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Thermo Scientific

TriPlus 500 Headspace with Transfer Line

Hardware Manual

MI-317000-0013 Revision B 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 with Transfer Line Hardware Manual, PN MI-317000-0013, Revision B

	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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***MY PRIMARY APPLICATION IS:* (Check only one)**

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- ❑ Clinical/Toxicology
- ❑ Energy
- ❑ Environmental
- ❑ Food/Agricultural
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- ❑ Research/Education
- ❑ Other_____

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fold

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- ❑ Other_____

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Austin TX 78728-3812
Unites States of America

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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
- the instrument is used according to the instructions provided and,
- if its operation is only entrusted to qualified trained personnel

Thermo Fisher Scientific is not liable for any damages derived from the non-compliance with the aforementioned recommendations.

Thermo Fisher Scientific S.p.A.
Via San Bovio 3, 20054 Segrate - Milan - Italy

Regulatory Compliance

Thermo Fisher Scientific performs complete testing and evaluation of its products to ensure full compliance with applicable domestic and international regulations.

Thermo Fisher Scientific declares, under sole responsibility, that the product as originally delivered complies with the requirements of the following applicable European Directives and carries the CE marking accordingly:

- 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.

FCC Compliance Statement

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

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

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.

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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.

Notice on the Proper Use of Thermo Scientific Instruments

In compliance with international regulations: Use of this instrument in a manner not specified by Thermo Fisher Scientific could impair any protection provided by the instrument.

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

CE

ThermoFisher SCIENTIFIC

Thermo Fisher Scientific S.p.A.
Via San Bovio 3
20054 Segrate Milan
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

ThermoFisher SCIENTIFIC

Thermo Fisher Scientific S.p.A.
Via San Bovio 3
20054 Segrate Milan
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:

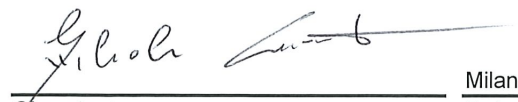
Electrical Equipment (Safety) Regulations	**2016**
Electromagnetic Compatibility Regulations	**2016**
The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (ROHS) Regulations	**2012**

and complies with the following harmonized standards and other technical specifications:

BS EN 61010-1:2010+A1:2019 **BS EN 61326-1:2021**

Signed for and on behalf of: Thermo Fisher Scientific S.p.A.:

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

Thermo Fisher Scientific hat Vereinbarungen mit Verwertungs-/Entsorgungsfirmen in allen EU-Mitgliedsstaaten getroffen, damit dieses Produkt durch diese Firmen wiederverwertet oder entsorgt werden kann. Mehr Information über die Einhaltung dieser Anweisungen durch Thermo Fisher Scientific, über die Verwerter, und weitere Hinweise, die nützlich sind, um die Produkte zu identifizieren, die unter diese RoHS Anweisung fallen, finden sie unter www.thermoscientific.com/rohsweee.

Contents

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Preface

This manual contains information for installing and maintaining, the Thermo Scientific™ TriPlus™ 500 Headspace Sampler with Transfer Line (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 using automated systems to run existing analytical methods.

Contents

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 (Sheet 1 of 2)

	Symbol	Description
		Direct Current
*		Alternating Current
		Both direct and alternating current
		Three-phase alternating current
		Earth (ground) terminal
		Protective conductor terminal
		Frame or chassis terminal

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

	Symbol	Description
		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 with Transfer Line and its components.

Contents

Instrument Basics

The TriPlus 500 Headspace Sampler with Transfer Line (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). See Figure 1.

Figure 1. TriPlus 500 HS-120 with the Transfer Line Connected to 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 6.
- **Sampling Path** — Includes an electrically actuated 6-port gas sampling valve, a sampling needle, and the GC column interface. See "Sampling Path" on page 7.
- **Pneumatic Connections** — Connections for the carrier gas and auxiliary gas supplies. See "Pneumatic Connections" on page 8.
- **Electrical Connections**— Includes electrical connections and communications ports for GC devices. See "Electrical Connections" on page 9.
- **Status Panel** — Consists of three light emitting diodes (LED) showing the current status of the instrument. See "Status Panel" on page 10.

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 HS Vial Loader includes:

- **Tray Holder** —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).

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 the 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.

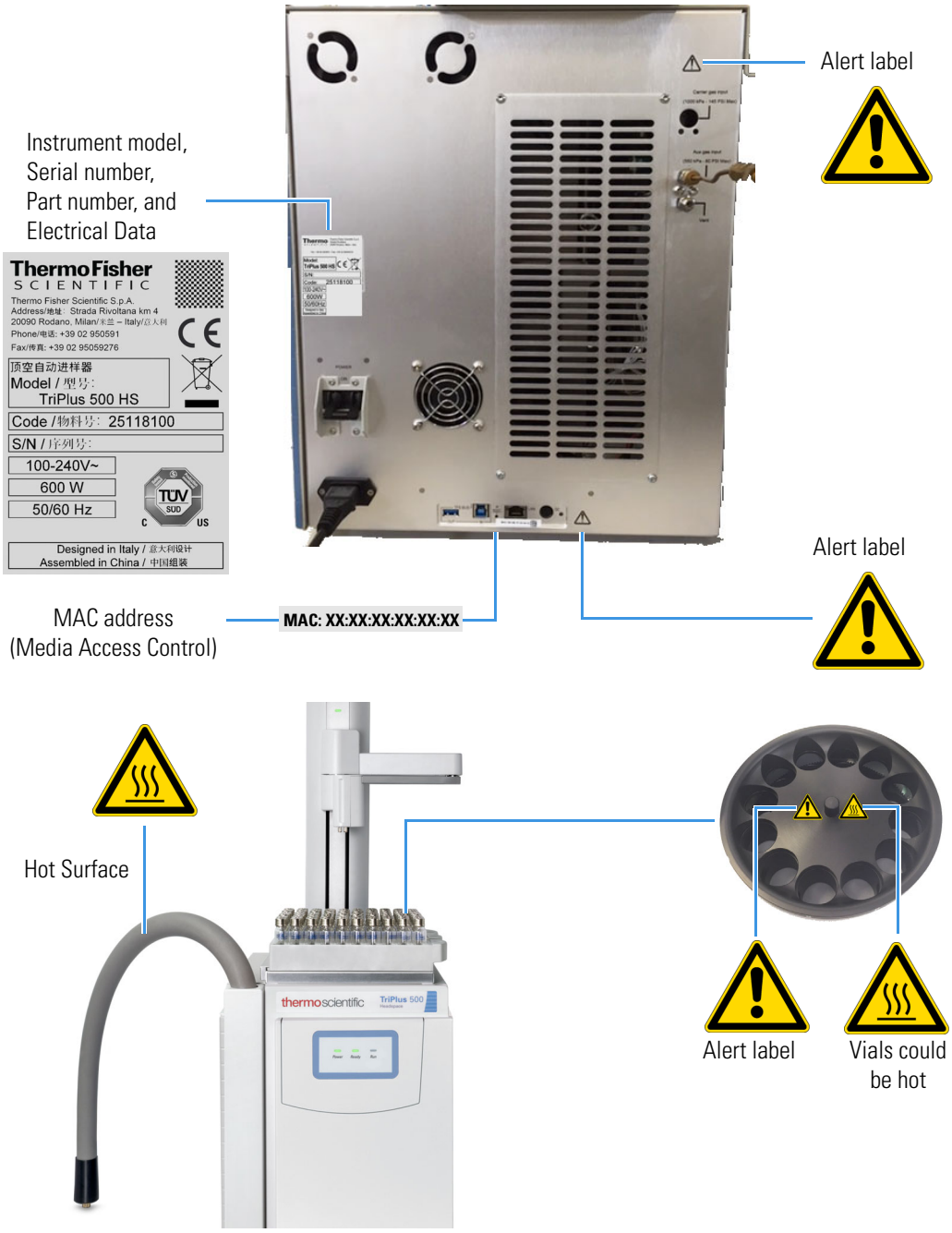
For more details see the following sections:

- "Installing the Vial Loader" on page 48
- "Vial Trays" on page 60
- "Barcode Reader" on page 68
- "Heated/Cooled Tray" on page 70

Label Locations

Figure 2, Figure 3, and Figure 4 show the locations of the labels attached to the TriPlus 500 HS, Vial Loader, and Barcode Reader.

Figure 2. Label locations on the TriPlus 500 HS



CAUTION BURN HAZARD: The transfer line, vial carousel, and vials can be hot. Allow them to cool before touching them.

Figure 3. Label locations on the Vial Loader

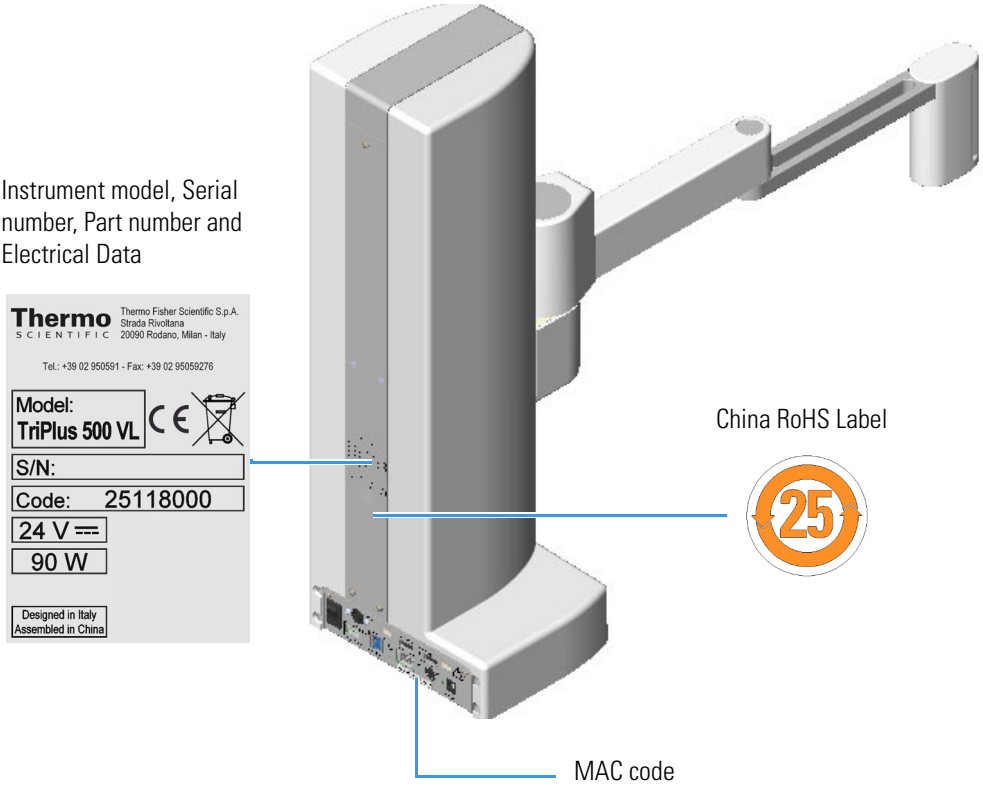
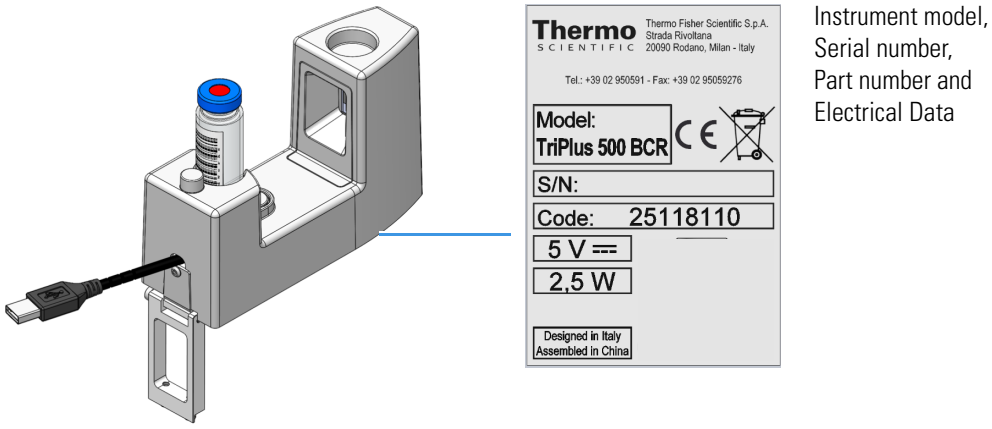


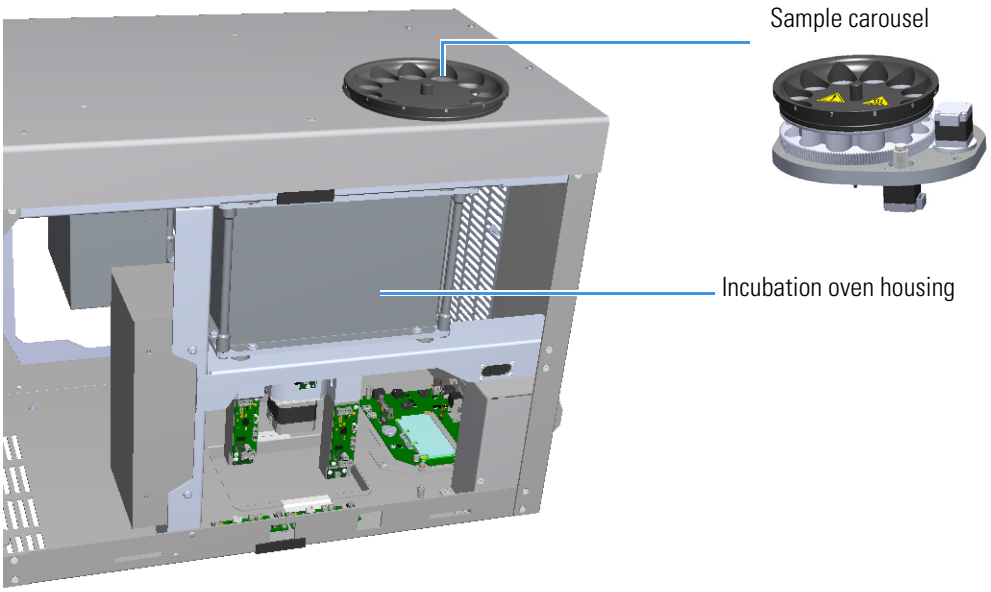
Figure 4. Label location on the Barcode Reader



Incubation Group

The Incubation Group includes the **Sample Carousel** and the **Incubation Oven**. See Figure 5.

Figure 5. 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.

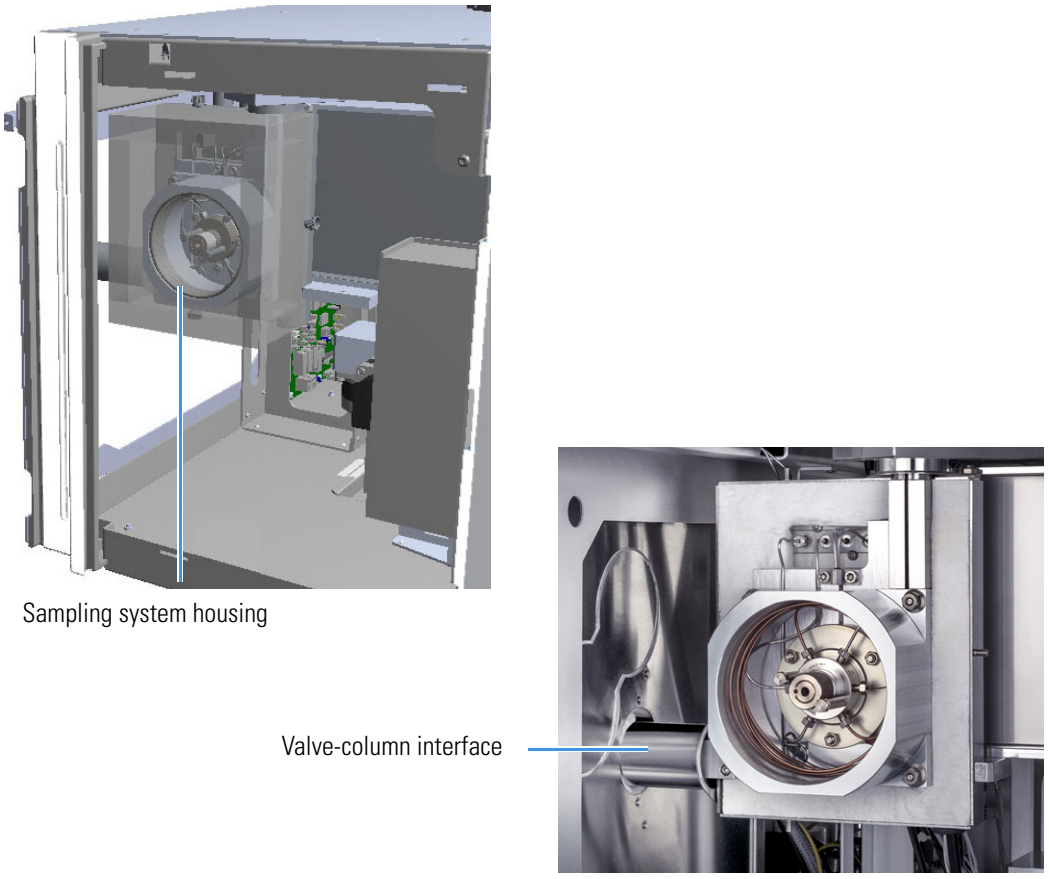
The vials are accurately thermostatted up to 300 °C and a fan provides a constant and uniform temperature. The vials are automatically inserted into the oven carousel from the sample vial carousel and can be shaken during the equilibration phase through the movements of the carousel.

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 connects to the GC through a heated transfer line. See Figure 6.

Figure 6. Sampling System



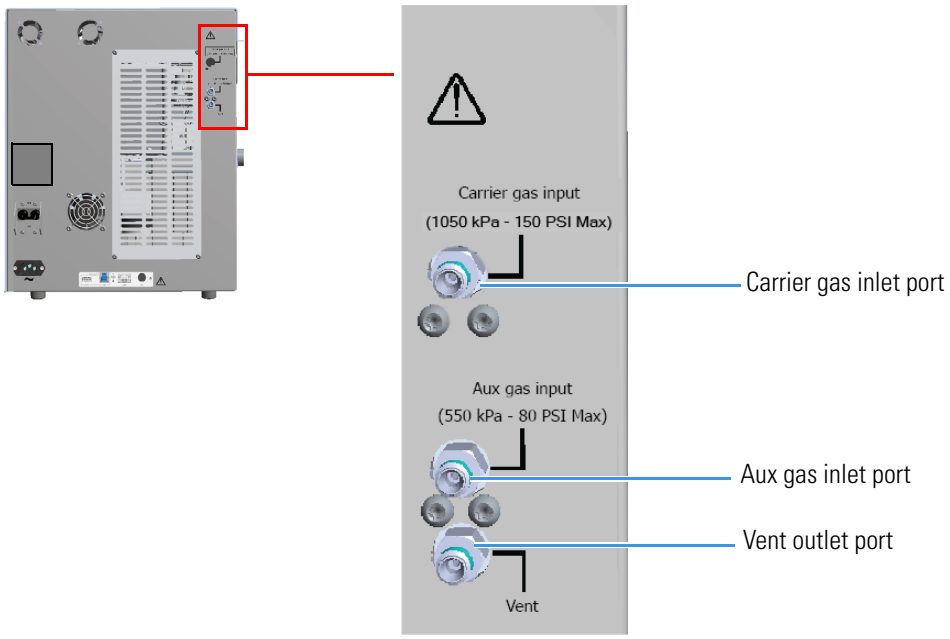
The sampling valve group is protected by a thermally insulated metal box. The valve is heated up to 225 °C with the standard factory-installed valve. An optional high temperature valve is available to heat the valve in range from 150 °C up to 300 °C. A wide range of sample loops allows injection of different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

The standard volume of the sample 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 inlet and outlet ports for connections to the sampling path and external devices. See Figure 7.

Figure 7. Pneumatic Interface



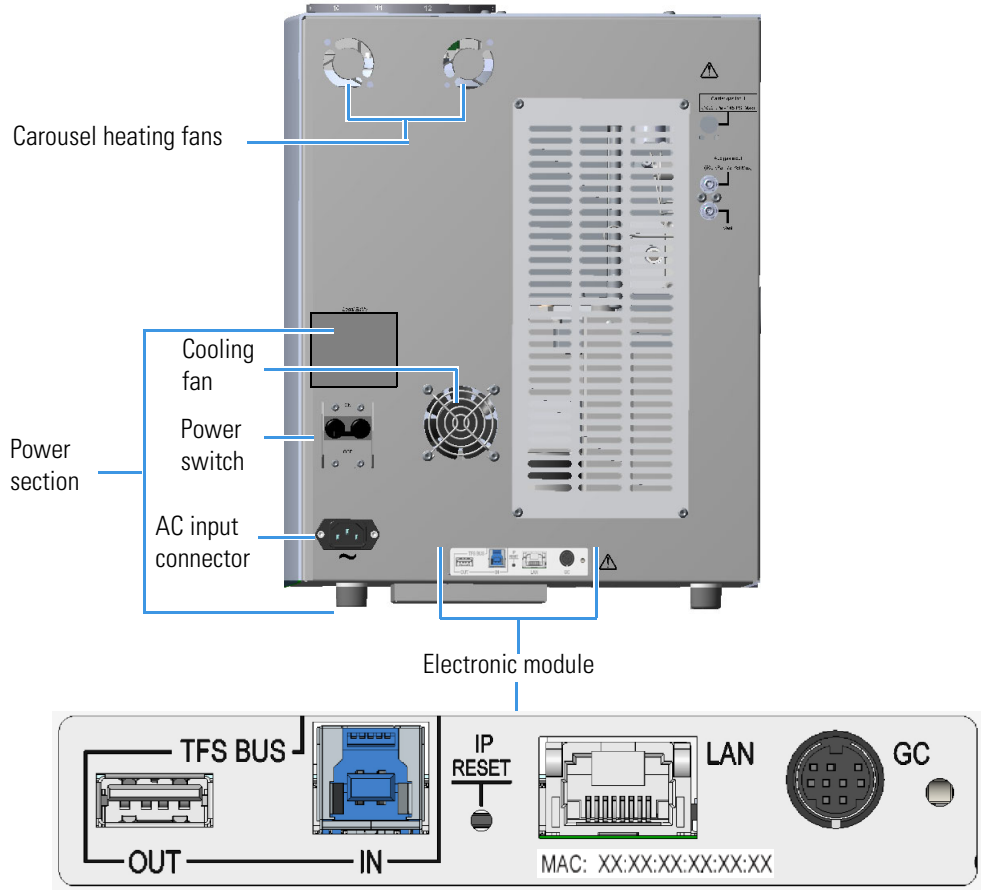
The pneumatic interface includes:

- An inlet port marked **Carrier gas input** (**1050 kPa - 150 PSI Max**) for connecting the carrier gas supply from the cylinder.
- 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.

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 8.

Figure 8. 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

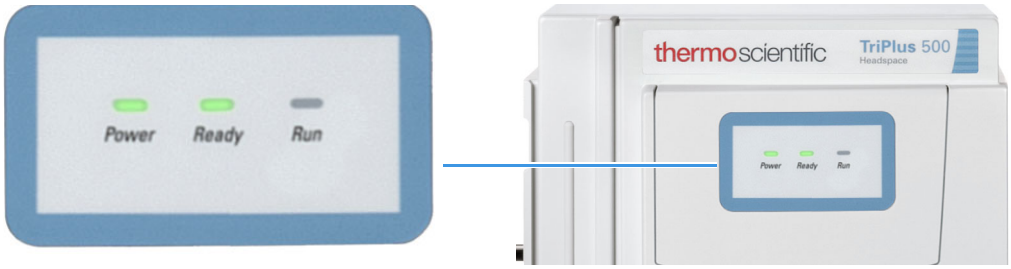
The electronic module includes:

- 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 is located on the front door of the TriPlus 500 HS and has three light emitting diodes (LED) displaying the instrument's current status. See Figure 9.

Figure 9. 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

Installation

This chapter provides instructions to install and prepare the TriPlus 500 HS.

Contents

Preliminary Information

This section provides preliminary information before you install and connect your TriPlus 500 HS.

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 instrument operation.

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

Verify Site Preparation

Before installing the TriPlus 500 HS with Transfer Line in 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

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

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

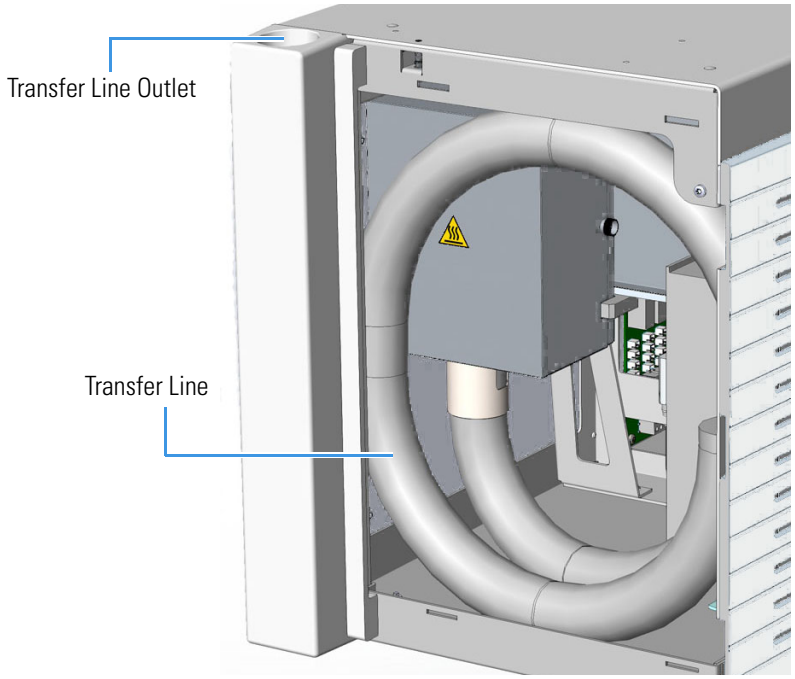
ATTENTION Cette opération doit être effectuée par un ingénieur de maintenance sur site (FSE) de Thermo Fisher Scientific.

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 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 equipment to the dealer or the factory without prior authorization from Thermo Fisher Scientific.

Note The TriPlus 500 HS ships with the transfer line inside the instrument. See Figure 10 for more details.

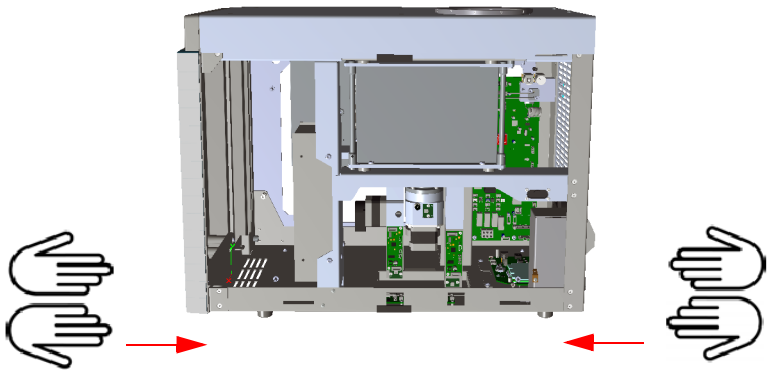
Figure 10. TriPlus 500 HS Transfer Line Location During Shipping



Placing the TriPlus 500 HS

Place the TriPlus 500 HS on a workbench allowing access to the 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 be made accessible. Optional equipment should be placed near the HS sampler to be easily connected.

Making the Gas Supply Plumbing Connections

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

Building the Gas Lines

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 (if required) on the line.

To 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
- tubing cutter
- connecting nuts and relevant ferrules
- two wrenches

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

AVERTISSEMENT Fixez les bouteilles de gaz 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 room to perform system maintenance.

4. Use a tubing cutter to cut the tubing.

Purging Gas Lines

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 carrier and auxiliary gas lines before you connect the gas supply to the HS sampler.

Use the following procedure to purge the carrier and auxiliary gas lines:

❖ To purge the gas line

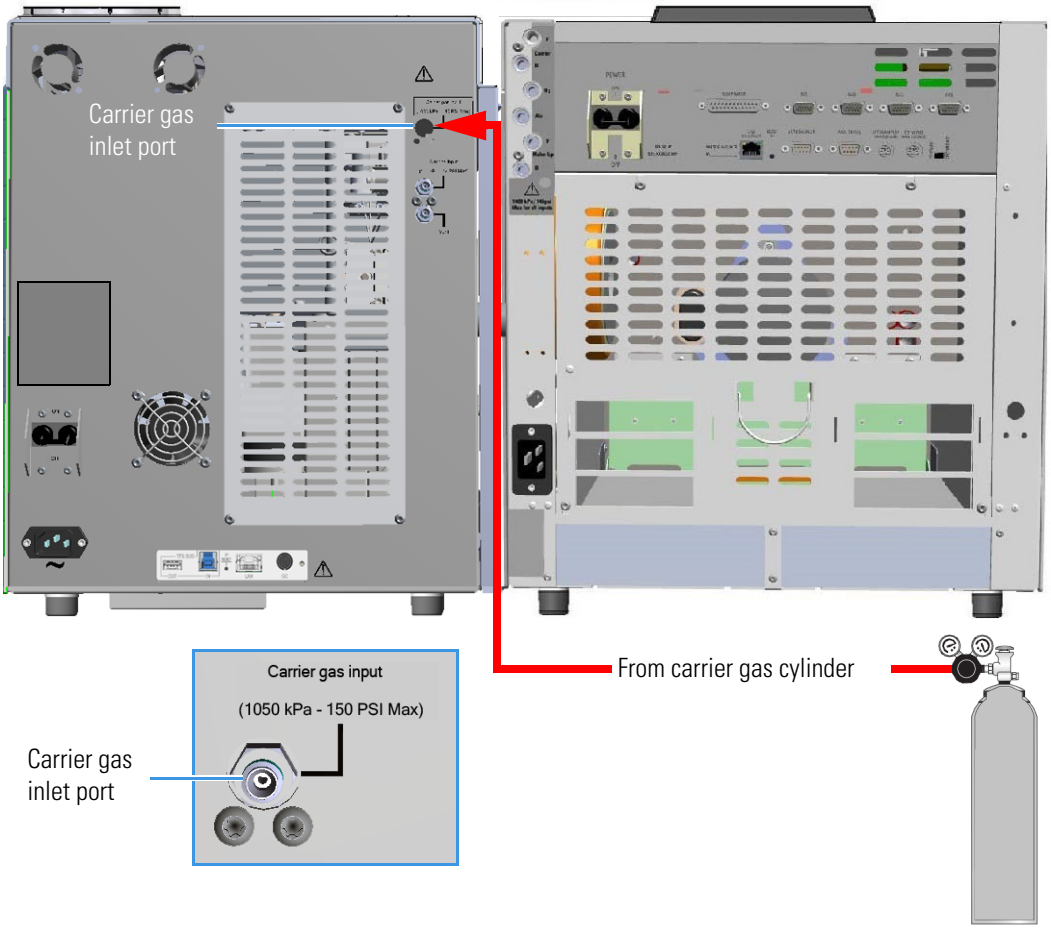
1. Turn the gas supply on, and set the pressure to 35 kPa (0.35 bar, 5 psig).
2. Allow the line to purge for 10 minutes.
3. Turn off the gas supply.

Connecting the Carrier Gas Line

The carrier gas supply line must be connected to the inlet port marked **Carrier gas input** on the instrument back panel using the proper ferrule and fittings.

In the standard configuration, the instrument is set up to use the gas chromatograph carrier gas regulation system, and the standard configuration is not equipped with any pressure or flow rate regulator.

Figure 11. Carrier Gas Connection



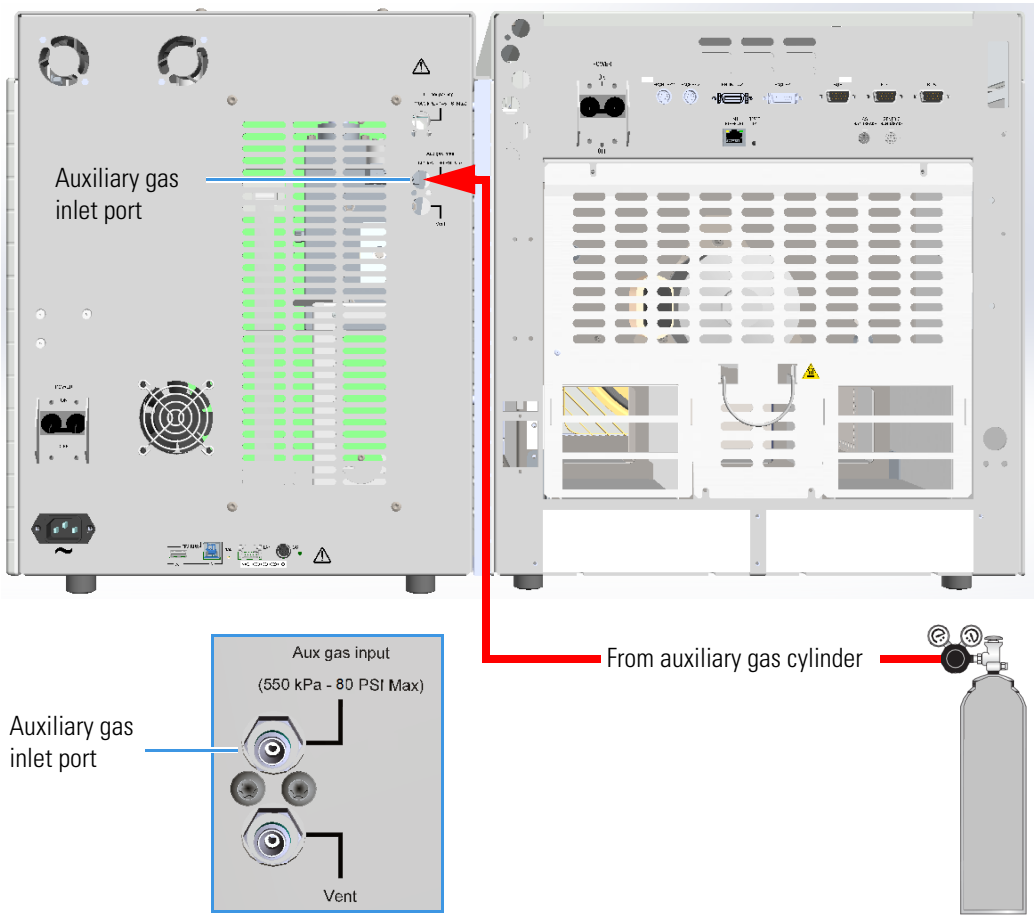
CAUTION The maximum pressure of the carrier gas to supply the TriPlus 500 HS is 1050 kPa (10.5 bar, 150 psi).

ATTENTION La pression maximale du gaz auxiliaire pour alimenter le TriPlus 500 HS est de 1050 kPa (10,5 bar, 150 psi).

Connecting the Auxiliary Gas Line

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

Figure 12. Auxiliary Gas Connection



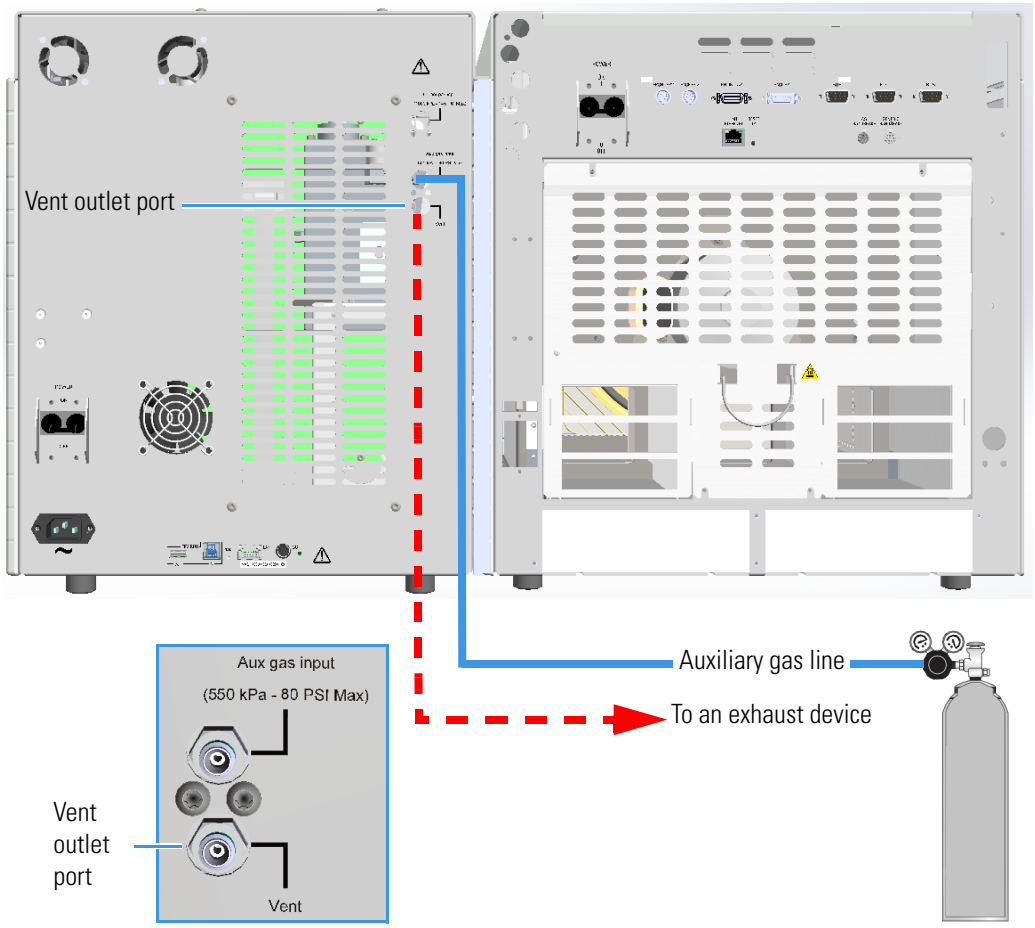
CAUTION The maximum pressure of the auxiliary gas to supply the TriPlus 500 HS is 550 kPa (5.5 bar, 80 psi). A minimum inlet pressure of 300 kPa of the auxiliary gas in required to supply the TriPlus 500 HS.

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 13.

Figure 13. 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 the 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 the GC**

See Figure 14 and Figure 15.

Figure 14. Electrical Connections to TRACE 1600/1610 GC (1)

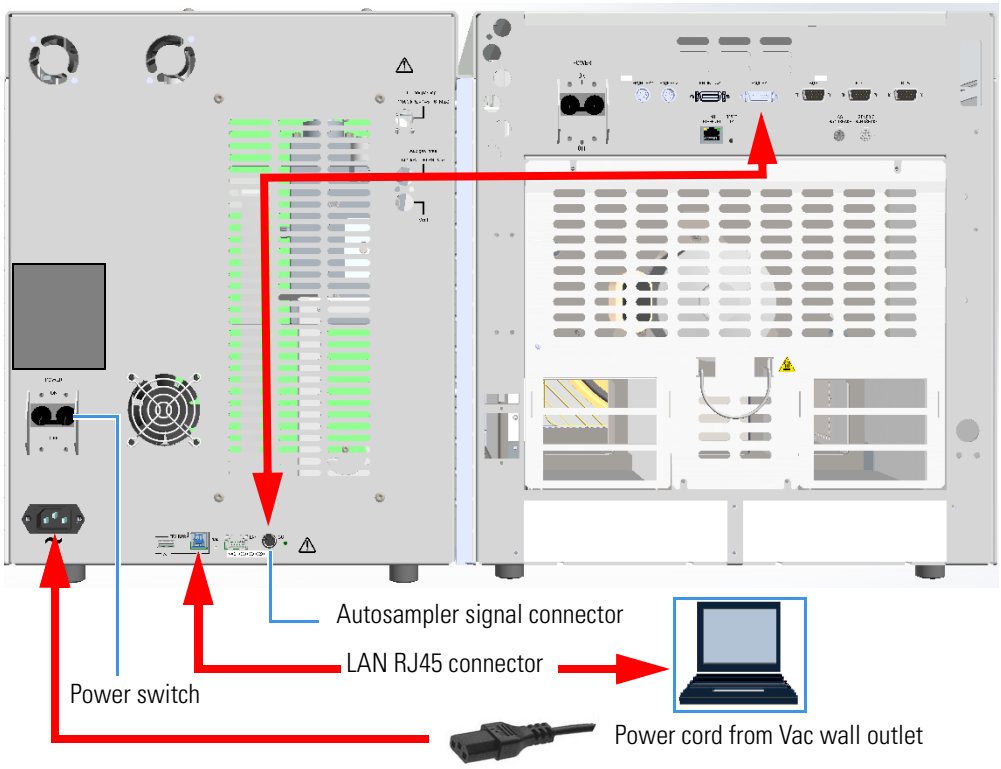
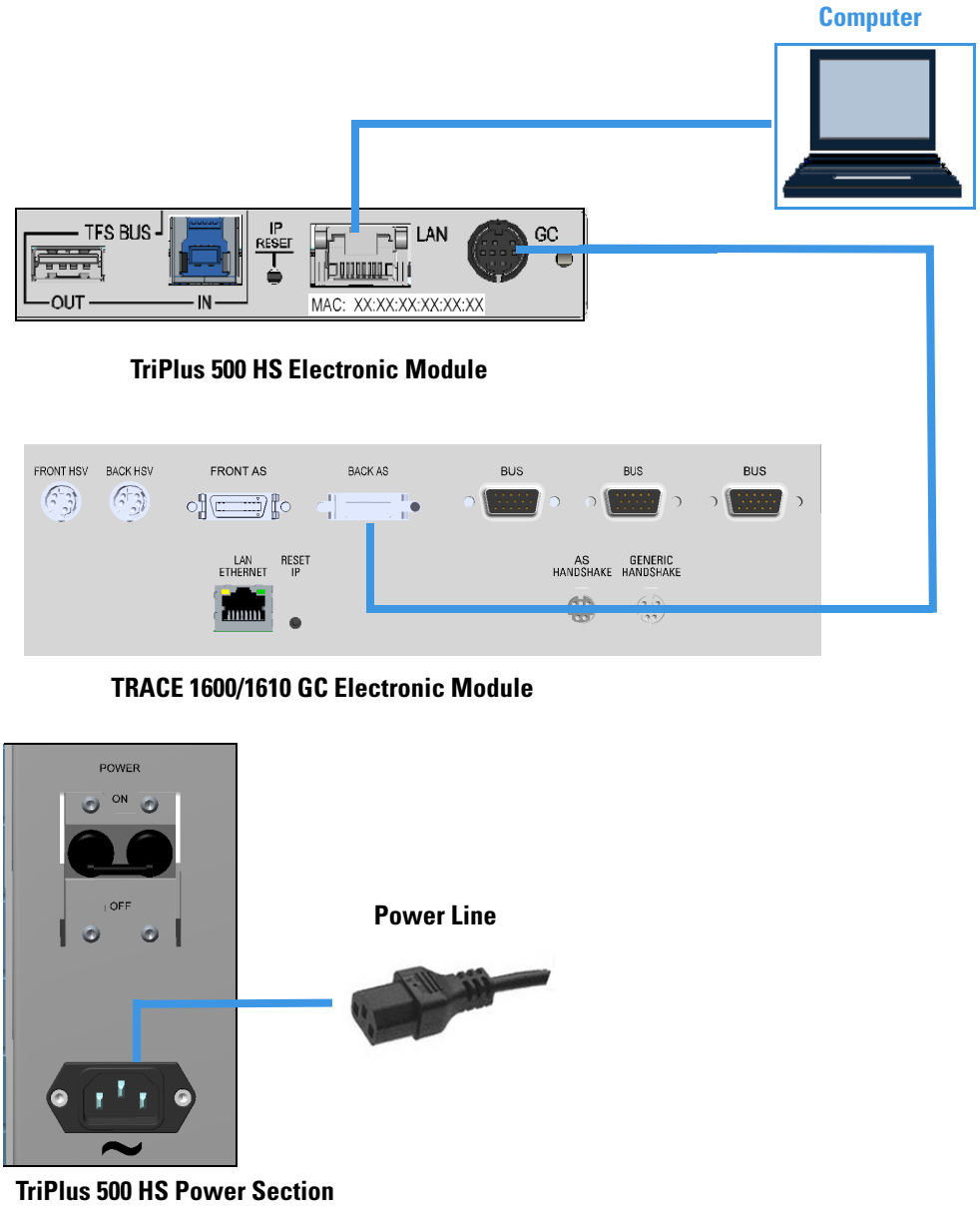


Figure 15. Electrical Connections to TRACE 1600/1610 GC (2)



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 14 and Figure 15.

Figure 16. Electrical Connections to TRACE 1300/1310 (1)

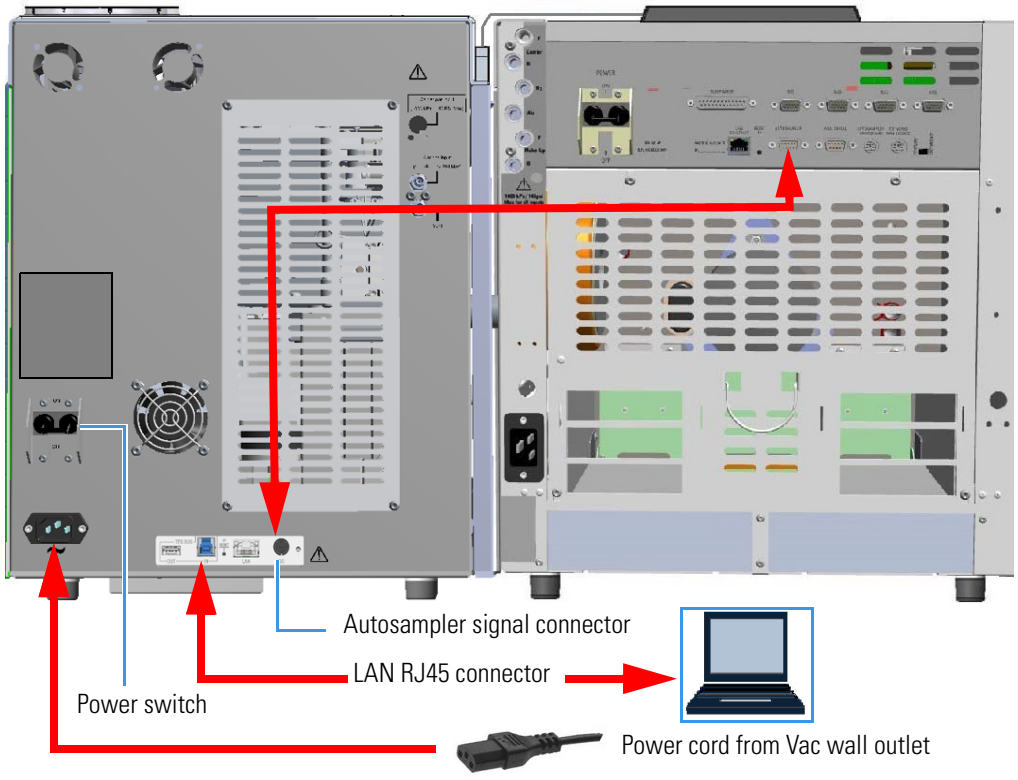
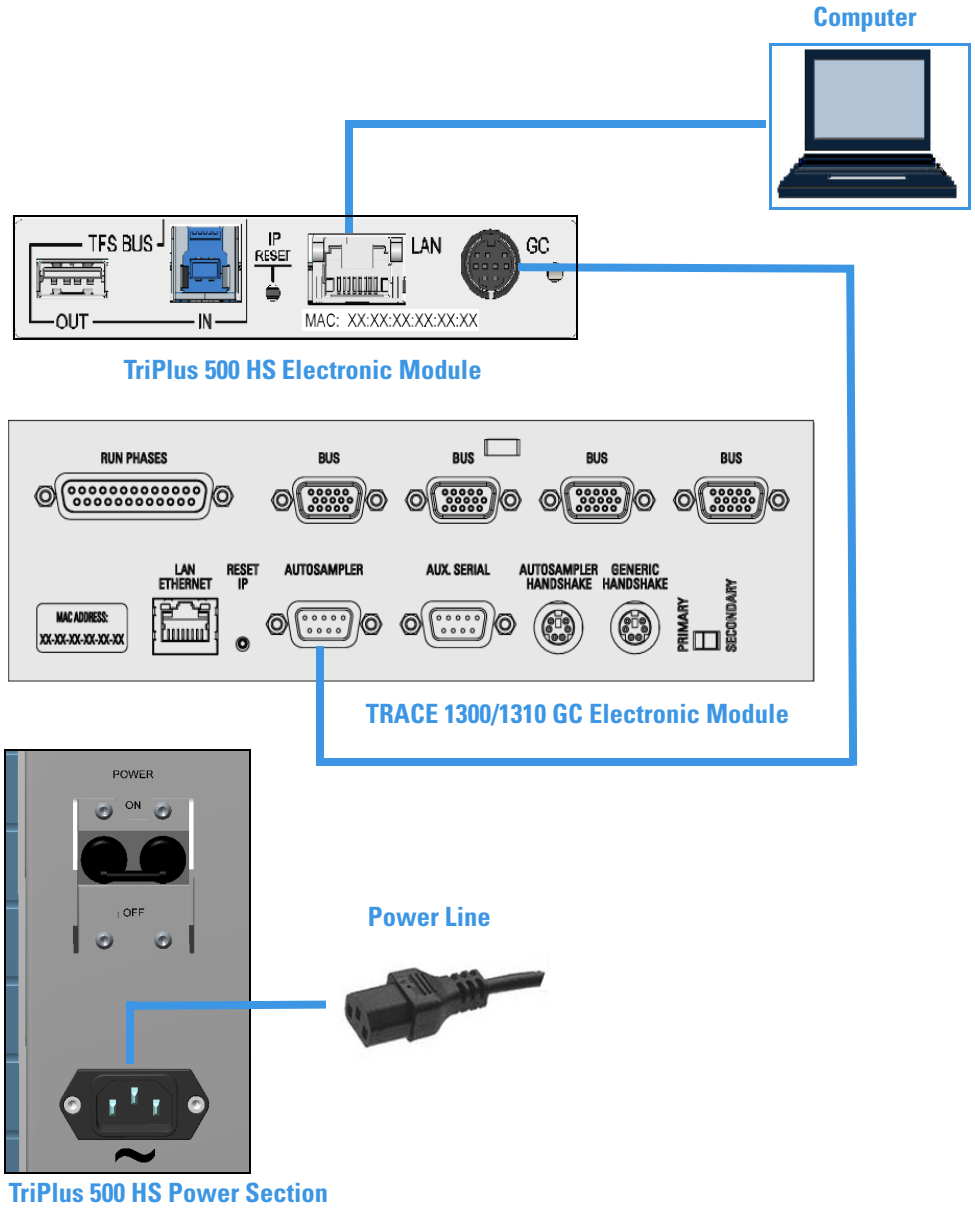


Figure 17. Electrical Connections to TRACE 1300/1310 (2)



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 "“Configuring LAN Communication” on page 24. 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.

Setting up LAN Communication

❖ 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.

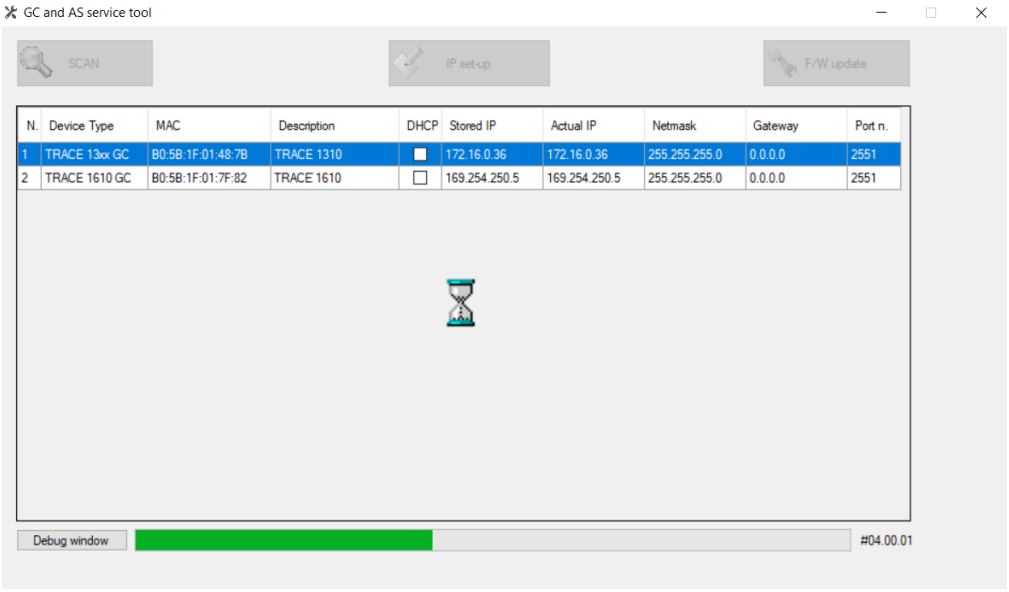
Updating the **Firmware** version on the GC must be carried out by a Thermo Fisher Scientific authorized technical personnel.

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**.

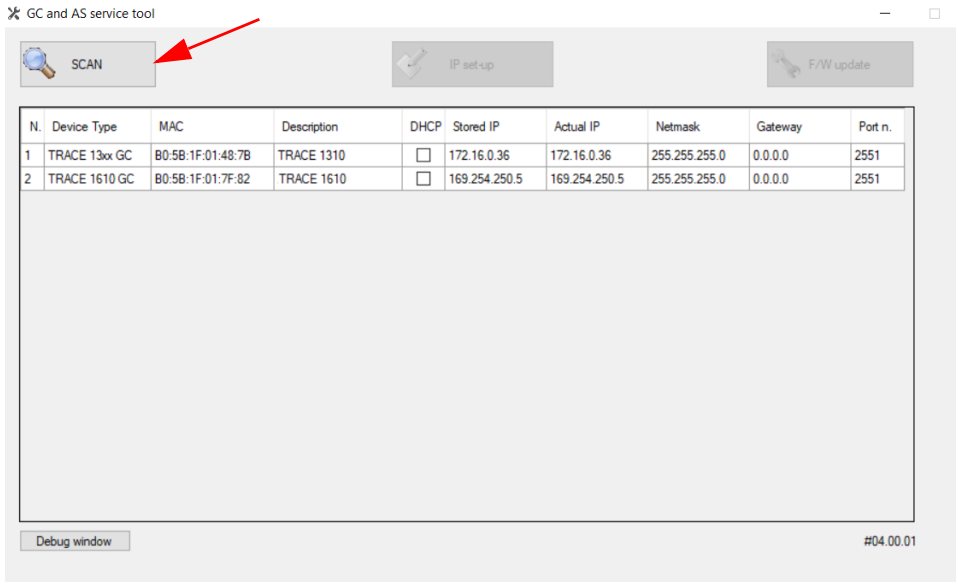
6. The system starts scanning for equipment powered on and connected to the LAN. During this process, the three buttons on the top of the page are disabled. See Figure 18.

Figure 18. 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 19.

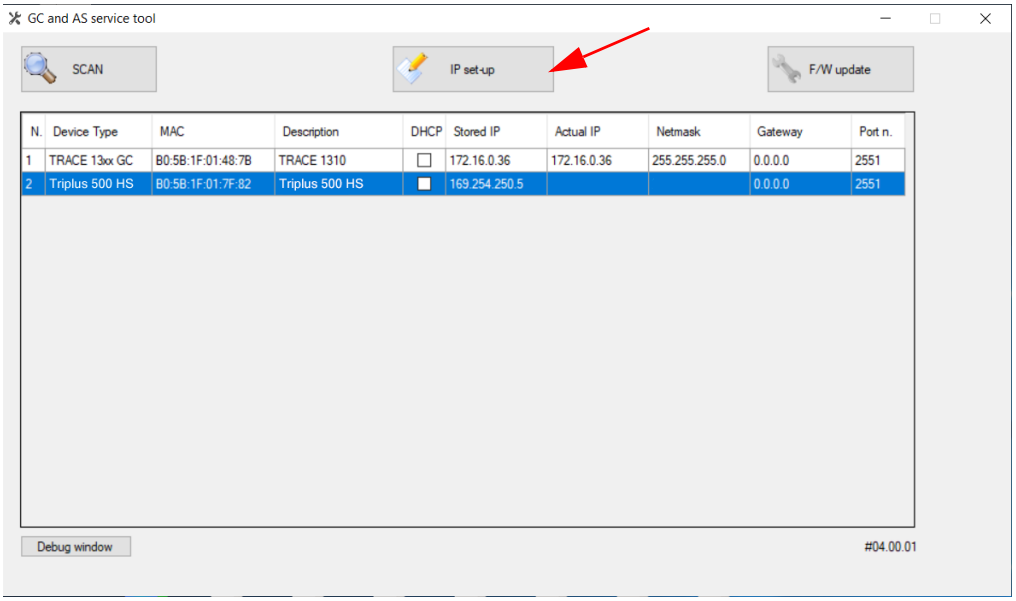
Figure 19. Equipment Connected to the LAN



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

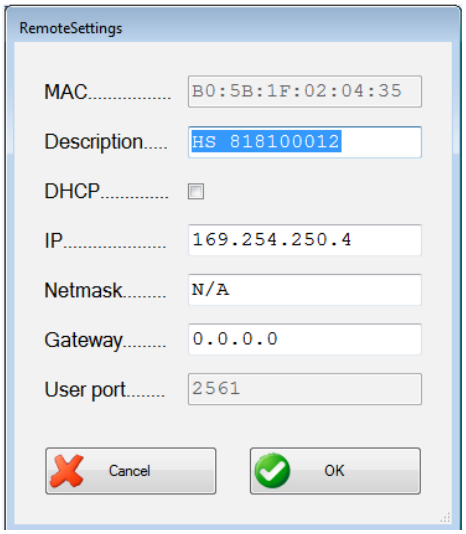
8. Select the TriPlus 500 HS to set up. All the three buttons on the top of the page are enabled. See the example in Figure 20.

Figure 20. Selecting an Instrument to Configure



9. Click **IP set-up**. The **Remote Settings** page is displayed. See the example in Figure 21.

Figure 21. 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 27.

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 alternate 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 Transfer Line

You can connect the TriPlus 500 HS to a gas chromatograph by connecting the HS transfer line and adapter to the GC injector.

❖ To connect the transfer line to a TRACE Series GC

Material Needed
Ceramic scoring wafer or sapphire scribe
Notched septum or typewriter correction fluid or a felt-tipped pen
1/4 in. Hexagonal retaining nut
Wrench Open-ended 1/4–5/16 in.

1. Shut down the GC
   a. Put the GC in standby condition
   b. Cool the oven, injectors, and detectors to room temperature.

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

   c. Close the gas supplies.

d. Power off the GC.

i. Push down the power switch (breaker), located at the back of the instrument, to the position O.

ii. Unplug the power cable from the AC Input connector into the back of the GC and from the wall outlet.

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

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.

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.

3. Uncoil and remove the transfer line from the HS.

4. Take 1.7 m of deactivated metal column and insert it into transfer line.

a. From the open end that will connect to the GC, slide the deactivated metal column through the transfer line until it appears on the other end.

5. Install the transfer line to the HS valve. See Figure 22.

a. Place the supplied nut on the 6-port valve and tighten it using the 1/4 in. wrench.

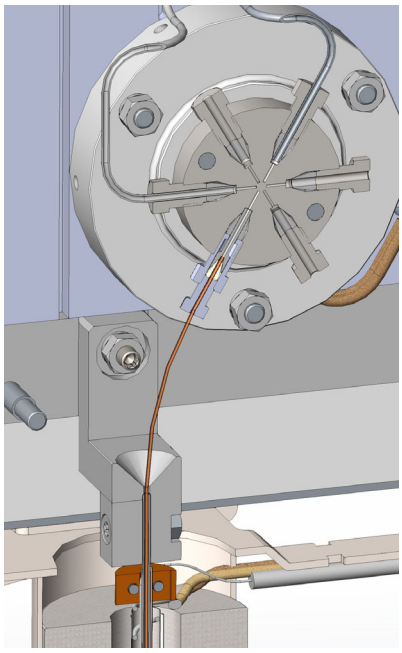
b. Slide the reducing nut and the relevant ferrule on the deactivated metal column.

c. Connect the reducing nut to the parent nut on the 6-port valve and tighten it until the deactivated metal column begins to grip. Then tighten an extra quarter turn.

WARNING Keep the deactivated metal column to its mechanical stop when tightening the reducing nut.

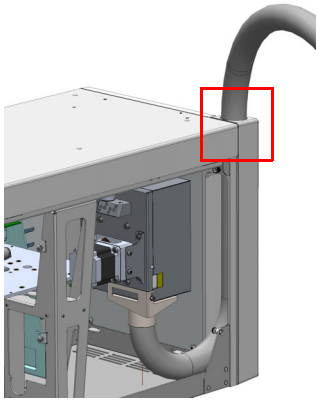
Note For specific analytical requirements, optional Sulfinert and fused silica transfer lines are available. The fused silica transfer line cannot be used at temperatures above 150 °C.

Figure 22. Transfer Line and Valve Connection



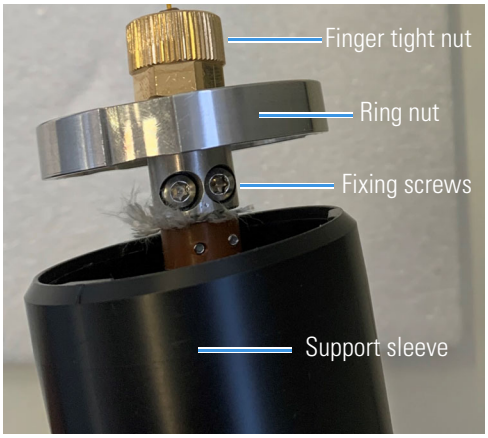
6. Route the transfer line to the outlet at the front of HS and through the top of the instrument.

Figure 23. Transfer line routed from the HS to the GC



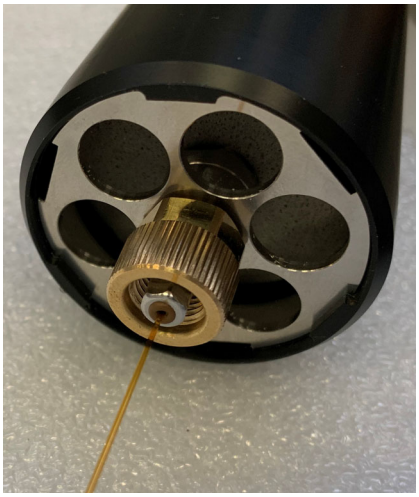
7. Install the black support sleeve to the end of the transfer line that will connect to the GC.
8. Install the ring nut (using the two screws) on the transfer line. See Figure 24.

Figure 24. Transfer line connection components



9. Finger-tighten the finger tight nut.
10. Slide the black support towards the ring nut. See Figure 25.

Figure 25. Transfer line configured

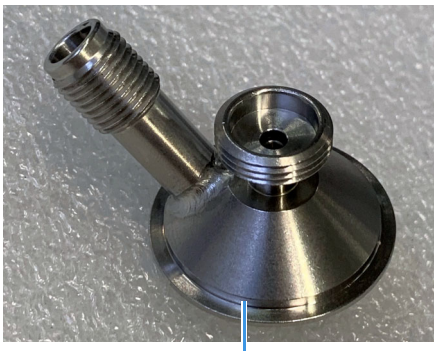


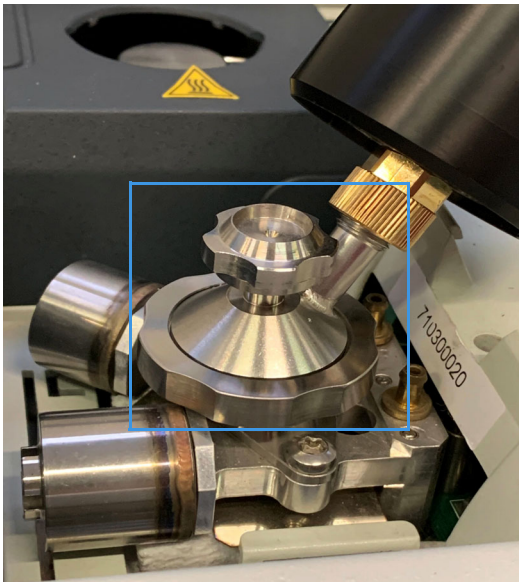
11. Rotate the black support to fix it in position.
12. Insert the provided dedicated O-ring on the transfer line.

Connecting the Transfer Line and SSL Adapter to a SSL Injector

The following section provides the instructions for connecting the transfer line and SSL adapter to the TRACE 1300/1600 Series GC SSL injector. See Figure 26.

Figure 26. SSL Adapter





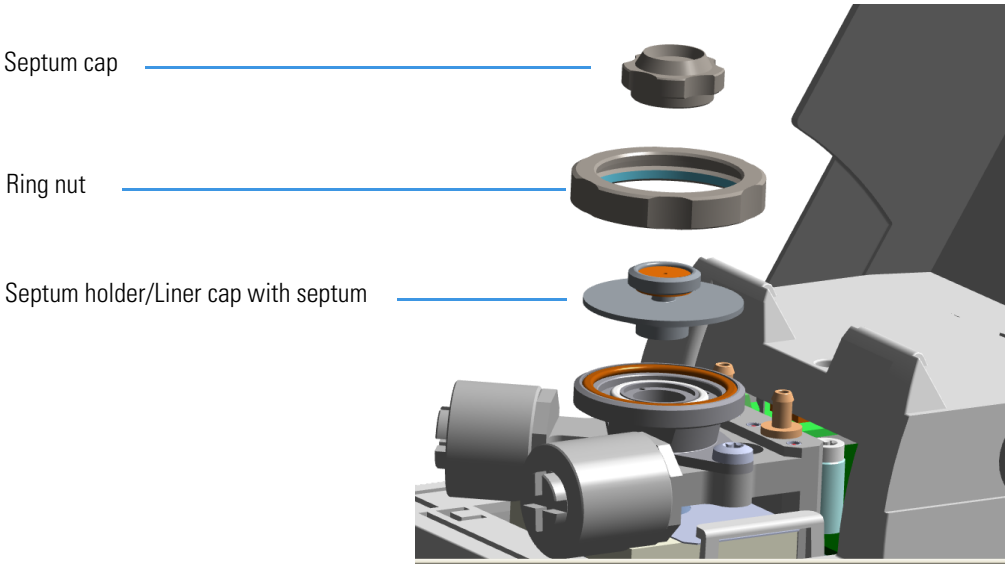
❖ **To install the SSL adapter:**

1. Put the TRACE 1300/1600 Series GC in standby condition.
2. Cool the oven, injector, and detector to room temperature.

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

3. Close the gas supplies.
4. Power off the GC.
5. Remove the column end from the injector and the detector.
   a. Open the front door of the GC.
   b. Loosen the retaining nut from the injector fitting on the upper interior wall of the GC oven.
   c. Remove the analytical column with its nut and ferrule from the bottom of the injector.
   d. Remove the analytical column with its nut and ferrule from the bottom of the detector.
6. Remove the top parts of the injector. See Figure 27.

Figure 27. Injector Top Parts Removal



a. Unscrew the septum cap from the injector.

b. Unscrew the ring nut.

c. Remove the septum holder/liner cap with septum from the injector body head.

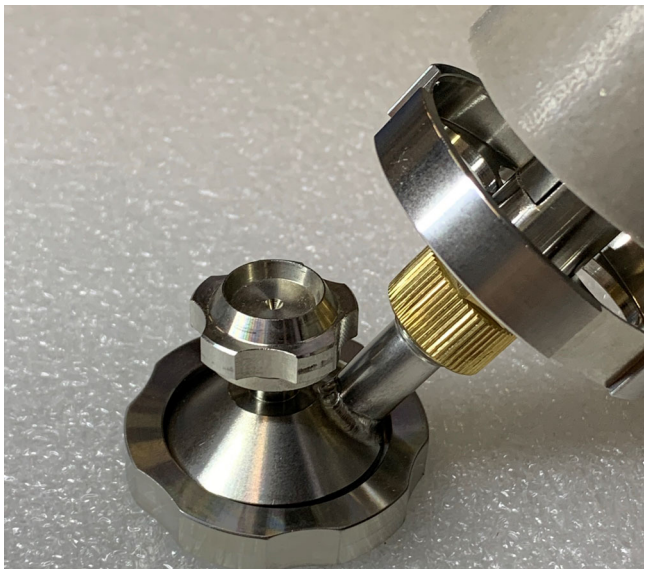
7. Attach the septum cap and ring nut to the SSL adapter.

8. Connect the transfer line to the SSL adapter using the finger tight nut. See Figure 28.

   a. With the deactivated metal column connected to the HS valve and extending 30 mm from the end of the transfer line, connect the SSL adapter by sliding the metal column into the adapter.

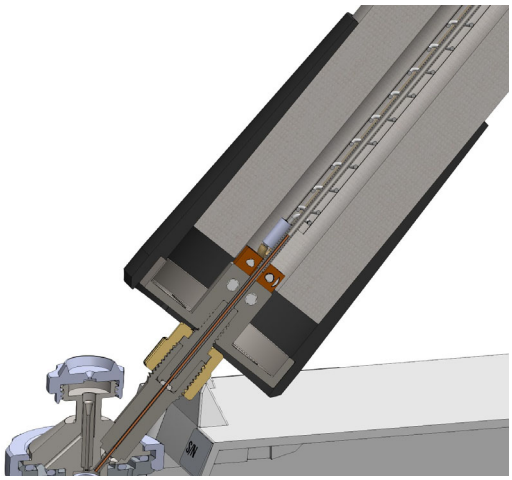
   b. Tighten the finger tight nut.

Figure 28. SSL Adapter Connected to the TriPlus 500 HS Transfer Line



9. Install the SSL adapter to the injector. See Figure 29.

Figure 29. SSL Y Connection



Note The transfer flow needs to be ≤ to the split flow in order to prevent an over-pressure into the injector.

10. Cut the piece of column end previously connected to the injector.
    a. Use a scoring wafer to score and break the column in order to remove the current ferrule and the nut.
11. Connect the column to the injector.
    a. Wipe about 100 mm (4 in.) of the column with a tissue soaked in methanol.
    b. Insert the column through the injector retaining nut and the proper ferrule (open end up). Wipe the column again with a tissue soaked in methanol.
    c. 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 injector retaining nut to make it easier to measure the proper distance between the nut and the end of the column.

    d. Position the column so the end of the column extends 30 mm above the end of the ferrule.
    e. Insert the notched septum on the column to hold the retaining nut at this position. Thread the retaining nut into the injector but do not tighten.
    f. Adjust the column position so that the septum contact the bottom of the retaining nut.
    g. Finger-tighten the retaining nut until it starts to grip the column plus a quarter turn.

h. Remove the notched septum from the column.

12. Open the gas supplies.
13. Power on the GC.
    a. Plug the power cable into the AC Input connector on the back of the GC and into the wall outlet.
    b. Flip out the power switch (breaker) to the position I.
14. Setup the GC.
    a. Set the oven and injector 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. If there is still no flow, consult the **Analytical Troubleshooting** section in the *User Guide*, or contact the Technical Support.
    c. Allow the column to purge for few minutes.
15. Perform a column leak check.
16. Calibrate the carrier gas flow (column evaluation).
    a. Select the column and input the physical characteristics of the column.
    b. If a pre-/post-column is present, set the length and nominal internal diameter of the pre-/post-column in the same valid ranges for the column. The following two lines are added to the menu.
    c. According to the physical characteristics of the column, the system calculates and displays the relevant Column K-factor.

    Note For the most reproducible results, you should conduct a more detailed column evaluation. However, the following steps, while recommended, are not required.

    d. Start column evaluation. At the end of the routine, a message will indicate that evaluation was successful.
    e. Expect a K-factor of approximately 0.7 – 0.9 for a 15 m, 0.25 mm ID column (1.3 – 2.0 for a 30 m, 0.25 mm ID column). If the column does not report a K-factor within this range or within 0.1 units of the previous stored value, check for a leak or broken column using the leak detector. The K-factor is a measured resistance for the column. A K-factor that is too low may indicate a leak in the system, while a K-factor that is too high may indicate a blockage.
17. Disconnect the column-flowmeter.
    a. Disconnect the column from the column-flowmeter connector.

b. Remove the clear plastic component, including its fittings, from the oven and set it aside.

c. Close the GC door.

18. Condition the column.

The column must be conditioned before inserting it into the detector.

Column conditioning consists of passing a carrier gas flow through the column heated at a programmed temperatures as described in the *column manufacturer's instructions*.

In case the column does not have any column conditioning instructions, perform the column conditioning by setting a final temperature up to 10 °C - 20 °C below its recommended maximum temperature.

CAUTION When performing column conditioning, the column should be connected only to the injector leaving the column outlet disconnected to avoid the possibility of contamination of the detector.
Do not use hydrogen as the carrier for conditioning! It could vent into the oven and present an explosion hazard.

a. Run the temperature program that is recommended by the manufacturer.

INSTRUMENT DAMAGE: Never exceed the column manufacturer's maximum operating temperature.

19. Connect the column to the detector inside the GC.

a. Lower the oven temperature to 30 °C and allow it to cool.

WARNING-BURN HAZARD: The injector, detector, oven, and transfer line may be hot. Allow them to cool to room temperature before touching them.

b. Unwind the column enough to easily connect its ends to the injector and the detector.

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

c. Wipe about 100 mm (4 in.) of the column with a tissue soaked in methanol.

d. Use a scoring wafer to score and break the column outlet about 2.5 cm (1 in.) from the end. Use a magnifying glass to check for an even, flat cut. Repeat if necessary.

e. Insert the column through the proper detector retaining nut and ferrule (open end up). Wipe the column again with a tissue soaked in methanol.

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

f. Position the column so that the end of the column extends the proper distance above the end of the ferrule as reported in Table 1.
For **PDD** see the instruction described at the step g on page 36.

Table 1. Column Insertion Depth For FID, NPD, TCD, ECD, FPD, and PDD Detectors

FID	NPD	TCD	ECD	FPD	PDD
Insert the column as far as goes and withdraw about 2 mm			23 mm	125 mm	136 mm

i. For **FID**, **NPD**, **TCD**, insert the column into the detector, paying attention to not force it further. Finger-tighten the retaining nut, then withdraw the column 2-3 mm. Tighten the retaining nut an additional a quarter turn.

ii. For **ECD** and **FPD**, insert the notched septum on the column to hold the retaining nut in this position. Thread the retaining nut into the detector but do not tighten.
Finger-tighten the retaining nut until it starts to grip the column plus a quarter turn. Remove the notched septum from the column.

g. For **PDD** the column must penetrate **136 mm** inside the capillary column adapter.

h. End of the column installation.

20. Close the front door of the GC. Perform the leak test. See "Performing a Leak Test" on page 42.

Connecting the Transfer Line and Vertical Adapter to a SSL Injector

The following section provides the instructions for connecting the transfer line and vertical adapter to the TRACE 1300/1600 Series GC SSL injector.

❖ **To install the vertical adapter:**

1. Put the TRACE 1300/1600 Series GC in standby condition.
2. Cool the oven, injector, and detector to room temperature.

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

3. Close the gas supplies.
4. Power off the GC.
5. Remove the column end from the injector and the detector.

a. Open the front door of the GC.

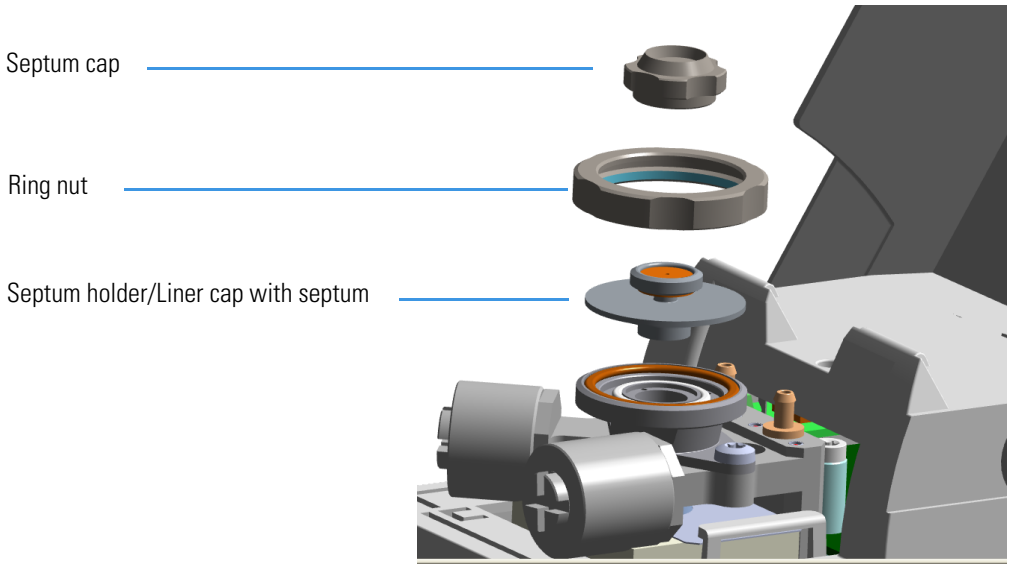
b. Loosen the retaining nut from the injector fitting on the upper interior wall of the GC oven.

c. Remove the analytical column with its nut and ferrule from the bottom of the injector.

d. Remove the analytical column with its nut and ferrule from the bottom of the detector.

6. Remove the top parts of the injector. See Figure 30.

Figure 30. Injector Top Parts Removal



a. Unscrew the septum cap from the injector.

b. Unscrew the ring nut.

c. Remove the septum holder/liner cap with septum from the injector body head.

d. Remove the large, white o-ring.

7. Attach the ring nut to the adapter.

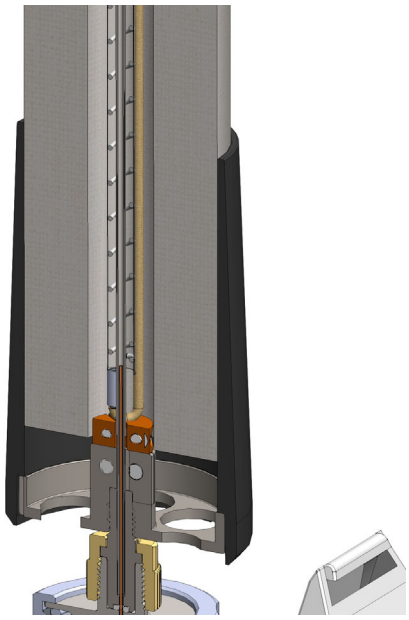
8. Connect the transfer line to the vertical adapter using the finger tight nut. See Figure 31.

a. With the deactivated metal column connected to the HS valve and extending 30 mm from the end of the transfer line, connect the vertical adapter by sliding the metal column into the adapter.

b. Tighten the finger tight nut.

9. Install the vertical adapter to the injector. See Figure 31.

Figure 31. SSL Single Connection



Note To increase the recovery of high boiling components, place insulating foam (included in your kit) on the adapter head.

Note The transfer flow needs to be ≤ to the split flow in order to prevent an over-pressure into the injector.

Connecting the Transfer Line and Agilent Adapter to an Agilent GC

The transfer line connects to the SSL inlet on the Agilent GC. The TriPlus 500 HS can be placed on either the right or left side of the Agilent GC.

❖ To install the Agilent adapter to the injector

1. Cool down the GC oven and turn it off. Refer to the Agilent GC documentation for more information.
2. Change the liner inside the injector to a dedicated liner.
3. Unscrew and remove the septum cap from the injector. See Figure 32.

Figure 32. Removing the Septum Cap

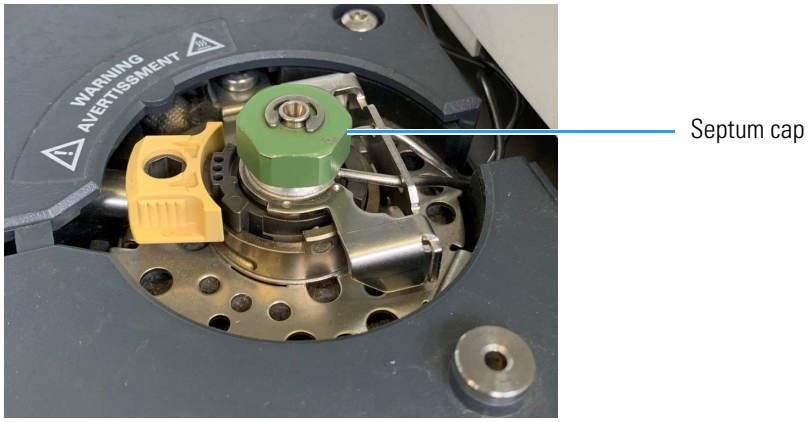
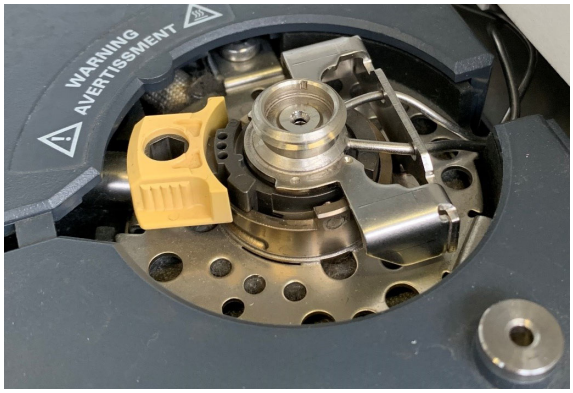
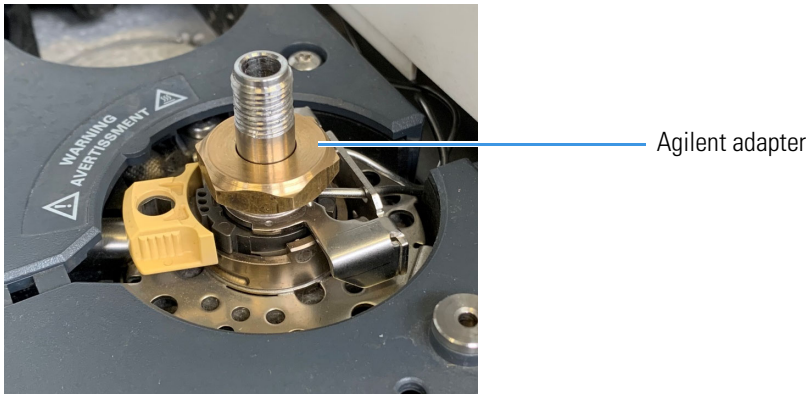


Figure 33. Septum Cap Removed



4. Connect the adapter by placing it on the injector and screwing it in. See Figure 34

Figure 34. Installing the Agilent Adapter



5. Install the fused silica into the transfer line. For more information about installing the fused silica follow the instructions in "Connecting the Transfer Line" on page 27.

Note Deactivated metal column or fused silica tubing can be used.

6. Cut the fused silica protruding from the end of the transfer line to 30 mm.

7. Slide the fused silica into the injector and finger tighten the transfer line to the adapter. See Figure 35.

Figure 35. Transfer Line Installed to GC Adapter

8. Connect the provided handshake cable to the HS and the GC.

Note Be aware that the flow coming from the TriPlus 500 HS will be added to the nominal split flow of the Agilent GC. The real split flow will be the sum of the nominal split flow and the HS transfer flow.

Note The overlap starts from the second GC run. During the first GC run the HS measures the GC cycle and uses this for setting the overlap. The GC method must be the same along the sequence in order to allow the overlapping

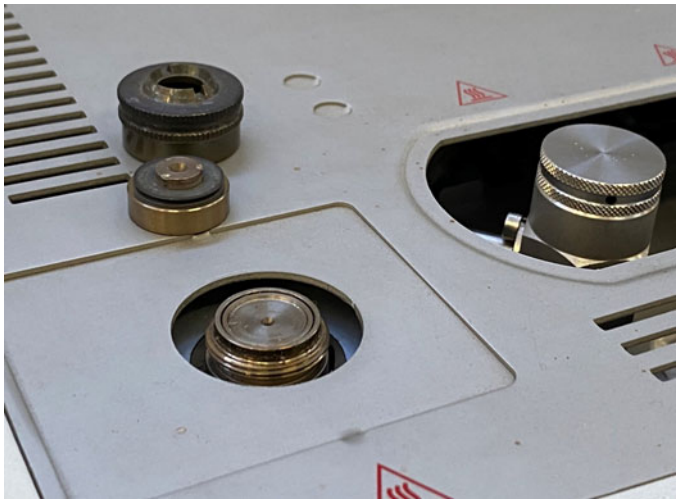
Connecting the Transfer Line to a TRACE GC Ultra

You can connect the TriPlus 500 HS transfer line to the SSL inlet on a TRACE GC Ultra. The TriPlus 500 HS should be placed to the right of the TRACE GC Ultra.

❖ To connect the TriPlus 500 HS transfer line to the TRACE GC Ultra SSL inlet

1. Cool down the temperatures of the TRACE GC Ultra and power it off. Refer to the TRACE GC Ultra documentation for more information.
2. Change the liner inside the injector to a dedicated liner.
3. Unscrew and remove the septum and septum cap from the SSL inlet. See Figure 36.

Figure 36. Removing the Septum and Septum Cap from the SSL Inlet

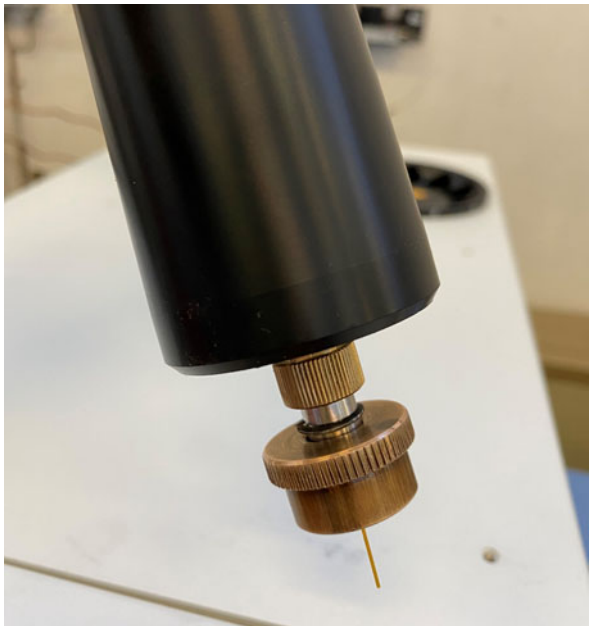


4. Install the fused silica into the transfer line. See "Connecting the Transfer Line" on page 27 for transfer line installation instructions.

Note Deactivated metal column or fused silica tubing can be used.

5. Install the adapter on the transfer line and slide the fused silica through the septum. See "Connecting the Transfer Line and SSL Adapter to a SSL Injector" on page 30 for adapter installation instructions. See Figure 37.

Figure 37. Fused Silica Installed in Transfer Line and Inlet Adapter



6. Cut the length of fused silica protruding from the end of the transfer line to 3 cm. Slide the fused silica into the injector and finger tighten the transfer line to the adapter. See Figure 38.

Figure 38. Transfer Line Connected to the TRACE GC Ultra SSL Inlet

7. Connect the provided handshake cable to the HS and GC.

Note The transfer flow needs to be ≤ to the split flow in order to prevent an over-pressure into the injector.

Note The overlap starts from the second GC run. During the first GC run the HS measures the GC cycle and use this for setting the overlap. The GC method must be always the same along the sequence in order to allow the overlapping

Performing a 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 done every time a modification is made to the system, for example: column or sample loop replacement.

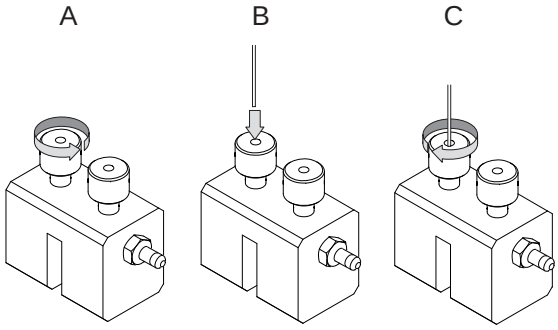
Note The TriPlus 500 must be off while performing a leak test on the GC.

❖ To perform a 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 39.

Figure 39. 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 the touch screen as 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.

Starting Up the Instrument

This section provides instructions to prepare the instrument for running analyses.

❖ To start 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 User Guide for more 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

Upgrade Equipment

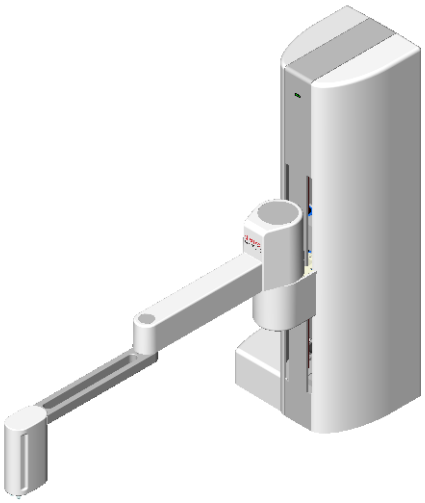
This chapter describes how to install the upgrade equipment available for the TriPlus 500 HS with Transfer Line. See the *TriPlus 500 with Transfer Line Spare Parts Guide* for information about ordering the equipment in this chapter.

Contents

Installing the Vial Loader

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

Figure 40. 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

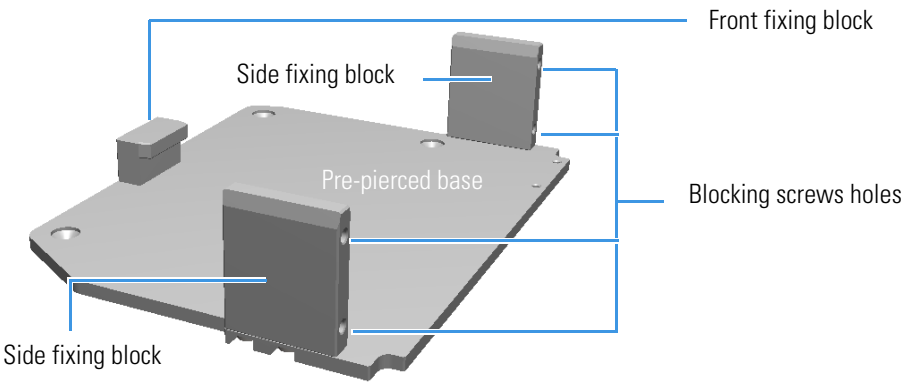
CAUTION The Vial Loader will be installed by an authorized Thermo Fisher Scientific Field Service Engineer (FSE), who will verify the instrument operation. If, for any reason, your system is not installed by a Thermo Fisher Scientific FSE, you should ensure that the following operations are performed. 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

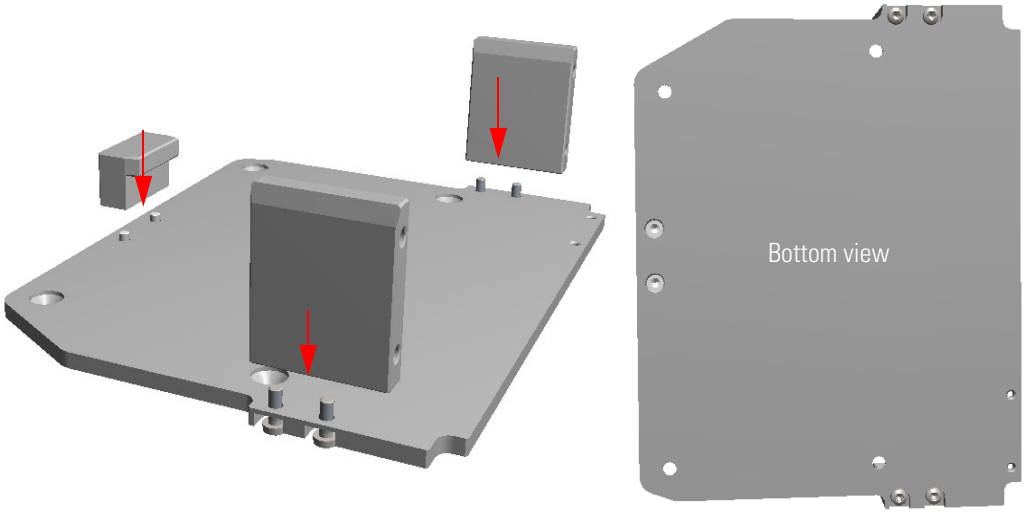
To install the Vial Loader on the TriPlus 500 HS use the dedicated fixing plate provided. See Figure 41.

Figure 41. Fixing Plate



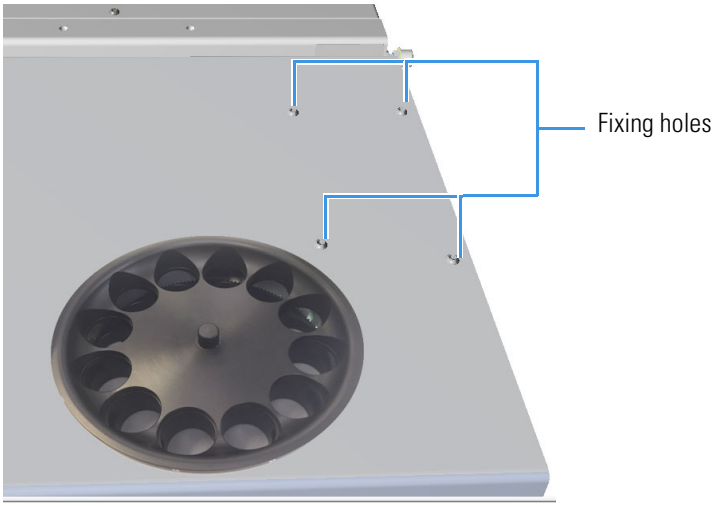
The fixing plate consists of a pre-pierced base on which a front fixing block and two side fixing blocks are mounted. Mount and fix these parts on the fixing plate as shown in Figure 42.

Figure 42. Fixing Plate Mounting



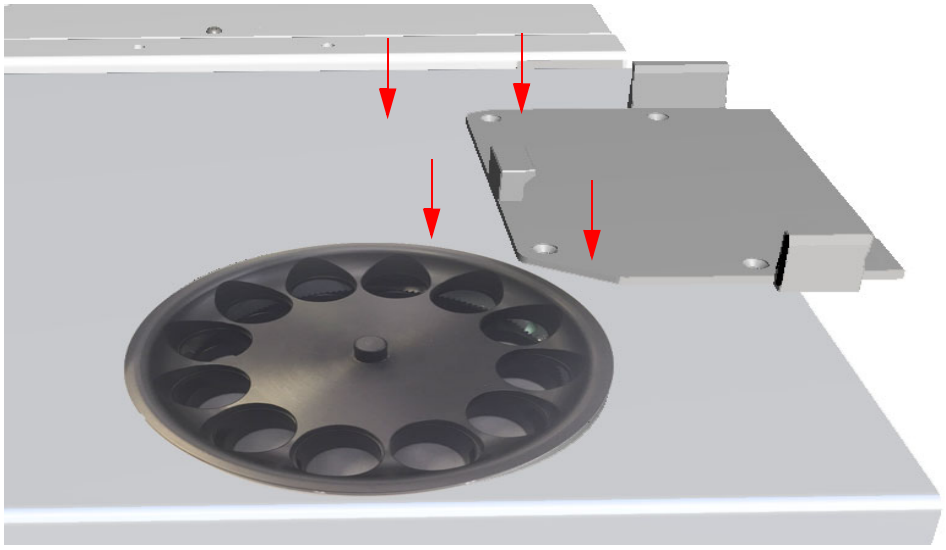
1. Install the fixing plate on the top cover of the HS sampler.
   a. On the top cover remove the four screws from the corresponding fixing holes. These screws are used to fix the plate on the top cover of the HS sampler. See Figure 43.

Figure 43. 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 44.

Figure 44. Fixing Plate Installation (2)



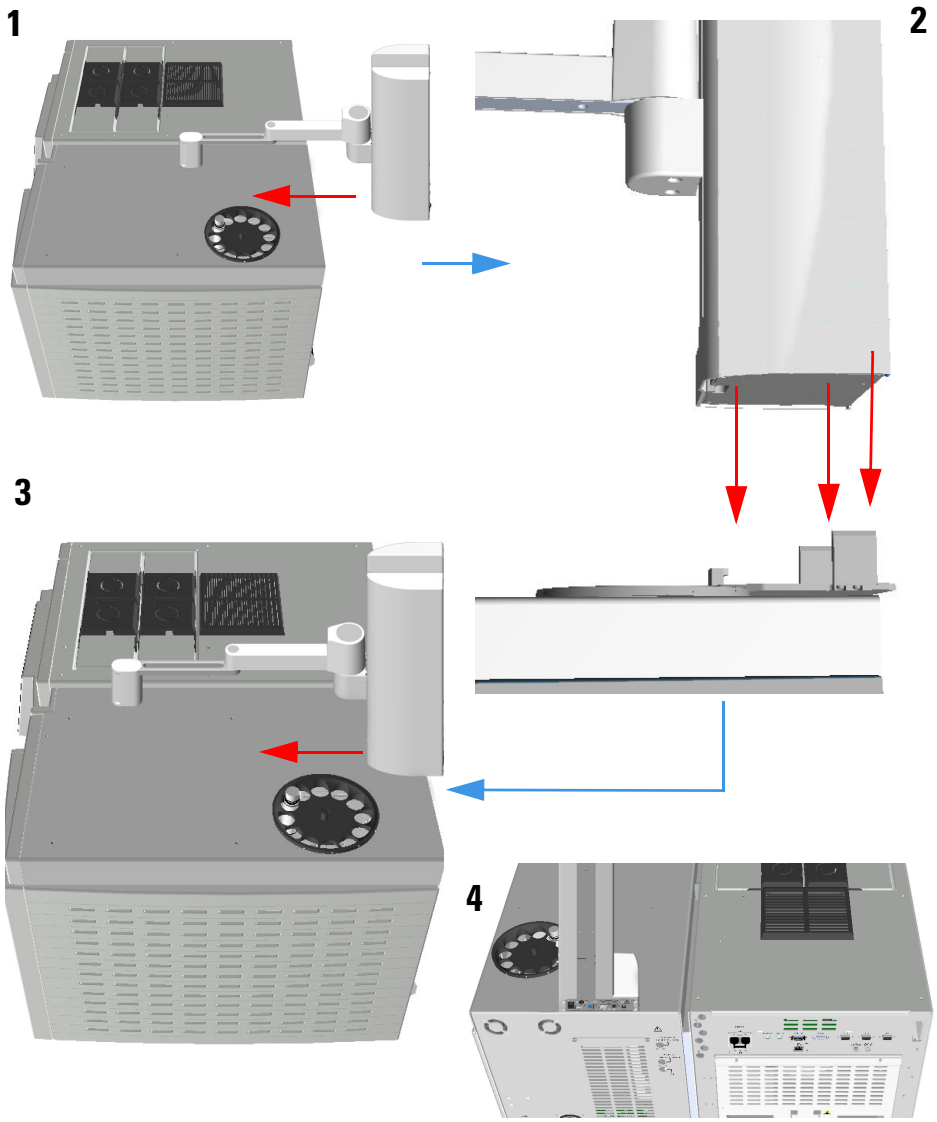
c. Using a T20 Torx head screwdriver screw the four fixing screws upwards to fix firmly the fixing plate on the top cover. The fixing plate protrudes about 4 cm (1.6 in.) from the back of the HS sampler.

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 45.

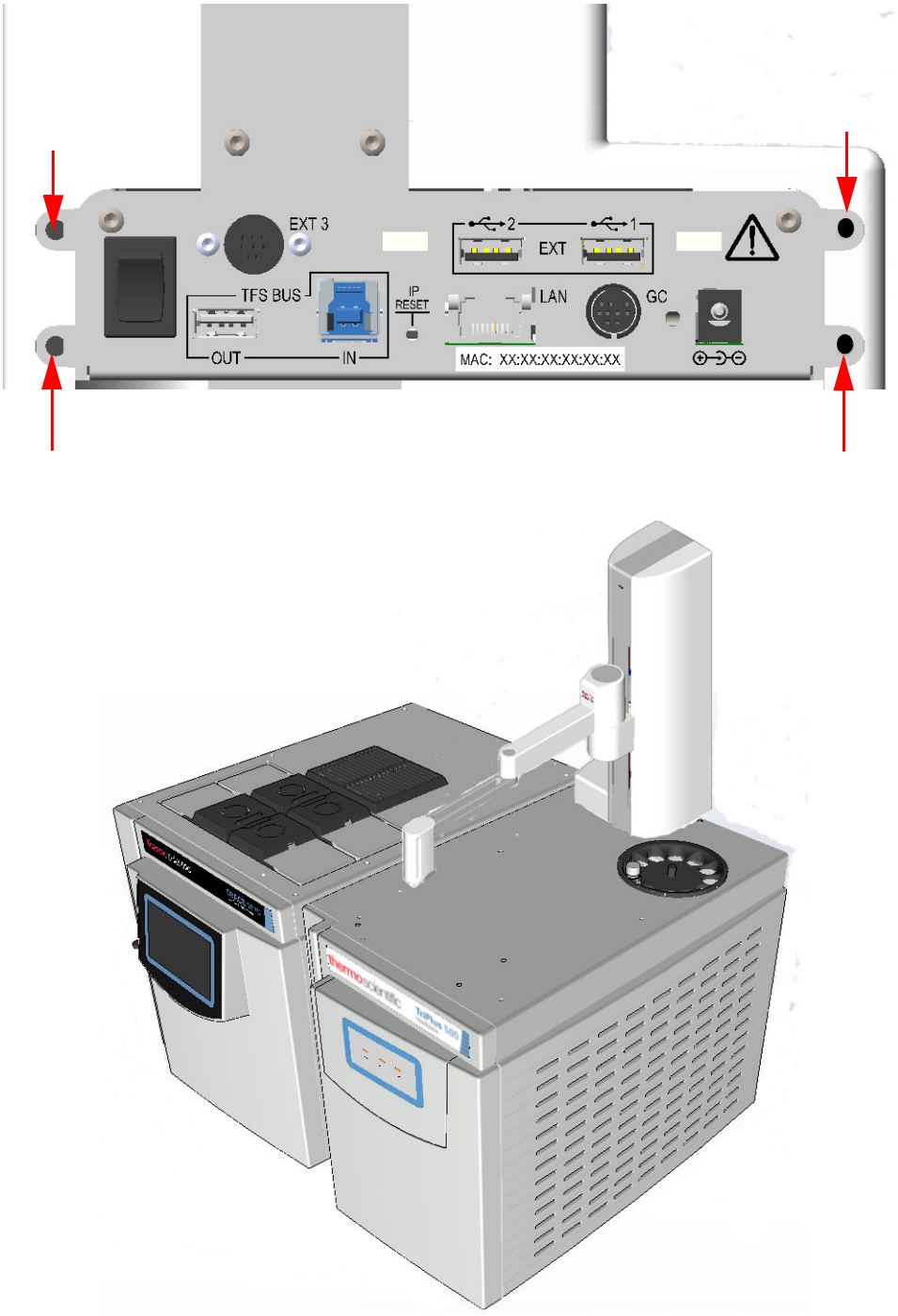
Figure 45. Vial Loader Installation (1)



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 relevant side fixing block. See Figure 46.

Figure 46. 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 47. Electrical Connections for TriPlus 500 HS and Vial Loader

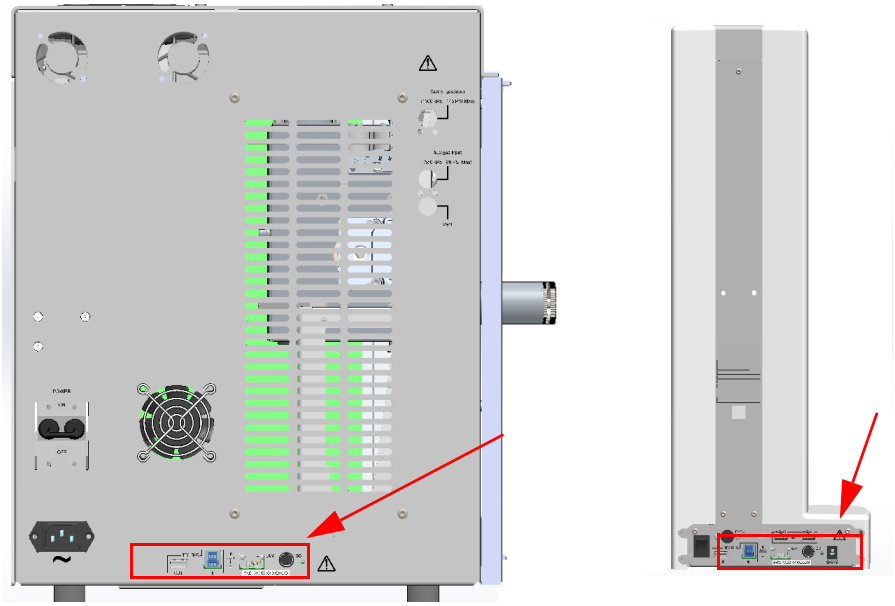
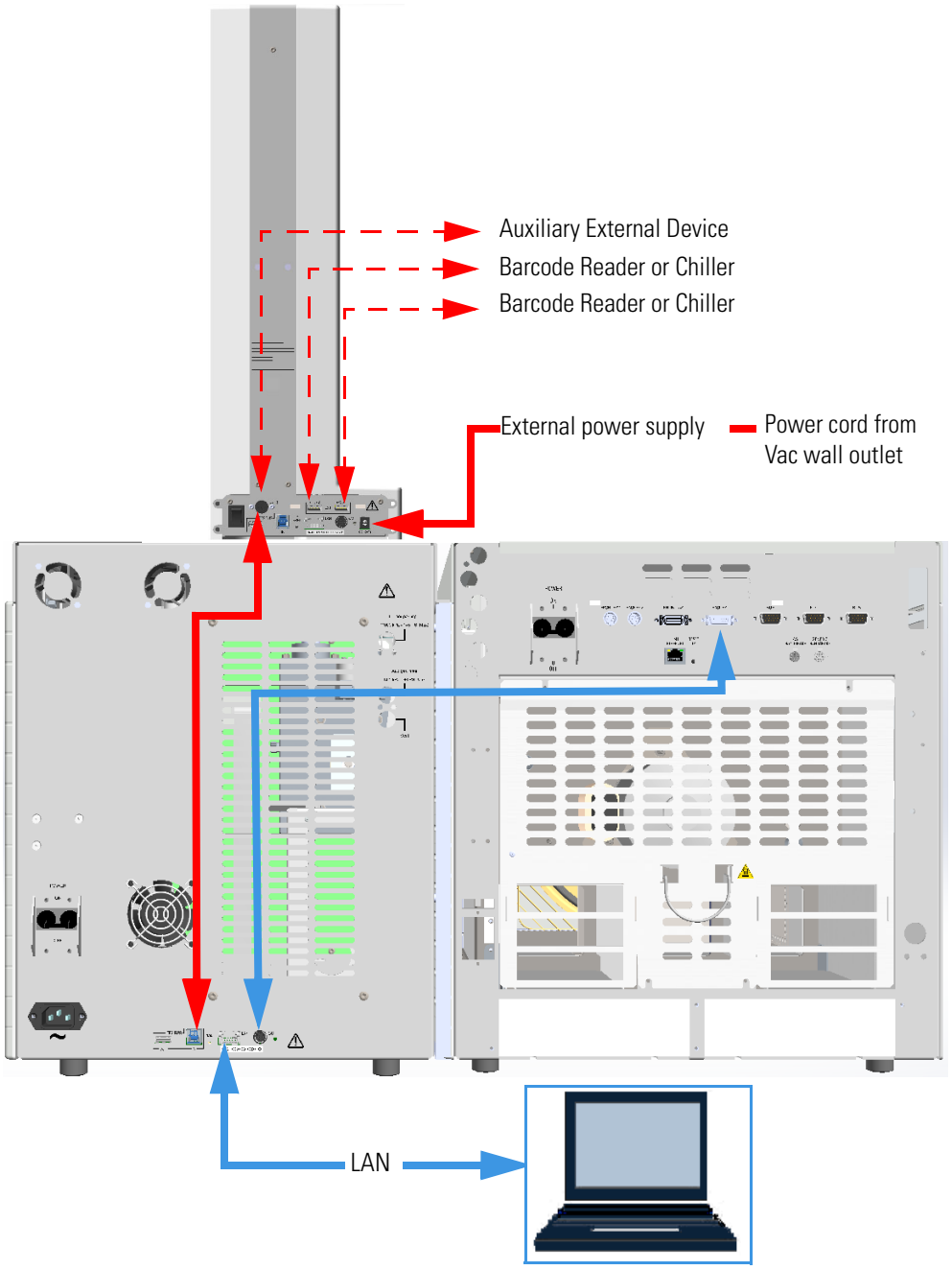


Figure 50 and Figure 51 show the typical electrical connections between the TriPlus 500 HS, the Vial Loader, and the other units of the system.

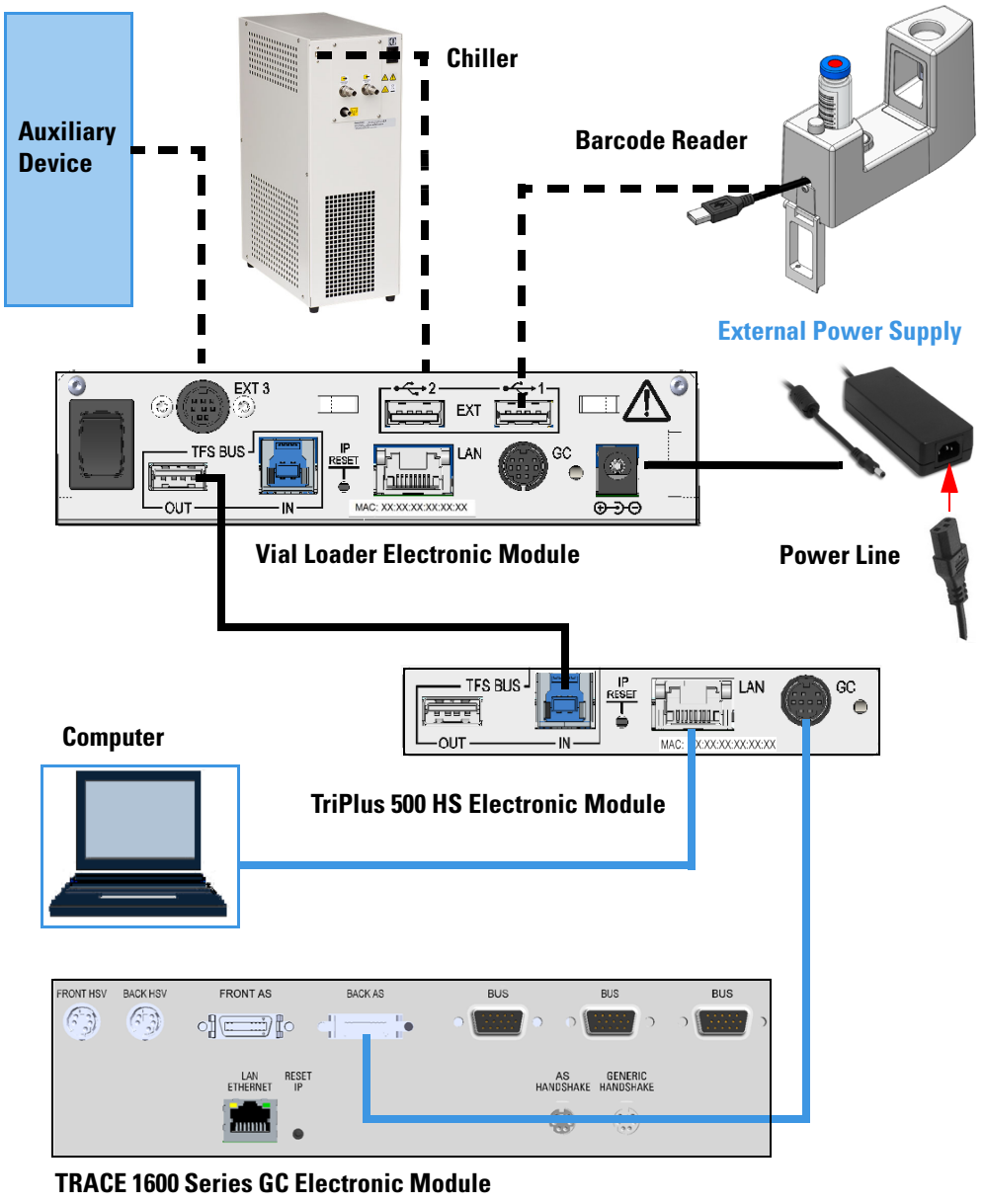
For more information about electrical connections, see "Making Electrical Connections" on page 43.

Figure 48. Typical Vial Loader Electrical Connections with TRACE 1600/1610 GC (1)



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

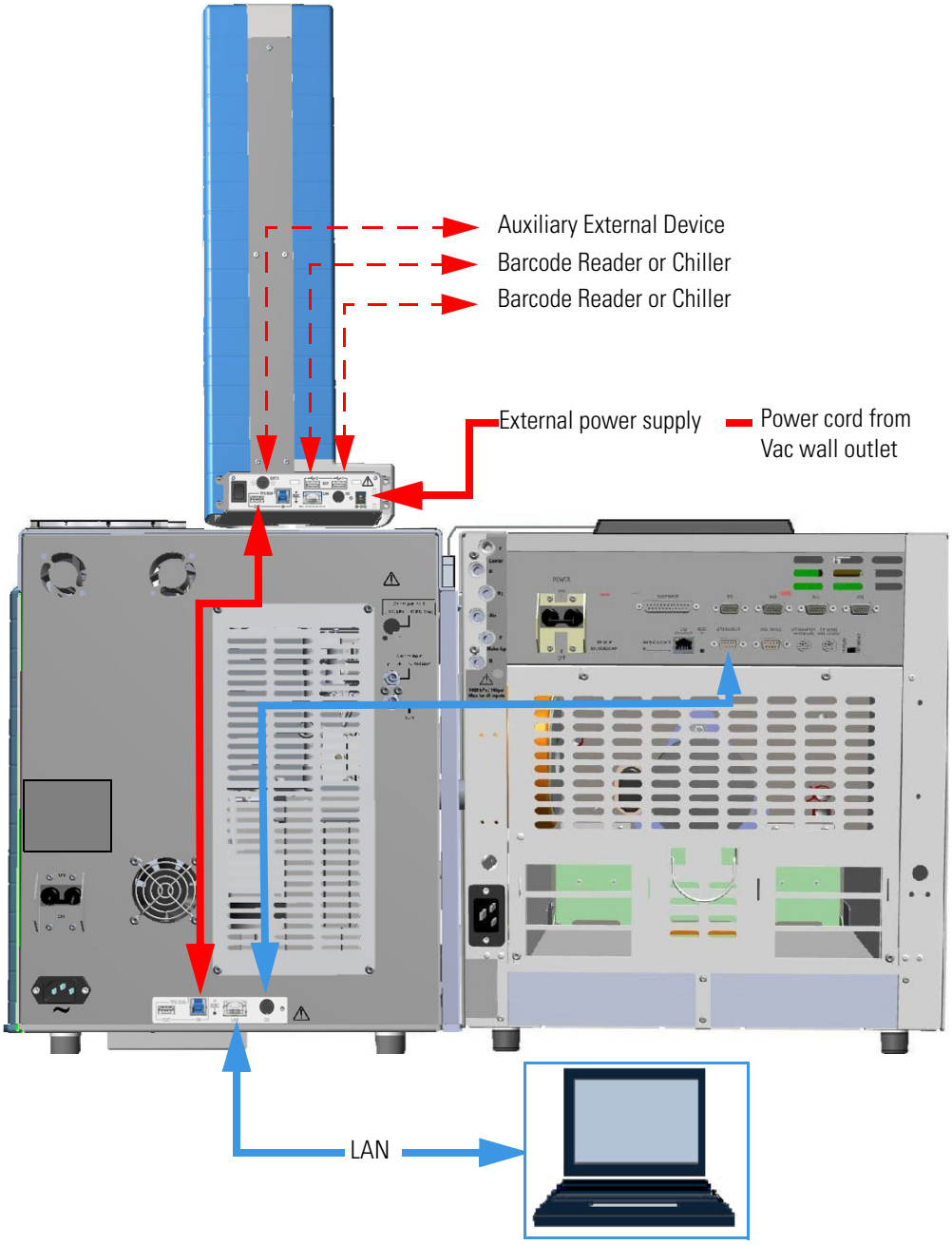
Figure 49. Typical Vial Loader Electrical Connections TRACE 1600/1610 GC (2)



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

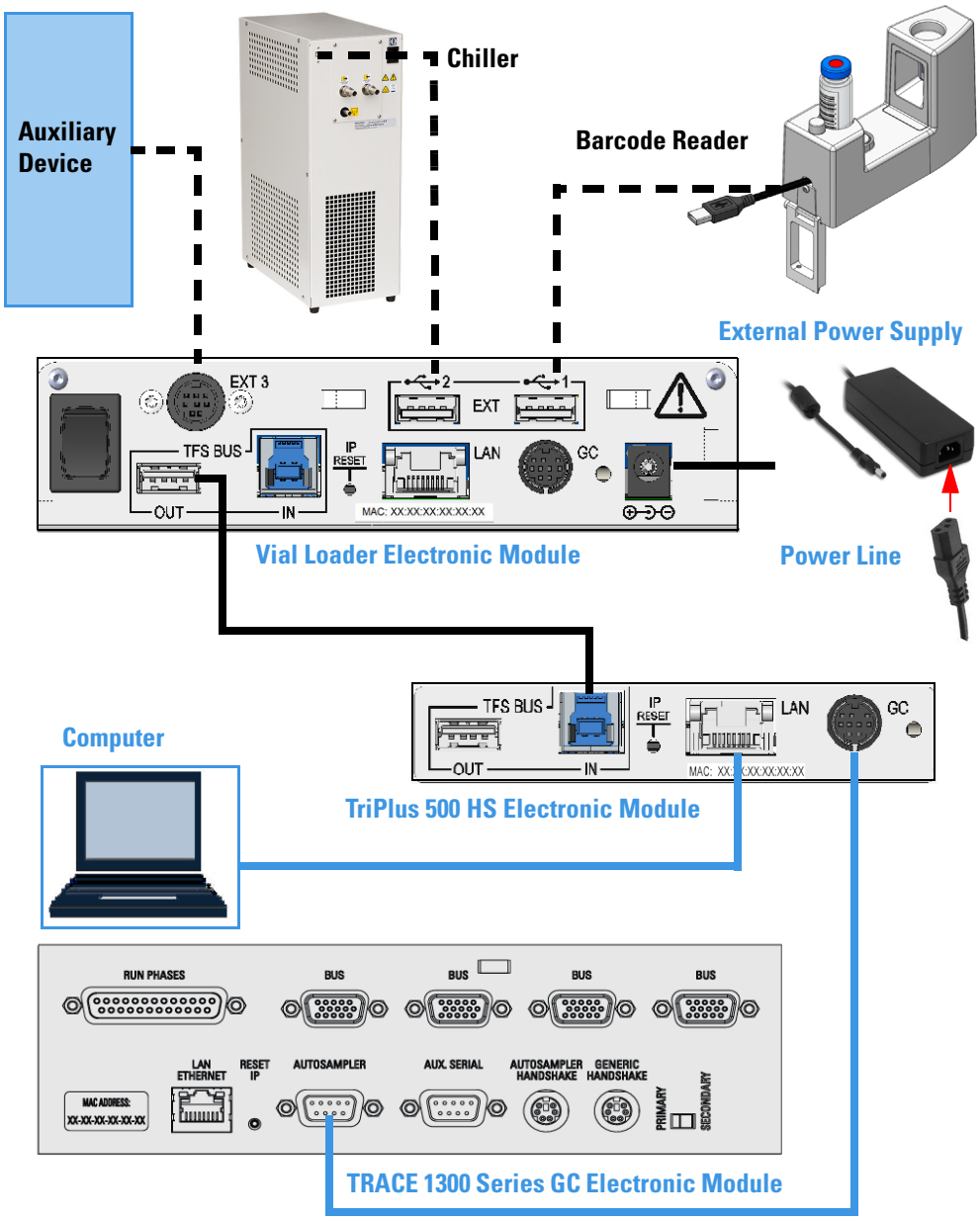
1. Using the cable provided, connect the **TFS BUS (IN)** port on the back of TriPlus 500 HS to the **TFS BUS (OUT)** port on the back of the Vial Loader.
2. Plug in the Vdc power cable of the external portable power supply into the jack marked ⊕⊃⊖ located on the back of the Vial Loader.
3. Connect the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

Figure 50. Typical Vial Loader Electrical Connections with TRACE 1300/1310 GC (1)



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

Figure 51. 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.

Vial Trays

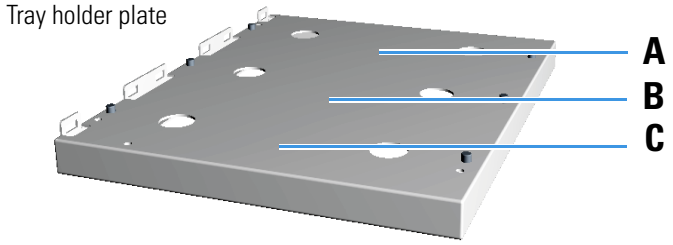
This section provides the instructions for installing the vial trays on the TriPlus 500 HS and on a TRACE 1300 Series GC.

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 52 shows the tray holder plate provided.

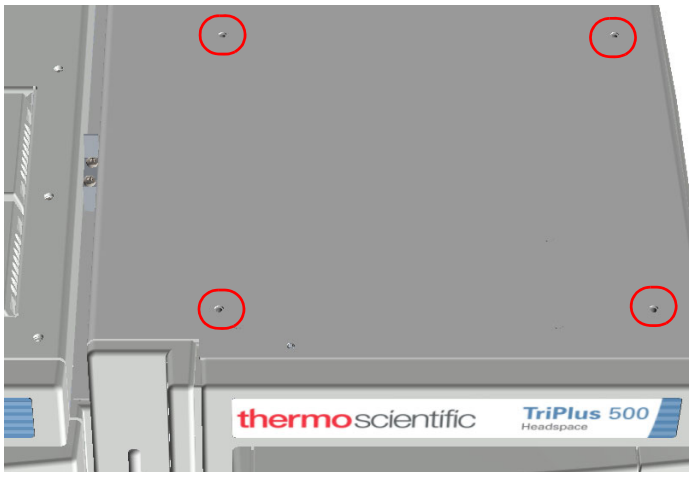
Figure 52. Vial Tray Installation on TriPlus 500 HS (1)



❖ **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 53.

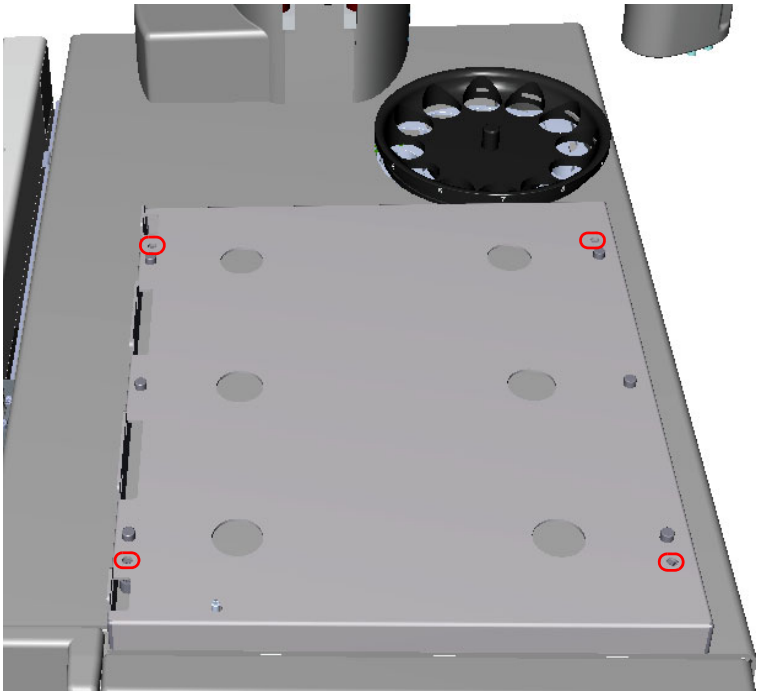
   Figure 53. Vial Tray Installation on TriPlus 500 HS (2)

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 54.

Figure 54. 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 55, Figure 56, and Figure 57.

Figure 55. Vial Tray Installation on TriPlus 500 HS (4)

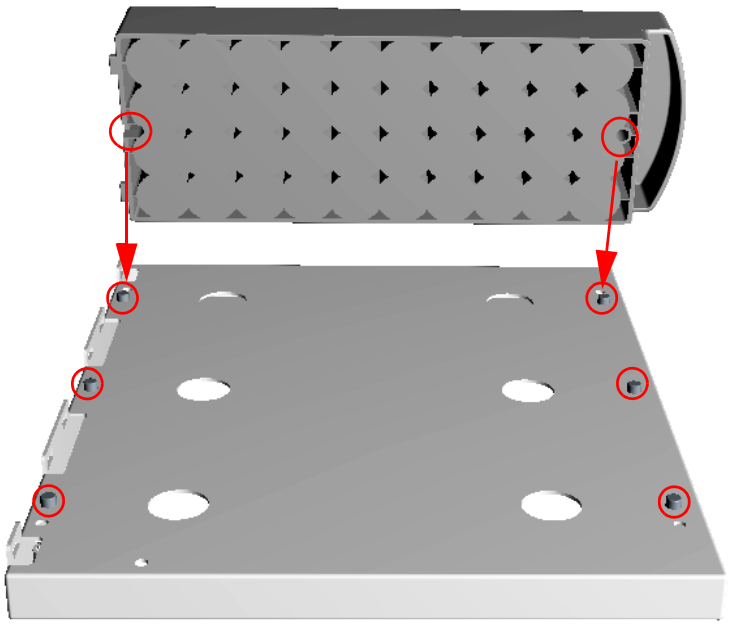


Figure 56. Vial Tray Installation on TriPlus 500 HS (5)

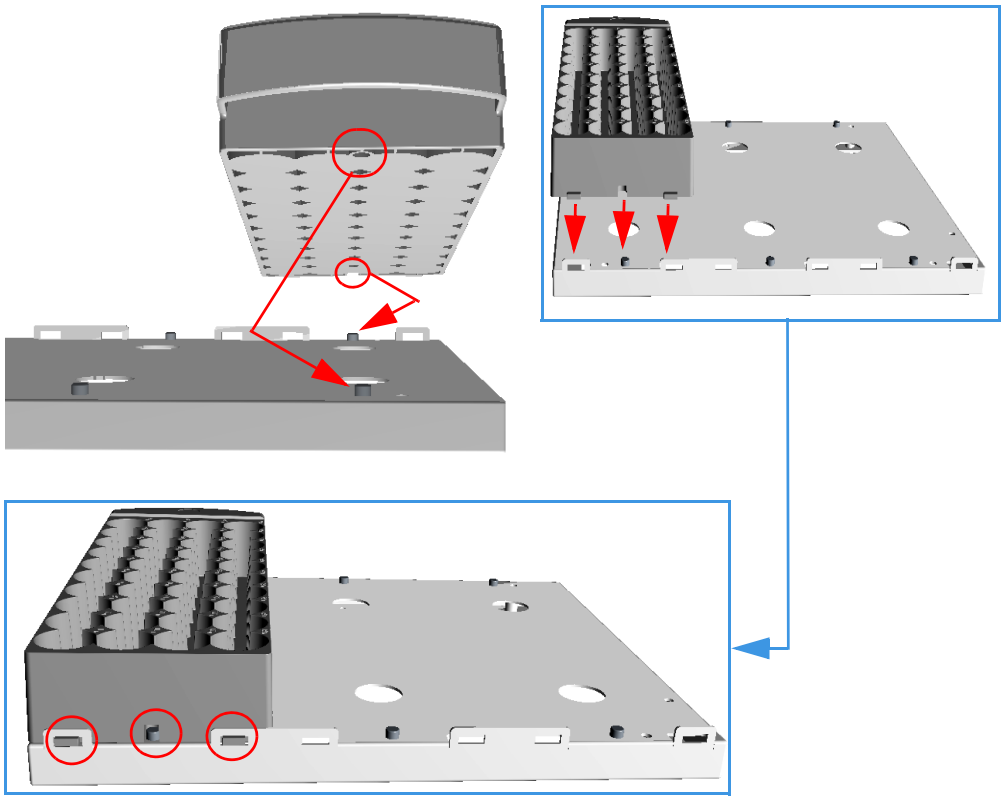
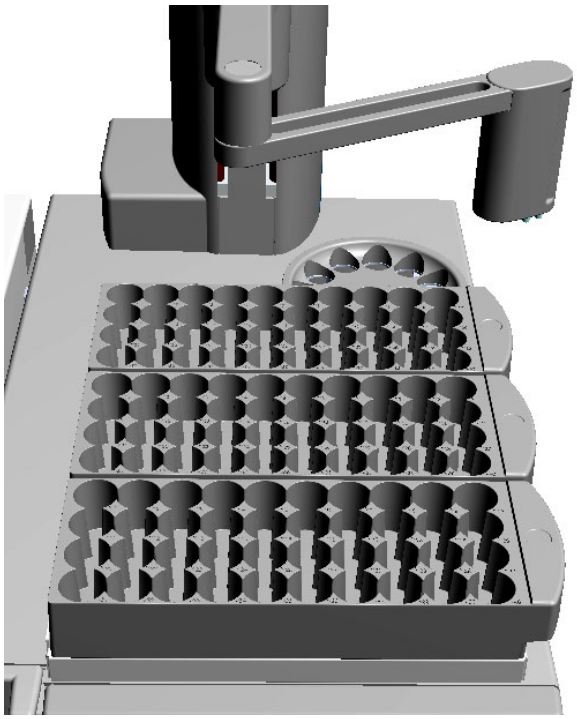


Figure 57. Vial Tray Installation on TriPlus 500 HS (6)



7. Place the vials into the vial trays. The result of the operation is shown in Figure 58.

Figure 58. 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 64.

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 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.

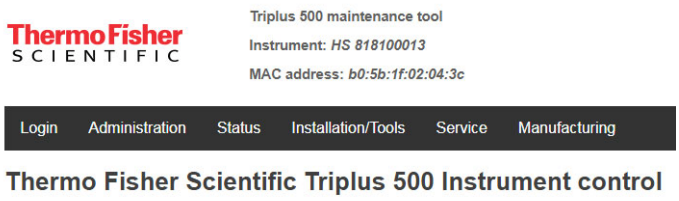
Avant de commencer la calibration de routine, assurez-vous que tous les plateaux pour flacons sont retirés de la plaque porte-plateaux. Vérifiez également que les flacons sont retirés du carrousel rotatif à 12 places.

❖ 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

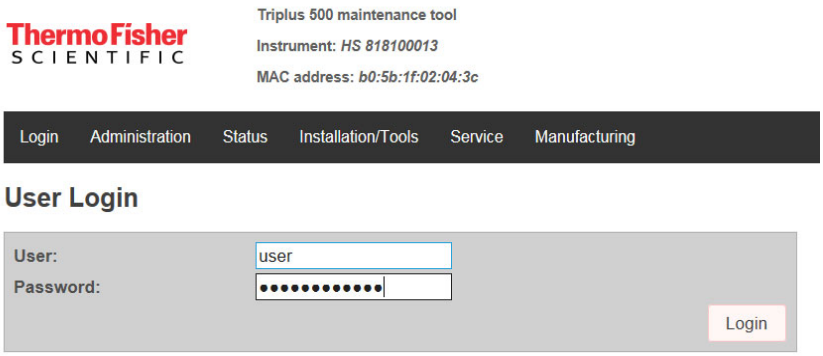
   for example: https://10.209.90.100
3. Press **Enter** and wait for the **Web Server Main Page**.



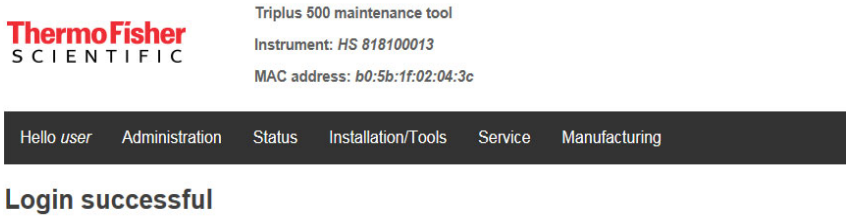
CAUTION This page has three access levels: **User**, **Service,** and **Manufacturing**. Each level is accessible with a specific User name and Password. The operator can only use the **User** level.

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.

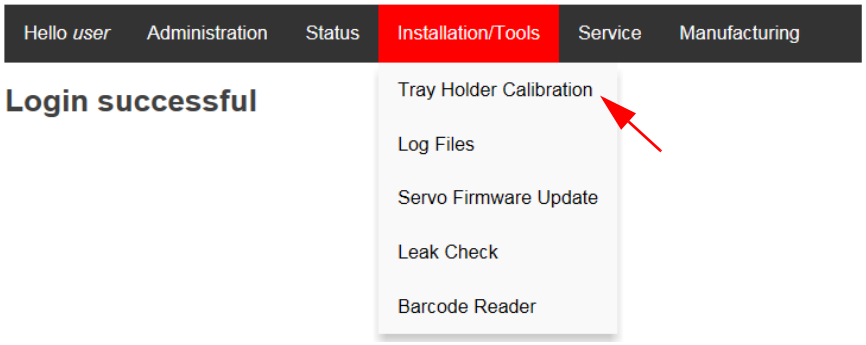
4. In the menu bar select **Login**, then perform the **User Login** typing the following **User** name and **Password**:
   - User name = **user**
   - Password = **ThermoFisher**



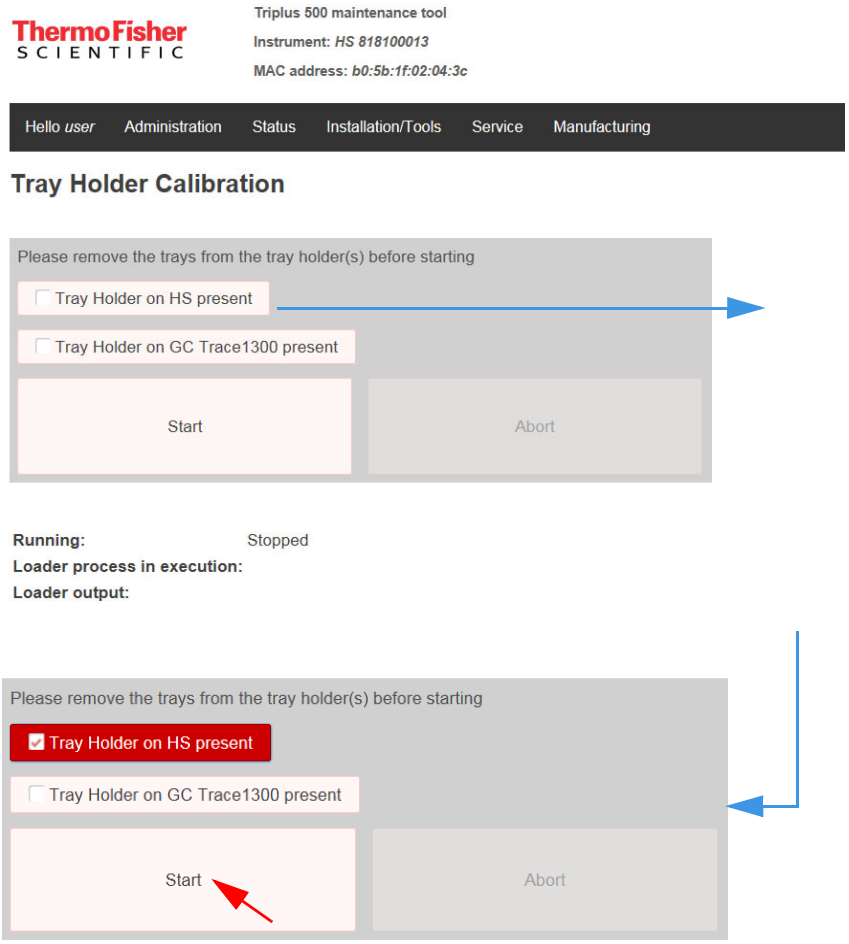
5. Press **Login**. If the login is correct the following page displays.



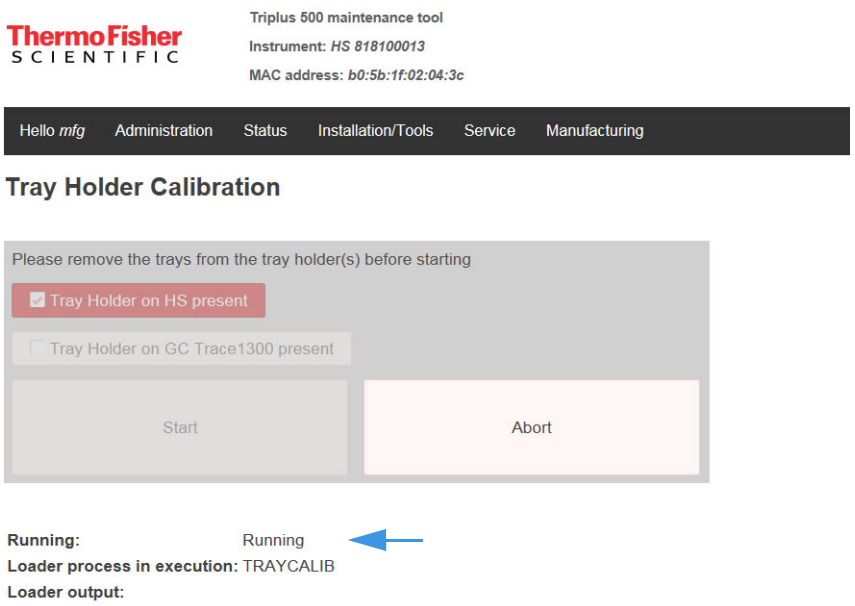
6. Select **Installation/Tool** and click **Tray Holder Calibration**.



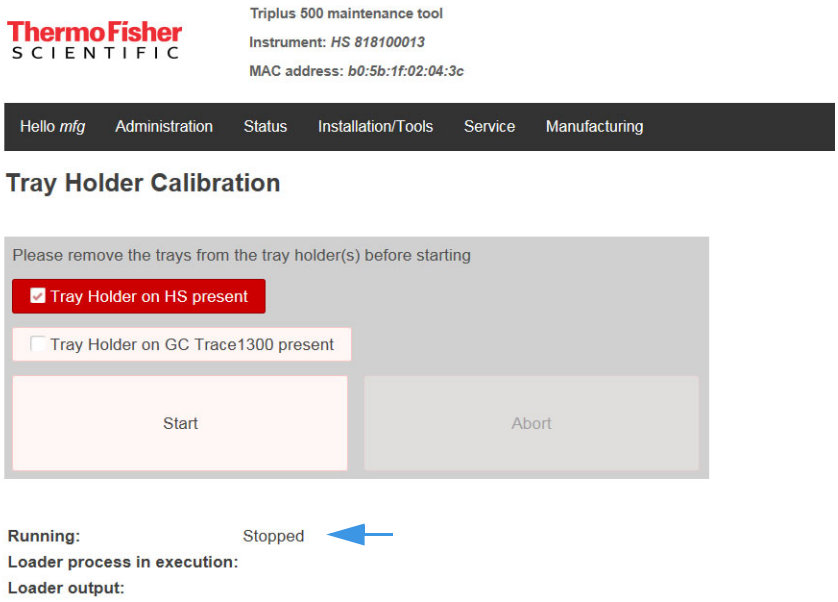
7. The system asks to remove all the vial trays from the tray holder plate. When ready, select where the tray holders are present by selecting the corresponding check box.



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.

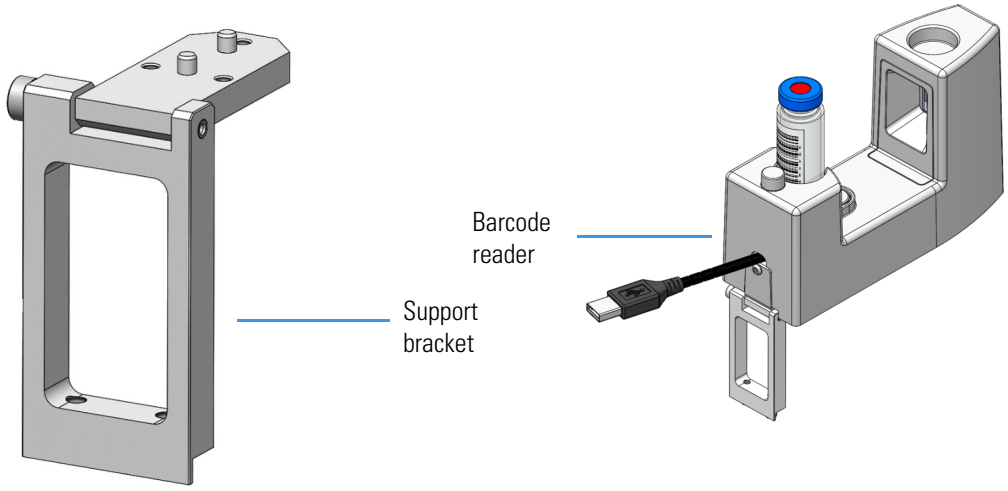


10. Once calibration is complete, exit the Web Server by selecting **Hello *user* > Logout**. Mount/remount the vial trays previously removed as described in the section Vial Trays. For more details about using the **Web Server**, refer to Chapter 7 of the *TriPlus 500 Headspace Sampler User Guide*.

Barcode Reader

The installation of the Barcode Reader requires the use of a dedicated support bracket. See Figure 59.

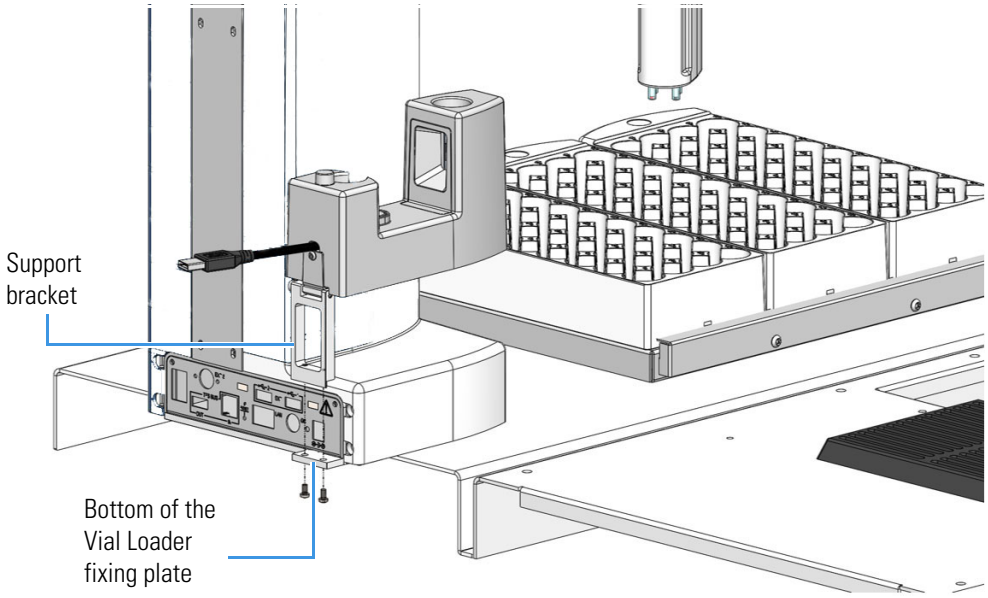
Figure 59. Barcode Reader Support Bracket



❖ To install the Barcode Reader

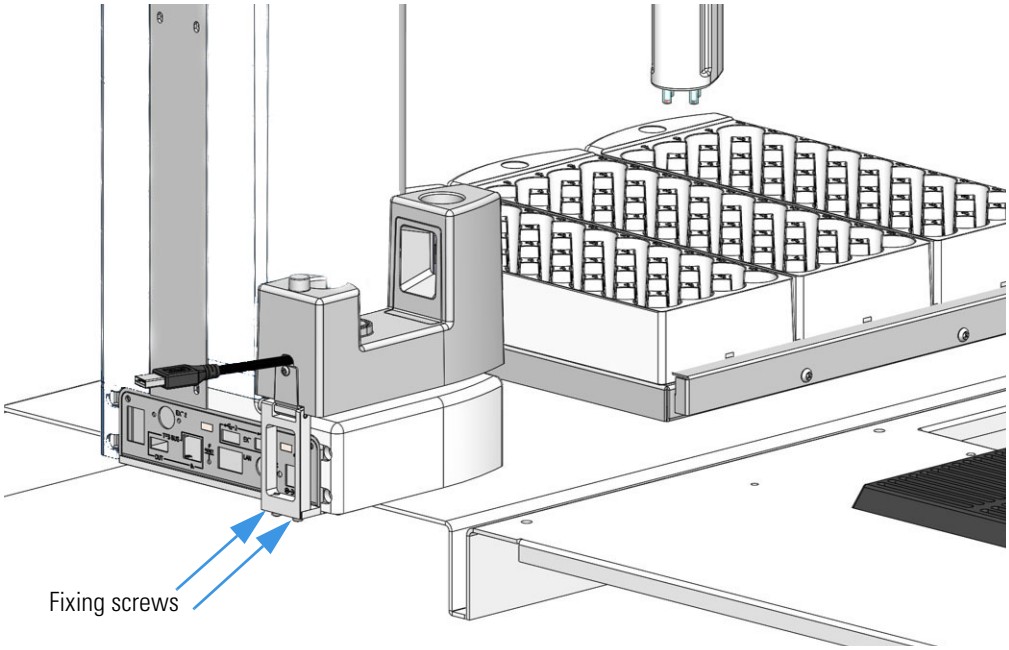
1. Place the Barcode Reader's support bracket against the back of the Vial Loader aligning the bottom fixing holes to the holes provided on the bottom of the Vial Loader fixing plate. See Figure 60.

   Figure 60. Barcode Reader Installation (1)



2. Fix the support bracket by using the M3 x 6 mm screws provided. See Figure 61.

Figure 61. 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 62 and Figure 63 the USB port **EXT 1** is used.

Figure 62. Barcode Reader Installation (3)

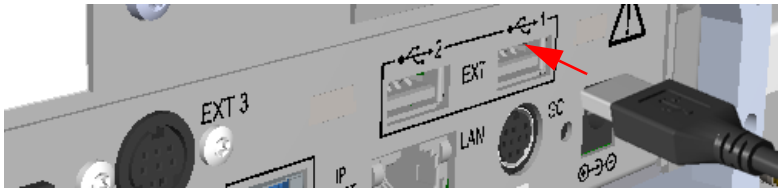


Figure 63. Barcode Reader Installation (4)

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 65 and Figure 65.

Figure 64. Vial Trays and Heated/Cooled Tray Holder Components

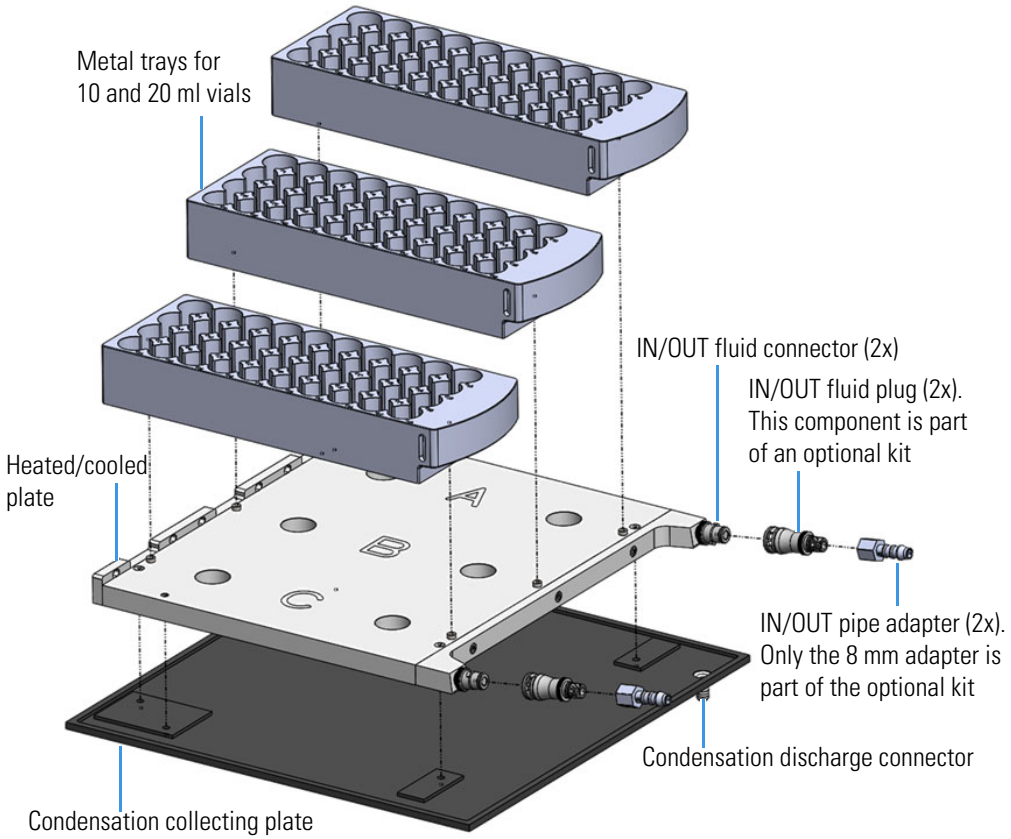


Figure 65. Heated/Cooled Tray Holder Plate Assembly

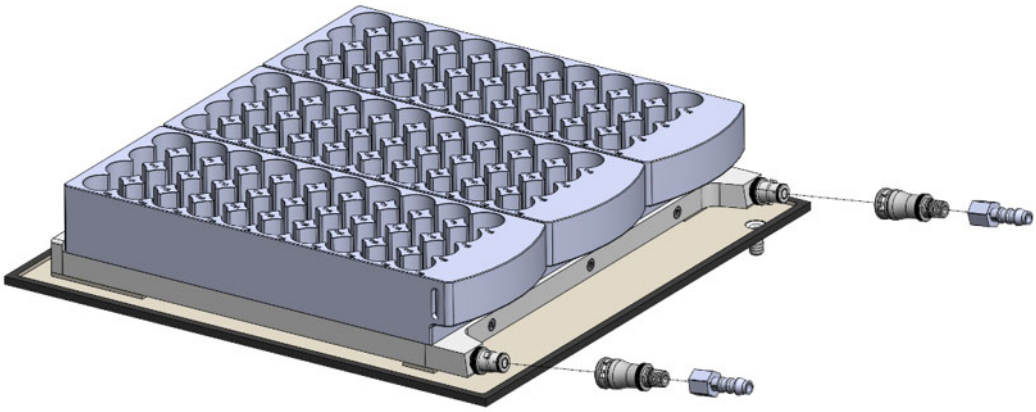
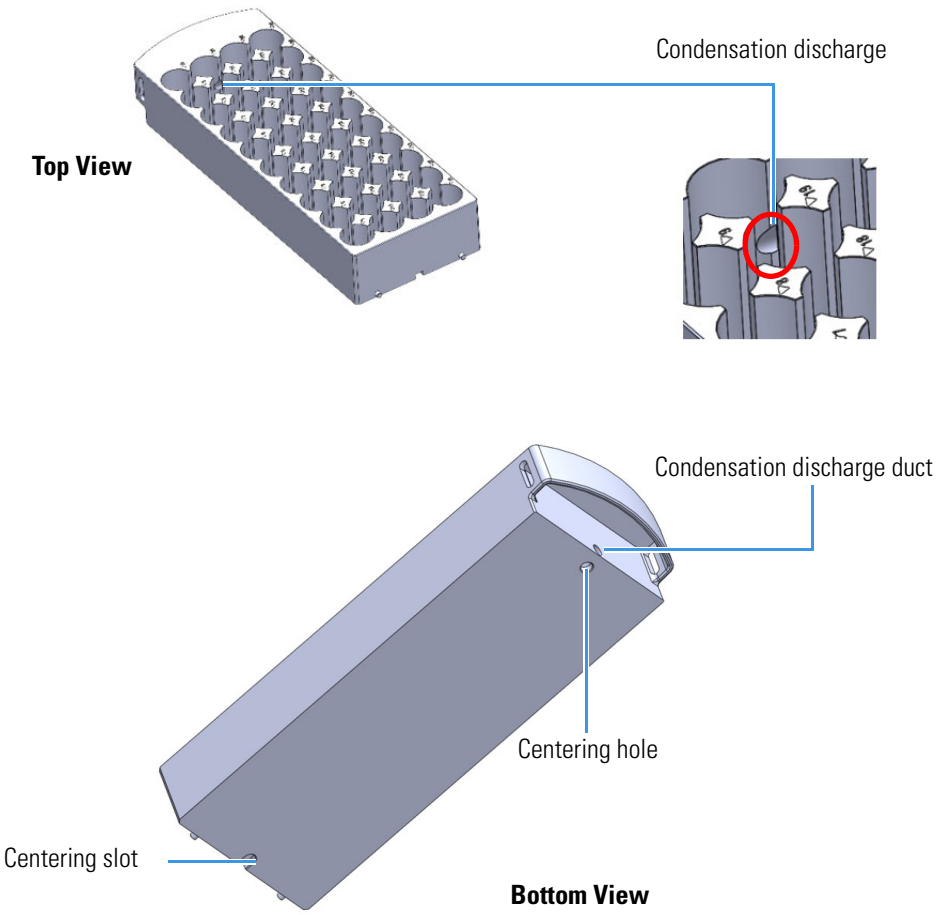


Figure 66. Heated/Cooled 40-position Vial Tray



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

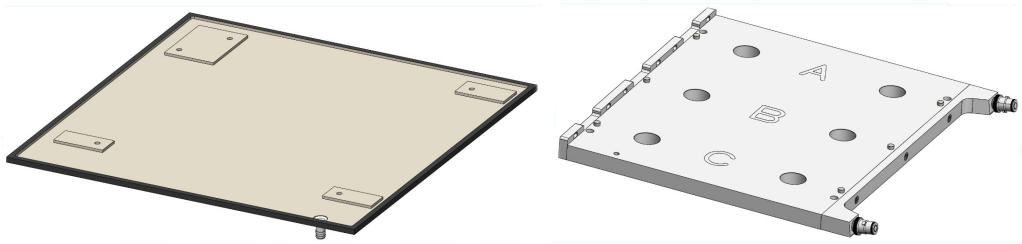
"Installing the Heated/Cooled Vial Trays on the TriPlus 500 HS" on page 73

"Connecting the Recirculating Chiller" on page 79

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 67.

Figure 67. Heated/Cooled Tray Holder Components

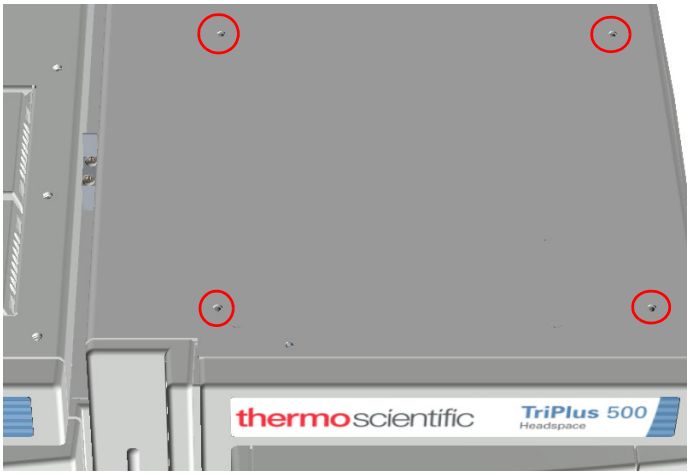


Condensation collecting plate | Heated/cooled tray holder plate

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

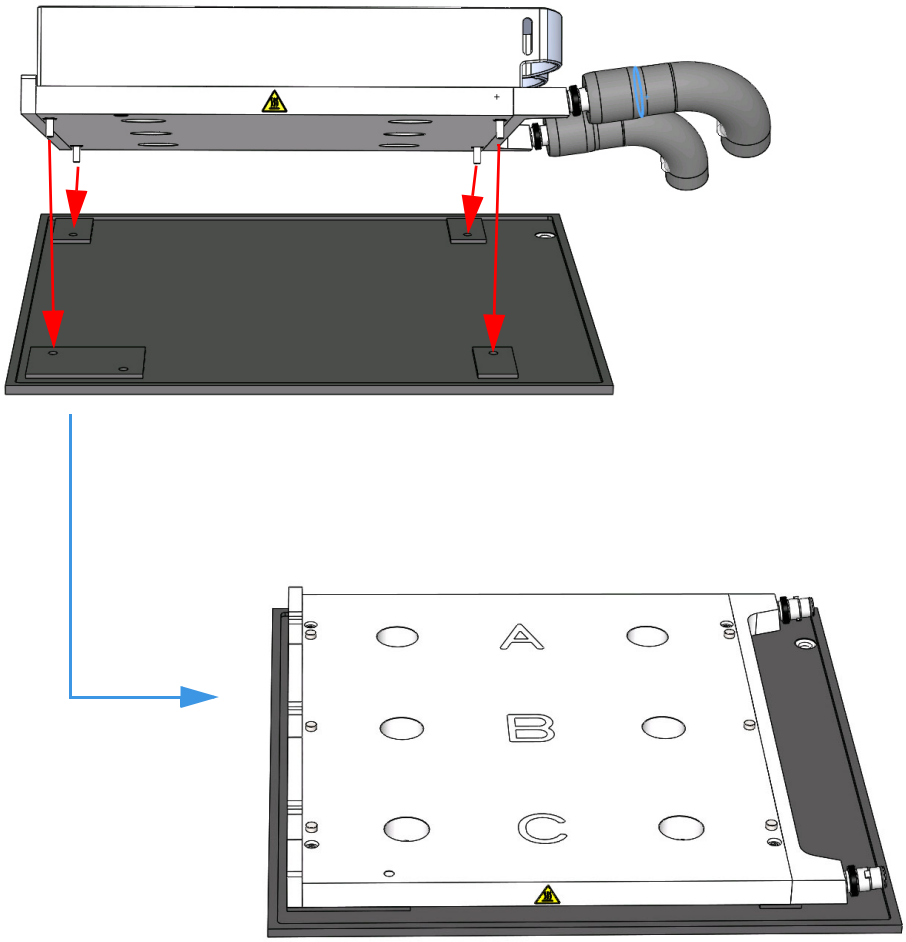
1. Make sure the Vial Loader is powered Off and disconnected from the power source.
2. If necessary, manually move the arms of the Vial Loader to create enough space for the next operations.
3. From the top cover of the TriPlus 500 HS remove the four plastic caps using a proper tool making sure to not scrape the cover. See the red circles in Figure 68.

   Figure 68. Heated/Cooled Vial Tray Installation on TriPlus 500 HS (1)



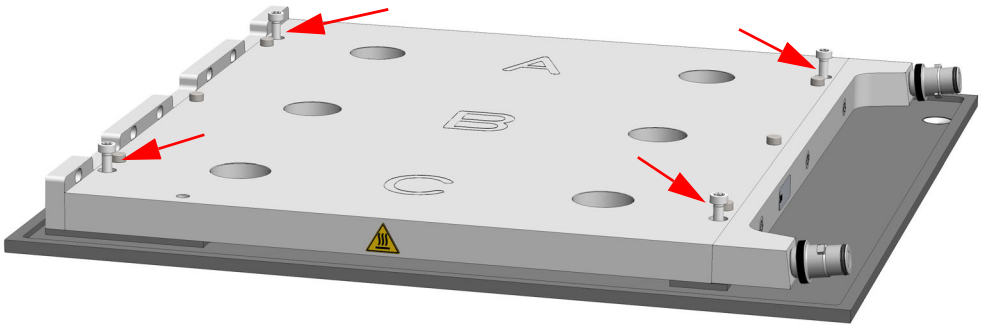
4. Place the condensation collecting plate on the top cover aligning the fixing holes of the plate on the fixing holes of the cover. See the red circles.
5. Place and align the heated/cooled tray holder plate and the four screws provided on the fixing holes of the condensation collecting plate. See Figure 69.

Figure 69. Heated/Cooled Vial Tray Installation on TriPlus 500 HS (2)



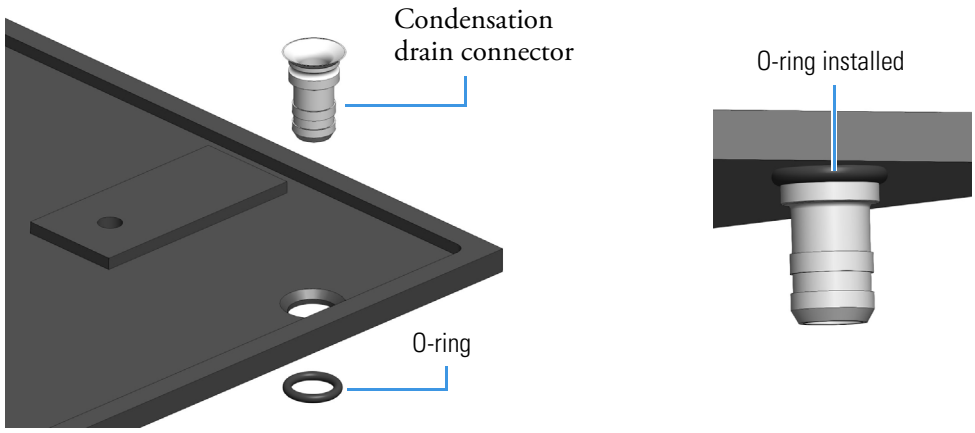
6. Using a T20 Torx head screwdriver fix the assembled plates on the top cover by screwing the four screws provided. Refer to Figure 70 for the four screw locations.

Figure 70. Heated/Cooled Vial Tray Installation on TriPlus 500 HS (3)



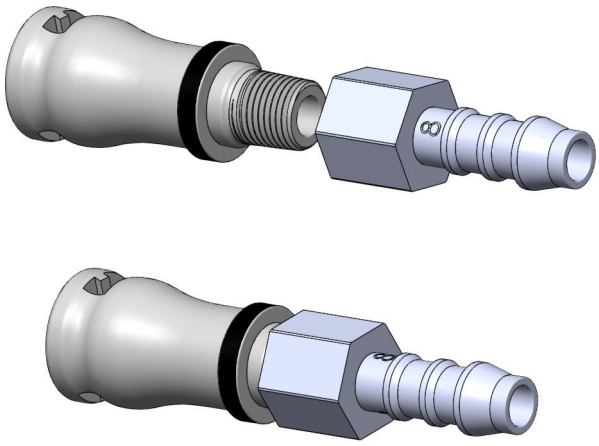
7. Connect the condensation drain connector. See Figure 71.

Figure 71. Heated/Cooled Vial Tray Installation on TriPlus 500 HS (4)



8. Assemble the tube connectors. See Figure 72.

Figure 72. Heated/Cooled Vial Tray Installation on TriPlus 500 HS (5)

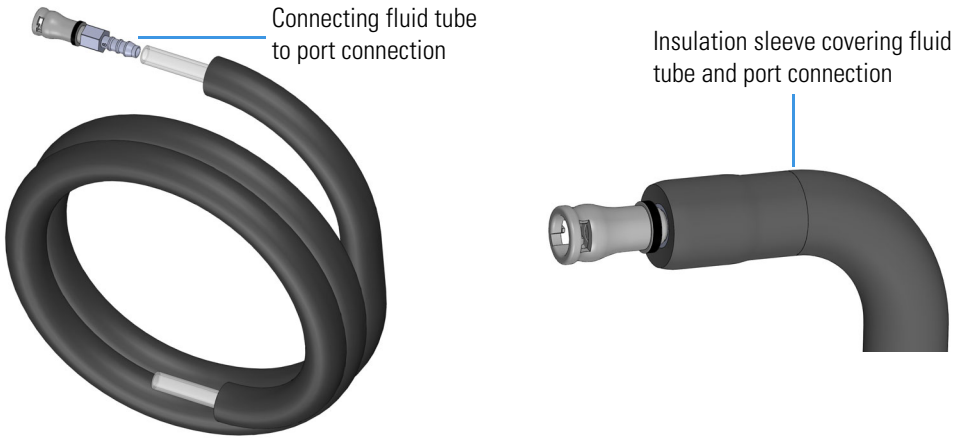


9. Connect without distinction each IN/OUT fluid tube to a port located on the heated/cooled tray holder plate. Cover the fluid tube and port connection with an insulation sleeve.

Note An insulation sleeve must cover the fluid tube and port connections. See Figure 73

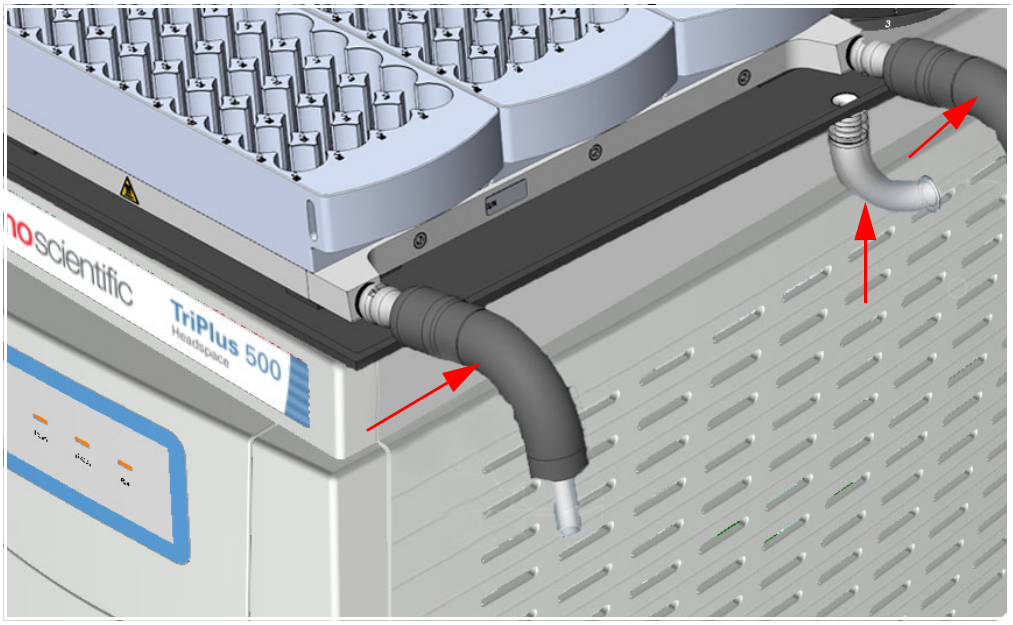
It also suggested to connect a condensation discharge tube to the port on the bottom of the condensation collecting plate. See Figure 74 for insulation sleeve and condensation discharge tube locations.

Figure 73. Heated/Cooled Vial Tray Installation on TriPlus 500 HS (6)



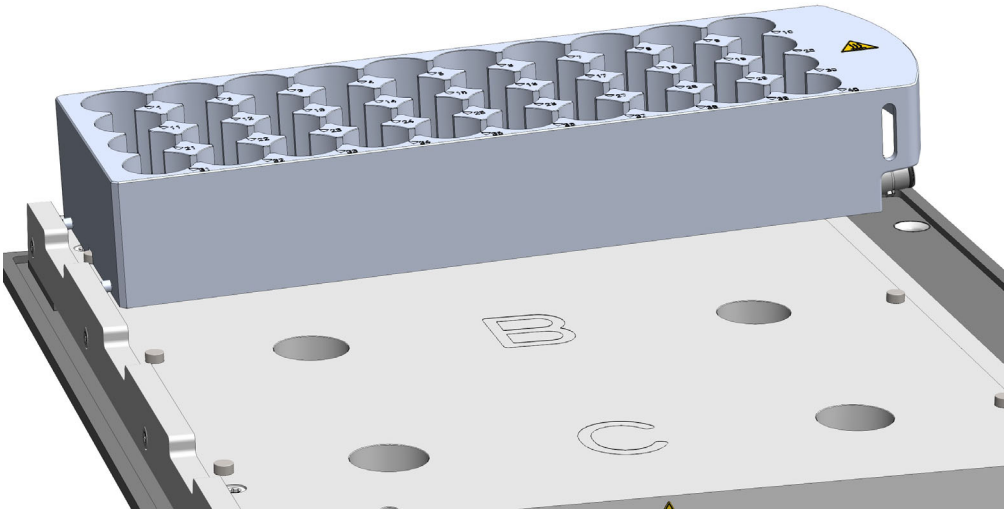
The IN/OUT fluid tubes will be connected to the IN/OUT ports of the recirculating chiller, while the condensation discharge tube can be inserted in a tank on the floor for condensation collection.

Figure 74. Heated/Cooled Vial Tray Installation on TriPlus 500 HS (7)



10. Place the metallic vial tray on the plate. See Figure 75, Figure 76, and Figure 77.
    a. Insert the sample tray pins into the corresponding holes on the left side of the plate.

Figure 75. 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 76. Heated/Cooled Vial Tray Installation on TriPlus 500 HS (9)

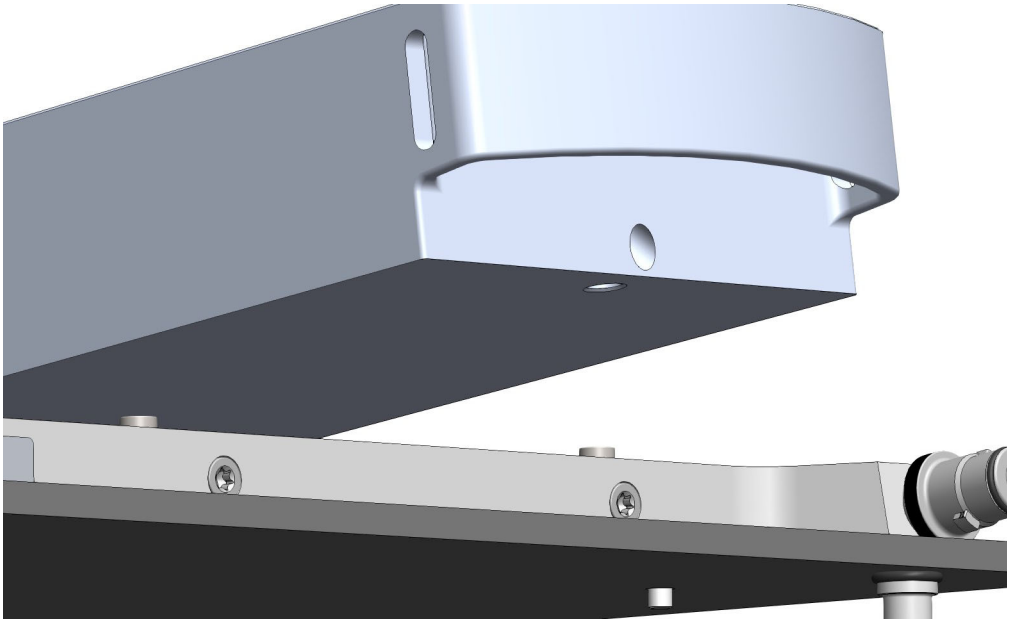
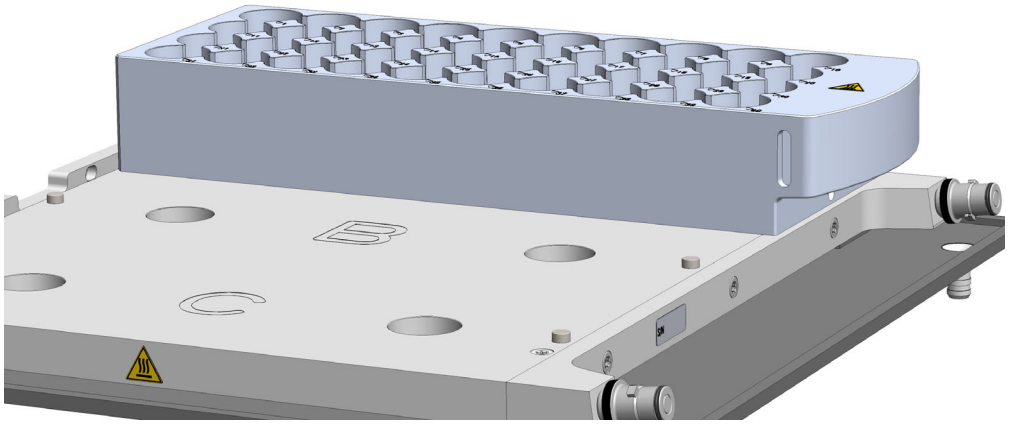


Figure 77. Heated/Cooled Vial Tray Installation on TriPlus 500 HS (10)



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.

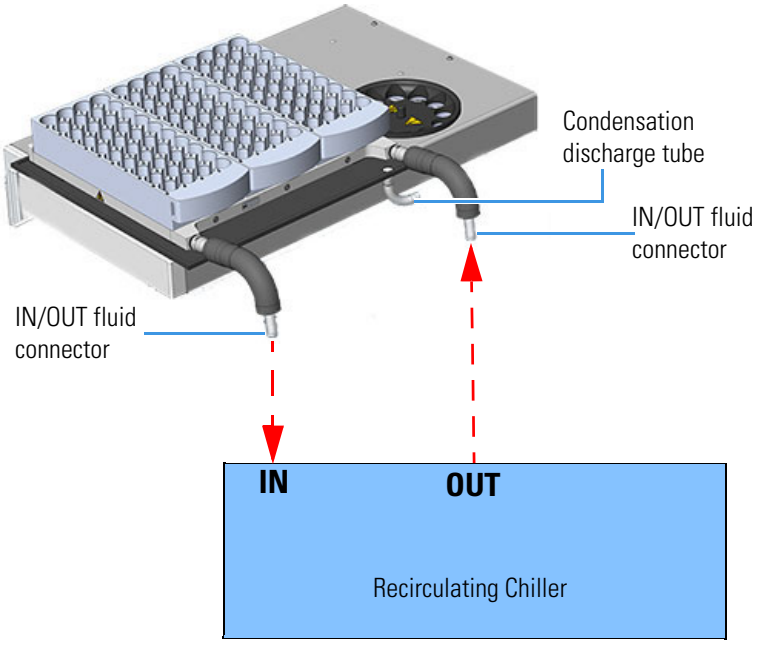
ATTENTION Ne placez PAS les flacons de 10 ml et 20/22 ml dans le même plateau pour flacons. Si des flacons de 10 ml et 20/22 ml sont utilisés simultanément, les flacons de 20/22 ml peuvent être placés uniquement sur le plateau pour flacons C.

12. Perform the **Tray Holder Calibration**. See "Calibrating the Tray Holder" on page 64.

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 78.

Figure 78. 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 79.

Figure 79. 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 80 and Figure 81.

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

Figure 80. Vial Loader Configuration - Chromeleon CDS Configuration Dialog Window.

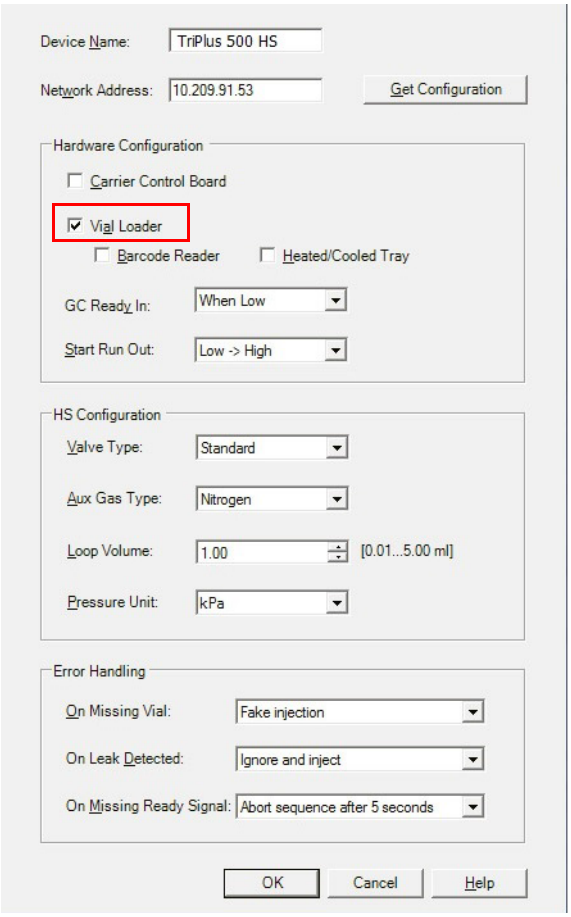
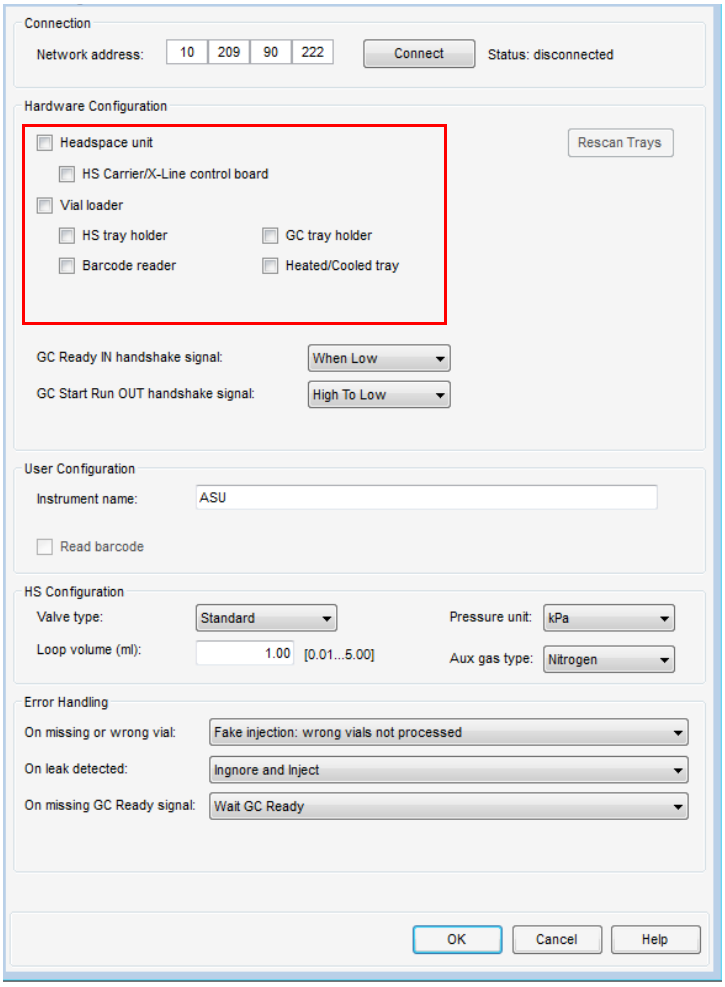


Figure 81. Vial Loader Configuration - TraceFinder CDS Configuration Dialog Window.



4

Instrument Checkout

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

Contents

Introduction

Use these procedures as a guideline, to check if your TRACE 1300 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 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 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 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, 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 2.

Table 2. TriPlus 500 HS with Transfer Line 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
Transfer Line Temperature	150 °C	150 °C
Transfer Flow	3 mL/min	3 mL/min
Injection Mode	Standard	Standard
Injection Time	0.3 minutes	0.5 minutes
Purge Level	2	2

6. Set the **Injection Parameters**. See Table 3.

Table 3. Setting Injection Parameters

Injection Parameters	FID	ECD	NPD	FPD	TCD	MS
Carrier Gas	Helium	Helium	Helium	Helium	Helium	Helium
Carrier Mode	Flow	Flow	Flow	Flow	Flow	ACF
Mode CF = Constant Flow	CF	CF	CF	CF	CF	CF
Carrier Gas Flow (mL/min)	3.5	3.5	3.5	3.5	3.5	1.5
Reference Gas: Helium (mL/min)					1	
Injection Mode	Splitless	Splitless	Splitless	Splitless	Splitless	Split
Splitless Time (minute)	2.5	2.5	2.5	2.5	2.0	
Split Flow (mL/min)	60	60	60	60	60	150
Purge Flow (mL/min)	5.00[a]	5.00[a]	5.00[a]	5.00[a]	5.00[b]	5.00
Vacuum Compensation	No	No	No	No	No	Yes
Transfer Line Temperature	150 °C	150 °C	150 °C	150 °C	150 °C	150 °C
Inlet Temperature	230 °C	230 °C	230 °C	230 °C	230 °C	230 °C

[a] Stop purge for 2.5 min.

[b] Stop purge for 2.0 min.

7. According to the detector in use set **Oven** parameters. See Table 4.

Table 4. 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 5.

Table 5. 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 6.

Table 6. 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 1 of the 12-seat rotating carousel.
4. Press Start on the GC to begin the checkout run.
5. The acceptance values in Table 7 and Table 8 indicate successful completion of the checkout. If these criteria are not met, repeat the test.

Table 7. 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 8. 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 9. Repeatability Acceptance Values for NPD, FPD, 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 with Transfer Line.

Contents

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 96.
- **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 3 mL.
  See the section "Replacing a Sample Loop" on page 100.
- **Back SSL Injector** — It does not require maintenance except when it must be restored for liquid injections.
  See the section "Set the normal working conditions." on page 103.

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 with Transfer Line, 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

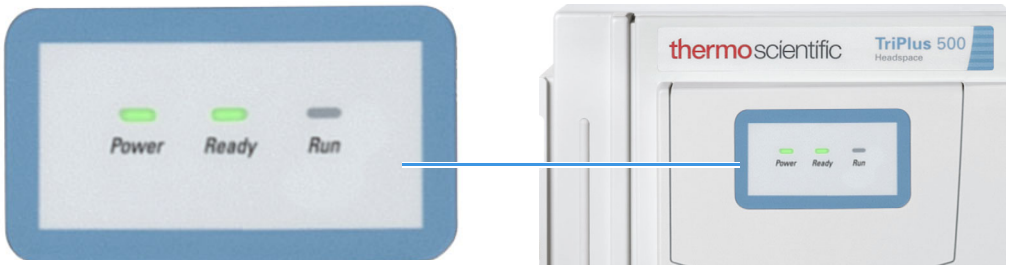
Powering On the TriPlus 500 HS

❖ **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.

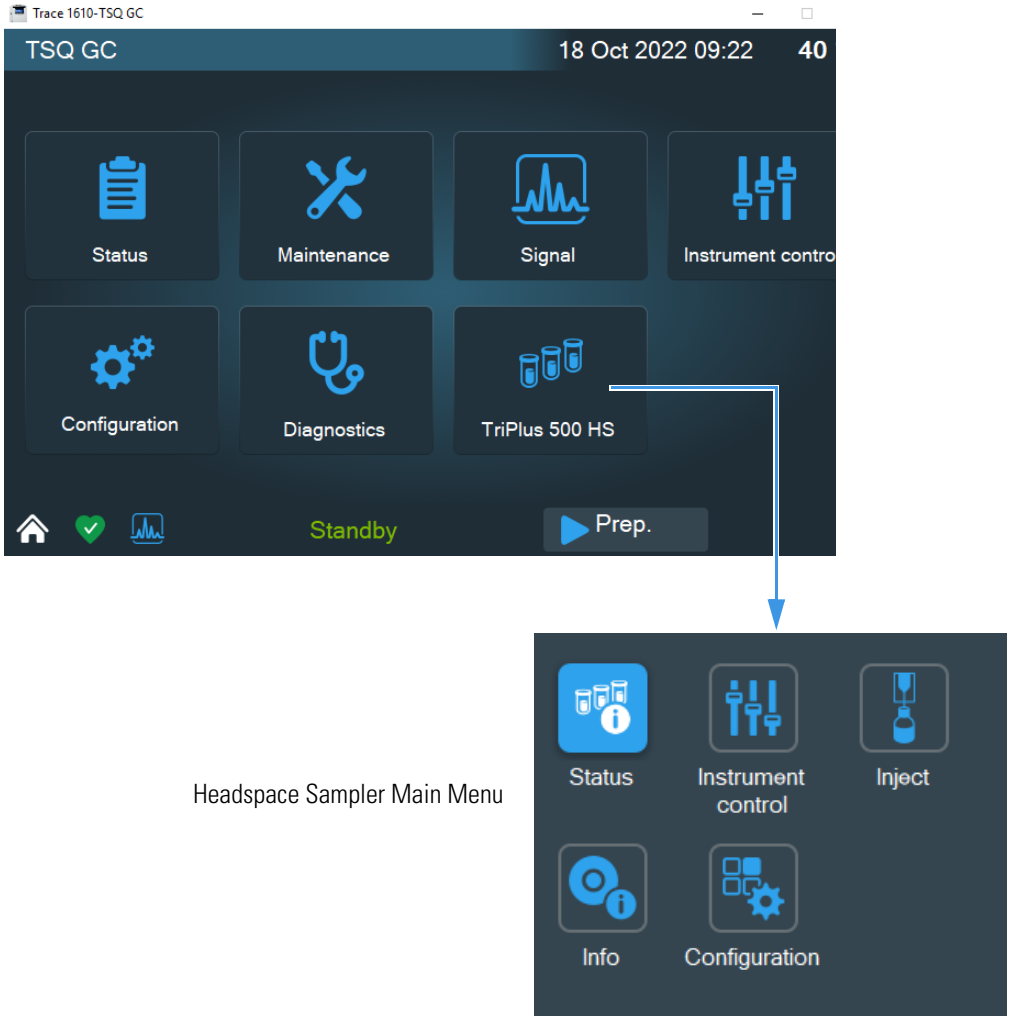
   When the HS sampler is powered on, all the LED on the status panel light up simultaneously. Next the **Power** light becomes a solid green, while the **Run** light flashes during the initialization phase. See Figure 82.

Figure 82. 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 83.

Figure 83. Touch screen Main Menu - Headspace Sampler Icon



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 100.

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 97
- "To remove the front door of the TriPlus 500 HS-120" on page 99

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.

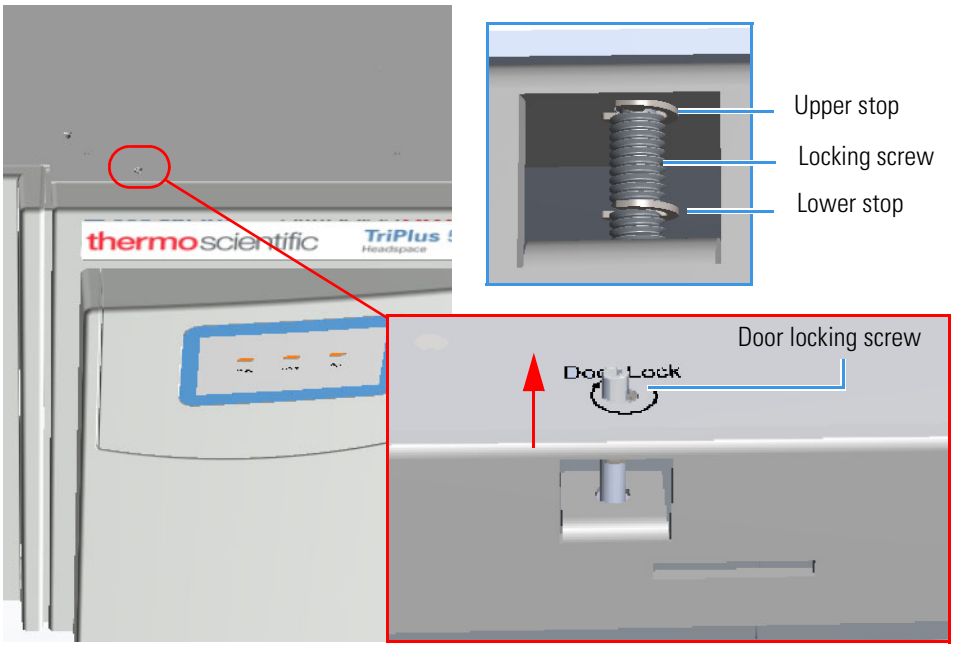
a. Push down the power switch (breaker), located at the back of the instrument, to the position **OFF**.

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 84.

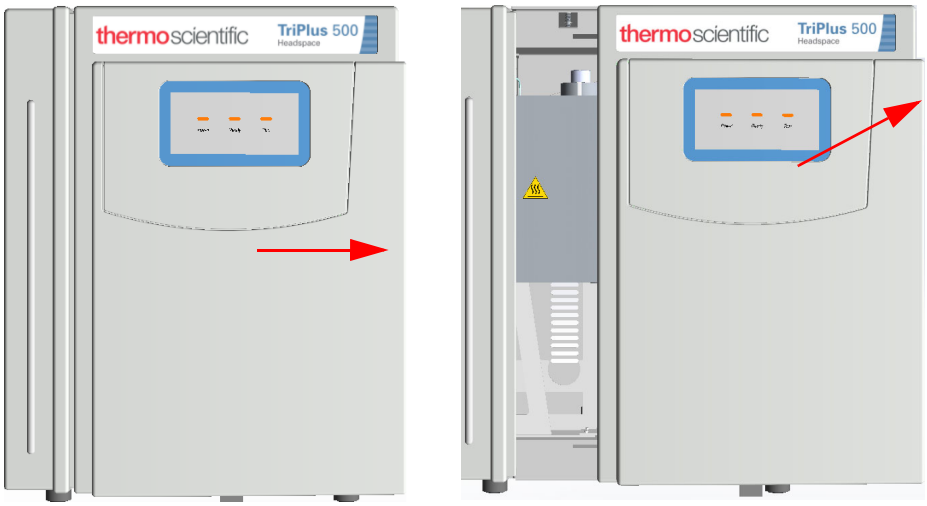
Figure 84. Front Door Removal (1)



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 85.

Figure 85. Front Door Removal (2)

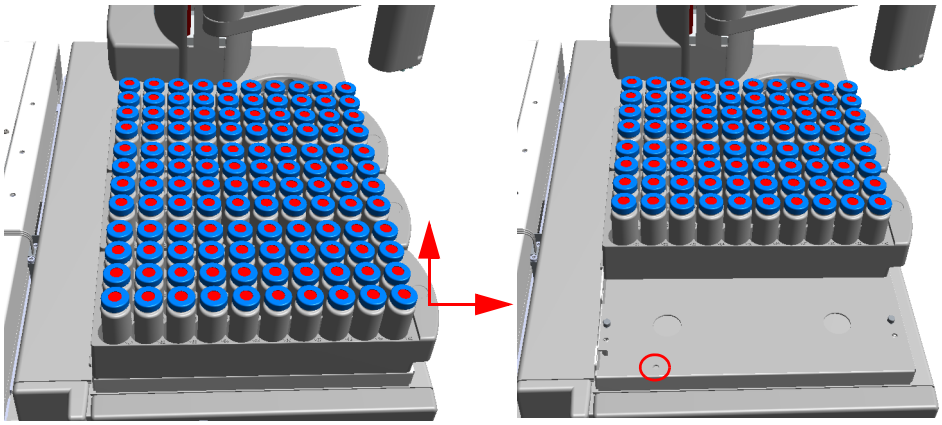


❖ To remove the front door of the TriPlus 500 HS-120

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 86.

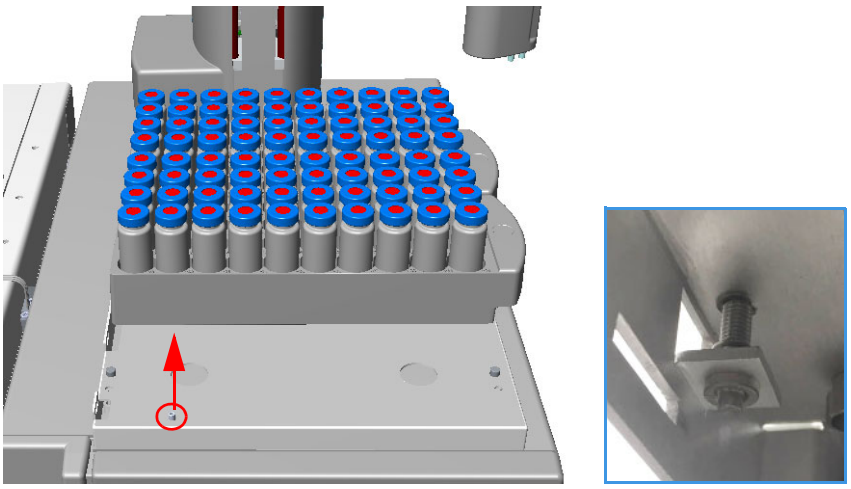
> **Note** The IN/OUT fluid tubes of the heated/cooled tray holder plate are not visualized for graphical convenience.

Figure 86. 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 87.

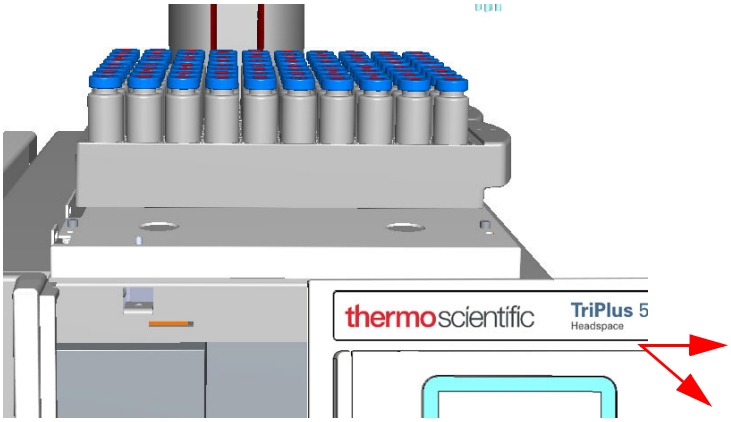
Figure 87. Front Door Removal (1)



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 88.

Figure 88. 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 97.
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 89 and Figure 90.

Figure 89. Opening the Sampling Valve Compartment (1)

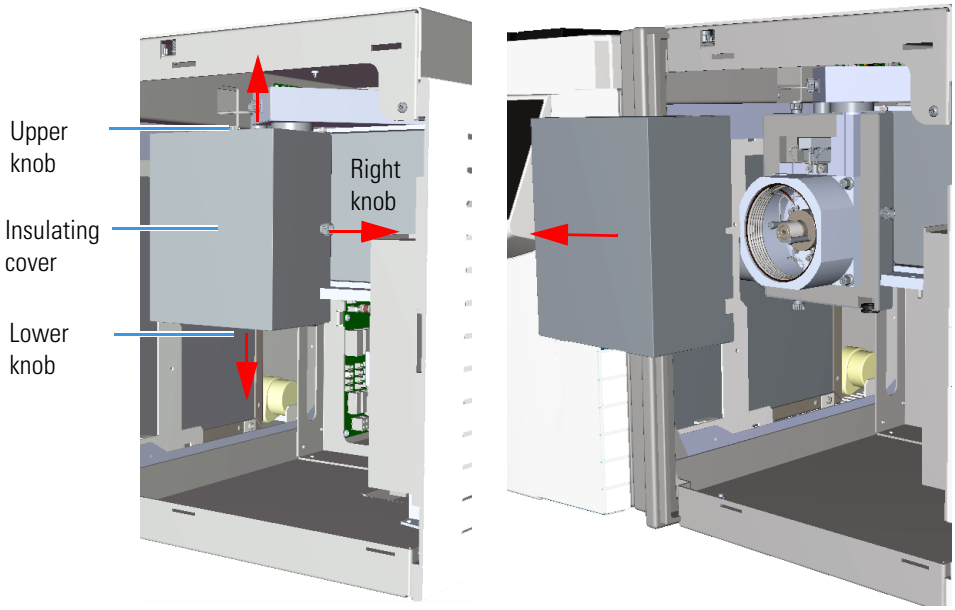
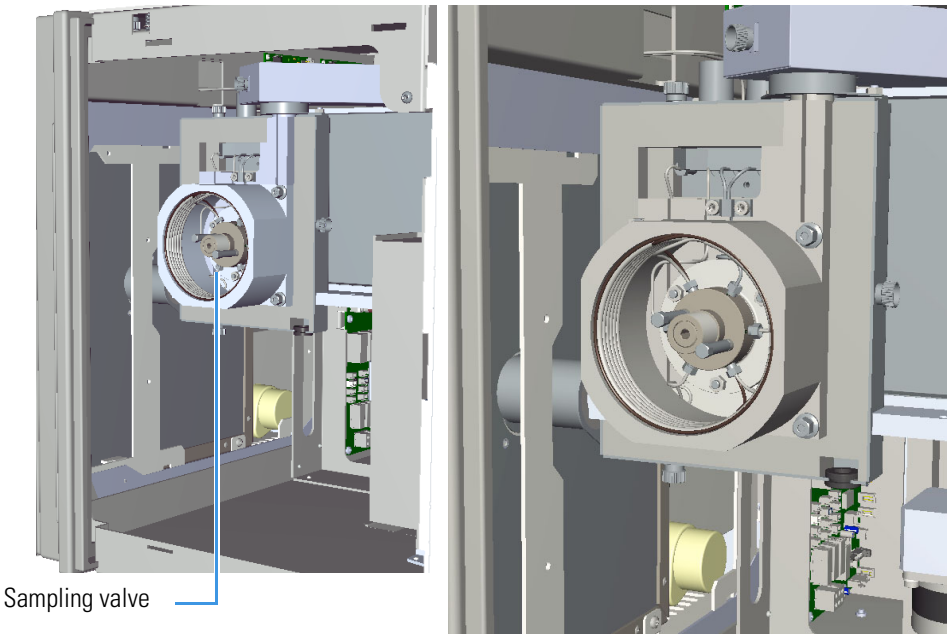
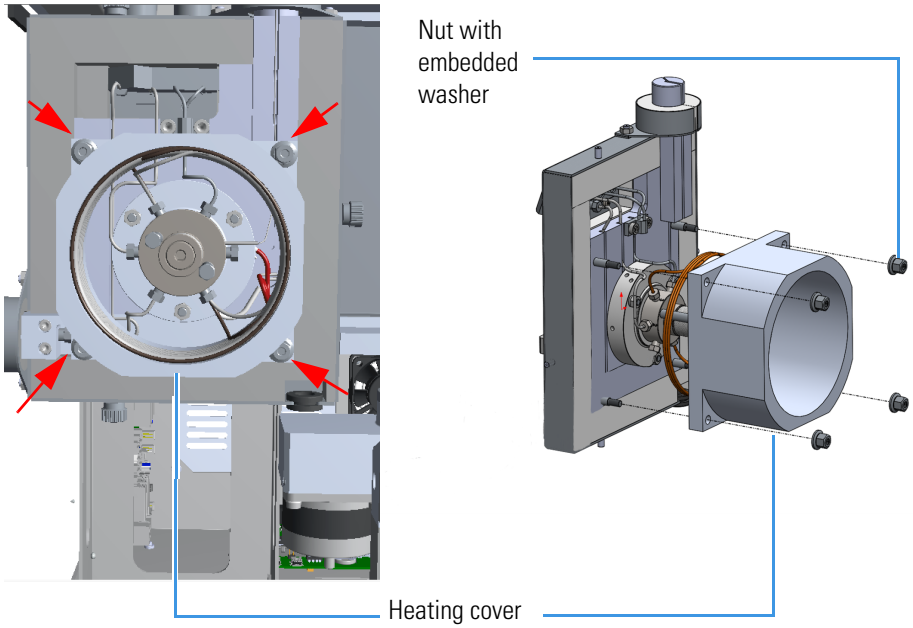


Figure 90. Opening the Sampling Valve Compartment (2)



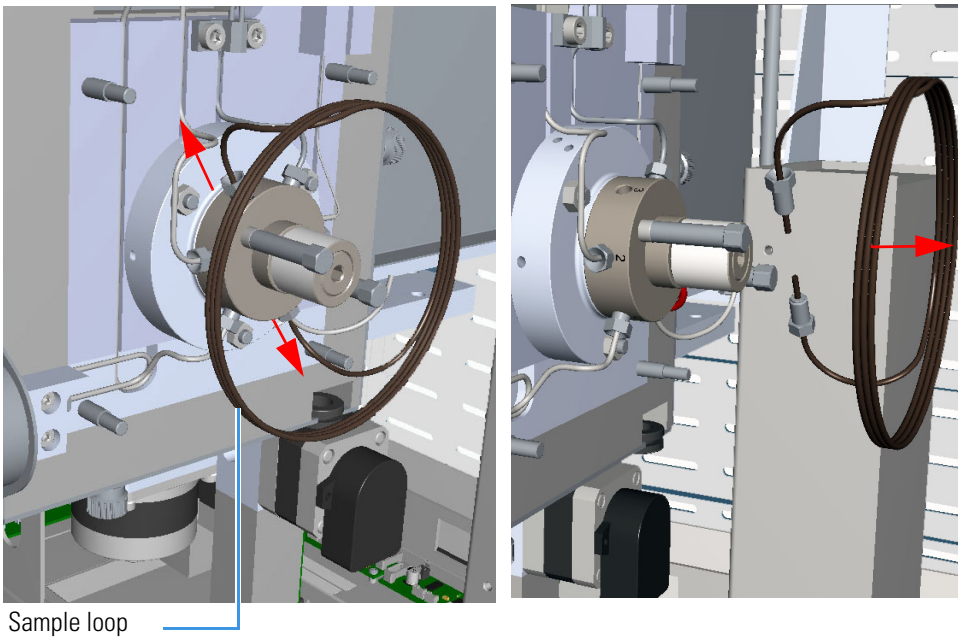
4. Remove the heating cover of the sampling valve.
   a. Using a 8 mm tube nut wrench loosen the four nuts and washers that fix the heating cover, then remove it. See Figure 91.

Figure 91. 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 92.

Figure 92. 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.

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