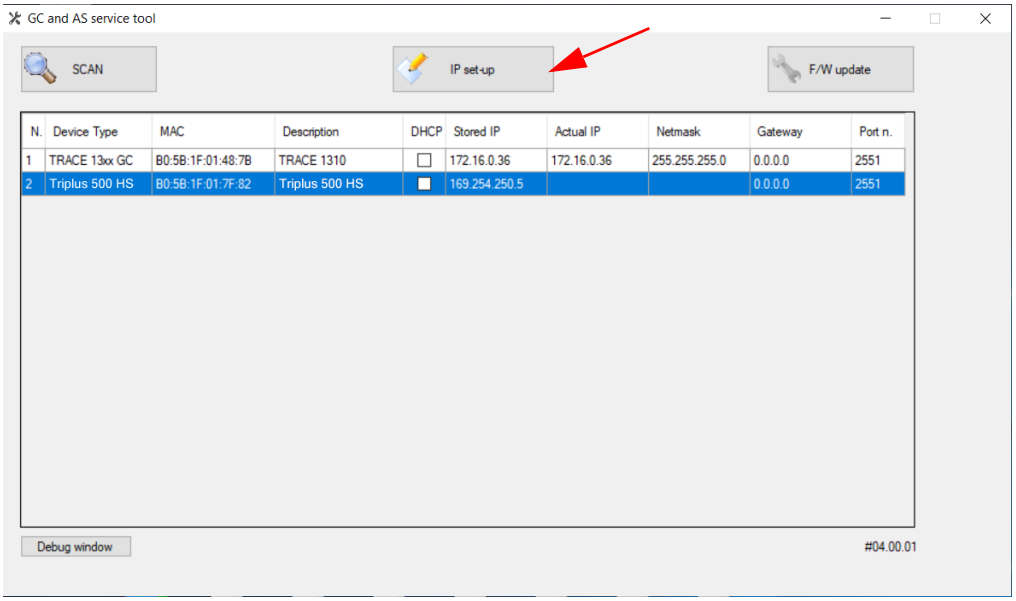
Figure 44. Equipment Connected to the LAN



Note To repeat the scan, click **SCAN**.

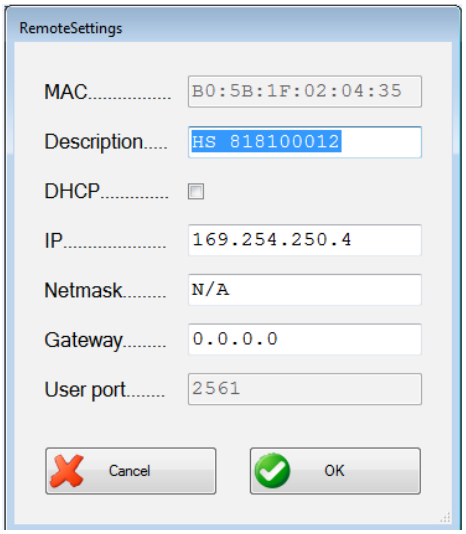
8. Select the TriPlus 500 HS to set up. All the three buttons on the top of the page are enabled. See the example in Figure 45.

Figure 45. Selecting an Instrument to Configure



9. Click **IP set-up**. The **Remote Settings** page is displayed. See the example in Figure 46.

Figure 46. Remote Settings Page



The editable parameters are: **Description**, **DHCP**, **IP**, **Netmask**, and **Gateway**.

After changing parameters, press **OK** to confirm the new settings.

10. Close the **GC and AS Service Tools** program.

11. Configure the Thermo Scientific™ Chromeleon™ or TraceFinder™ Chromatography Data System (CDS) in use. See the section "Configuring the Data System" on page 48.

Configuring the Data System

Note Create a label with the IP address and the TCP Port that are set in the instrument. Stick the label where it can be easily found when necessary to configure the data system.

1. Launch the Data System. In the relevant **Configuration** page specify a direct TCP/IP address.
2. Enter the IP address of TriPlus 500 HS and set the socket used.

   Standard operation parameters are set by default; however, your TriPlus 500 HS may be hidden behind a Firewall that may prevent Port 2551 from being used.

   You can set an alternative port number. The number of the socket entered in this box must correspond to the port assigned to the instrument setup.

CAUTION If the connection is performed through hubs over a 10 Mbit/s network, it is suggested that no more than five TriPlus 500 HS units be connected on the same network trunk. If you have a switched network, this warning does not apply.

ATTENTION Si la connexion est établie via des pôles sur un réseau à 10 Mbit/s, il est recommandé de ne pas connecter plus de cinq unités TriPlus 500 HS sur la même ligne réseau. Si vous disposez d'un réseau à commutation, cet avertissement ne s'applique pas.

Connecting the Analytical Column

CAUTION Ensure that the GC column has been conditioned before connecting it to the valve-column interface. The material released from the column during conditioning (column bleed) may contaminate the detector.

ATTENTION Assurez-vous que la colonne GC a été conditionnée avant de la connecter à l'interface vanne-colonne. Les matières rejetées par la colonne lors du conditionnement (ressuage de la colonne) peuvent contaminer le détecteur.

❖ **To connect the analytical column to the valve-column interface**

Material Needed
Ceramic scoring wafer or sapphire scribe
Notched septum or typewriter correction fluid or a felt-tipped pen

Material Needed
Graphite Vespel® ferrule for 0.1 mm - 0.25 mm Column or Graphite Vespel® ferrule for 0.32 mm Column or Graphite Vespel® ferrule for 0.53 mm Column
1/4 in. Hexagonal retaining nut
Wrench Open-ended 1/4–5/16 in.

1. Open the front door of the GC.
2. Unwind the column enough to easily connect its ends to the valve-column interface.

   Note Wear clean, lint- and powder-free gloves when you handle the column and injector ferrule.

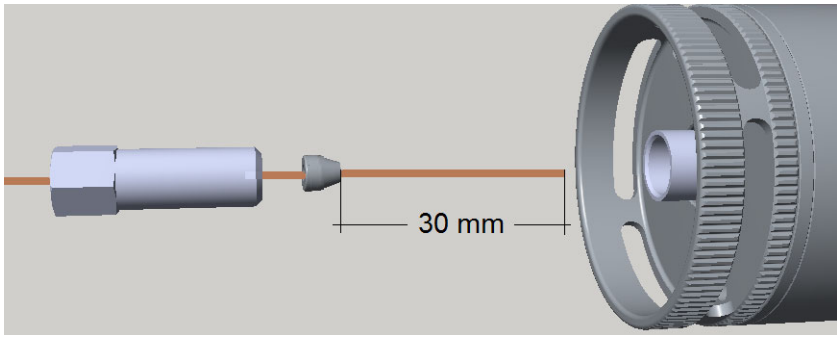
3. Wipe about 100 mm (4 in.) of the column with a tissue soaked in methanol.
4. Insert the column through the hexagonal retaining nut and the proper ferrule (open end up). Wipe the column again with a tissue soaked in methanol.
5. Use a scoring wafer to score and break the column about 1 cm (0.4 in.) from the end. Use a magnifying glass to check for an even, flat cut. Repeat if necessary.

   Tip Slide a notched septum on the column before the retaining nut to make it easier to measure the proper distance between the nut and end of the column.

   Alternatively, use typewriter correction fluid or a felt-tipped pen to mark the correct position of the ferrule from the end of the column.

6. Position the column so that the end of the column extends the **30 mm** above the end of the ferrule. See Figure 47.

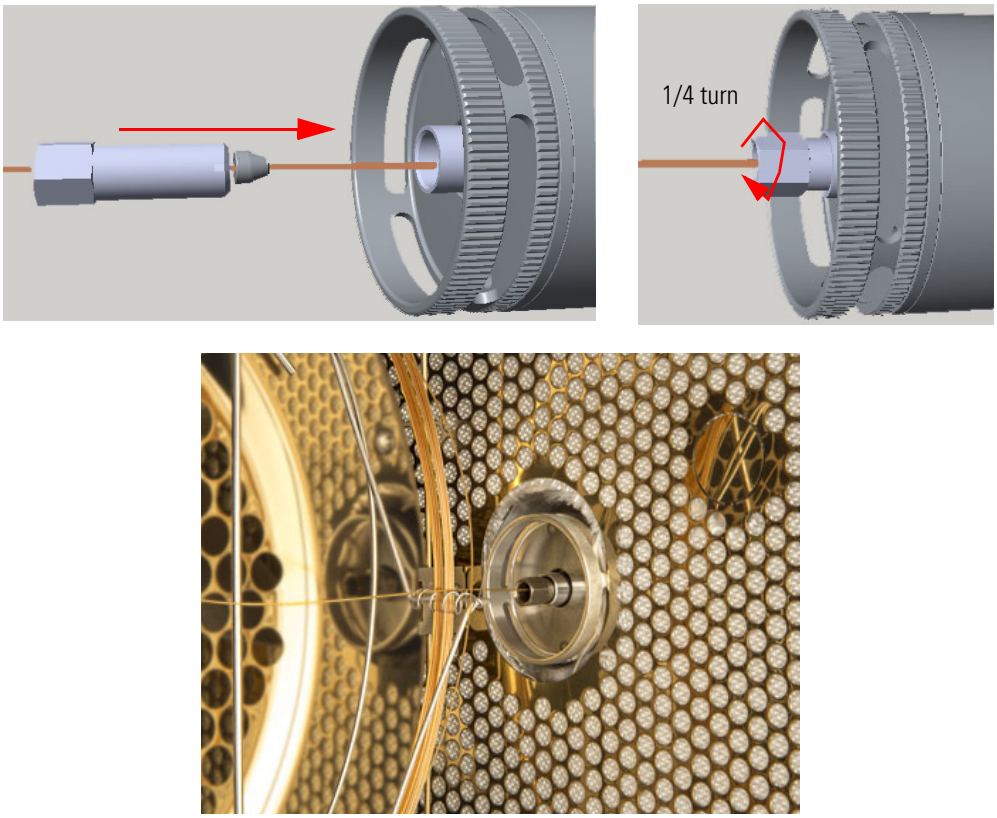
   Figure 47. Column Connection (1)



7. Insert the notched septum on the column to hold the retaining nut at this position. Thread the retaining nut into the valve-column interface but do not tighten.
8. Adjust the column position so that the septum contacts the bottom of the retaining nut.

9. Finger-tighten the retaining nut until it starts to grip the column plus a quarter turn. See Figure 48.

Figure 48. Column Connection (2)



10. Remove the notched septum from the column.
11. Perform the leak test. See the section "Performing the Leak Test" on page 56.

iConnect Column Lock

Complete the following steps to install the iConnect™ Column Lock.

Wear clean, lint- and powder-free gloves when you handle the column and injector ferrule.

CAUTION The iConnect Column Lock has a maximum operating temperature of 350 °C. Do not use the iConnect Column Lock with an oven, inlet, or detector set to temperatures exceeding 350 °C.

ATTENTION Le verrou de colonne iConnect présente une température de fonctionnement maximale de 350 °C. N'utilisez pas le verrou de colonne iConnect avec un four, un injecteur ou un détecteur réglé à des températures supérieures à 350 °C.

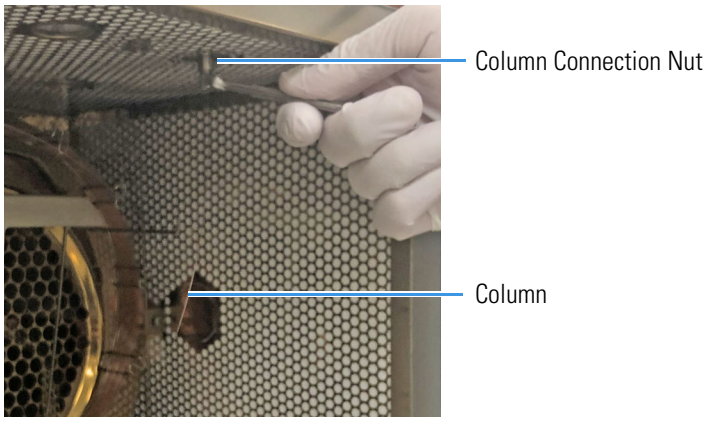
❖ To install in the iConnect Column Lock

1. Put the GC in standby condition.
2. Cool the oven and injector to 40 °C or less.

   Note Press the **Maintenance** button to cool down the GC automatically.

3. Turn the carrier gas off, and wait for the carrier pressure to go to zero.
4. Remove the standard bottom column connection retaining nut from the injector or detector body.

Figure 49. Removing the Retaining Nut



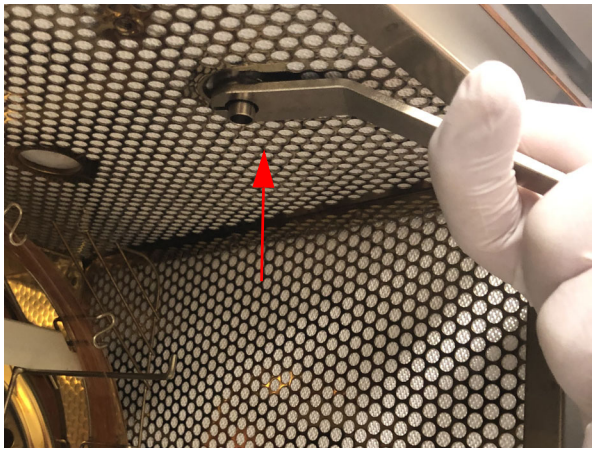
5. Use a 1/2 in. offset wrench to remove the retaining nut. See Figure 50.

CAUTION Save the bottom parts of the injector or detector in a safe place because they will be reused when you restore the original configuration.

ATTENTION Conservez en lieu sûr les parties inférieures de l'injecteur ou du détecteur car elles seront réutilisées lors de la restauration de la configuration d'origine.

Figure 50. 1/2 in. Offset Wrench

Figure 51. Removing the Retaining Nut with an Offset Wrench

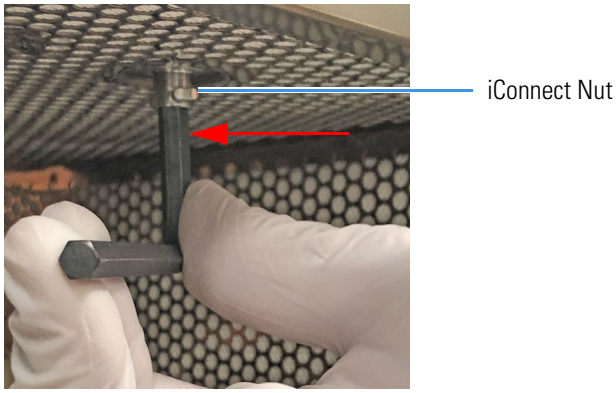


- When installing an iConnect on a SSL inlet, replace the base seal with a new one.

WARNING Always use the provided washer with the iConnect Nut (packed together with the SSL base seal). You must also use this washer when using the iConnect with a detector base.

6. Finger tighten the iConnect nut.
7. Tighten the iConnect nut with a clean 6 mm Allen wrench. See Figure 52.

Figure 52. 6 mm Allen Wrench Tightening the iConnect Nut



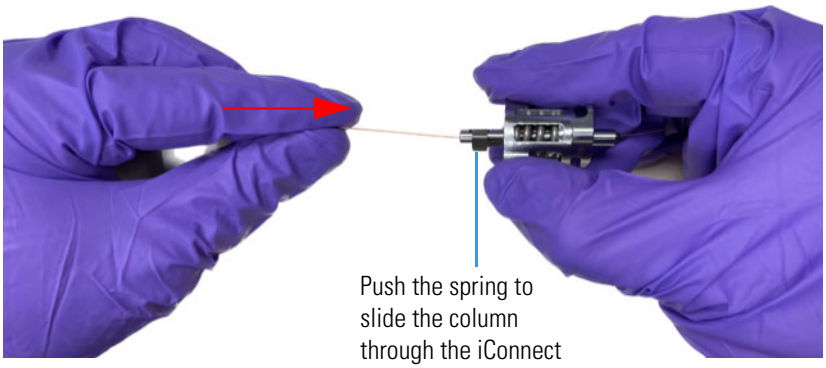
8. Wipe about 100 mm (4 in.) of the column with a tissue soaked in methanol.
9. Slide the column through the iConnect Column Lock. Pinch the spring at the base of the iConnect to allow the column to slide through. See Figure 53 and Figure 54.

CAUTION When you push the spring to slide the column through the iConnect, keep the spring pushed. If the spring is in contact with the column while sliding the column, it might score the protective coating, and affect the seal to the ferrule or cause the column to break later.

ATTENTION Quand vous enfoncez le ressort pour faire glisser la colonne à travers l'iConnect, maintenez la pression sur le ressort. Si le ressort entre en contact avec la colonne pendant le glissement de celle-ci, le revêtement de protection risque d'être endommagé, avec pour conséquence possible une perte d'étanchéité de la ferrule ou la casse future de la colonne.

Figure 53. Spring Location

Figure 54. Inserting the Column into the iConnect Column Lock



10. Insert the column through the iConnect nut and ferrule (open end up).
11. Set the column length according to the injector or detector type. See Table 2 and Table 3 for column insertion depths.

Note Detector and injector insertion depths are measured from the top of the ferrule. See Figure 55 for an example of the SSL and SSLBKF insertion depths.

It is recommended to insert the column a few extra mm and then trim to the correct depth.

Table 2. Column Insertion Depth for SSL, SSLBKF, and GSV Injectors

Injector	Column Insertion Depth
SSL	5 mm (splitless) 10 mm (split)

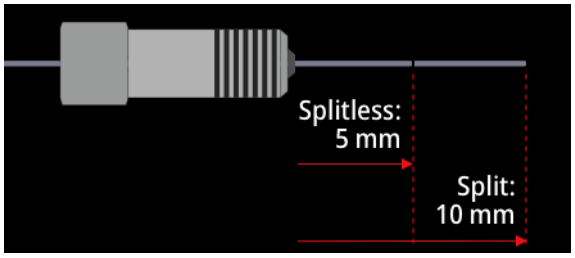
Table 2. Column Insertion Depth for SSL, SSLBKF, and GSV Injectors

Injector	Column Insertion Depth
SSLBKF	5 mm (splitless) 10 mm (split)
GSV	23 mm

Table 3. Column Insertion Depth for ECD, FID, FPD, NPD, and TCD Detectors

Detector	Column Insertion Depth
ECD	23 mm
FID	36 mm
FPD	125 mm
NPD	32 mm
TCD	10 mm

Figure 55. SSL and SSLBKF Column Depths



CAUTION Use the type of Graphite/Vespel® ferrules provided in the connector outfits. Ensure ferrules are the appropriate size for the type of capillary column in use.

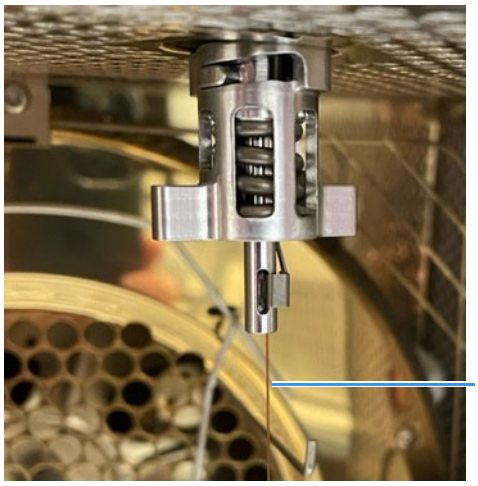
ATTENTION Utilisez le type de ferrules Graphite / Vespel™ fourni dans les raccords de branchement. Veillez à ce que les ferrules soient d'une taille appropriée pour le type de colonne capillaire utilisé.

Note For typical 0.1 to 0.25 mm inner diameter columns with a 0.36 mm outer diameter, ferrule packages are required with P/N 290VA191 to seal properly. These ferrules have a hole size of 0.37 mm and a label with "r2" after Pk 10.

12. Turn the iConnect Column Lock a quarter turn until it stops. See Figure 56.

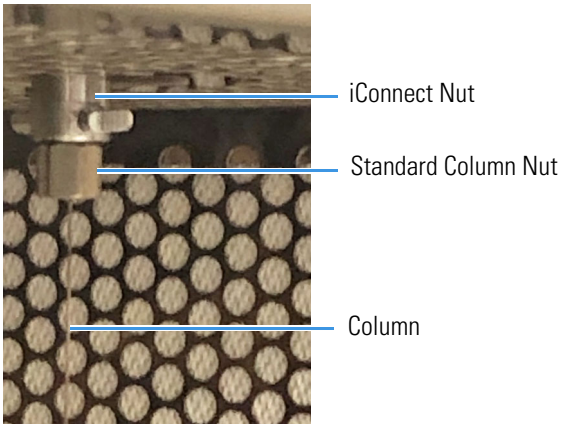
Figure 56. Connecting the iConnect Column Lock to the iConnect Nut

Figure 57. iConnect Column Lock Installed



Note The standard column nut can also be connected to the iConnect nut as well. See Figure 58.

Figure 58. Standard Column Nut Connected to the iConnect Nut



Note For information about column conditioning and performing a leak check, refer to the *Replacing a Column* section of Chapter 2, *Performing Routine Maintenance,* in the *TRACE 1600/1610 Hardware Manual*.

Performing the Leak Test

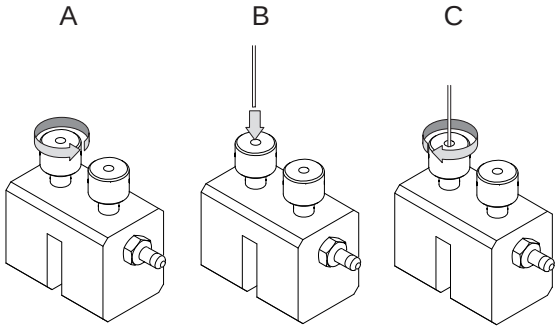
Once the HS sampler has been assembled and connected to the gas chromatograph, it is advisable to perform a leak test on the entire pneumatic circuit, from the carrier gas inlet to the column outlet. This procedure should be repeated every time a modification is made to the system, for example: column or sample loop replacement.

❖ To perform the leak test

1. Disconnect the analytical column from the detector and insert a silicone rubber septum in its end.

   Alternatively, carefully push the capillary column end into the column section of the column-flowmeter connector. See Figure 59.

   Figure 59. Using a Flowmeter for Leak Check

2. Open the gas supplies.
3. Power on the GC.
4. Setup the GC.
   a. Set the oven temperature to 50 °C.
   b. Use the column-flowmeter connector to verify that there is flow through the column. If you do not have a flowmeter, dip the column outlet in a small vial of methanol. Bubbles indicate there is flow through the column. If there is no flow, check that the carrier gas is on, the GC inlet is pressurized, and the column is not plugged.
   c. Allow the column to purge for few minutes.
5. If your GC is equipped with a touch screen user interface, select the **Leak Check** icon in the **Maintenance** menu, otherwise perform the Leak Check through the Chromatography Data System by selecting the proper function.

6. Start the leak check to begin operation. The split and purge valves of the selected channel are automatically closed and the channel is pressurized with carrier gas to the leak check setpoint.
7. The system monitors the pressure for one minute. If the pressure does not drop more than the maximum allowed sensitivity value, then the leak check will pass.
8. If the leak check did not pass, you should use the leak detector to find and fix the leaks.

   Tip Leaks can be caused by not tightening the fitting on the column-flowmeter connector. We recommend that you check that fitting before looking elsewhere.

9. Repeat the leak check until no leaks are indicated.
10. At the end of the leak test routine re-connect the column to the detector.

Instrument Start-up

This section provides instructions for preparing the instrument for running analyses.

❖ To start-up the system

1. Open the gas supplies for the GC and TriPlus 500 HS.
2. Power on the GC by placing the power switch in the On (up) position marked **I**.
3. Configure TriPlus 500 HS through the Thermo Scientific™ Chromatography Data System (CDS) in use.
4. Edit the analytical method for the GC. Refer to your TRACE Series GC User Guide for additional information.
5. Edit the analytical method for TriPlus 500 HS. Refer to the *TriPlus 500 Headspace Sampler User Guide*.
6. Prepare your samples, then place the sample vials into the sample carousel of the HS sampler.
7. Start the sequence of samples.

3

Upgrading Equipment

This chapter provides the instructions for upgrading the TriPlus 500 HS with the available devices such as the Vial Loader, Vial Trays, and Barcode Reader.

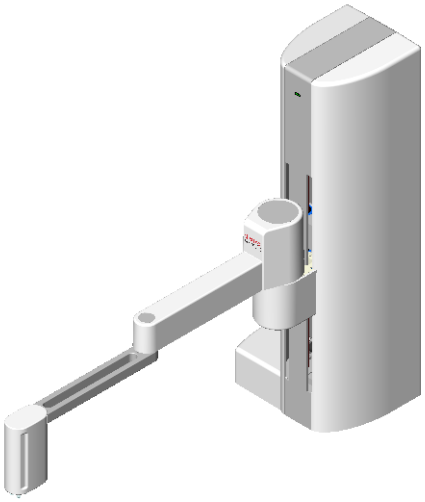
Contents

- Installing the Vial Loader
- Installing the Vial Trays
- Calibrating the Tray Holder
- Installing the Barcode Reader
- Installing the Heated/Cooled Tray
- Configuring the Devices

Installing the Vial Loader

This section contains instructions for installing the Vial Loader on the TriPlus 500 HS.

Figure 60. Vial Loader



Unpacking the Vial Loader

After inspecting the exterior of the shipping container for damage, carefully unpack the Vial Loader and do the following:

CAUTION The Vial Loader weighs approximately 7 kg (15.5 lb) when unpacked. Do not to move the arms of the Vial Loader when lifting the instrument.

How to lift the Vial Loader

ATTENTION Une fois déballé, le chargeur de flacon pèse environ 7 kg (15,5 lb).

Ne déplacez pas les bras du chargeur de flacon lorsque vous soulevez l'instrument.

Check the contents of each box against the packing list to verify the shipment is complete, then inspect each item for damage. If equipment is damaged, keep the box and its equipment in its existing condition and immediately notify the carrier.

Submit a damage claim directly to the carrier, and send a copy (including any shortage claim) to your authorized Thermo Fisher Scientific sales representative.

Do not return any equipment to the dealer or the factory without prior Thermo Fisher Scientific authorization.

Installing the Vial Loader on the TriPlus 500 HS

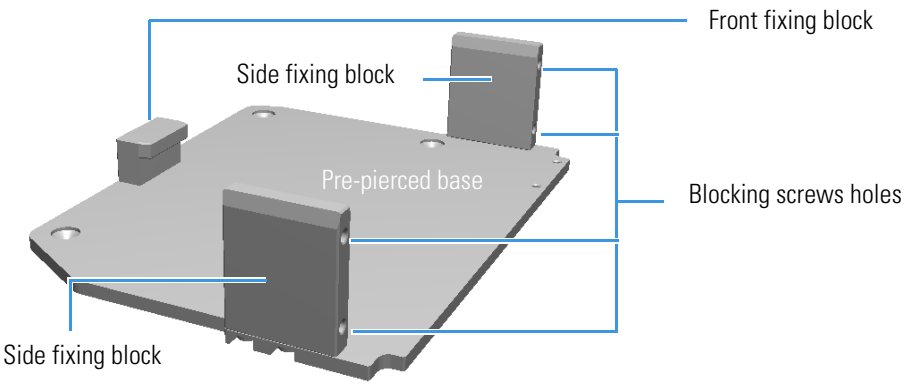
CAUTION The Vial Loader will be installed by an authorized Thermo Fisher Scientific Field Service Engineer (FSE), who will verify the instrument operation. If, for any reason, your system is not installed by a Thermo Fisher Scientific FSE, you should ensure that the following operations are performed. Use the standard outfit checklist accompanying the instrument to verify that all items have been received.

ATTENTION Le chargeur de flacon doit être installé par un ingénieur de maintenance sur site (FSE) autorisé de Thermo Fisher Scientific. L'ingénieur doit contrôler le fonctionnement de l'instrument. Si, pour une raison quelconque, votre système n'est pas installé par un FSE de Thermo Fisher Scientific, vous devez vous assurer que les opérations suivantes sont effectuées. Utilisez la liste de contrôle de l'équipement standard accompagnant l'instrument pour vérifier que tous les articles ont été reçus.

❖ To install the vial loader on the TriPlus 500 HS

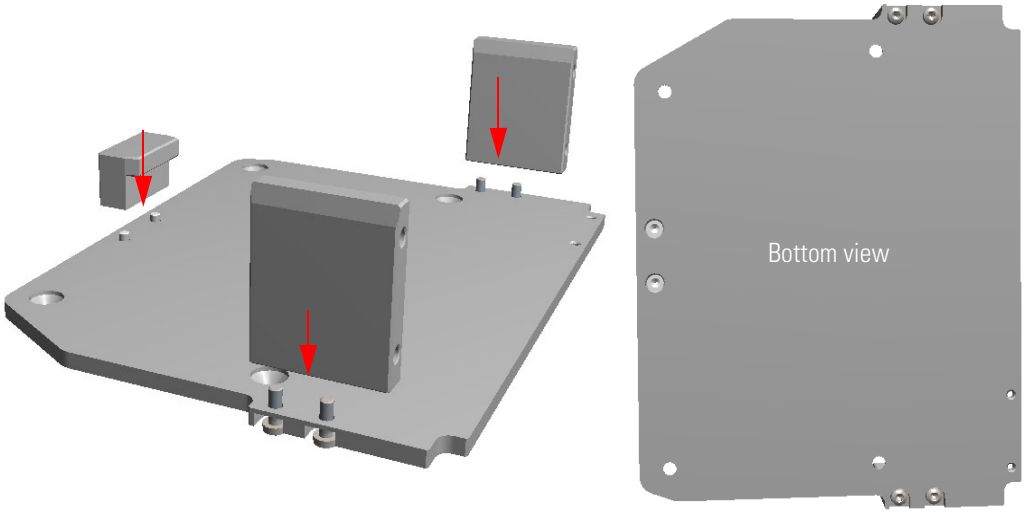
To install the Vial Loader on the TriPlus 500 HS use the dedicated fixing plate provided. See Figure 61.

Figure 61. Fixing Plate



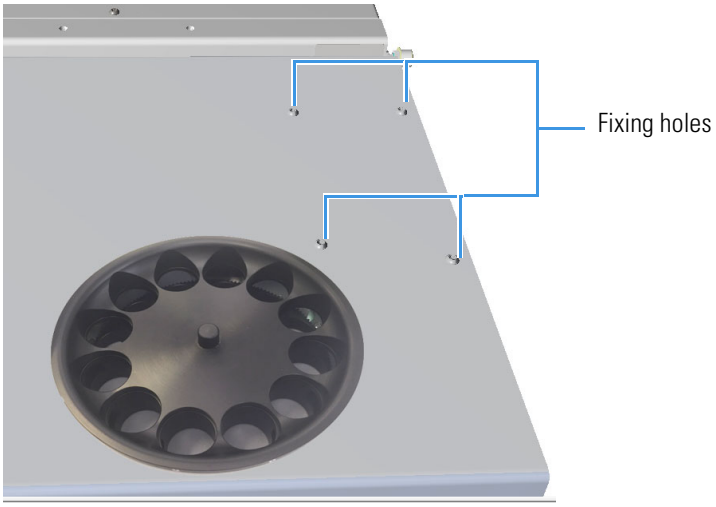
The fixing plate consists of a pre-pierced base on which a front fixing block and two side fixing blocks are mounted. Mount and fix these parts on the fixing plate as shown in Figure 62.

Figure 62. Fixing Plate Mounting



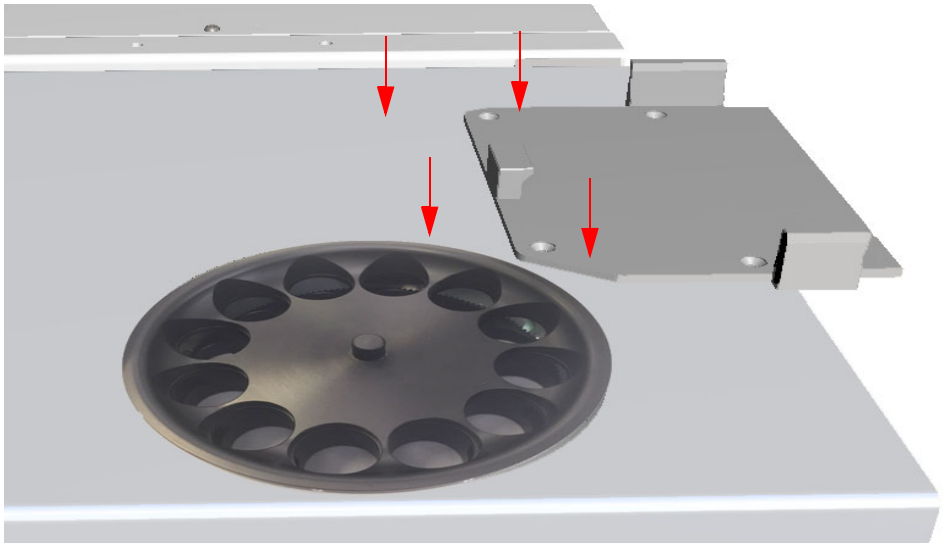
1. Install the fixing plate on the top cover of the HS sampler.
   a. On the top cover remove the four screws from the corresponding fixing holes. These screws are used to fix the plate on the top cover of the HS sampler. See Figure 63.

Figure 63. Fixing Plate Installation (1)



   b. Mount the fixing plate by aligning the four installation holes to the corresponding holes on the top cover, then insert the fixing screws previously removed into the four holes on the fixing plate. See Figure 64.

Figure 64. Fixing Plate Installation (2)



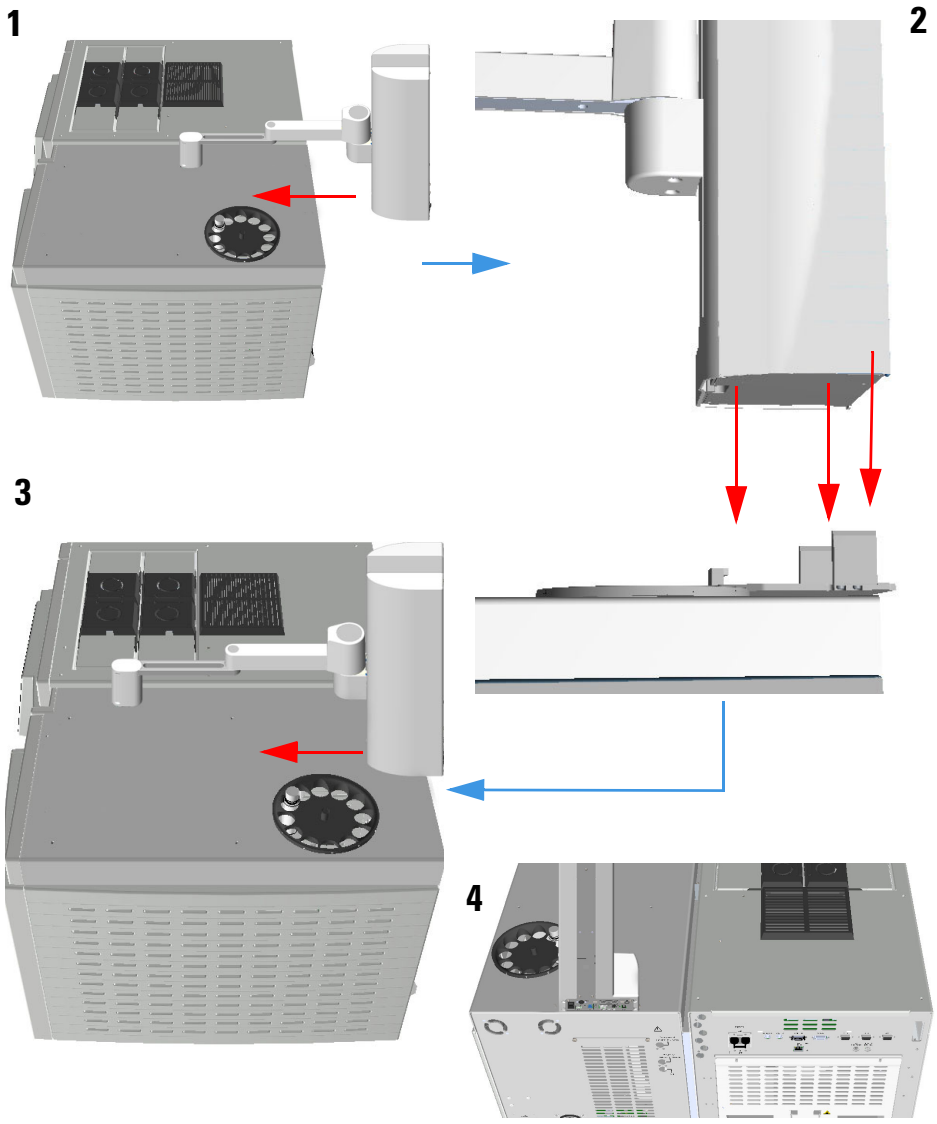
c. Using a T20 Torx head screwdriver screw the four fixing screws upwards to fix firmly the fixing plate on the top cover. The fixing plate protrudes about 4 cm (1.6 in.) from the back of the HS sampler.

2. Place and fix the Vial Loader.

   a. Carefully lift the Vial Loader and place it on the fixing plate. Be sure to insert the front and the side fixing blocks into the slots provided on the bottom of the Vial Loader.

   b. Push the Vial Loader up to hook it to the front fixing block. See Figure 65.

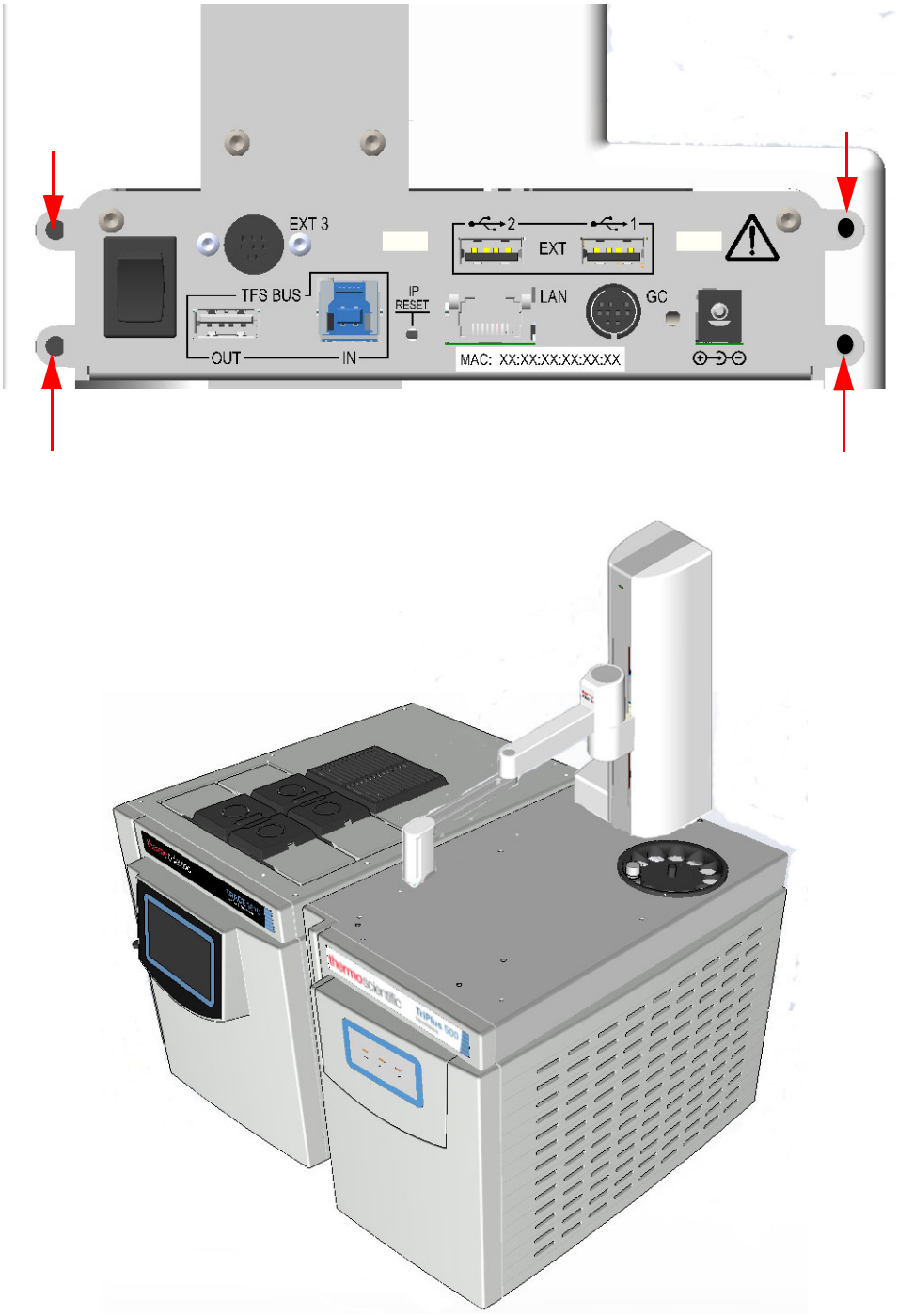
Figure 65. Vial Loader Installation (1)



c. Insert the fixing screws provided into the fixing holes located on the sides of the Vial Loader's electronic module.

d. Using a Torx head T20 screwdriver, screw the four fixing screws up to grip the side fixing block. See Figure 66.

Figure 66. Vial Loader Installation (2)



Making the Vial Loader Electrical Connections

This section details the electrical connections of the Vial Loader.

CAUTION The power line and the connections among the instruments must maintain good electrical grounding. Poor grounding represents a danger for the operator and may seriously affect the instrument performance.

Do not connect the Vial Loader to lines feeding devices of a heavy duty nature, such as motors, UV lamps, refrigerators, and other devices that can generate disturbances.

If other instruments, such as a computer or printer, have to be connected to the same electrical line as the Vial Loader, ensure the electrical line is capable of withstanding electrical consumptions by calculating the total absorption.

ATTENTION La ligne électrique et les connexions entre les instruments doivent maintenir une bonne mise à la terre électrique. Une mauvaise mise à la terre représente un danger pour l'utilisateur et peut affecter sérieusement les performances de l'instrument.

Ne connectez pas le chargeur de flacon à des appareils d'alimentation robustes tels que des moteurs, des lampes UV, des réfrigérateurs et d'autres appareils susceptibles de générer des perturbations.

Si d'autres instruments, tels qu'un ordinateur ou une imprimante, doivent être connectés à la même ligne électrique que le chargeur de flacon, assurez-vous que la ligne électrique est capable de supporter les consommations électriques en calculant l'absorption totale.

WARNING This instrument is electrically powered, and therefore all electrical connections must be provided with good grounding. Poor grounding can represent a danger to the operator and adversely affect instrument efficiency.
DO NOT manually move the loader arms when the Vial Loader is powered On.

AVERTISSEMENT Cet instrument est alimenté électriquement. Les branchements électriques doivent être fournis avec une bonne mise à la terre. Une mauvaise mise à la terre peut représenter un danger pour l'utilisateur et peut affecter de manière négative l'efficacité de l'instrument.

NE déplacez PAS manuellement les bras du chargeur lorsque le chargeur de flacon est sous tension.

❖ To make the Vial Loader electrical connections

Note Both the electronic interfaces of the TriPlus 500 HS and Vial Loader include ports named TFS IN, TFS OUT, LAN, and GC.

Figure 67. Electrical Connections for TriPlus 500 HS and Vial Loader

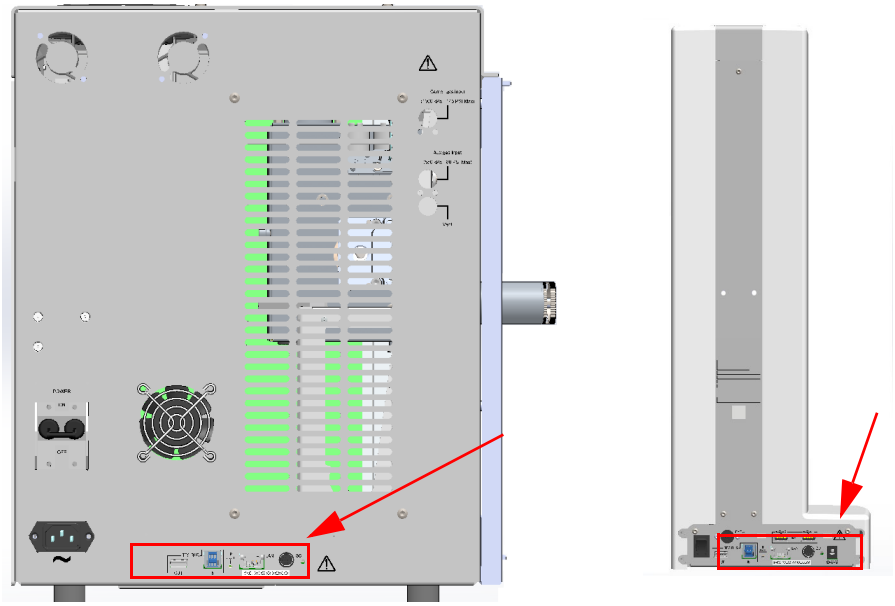
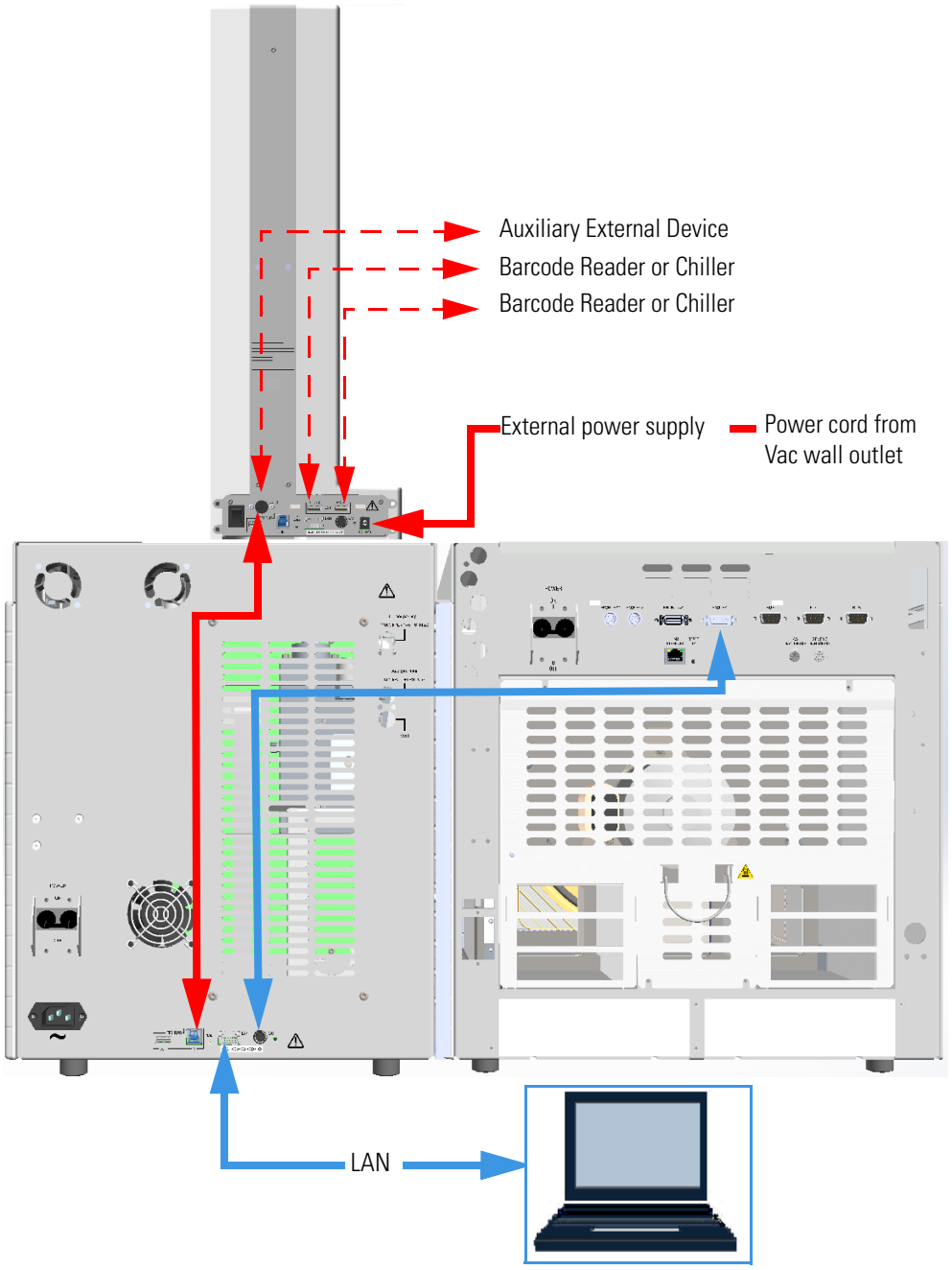


Figure 68, and Figure 69 show the typical electrical connections between the TriPlus 500 HS, the Vial Loader, and the other units of the system.

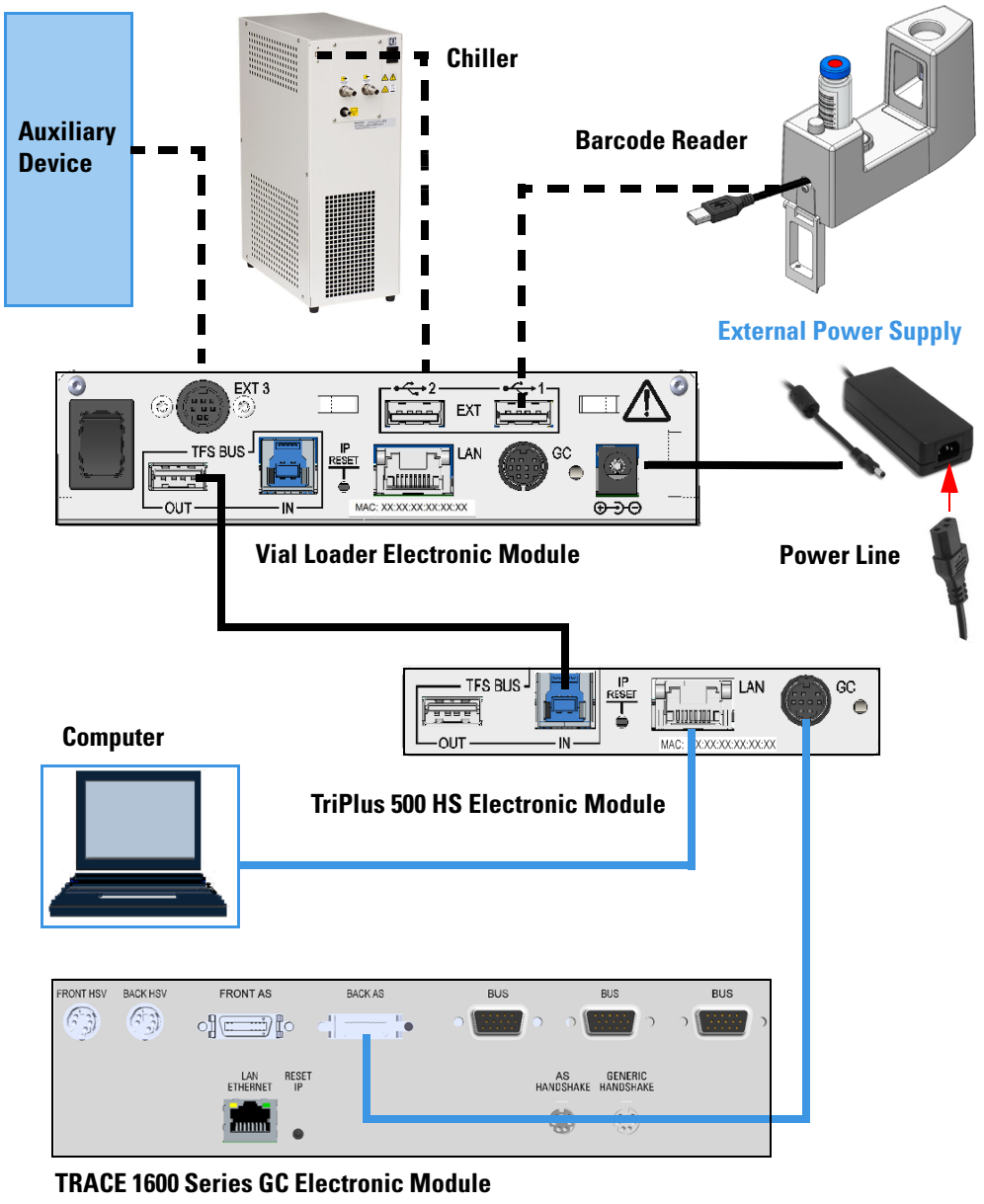
For more information about electrical connections, see "Making Electrical Connections" on page 40.

Figure 68. Typical Vial Loader Electrical Connections with TRACE 1600/1610 GC (1)



Note Red broken lines = new connections. Blue lines = existing connections.

Figure 69. Typical Vial Loader Electrical Connections with TRACE 1600/1610 GC (2)



Note **Black** broken lines = new connections. Blue lines = existing connections.

1. Using the cable provided, connect the **TFS BUS (IN)** port on the back of TriPlus 500 HS to the **TFS BUS (OUT)** port on the back of the Vial Loader.
2. Plug in the Vdc power cable of the external portable power supply into the jack marked ⊕⊃⊖ located on the back of the Vial Loader.
3. Connect the power cord of the external power supply to the mains outlet.

Figure 70. Typical Vial Loader Electrical Connections with TRACE 1300/1310 GC (1)

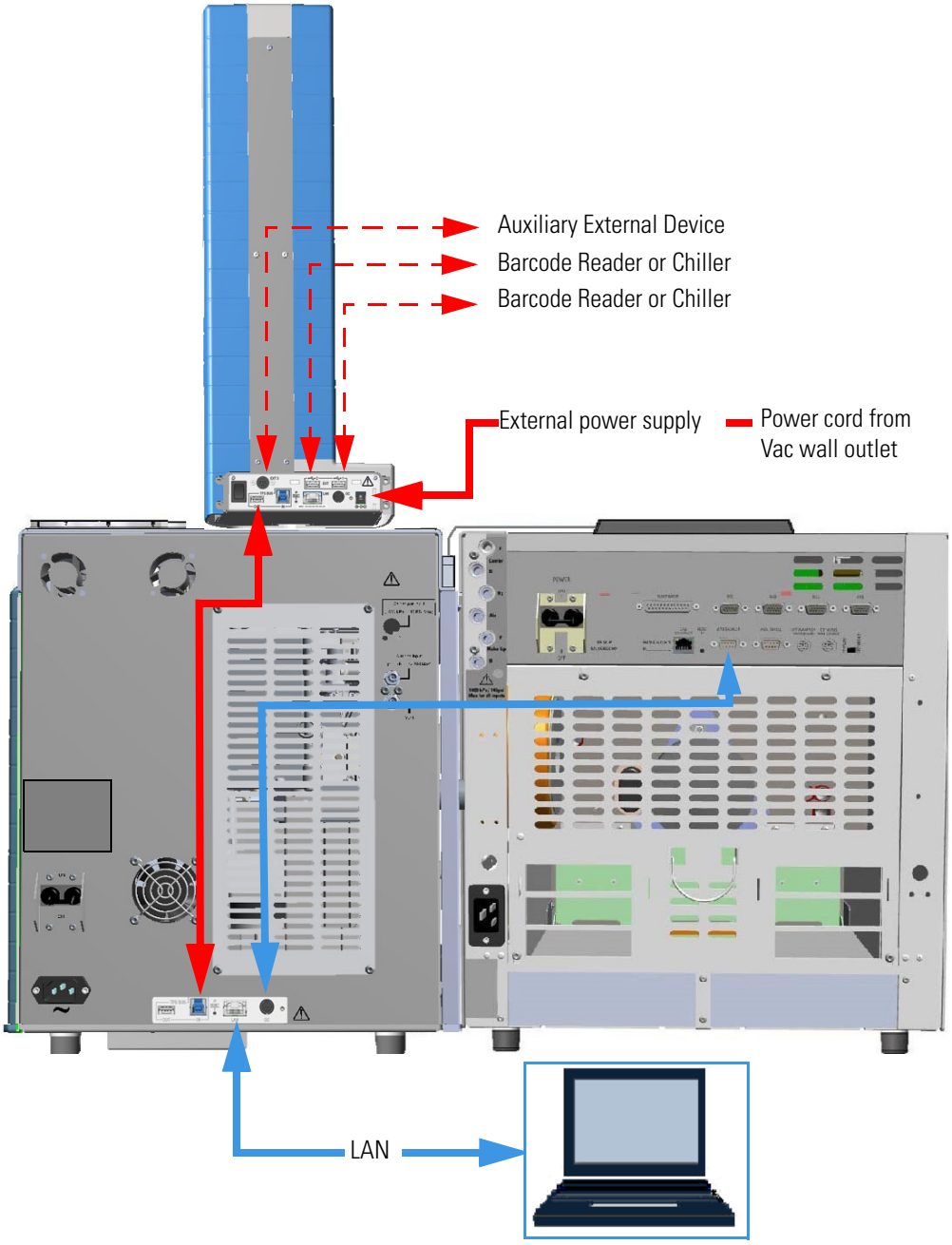
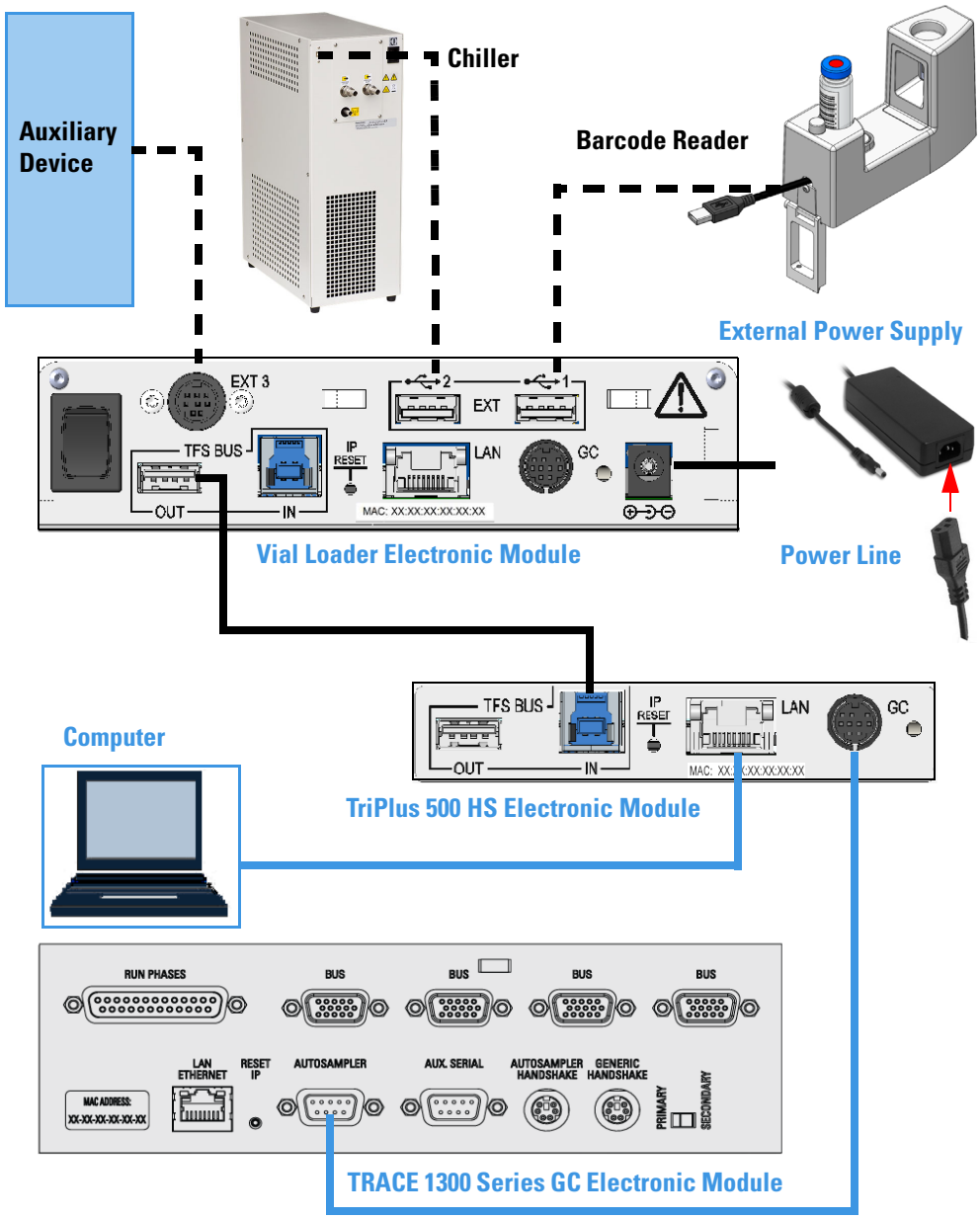


Figure 71. Typical Vial Loader Electrical Connections with TRACE 1300/1310 GC (2)



Note **Black** broken lines = new connections. Blue lines = existing connections.

1. Using the cable provided, connect the **TFS BUS (IN)** port on the back of TriPlus 500 HS to the **TFS BUS (OUT)** port on the back of the Vial Loader.
2. Plug in the Vdc power cable of the external portable power supply into the jack marked ⊕⊃⊖ located on the back of the Vial Loader.
3. Connect the power cord of the external power supply to the mains outlet.

Installing the Vial Trays

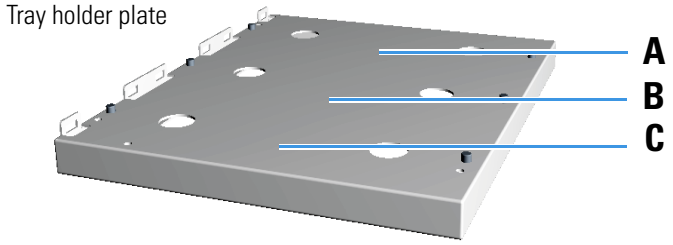
This section provides the instructions for installing the vial trays on the TriPlus 500 HS and on a TRACE 1300/1600 Series GC.

Installing the Vial Trays on TriPlus 500 HS

The installation of the vial trays requires the installation of the dedicated tray holder plate on the top cover of TriPlus 500 HS.

Figure 72 shows the tray holder plate provided.

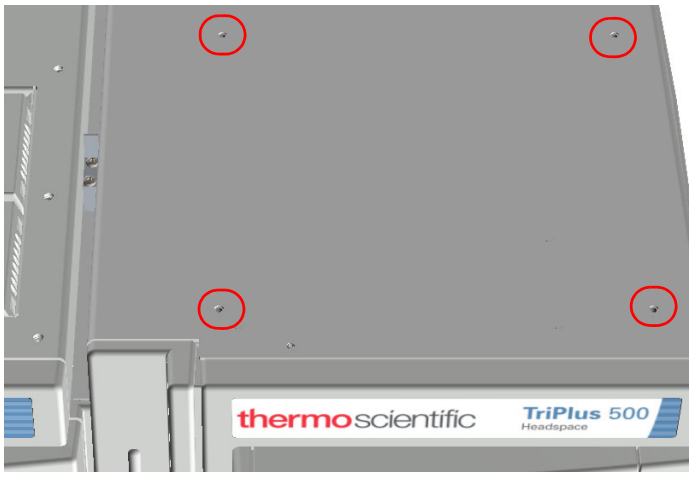
Figure 72. Vial Tray Installation on TriPlus 500 HS (1)



❖ **To install the vial trays on TriPlus 500 HS**

1. Make sure that the Vial Loader is powered **Off** and disconnected from the power source.
2. If necessary, manually move the arms of the Vial Loader to create enough space for the next operations.
3. Remove the four plastic caps from the top cover of the TriPlus 500 HS using a proper tool making sure to not scrape the cover. See the red circles in Figure 73.

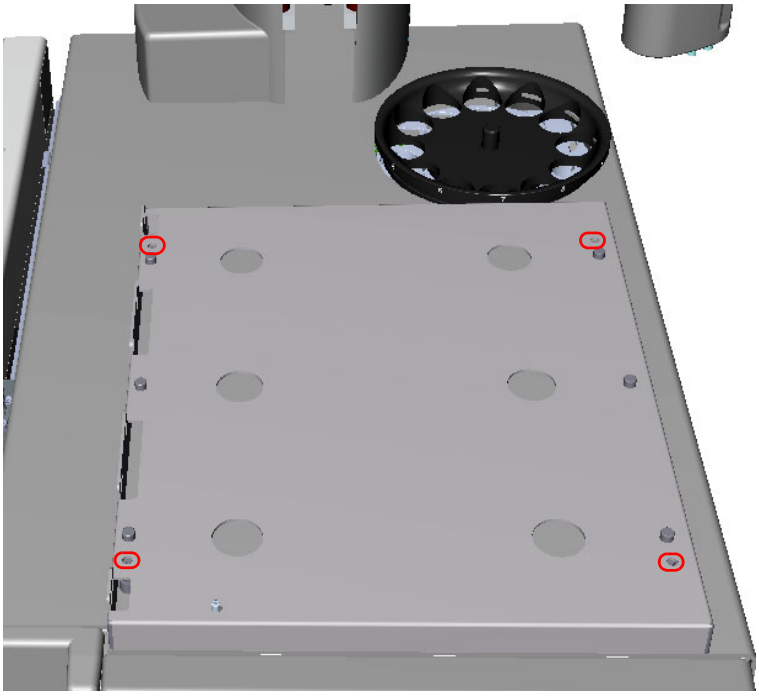
   Figure 73. Vial Tray Installation on TriPlus 500 HS (2)

4. Place the tray holder plate on the top cover aligning the fixing holes of the plate on the fixing holes of the top cover.

5. Using the T20 Torx head screwdriver, fix the tray holder plate on the top cover by screwing the four fixing screws. See the red circles in Figure 74.

Figure 74. Vial Tray Installation on TriPlus 500 HS (3)



6. Place the vial tray on the plate aligning the two holes, on the bottom of the sample tray, on the corresponding pins on the plate. See Figure 75, Figure 76, and Figure 77.

Figure 75. Vial Tray Installation on TriPlus 500 HS (4)

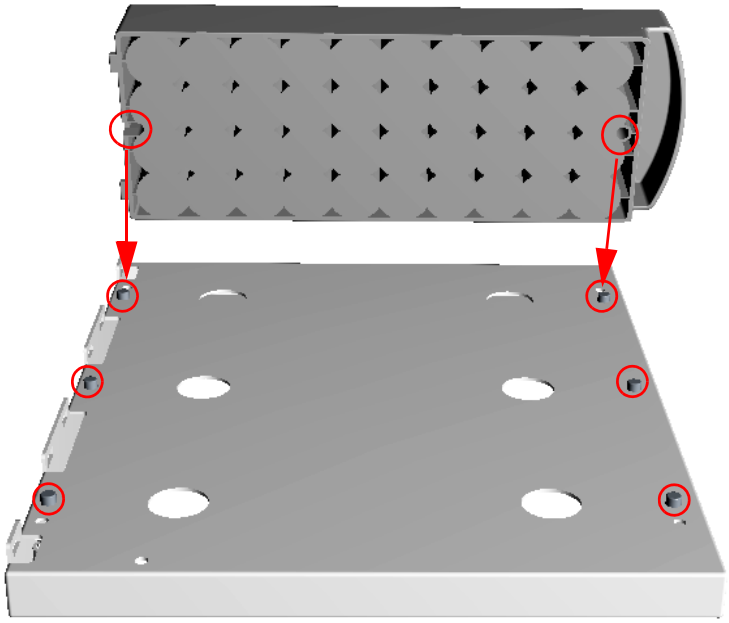


Figure 76. Vial Tray Installation on TriPlus 500 HS (5)

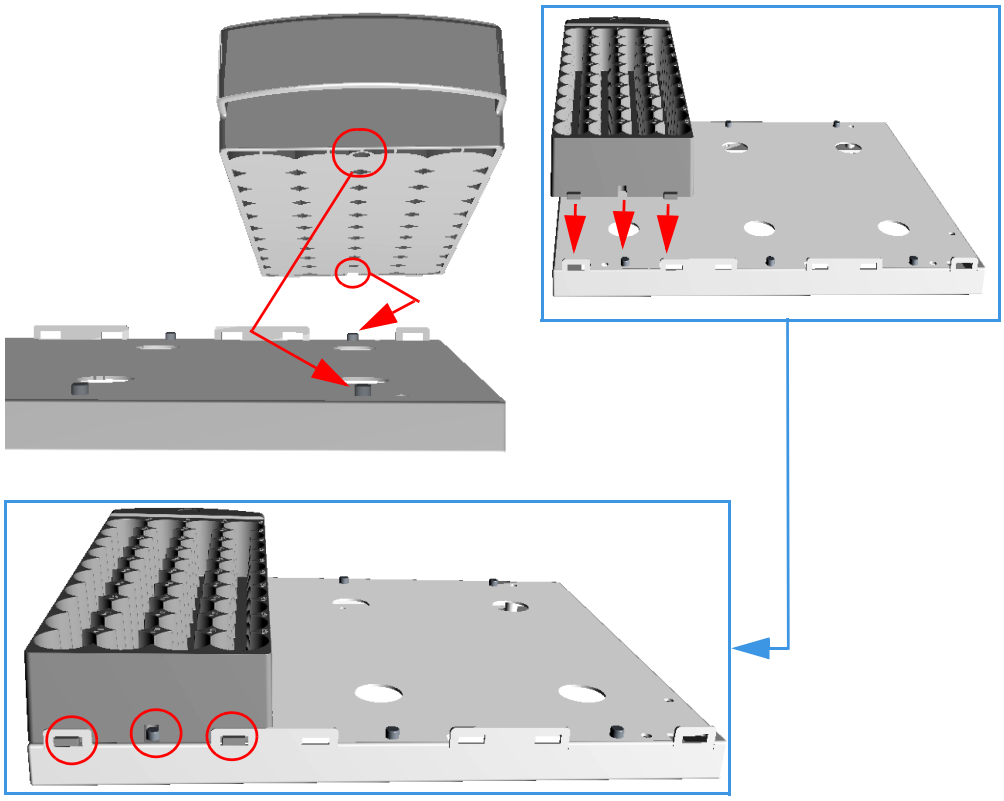


Figure 77. Vial Tray Installation on TriPlus 500 HS (6)

7. Place the vials into the vial trays. The result of the operation is shown in Figure 78.

Figure 78. Vial Tray Installation on TriPlus 500 HS (7)

Front view

Right side view

HS Vial Tray C
HS Vial Tray B
HS Vial Tray A

CAUTION DO NOT place 10 mL and 20/22 mL vials into the same vial tray. If 10 mL and 20/22 mL vials are used simultaneously, the 20/22 mL vials can only be placed on Vial Tray C.

ATTENTION Ne placez PAS les flacons de 10 ml et 20/22 ml dans le même plateau pour flacons. Si des flacons de 10 ml et 20/22 ml sont utilisés simultanément, les flacons de 20/22 ml peuvent être placés uniquement sur le plateau pour flacons C.

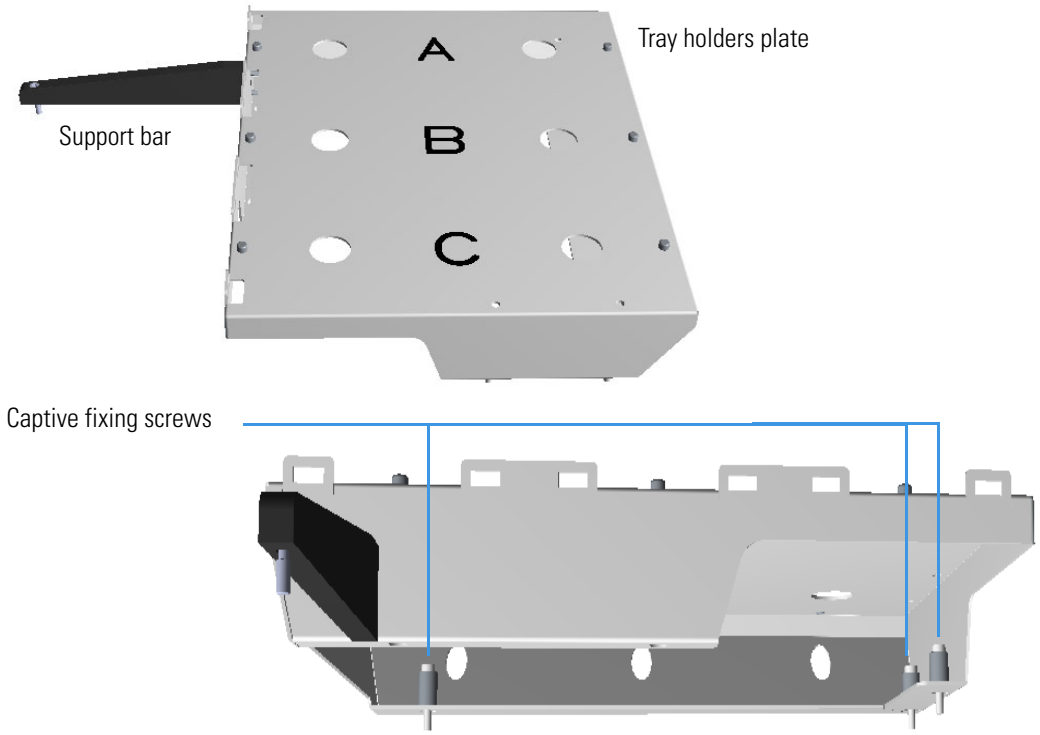
8. Perform the **Tray Holder Calibration**. See "Calibrating the Tray Holder" on page 81.

Installing Vial Trays on a TRACE 1300/1600 Series GC

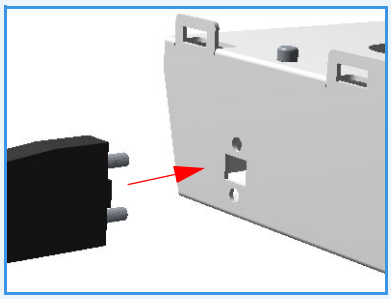
Installation of the vial trays requires the installation of the dedicated tray holder plate with the support bar on the top cover of a TRACE 1300/1600 Series GC. See Figure 79.

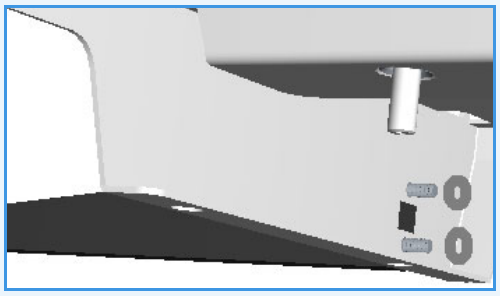
Tip If your TP 500 HS is being with an AI/AS 1610, do not route cables under the GC tray holder. Leave any cables to the outside of the GC tray holder and route them to the rear of the GC by positioning them between the tray holder and the vial loader.

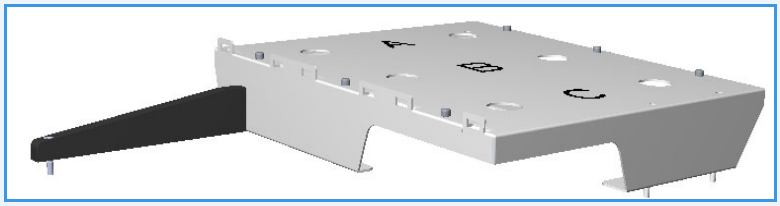
Figure 79. Spacers and Tray Holder Plate for the TRACE 1300/1600 Series GC



Note Fix the support bar on the tray holder plate by using the two M4 nuts provided as shown in the following images.



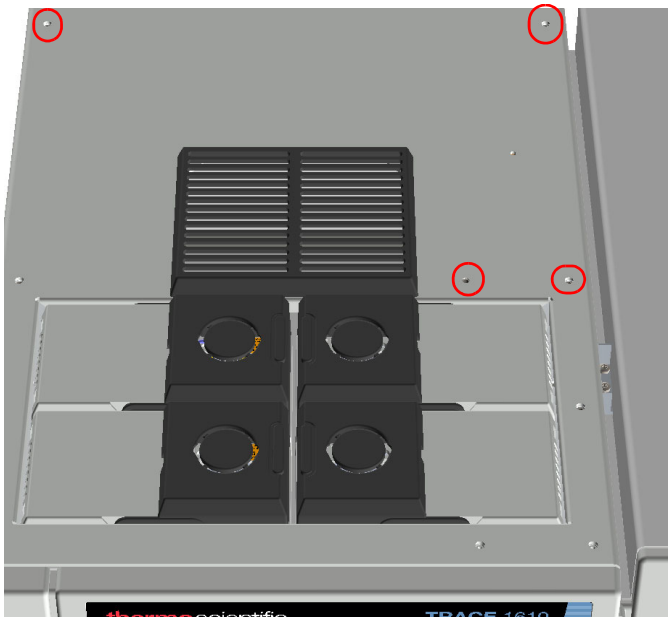




❖ To install the vial trays on a TRACE 1300/1600 Series GC

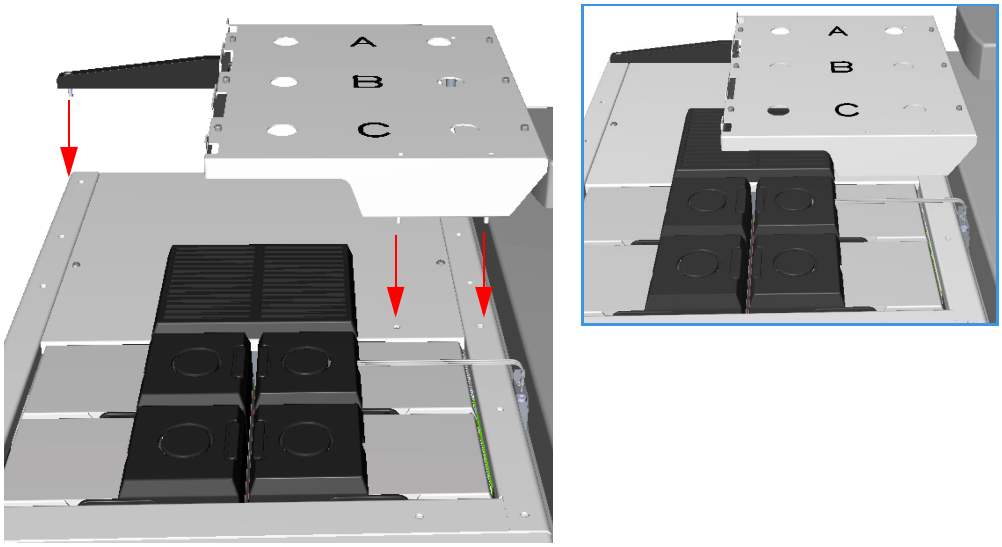
1. Make sure that the TRACE 1300/1600 Series GC is powered Off and disconnected from the power source.
2. If necessary, manually move the arms of the Vial Loader, to create enough space for the next operations.
3. Remove the plastic caps from the top cover of the TRACE 1300/1600 Series GC using a proper tool, making sure not to scrape the cover. See the red circles in Figure 80.

Figure 80. Vial Tray Installation on a TRACE 1300/1600 Series GC (1)



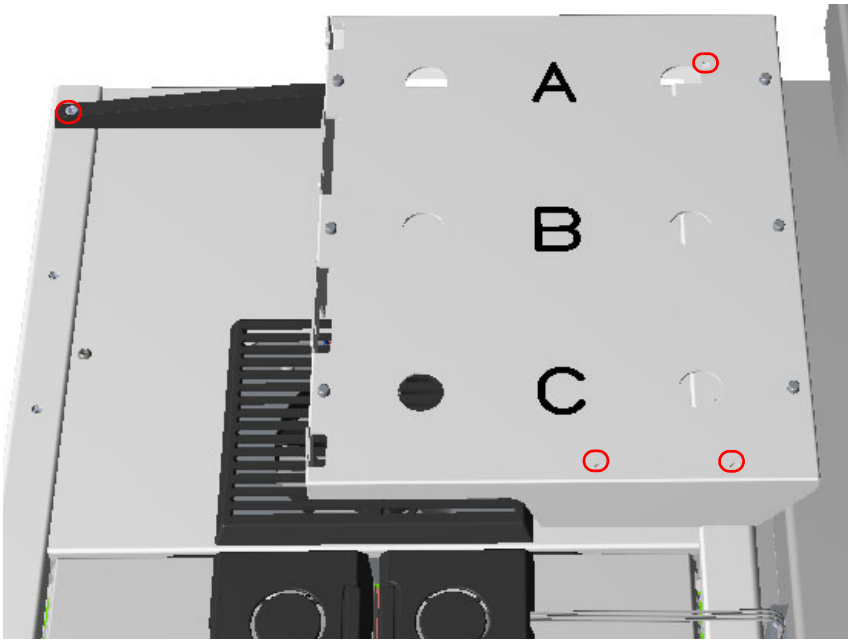
4. Place the tray holder plate on the top cover aligning the captive fixing screws and the support bar fixing screws on the corresponding fixing holes of the cover. See Figure 81.

Figure 81. Vial Tray Installation on a TRACE 1300/1600 Series GC (2)



5. Using the T20 Torx head screwdriver fix the tray holder plate on the top cover inserting the screwdriver into the holes provided on the plate for screwing the relevant captive fixing screw, then fix the support bar by screwing in the relevant fixing screw. See the red circles in Figure 82.

Figure 82. Vial Tray Installation on a TRACE 1300/1600 Series GC (3)



6. Place the vial tray on the plate by aligning the two holes on the bottom of the vial tray on the corresponding pins on the plate. See Figure 83, Figure 84, and Figure 85.

Figure 83. Vial Tray Installation on a TRACE 1300/1600 Series GC (4)

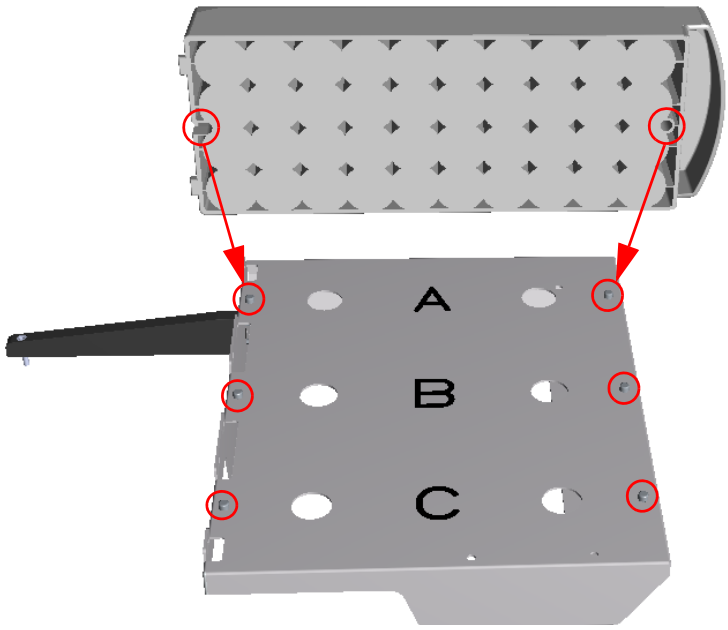


Figure 84. Vial Tray Installation on a TRACE 1300/1600 Series GC (5)

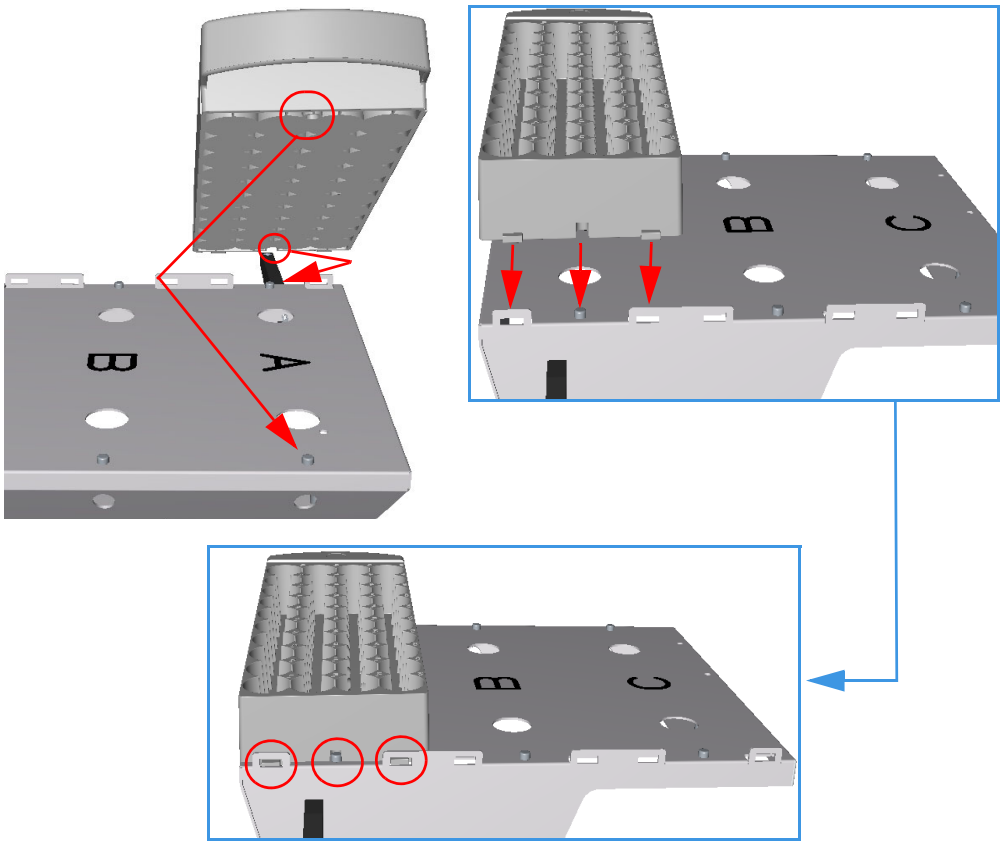
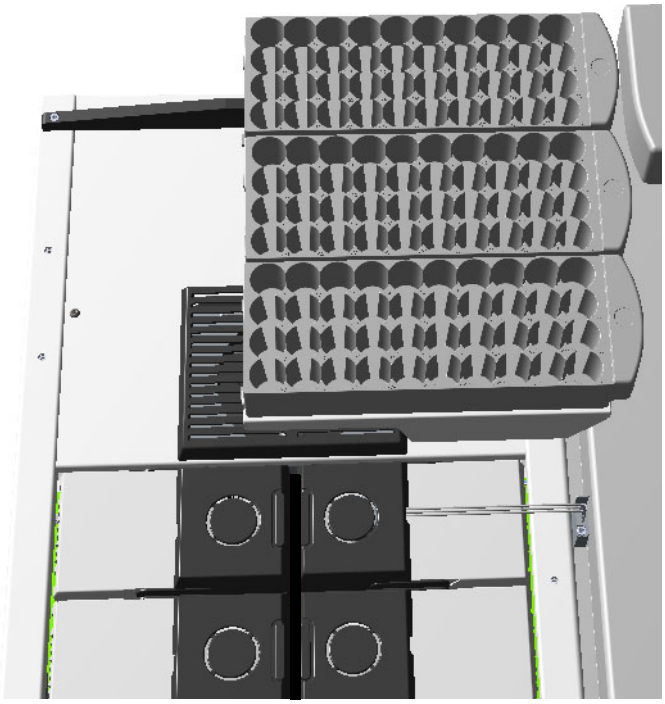
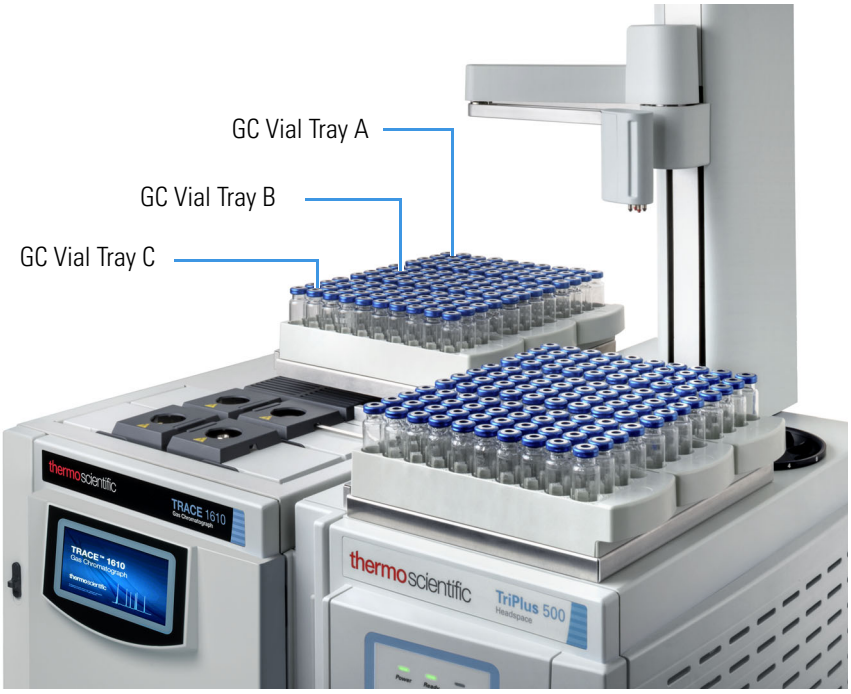


Figure 85. Vial Tray Installation on a TRACE 1300/1600 Series GC (6)



7. Place the vials into the vial trays. The result of the operation is shown in Figure 86.

Figure 86. Vial Tray Installation on a TRACE 1600 Series GC (7)



CAUTION DO NOT place 10 mL and 20/22 mL vials into the same vial tray. If 10 mL and 20/22 mL vials are used simultaneously, the 20/22 mL vials can only be placed on Vial Tray A.

ATTENTION Ne placez PAS les flacons de 10 ml et 20/22 ml dans le même plateau pour flacons. Si des flacons de 10 ml et 20/22 ml sont utilisés simultanément, les flacons de 20/22 ml peuvent être placés uniquement sur le plateau pour flacons A.

8. Perform the Tray Holder Calibration. See "Calibrating the Tray Holder" on page 81.

Calibrating the Tray Holder

This section provides the instructions for calibrating the motion of the Vial Loader on the tray holder plates, either positioned on the TriPlus 500 HS or the TRACE 1300/1600 Series GC.

CAUTION The purpose of this procedure is to calibrate the motion of the Vial Loader on the holder plate without the vial trays installed.

Before starting the calibration routine, make sure that all the vial trays are removed from the tray holder plate, and all the vials are removed from the 12-seat rotating carousel.

ATTENTION L'objectif de cette procédure est de calibrer le mouvement du chargeur de flacon sur la plaque support sans les plateaux pour flacons installés.

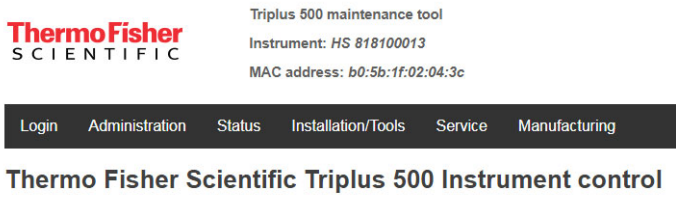
Avant de commencer la calibration de routine, assurez-vous que tous les plateaux pour flacons sont retirés de la plaque porte-plateaux. Vérifiez également que les flacons sont retirés du carrousel rotatif à 12 places.

❖ To calibrate the tray holder

1. Take note of the **Actual IP** address of the TriPlus 500 HS to calibrate.
2. Open your Internet browser. Access the Thermo Scientific™ Web Server using the following address:

   https://actual IP address

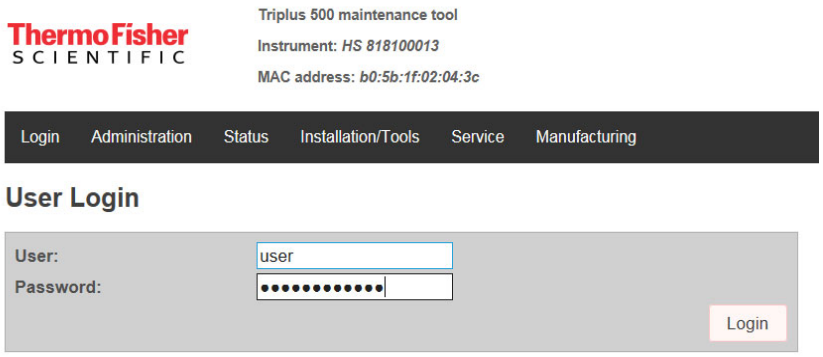
   for example: https://10.209.90.100
3. Press **Enter** and wait until the **Web Server Main Page** displays.



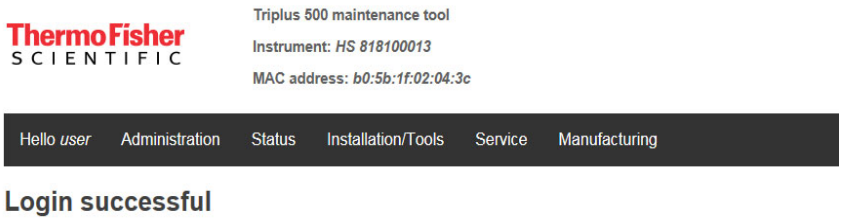
CAUTION This page has three access levels: **User**, **Service,** and **Manufacturing**. Each level is accessible with a specific User name and Password. The operator can only use the **User** level.

ATTENTION Cette page a trois niveaux d'accès : **utilisateur**, **service** et **fabrication**. Chaque niveau est accessible à l'aide d'un nom d'utilisateur et d'un mot de passe spécifiques. L'utilisateur peut uniquement utiliser le niveau utilisateur.

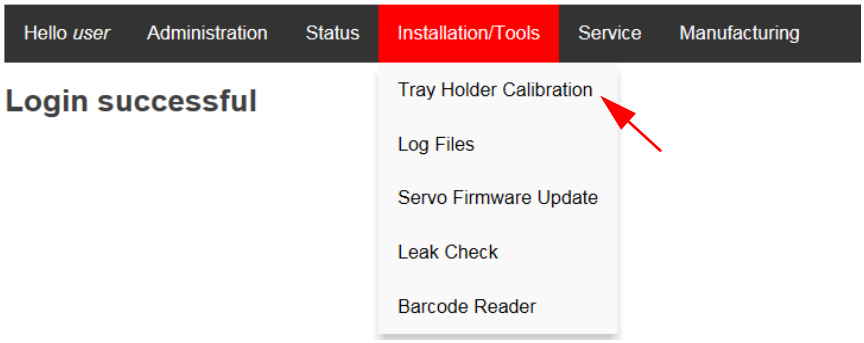
4. In the menu bar select **Login**, then perform the **User Login** typing the following **User** name and **Password**:
   - User name = **user**
   - Password = **ThermoFisher**



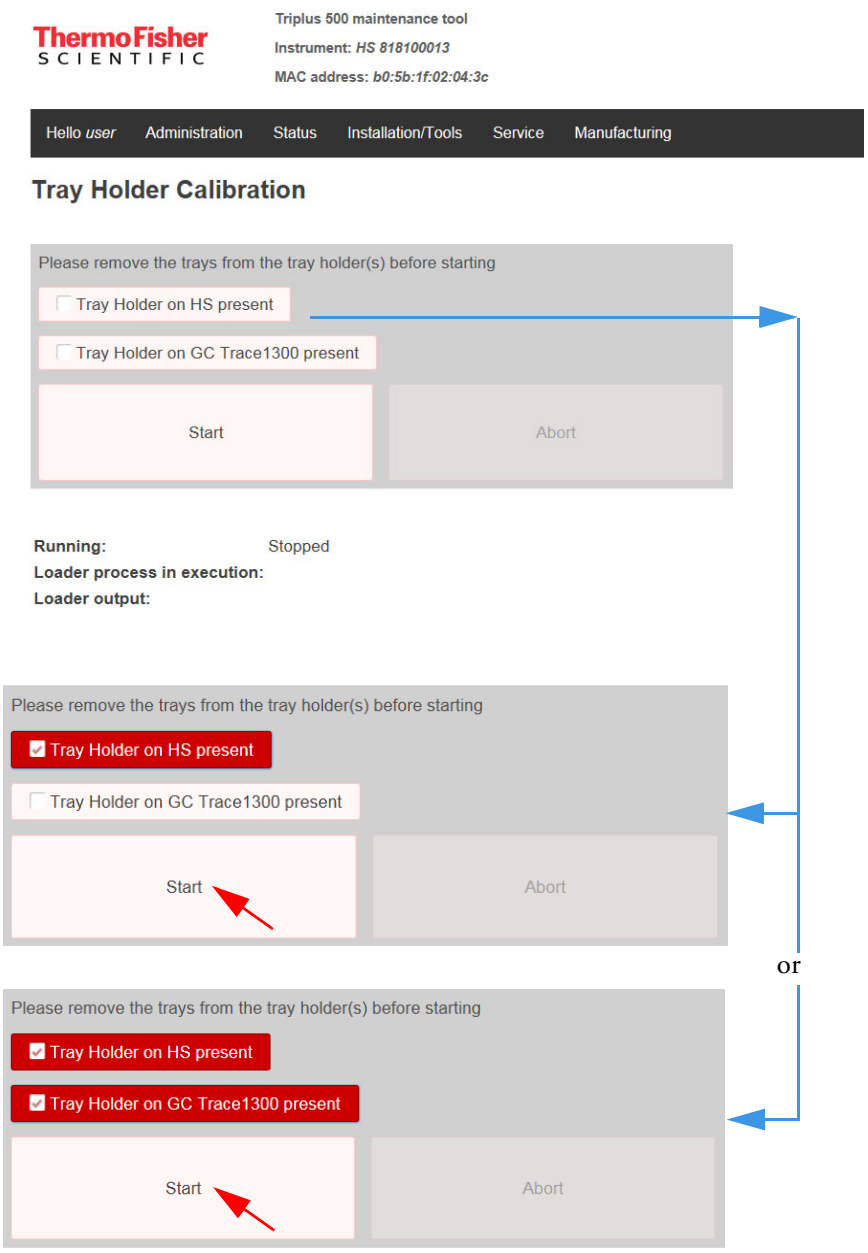
5. Press **Login**. If the login is correct the following page displays.



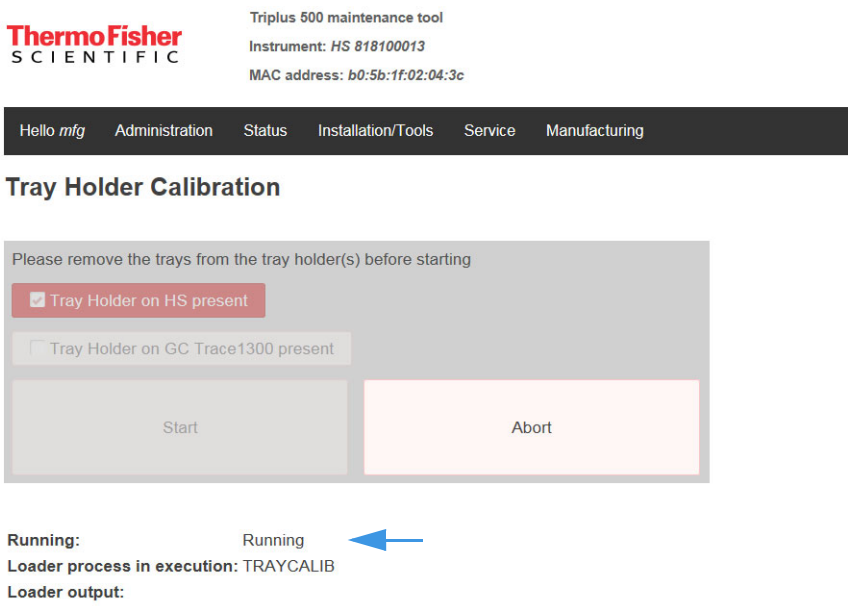
6. Select **Installation/Tool** and click **Tray Holder Calibration**.



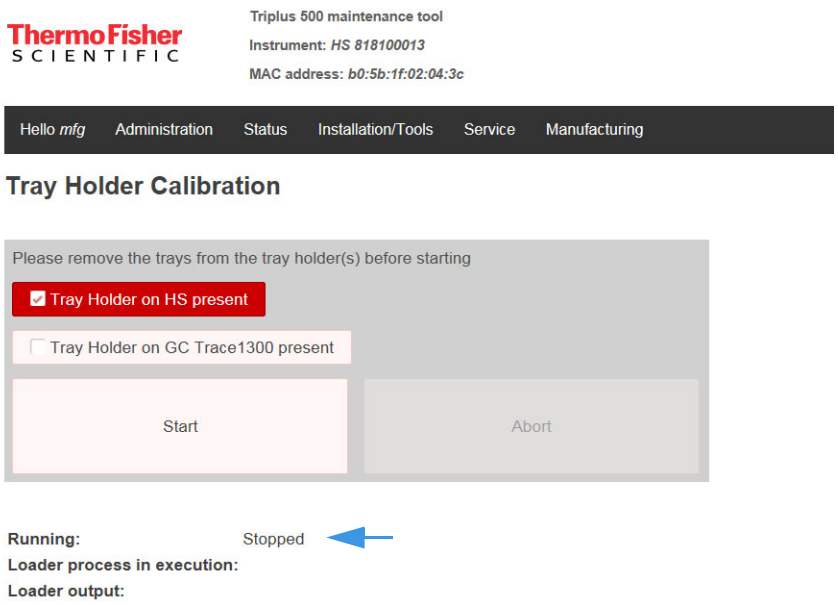
7. The system asks to remove all the vial trays from the tray holder plate. When ready, select where the tray holders are present by selecting the corresponding check box.


ThermoFisher SCIENTIFIC
Triplus 500 maintenance tool
Instrument: HS 818100013
MAC address: b0:5b:1f:02:04:3c
Hello user
Administration
Status
Installation/Tools
Service
Manufacturing
Tray Holder Calibration
Please remove the trays from the tray holder(s) before starting
Tray Holder on HS present
Tray Holder on GC Trace1300 present
Start
Abort
Running: Stopped
Loader process in execution:
Loader output:
Please remove the trays from the tray holder(s) before starting
Tray Holder on HS present
Tray Holder on GC Trace1300 present
Start
Abort
or
Please remove the trays from the tray holder(s) before starting
Tray Holder on HS present
Tray Holder on GC Trace1300 present
Start
Abort

8. For example select **Tray Holder on HS present** check box. When ready, select **Start**. The **Tray Holder Calibration** procedure begins.



9. The Vial Loader performs the automated calibration routine at the end of which the Vial Loader goes back to home position and the routine is automatically stopped.

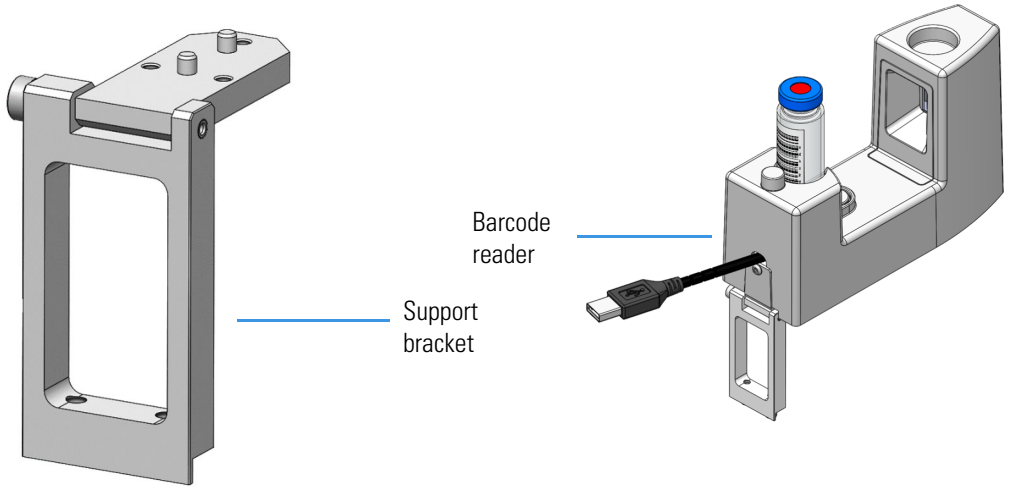


10. Once calibration is complete, exit the Web Server by selecting **Hello *user* > Logout**. Mount/remount the vial trays previously removed as described in the section Installing the Vial Trays. For more details about using the **Web Server**, refer to Chapter 7 of the *TriPlus 500 Headspace Sampler User Guide*.

Installing the Barcode Reader

The installation of the Barcode Reader requires the use of a dedicated support bracket. See Figure 87.

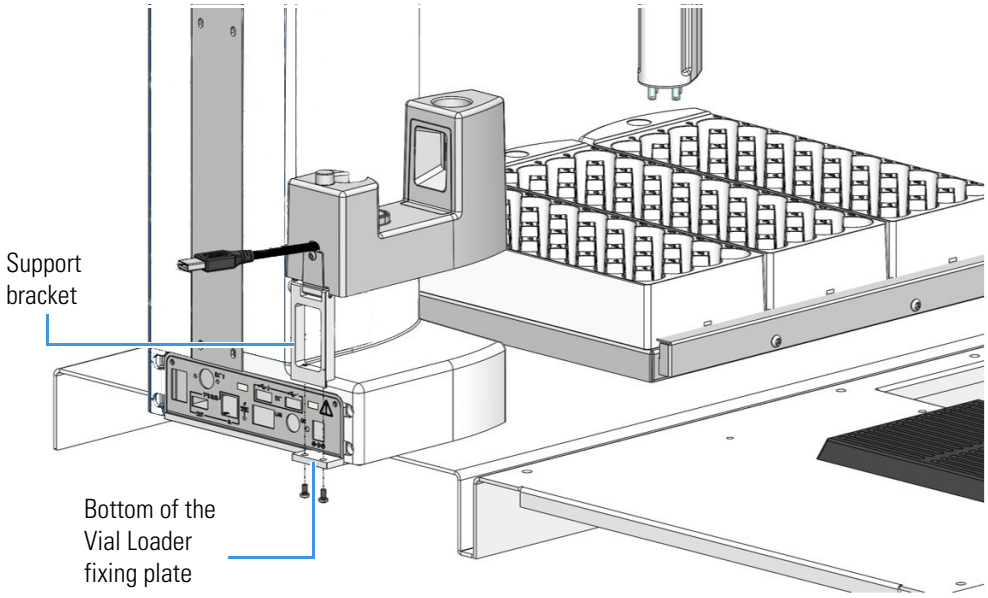
Figure 87. Barcode Reader Support Bracket



❖ **To install the Barcode Reader**

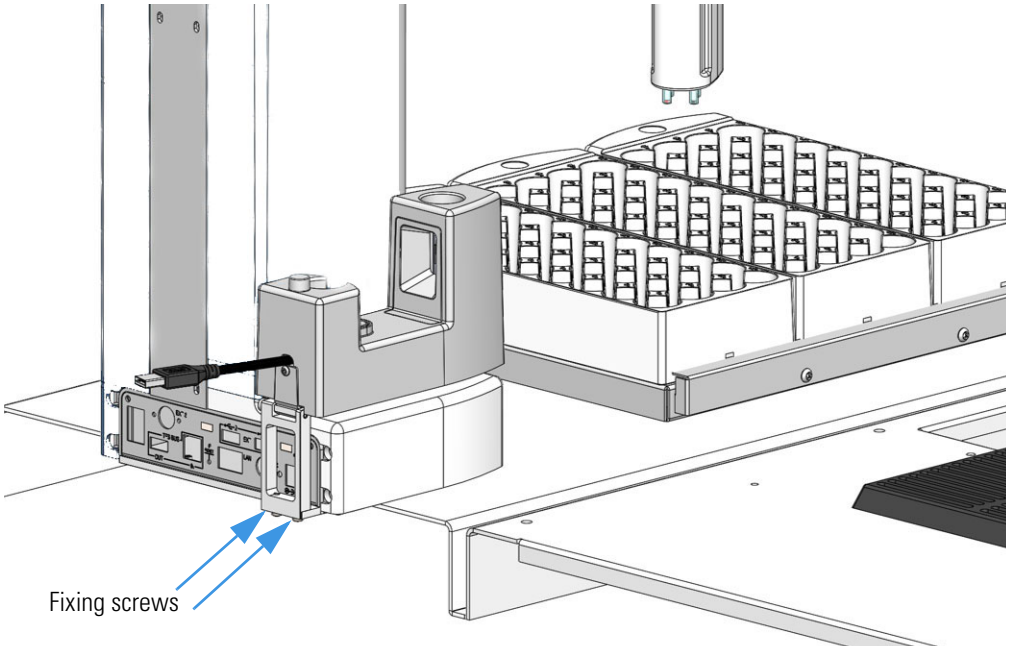
1. Place the Barcode Reader's support bracket against the back of the Vial Loader aligning the bottom fixing holes to the holes provided on the bottom of the Vial Loader fixing plate. See Figure 88.

Figure 88. Barcode Reader Installation (1)



2. Fix the support bracket by using the M3 x 6 mm screws provided. See Figure 89.

Figure 89. Barcode Reader Installation (2)



3. Connect the USB cable coming from the back of the Barcode Reader to the USB port marked **EXT** ⇆ **1** (or **2**) on the Vial Loader electronic module. In the examples of Figure 90 and Figure 91 the USB port **EXT 1** is used.

Figure 90. Barcode Reader Installation (3)

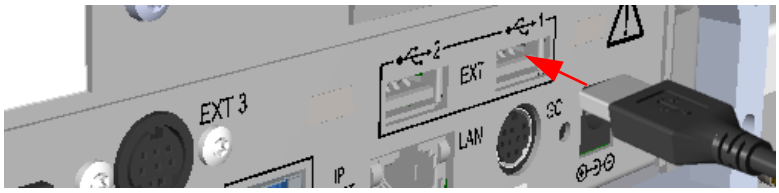


Figure 91. Barcode Reader Installation (4)

Installing the Heated/Cooled Tray

The Heated/Cooled Tray is an optional accessory for heating/cooling the vials on the vial tray through the circulation of a fluid underneath the dedicated heated/cooled tray holder plate. See Figure 93 and Figure 93.

Figure 92. Vial Trays and Heated/Cooled Tray Holder Components

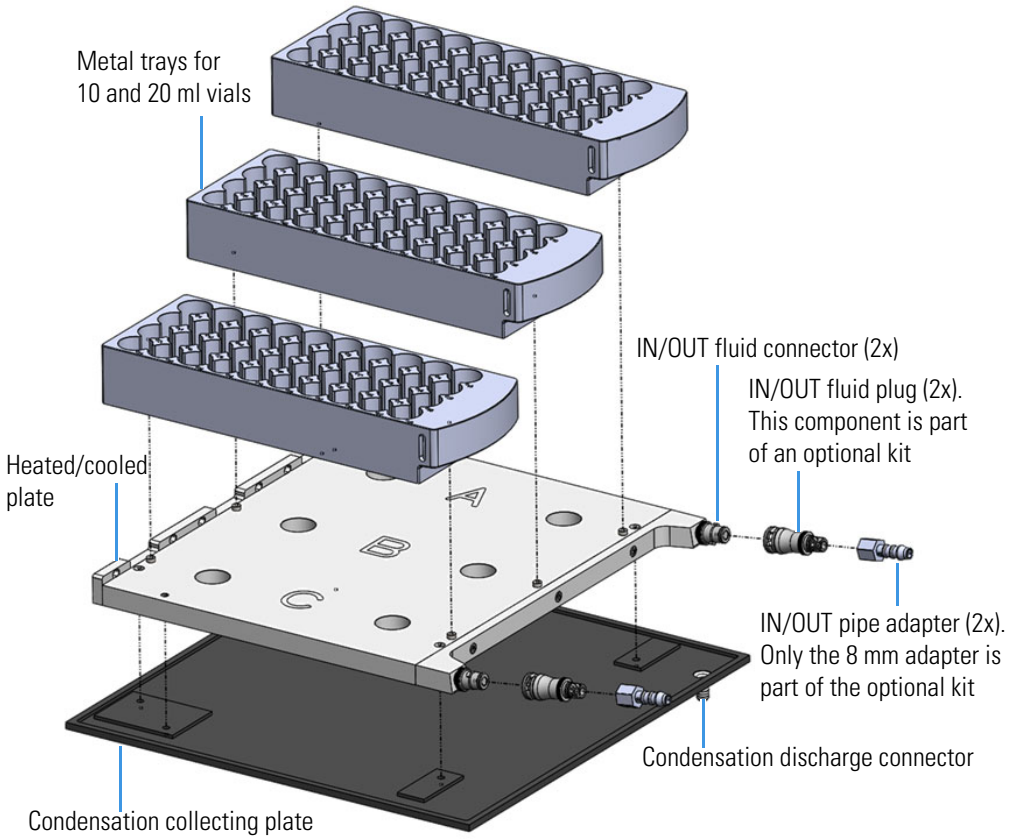


Figure 93. Heated/Cooled Tray Holder Plate Assembly

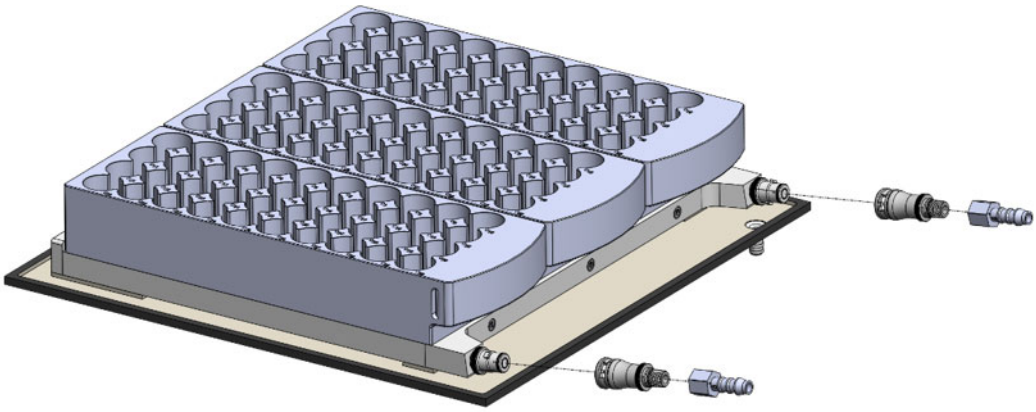
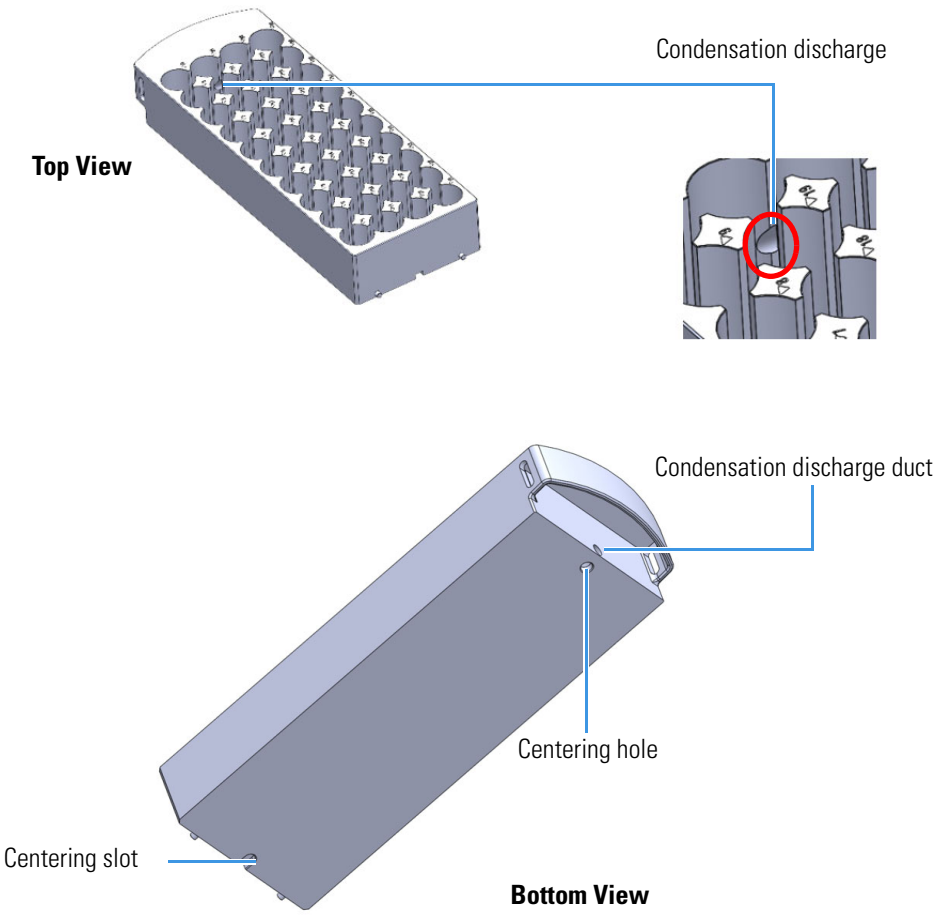


Figure 94. Heated/Cooled 40-position Vial Tray



To install the heated/cooled vial trays and connect the recirculating chiller, follow the instructions in the following sections:

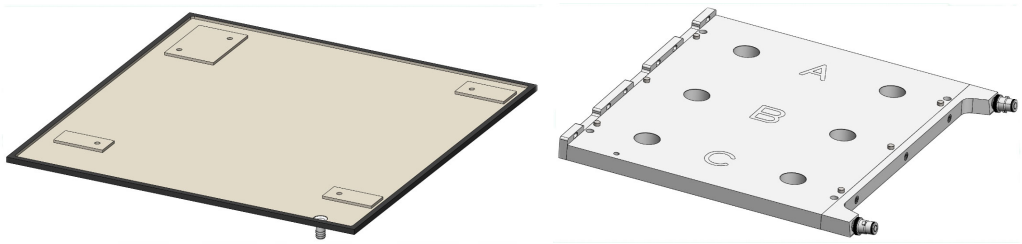
"Installing the Heated/Cooled Vial Trays on the TriPlus 500 HS" on page 92

"Connecting the Recirculating Chiller" on page 98

Installing the Heated/Cooled Vial Trays on the TriPlus 500 HS

The installation of the heated/cooled vial trays requires the installation of the dedicated heated/cooled tray holder plate on the top cover of the TriPlus 500 HS. See Figure 95.

Figure 95. Heated/Cooled Tray Holder Components

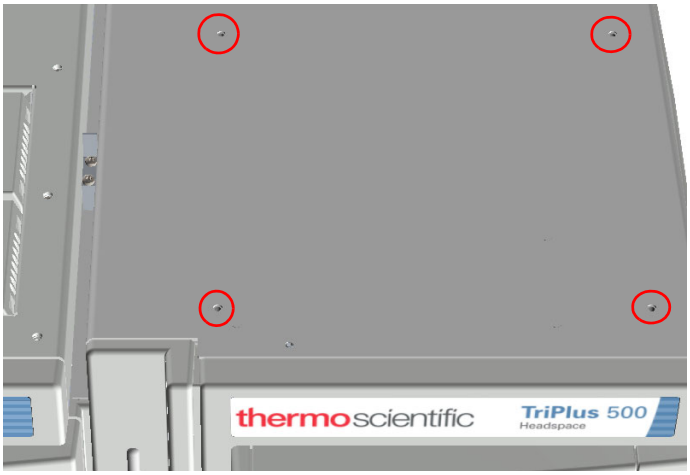


Condensation collecting plate | Heated/cooled tray holder plate

❖ **To install the heated/cooled tray holder plate on the TriPlus 500 HS**

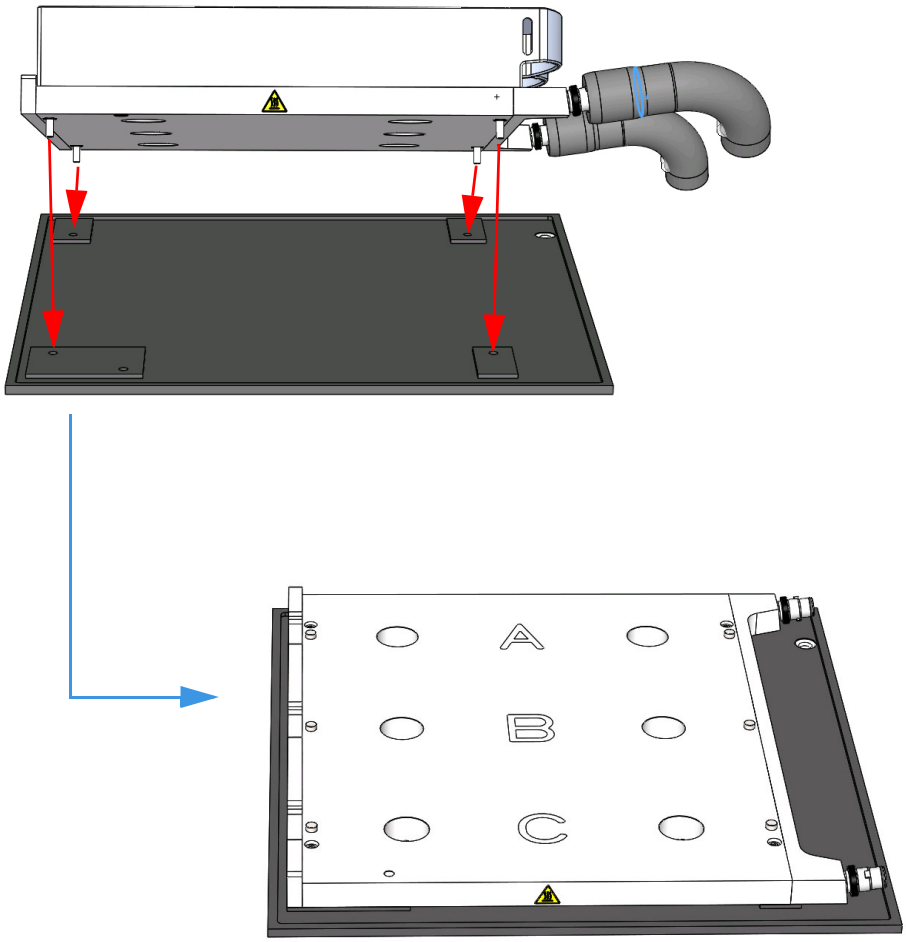
1. Make sure the Vial Loader is powered Off and disconnected from the power source.
2. If necessary, manually move the arms of the Vial Loader to create enough space for the next operations.
3. From the top cover of the TriPlus 500 HS remove the four plastic caps using a proper tool making sure to not scrape the cover. See the red circles in Figure 96.

   Figure 96. Heated/Cooled Vial Tray Installation on TriPlus 500 HS (1)



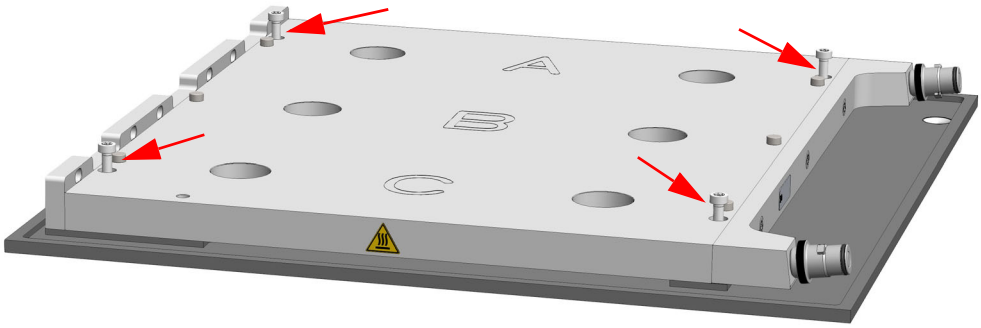
4. Place the condensation collecting plate on the top cover aligning the fixing holes of the plate on the fixing holes of the cover. See the red circles.
5. Place and align the heated/cooled tray holder plate and the four screws provided on the fixing holes of the condensation collecting plate. See Figure 97.

Figure 97. Heated/Cooled Vial Tray Installation on TriPlus 500 HS (2)



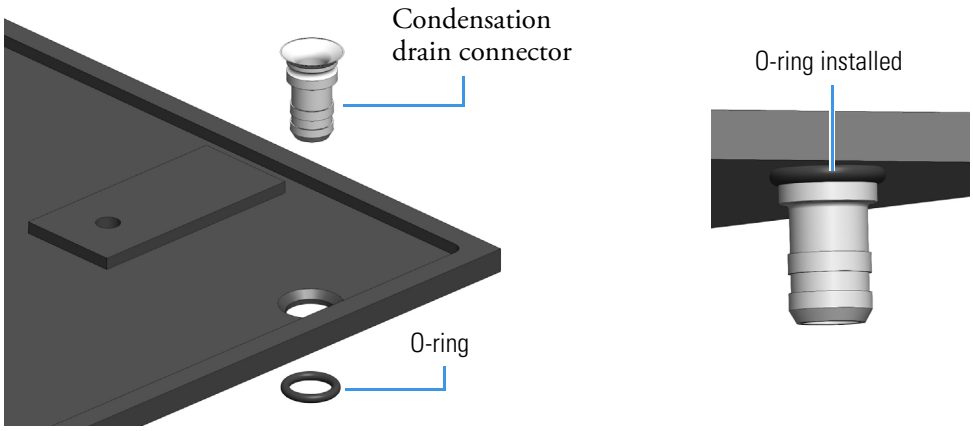
6. Using a T20 Torx head screwdriver fix the assembled plates on the top cover by screwing the four screws provided. Refer to Figure 98 for the four screw locations.

Figure 98. Heated/Cooled Vial Tray Installation on TriPlus 500 HS (3)



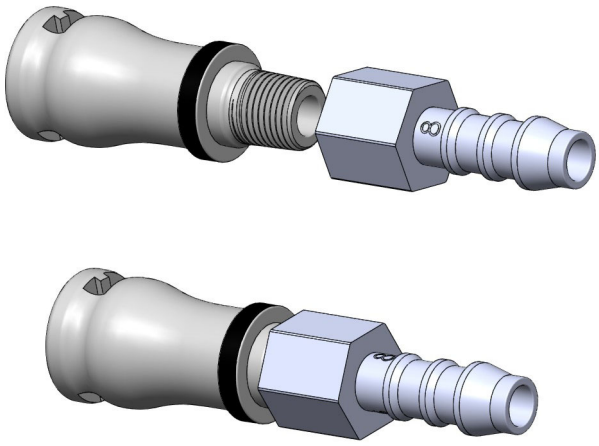
7. Connect the condensation drain connector. See Figure 99.

Figure 99. Heated/Cooled Vial Tray Installation on TriPlus 500 HS (4)



8. Assemble the tube connectors. See Figure 100.

Figure 100. Heated/Cooled Vial Tray Installation on TriPlus 500 HS (5)

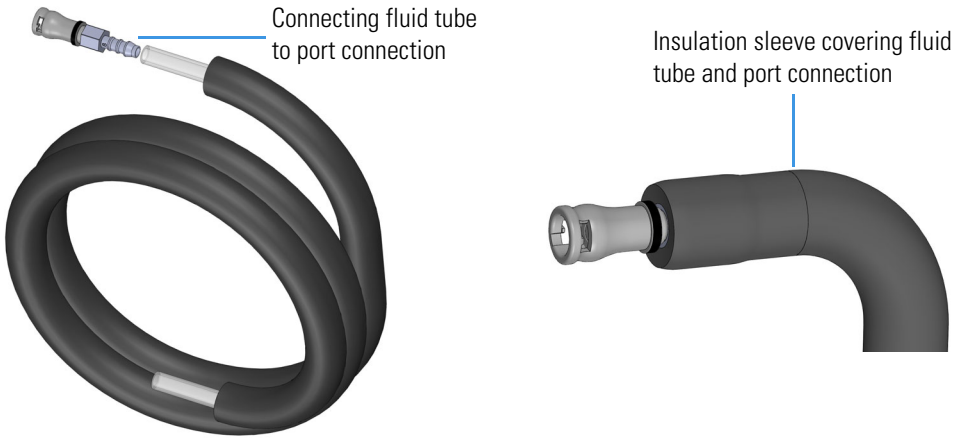


9. Connect without distinction each IN/OUT fluid tube to a port located on the heated/cooled tray holder plate. Cover the fluid tube and port connection with an insulation sleeve.

Note An insulation sleeve must cover the fluid tube and port connections. See Figure 101

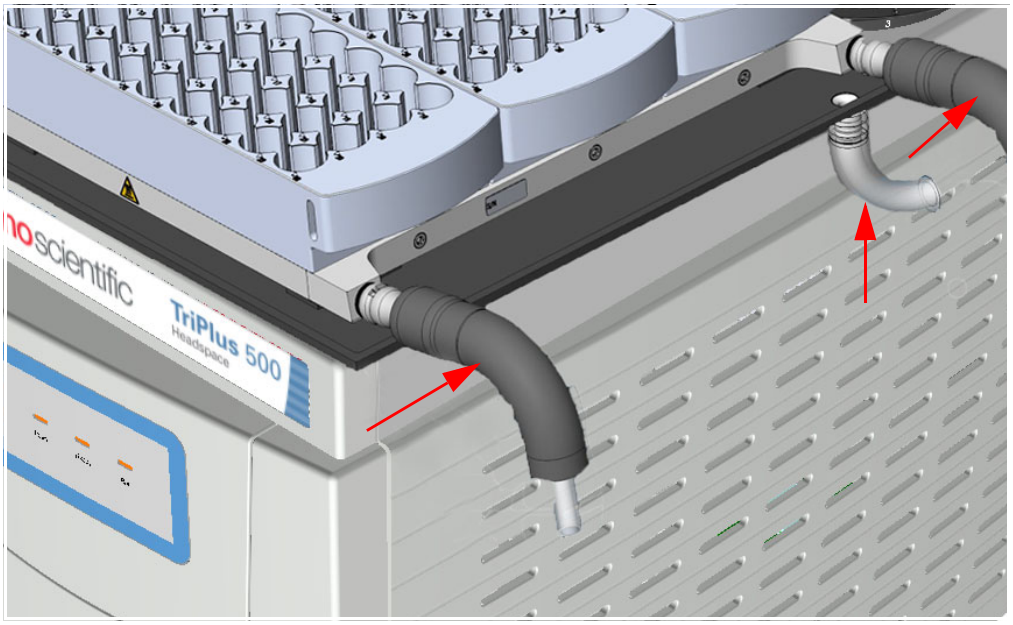
It also suggested to connect a condensation discharge tube to the port on the bottom of the condensation collecting plate. See Figure 102 for insulation sleeve and condensation discharge tube locations.

Figure 101. Heated/Cooled Vial Tray Installation on TriPlus 500 HS (6)



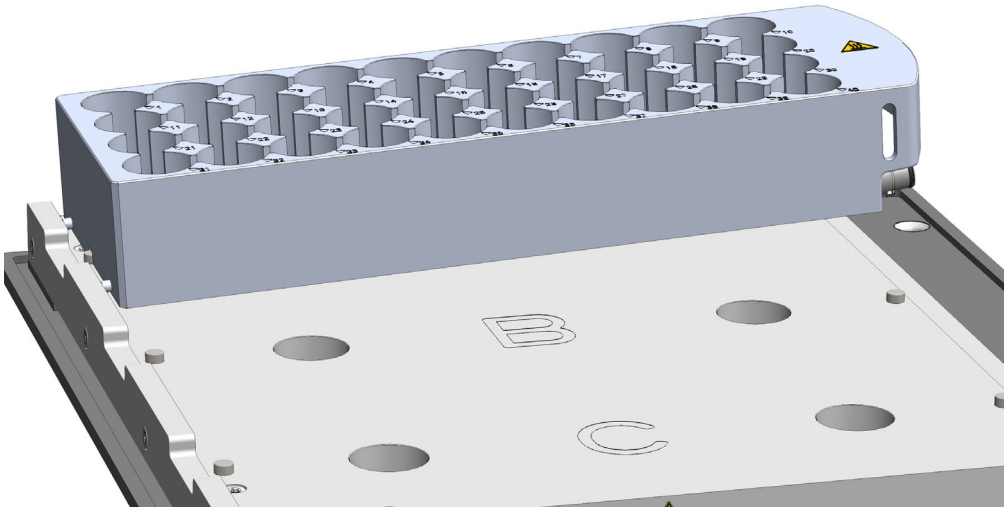
The IN/OUT fluid tubes will be connected to the IN/OUT ports of the recirculating chiller, while the condensation discharge tube can be inserted in a tank on the floor for condensation collection.

Figure 102. Heated/Cooled Vial Tray Installation on TriPlus 500 HS (7)



10. Place the metallic vial tray on the plate. See Figure 103, Figure 104, and Figure 105.
    a. Insert the sample tray pins into the corresponding holes on the left side of the plate.

Figure 103. Heated/Cooled Vial Tray Installation on TriPlus 500 HS (8)



b. Align the two holes on the bottom of the vial tray, to the corresponding pins on the plate.

Figure 104. Heated/Cooled Vial Tray Installation on TriPlus 500 HS (9)

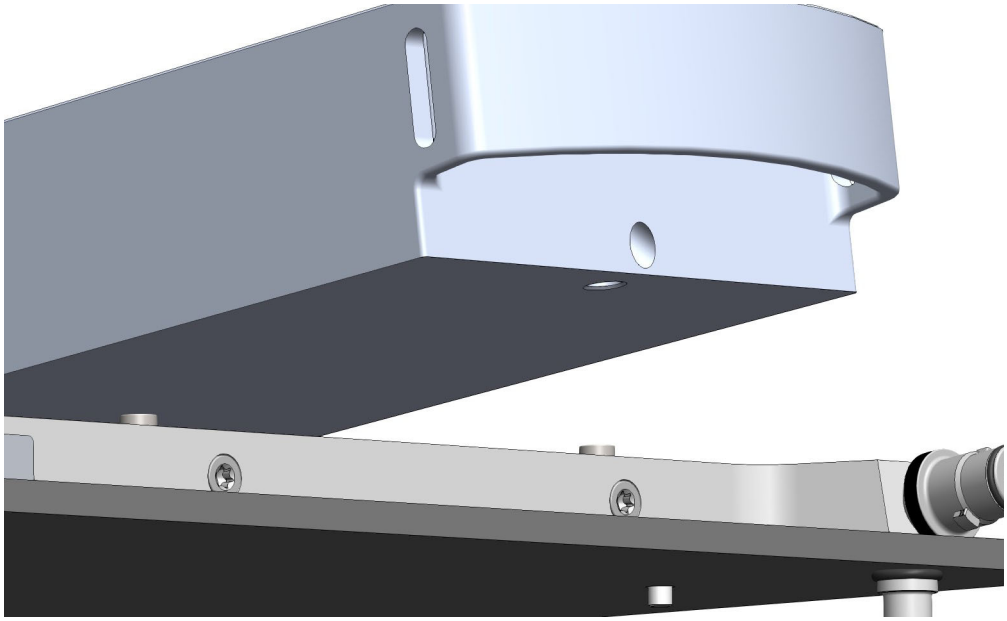
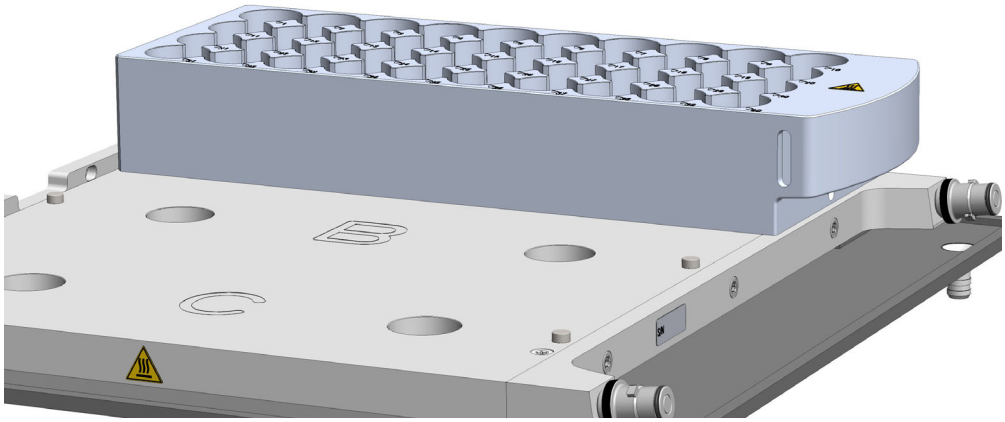


Figure 105. Heated/Cooled Vial Tray Installation on TriPlus 500 HS (10)



11. Place the vials into the vial trays.

CAUTION DO NOT place 10 mL and 20/22 mL vials into the same vial tray. If 10 mL and 20/22 mL vials are used simultaneously, the 20/22 mL vials can only be placed on Vial Tray C.

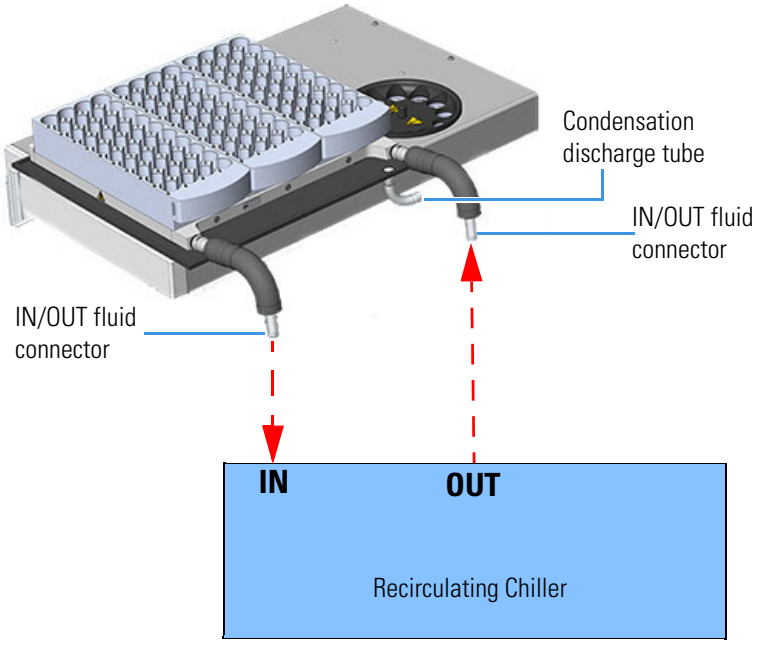
ATTENTION Ne placez PAS les flacons de 10 ml et 20/22 ml dans le même plateau pour flacons. Si des flacons de 10 ml et 20/22 ml sont utilisés simultanément, les flacons de 20/22 ml peuvent être placés uniquement sur le plateau pour flacons C.

12. Perform the **Tray Holder Calibration**. See "Calibrating the Tray Holder" on page 81.

Connecting the Recirculating Chiller

Connect the heated/cooled tray holder plate to the external recirculating chiller in use. We suggest to connect the IN/OUT fluid tubes without distinction as shown in Figure 106.

Figure 106. External Recirculating Chiller IN/OUT Tubes Connection

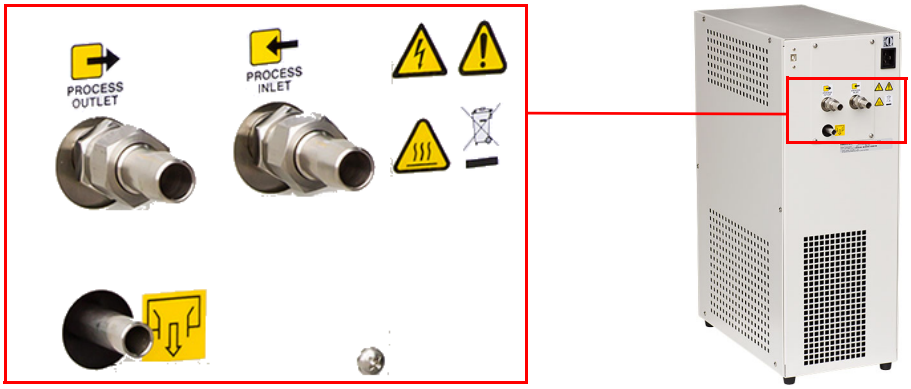


The two tubes should be covered with insulating material.

- **IN** is the inlet of the fluid
- **OUT** is the outlet of the fluid.

If you are using the Thermo Scientific™ Accel™ 500 LC Cooling/Heater Recirculating Chiller, connect the IN/OUT fluid tubes as shown in Figure 107.

Figure 107. Accel 500 IN/OUT Tubes Connection



Configuring the Devices

All devices on the TriPlus 500 HS are configured through your Thermo Scientific™ Chromatography Data System.

By clicking **Connect** the configuration is automatically read by the TriPlus 500 HS. The manual selection is useful in case of off-line editing of the method. The status of the connection is visualized on the right of the button (e.g: disconnected, connected).

See Figure 108 and Figure 109.

For further details refer to the *TriPlus 500 Headspace Sampler User Guide*.

Figure 108. Vial Loader Configuration - Chromeleon CDS Configuration Dialog Window.

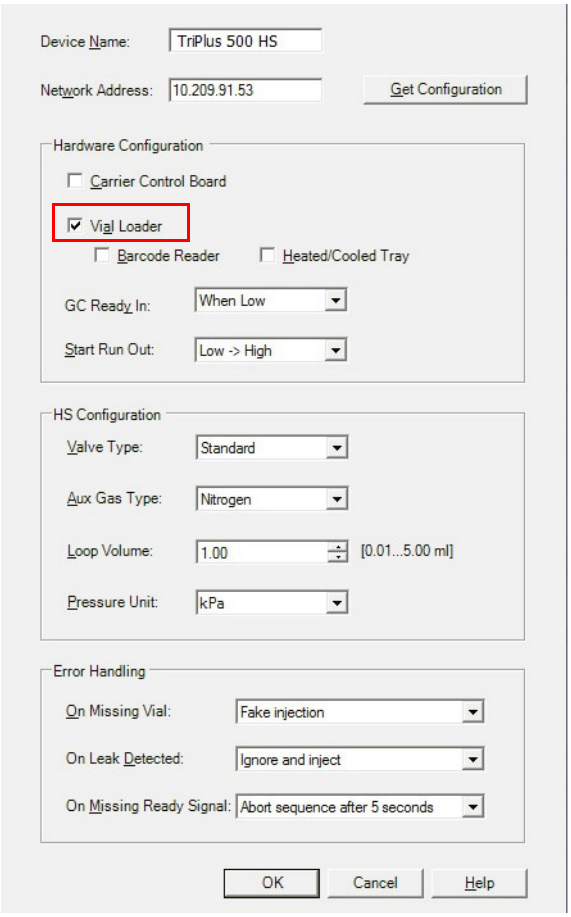
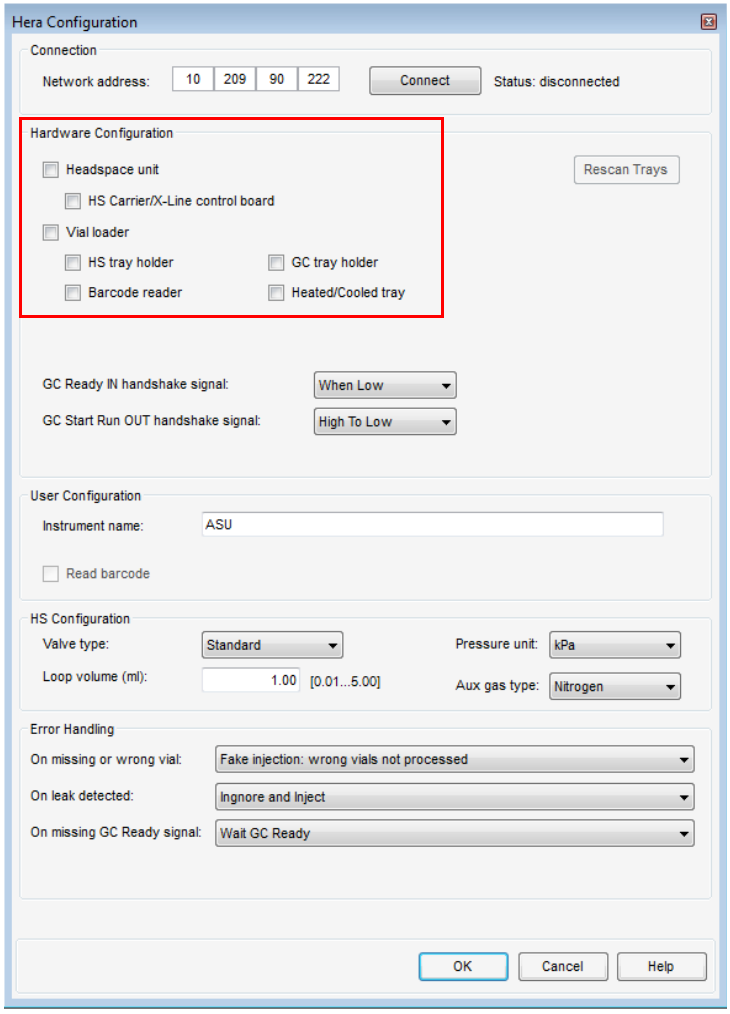


Figure 109. Vial Loader Configuration - TraceFinder CDS Configuration Dialog Window.



4

Instrument Checkout

This chapter provides the instructions to check instrument analytical performance after the installation has been completed.

Contents

- Introduction
- Before Performing the Checkout
- Starting the Checkout

Introduction

Use these procedures as a guideline, to check if your TRACE 1300/160 Series GC coupled with TriPlus 500 HS continues to perform according to the original checkout testing specifications carried out in the factory.

IMPORTANT Calculate the signal-to-noise ratio

Different chromatography data systems have generally different ways to calculate the signal-to-noise ratio. We describe a generic procedure that works for every chromatography data system.

- Choose a part of baseline without peaks or interference signals and calculate the noise over 0.1 min of acquisition. Note the noise.
- Measure the height of the peak of interest.
- Calculate the signal-to-noise ratio by dividing the peak height and the noise previously measured.
- Repeat the procedure for each peak of interest.
- To calculate the signal-to-noise ratio using a specific data system procedure, please refer to its user manual.

Note If it is not possible to find a suitable part of baseline to measure a suitable noise in the checkout chromatogram due to high chemical noise, acquire a baseline with the GC in stand-by at the initial temperature and measure the noise on this baseline.

Before Performing the Checkout

WARNING When a TriPlus 500 HS + TRACE 1300/1600 Series GC + Mass Spectrometer system is installed at the same time, before performing the checkout of the TriPlus 500 HS, it is necessary to perform the checkout of the Mass Spectrometer following the instructions reported in the dedicated manuals.

When a Thermo Scientific™ ISQ™ Series or TSQ™ Mass Spectrometer (MS) Series is added in a second time to a system TriPlus 500 HS + TRACE 1300/1600 Series GC, the checkout of the TriPlus 500 HS is performed verifying a value of repeatability and not verifying the signal-to-noise ratio.

AVERTISSEMENT Lorsqu'un système de spectromètre de masse, un TriPlus 500 HS et un TRACE GC, série 1300/1600 sont installés simultanément et avant d'effectuer la vérification du TriPlus 500 HS, il est nécessaire de procéder à la vérification du spectromètre de masse en suivant les instructions fournies dans les manuels spécialisés.

Lorsqu'un spectromètre de masse (MS) Thermo Scientific™ de série ISQ™ ou TSQ™ est ajouté à un système TriPlus 500 HS et à un TRACE GC, série 1300/1600, la vérification du TriPlus 500 HS est effectuée en vérifiant une valeur de répétabilité et non en vérifiant le rapport signal/bruit.

Before starting the checkout, the following operations should be carried out:

1. Verify the required gas supplies are properly connected to your instrument.
2. The column currently installed should be carefully removed and replaced with the test column. See the following cautions for which test column to use.

CAUTION In case of **FID**, **ECD**, and **TCD** detectors, the test column to use is:
TR-5; 7 m long; 0.32 mm ID; 0.25 mm film thickness. (P/N 260E113P)

In case of **NPD** and **FPD** detectors, the test column to use is:
TR-5 MS; 15 m long; 0.32 mm ID; 1 mm film thickness (P/N 260F285P).

In case of **MS** detector, the test column to use is:
TG-SQC, 15 m long; 0.25 mm ID; 0.25 mm film thickness (P/N 26070-1300).

ATTENTION En cas de détecteurs **FID**, **ECD**, ou **TCD** la colonne test à utiliser est :
TR-5; 7 m de long; DI de 0,32 mm; 0,25 mm d'épaisseur de film. (RÉF. 260E113P)

En cas de détecteurs **NPD** ou **FPD**, la colonne test à utiliser est :
TR-5 MS; 15 m de long; DI de 0,32 mm; 1 mm d'épaisseur de film (RÉF. 260F285P).

En cas de détecteurs **MS**, la colonne test à utiliser est :
TG-SQC, 15 m de long; DI de 0,25 mm; 0,25 mm d'épaisseur de film (RÉF. 26070-1300).

3. Ensure that the Column Evaluation and Leak Test have been performed.

4. Verify that your Thermo Scientific™ Chromatography Data System is properly connected to your GC system.

5. Set the **TriPlus 500 HS** parameters. See Table 4.

Table 4. TriPlus 500 HS Parameters

Parameter	For FID, TCD, and ECD set to:	For NPD, FPD, and MS set to:
Vial Incubation Temperature	150 °C	80 °C
Vial Incubation Time	3 minutes	8 minutes
Vial Shaking	Off	Off
Vial Pressure	50 kPa	50 kPa
Pressure Equilibration Time	0.5 minutes	0.5 minutes
Loop/Sample Path Temperature	150 °C	80 °C
Loop Pressure	30 kPa	30 kPa
Loop Equilibration Time	0.5 minutes	0.5 minutes
Injection Mode	Standard	Standard
Injection Time	0.3 minutes	0.5 minutes
Purge Level	2	2

6. Set the **Injection Parameters**. See Table 5.

Table 5. Setting Injection Parameters

Injection Parameters	FID	ECD	NPD	FPD	TCD	MS
Carrier gas	Helium	Helium	Helium	Helium	Helium	Helium
Mode CP= Constant Pressure	CP	CP	CP	CP	CP	
Mode CF = Constant Flow						CF
Carrier Gas Pressure (kPa)	30	30	30	30	30	
Carrier Gas Flow (mL/min)						1.5
Reference Gas: Helium (mL/min)					1	
Injection Mode	Splitless	Splitless	Splitless	Splitless	Splitless	Split
Splitless Time (minute)	0.8	0.8	0.8	0.8	0.8	
Split Flow (mL/min)	60	60	60	60	60	150
Purge Flow (mL/min)	5.00	5.00	5.00	5.00	5.00	5.00
Vacuum Compensation	No	No	No	No	No	Yes

7. According to the detector in use set **Oven** parameters. See Table 6.

Table 6. Setting Oven Parameters

Oven Parameters	FID	ECD	NPD	FPD	TCD	MS
Initial Temperature (°C)	50	70	50	50	50	50
Initial Time (minute)	1	1	0	0	1	0
Ramp 1 (°C/min)	20	20	30	30	20	30
Final Temperature (°C)	200	220	300	300	200	300
Final Time (minute)	1	1	1	1	1	1

8. Set **Detector** parameters. See Table 7.

Table 7. Setting Detector Parameters for GC and MS detectors

Detector Parameters	FID	ECD	NPD	FPD	TCD	MS
Air (mL/min)	350		60	115	200	
Hydrogen (mL/min)	35		2.3	90		
Make up-gas Nitrogen (mL/min)	40	15	15			
Temperature (°C)	250	300	300			
Flame	On			On		
Polarizer Voltage (V)			4			
Filament Temperature °C					250	
Negative Polarity					Off	
Filament Power					On	
Reference Current (nA)		0.5				
Pulse Amplitude (V)		50				
Pulse Width (µs)		1.0				
Cell Temperature (°C)				150		
Ignition Threshold (nA)				0.1		
PMT Voltage				Default		
Transfer Line Temperature (°C)						250
Ion Source Temperature (°C)						250
Ionization Mode						EI
GC Run Time						Yes
Scans Time (minutes)						2.00
Mass List of Range (amu)						50-350
Dwell or Scan Times (seconds)						0.2

Starting the Checkout

1. Activate your Chromatography Data System and set the parameters required for the checkout.
2. Prepare a 20 mL vial and using a microcap dispense 5 µL of the test mixture for the detector placed on the GC and for the Mass Spectrometer. See Table 8.

Table 8. Test Mixture

Test Mixture	FID	ECD	NPD, FPD, and MS	TCD
Part Number	33819020	33819011	33819024	33819016
Solvent for Blank Analysis	n-hexane	iso-octane	Ethanol	n-hexane
Solvent for Test Mixture	n-hexane	iso-octane	Ethanol	n-hexane
Dodecane (µg/mL)	20			200
Tetradecane (µg/mL)	20			200
Hexadecane (µg/mL)	20			200
Lindane (µg/mL)		0.030		
Aldrin (µg/mL)		0.030		
1,3 Dichlorobenzene (Vol./Vol.%)			0.05	
Nitrobenzene (Vol./Vol.%)			0.05	
Di-tert-Butyl sulfide (Vol./Vol.%)			0.05	

3. Place the vial with the test mixture into position 1of the 12-seat rotating carousel.
4. Press Start on the GC to begin the checkout run.
5. The acceptance values in Table 9 and Table 10 indicate successful completion of the checkout. If these criteria are not met, repeat the test.

Table 9. Checkout Acceptance Values for FID and ECD Detectors

Analytical Results: Signal-to-Noise Ratio	FID	ECD	TCD
Dodecane	> 1500		
Tetradecane	> 1500		> 100
Hexadecane	> 1500		> 100
Lindane		> 500	
Aldrin		> 500	

Table 10. Repeatability Acceptance Values for FID and ECD Detectors

Analytical Results: Repeatability RSD%	FID, ECD, and TCD
Dodecane	< 5 (for 6 injections)
Tetradecane	< 5 (for 6 injections)
Hexadecane	< 5 (for 6 injections)
Lindane	< 5 (for 6 injections)
Aldrin	< 5 (for 6 injections)

Table 11. Repeatability Acceptance Values for NPD, FPD, TCD and MS Detectors

Analytical Results: Repeatability RSD%	**NPD**
Nitrobenzene	< 5 (for 6 injections)
Analytical Results: Repeatability RSD%	**FPD**
Di-tert-Butyl sulfide	< 5 (for 6 injections)
Analytical Results: Repeatability RSD%	**MS**
1,3 Dichlorobenzene	< 10 (for 6 injections)

Note For the MS detector, check the dichlorobenzene's peak (the first after the solvent peak). According to the sensitivity of the instrument, it may be necessary to adjust the value of Split Flow and Split Ratio.

5

Performing Routine Maintenance

This chapter provides instructions for performing routine maintenance on the TriPlus 500 HS.

Contents

- Read Me First
- Maintenance Supplies and Tools
- Powering On the TriPlus 500 HS
- Shutting Down the TriPlus 500 HS
- Exterior Cleaning
- Removing the Front Door
- Replacing a Sample Loop
- Restoring the SSL Injector for Liquid Injections

Read Me First

The instrument will be generally serviced by Thermo Fisher Scientific authorized and trained technical personnel for all the warranty period or, after warranty, 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 bear 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, the latter must prove to be adequately trained to perform the specific maintenance operation.

AVERTISSEMENT Si, pour des raisons techniques, il est nécessaire de travailler sur des pièces de la machine pouvant comporter des opérations dangereuses (pièces mobiles, composants sous tension, etc.) Le support technique autorisé de Thermo Fisher Scientific doit être appelé.

Cette situation peut être identifiée parce que l'accès à ces pièces mobiles n'est possible qu'avec un outil particulier et que les capots de protection amovibles concernés portent un symbole qui attire l'attention de l'opérateur sur les avertissements spécifiques inclus dans la documentation accompagnant l'instrument.

Si le travail doit être effectué par l'opérateur, ce dernier doit prouver qu'il est suffisamment formé pour effectuer l'opération de maintenance spécifique.

There are some components of the HS sampler that require routine maintenance, depending on the quantity and types of samples you are running. A frequently used instrument will require more maintenance than an instrument that is rarely used.

- **External Cleaning** — The HS sampler needs to be cleaned when it gets dirty. See the section "Exterior Cleaning" on page 114.
- **Vial Loader** — The Vial Loader does not require maintenance except for external cleaning. The maintenance of the internal components (motors, belts, etc.) must be done by an authorized and trained Thermo Fisher Scientific technical personnel.
- **Barcode Reader** — The outside of the Barcode Reader should be cleaned weekly or as needed. Use only a soft lint-free cloth dampened with mild soap and water.

- **Sample loop** — According to the analysis requirements, you may need to replace the standard sample loop of 1 mL volume with another sample loop with different volume such as 25 µL, 50 µL, 100 µL, 500 µL, or 3mL.
  See the section "Replacing a Sample Loop" on page 118.
- **Back SSL Injector** — It does not require maintenance except when it must be restored for liquid injections.
  See the section "Restoring the SSL Injector for Liquid Injections" on page 121.

WARNING-BURN HAZARD: All the maintenance operations must be carried out at low temperature to avoid burns. Therefore, before beginning the maintenance, the heated zones of the TriPlus 500 HS must be cooled to room temperature, and then the gases supply must be closed.

AVERTISSEMENT RISQUE DE BRÛLURE : Les opérations de maintenance doivent être effectuées à basse température pour éviter les brûlures. Par conséquent, avant de commencer la maintenance, les zones chauffées du TriPlus 500 HS doivent être refroidies à la température ambiante, puis l'alimentation en gaz doit être fermée.

Maintenance Supplies and Tools

To perform routine maintenance on the TriPlus 500 HS, you will need the following supplies and tools.

- Wrench, open-end, 1/4 in., 3/16 in., and 1/8 in.
- Flathead screwdriver
- 8-mm tube nut wrench
- 7-mm wrench
- T25 Torx head screwdriver
- T25 Torx head screwdriver, L shape
- T20 Torx head screwdriver
- T10 Torx head screwdriver
- T8 Torx head screwdriver
- 3 mm Allen key wrench
- 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
- Detergent (Alconox™, Micro®, or equivalent)
- Gas, clean and dry (N_2 or He)
- Gloves, clean, lint- and powder-free, latex or nitrile
- Lint-free cloth

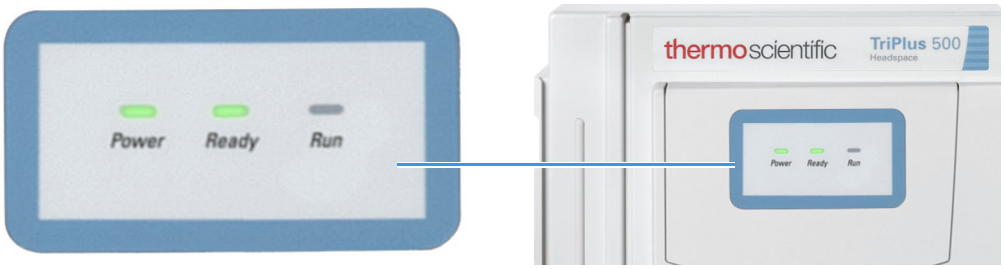
Powering On the TriPlus 500 HS

❖ **To power on the TriPlus 500 HS**

1. Open the auxiliary gas supply.
2. Plug the power cable to the AC Input connector (Main socket) on the HS sampler, and to the wall outlet.
3. Flip up the power switch, located on the back side to the **ON** position.

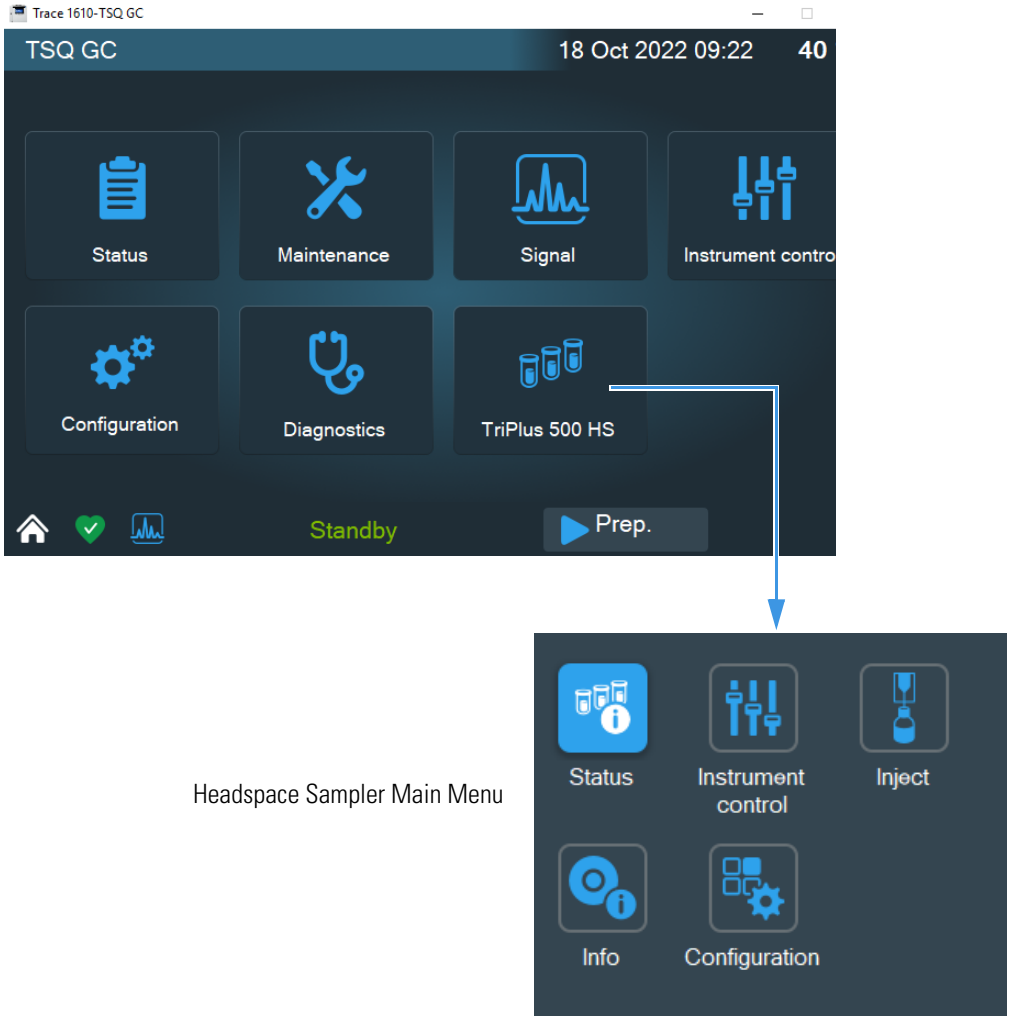
   When the HS sampler is powered on, all the LED on the status panel light up simultaneously. Next the **Power** light becomes a solid green, while the **Run** light flashes during the initialization phase. See Figure 110.

   Figure 110. Status Panel



   When the HS sampler is coupled with a TRACE 1310 GC, the **Headspace sampler** icon is visualized on the Main Menu. See Figure 111.

Figure 111. Touch screen Main Menu - Headspace Sampler Icon



Headspace Sampler Main Menu

4. Open the Thermo Scientific Chromatography Data System (CDS) installed on the computer.
5. Set the analytical parameters.

Shutting Down the TriPlus 500 HS

❖ **To shut down the TriPlus 500 HS**

1. Cool down the HS sampler heated zones. It is not necessary turn off the auxiliary gas supply at the cylinder.
2. Push down the power switch (breaker), located at the back of the instrument, to the position **OFF**.
3. Power off all the remaining instruments.

Exterior Cleaning

Normal usage of the TriPlus 500 HS and its components can cause the exterior to get dirty.

WARNING It is your responsibility to keep dangerous liquids, materials, or both from seeping inside the TriPlus 500 HS during operation and maintenance. Solvent must not be used. Do not spray on electrical parts.

AVERTISSEMENT Il est de votre responsabilité d'empêcher les liquides, les matériaux dangereux, ou les deux, de s'infiltrer à l'intérieur du TriPlus 500 HS pendant le fonctionnement et la maintenance. Le solvant ne doit pas être utilisé. Ne pas vaporiser sur les pièces électriques.

❖ To clean the instrument externally

1. Cool the sampler and place it in stand-by condition.
2. Power off the TriPlus 500 HS.
   a. Push down the power switch (breaker), located at the back of the instrument, to the position **OFF**.
   b. Unplug the power cable from the AC Input connector and from the wall outlet.
3. If the **Vial Loader** is present, power it off and unplug the power cable from the jack marked ⊕⊸⊖ and from the wall outlet.
4. 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 Safety Data Sheet (SDS) for that substance.
5. Dry with a clean cloth.
6. If external devices are present, plug the power cable to the power input of each device, and to the wall outlet.
7. Power on the Vial Loader if present.

a. Plug in the Vdc power cable of the external portable power supply into the jack marked ⊕⊃⊖ 1.

b. Connect the power cord of the external power supply to the mains outlet.

8. Power on TriPlus 500 HS:

a. Plug the power cable to the AC Input connector and to the wall outlet.

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

c. Set the normal working conditions.

Removing the Front Door

This operation is required for maintaining the sampling compartment of the TriPlus 500 HS. See the sections "Replacing a Sample Loop" on page 118.

According to the configuration of your TriPlus 500 HS, please see the following relevant procedures:

- "To remove the front door of TriPlus 500 HS-12" on page 115
- "To remove the front door of the TriPlus 500 HS-120" on page 117

WARNING-BURN HAZARD: The heated zones of the HS sampler could be hot. Cool to room temperature before touching them.

AVERTISSEMENT RISQUE DE BRÛLURE : Les zones chauffées de l'échantillonneur HS peuvent être chauds. Laissez-les refroidir à la température ambiante avant de les toucher.

❖ To remove the front door of TriPlus 500 HS-12

1. Close the auxiliary gas supply, then power the TriPlus 500 HS off.

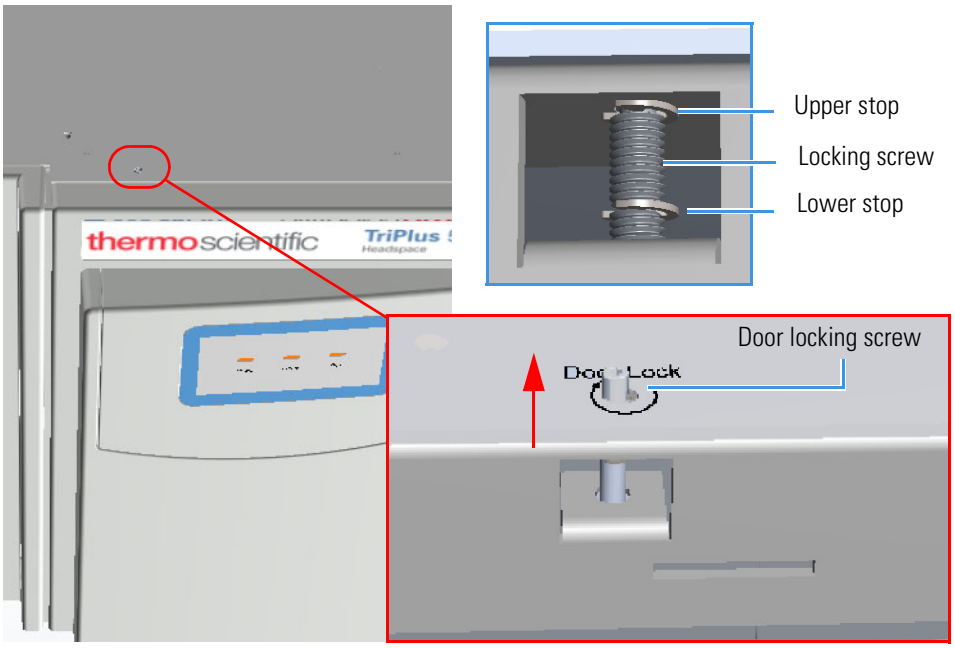
a. Push down the power switch (breaker), located at the back of the instrument, to the position **OFF**.

b. Unplug the power cable from the AC Input connector and from the wall outlet.

2. Remove the front door of the TriPlus 500 HS.

a. From the top cover of the TriPlus 500 HS unscrew the front door locking screw until it protrudes the top cover up to reach the upper stop. See Figure 112.

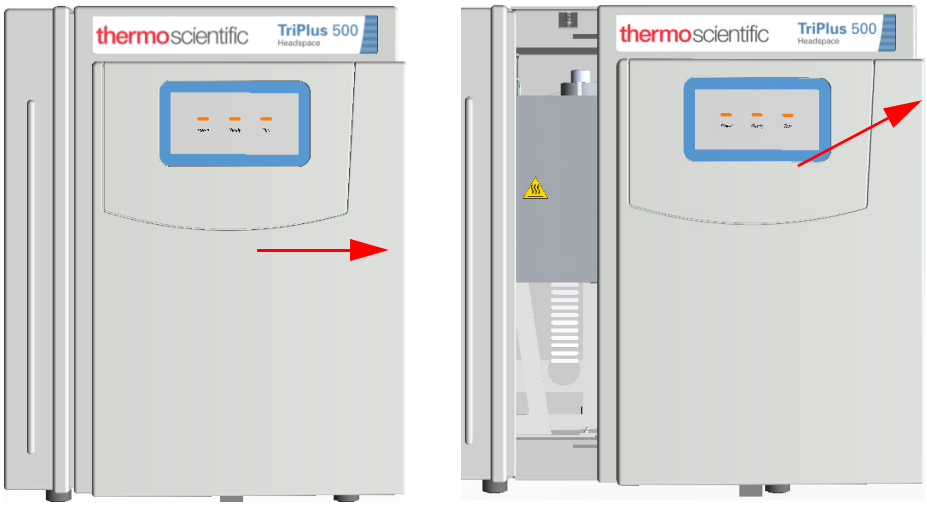
Figure 112. Front Door Removal (1)



b. Slide the front door towards the right of the instrument up to unhook it being aware that the Status Panel cable is attached to the panel.

c. Disconnect the Status Panel cable, then remove the front door. See Figure 113.

Figure 113. Front Door Removal (2)

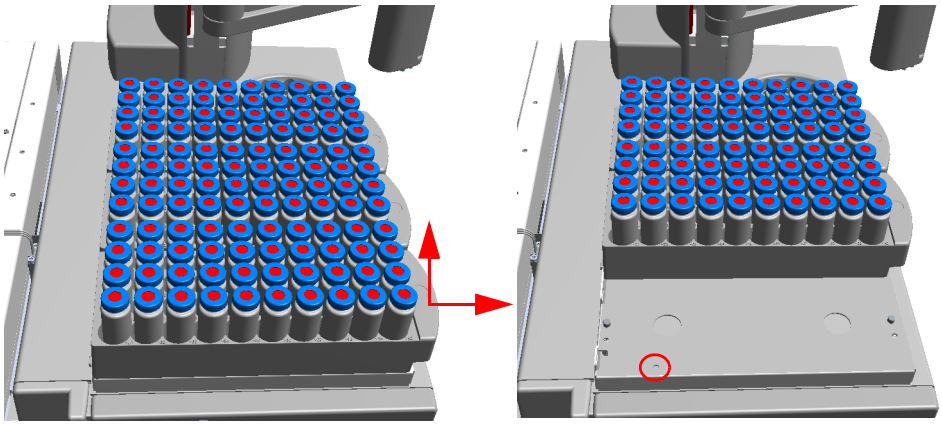


❖ To remove the front door of the TriPlus 500 HS-120

1. Close the auxiliary gas supply, then power the TriPlus 500 HS off.
   a. Push down the power switch (breaker), located at the back of the instrument, to the position **OFF**.
   b. Unplug the power cable from the AC Input connector and from the wall outlet.
2. Remove the front door of the TriPlus 500 HS.
   a. Remove the sample tray **HS Sample Tray C** from the standard or heated/cooled tray holder plate. See Figure 114.

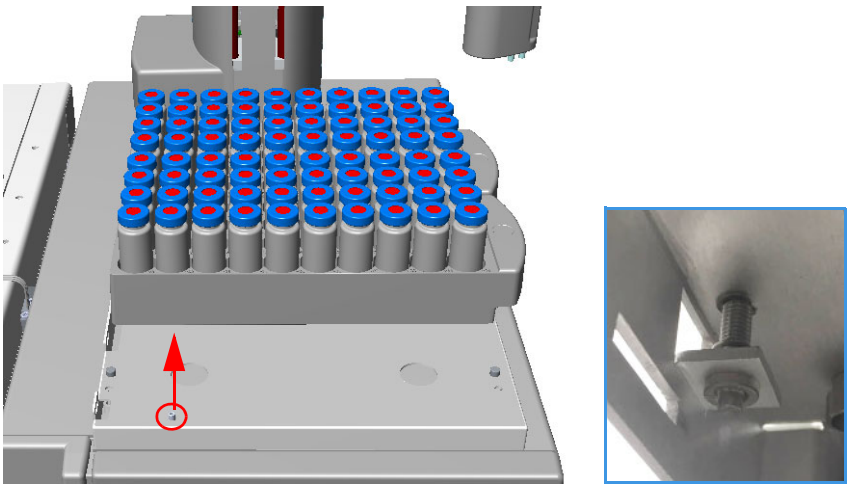
> **Note** The IN/OUT fluid tubes of the heated/cooled tray holder plate are not visualized for graphical convenience.

Figure 114. HS Sample Tray Removal



   b. On the tray holder plate insert the Torx head screwdriver into the hole provided to access the front door locking screw. Unscrew the locking screw until the upper stop is reached. See Figure 115.

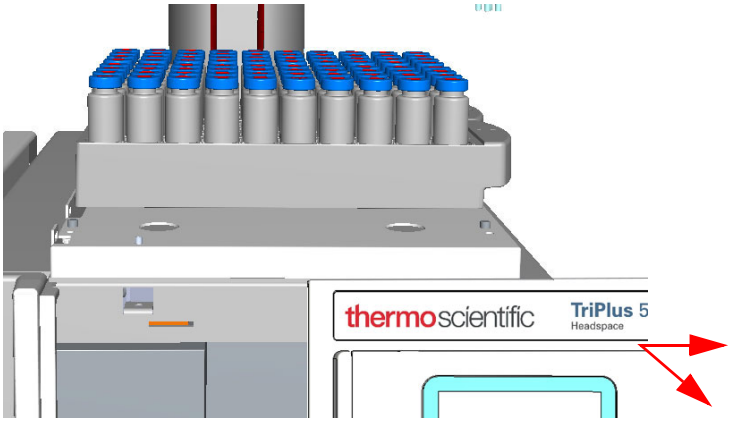
Figure 115. Front Door Removal (1)



c. Slide the front door towards the right of the instrument up to unhook it, being aware that the Status Panel cable is attached to the panel.

d. Disconnect the Status Panel cable, then remove the front door. See Figure 116.

Figure 116. Front Door Removal (2)



Replacing a Sample Loop

According to the analysis requirements, you may need to replace the standard sample loop of 1 mL volume with another sample loop with different volume such as 25 µL, 50 µL, 100 µL, 500 µL, or 3 mL.

❖ To replace a sample loop

Note The following instructions do not account for the presence of optional devices as Vial Loader, Sample Trays, and Barcode Reader.

1. Close the auxiliary gas supply, then power off the HS sampler.
   a. Push down the power switch (breaker), located at the back of the instrument, to the position **OFF**.
   b. Unplug the power cable from the AC Input connector and from the wall outlet.
2. Make sure that the front door of TriPlus 500 HS has been removed. See "Removing the Front Door" on page 115.
3. Open the sampling compartment to access to the sampling valve.
   a. Loosen the upper, lower, and right knobs that fix the insulating cover, then remove it. See Figure 117 and Figure 118.

Figure 117. Opening the Sampling Valve Compartment (1)

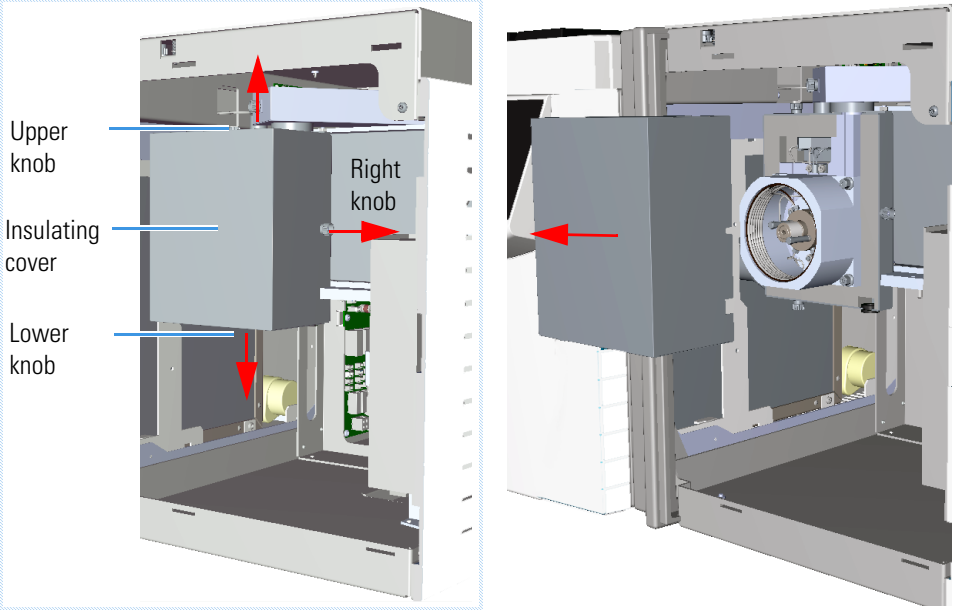
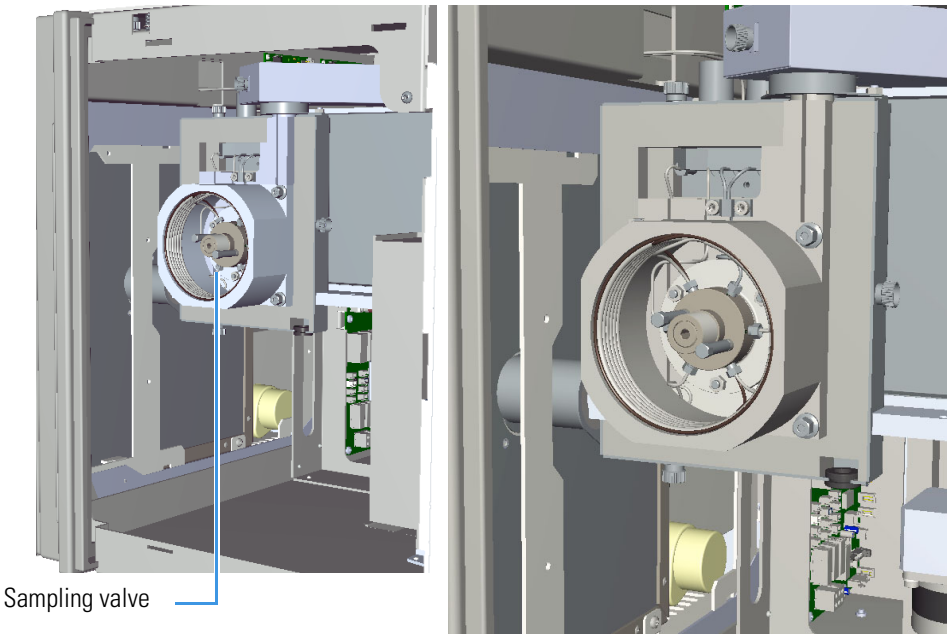
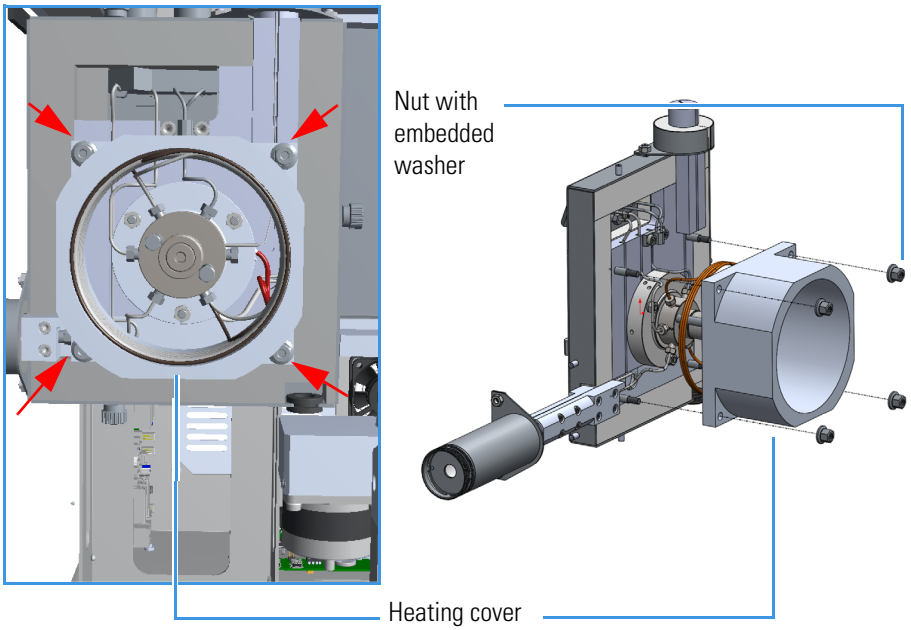


Figure 118. Opening the Sampling Valve Compartment (2)



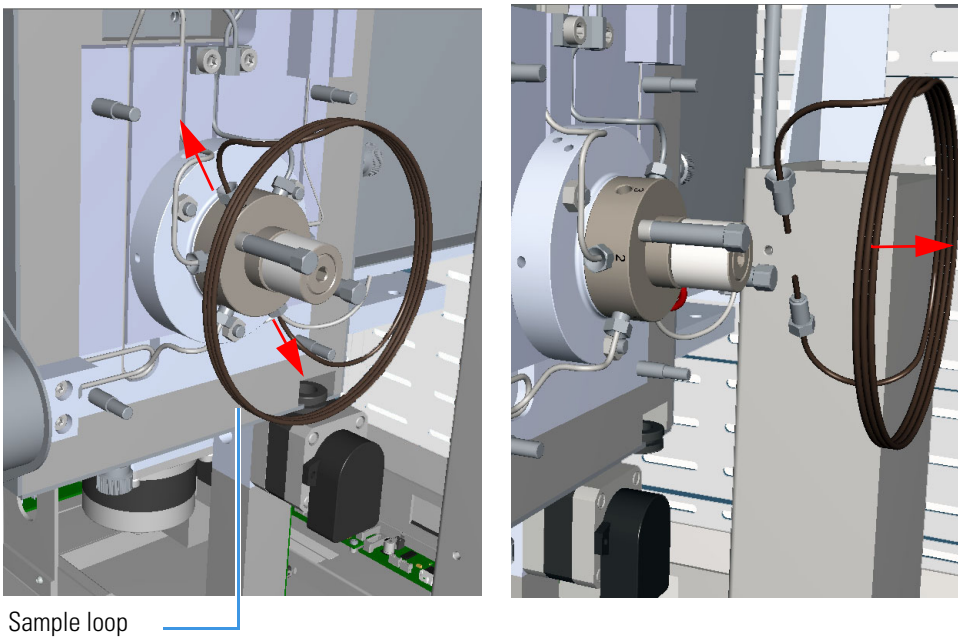
4. Remove the heating cover of the sampling valve.
   a. Using a 8 mm tube nut wrench loosen the four nuts and washers that fix the heating cover, then remove it. See Figure 119.

Figure 119. Opening the Sampling Compartment (3)



5. Replace the sample loop.
   a. Using a 1/4 in. wrench, loosen the nuts connecting sample loop to the port 3 and 6 of the sampling valve. See Figure 120.

Figure 120. Sample Loop Replacement (1)



   b. Remove the sample loop off the sampling valve.
   c. Mount the new sample loop over the sampling valve and tighten the nuts.

6. Reinstall and fix the heating cover.
7. Reinstall and fix the compartment insulating cover.
8. Reinstall the optional devices if present.
9. Open the auxiliary gas supply.
10. Reinstall the front door paying attention to reconnect the Status Panel cable. Screw the locking screw up it reaches the lower stop.
11. Power on the HS sampler.
12. Set the normal working conditions.

Restoring the SSL Injector for Liquid Injections

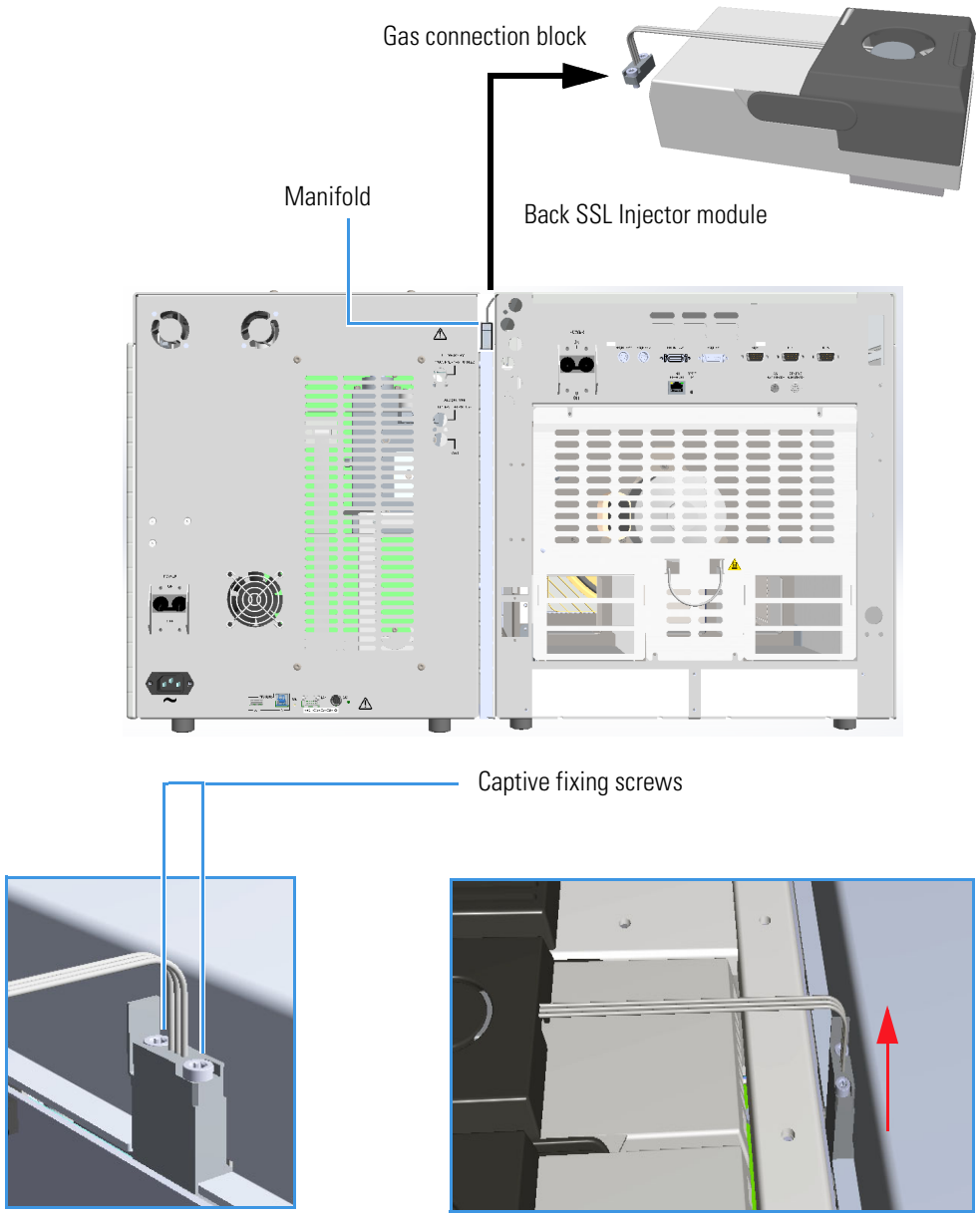
❖ **To restore the SSL injector for liquid injections**

1. Put the GC in standby condition.
2. Cool the oven, injectors and detectors to room temperature.

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

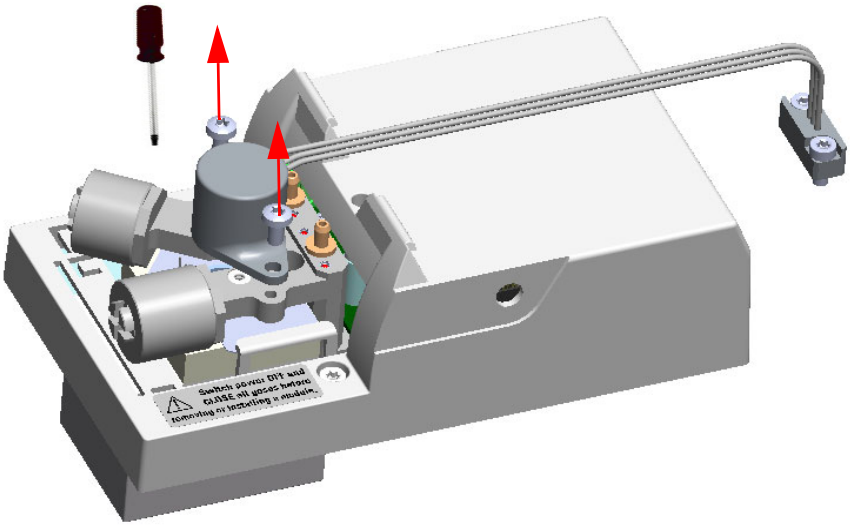
3. Power off the GC.
   a. Push down the power switch (breaker), located at the back of the instrument, to the position **O**.
   b. Unplug the power cable from the AC Input connector into the back of the GC and from the wall outlet.
4. If external modules are present, unplug the power cable from the AC Input connector of each external module, and from the wall outlet.
1. Cool down the TriPlus 500 HS heated zones. It is not necessary turn off the auxiliary gas supply at the cylinder.
2. Push down the power switch (breaker), located at the back of the instrument, to the position **OFF**.
3. Power off Vial Loader and all the remaining instruments if present.
4. In the GC oven, disconnect the capillary column from the valve-column interface.
5. Unscrew the two captive fixing screws from the Carrier manifold on the left side of TriPlus 500 HS and remove the gas connection block. See Figure 121.

Figure 121. Restoring SSL Injector (1)



6. Remove the Back SSL injector module from its seat.
7. Remove the module flap cover.
8. Remove the adapter gas tubing block from the Back SSL injector module.
   a. Remove the adapter for the injector body housing unscrewing the two injector body fixing screws using a T20 Torx head screwdriver. See Figure 122.

Figure 122. Restoring SSL Injector (2)



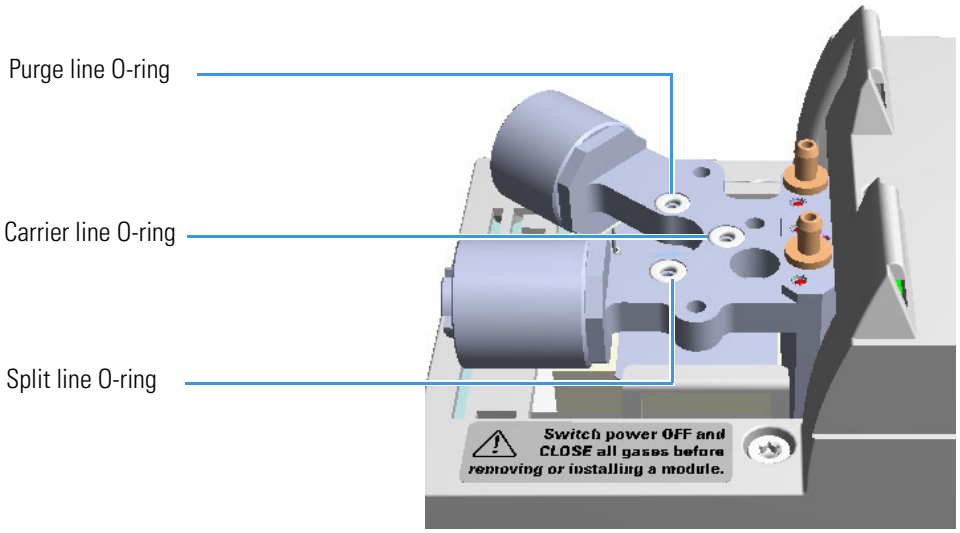
WARNING Make sure the three purge, carrier, and split lines O-rings are placed into their seats on the gas connections. See Figure 123.

Do not proceed with the operation if the O-rings are missing.

AVERTISSEMENT Assurez-vous que les joints toriques de purge, de porteur et de ligne à débit divisé sont placés dans leurs logements sur les connexions de gaz. Voir Figure 123.

N'installez pas le bloc de tuyaux de gaz de l'adaptateur si des joints toriques sont manquants.

Figure 123. Restoring SSL Injector (3)

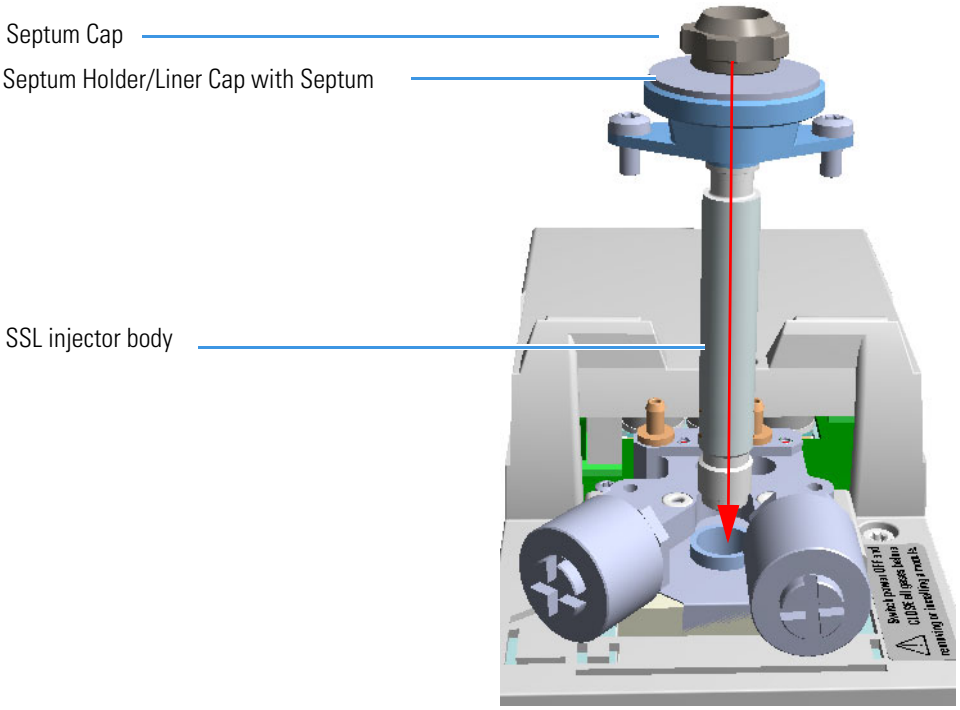


9. Reinsert the top parts of the injector and the injector body.

a. Take the **ring nut**, the **septum cap,** the **septum holder/liner cap with septum** and the **injector body** containing the **liner** and relative **liner seal** previously stored in a safe place.

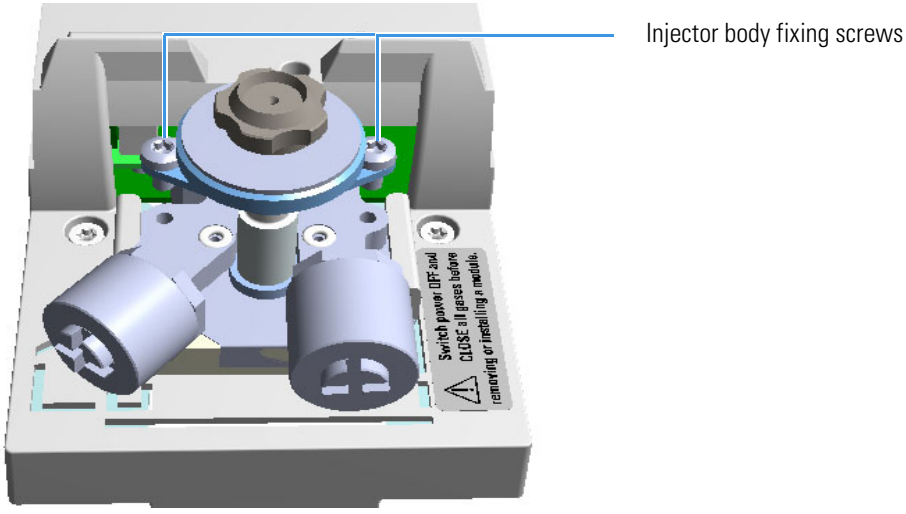
b. Insert the whole group into the injector module. See Figure 124.

Figure 124. Restoring SSL Injector (5)



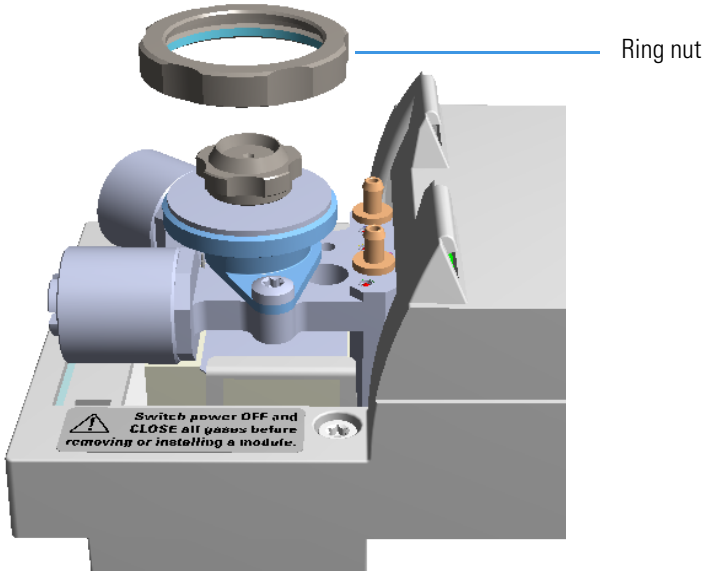
c. Using a T20 Torx head screwdriver fix the group screwing the two fixing screws previously removed. See Figure 125.

Figure 125. Restoring SSL Injector (6)



d. Screw in the ring nut. See Figure 126.

Figure 126. Restoring SSL Injector (7)

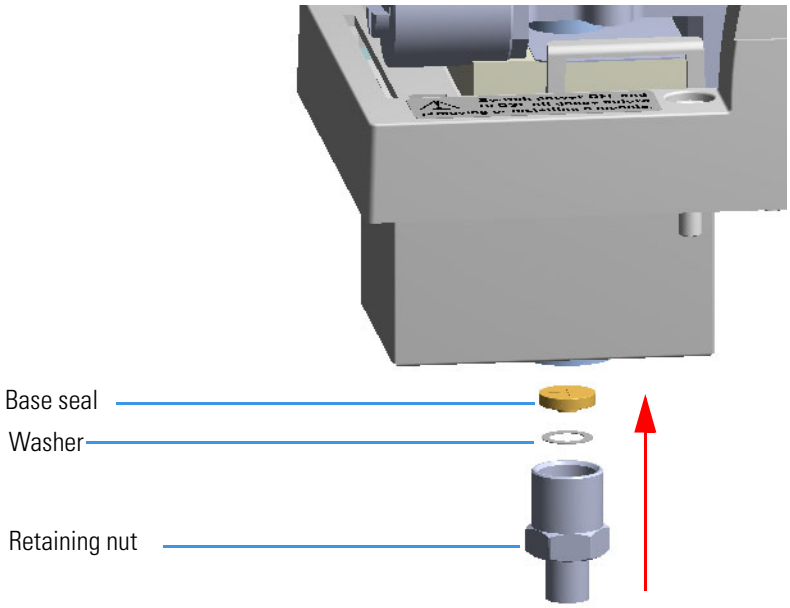


10. Insert the bottom parts of the injector.

a. Screw the **retaining nut** with the **washer** and the **base seal** into the bottom of the injector. See Figure 127.

Note It is suggested to replace the base seal with a new one.

Figure 127. Restoring SSL Injector (4)



11. Reinstall the module flap cover.
12. Reinstall the SSL injector module on the GC.
13. In the GC oven connect the capillary column to the bottom of the injector.
14. Turn the gases on, and power on the GC
15. Perform the leak test.

Glossary

This section lists and defines terms used in this guide.
It also includes acronyms, metric prefixes, and symbols.

A B C D E F G H I J K L M N O P Q R S T V V W X Y Z

A

A ampere

ac alternating current

ADC analog-to-digital converter

B

b bit

B byte (8 b)

baud rate data transmission speed in events per second

C

C Carbon

°C Celsius

CDS Chromatography Data System

CIP Carriage and Insurance Paid To

cm centimeter

CPU central processing unit (of a computer)

<Ctrl> control key of the keyboard

D

d depth

DAC digital-to-analog converter

dc direct current

DS data system

E

EMC electromagnetic compatibility

ESD electrostatic discharge

F

f femto

°F Fahrenheit

FOB Free on board

FSE Field Service Engineer

ft foot

G

g gram

GC gas chromatography- gas chromatograph

GND electrical ground

H

h height

h hour

H Hydrogen

harmonic distortion A high-frequency disturbance that appears as distortion of the fundamental sine wave

He Helium

HS Headspace

HV high voltage

Hz hertz (cycles per second)

I

ID inside diameter

IEC International Electrotechnical Commission

Impulse See *transient*

in. inch

I/O input/output

K

k kilo (10^3 or 1024)

K Kelvin

kg kilogram

kPa kilopascal

L

l length

L liter

LAN Local Area Network

lb pound

LED light-emitting diode

M

m meter (or milli [10^{-3}])

M mega (10^6)

µ micro (10^{-6})

min minute

mL or ml milliliter

mm millimeter

MS mass spectrometry-mass spectrometer

m/z mass-to- charge ratio

N

n nano (10^{-9})

N Nitrogen

negative polarity The inverse of a detector signal polarity.

nm nanometer

O

OD outside diameter

Ω ohm

P

p pico (10^{-12})

Pa pascal

PCB printed circuit board

PN part number

psi pounds per square inch

R

RAM random access memory

<Return> <Return> key on the keyboard

RF radio frequency

ROM read-only memory

RS-232 industry standard for serial communication

S

s second

sag See *surge*

slow average A gradual long-term change in average RMS voltage level, with typical duration greater than 2 s.

SOP Standard Operating Procedures

SSL split/splitless injector

source current The current needed to ignite a source, such as a detector lamp.

surge A sudden change in average RMS voltage level, with typical duration between 50 µs and 2 s.

T

transient A brief voltage surge of up to several thousand volts, with a duration of less than 50 µs.

V

V volt

Vac volts, alternating current

Vdc volts, direct current

VGA Video Graphics Array

VL Vial Loader

W

w width

W Watt

When a unit of measure has a quotient (e.g. Celsius degrees per minute or grams per liter) this can be written as negative exponent instead of the denominator:

For example:
°C min^{-1} instead of °C/min
g L^{-1} instead of g/L