



Thermo Scientific

TriPlus 100 Liquid Sampler

Hardware Manual

P/N 31709703 Revision C December 2015

Thermo
SCIENTIFIC

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TriPlus 100 Liquid Sampler Hardware Manual, PN 31709703, Third Edition

	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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- installation
- re-calibration
- changes and repairs

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- Machinery Directive: 2006/42/EC

... and conforms with the following product standards:

Safety

This device complies with:

- ANSI/UL 61010-1:2004 2nd Edition, CAN/CSA C22.2 No. 61010-1:2004 2nd Edition.
- EN 61010-2-010:2003 | EN 61010-2-051:2003 | EN 61010-2-081:2001+A1:2003

Electromagnetic Compatibility

This device complies with:

- EN 61326-1:2006 / IEC 61326-1:2005
- EN 61000-6-2:2005 / IEC 61000-6-2:2005 | EN 61000-6-3:2007 / IEC 61000-6-3:2006

Laser Class 1

The selected Class 1 Laser for the module Barcode Reader of the TriPlus 100 Liquid Sampler system complies with the following regulations:

- 21 CFR1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated July 26, 2001

- EN60825-1:1994 + A1:2002 + A2:2001
- IEC60825-1:1993 + A1:1997 + A2:2001

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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 UNDESIRE 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.

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

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IMPORTANT

The symbol indicates the product must not be disposed of with the normal household wastes. Correct disposal of this product prevents any potentially negative impact on the environmental and human health that could arise from any inappropriate handling of the product itself.

WEEE and RoHS rules, while laid down at European level, are put into national law at national level. When exporting to Europe, it is essential to comply with national law in each relevant country. The EU law simply serves as a template for national laws, which may differ considerably.

Each EU Member State has own regulations regarding the application of these directives. Please refer to the regulations in force in your country.

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Preface

This manual provides detailed information for installing, defining objects, interfacing, maintaining, and troubleshooting the Thermo Scientific™ TriPlus™ 100 Liquid Sampler system.

This manual is organized as follows:

- [Chapter 1, “Specifications,”](#) provides general specifications of the TriPlus 100 Liquid Sampler system.
- [Chapter 2, “Installation of the TriPlus 100 Liquid Sampler,”](#) provides information for installing the TriPlus 100 Liquid Sampler system.
- [Chapter 3, “TriPlus 100 Liquid Sampler Defining Object Positions,”](#) provides the instructions for defining the teaching position of the modules of the TriPlus 100 Liquid Sampler system, the referencing position and the calibration. The definition of these terms, and the Row and Column sample positions, are also explained.
- [Chapter 4, “TriPlus 100 Liquid Sampler Firmware,”](#) provides instructions for creating, copying, and restoring backup files, and for upgrading and downgrading the Firmware.
- [Chapter 5, “Maintenance,”](#) provides guidelines for maintaining the TriPlus 100 Liquid Sampler system and its modules.
- [Chapter 6, “Troubleshooting,”](#) gives a quick overview of possible causes and recommended actions which can be taken to eliminate an erratic behavior.

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.

Power Rating

TriPlus 100 Liquid Sampler system:

100/240 Vac +/-10%; 50/60 Hz; 5 A max; 200 VA (400 VA when two Power Modules are required).

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

Contacting Us

Thermo Fisher Scientific provides comprehensive technical assistance worldwide and is dedicated to the quality of our customer relationships and services.

Use <http://www.thermoscientific.com> address for products information.

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

Related Documentation

In addition to this manual, Thermo Scientific provides the following documents for the TriPlus 100 Liquid Sampler system.

- *TriPlus 100 Liquid Sampler Preinstallation Requirements Guide*, PN 31709701
- *TriPlus 100 Liquid Sampler User Guide*, PN 31709702
- *TriPlus 100 Liquid Sampler Spare Parts Guide*, PN 31709704

To suggest ways we can improve the documentation, follow this link to complete our [documentation survey](#).

Safety Alerts and Important Information

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 guide:

Symbol	Descriptor
	BIOHAZARD: Indicates that a biohazard <i>will, could, or might</i> occur.
	BURN HAZARD: Alerts you to the presence of a hot surface that <i>could or might</i> cause burn injuries.
	ELECTRICAL SHOCK HAZARD: Indicates that an electrical shock <i>could or might</i> occur.
	FIRE HAZARD: Indicates a risk of fire or flammability <i>could or might</i> occur.
	EXPLOSION HAZARD. Indicates an explosion hazard. This symbol indicates this risk <i>could or might</i> 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 <i>could or might</i> cause physical injury.

	GLOVES REQUIRED: Indicates that you must wear gloves when performing a task or physical injury <i>could</i> or <i>might</i> occur.
	CLOTHING REQUIRED. Indicates that you should wear a work clothing when performing a task or else physical injury <i>could</i> or <i>might</i> occur.
	BOOTS REQUIRED. Indicates that you must wear boots when performing a task or else physical injury <i>could</i> or <i>might</i> occur.
	MATERIAL AND EYE HAZARD. Indicates you must wear eye protection when performing a task.
	HAND AND CHEMICAL HAZARD: Indicates that chemical damage or physical injury <i>could</i> or <i>might</i> occur.
	HARMFUL. Indicates that the presence of harmful material <i>will, could, or might</i> occur.
	INSTRUMENT DAMAGE: Indicates that damage to the instrument or component <i>might</i> occur. This damage might not be covered under the standard warranty.
	LIFTING HAZARD. Indicates that a physical injury <i>could</i> or <i>might</i> occur if two or more people do not lift an object.
	MATERIAL AND EYE HAZARD: Indicates that eye damage <i>could</i> or <i>might</i> 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 <i>could</i> or <i>might</i> put you at risk for a physical injury.
	TOXIC SUBSTANCES HAZARD: Indicates that exposure to a toxic substance could occur and that exposure <i>could</i> or <i>might</i> cause personal injury or death.
	LASER HAZARD. Indicates that exposure to a laser beam <i>will, could, or might</i> cause personal injury.
	RADIOACTIVE HAZARD. Indicates that the presence of radioactive material <i>could</i> or <i>might</i> 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 <i>could cause personal injury</i> .

Instrument Markings and Symbols

Table 1 explains the symbols used on Thermo Fisher Scientific instruments. Only a few of them are used on the TriPlus 100 Liquid Sampler system. See the asterisk.

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

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

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

Symbol	Description
* 	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 the TriPlus 100 Liquid Sampler system, or parts of it (following the life cycle principle), as well as for the end user TriPlus 100 Liquid Sampler system in the lab during the learning phase, and in routine work.



IMPORTANT Read this section first before operating the TriPlus 100 Liquid Sampler system.

General Considerations

- Before a unit is put to use, consult the TriPlus 100 Liquid Sampler system User Guide and related documents under all circumstances.
- Changes or modifications to this unit not expressly approved by the party responsible for compliance, could void your's 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.

In general, this type of situation arises when access to the parts is only possible using a tool. When you perform a maintenance operation, you must have received proper training to carry out that specific task.

Electrical Hazards



Every analytical instrument has specific hazards. Be sure to read and comply with the following pre-cautions. They ensure the safe and long-term use of your TriPlus 100 Liquid Sampler system.

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.

Connect the TriPlus 100 Liquid Sampler system only to instruments complying with IEC 61010 safety regulations.

The power line and the connections between the TriPlus 100 Liquid Sampler system 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 the TriPlus 100 Liquid Sampler system 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.

Pay attention not to leave any cable connecting the TriPlus 100 Liquid Sampler system 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 100 Liquid Sampler system. The instrument is properly grounded in accordance with these regulations when shipped. To ensure safe operation, you do not must 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 the TriPlus 100 Liquid Sampler system shows visible signs of damage, exposure to any liquids or has been transported under severe stress.

Preface

Safety Information and Warnings



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(ies) 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 the TriPlus 100 Liquid Sampler system. 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.



Never try to repair or replace any components of the instrument without the assistance of a Thermo Fisher Scientific representative. There are no operator-serviceable or replaceable parts inside the power supply(ies) or in the TriPlus 100 Liquid Sampler system. If a power supply is not functioning, contact a Thermo Fisher Scientific representative.



The power supplies for the TriPlus 100 Liquid Sampler system, the Temperature Controlled Drawer have the symbols **I/O** on the label for the power switch to indicate ON/OFF. If a Temperature Controlled Drawer is installed in combination with a TriPlus 100 Liquid Sampler system, a second power supply is active in the complete system. Turning OFF the two power supplies, or pulling the two power cords in an emergency, stop the entire TriPlus 100 Liquid Sampler system.

It is important that the power supply(ies) is in a location where the power ON/OFF switch is accessible and easy to operate, and where it is possible to unplug the AC power cord from the power supply/wall outlet in case of emergency.

Laser Safety Information



Safety Warning for Laser Class 1 Product.

CLASS 1 LASER PRODUCT
LASER KLASSE 1
APPAREIL À LASER DE CLASSE 1



WARNING The installed Laser device is a Class 1 Laser Product.

Class 1 Laser devices are not considered to be hazardous when used for their intended purpose. The following statement is required to comply with US and international regulations:

CAUTION Use of controls, adjustments or performance of procedures other than those specified herein might result in hazardous laser light exposures.

The selected Class 1 Laser for the module Barcode Reader of the TriPlus 100 Liquid Sampler system complies with the following regulations:

- 21 CFR1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated July 26, 2001
- EN60825-1:1994 + A1:2002 + A2:2001
- IEC60825-1:1993 + A1:1997 + A2:2001

The software contains a built-in safety time limit such that the laser scanning mechanism cannot be operated in AIM mode for more than 5 continuous seconds.

Other Hazards



To avoid injury and possible infection through contamination during TriPlus 100 Liquid Sampler system operation, keep your hands away from the syringe.



Do not operate the TriPlus 100 Liquid Sampler system without the safety guard. The safety guard must be installed for safe operation. Do not place any objects inside the area of the safety guard. Keep away from the area around the safety guard during operation of the TriPlus 100 Liquid Sampler system.



Danger of crushing to fingers and hands. To avoid injury keep your hands away from moving parts during operation. Turn off the power to the TriPlus 100 Liquid Sampler system 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 100 Liquid Sampler system. Know the physical and chemical properties of the solvents you use. See the MSDS (Material Safety Data Sheets) from the manufacturer of the solvents being used.

When using the TriPlus 100 Liquid Sampler system, follow the generally accepted procedures for quality control and method development.

When using the TriPlus 100 Liquid Sampler system in the field of chromatographic analysis, if a change is observed in the retention of a particular compound, in the resolution between two compounds, or in the peak shape, immediately determine the reasons for the changes. Do not rely on the separation results until you determine the cause of a change.

Do not operate on the instrument components that form part of the work area of the TriPlus 100 Liquid Sampler system when it is in motion.



Use caution when working with any polymer tubing under pressure:

- Always wear eye protection when near pressurized polymer tubing.
- Do not use polymer tubing that has been severely stressed or kinked.
- Do not use polymer tubing, in particular no PEEK or Tefzel tubing when using tetrahydrofuran (THF), dimethylsulfoxide (DMSO), chlorinated organic solvents, concentrated mineral acids such as nitric, phosphoric or sulfuric acids, or any related compounds.

Preface

Safety Information and Warnings



Do not use vials without a sealing cap, or microtiter or deepwell plates without a plate seal. Vapor phase from organic solvents can be hazardous and flammable. Acidic vapor phase can cause corrosion to critical mechanical parts.



When sample vials have to undergo heating and agitation, it is important to consider the glass quality. Use high quality glass only. Remember that depending on the application conditions, high pressure can build up in the vial. Whenever a temperature greater than 60 °C is applied, consider the vapor pressure of the solvent used to ensure that no excessive pressure builds up.

This is important when using a temperature above 100 °C and especially at the maximum temperature of 200 °C. Be aware that solid materials can also contain volatile compounds such as water (humidity) which could cause build-up of excess vapor pressure.

Do not reuse the vials. During the process of washing the vial, micro-cracks can form which will weaken the glass wall and increase the chances of the vial breaking.



When filling-up a standard reservoir or replacing a solvent such as a washing solvent, remove the solvent reservoir bottle from the system to avoid a possible spill over the instrument. Depending on the physical, chemical or hazardous properties of the solvent, use the appropriate protective measures for handling.

Working with Toxic or other Harmful Compounds



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.

Before using dangerous substances (toxic, harmful, and so on) read the hazard indications and information reported in the Material Safety Data Sheet (MSDS) supplied by the manufacturer, referring to the relevant CAS (Chemical Abstract Service) number. The TriPlus 100 Liquid Sampler system requires the use of several chemical products with different hazard characteristics, which are present in vials and syringes. Before using these substances or replacing the syringe, please read the hazard indications and information reported in the MSDS supplied by the manufacturer referring to the relevant CAS number.

When preparing the samples, please refer to local regulations for the ventilation conditions of the work room.

All waste materials must be collected and eliminated in compliance with the local regulations and directives in the country where the instrument is used.

Biological Hazards



In laboratories where samples with potential biological hazards are handled, you must label any equipment or parts thereof which might become contaminated with biohazardous material. The appropriate warning labels are included with the shipment of the instrument. It is your responsibility to label the relevant parts of the instrument.

When working with biohazardous materials, it is your responsibility to fulfill the following mandatory requirements:

- Instructions on how to safely handle biohazardous material must be provided.
- Operators must be trained and made aware of the potential dangers.
- Personal protective equipment must be provided.
- Instructions must be provided on what to do in case 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.
- Instructions for decontamination and safe disposal of the relevant parts must be provided.

It is your responsibility to handle hazardous chemicals or biological compounds (including, but not limited to, bacterial or viral samples and the associated waste), safely and in accordance with international and local regulations.

Maintenance

Any external cleaning or maintenance must be performed with the TriPlus 100 Liquid Sampler system 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 MSDS (Material Safety Data Sheet) 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 rack, syringe tool, wash module, 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 the TriPlus 100 Liquid Sampler system.

It is your responsibility to handle hazardous chemicals or biological compounds, including (but not limited to) bacterial or viral samples and the associated wastes, safely and in accordance with international and local regulations.

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 the TriPlus 100 Liquid Sampler system for complimentary equipment pick-up and recycling.

WARNING The customer has to ensure that the TriPlus 100 Liquid Sampler system 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: Syringes, Vials and Well Plates. 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.

Specifications

This section provides general specifications of the TriPlus 100 Liquid Sampler system.

Contents

- [Electrical Specifications](#)
- [Physical Specifications](#)
- [Operating and Environmental Specifications](#)
- [Sound Pressure Level](#)
- [Hardware and Software Requirements](#)
- [TriPlus 100 Liquid Sampler Software Requirements](#)

Electrical Specifications

The electrical specifications and the various protection classes are provided in [Table 1](#) and [Table 2](#).

Table 1. General Electrical Specifications

Parameter	Requirements
Voltage	36 VDC
Current	3.2 A
Fuse	T6.3 A/250 V

Table 2. Handheld Controller Power Supply

Parameter	Requirements
Input line voltage	Grounded AC, 100 V to 240 V
Input line frequency	50/60 Hz
Input power	4 A
Output voltage	36 VDC
Output current	5.55 A (total for two Outlets)
Power Rate	200 W

- **Protection Class I** — Describes the insulating scheme used in the instrument to protect the user from electrical shock. Class I identifies a single level of insulation between live parts (wires) and exposed conductive parts (metal panels), in which the exposed conductive parts are connected to a grounding system. In turn this grounding system is connected to the third pin (ground pin) on the electrical power plug.
- **Over Voltage Category II** — Pertains to instruments that receive their electrical power from a local level such as an electrical wall outlet.
- **Pollution Degree 2** — Measure of pollution on electrical circuits that may produce a reduction of the dielectric strength or surface resistivity. Degree 2 normally refers only to non-conductive pollution. Occasionally, however, a temporary conductivity caused by condensation is to be expected.
- **Moisture Protection** — Normal (IPX0) – PIXY means that there is NO Ingress Protection against any type of dripping or sprayed water. The X is a place holder to identify protection against dust, if applicable.

Physical Specifications

The physical specification for the TriPlus 100 Liquid Sampler system are listed in [Table 3](#).

Table 3. Space and Load Requirements

Instrument	Depth (Y-axis)		Width (X-axis)		Height (Z-axis)		Mass	
	cm	in.	cm	in.	cm	in.	kg	lbs
TriPlus 100 Liquid Sampler system	50.3 ¹	19.8 ¹	85	33.5	54	21.3	15.3 ⁴	33.7 ⁴

¹ About 20 cm (about 8-in.) of the orthogonal crossrail (Y-axis) are protruding the back of the GC.

² Dimension of the entire working range including Handheld bracket

³ Dimension including the support legs [about 22 cm (8.7 in.) height]

⁴ Mass without accessories.

Operating and Environmental Specifications

These specifications are listed in [Table 4](#).

Table 4. Operating and Environmental Specifications

Parameter	Requirements
Operating temperature range	5 °C to 40 °C (41 °F to 104 °F)
Maximum relative humidity	80%, non-condensing
Work Environment	Indoor Use
Altitude	3000 m above sea level
Mains Voltage Variation	±10%
Bench space	At least 30 cm (12 in.) at the back.
Access to power switches and power cords.	Clean, level and smooth surface.
Clean, level and smooth surface.	Solid bench plate.
Vibration	Negligible
Static electricity	Negligible

Sound Pressure Level

The sound pressure level is listed in [Table 5](#).

Table 5. Sound Pressure Level

Parameter	Requirements
Sound Pressure Level	Measured value: <ul style="list-style-type: none">• TriPlus 100 Liquid Sampler system (basic unit): 64 dBA• TriPlus 100 Liquid Sampler system with Agitator: 66 dBA• TriPlus 100 Liquid Sampler system with Vortexer without sample vial: 67 dBA• TriPlus 100 Liquid Sampler system with Vortexer with 20 mL sample vial inserted: 78 dBA. One meter from the equipment in the direction of maximum sound pressure level.
According to UL 610107A-1, 1st Edition, clause 12.5.	Limit < 85 dBA dBA = A weighted sound pressure level

Hardware and Software Requirements

This section details the hardware and software requirements.

Computer Hardware Requirements

The computer hardware minimal requirements depends on the Microsoft Windows Operating System and, if applicable, on the **MS.NET Framework software** used. See recommendations from Microsoft[®].

It is also important to consider the minimum requirements for the operation of the Chromatography Data System Software (CDS).

For operation of the TriPlus 100 Liquid Sampler system, both an Ethernet (TCP/IP) and a USB communication port are required. The computer in use must be equipped accordingly: LAN or Ethernet IEEE 802.3 Industry Standard 10/100 Base-T. The network interface of the TriPlus 100 Liquid Sampler system supports the Auto-MDI(X) protocol.

The USB Device/Client Type B communication port of the TriPlus 100 Liquid Sampler system is currently not activated.

USB Stick (Memory Drive)

Use a commercially available standard USB memory stick with at least 100 MB memory size. No special formatting of the drive (stick) is necessary; on the contrary only one partition must be defined. If two partitions are defined, subsequent errors occur, and the access to the system is denied.

Commercially available USB sticks with encrypting software installed, and secure USB drives, typically have two partitions. This type of USB drive cannot be utilized in combination with the TriPlus 100 Liquid Sampler system.

The following software types of the USB memory drive are compatible with the TriPlus 100 Liquid Sampler system:

- FAT
- FAT32
- The software NTFS is **NOT** supported. If an USB Stick with this software is used, the stick will not be recognized by the Firmware.

PC Software Requirements

All the software functionality such as Backup (Restore), or Update for the TriPlus 100 Liquid Sampler system Firmware are performed directly via USB interface using the TriPlus 100 Liquid Sampler USB stick. For these purposes, no specific software on a PC is required.

For the operation of the TriPlus 100 Liquid Sampler system with a Thermo Scientific Chromatography Data System (CDS), for example: Chromeleon, Xcalibur, ChromQuest, or Chrom-Card, a software driver is used. The specific requirements for operation of the integrated TriPlus 100 Liquid Sampler system in the CDS are outlined by the supplier of the CDS software.

Configuring Windows for Firmware and for the CDS

When configuring the Windows Operating software for the TriPlus 100 Liquid Sampler system, it is important to note that the CDS to be used in conjunction with the TriPlus 100 Liquid Sampler system might require specific settings as well. These settings must be matched for reliable operation of the analytical system. See the corresponding sections in the installation manual of the specific CDS.

Firewall or Virus Scanner Settings

In order to reliably operate the TriPlus 100 Liquid Sampler system and the selected Chromatography Data System (CDS), it is necessary to turn **OFF** any third party **Firewall** or **Virus Scanner** software.

If for any reason a firewall has to be activated, the TCP Ports 80, 64000, 64001, and 8194 must be unlocked.

Screen Savers

It is highly recommended **NOT** to use any **Screen Savers**.

Disabling Power Management

Depending on the Windows Operating System version and the default settings, the computer may enter standby mode automatically after a specified time if no mouse or keyboard activity is detected. Using this **Power Save** mode in the environment with laboratory instruments where unattended operation day and night is expected, will likely result in loss of data, interruptions of specific functions, or whole operations.

❖ To disable Windows power management

1. Select the Windows **Control Panel**
2. Select **System and Security**
3. Select **Power Options**
4. From **Power Plan** select the menu item **Put the Computer to sleep: Never**

Note Depending on the Windows version, the path or wording may differ slightly. The example given above is based on Windows 7.

TriPlus 100 Liquid Sampler Software Requirements

The firmware of the TriPlus 100 Liquid Sampler system is the collective term referring to all required software and data that complement one another, and make up the complete firmware of the TriPlus 100 Liquid Sampler system. It consist mainly of:

- Operating System (OS)
- TriPlus 100 Liquid Sampler system Application Software
- TriPlus 100 Liquid Sampler system Configuration (persisted data)
- TriPlus 100 Liquid Sampler system Device Firmware

When restoring a **TriPlus 100 Liquid Sampler Configuration Backup**, the software packages **TriPlus 100 Liquid Sampler Application** and **TriPlus 100 Liquid Sampler Configuration** are saved, under the file extension ***.pac**. This file is always stored as an archive file.

The **Operating System** and the firmware of the devices of the TriPlus 100 Liquid Sampler system are not stored in the configuration backup.

In case of a software update for the firmware of the TriPlus 100 Liquid Sampler system, a single archive file with the file extension ***.cont** will be supplied.

The software supplied depends on the compatibility of all the software packages. In some cases, only the firmware of the TriPlus 100 Liquid Sampler system device is necessary to complete the update. All other software packages remain untouched, and are compatible. If major changes are made to the operating systems, could also be necessary to adapt both the **TriPlus 100 Liquid Sampler Application**, and the **TriPlus 100 Liquid Sampler Configuration** software to provide full compatibility.

Installation of the TriPlus 100 Liquid Sampler

This chapter provides information for installing the TriPlus 100 Liquid Sampler system.

Contents

- Introduction
- Installation Quick Reference Guide
- Unpacking the Components
- Installing the TriPlus 100 Liquid Sampler Supports on the GC
- Placing the TriPlus 100 Liquid Sampler on the Supports
- Installation of the TriPlus 100 Liquid Sampler System
- Installing the TriPlus 100 Liquid Sampler Head
- Installing the Handheld Controller and Safety Guard
- Installing the Wash Stations
- Installing a Tray Holder
- Installing an Agitator
- Installing a Vortexer
- Installing a Barcode Reader
- Installing a Liquid Cooled Tray Holder
- Installing a Temperature Controlled Drawer
- Inserting/Removing a Syringe into the Syringe Adapter
- Connecting the Power Module
- Combining the TriPlus 100 Liquid Sampler to Other Devices
- Establishing Communication with the Computer

Introduction

This chapter describes the installation of the TriPlus 100 Liquid Sampler system and its modules. Referencing of the TriPlus 100 Liquid Sampler system and teaching of the various modules are described in [Chapter 3, “TriPlus 100 Liquid Sampler Defining Object Positions.”](#)

Who Performs the Installation



CAUTION The TriPlus 100 Liquid Sampler system is installed by authorized Thermo Fisher Scientific technical personnel, who will check its correct operation. For more details, please contact Thermo Fisher Scientific local representatives. Should the instrument not be installed by Thermo Fisher Scientific personnel, please strictly adhere to the following instructions.

Space Requirements

Provide enough space around the instrument on which the TriPlus 100 Liquid Sampler system must be installed making reference to the overall dimensions of the sampler described in the *TriPlus 100 Liquid Sampler Preinstallation Requirements Guide*.



WARNING Pay attention not to operate on the instrumental parts included in the work area of the sampler when this is in movement.

Electrical Requirements

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



CAUTION Do not connect the TriPlus 100 Liquid Sampler system to lines feeding devices of a heavy duty nature, such as motors, UV lamps, refrigerators and other devices that can generate disturbances.

Pay attention not to leave any cable connecting the sampling unit and the chromatographic system or the power cord close to the GC hot air vents.

Connect the TriPlus 100 Liquid Sampler system only to instruments complying with the IEC 61010 safety regulations.

Sampler Supports

The TriPlus 100 Liquid Sampler system is installed on the GC by using the two appropriate supports provided. Every support has a bar provided with holes for the fixing on the GC, and a vertical support leg provided with clamps for the correct hookup of the sampler.

Material Required for the Installation

To install the TriPlus 100 Liquid Sampler system and its modules, the following material is required:

- T6 Torxhead screwdriver
- T10 Torxhead screwdriver
- T20 Torxhead screwdriver
- T25 Torxhead screwdriver
- Two flat wrenches
- Flat-head screwdriver

Installation Quick Reference Guide

Table 6. Installation Quick Reference Guide (Sheet 1 of 2)

Step	Action	Reference
01	Prepare the working area and the GC System.	See the relevant Preinstallation Requirements Guide for the GC system and TriPlus 100 Liquid Sampler system.
02	Check if all components of the TriPlus 100 Liquid Sampler system are delivered.	See "Unpacking the Components" on page 12.
03	Install the supports of the TriPlus 100 Liquid Sampler system on the GC	See "Installing the TriPlus 100 Liquid Sampler Supports on the GC" on page 13.
04	Install the TriPlus 100 Liquid Sampler system on the GC.	See "Placing the TriPlus 100 Liquid Sampler on the Supports" on page 19.
05	Connect all the Active and Passive modules to complete the required system configuration.	See "Installation of the TriPlus 100 Liquid Sampler System" on page 20.
06	Make all electrical connections, including the Active modules.	See "Installation of the TriPlus 100 Liquid Sampler System" on page 20.
07	Insert the required syringe into the syringe adapter.	"Inserting/Removing a Syringe into the Syringe Adapter" on page 43.
08	Prepare the computer with the required software:	Follow the recommendations and specifications from Thermo Fisher Scientific. See "Hardware and Software Requirements" on page 4.
09	Connect the TriPlus 100 Liquid Sampler system to the Network environment. LAN cable is provided with the system.	See "Combining the TriPlus 100 Liquid Sampler to Other Devices" on page 50.

2 Installation of the TriPlus 100 Liquid Sampler

Unpacking the Components

Table 6. Installation Quick Reference Guide (Sheet 2 of 2)

Step	Action	Reference
10	Power up the system.	See How to Start the TriPlus 100 Liquid Sampler in the <i>TriPlus 100 Liquid Sampler User Guide</i> .
11	When handheld controller is not part of the TriPlus 100 Liquid Sampler system: Establish LAN Communication and start the virtual handheld controller software under Xcalibur.	Follow the recommendations and specifications from Thermo Fisher Scientific. I.P. address TriPlus 100 Liquid Sampler system: 192.168.99.230 I.P. address computer: 192.168.99.210 Subnet mask: 255.255.255.0
12	Check the firmware version. The TriPlus 100 Liquid Sampler system operates with firmware version 2.0 or higher.	Path from the Start Screen: Options About. See About Menu in the <i>TriPlus 100 Liquid Sampler User Guide</i> . See “Updating the Firmware” on page 93 .
13	Change the Access Level to Extended User	See Access Level in the <i>TriPlus 100 Liquid Sampler User Guide</i> .
14	Press Options and select in the pull-up menu the item Setup Modules. - Check availability of the Active modules. - Add all required Passive modules. - Check or add if necessary in following order: Signal, Input/Output Interface, and Chromatograph System	See Setup Menu Item in the <i>TriPlus 100 Liquid Sampler User Guide</i> .
15	From the Start Screen select the required LS1 tool, press Enter, and select menu item Needle Guide Type. Note: The parameter Cap Type in the class Vial Type has to correspond with the Tool Needle Guide Type. Example: Magnetic10/20 Magnetic Cap. Magnetic 2mL Magnetic Cap Foil Cutter MTP Plates. If Needle Guide Type is defined as Not Specified , a run is prohibited also when the Cap Type is set No Cap or Non Magnetic Cap .	Explanations for the different settings: Not Specified: Prohibits the execution of a run. Magnetic 2mL: Magnetic Transport for 2 mL vial (magnetic ring not installed). Magnetic 10/20 mL: Magnetic transport of 10 or 20 mL vials. Large magnetic ring installed. Foil Cutter: Foil Cutter for MicroTiter Plate foils installed.
16	Press Options and select in the pull-up menu the item Service Installation. Follow step-by-step the installation wizard.	See Service Menu - Installation Item in the <i>TriPlus 100 Liquid Sampler User Guide</i> .
17	Make a Backup file	See Maintenance Menu Item- Backup in the <i>TriPlus 100 Liquid Sampler User Guide</i> . and “The Firmware” on page 82 .

Unpacking the Components

A TriPlus 100 Liquid Sampler system is shipped into one box. Depending on the configuration and optional modules, the entire system may be shipped in more than one box:

- The main box contains the base of the TriPlus 100 Liquid Sampler system (X-,Y- axes assembly), and the standard modules such as Handheld Controller, Power Module, Tray Holders, Trays, Wash Stations, and so on.

❖ **To unpack the instrument**

1. Open the boxes, remove the accessory boxes to compare the packing list, and check for completeness of the shipment
2. Carefully lift the base of the TriPlus 100 Liquid Sampler system and remove it from the box.



CAUTION This operation must be performed by TWO persons who must stand each on one side of the X-axis and put their hands underneath it.

Hold the Y-axis in place while the assembly is being removed from the box. Set the base assembly of the TriPlus 100 Liquid Sampler system on a bench.

3. Unpack the remaining box that includes the Head.
If applicable, unpack the other boxes with any additional accessories included.
4. When placing the TriPlus 100 Liquid Sampler system onto a GC, make sure that no objects interfere with the Y-axis, or the Head, throughout the entire potential range of movement.

Installing the TriPlus 100 Liquid Sampler Supports on the GC

The supports for the TriPlus 100 Liquid Sampler system are two vertical legs provided into a dedicated **GC Mounting Kit**.

To install the supports on your GC refer to the following procedures:

- [“Installing the Supports on a Single GC” on page 14](#)
- [“Installing the Supports on a Double TRACE 1300/1310” on page 14](#)
- [“Installing the Supports on a TRACE 1300/1310 GC Coupled with a MS” on page 15](#)
- [“Installing the Supports on a Double TRACE GC Ultra” on page 15](#)
- [“Installing the Supports on a Double FOCUS GC” on page 16](#)
- [“Installing the Supports on a TRACE GC Ultra Coupled with a FOCUS GC” on page 17](#)
- [“Installing the Supports on a Double TRACE GC Ultra Coupled with a MS” on page 18](#)
- [“Installing the Supports on a TRACE GC Ultra and on a FOCUS GC Coupled with a MS” on page 18](#)

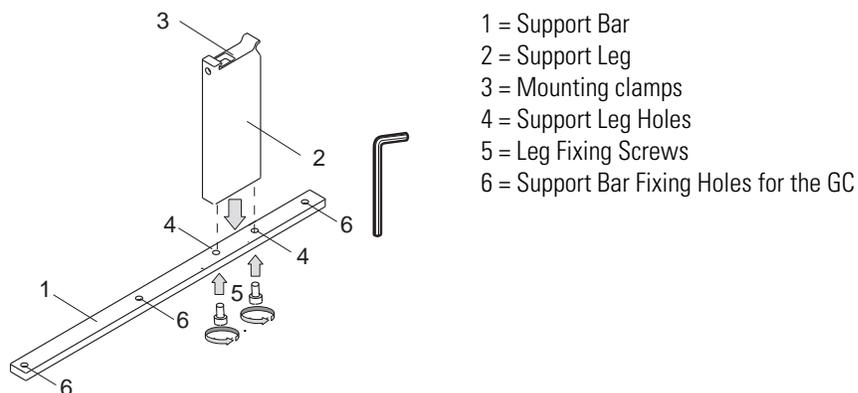
2 Installation of the TriPlus 100 Liquid Sampler

Installing the TriPlus 100 Liquid Sampler Supports on the GC

Sampler Supports Assembling

With reference to [Figure 1](#), proceed as follows:

Figure 1. Support Assembling



1. Insert the provided fixing screw into each hole present on the support bar.
2. Place the support leg on the support bar paying attention that the fixing screw of the leg is frontally turned.
3. Tighten the fixing screws.

Installing the Supports on a Single GC

To install the sampler supports on a GC, proceed as follows:

1. From the GC upper cover remove the plastic caps covering the corresponding fixing holes.
2. Insert into each holes present on the support bar the provided fixing screw.
3. Mount each sampler support on the GC paying attention to have the support leg turned toward the back of the GC.
4. Guide the fixing screws into the corresponding fixing holes.
5. Tighten the fixing screws.

Installing the Supports on a Double TRACE 1300/1310

To properly install the sampler supports on two TRACE 1300/1310 units, placed side by side, proceed as follows:



CAUTION Before proceeding, verify that the working area is large enough to accommodate two GC units and possible external devices.

1. Place the two TRACE 1300/1310 side by side.
1. From the upper cover of the GC placed on the right, remove the plastic caps covering the corresponding fixing holes.
2. Insert into each holes present on the support bar the provided fixing screw.
3. Mount each sampler support on the GC paying attention to have the support leg turned toward the back of the GC.
4. Guide the fixing screws into the corresponding fixing holes.
5. Tighten the fixing screws.

Installing the Supports on a TRACE 1300/1310 GC Coupled with a MS

To properly install the sampler supports on a TRACE 1300/1310 GC for MS, proceed as follows:



CAUTION Before proceeding, verify that the working area is large enough to accommodate the GC, the MS detector and possible external devices.

1. From the GC upper cover remove the plastic caps covering the corresponding fixing holes.
2. Insert into each holes present on the support bar the provided fixing screw.
3. Mount each sampler support on the GC paying attention to have the support leg turned toward the back of the GC.
4. Guide the fixing screws into the corresponding fixing holes. Tighten the fixing screws.

Installing the Supports on a Double TRACE GC Ultra

To properly install the sampler supports on two TRACE GC Ultra units, placed side by side, proceed as follows:



CAUTION Before proceeding, verify that the working area is large enough to accommodate two GC units and possible external devices.

1. From both sides of the first GC upper cover remove the plastic caps covering the corresponding fixing holes.
2. Insert the provided fixing screw into each hole present on the support bar.
3. Mount each sampler support on the GC paying attention to have the support leg turned toward the back of the GC.

2 Installation of the TriPlus 100 Liquid Sampler

Installing the TriPlus 100 Liquid Sampler Supports on the GC

4. Guide the fixing screws into the corresponding fixing holes, then tighten the fixing screws.
5. Move the second GC beside the first one leaving a distance of about 90 mm between the two GC units.
6. From the left side of the second GC upper cover remove the plastic caps covering the corresponding fixing holes.
7. Insert the appropriate fixing screws into each hole present on the spacer plate provided.
8. Mount the spacer plate on the two GC units.
9. Guide the fixing screws into the corresponding fixing holes, then tighten the fixing screws.

Installing the Supports on a Double FOCUS GC

To properly install the sampler supports on two FOCUS GC Ultra units, placed side by side, proceed as follows:



CAUTION Before proceeding, verify that the working area is large enough to accommodate two GC units and possible external devices.

1. Place the two FOCUS GC units side by side leaving a distance of about 130 mm between the two GC units.
2. From the **right** side of each of the FOCUS GC upper cover remove the plastic caps covering the corresponding fixing holes.
3. Insert the provided fixing screw into each hole present on the support bar.
4. Mount each sampler support on the GC units paying attention to ensure that the support leg is turned toward the back of the GC.
5. Guide the fixing screws into the corresponding fixing holes, then tighten the fixing screws.
6. From the **left** side of the second FOCUS GC upper cover remove the plastic caps covering the corresponding fixing holes.
7. Insert the appropriate fixing screws into each hole present on the spacer plate provided.
8. Mount the spacer plate on the two GC units.
9. Guide the fixing screws into the corresponding fixing holes, then tighten the fixing screws.



CAUTION Before proceeding, verify that the working area is large enough to accommodate the GC units, the MS detector, and possible external devices.

1. From the **right** side of the TRACE GC Ultra and from the **left** side of the TRACE GC Ultra for MS upper cover remove the plastic caps covering the corresponding fixing holes.
2. Insert the provided fixing screw into each hole present on the support bar.
3. Mount each sampler support on the GC units paying attention to have the support leg turned toward the back of the GC.
4. Guide the fixing screws into the corresponding fixing holes, then tighten the fixing screws
5. Place the two GC units beside the MS detector.

Installing the Supports on a TRACE GC Ultra Coupled with a FOCUS GC

To properly install the sampler supports on a TRACE GC Ultra alongside a FOCUS GC, proceed as follows:



CAUTION Before proceeding, verify that the working area is large enough to accommodate two GC units and possible external devices.

1. Place the FOCUS GC on the **left** and the TRACE GC Ultra on the **right** leaving a distance of about 57 mm between the two GC units.
2. From **both** sides of the TRACE GC Ultra upper cover, remove the plastic caps covering the corresponding fixing holes.



CAUTION One of the two supports must not be assembled. If the supports have already been assembled, one of them must be disassembled.

3. Disassemble one sampler support removing the support leg from the support bar unscrewing the two fixing screws.
4. Mount the support leg on the spacer plate provided and fix them by using the same fixing screws previously removed.
5. Insert the provided fixing screw into each hole present on the support bar.
6. Mount the alone support bar on the **left** side and the complete sampler support on the **right** side of the TRACE GC Ultra paying attention to have the support leg turned toward the back of the GC.

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Installing the TriPlus 100 Liquid Sampler Supports on the GC

7. Guide the fixing screws into the corresponding fixing holes, then tighten the fixing screws.
8. From the **right** side of the FOCUS GC upper cover remove the plastic caps covering the corresponding fixing holes.
9. Insert the appropriate fixing screws into each hole present on the spacer plate assembled with the support leg.
10. Mount the spacer plate assembling on the two GC units.
11. Guide the fixing screws into the corresponding fixing holes, then tighten the fixing screws.

Installing the Supports on a Double TRACE GC Ultra Coupled with a MS

To properly install the sampler supports on two TRACE GC Ultra for MS, proceed as follows:



CAUTION Before proceeding, verify that the working area is large enough to accommodate the GC units, the MS detector, and possible external devices.

1. From the **right** side of the TRACE GC Ultra and from the **left** side of the TRACE GC Ultra for MS upper cover remove the plastic caps covering the corresponding fixing holes.
2. Insert the provided fixing screw into each hole present on the support bar.
3. Mount each sampler support on the GC units. Pay attention that the support leg is turned toward the back of the GC.
4. Guide the fixing screws into the corresponding fixing holes, then tighten the fixing screws.
5. Place the two GC units beside the MS detector.

Installing the Supports on a TRACE GC Ultra and on a FOCUS GC Coupled with a MS

To properly install the sampler supports on a TRACE GC Ultra for MS and a FOCUS GC placed on the sides of a MS detector, proceed as follows:



CAUTION Before proceeding, verify that the working area is large enough to accommodate the GC units, the MS detector, and possible external devices.

1. From the TRACE GC Ultra upper cover remove the plastic caps covering the corresponding fixing holes.
2. Insert the provided fixing screw into each holes present on the support bar.

3. Mount each sampler support on the TRACE GC Ultra Pay attention that the support leg is turned toward the back of the GC.
4. Guide the fixing screws into the corresponding fixing holes, then tighten the fixing screws.
5. Place the two GC units beside the MS detector.
6. To mount the sampler use the appropriate support and fixing it on the installation holes provided on the top of the GC.
7. For further details please refer to the *Operating Manual* of the sampling system in use.

Placing the TriPlus 100 Liquid Sampler on the Supports

To place the TriPlus 100 Liquid Sampler system onto the supports (vertical legs), proceed as follows:

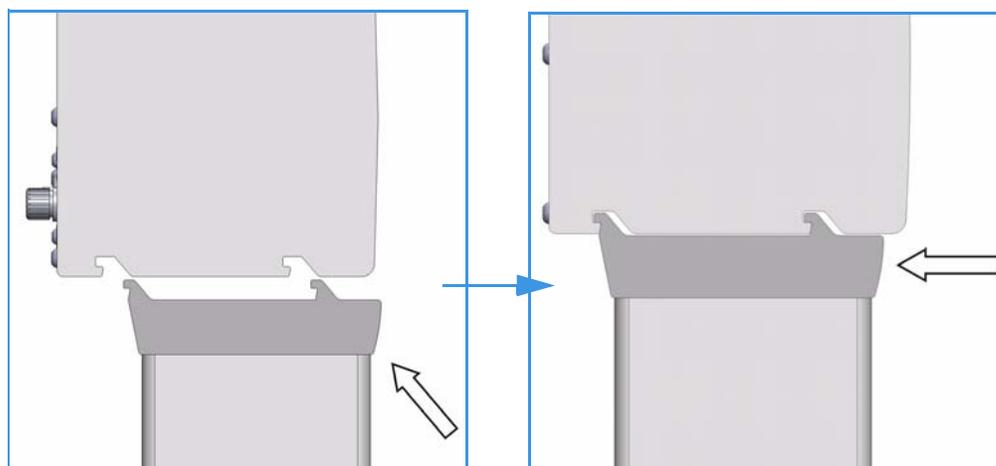
1. Loosen the two mounting clamps Torx screws of the vertical legs.
2. Place the base assembly of the TriPlus 100 Liquid Sampler system on top and fit the legs into the groove in the X- axis.



CAUTION This operation must be performed by TWO persons who must stand each on one side of the X-axis and put their hands underneath it.

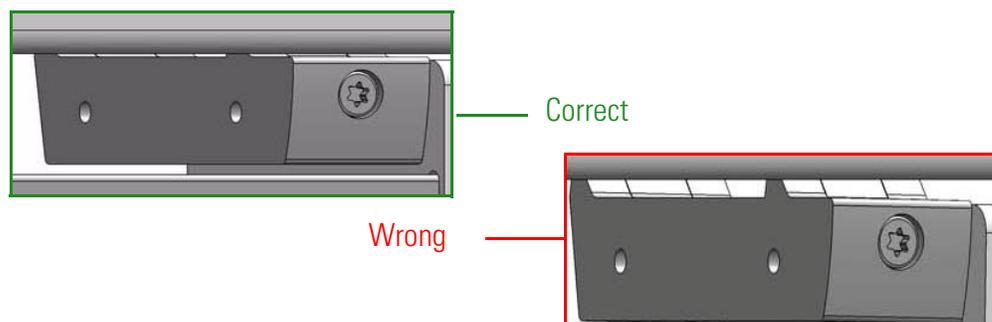
3. Be sure that the mounting clamps fit completely into the grooves. Alternately tighten the two Torx screws until the legs are firmly in place.

Figure 2. Positioning and Fixing of the Mounting Clamps in the X-axis Grooves



4. Be sure that the mounting clamps fit completely into the grooves. Alternately tighten the two Torx screws until the legs are firmly in place.
5. Double check if the leg mounting clamps are correctly hooked to the X-axis. See [Figure 3](#).

Figure 3. Correct and Wrong Hooking of Mounting Clamps



Installation of the TriPlus 100 Liquid Sampler System

This section details the installation of the TriPlus 100 Liquid Sampler system and its modules.



Note for Field Service Engineers — Discuss with the customer the positions of the base and modules of the TriPlus 100 Liquid Sampler system hooked to the X-axis considering the GC configuration. Open zones should be easily accessible by the Head of the TriPlus 100 Liquid Sampler system but placing an object above a heated zone could be dangerous, or at the very least influence the stability of the analytical sample. Consider the space availability in the lab and to adjacent instruments as well.



WARNING Do not place a module of the TriPlus 100 Liquid Sampler system, which might contain flammable solvents, directly above a heated zone. Special attention has to be paid to the Wash Station and its waste line (if applicable), and Tray Holders with sample vials inserted.

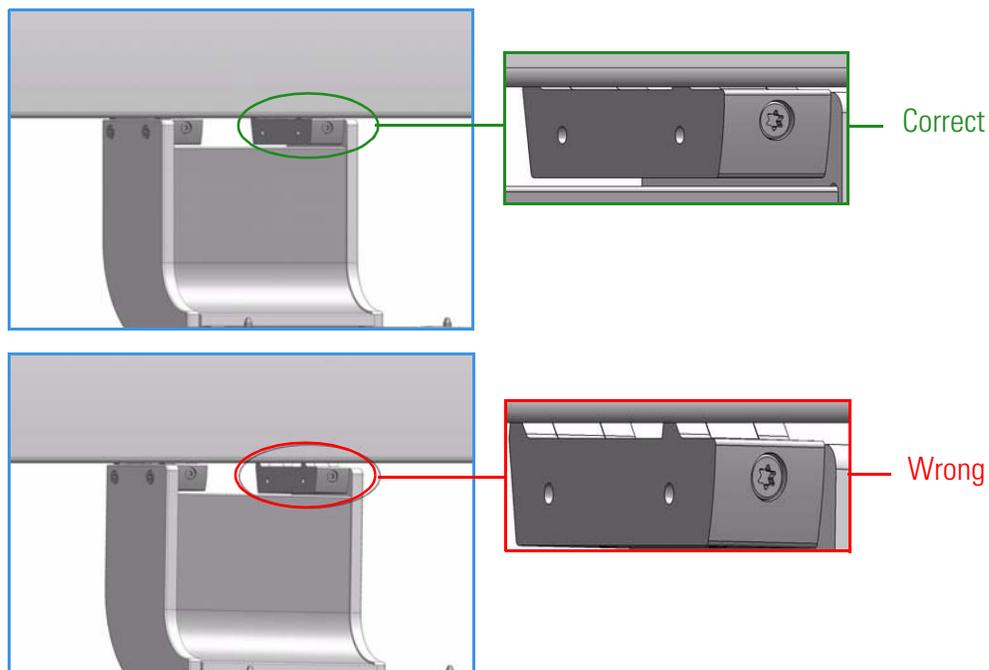
It is suggested to install the modules on the X-axis in the position more suitable, paying attention not to invade the injection zone. The installed components shall not prevent the Z-axis movements.

❖ To Anchor the modules to the X-axis

The module to be anchored has one or two clamps. In the second case, they must be alternately and progressively hooked. The hooking sequence is as follows:

1. Slightly tilt the component downwards in a way that the back hook of the clamp, present on the top, enter the proper grooves.
2. Straighten the component so that also the front hook of the clamp enters the proper slot parallel to the previous one.
3. Slightly push the component backwards in a way that the clamp hooks result perfectly anchored. See [Figure 4](#).

Figure 4. Correct and Wrong Hooking of Module Mounting clamps



4. Tighten the fixing screw located behind the clamp.

For installing each single module refer to the following sections:

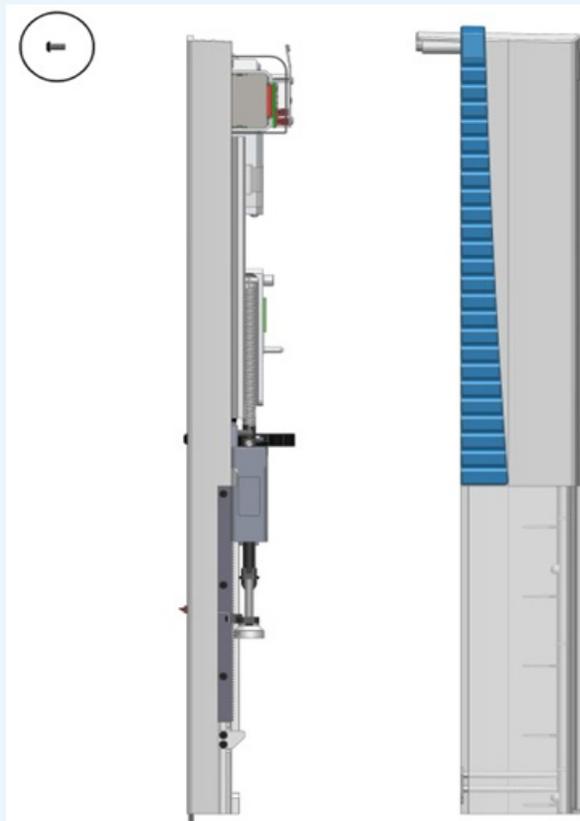
- “Installing the TriPlus 100 Liquid Sampler Head” on page 22
- “Installing the Handheld Controller and Safety Guard” on page 26
- “Installing the Wash Stations” on page 29
- “Installing the Standard Wash Station” on page 29
- “Installing the Large Wash Station” on page 31
- “Installing the Solvents Station” on page 32
- “Installing the Fast Wash Station” on page 33
- “Installing a Tray Holder” on page 35
- “Installing an Agitator” on page 36
- “Installing a Vortexer” on page 37
- “Installing a Barcode Reader” on page 39
- “Installing a Liquid Cooled Tray Holder” on page 40
- “Installing a Temperature Controlled Drawer” on page 41
- “Inserting/Removing a Syringe into the Syringe Adapter” on page 43

2 Installation of the TriPlus 100 Liquid Sampler

Installing the TriPlus 100 Liquid Sampler Head

Installing the TriPlus 100 Liquid Sampler Head

Note Installation of the Head of the TriPlus 100 Liquid Sampler (Z-axis) must be done carefully. When installing it for the first time, have someone hold it in place while the mounting screw is inserted.



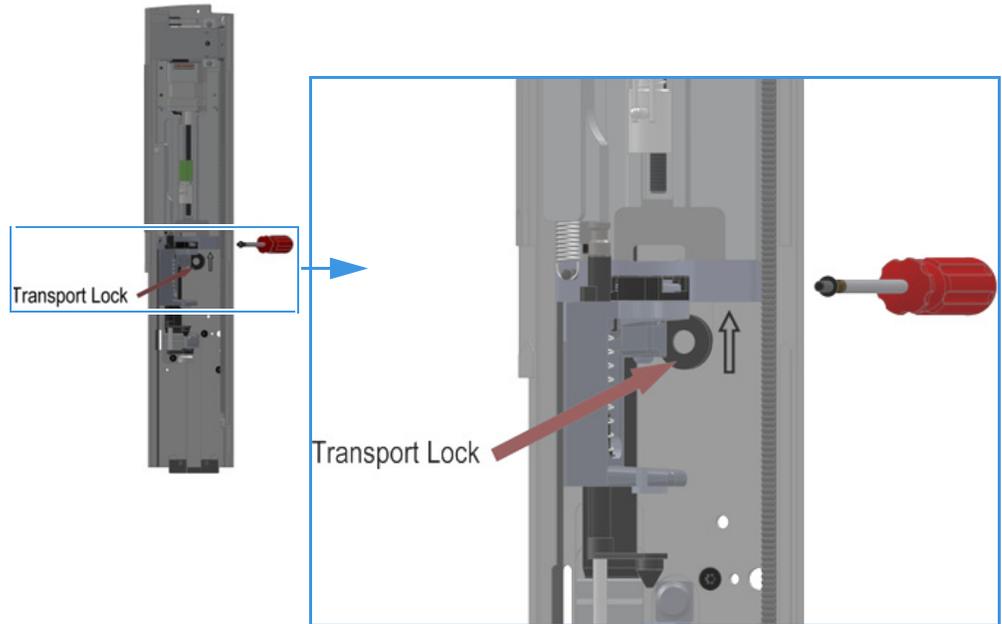
IMPORTANT The head is secured with a **Transport Locking Device** in order to prevent uncontrolled movement of the slider along the Z-Axis during the shipping. The locking device must be removed before installing the head to the base.

The Head is shipped disassembled. The cover is separated from the mechanical part.

❖ To install the TriPlus 100 Liquid Sampler head

1. Locate the **Transport Locking Device** screw. Using a Torx T20 screwdriver remove the screw and the polymer spacer. See [Figure 5](#).

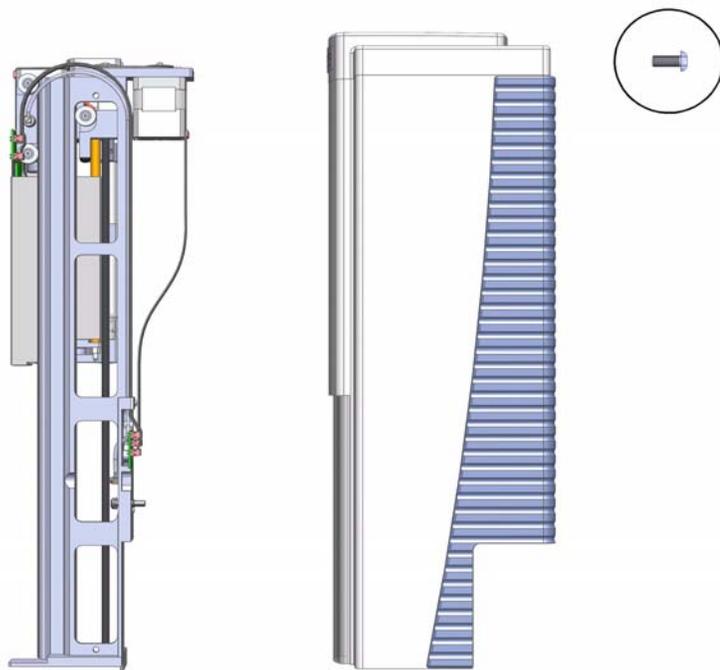
Figure 5. Transport Locking Device



Save the Transport Locking Device for future use. If for any reason the head unit has to be returned for inspection or repair, the Transport Locking Device must be reinstalled prior to shipping.

2. Locate the Torx mounting screw as shown in [Figure 6](#).

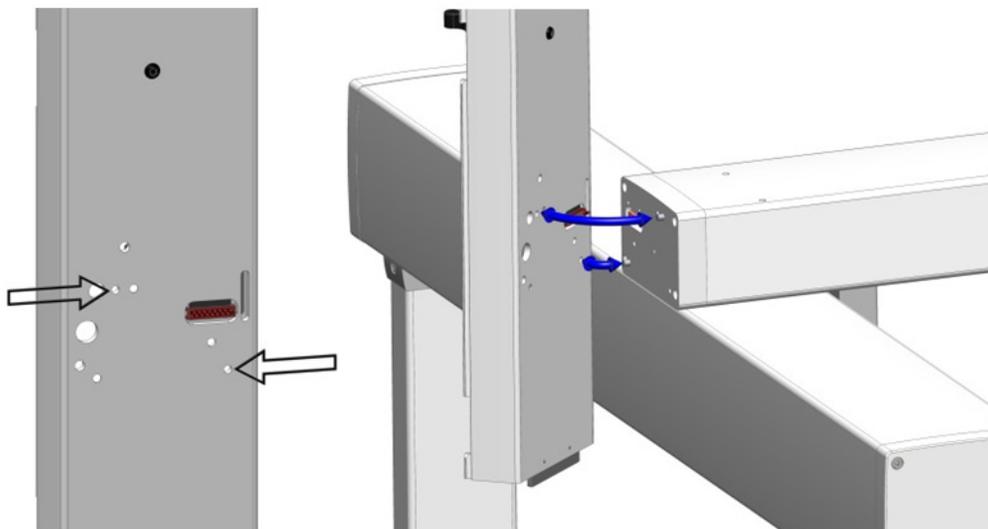
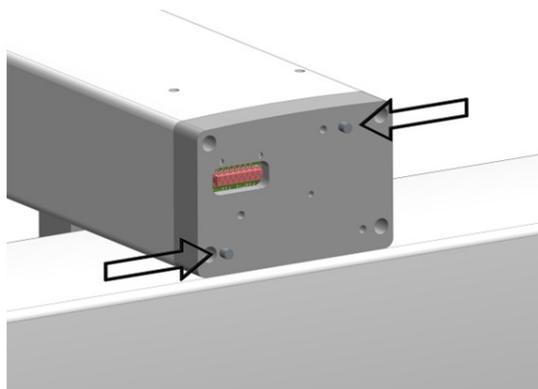
Figure 6. TriPlus 100 Liquid Sampler Head: Internal Mechanic Part and Cover



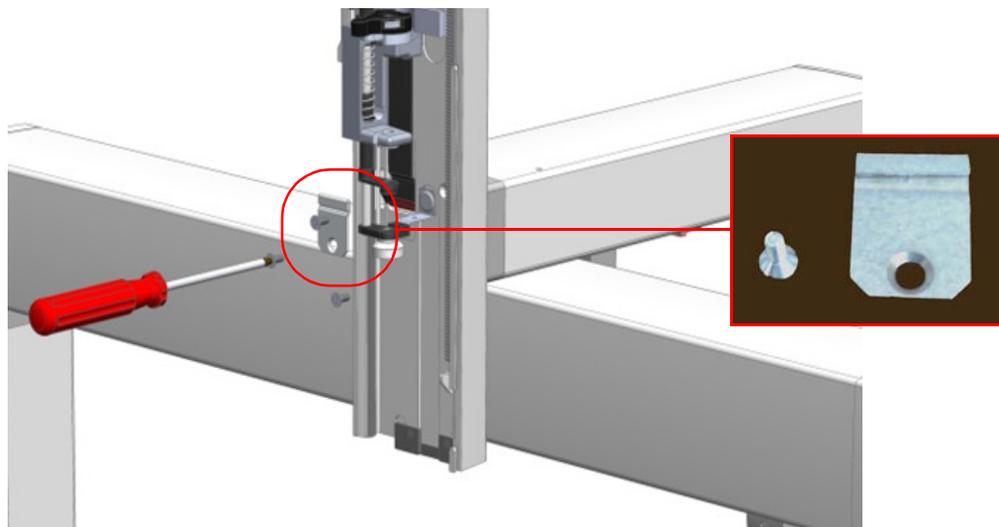
2 Installation of the TriPlus 100 Liquid Sampler

Installing the TriPlus 100 Liquid Sampler Head

3. Hold the Head in place against the Y-axis. Make sure the two locating pins on the Y-axis fit into the two guide pin holes on the Head.



4. Place the provided Torx mounting screw into the hole from the front and securely tighten the screw by using the T25 Torx screwdriver provided.



Note The Ribbon Cable within the Head is already assembled and fixed. No installation of this part is necessary.



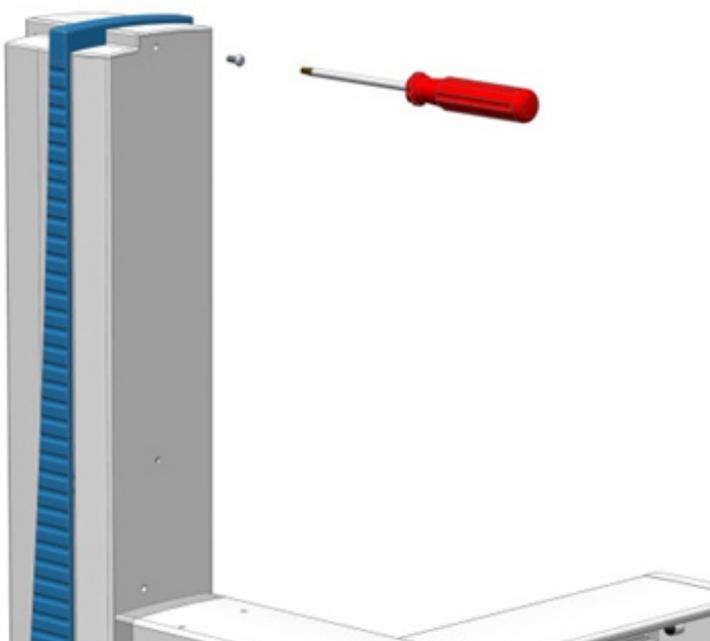
5. Locate the cover of the Head and put it over the mechanical construction of the Head. The cover is positioned such that the latching devices of the cover are positioned in the cut-outs of the Head frame. Push the cover downwards, parallel to the frame to engage the latches.



6. Tighten the screw at the backside of the cover to fix it to its mechanical part.

2 Installation of the TriPlus 100 Liquid Sampler

Installing the Handheld Controller and Safety Guard

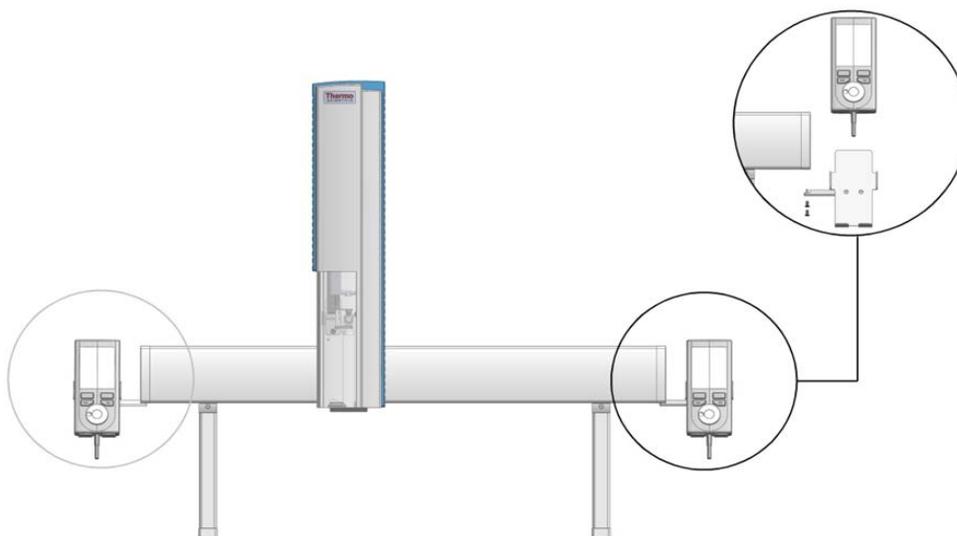


Installing the Handheld Controller and Safety Guard

The Handheld Controller is an optional module for the TriPlus 100 Liquid Sampler system. If it is not part of the system configuration ordered, the TriPlus 100 Liquid Sampler system can be controlled with the Virtual Handheld Controller software.

Note If the Handheld Controller is part of the configuration, it is advisable to install first all the other modules which are connectable to the X-axis. The Safety Guard can be installed at the end when everything else has been tested and completed.

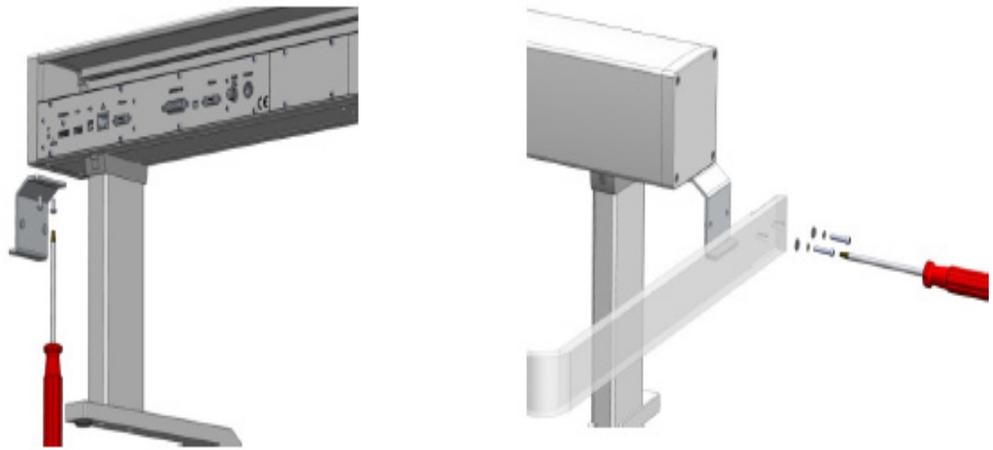
Figure 7. Handheld Controller Installation



❖ **To install the safety guard and the handler controller**

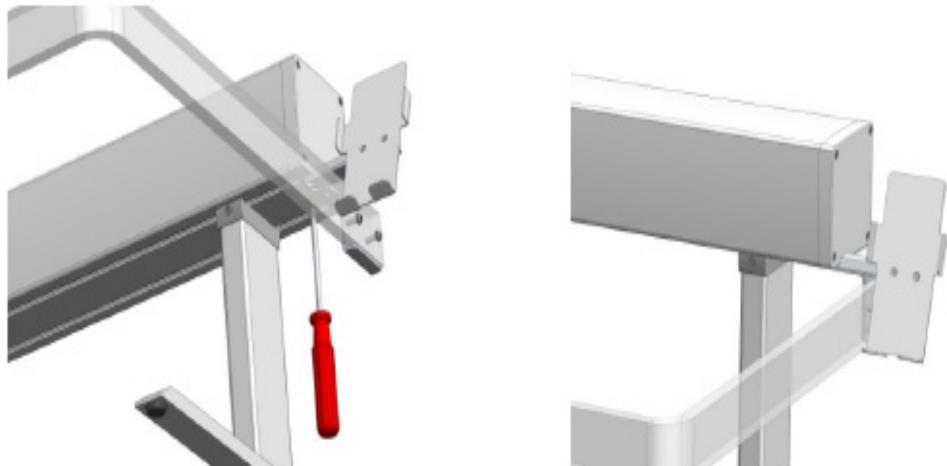
1. Install the Safety Guard brackets on the left and right side to the of the X-axis. The brackets are installed underneath the Side Cover of the X-axis using the two holes at back side. The two front holes are reserved for the Handheld Controller mounting bracket. Do not completely tighten the screw to allow enough play to connect the Safety Guard. See [Figure 8](#).

Figure 8. Safety Guard Installation



2. Connect the Safety Guard to the brackets by using the screws provided. Keep the Safety Guard in a square position and alternately tighten the screws from the brackets, and the guard on either side.
3. Install the Handheld Controller mounting bracket on either the right or left side of the X-axis. See [Figure 9](#).

Figure 9. Handheld Control Bracket Installation

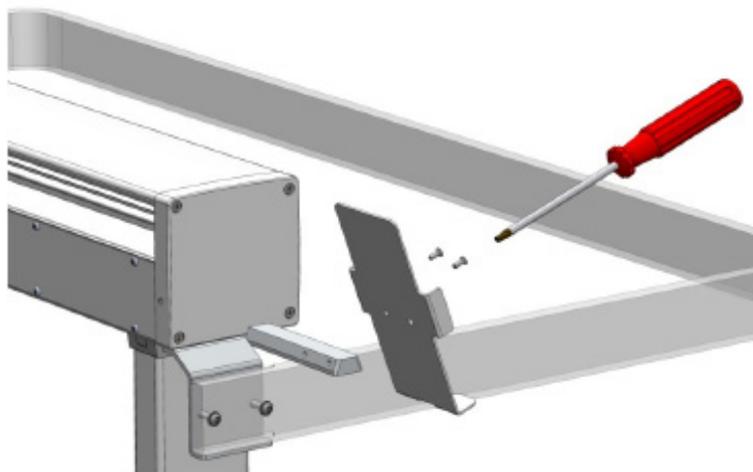


2 Installation of the TriPlus 100 Liquid Sampler

Installing the Handheld Controller and Safety Guard

By default, the Handheld Controller bracket is assembled for the right hand installation. If the bracket is installed on the left hand side, remove the bracket from the holder, reverse it, and install it to the backside of the holder. See [Figure 10](#).

Figure 10. Reversing Handheld Controller Bracket for Left Side Installation



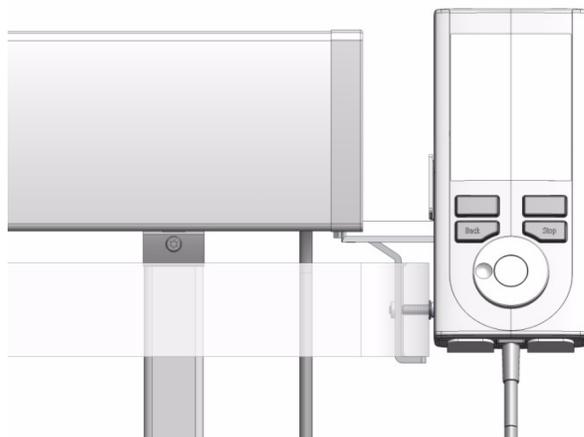
4. Connect the Handheld Controller cable to the connector marked **Handheld Controller** of the Control Interface on the back of the X-axis. See [Figure 11](#).

Figure 11. Handheld Controller Connection



5. Place the Handheld Controller onto its mounting bracket. See [Figure 12](#).

Figure 12. Handheld Controller Position



Installing the Wash Stations

The TriPlus 100 Liquid Sampler system can be equipped with four different types of Wash Stations: **Standard**, **Large Volume**, **Solvents**, and **Fast**. See the following sections:

- “Installing the Standard Wash Station” on [page 29](#)
- “Installing the Large Wash Station” on [page 31](#)
- “Installing the Solvents Station” on [page 32](#)
- “Installing the Fast Wash Station” on [page 33](#)



WARNING Observe the safety measures if a Waste Line is installed in combination with a GC. Do not position the entire Wash Station above a heated zones. Pay special attention to the guidance of the Waste Line. For GC, often highly flammable wash solvents are used (organic solvents, such as, for example: hexane, acetone, esters, and so on).

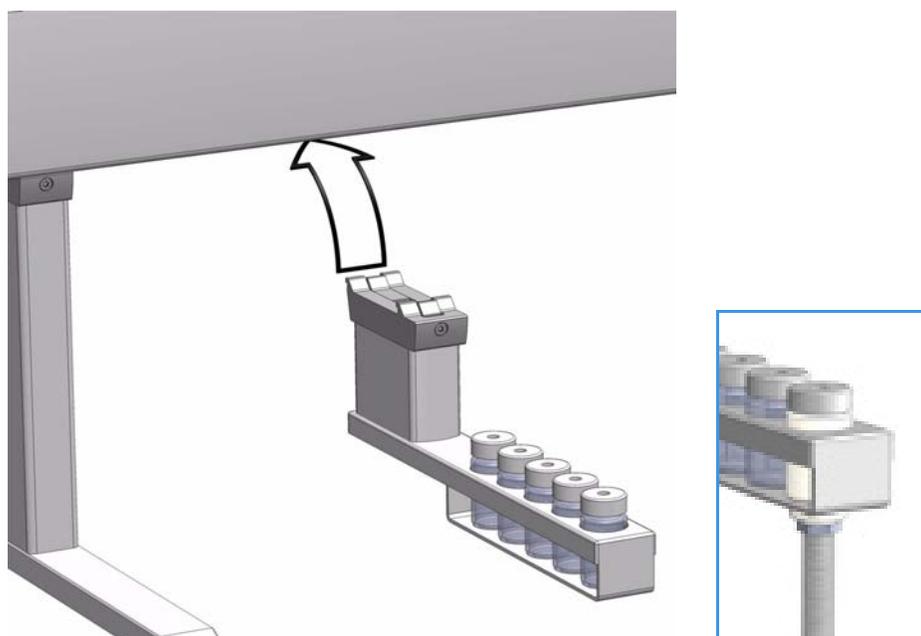
Installing the Standard Wash Station

❖ To install the standard wash station

1. Use the T20 Torxhead screwdriver to loosen the screw from the Wash Station mounting clamp.
2. Hook the Standard Wash Station assembly to the X-axis.

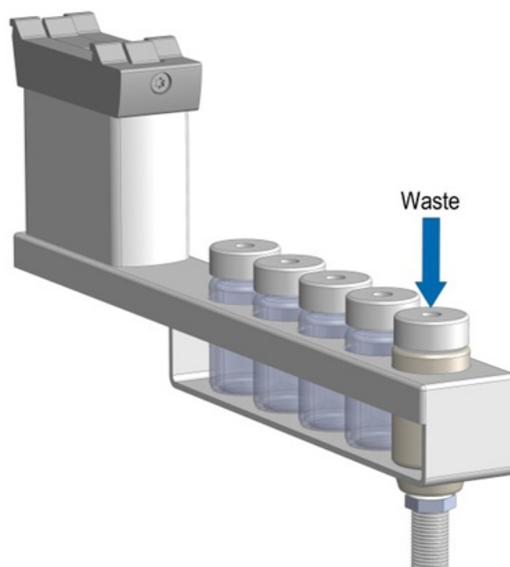
2 Installation of the TriPlus 100 Liquid Sampler

Installing the Wash Stations



3. Tighten the mounting screw.
4. Convert the Standard Wash Station with the Drainage Adapter.
 - a. Remove the Waste Vial in position 5.
 - b. Insert the Drainage Adapter.

The drainage adapter resembles a vial, and the material is PVDF (Polyvinylidene fluoride). The same polymer cap (with septum inserted), used for the Wash vials, can be used for this adapter. The drainage adapter has a stainless steel nipple connected to the bottom. A waste tubing has to be connected.

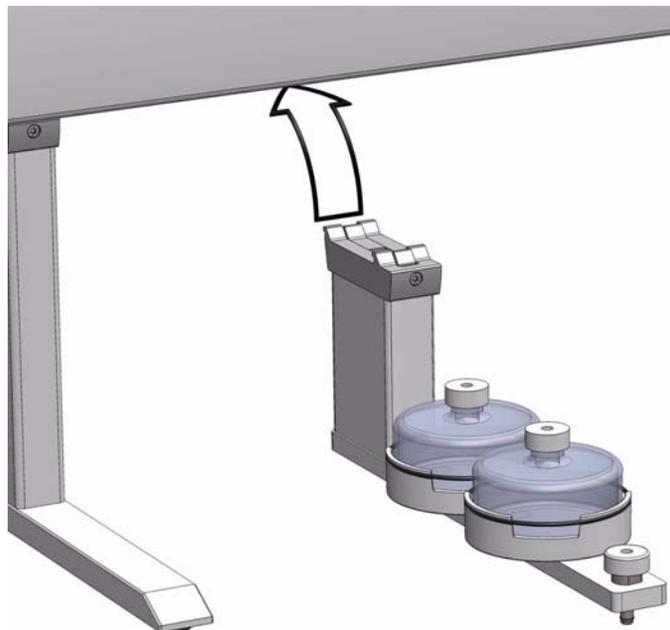


Installing the Large Wash Station

❖ To install the large wash station

1. Use the T20 Torxhead screwdriver to loosen the screw from the Wash Station mounting clamp.
2. Hook the Large Wash Station assembly to the X-axis.

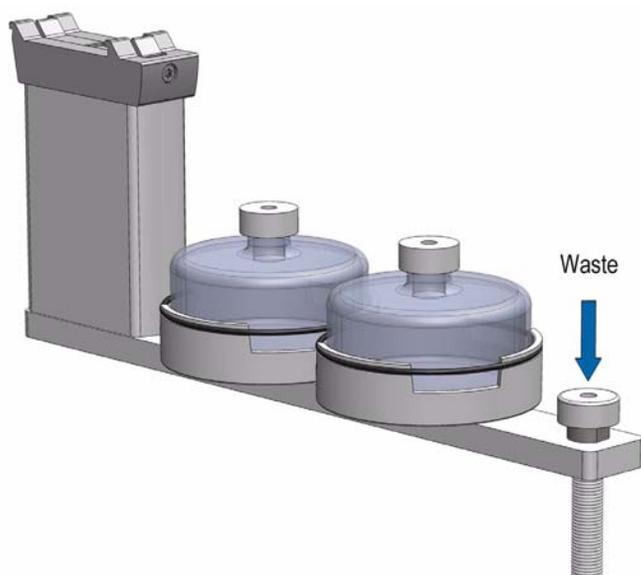
Figure 13. Large Wash Station



3. Tighten the mounting screw.
4. Place the solvent reservoir bottles onto their holders.
5. Connect one end of the supplied polyethylene waste tubing to the Waste port. Place the other end of the tubing into the waste reservoir (not supplied). Stretch the PE tubing to make sure that no used wash solvent is trapped before the Waste reservoir.

2 Installation of the TriPlus 100 Liquid Sampler

Installing the Wash Stations



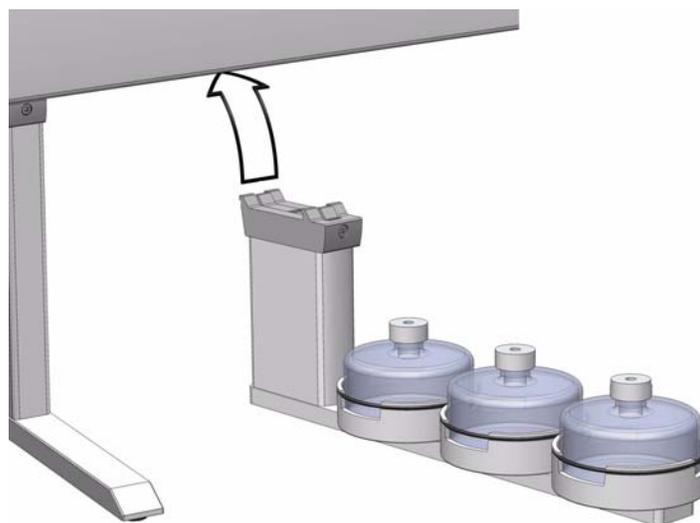
WARNING The Waste reservoir **MUST** be placed in a lower position than the Large Wash Station assembly. Make sure that the waste liquid flows into the container without restriction. For safety reasons, place the waste container into a collection pan.

Installing the Solvents Station

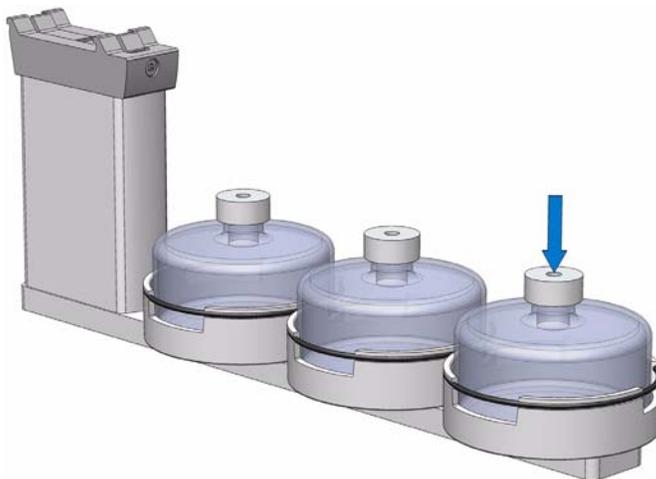
❖ To install the solvents station

1. Use the T20 Torxhead screwdriver to loosen the screw from the Wash Station mounting clamp.
2. Hook the Solvents Station assembly to the X-axis.

Figure 14. Solvent Station



3. Tighten the mounting screw.
4. Place the solvent reservoir bottles onto their holders.



WARNING The Waste reservoir **MUST** be placed in a lower position than the Solvents Station assembly. Make sure that the waste liquid flows into the container without restriction. For safety reasons, place the waste container into a collection pan.

Installing the Fast Wash Station

The Fast Wash Station is shipped in a box separate from the system. The box also includes the Solvent Reservoir Kit (two 1000 mL glass bottles, and a Tubing Kit).

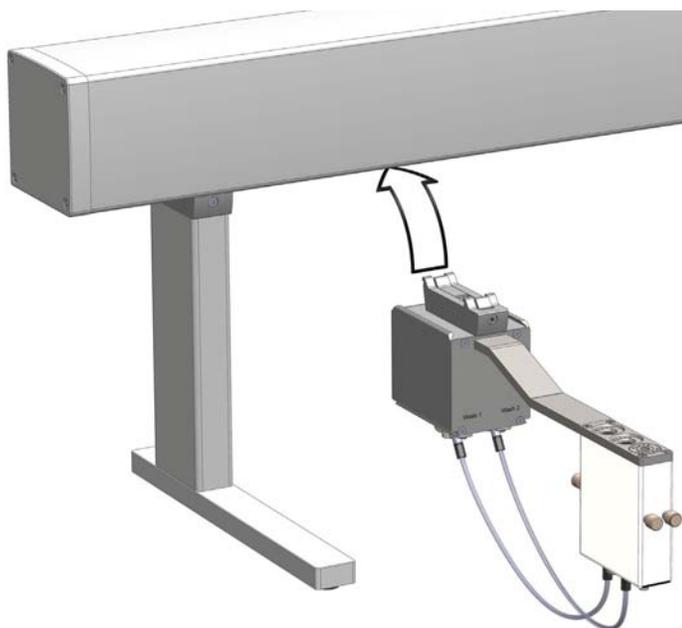


CAUTION Do not place the station and specifically the waste line above a heated zone. Tightly secure the waste line using a cable binder or similar item.

❖ To install the fast wash station

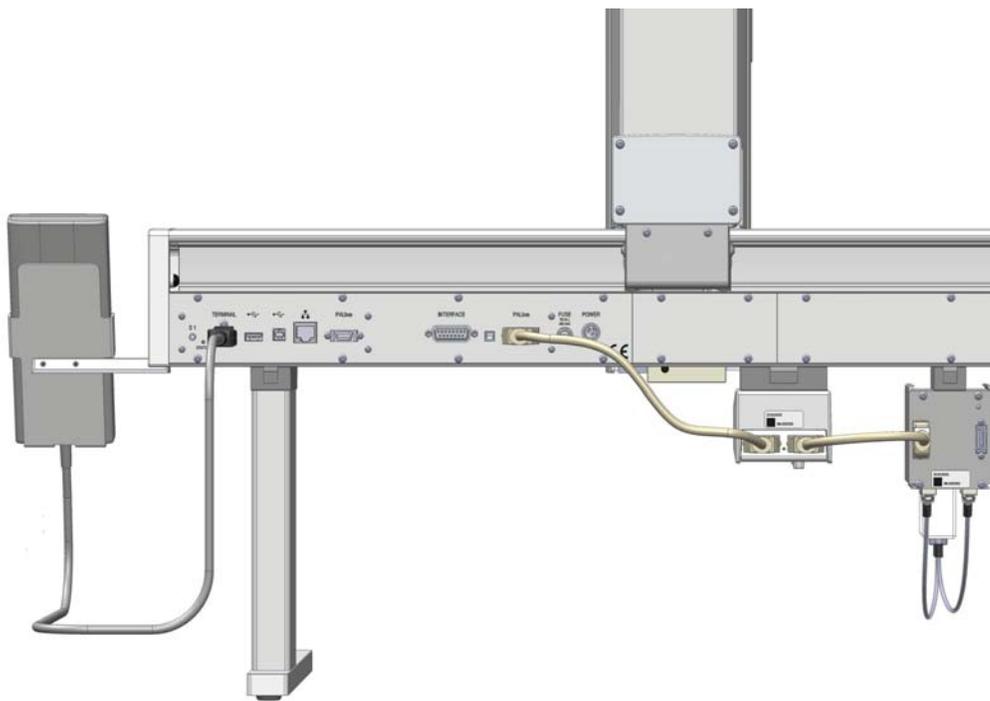
1. Connect the solvent lines from the **Solvent Reservoir Kit** to the Inlet connectors of the micro pump.
2. Loosen the two Torx screw on the mounting bracket for the module.
3. Hook the Fast Wash Station assembly to the X-axis.
4. Be sure that the clamp fits completely into the grooves. Alternately tighten the two Torx screws until the mounting clamp is firmly in place.
5. Double check whether the Fast Wash Station clamp is correctly attached to the X-Axis.

Figure 15. Fast Wash Station



6. Connect the supplied control cable from the connector on the back side of the Fast Wash Station to the Control Interface connector marked **BUS**. If BUS connector is already occupied, connect the cable to another Active module with an open connector. For details see [Figure 16](#).

Figure 16. Fast Wash Station Connections

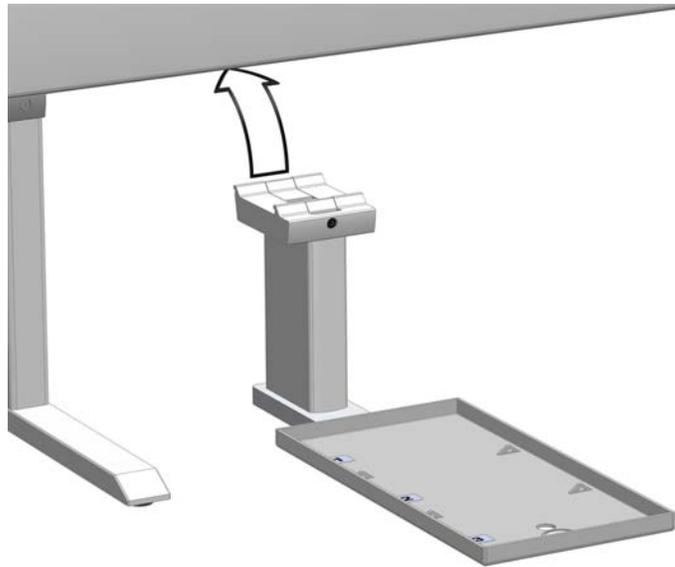


Installing a Tray Holder

❖ **To install the tray holder**

1. Use the T20 Torxhead screwdriver to loosen the Torx screw on the mounting clamp.
2. Install the Tray Holder with the mounting clamp teeth fitting into the grooves on the bottom of the X-axis.

Figure 17. Tray Holder Installation



3. Tighten the Torx screw until the mounting clamp is firmly in place.
4. Check if the clamp is correctly hooked to the X-axis.



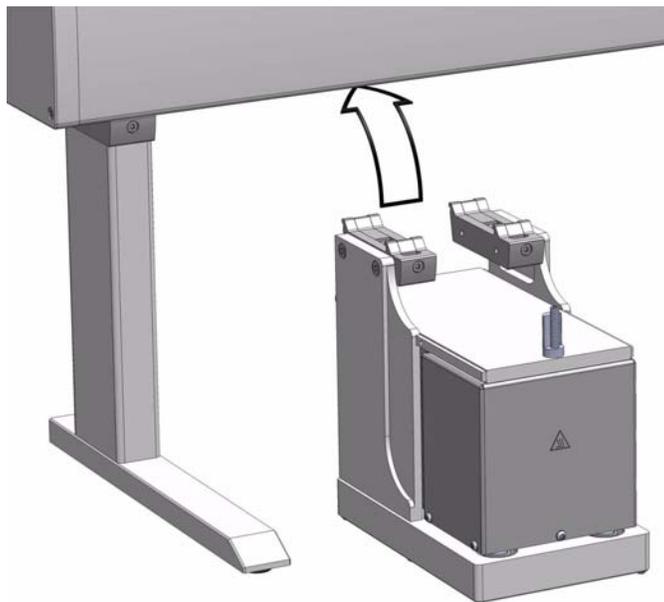
CAUTION A passive Tray Holder module can adapt Racks made for different vial sizes. When the different racks are used, consider the different vial heights and ensure that the Stack Drawer Magnet, attached to the lower needle guide, does not catch on the front row of vials from the rack behind.

Installing an Agitator

❖ **To install the agitator**

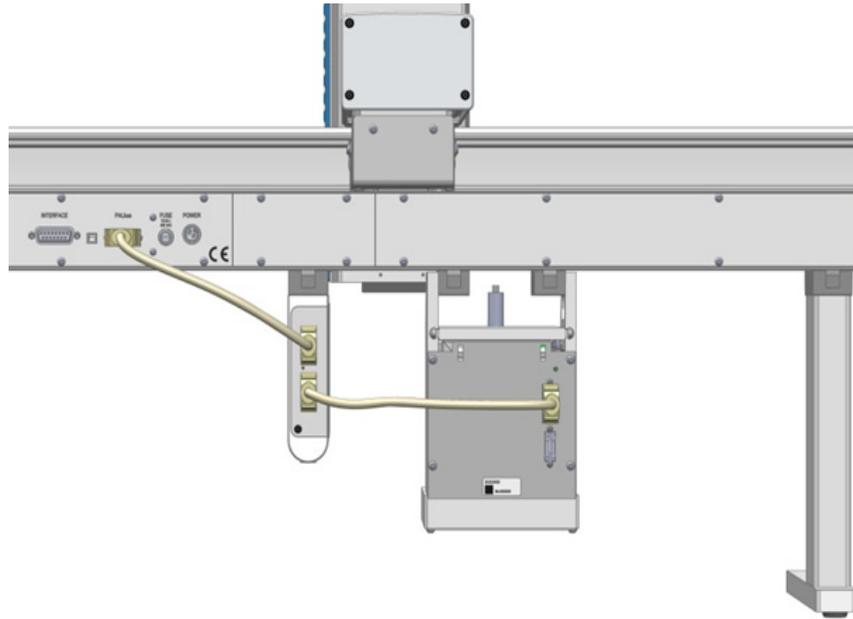
1. Loosen the two Torx screws on the two Agitator mounting clamps.

Figure 18. Installing the Agitator



2. Be sure that the clamps fit completely into the grooves. Alternately tighten the two Torx screws until the two mounting clamps are firmly in place.
3. Double check if the Agitator clamps are correctly hooked to the X-axis.
4. Connect the supplied control cable (daisy chain cable) from the connector on the back side of the Agitator to the Control Interface connector marked **BUS**.
If BUS connector is already occupied, connect the cable to another Active module with an open connector. For details see [Figure 19](#).

Figure 19. Agitator Electrical Connections

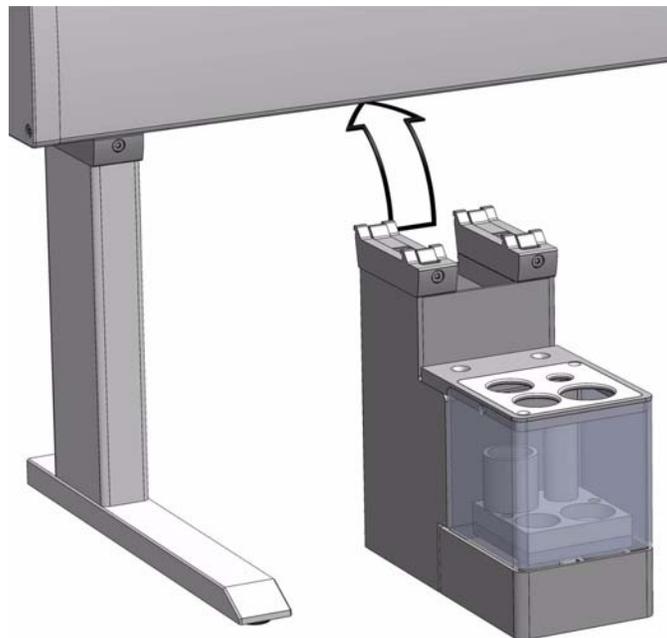


Installing a Vortexer

❖ **To install the vortexer**

1. Loosen the two Torx screws on the two Vortex Mixer mounting clamps.

Figure 20. Installing a Vortexer Module

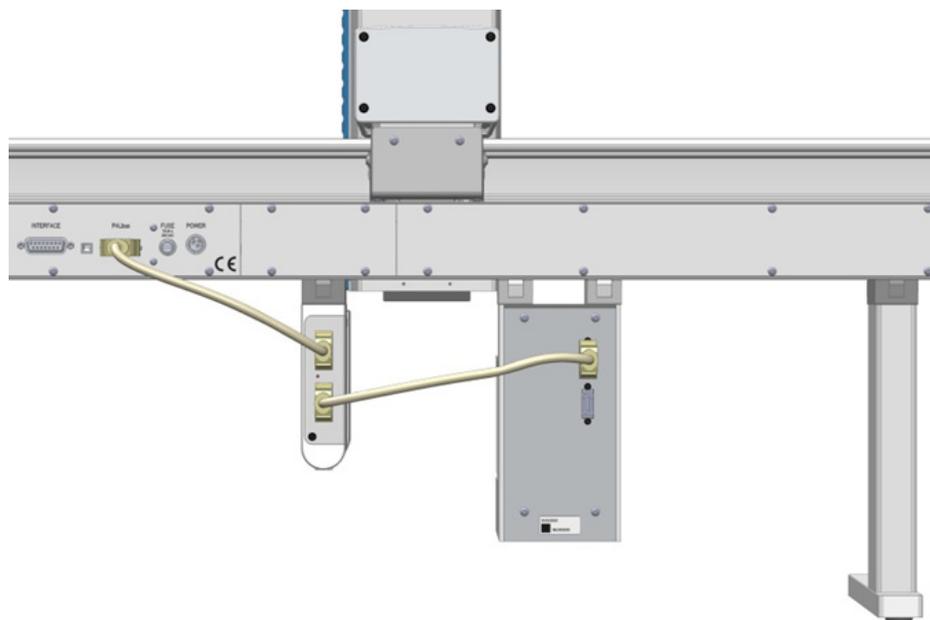


2 Installation of the TriPlus 100 Liquid Sampler

Installing a Vortexer

2. Be sure that the clamps fit completely into the grooves. Alternately tighten the two Torx screws until the two mounting clamps are firmly in place.
3. Double check if the Vortexer clamps are correctly hooked to the X-axis.
4. Connect the supplied control cable (daisy chain cable) from the connector on the back side of the module to the Control Interface connector marked **BUS**. If BUS connector is already occupied, connect the cable to another Active module with an open connector. For details see the [Figure 21](#).

Figure 21. Vortexer Electrical Connections

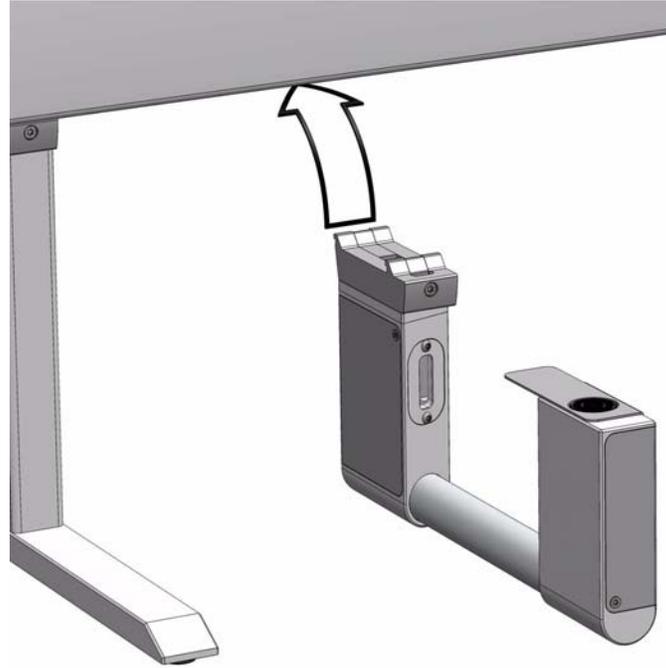


Installing a Barcode Reader

❖ **To install the barcode reader**

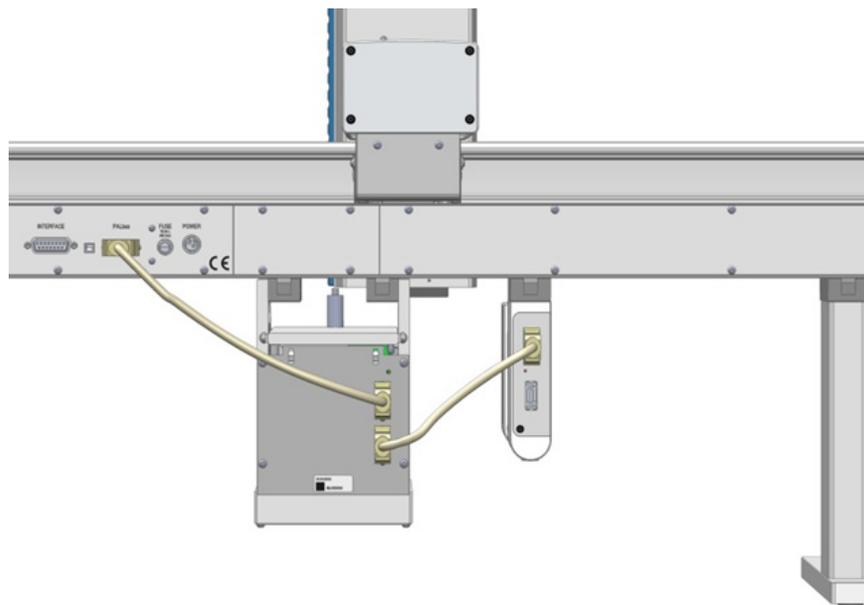
1. Loosen the two Torx screws on the two Barcode Reader mounting clamps.

Figure 22. Installing the Barcode Reader



2. Be sure that the clamps fit completely into the grooves. Alternately, tighten the two Torx screws until the two mounting clamps are firmly in place,
3. Double check if the Barcode Reader clamps are correctly hooked to the X-axis.
4. Connect the supplied control cable (daisy chain cable) from the connector on the back side of the Barcode Reader module to the Control Interface connector marked **BUS**. If BUS connector is already occupied, connect the cable to another Active module with an open connector. For details see [Figure 23](#).

Figure 23. Barcode Reader Electrical Connections

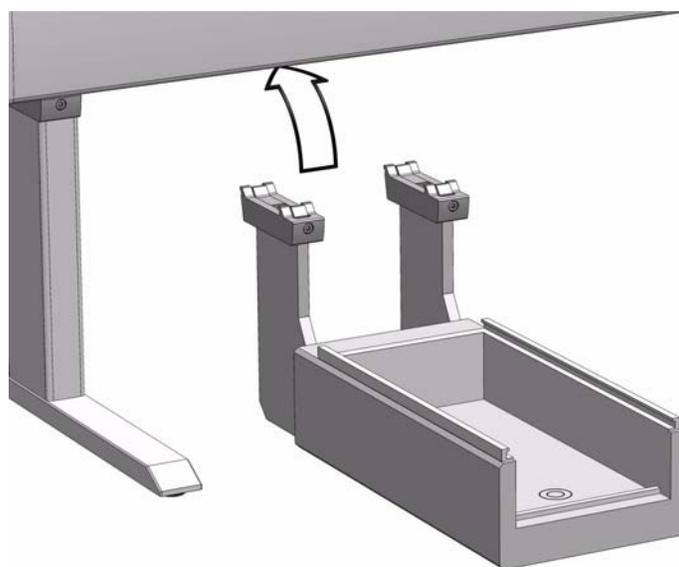


Installing a Liquid Cooled Tray Holder

❖ **To install the liquid cooled Tray holder**

1. Loosen the two Torx screws on the two module mounting clamps.

Figure 24. Installing the Liquid Cooled Tray Holder Module



2. Be sure that the clamps fit completely into the grooves. Alternately tighten the two Torx screws until the two mounting clamps are firmly in place;

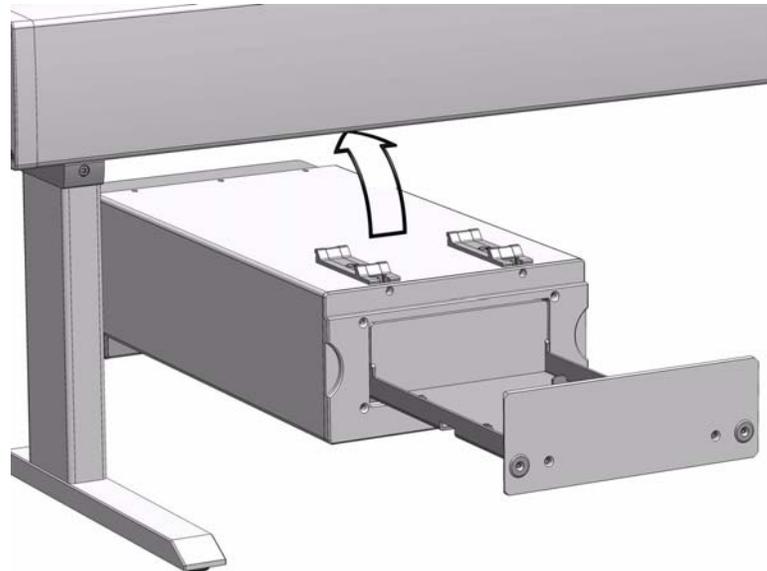
3. Double check if the Liquid Cooled Tray Holder clamps are correctly hooked to the X-axis.
4. Connect the hoses from the liquid circulation bath, tighten securely using pipe clamp.
5. Select the liquid medium for temperature control according to the application requirements.
6. Ensure the quality of the hose, connections and consider the compatibility with the liquid medium being circulated. Avoid any leaks or spill to prevent physical injury caused by the coolant or possible fire.

Installing a Temperature Controlled Drawer

❖ To install the temperature controlled drawer

1. Loosen the two Torx screws on the two module mounting clamps.

Figure 25. Installing the Temperature Controlled Drawer

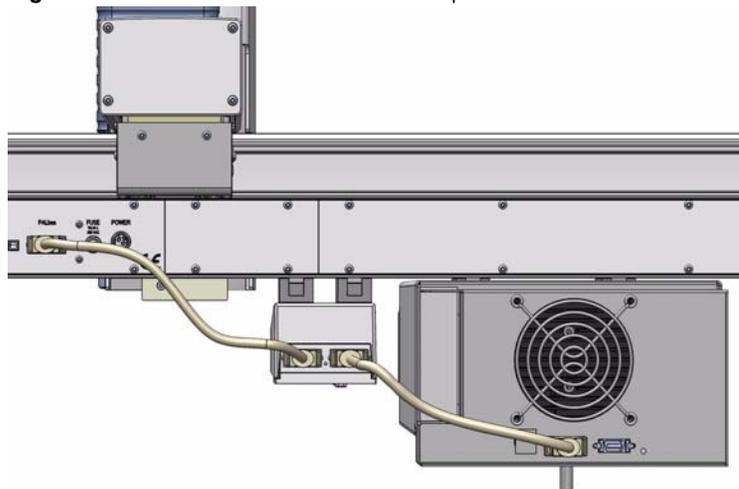


2. Be sure that the clamps fit completely into the grooves. Alternately tighten the two Torx screws until the two mounting clamps are firmly in place.
3. Double check if the Temperature Controlled Drawer clamps are correctly hooked to the X-axis
4. Power off the TriPlus 100 Liquid Sampler system before making any electrical connections.
5. Connect the supplied control cable (daisy chain cable) from the connector on the back side of the module to the Control Interface connector marked **BUS**. If BUS connector is already occupied, connect the cable to another Active module with an open connector. For details see [Figure 26](#).

2 Installation of the TriPlus 100 Liquid Sampler

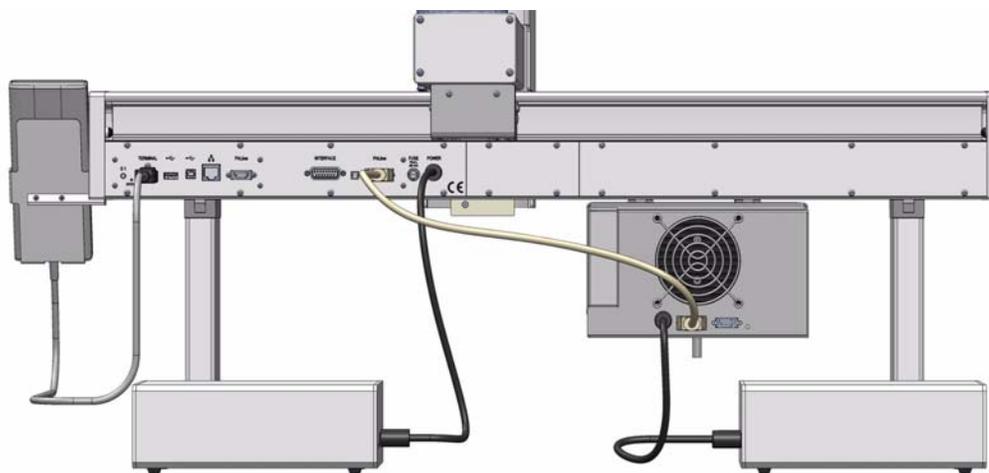
Installing a Temperature Controlled Drawer

Figure 26. Electrical Connections of Temperature Controlled Drawer



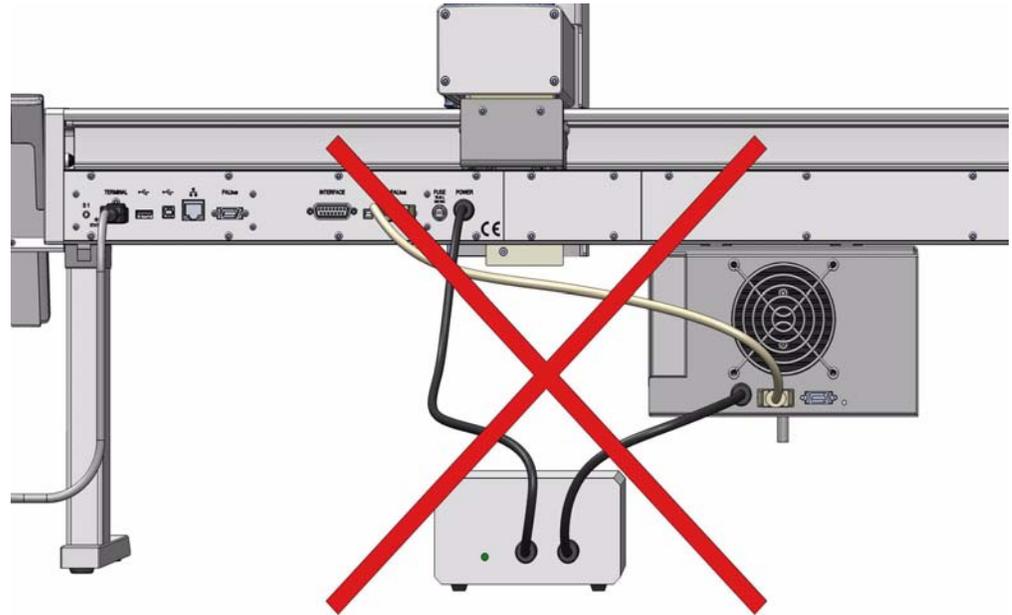
6. Connect the cable provided to the connector **OUT** of the Power Module (Power Supply) marked **TriPlus 100 Liquid Sampler**.
7. Connect the other side of the cable to the Temperature Controlled Drawer at the back of the module.

Figure 27. Correct Electrical Connections to Two Power Supply Module



WARNING It is mandatory to use the supplied Power Module to connect the Temperature Controlled Drawer also if the second connector marked **Aux** of the Power Module used for the TriPlus 100 Liquid Sampler system is not occupied. The electrical demands of the entire system are too high to be covered by a single Power Module.

Figure 28. Forbidden Electrical Connection to a SINGLE Power Supply



8. Connect the power cable from the power connector built into the switch to the wall outlet.

Inserting/Removing a Syringe into the Syringe Adapter

This section provides instructions for inserting/removing the syringe into/from the Syringe Adapter.

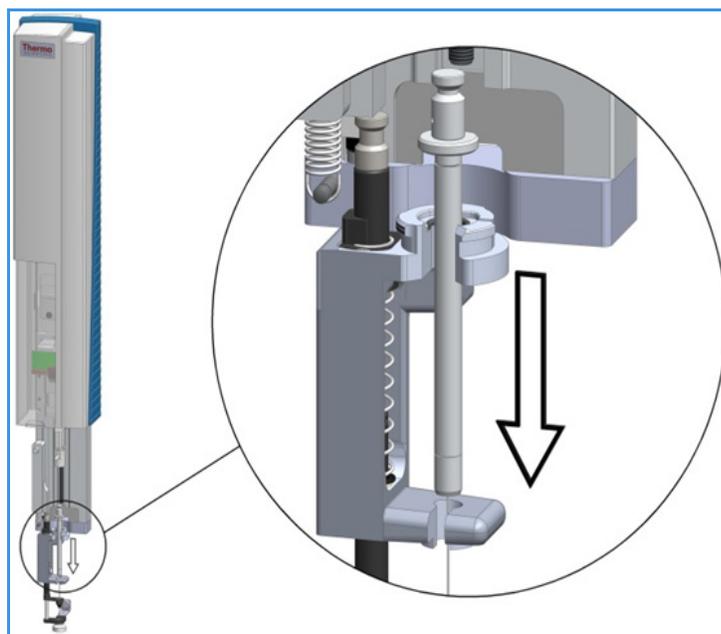
For details see the following procedures:

- “To insert a syringe into the syringe adapter” on page 43
- “To remove a syringe from the syringe adapter” on page 46

❖ To insert a syringe into the syringe adapter

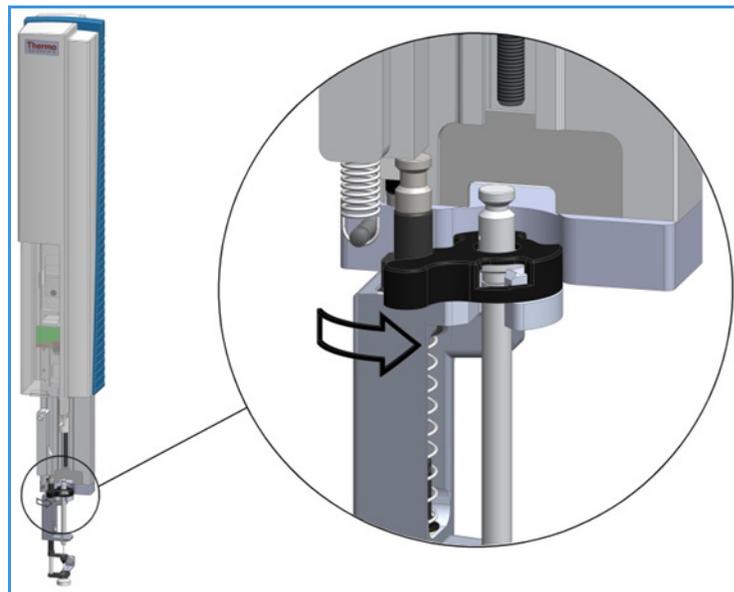
1. Remove the black polymer Bayonet Nut from the Syringe Adapter;
2. Ensure that the Plunger Adapter is moved-up in a comfortable position which allows inserting syringe easily. The ejector of the coupling device should be in front (eject) position. See [Figure 29](#).

Figure 29. Syringe Insertion into the Syringe Adapter



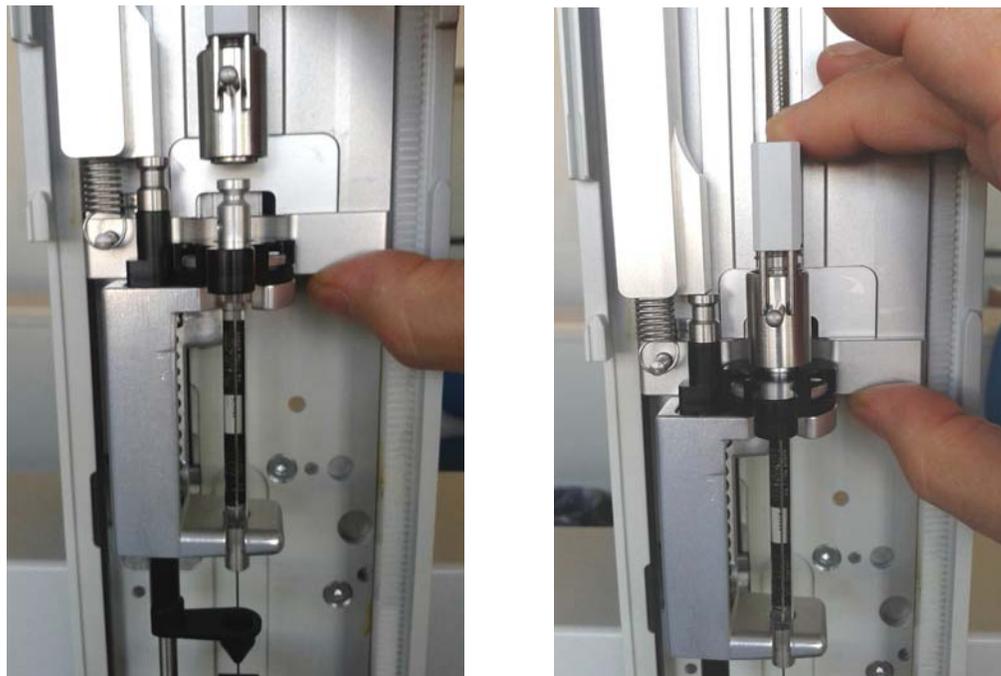
3. Carefully insert the syringe body guiding the needle tip into the upper and the lower needle guide. Press the syringe flange firmly into the tool holder. Press the syringe flange firmly into the tool holder.
4. Put the Bayonet Nut over the syringe plunger and position it in the groove of the upper part of the Syringe Adapter. Tighten the black polymer Bayonet Nut to hold the syringe tight in correct position. See [Figure 30](#).

Figure 30. Tightening the syringe in Position with the Bayonet Nut



5. Lift down the Releasing Holding Pin of the coupling device and let it spring. The Ejector is a spring-loaded ball-bearing device, the releasing kick forces the ejection of the Syringe Plunger Adapter. See [Figure 31](#).

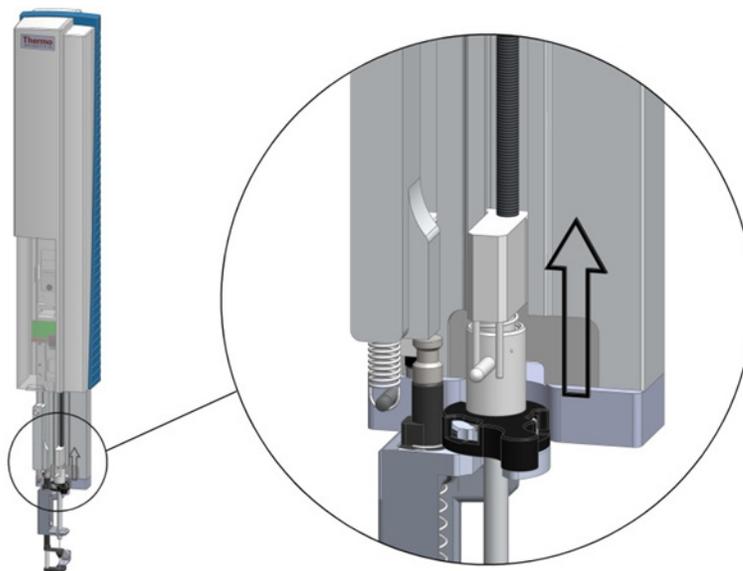
Figure 31. Lift Down the Releasing Holding Pin



❖ **To remove a syringe from the syringe adapter**

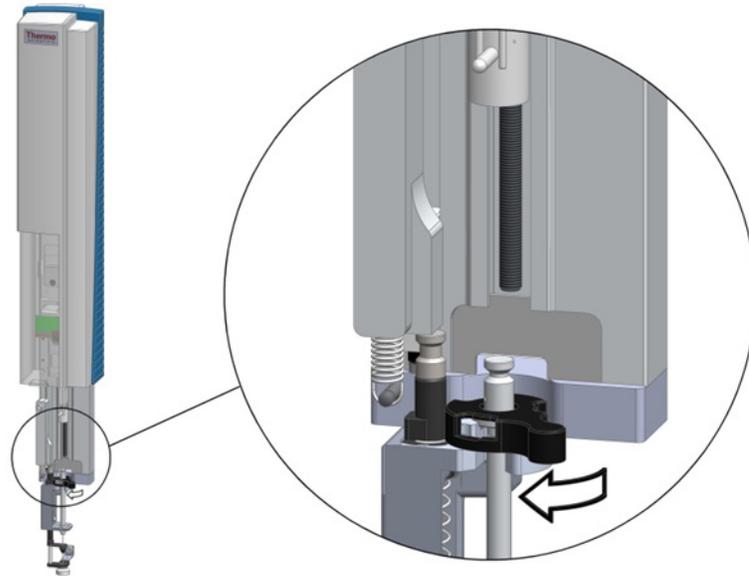
1. Manually move the Plunger Coupling Adapter upwards to get enough space to eject the Syringe Plunger Adapter.
2. Lift up the Releasing Holding Pin of the coupling device and let it spring. The Ejector is a spring-loaded ball-bearing device, the releasing kick forces the ejection of the Syringe Plunger Adapter. See [Figure 32](#).

Figure 32. Moving the Plunger Coupling Device Upwards



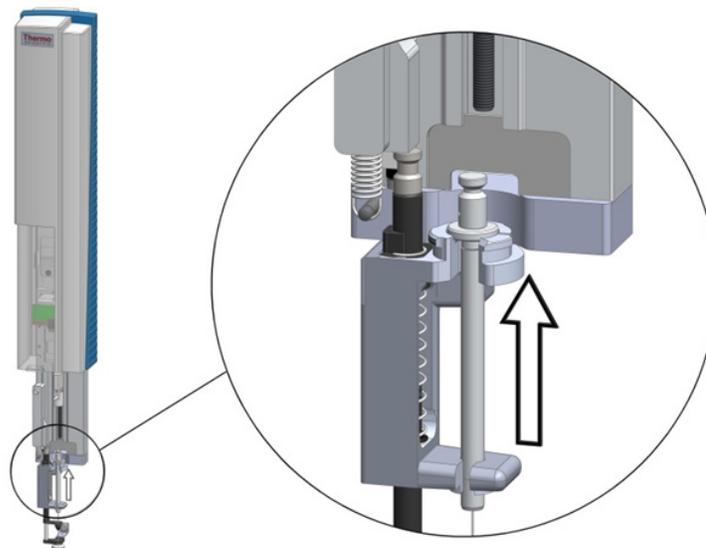
3. Disengage the fixation of the syringe by turning the black polymer Bayonet Nut to the left side. See [Figure 33](#).

Figure 33. Releasing the Fixation of the Syringe



4. Lift up the syringe carefully out of Syringe Adapter. See [Figure 34](#).

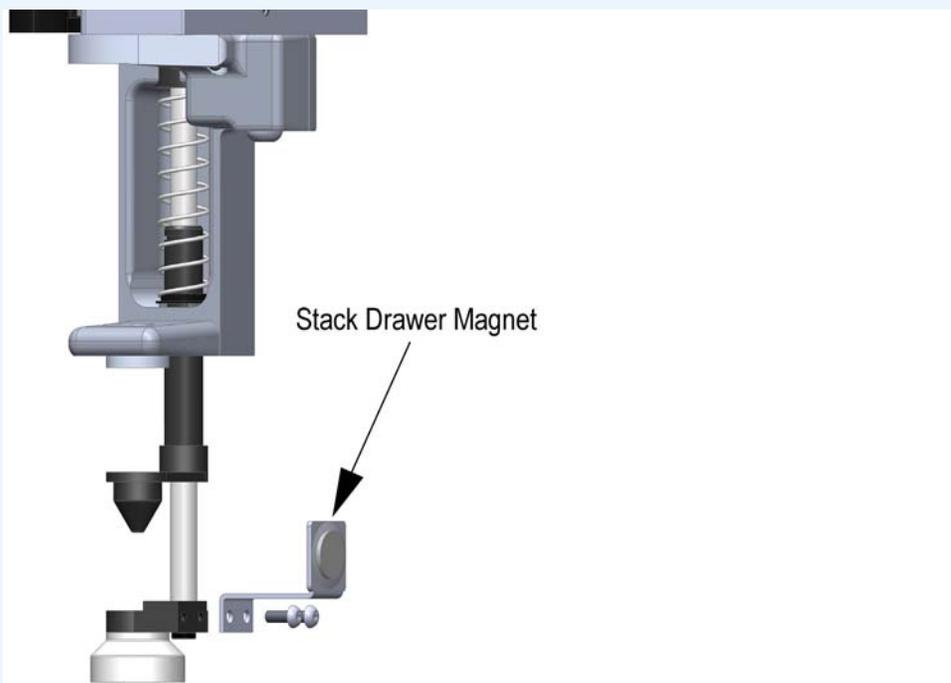
Figure 34. Lifting Syringe from Syringe Adapter



2 Installation of the TriPlus 100 Liquid Sampler

Connecting the Power Module

Note The Syringe Holder is not equipped with the **Stack Drawer Magnet**. If the sampler must operate in combination with the **Temperature Controlled Drawer**, the optional Stack Drawer Magnet is required. The following figure shows how to install the Stack Drawer Magnet on the Syringe Holder.



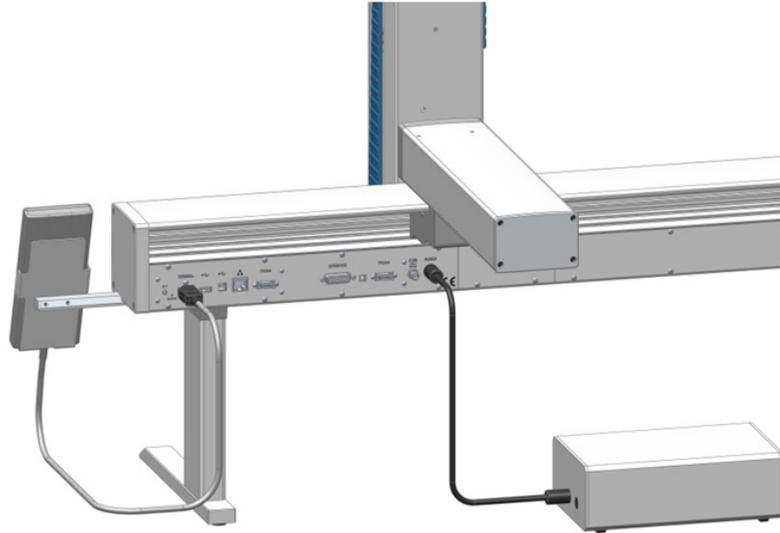
Connecting the Power Module



WARNING Always switch OFF the Power Module of the TriPlus 100 Liquid Sampler system before connecting or disconnecting any accessories cables.

❖ To connect the power module

1. Locate the power supply module.
2. Connect the provided cable to the connector **OUT** of the Power Module.

Figure 35. Power Supply Connection

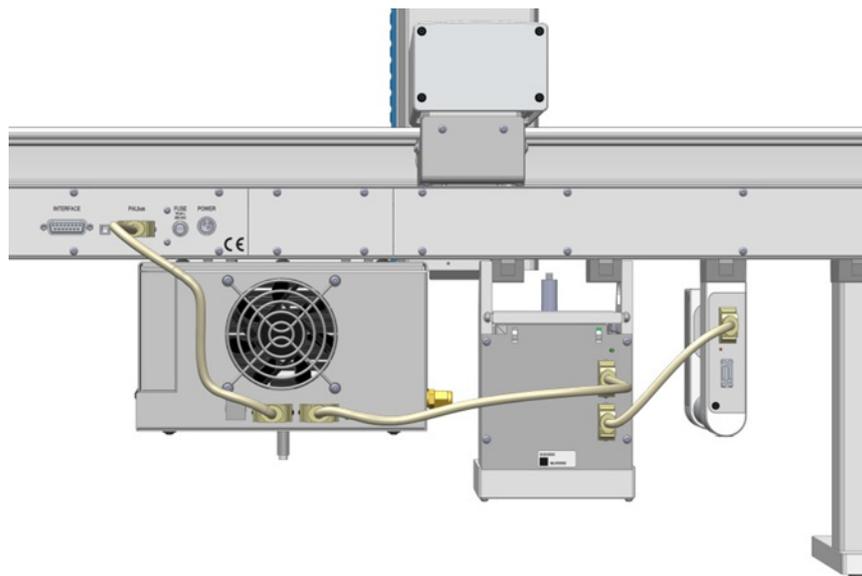
Note The second outlet marked AUX of the Power Module is identical to the outlet of the TriPlus 100 Liquid Sampler system, including connector size and pins, and outlet voltage.

3. Connect the other side of the cable to the connector marked **Power** at the backside of the TriPlus 100 Liquid Sampler system.
4. Connect the power cable from the power connector built into the switch to the wall outlet.
5. Make sure that the cable from Handheld Controller is correctly connected to the control board.
6. Make sure that all the active modules are linked together (daisy chaining) and that the first module is connected to the connector marked **BUS** as shown in [Figure 36](#).

2 Installation of the TriPlus 100 Liquid Sampler

Combining the TriPlus 100 Liquid Sampler to Other Devices

Figure 36. Modules Electrical Connection



Combining the TriPlus 100 Liquid Sampler to Other Devices

Combining the TriPlus 100 Liquid Sampler system with a GC requires synchronization of a Ready-Signal and a relay contact output signal.

This section explains the available input and output signals and the pin allocations of the external connectors.

Synchronization and Output Signals

This section provide information enabling you to copy the default signals and add, for example, a second output signal if required. Synchronization signals are inputs that inform the TriPlus 100 Liquid Sampler system to wait or to proceed with a sample-processing step. Output signals are sent from the TriPlus 100 Liquid Sampler system to the GC, to indicate the status or the completion of the processing steps.

❖ How to Setup the Synchronization Signals

The synchronization signals from the system to the GC must be set step-by step.

1. Assign an **Input** and an **Output** signal, and establish the type of contact required to receive or send a signal. Type of contacts are a TTL (Transistor-Transistor Logic), a relays contact, an Opto-coupler or another type.

The required parameters such as **Pulse Duration** and **Blocking Time** must be added.

2. An output signal is required to send a start signal to the GC. Typically the **Switch Out Signal 1 (SWOut1)** is used for this task.

The assigned signals must be matched with the pin allocation of the synchronization cable. Synchronize the signal parameters with the GC System.

Refer to the section **Input/Output Interface** and to the section **Signal** in the *TriPlus 100 Liquid Sampler User Guide*. The **Ready** signal is usually sent from the GC to the system; a TTL-In signal is used to receive the **Ready** signal. Depending on the GC settings, the signal is set to **active high** or **active low**.

3. Bundle the required **Input Signal** and **Output Signals** for the GC System. The bundle can be configured and tested in the combination of the system, and the other device. The bundling is described in the section **Chromatograph System** in the *TriPlus 100 Liquid Sampler User Guide* as the last step in setting up signals.

For details refer to the section **TriPlus Basic Information** and to the section **Setup Menu Item** in the *TriPlus 100 Liquid Sampler User Guide*.

External Connectors

The external connectors of the control interface are shown in [Figure 37](#):

Figure 37. Control Interface Connectors



The connectors are the follows:

- [Handheld Controller Connector](#)
- [USB Host Connector](#)
- [USB Device/Client Connector](#)
- [Ethernet Connector](#)
- [Bus Connector](#)
- [Interface Connector](#)
- [Fuse Port](#)
- [Power Connector](#)

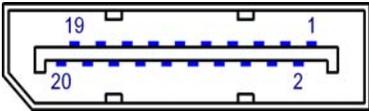
2 Installation of the TriPlus 100 Liquid Sampler

Combining the TriPlus 100 Liquid Sampler to Other Devices

Handheld Controller Connector

The pin-out of the Handheld Controller 20-pin display port connector, marked HANDHELD CONTROLLER is list in [Table 7](#).

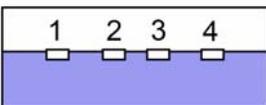
Table 7. Handheld Controller Connector Pin-out

Connector Layout	Pin	Signal Name
	1	TxOut0-
	2	Term_nPresent
	3	TxOut0+
	4	TxOut1-
	5	GND
	6	TxOut1+
	7	TxOut2-
	8	GND
	9	TxOut2+
	10	TxClkOut-
	11	GND
	12	TxClkOut+
	13	+3.3 VDC
	14	GND
	15	+3.3 VDC
	16	GND
	17	Term_RxExt
	18	+3.3 VDC
	19	GND
	20	Not connected

USB Host Connector

The pin-out of the 4-pin USB Type A connector, marked  is list in [Table 8](#).

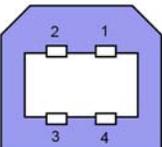
Table 8. USB Host Connector Pin-out

Connector Layout	Pin	Signal Name
	1	+5VDC
	2	Data-
	3	Data+
	4	GND

USB Device/Client Connector

The pin-out of the 4-pin USB Type B connector, marked  is list in [Table 9](#).

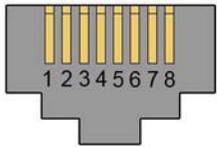
Table 9. USB Device/Client Connector Pin-out

Connector Layout	Pin	Signal Name
	1	VCC
	2	Data-
	3	Data+
	4	GND

Ethernet Connector

The pin-out of the 8-pin RJ45 connector, marked  is list in [Table 10](#). Currently this connector is not active.

Table 10. Ethernet Connector Pin-out

Connector Layout	Pin	Signal Name
	1	TX+
	2	TX-
	3	RX+
	4	NC
	5	NC
	6	RX-
	7	NC
	8	NC

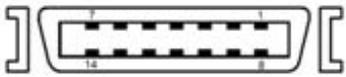
2 Installation of the TriPlus 100 Liquid Sampler

Combining the TriPlus 100 Liquid Sampler to Other Devices

Bus Connector

The pin-out of the Bus 14-pin Mini Delta Ribbon connector, marked BUS is list in [Table 11](#).

Table 11. BUS Connector Pin-out

Connector Layout	Pin	Signal Name
	1	TXD
	2	NC
	3	+36VDC
	4	+36VDC
	5	+36VDC
	6	+36VDC
	7	+36VDC
	8	RXD
	9	nAlarm
	10	GND
	11	GND
	12	GND
	13	GND
	14	GND

Interface Connector

The pin-out of the Interface 15-pin DSUB female connector, marked INTERFACE is list in [Table 12](#).

Table 12. Interface Connector Pin-out (Sheet 1 of 2)

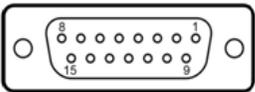
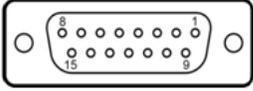
Connector Layout	Pin	Signal Name
	1	TTLOut1
	2	TTLOut3
	3	Relais1A
	4	Relais1B
	5	Relais2B
	6	OptoIn+
	7	TTLIn1
	8	GND

Table 12. Interface Connector Pin-out (Sheet 2 of 2)

Connector Layout	Pin	Signal Name
	9	TTLOut2
	10	GND
	11	TTLIn2
	12	Relais2A
	13	TTLIn3
	14	OptoIn-
	15	+5VDC

Fuse Port

In the control interface a T6.3A; 250 V; 5 x 20 mm fuse is installed.

Power Connector

The pin-out of the 3-pin KYcon KPJX-3S-S connector, marked POWER is list in [Table 13](#).

Table 13. Power Connector Pin-out

Connector Layout	Pin	Signal Name
	1	VCC
	2	Data-
	3	Data+

Establishing Communication with the Computer

This section provides instruction for establishing communication between the TriPlus 100 Liquid Sampler system and the computer.

Connecting the TriPlus 100 Liquid Sampler with Factory Settings

In order to select the required network setup best suited for the your's laboratory setting, the following possibilities are available:

- **Direct connection** — The TriPlus 100 Liquid Sampler system is directly connected to the computer via the LAN cable. There is no corporate network or router connection.
 - IP Address for the TriPlus 100 Liquid Sampler system: 192.168.99.230
 - IP Address for the computer: 192.168.99.210

2 Installation of the TriPlus 100 Liquid Sampler

Establishing Communication with the Computer

- Subnet Mask: 255.255.255.0
- Default Gateway: not required, leave the field empty (if an address is entered, it will not be used)
- **Corporate Network with DHCP Protocol** — Ask the network administrator to verify and integrate the setup within a corporate network. Select the DHCP Protocol, the network assignees an IP Address and a Subnet Mask to the TriPlus 100 Liquid Sampler system.
- **Corporate Network with Fixed IP Address** — Ask the network administrator to provide the IP Address, the Subnet Mask, and the Default Gateway to configure the TriPlus 100 Liquid Sampler system within the corporate network.

To establish communication to the computer, please refer to the following sections:

- [“Setting Up the Direct Connection” on page 56](#)
- [“Setting up the Network Interface” on page 58](#)
- [“Setting up the Network Interface by using the Handheld Controller” on page 58](#)
- [“Restoring Factory Default Network Settings” on page 59](#)
- [“Setting up a Corporate Network” on page 60](#)

Setting Up the Direct Connection



CAUTION The following description assumes that an Ethernet cable is connected directly from the TriPlus 100 Liquid Sampler system to a computer and not integrated within a customer network. If this is the case, consult your System Administrator for support. The same is true as soon as the DHCP Mode is activated.

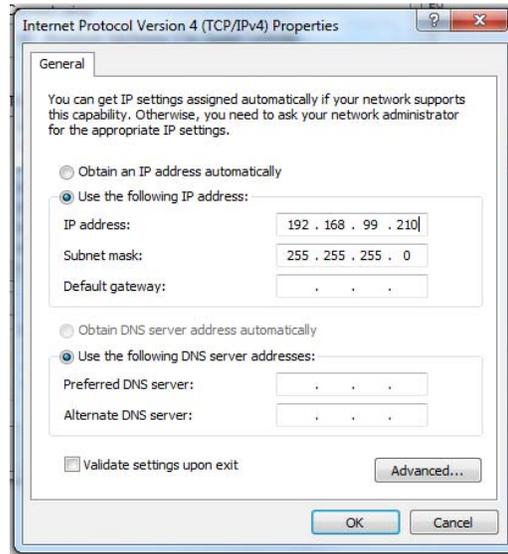
This description is also valid for use with the Virtual Handheld Controller.

The System is pre-configured to use a static IP Address. To set the initial Ethernet settings, prepare a network computer in the same IP Subnet:

❖ To setup the direct connection

1. If the computer is already part of your network, record its TCP/IP configuration settings.

Figure 38. Setting IP Properties in the Computer



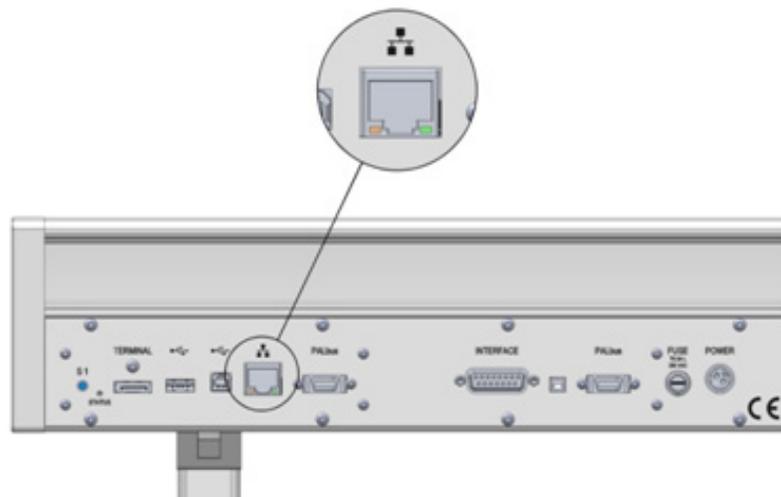
2. Configure the computer with a static IP Address **192.168.99.230**, and a Subnet Mask **255.255.255.0**. Do not enter a **Default Gateway** address.

Note Use the proposed IP Address number as shown in [Figure 38](#). If a deviation is required, do not use the following numbers of the last address package:

- 192.168.99.0 is reserved for the Net address
- 192.168.99.255 is reserved for the Broadcast address
- 192.168.1.100 is reserved for the TriPlus 100 Liquid Sampler system

3. Connect the Ethernet cable from the control board of the TriPlus 100 Liquid Sampler system to the computer, and verify that the LAN control LED lights when connected to a powered-on computer. See [Figure 39](#).

Figure 39. LAN Cable Connection to the PC



2 Installation of the TriPlus 100 Liquid Sampler

Establishing Communication with the Computer

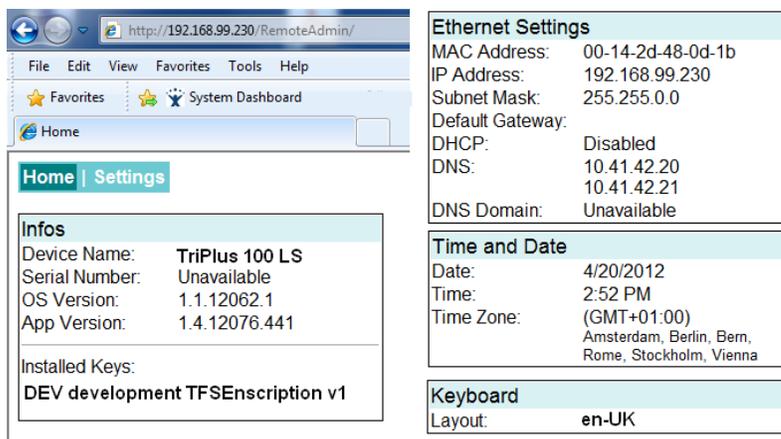
Note If the communication is not established, use a **Cross Adapter** for the LAN cable. The adapter can be connected on either side.

Setting up the Network Interface

❖ To configure the ethernet port of the computer for LAN access

1. Establish a LAN connection from the computer to the TriPlus 100 Liquid Sampler system by opening a browser, and entering **http://192.168.99.230** in the address field.
2. Configure the IP Address settings as shown in [Figure 40](#).

Figure 40. LAN Communication Settings



Ethernet Settings	
MAC Address:	00-14-2d-48-0d-1b
IP Address:	192.168.99.230
Subnet Mask:	255.255.0.0
Default Gateway:	10.41.42.20
DHCP:	Disabled
DNS:	10.41.42.20 10.41.42.21
DNS Domain:	Unavailable

Time and Date	
Date:	4/20/2012
Time:	2:52 PM
Time Zone:	(GMT+01:00) Amsterdam, Berlin, Bern, Rome, Stockholm, Vienna

Keyboard	
Layout:	en-UK

3. Click **Apply** to confirm the changes, and activate the new network settings.
4. When the setup steps are completed, you can deploy the TriPlus 100 Liquid Sampler system in your network. If needed, you can now reconfigure your computer back to its original TCP/IP settings.
5. If your computer is connected to a factory network, configure the IP Address settings appropriate for your network. Consult your System Administrator for the correct settings.

For further details see also the section **Service Menu Item-Installation** in the *TriPlus 100 Liquid Sampler User Guide*.

Setting up the Network Interface by using the Handheld Controller

Setting up the network by using the Handheld Controller, follow the instructions as described in the section **Service Menu Item-Installation** in the *TriPlus 100 Liquid Sampler User Guide*.

The computer settings must be accurate.

[Figure 41](#) shows the Network default settings for the TriPlus 100 Liquid Sampler system.

Figure 41. TriPlus 100 Liquid Sampler Network Settings

Setup Network		16:13
Press 'Enter' to edit a field and press 'Ok' when finished.		
DHCP	<input type="checkbox"/>	
IP Address	192.168.99.230	
Subnet Mask	255.255.255.0	
Default Gateway	0.0.0.0	
Ok		

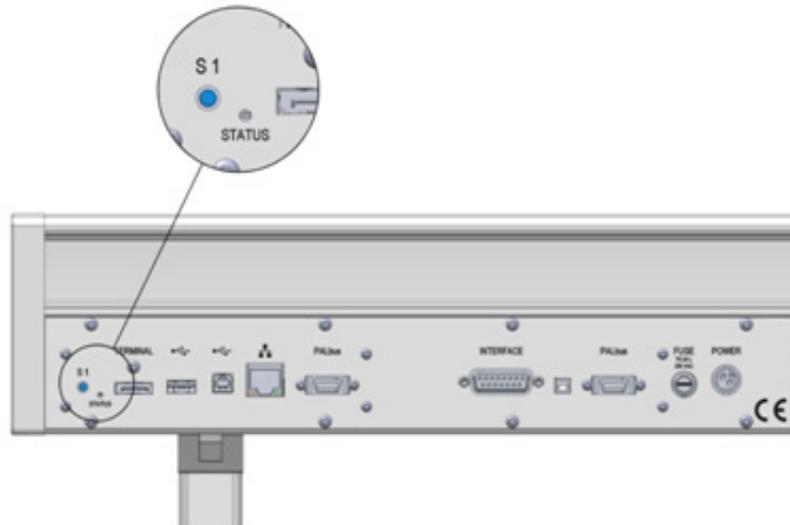
Do not use the DHCP mode nor an entry in the Default Gateway field.

Restoring Factory Default Network Settings

It is sometimes desirable to restore the factory default network settings of the TriPlus 100 Liquid Sampler system if you moved the instrument to a new network, or lost the IP Address.

To restore the factory default settings, without knowing the IP Address, you must use the **Reset** button marked **S1** on the back panel. See [Figure 42](#).

Figure 42. Reset Button S1



❖ To reset the TriPlus 100 Liquid Sampler system

1. Power OFF the TriPlus 100 Liquid Sampler system.
2. Press the **Reset** button **S1** by using an appropriate tool.

2 Installation of the TriPlus 100 Liquid Sampler

Establishing Communication with the Computer

3. Power ON the TriPlus 100 Liquid Sampler system with the Reset button pressed, and hold it pressed for at least 10 to 15 seconds. The LED starts blinking for a short time. Keep the button pressed for another five seconds.
4. The LED starts blinking eight times within one or two seconds. A second rush of blinking of the LED after this indicates that the system has been reset to factory default settings.
5. Release the button, and follow the steps in the section [“Connecting the TriPlus 100 Liquid Sampler with Factory Settings”](#) on page 55 to setup the Ethernet port with factory settings.

Setting up a Corporate Network

Setup within a corporate network requires the support of the system administrator who has local administrator privileges for Windows, and network setup.

Installing the TriPlus 100 Liquid Sampler system as part of an analytical system into a corporate network does not require any special precautions. Use the state-of-the-art technique available.

For operation of the TriPlus 100 Liquid Sampler system, an Ethernet (TCP/IP) is required. The computer in use has to be equipped accordingly. LAN or Ethernet IEEE 802.3 Industry Standard 10/100 Base-T. The network interface of the TriPlus 100 Liquid Sampler system supports network connections Auto-MDI(X) of a switch which follows the protocol 1000Base-T standard.

The Firmware accepts a moderate latency time, however if in a network the latency time clearly exceeds 500 ms, it must be inspected closely.

IMPORTANT For the LAN communication, the following ports must be kept open:

64001 = Integration driver routing port

64000 = TriPlus 100 Liquid Sampler system Communication

8194 = Data subscription

80 = Web interface

For further details see the section [“Hardware and Software Requirements”](#) on page 4.

For the LAN communication troubleshooting, see [Chapter 6, “Troubleshooting.”](#)

TriPlus 100 Liquid Sampler Defining Object Positions

This chapter provides the instructions for defining the teaching position of the modules of the TriPlus 100 Liquid Sampler system, the referencing position, and the calibration of the tool. The definition of these terms, the row, and the positions of the column sample are also explained.

Contents

- Definitions of Teaching, Referencing, and Calibration
- Slot Positions
- Definition of Row and Columns
- Definition of Vial or Well Position Pattern
- Definition of Inclination
- Modules Teaching Step-by-Step Procedure
- TriPlus 100 Liquid Sampler Modules Teaching
- Teaching Standard Wash Station Position
- Teaching Large Volume Wash Station Position
- Teaching Solvents Station Position
- Teaching Fast Wash Station Position
- Teaching Tray Holder
- Teaching GC Injector Position
- Teaching Agitator Position
- Teaching Vortexer Position
- Teaching a Barcode Reader Position
- Teaching Liquid Cooled Tray Holder Position
- Teaching Temperature Controlled Drawer Position

Definitions of Teaching, Referencing, and Calibration

The term **Teaching** is used to define the X-, Y-, and Z- axis positions for each module.

The teaching process is activated by moving the Head of the sampler to the **Teach Point**. [Figure 43](#) and [Figure 44](#) show examples of teaching position for a Temperature Controlled Drawer, and for a Tray Holder.

Figure 43. Temperature Controlled Drawer Teaching Position

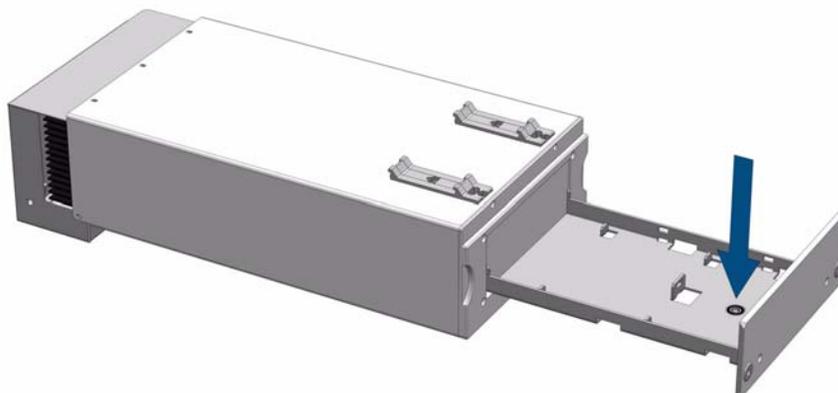
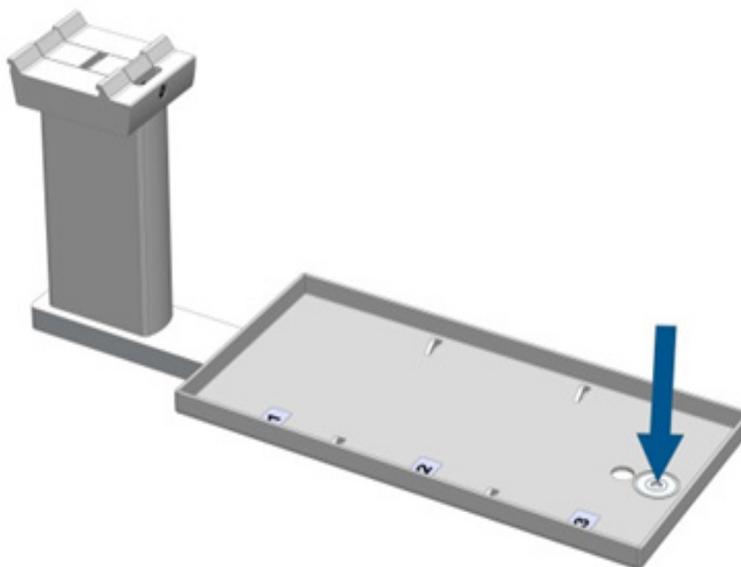


Figure 44. Tray Holder Teaching Position



The **Teach Point** is marked by the disc (“**lunette**”) with two concentric rings. The disc is used as a **Reference Point**.



IMPORTANT The Teaching, Referencing, and Calibrating procedure are described in the section “[Modules Teaching Step-by-Step Procedure](#)” on [page 67](#).

Note After a replacement of the Syringe Adapter because of a damage or repair, it is necessary to teach again all the positions with the new installed Syringe Adapter. Small variations of manufacturing tolerances can be absorbed by doing so.

Slot Positions

A **Slot** is defined as a position within a module that can be occupied by a sample tray such as Tray 54, or a Well Plate.

Slots are used for Tray Holders and for Temperature Controlled Drawer. The numbering for Slots is defined from the X-axis to the front.

The [Figure 45](#) illustrates the example of a Tray Holder including the Slots with spaces for installing up to three trays. The [Figure 46](#) shows the same Tray Holder but with a Tray 60 installed, which spreads over the three slot positions. In this example, the Tray Holder is defined as holder with a single Slot.

Figure 45. Tray Holder with Two Trays Installed

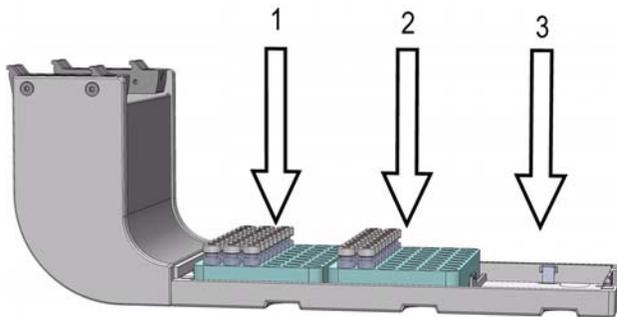
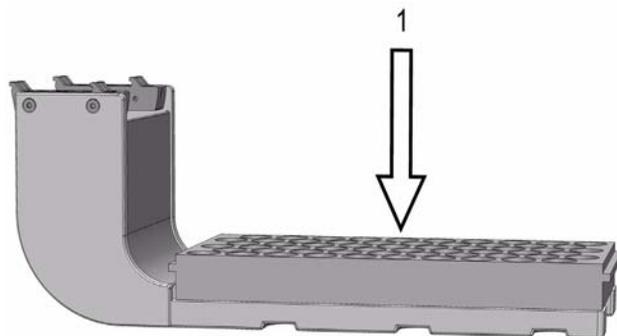


Figure 46. Tray Holder with a Single Tray Installed



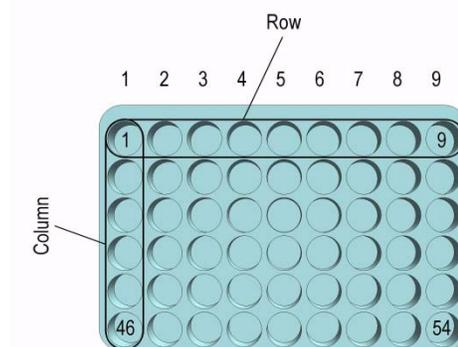
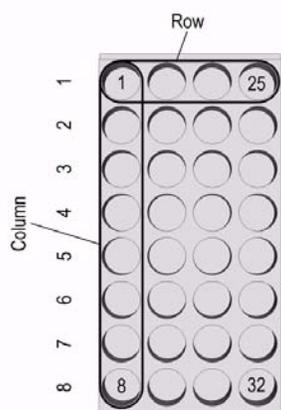
Definition of Row and Columns

The TriPlus 100 Liquid Sampler system uses a constant pattern for the definition of **Column** and **Row**. The concept is identically as used in spreadsheet programs, for example Excel.

The **Column** is always in the direction of the Y-axis and independent of the sample order. The definition is shown in Figure 47 with the Tray 60 and the Tray 54 (which has the same footprint as Well Plate).

A **Row** is not associated with an X-axis or Y-axis.

Figure 47. Tray 32 and Well Plate



Definition of Vial or Well Position Pattern

The definition of **Pattern** is only required for Trays and Well Plates.

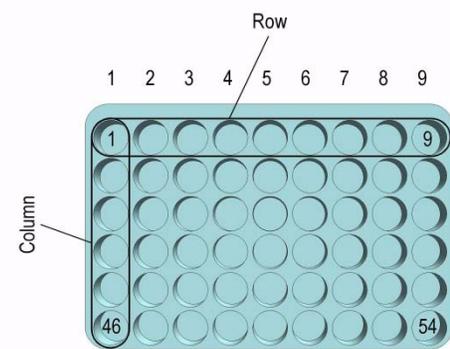
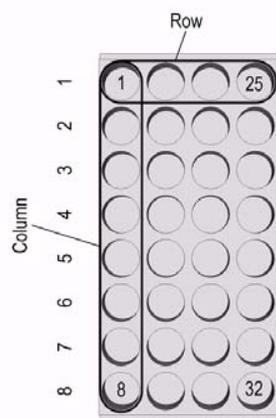
The arrangement of vial or well positions in a tray or well plate can be in a **regular** or what is often referred to as a **staggered** pattern. A staggered pattern can take two forms:

- **Staggered+** — The second row is offset by +x (mm) of the hole pattern
- **Staggered-** — The second row is offset by -x (mm) of the hole pattern

See the following examples:

Pattern Type Regular

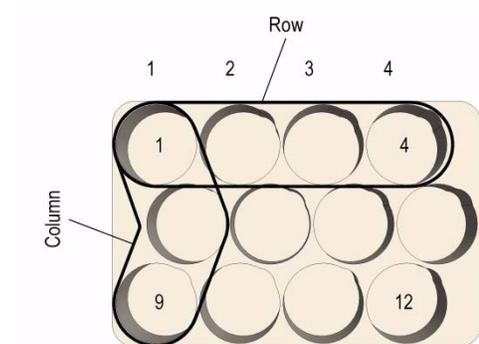
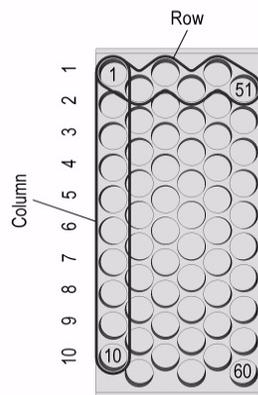
The vial or well positions are equally distributed.



Pattern Type Staggered+

The vial or well positions are arranged in a staggered pattern.

Example: The offset of the second Row is shifted by +50% of the hole pattern. The offset value is selectable (in mm).



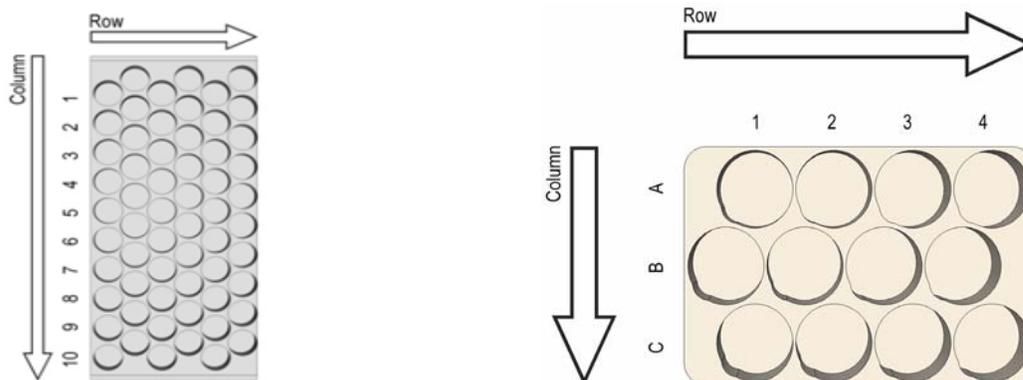
Pattern Type Staggered-

The vial or well positions are arranged in a staggered pattern.

Example: The offset of the second Row is shifted by -50% of the hole pattern. The offset value is selectable (in mm).

3 TriPlus 100 Liquid Sampler Defining Object Positions

Definition of Inclination

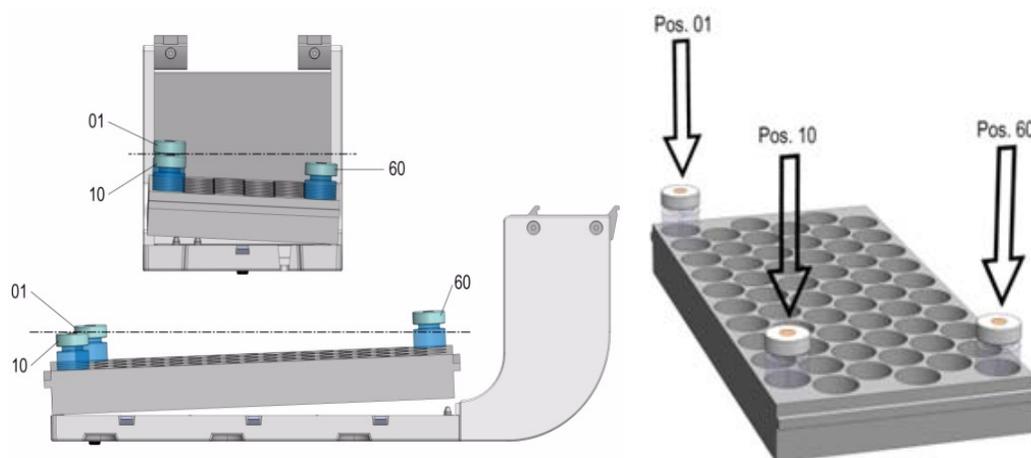


Definition of Inclination

If the Tray surface is not exactly horizontal and planar but inclined in one or more axes, you can perform a correction through the Firmware. A dialog window appears when a Tray has been checked-out at the corners, asking to verify vial positions and heights.

How to correct a possible inclination is shown in the example of [Figure 48](#).

Figure 48. Inclination correction



The values for the **3-Corner** calibration are assigned to the Tray linked to the Tray Holder. It is important that the X-, Y-, and Z-positions of the Tray Holder are determined first. If for any reason the X-, Y-, and Z-positions of the Tray Holder are taught again, the 3-Corner values for each related Tray are lost.

The 3-Corner calibration has to be repeated again for each Tray related to the Tray Holder. The reason of this behavior is the direct relationship of the Tray Holder to the Tray, considered as parent-child dependency, as expressed in computer programming.

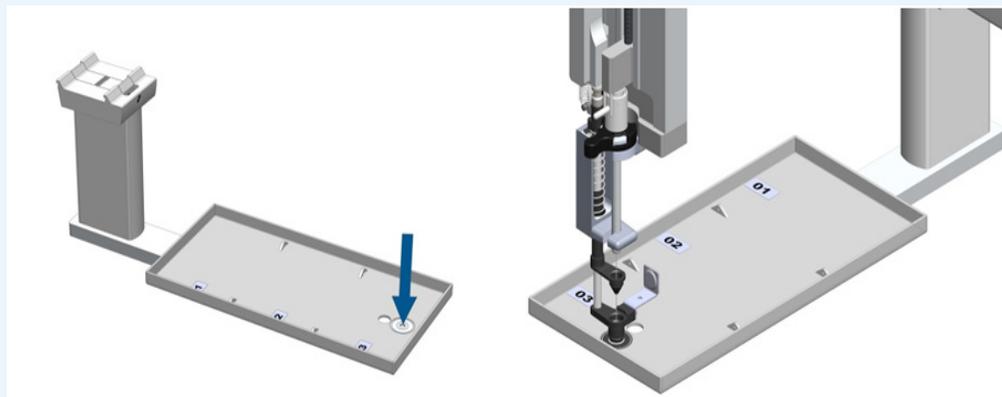
Modules Teaching Step-by-Step Procedure

Apply this procedure to define all the Teach Points for all the modules installed. Make sure that the Tray Holder, Agitator, Wash Module, and any other module which is part of the configuration are properly mounted to the X-axis of the sampler.

❖ To teach the modules

The following description is an example of how to teach the X-, Y-, and Z-Positions for a Tray Holder. The procedure is the same for all the modules.

Note For a Tray Plate, the teaching position is a disc with two concentric rings. This disk is called the **Lunette**. The size of the inner ring corresponds to the size of the Lower Needle Guide and the outer ring matches the diameter of the Magnet Adapter Ring. The Lower Needle Guide should be centered in the inner ring or if the Magnet Adapter Ring is installed, it should match with the outer ring. See the following figure:



To teach the individual module see the section “TriPlus 100 Liquid Sampler Modules Teaching” on page 71.



IMPORTANT For the teaching of the X-, Y-, Z-Positions is it necessary to activate the **Extended User Access Level**.

To teach the positions several paths are available. At the moment of the installation the logical path to choose is **Options | Service | Installation**.

Note Ensure all non-active modules are loaded prior to the installation, and they will be added to the teaching section automatically.

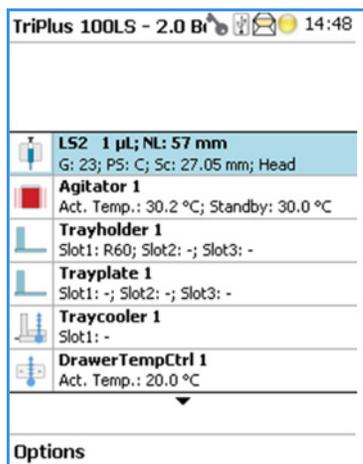
When the system is already setup and a position of a module is changed, you can select the path **Options | Setup | Modules**.

1. Switch On the TriPlus 100 Liquid Sampler system. The sampler goes through the boot-up procedure and finally displays the Start Screen. See [Figure 49](#).

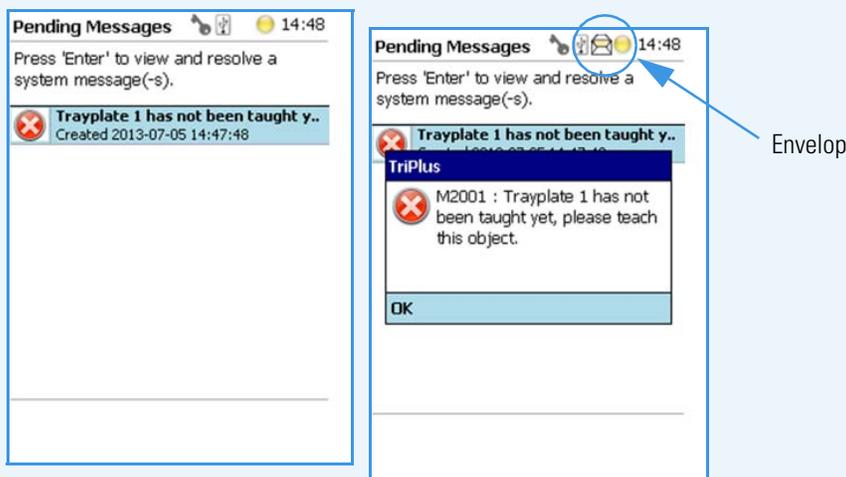
3 TriPlus 100 Liquid Sampler Defining Object Positions

Modules Teaching Step-by-Step Procedure

Figure 49. Start Screen



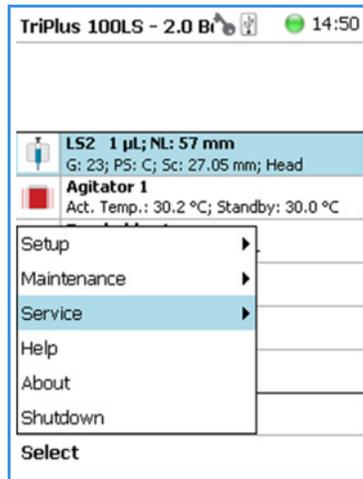
Note If an error appears during the boot-up procedure, an envelope will appear in the Status Line indicating a **Pending Message**.



Find the source of the problem verifying all the connections. After the corrective measures, restart the system.

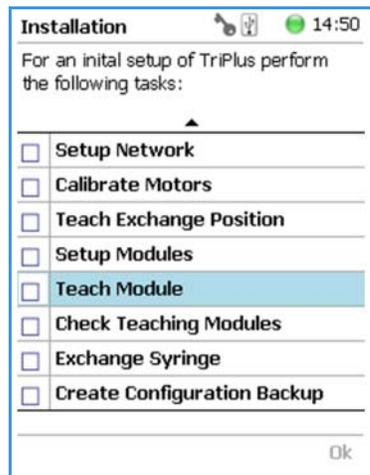
For detail, see the [Chapter 6, “Troubleshooting,”](#) and refer to the section [Starting the TriPlus 100 Liquid Sampler](#) in the *TriPlus 100 Liquid Sampler User Guide*.

2. From the **Options** pull-up menu, select the Item menu **Service**, and the list item **Installation**.



Note When installing the system it is mandatory following the **Installation** wizard step-by-step.

3. Follow the **Installation** wizard step-by-step until the point **Teach Module** appears. Activating this wizard section will turn off the current to the devices of the sampler. You may now move the sampler manually to any position.



The following message is displayed: **Move the Head to the teach point and press Save when finished.**

An illustration of the module with an arrow indicating the teach position appears on the display; it does help you to understand the step.

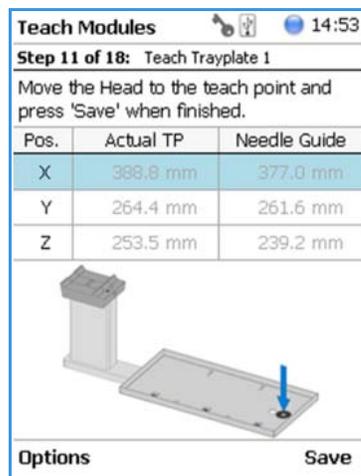
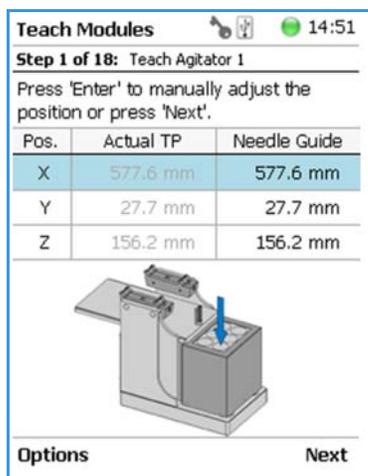


CAUTION To move the Head in a controlled way to the teaching position, it is advisable to hold the Y-axis with one hand and with your other hand hold the Tool body. Do NOT hold the Needle Guide moving the Head. This part is mechanically flexible and could lead to misalignment.

3 TriPlus 100 Liquid Sampler Defining Object Positions

Modules Teaching Step-by-Step Procedure

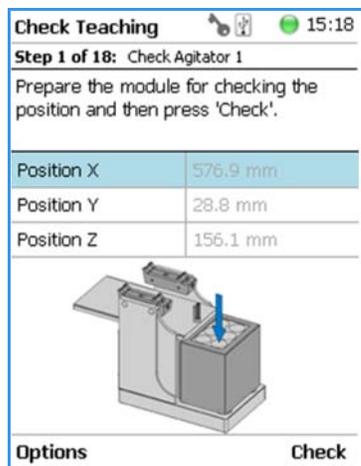
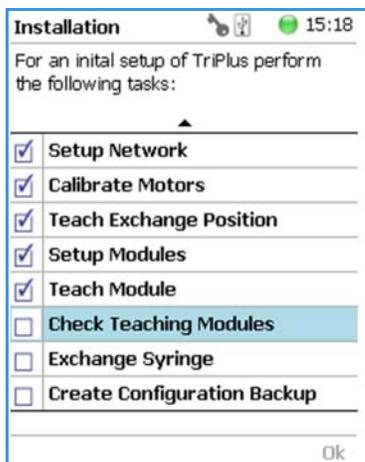
- After pressing **Save**, fine tune the teaching by pressing **Enter** button. Perform the manual adjustment of the Y-, X-, and Z-axes.



- When the teaching of the X-, Y-, Z-Positions is completed, press **Next**. The wizard moves automatically to the next module.
- Repeat the steps 4 to 6 for each module listed in the configuration of the system.
- After teaching the position of the individual module it is not necessary to request a Check Position. Verify each position at the moment of the set up for avoiding the risk of losing a step during the teaching process.
The new control concept of the TriPlus 100 Liquid Sampler system with its Servo Drives provides the added security of knowing each position at any time. Therefore, checking the teaching position is no longer necessary.

This saves time for the operator. However, the check can be requested by activating Check Teaching modules.

- After finishing the teaching of all active and passive modules, you can verify all positions by calling up the wizard step **Check Teaching Modules**.



TriPlus 100 Liquid Sampler Modules Teaching

The objective is defining all Teach Points for all the modules installed.

According to the configuration of your TriPlus 100 Liquid Sampler system, make sure that all the stations and the modules are properly mounted on the X-axis.

See the following sections for an overview of the teach point of each station and module:

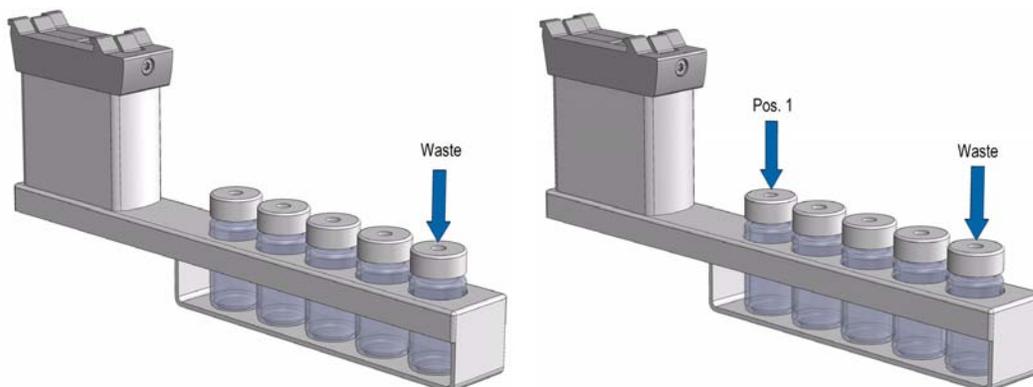
- [“Teaching Standard Wash Station Position” on page 72](#)
- [“Teaching Large Volume Wash Station Position” on page 73](#)
- [“Teaching Solvents Station Position” on page 73](#)
- [“Teaching Fast Wash Station Position” on page 74](#)
- [“Teaching Tray Holder” on page 75](#)
- [“Teaching GC Injector Position” on page 75](#)
- [“Teaching Agitator Position” on page 76](#)
- [“Teaching Vortexer Position” on page 77](#)
- [“Teaching Liquid Cooled Tray Holder Position” on page 79](#)
- [“Teaching Temperature Controlled Drawer Position” on page 80](#)

To perform step by step the module teaching procedure, see the section [“Modules Teaching Step-by-Step Procedure” on page 67](#).

Teaching Standard Wash Station Position

The teach position for the Standard Wash Station is the front vial (#5).
The Lower Needle Guide should be centered in these holes with the bottom of the lower needle guide lightly touching the surface of the caps.

Figure 50. Teaching Position for Standard Wash Station and Fine-tuning of Vial #1

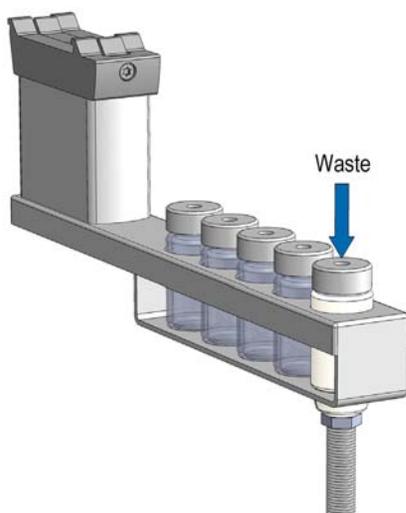


For the Standard Wash Station it is sufficient to teach position # 5 only. As long as the station is mounted in square way, this approach is sufficient.

When in doubt, check each position individually. Select each position of the Standard Wash Station, position #1 to position #5, and check the teach position. If a deviation is found, do the necessary fine-tuning.

The teaching process for the Standard Wash Station with an inserted Waste Line Adapter does not differ from the standard module. See [Figure 51](#).

Figure 51. Teaching of Waste Positions with inserted Drainage Adapter



WARNING Observe safety measures if a waste line is installed in combination with a gas chromatograph. Do not place the waste line above a heated zone.

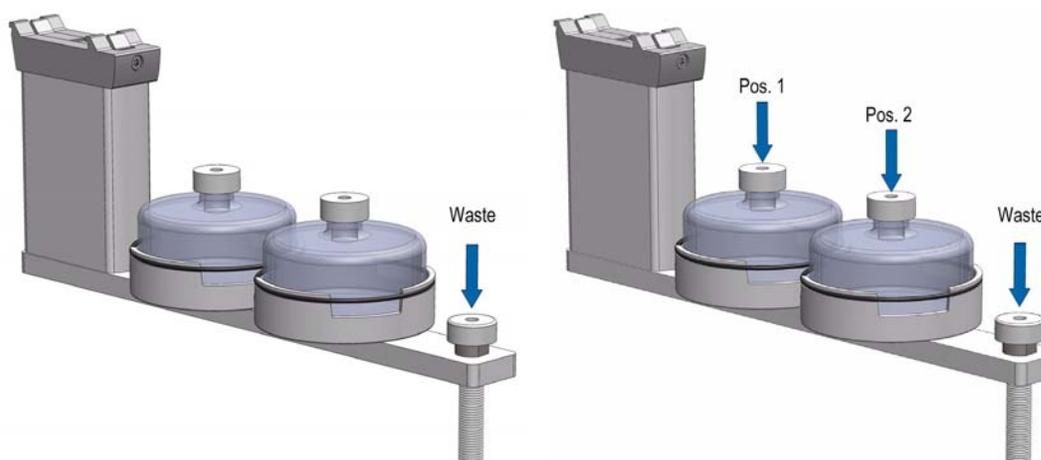
Teaching Large Volume Wash Station Position

The teaching position for the Large Volume Wash Station is the **Waste**.
The lower needle guide should be centered in these holes with the bottom of the Lower Needle Guide slightly touching the surface of the Station assembly.

For the Large Volume Wash Station it is sufficient to teach the position **Waste** only. As long as the module is mounted in square way, this approach is sufficient.

When in doubt, check each position individually. Select each position of the Large Volume Wash Station, position #1 and position #2, and check the teach position. If a deviation is found, do the necessary fine-tuning.

Figure 52. Teaching Position for Large Volume Wash Station and Fine-tuning.



WARNING Observe safety measures if a waste line is installed in combination with a gas chromatograph. Do not position the waste line above a heated zone.

Teaching Solvents Station Position

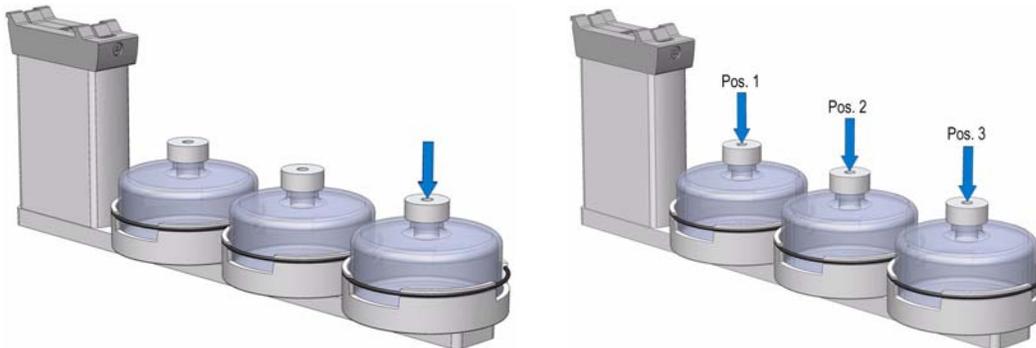
The teaching position for the Solvents Station is the **third position**.

The lower needle guide should be centered in these holes with the bottom of the Lower Needle Guide slightly touching the surface of the reservoir bottle cap.

For the Solvent Station it is sufficient to teach position #3 only. As long as the module is mounted in square way, this approach is sufficient.

When in doubt, check each position individually. Select each position of the Solvents Station, position #1 and position #2, and check the teach position. If a deviation is found, do the necessary fine-tuning.

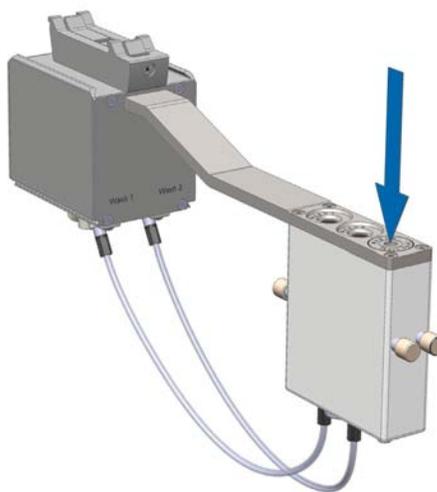
Figure 53. Teach Points for Three Solvent Reservoir and Position 1 to 3



Teaching Fast Wash Station Position

The teach position of a Fast Wash Station is the **lunette** at the front of the module. See [Figure 54](#).

Figure 54. Teach Points for Fast Wash Station



To define the position complete the following steps:

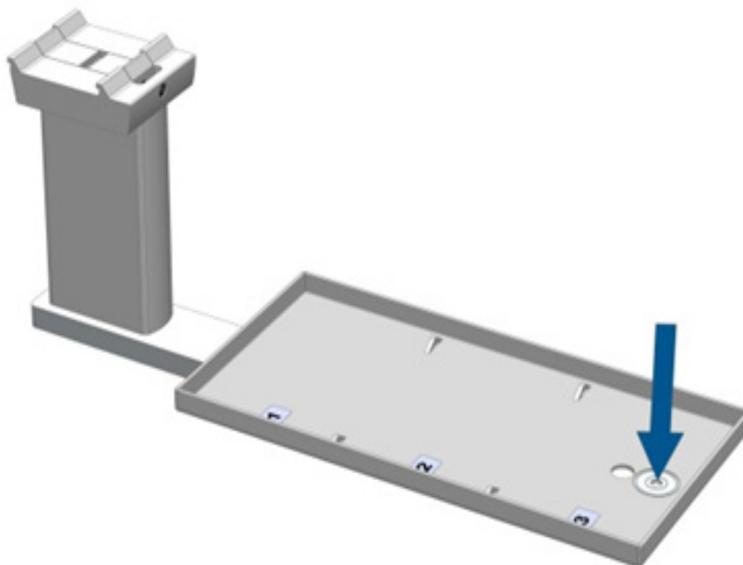
1. Select the access **Extended User Level**.
2. From the **Options** pull-up menu, select the item **Setup | Modules | Wash Stations | Fast Wash**.
3. If required by the application, attach the magnetic vial transport ring to the lower needle guide.
4. Define the X-, Y-, and Z- positions common to all objects. The teach position is located at the front of the upper drawer. The lower needle guide should be centered in the Lunette.

Teaching Tray Holder

The teach position of a Tray Holder is the **lunette** at the front of the module.

The Lower Needle Guide should be centered in the inner ring with the bottom of the Lower Needle Guide slightly touching the surface. If the Magnet Adapter Ring is installed, the magnet ring should match with the outer ring of the lunette.

Figure 55. Teach Position for Tray Holder



Teaching GC Injector Position

For certain GC models, centering rings are provided with the GC mounting kit.

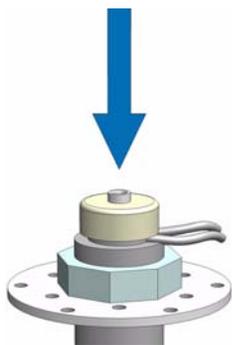
If a centering ring is available, it should not only be used for teaching the injector position, but also for routine work.

The ring stabilizes the needle guide of the Head at the moment of needle penetration. It acts as a guide tool and prevents needle bending.

For the GC Inj1 (GC Inj2), the teaching position is the appropriate GC Injection port.

The lower needle guide should be centered on the port with the bottom of the lower needle guide lightly touching its surface.

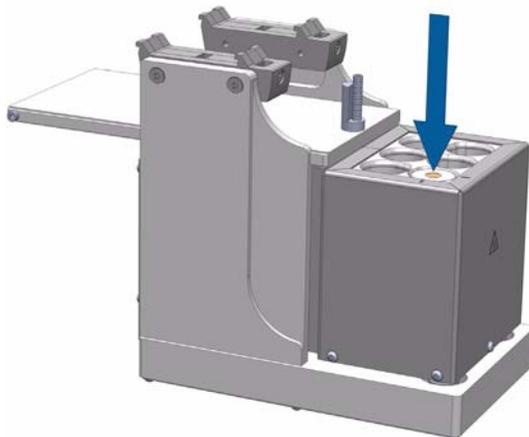
Figure 56. GC Injector (GC Inj1) Teaching Point



Teaching Agitator Position

The Agitator teaching position is located as indicated in [Figure 57](#).

Figure 57. Teaching Position for Agitator



To define the position, complete the following steps:

1. Select the access **Extended User Level**.
2. From the **Options** pull-up menu select the item **Setup | Modules | Agitator & Vortexer**.
3. From the **Options** pull-up menu select the item **Teach Module**.
4. Open the white Agitator cover manually and block it open by using a screwdriver, fitting it into the side of the cover.
5. Insert a 20 mL vial in sample position #1.
6. Connect the red vial transport ring to the lower needle guide.
7. Define the X-, Y-, Z- positions common to all objects as described in [“Modules Teaching Step-by-Step Procedure”](#) on [page 67](#).

The teach position is located at the hole in the steel vial cap. The Lower Needle Guide should be centered on the vial cap and should touch the cap.

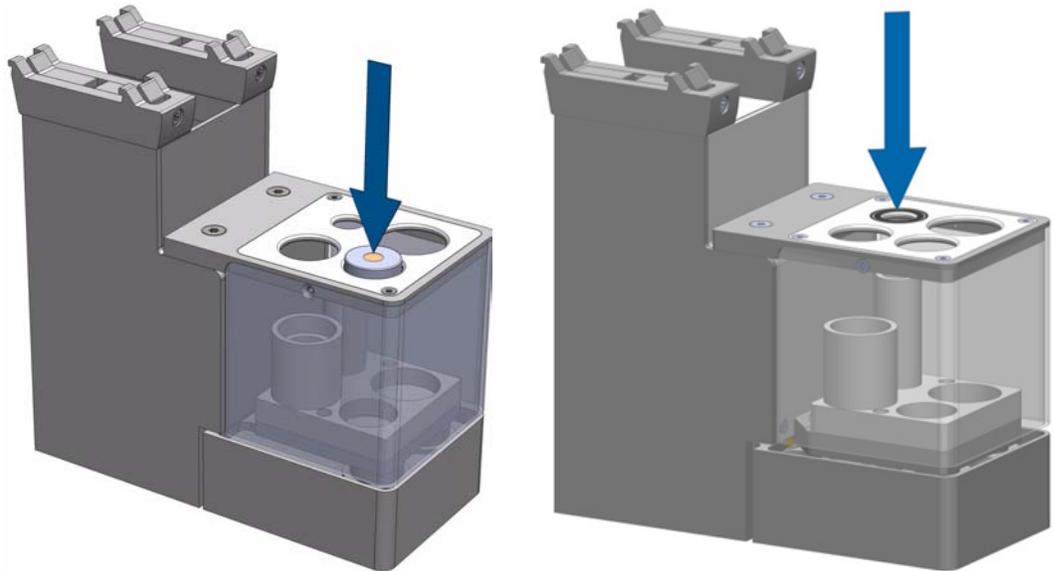
8. Remove the screwdriver and close the Agitator cover.

Note It is recommended that you create a configuration backup before a module is added or shifted in the system.

Teaching Vortexer Position

The Vortexer teaching position is located as indicated in [Figure 58](#).

Figure 58. Vortexer Teaching Position



To define the position complete the following steps:

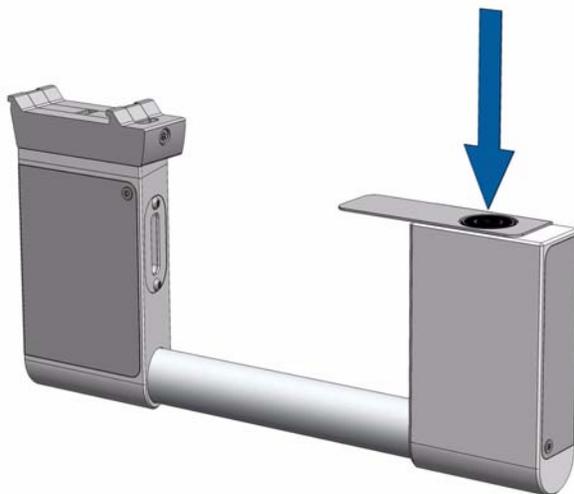
1. Select the access **Extended User Level**.
2. From the **Options** pull-up menu select the item **Setup | Modules | Agitator & Vortexer**.
3. From the **Options** pull-up menu select the item **Teach Module**.
4. Insert a vial with corresponding size in sample position.
5. Connect the red vial transport ring to the lower needle guide.
6. Define the X-, Y-, Z- positions common to all objects as described in “[Modules Teaching Step-by-Step Procedure](#)” on [page 67](#).
The teach position is located at the hole in the steel vial cap. The Lower Needle Guide should be centered on the vial cap and should touch the cap.

Note It is recommended that you create a configuration backup before a module is added or shifted in the system.

Teaching a Barcode Reader Position

The Barcode Reader teaching position is located as indicated in [Figure 59](#).

Figure 59. Teaching Position for Barcode Reader



To define the position, complete the following steps:

1. Select the access **Extended User Level**.
2. From the **Options** pull-up menu select the item **Setup | Modules | Barcode Reader**.
3. Select Barcode Reader.
4. From the **Options** pull-up menu select the item **Teach Module**.
5. Define the X-, Y-, Z-positions common to all objects as described in “[Modules Teaching Step-by-Step Procedure](#)” on [page 67](#).

The teach positions is located on top of the front module.

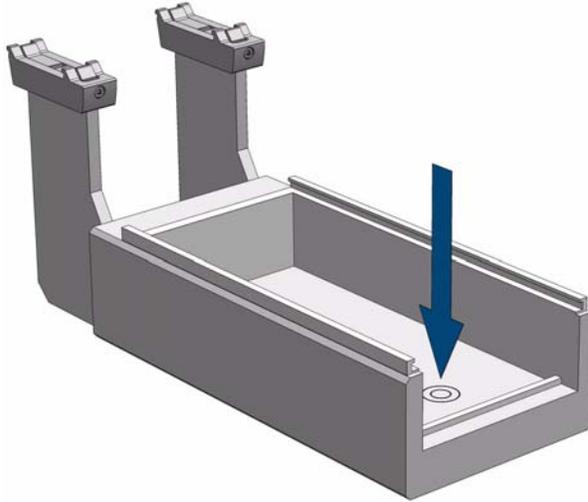
The Lower Needle Guide should be centered on the lunette.

Note It is recommended that you create a configuration backup before a module is added or shifted in the system.

Teaching Liquid Cooled Tray Holder Position

The Liquid Cooled Tray Holder teaching position is located as indicated in [Figure 60](#).

Figure 60. Teaching Position for Liquid Cooled Tray Holder



To define the position complete the following steps:

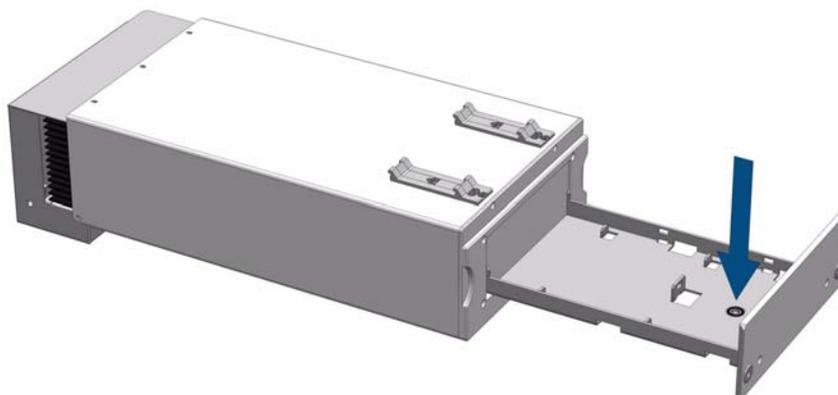
1. Select the access **Extended User Level**.
2. From the **Options** pull-up menu select the item **Setup | Modules | Tray Holders**.
3. Select Cooled Tray Holder.
4. If required by the application, connect the large vial transport ring to the Lower Needle Guide.
5. From the **Options** pull-up menu select the item **Teach Module**.
6. Define the X-, Y-, Z- positions common to all objects as described in [“Modules Teaching Step-by-Step Procedure”](#) on [page 67](#).
The teach position is located at the bottom of the module.
The Lower Needle Guide should be centered on the lunette.

Note It is recommended that you create a configuration backup before a module is added or shifted in the system.

Teaching Temperature Controlled Drawer Position

The Temperature Controlled Drawer teaching position is located as indicated in [Figure 60](#).

Figure 61. Teach Position for Temperature Controlled Drawer



To define the position complete the following steps:

1. Select the access level **Extended User**.
2. From the **Options** pull-up menu select the item **Setup | Modules | Sample Drawers**.
3. Select Sample Drawer.
4. If required by the application, connect the large vial transport ring to the Lower Needle Guide.
5. From the **Options** pull-up menu select the item **Teach Module**.
6. Define the X-, Y-, Z- positions common to all objects. The teach position is located at the front of the drawer. The Lower Needle Guide should be centered on the lunette.

Note It is recommended that you create a configuration backup before a module is added or shifted in the system.

TriPlus 100 Liquid Sampler Firmware

This chapter provides instructions for creating, copying, and restoring backup files, and for upgrading and downgrading the Firmware.

Contents

- [The Firmware](#)
- [Create a Diagnostic Backup File](#)
- [Create Configuration Backup File](#)
- [Restore Backup File](#)
- [Update and Downgrade Functions](#)
- [Updating the Firmware](#)
- [Downgrading the Firmware](#)



WARNING All the operations described in this chapter must be carried out only by authorized and trained Thermo Fisher Scientific technical personnel,

The Firmware

This section introduces the Firmware and its structure.



WARNING During any of the operations described in this section, it is mandatory that the TriPlus 100 Liquid Sampler system is connected to the power supply. If the power supply is interrupted during a process, the booting commands may become corrupted and the TriPlus 100 Liquid Sampler system can no longer be started. In such a case the control board must be returned in the factory in order for the boot loader to be reconfigured.

Introduction

The Firmware is the product name for all the software and the persisted data located on the control or on the devices. It consists mainly of:

- Operating System (OS)
- Application Software
- Configuration — Persisted data
- Device Firmware — Firmware of all active modules which are part of the specific TriPlus 100 Liquid Sampler configuration.
- Presets — The presets define a model configuration for the liquid injection technique.

Note The file extension for the Firmware is ***.cont**

Two different backup types are available: **Configuration Backup**, and **Diagnostic Backup**. The configuration backup can be used to restore the Firmware. Therefore, both backup file types can be used to restore the Firmware.

It is important to differentiate between **Restore** and **Update**:

- The **Restore** file originated from the configuration backup with the extension ***.pack**.
- The **Update** file is provided by Thermo Fisher Scientific for software updating. An Update package always contains the Operating System (OS), the Device Firmware, the Application Software, and the Presets software package starting with Firmware version 2.0.

The Update file is again an encapsulated archive file with the file extension ***.cont**. The Update file has to be included in a directory named **Autorun**.

IMPORTANT You must spell **Autorun** correctly. Only one file with the extension ***.cont** can be stored in the directory **Autorun**.

The directory **Autorun** must be loaded onto the USB Stick. Inserting the USB Stick into the control board when the system is powered off, followed by turning on the power, the process of loading the **cont file** to the flash memory starts.

The Operating System (OS) software package must be installed for any process. The OS is part of the Firmware package, included in a ***.cont** file only.

The installation of the software packages depends on the function **Update** or **Downgrade**.

Firmware Filename Structure

The structure of the filename is:

OEM/VAR Name - Product Name - Product Version - Software Version - TFS
ChangeSetID.cont

Examples: TMO-TriPlus 100 Liquid Sampler-1.4.1-1.4.12071.1101.7662.cont

The Firmware file name is clearly structured and contains the following informations:

- **Product Name** — Product name of the TriPlus 100 Liquid Sampler system.
- **Product Version** — Identifies the software. The Product Version is an alphanumerical code, which can contain an add-on such as Beta. A released version is always numerical, without add-on.
- **Software Version** — Contains always the first two numbers of the release version; the timestamp when the software was created is automatically added.
- **TFS Change Set-ID** — This identification is related to the software source code. The ID is important for the software developer only.
- ***.cont** — Extension for the Firmware (mandatory).

The Rules are:

- The individual parts of the file name are separated by the minus symbol (-).
As a consequence, this symbol is not allowed within the actual parts of the file name.
- The following characters are forbidden: \ / : * ? " < > | |
However, the space character is allowed.

Overview of the Backup and Restore Function

The **Backup** and **Restore** functions are available through the handheld controller menu.

It is important to understand the difference between **Restore** and **Update**:

- The term **Update** is solely used for a file provided by Thermo Fisher Scientific to upgrade or update the Firmware version.

The file extension for **Update/Downgrade** file is ***.cont**.

The file extension for **Restore** file is ***pack**.

The difference between **Restore** and **Update** functions is the following:

- The **Restore** process always originates from a known backup file from the same TriPlus 100 Liquid Sampler, which means that the Application Software and the key encryption will match, and the Configuration of the instrument is known.
- The **Update** process is not carried out through the handheld controller menu dialog.
- The option **Backup** creates a backup file of the TriPlus 100 Liquid Sampler in its current status. This backup file is stored on the SD card, installed on the control board.

Backup of the Firmware

Two different types of backup files are provided:

- **Configuration Backup** — Used for a **Restore** procedure.
- **Diagnostic Backup** — Supports and troubleshoots a TriPlus 100 Liquid Sampler system. For this purpose you must send the file by e-mail to the Thermo Fisher Scientific technical support center: gc.gcms.customersupport@thermofisher.com, with the file description, and providing as well the Firmware version used. The Diagnostic Backup file can also be used for a **Restore** procedure.

The differences of the two backup files are summarized in [Table 14](#):

Table 14. Backup Files Differences

Item	Configuration Backup	Diagnostic Backup
Firmware packages included in Backup file		
Operating system (OS)	No	No
Application Software	No	Yes
Configuration (Persistent Data, Data Base)	Yes	Yes
Device Firmware	No	Yes
Presets	No	Yes
File Details		
File Extension	*.pack	*.pack
File Size (approximately)	Up to 4 MB	Up to 24 MB
Time required to save Backup File	Up to 5 min.	Up 15 min.
Availability in Access Level	<ul style="list-style-type: none"> • User • Extended User • Service 	<ul style="list-style-type: none"> • --- • Extended User • Service
Purpose of use	Restore	(Restore) Diagnostic Troubleshooting



CAUTION During any of the next operations, the TriPlus 100 Liquid Sampler system must be connected to the power supply. If the power supply is interrupted during a process, the booting commands might become corrupted, then the system cannot longer be started.

In this case return the control board to the factory, in order for re-configuring the boot loader.

To create a **Backup file**, select the Access Level **Extender User**, select from the **Options** pull-up menu the list item **Maintenance**, then **Create Diagnostic Backup** or **Create Configuration Backup**.

For details see the following sections:#

- “[Create a Diagnostic Backup File](#)” on page 85
- “[Create Configuration Backup File](#)” on page 87

Create a Diagnostic Backup File

This option creates a diagnostic backup file of the TriPlus 100 Liquid Sampler system in its current status. The configuration backup is stored on the SD card installed on the control board.

Be aware that only one backup file can be stored on the SD card.

If for example a **Diagnostic Backup** file is created, and directly followed by creating a **Configuration Backup** file, the first file, in this example the Diagnostic Backup file, will be overwritten. To save both files it is necessary to copy each file immediately onto the USB Stick.

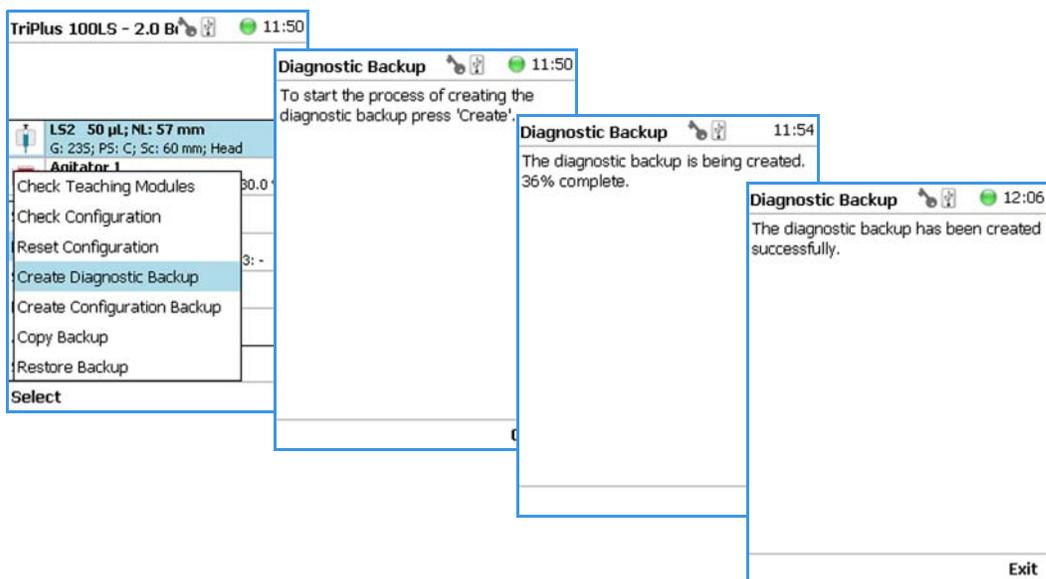
See “[Copy a Diagnostic Backup File](#)” on page 86.

❖ To create a Diagnostic Backup file

1. Select from the **Options** pull-up menu the list item **Maintenance**.
2. Select the item **Create Diagnostic Backup**.

4 TriPlus 100 Liquid Sampler Firmware

Create a Diagnostic Backup File



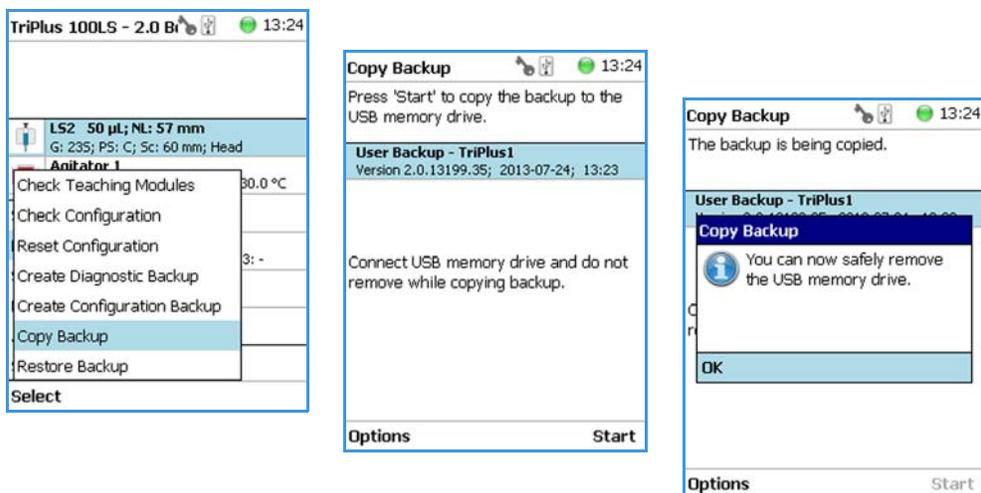
3. Press **Create** to start the process, the blue LED blinks signalling the execution mode. This process takes several minutes.
4. At the end of the process the message **the diagnostic backup has been created successfully** appears.

Copy a Diagnostic Backup File

It is good practice to store the backup file in a safe place, if possible on a net worked-server. We recommend keep an authorized configuration backup outside of the premises.

❖ To copy a diagnostic backup file from the SD card to the USB stick

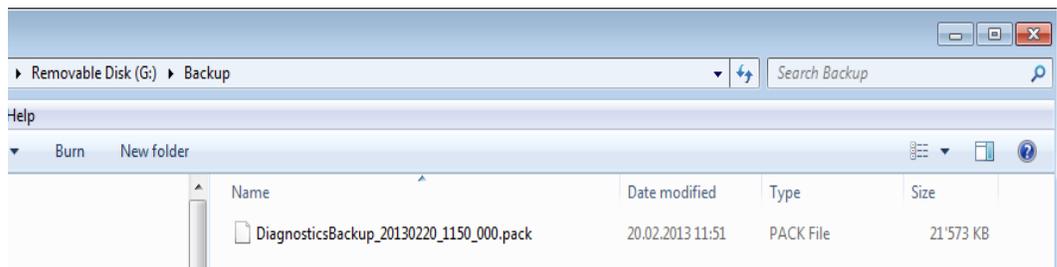
1. Insert the **USB Stick** into the connector **USB Host**.
2. Select the item **Copy Backup**, and follow the dialog.



3. Press **Start** to copy the file to the USB memory device.
4. At the end of the process the message **backup has been created successfully** appears.
5. Remove the USB Stick.

The backup file has the following name convention:
Diagnosticbackup_Date_Time_Number.pack

The system creates a directory on the USB Stick, named **Backup**. The configuration backup is stored as a single archive file with the extension ***.pack**.



Create Configuration Backup File

This option creates a configuration backup file of the TriPlus 100 Liquid Sampler system in its current status. The configuration backup is stored on the SD card installed on the control board.

Be aware that only one backup file can be stored on the SD card.

If for example a **Diagnostic Backup** file is created and directly followed by creating a **Configuration Backup** file, the first file, in this example the Diagnostic Backup file, will be overwritten.

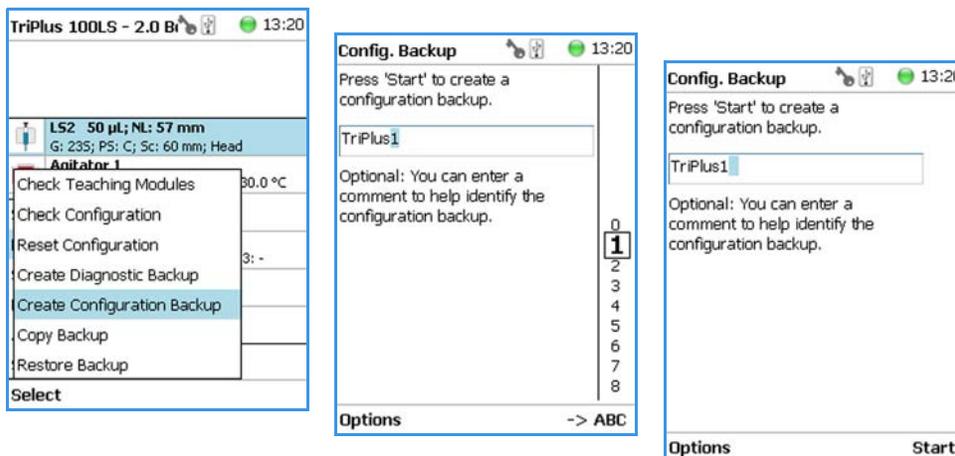
To save both files it is necessary to copy each file immediately onto the USB Stick. [“Copy a Configuration Backup File”](#) on [page 88](#).

❖ To create a configuration backup file

1. Select from the **Options** pull-up menu the list item **Maintenance**.
2. Select the item **Create Configuration Backup**.

4 TriPlus 100 Liquid Sampler Firmware

Create Configuration Backup File



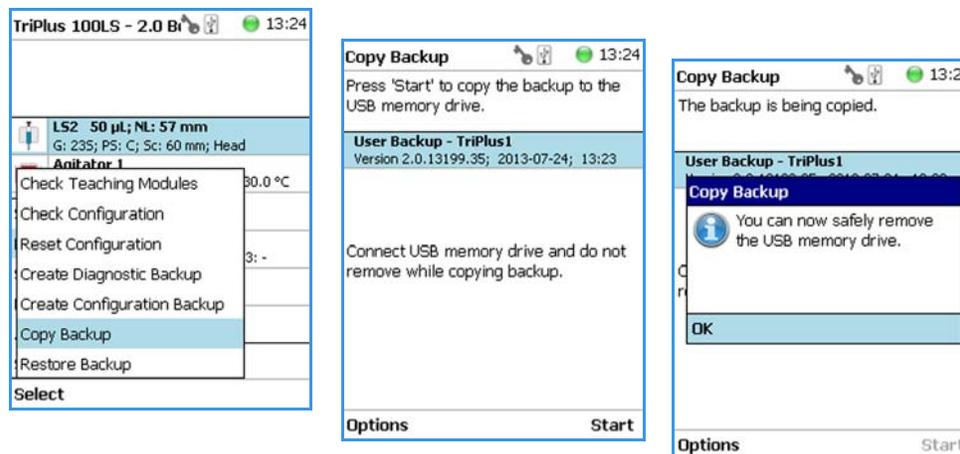
3. Enter a comment to help identify this configuration backup, if you want.
 - a. Press **Enter** to open the alphanumeric selection of characters.
The pull-up menu **Options** provides the possibilities to **Insert** or **Delete** a character or **Clear a Text**.
4. Press **Start** to begin the process; the blue LED blinks, signaling the execution mode. This process takes several minutes.
5. At the end of the process the message **backup has been created successfully** appears.

Copy a Configuration Backup File

It is good practice to store the backup file in a safe place, if possible on a net worked-server. We recommend keep an authorized configuration backup outside of the premises.

❖ To copy a configuration backup from the SD card to the USB stick

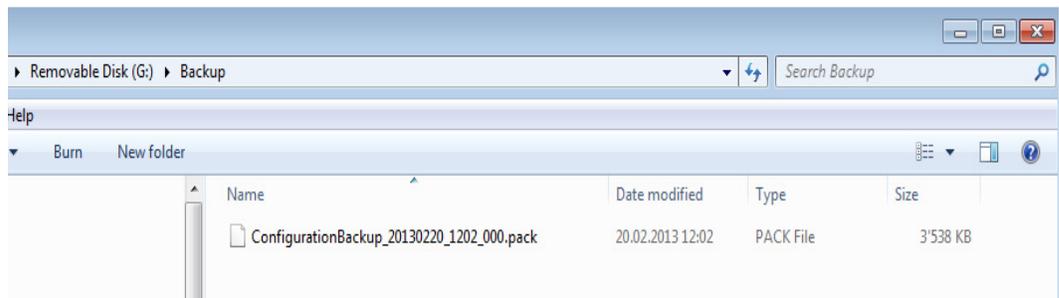
1. Insert the **USB Stick** into the connector **USB Host**.
2. Select the item **Copy Backup**, and follow the dialog.



3. Press **Start** to copy the file to the USB memory device.
4. At the end of the process the message **backup has been created successfully** appears.
5. Remove the USB Stick.

The backup file has the following name convention:
ConfigurationBackup_Date_Time_Number.pack

The system creates a directory on the USB Stick, named **Backup**. The configuration backup is stored as a single archive file with the extension ***.pack**.



Restore Backup File

The function **Restore** loads a **Backup** file saved from the same TriPlus 100 Liquid Sampler system back to the system. Only a Backup file (*.pack file) can be used. The key, the encryption of the Application, and the device Firmware files must match.



CAUTION The following **Restore Backup File** process is a general description. Please read through these points first before starting the process. Be aware that an older backup file may contain a Configuration which is no longer compatible. See also the section “[Update and Downgrade Functions](#)” on [page 92](#).

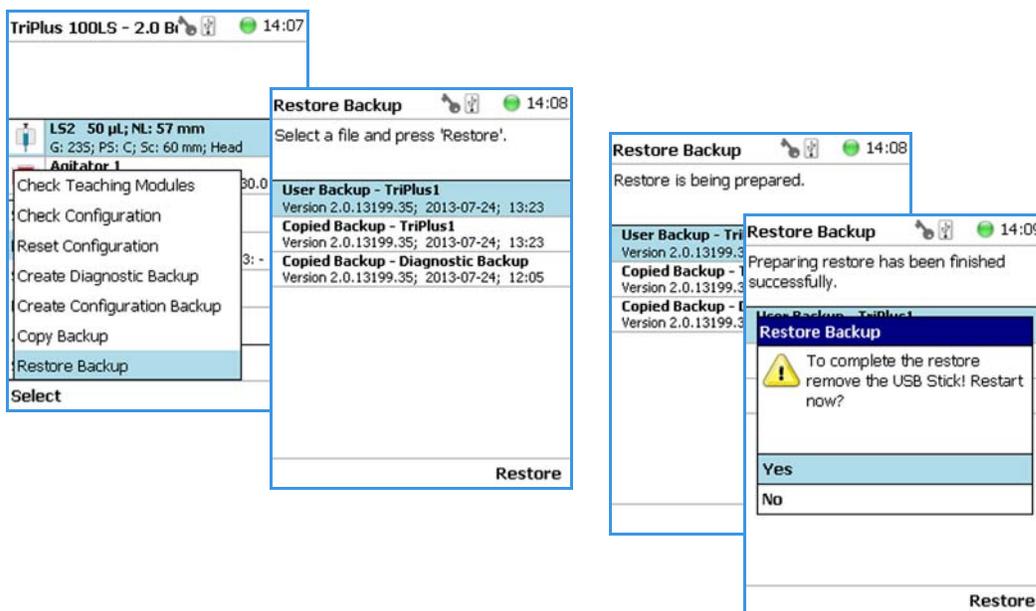
❖ To restore a backup file

Restore function is only available in the **Extended User Level**.

1. Select from the **Options** pull-up menu the list item **Maintenance**.
2. Select the menu item **Restore** to load a backup to the system.

4 TriPlus 100 Liquid Sampler Firmware

Restore Backup File



3. Press **Restore Backup** to start the process; the following steps are automatically carried out:

The backup file has to be placed in the folder **Autorun**. You must spell **Autorun** correctly. The system software searches only for files embedded in the folder.

- a. The dialog window shows all available backup files which are stored either on the SD card, or on the USB Stick.

Note The file can be located on the SD card or on the USB Stick. The file named **User Backup – TriPlus 100 Liquid Sampler1** is the file stored on the SD card.

The other files named **Copied Backup File** are the files which have been copied from the TriPlus 100LS (SD card) to the USB. The system will search for the available files.

- b. Select the required backup file, and press **Restore**. to start the process. The file named **Copied Backup** is the file that has been copied from the TriPlus 100 Liquid Sampler (SD card) to the USB device.
- c. When finished, a pop-up window appears with the message: **In order to complete the restore, TriPlus 100 Liquid Sampler must be restarted. Restart now? Yes/No.** Select **Yes** to restart the system.



WARNING The two points mentioned are important:

- **Remove first the USB Stick** — The process of updating/downgrading would be started automatically if the USB drive would remain connected to the TriPlus 100 Liquid Sampler, and a software file for update/downgrade (*.cont file) would be detected after rebooting the TriPlus 100 Liquid Sampler system.
- **TriPlus 100 Liquid Sampler must be restarted** — When selected, does the power down and the software will be rebooted automatically. It is not necessary to turn off the main power switch at the power supply.

The new software configuration will be activated after the next restart of the TriPlus 100 Liquid Sampler system.

4. After a system restart, check under **About to verify** that the software version has been loaded and activated.
5. Create a User Backup file after successfully restoring the software, calibrating the motors, and teaching of the X-,Y-,Z-axes.

Special Cases and Error Message

TriPlus 100 Liquid Sampler generates a **Backup** file from the current configuration, and stores this file on the SD card. The file is named **Before Installation**. This file is a security backup to give you the choice to reload the previous configuration.

At the start of the Restore process the compatibility of the selected **Restore** file is checked against the Application and the installed key of the TriPlus 100 Liquid Sampler system. If an incompatibility is detected, the process of restoring is aborted, and the error message is displayed.



CAUTION Be aware that an older backup file may contain a software version which is no longer compatible with the installed device firmware of an active module.

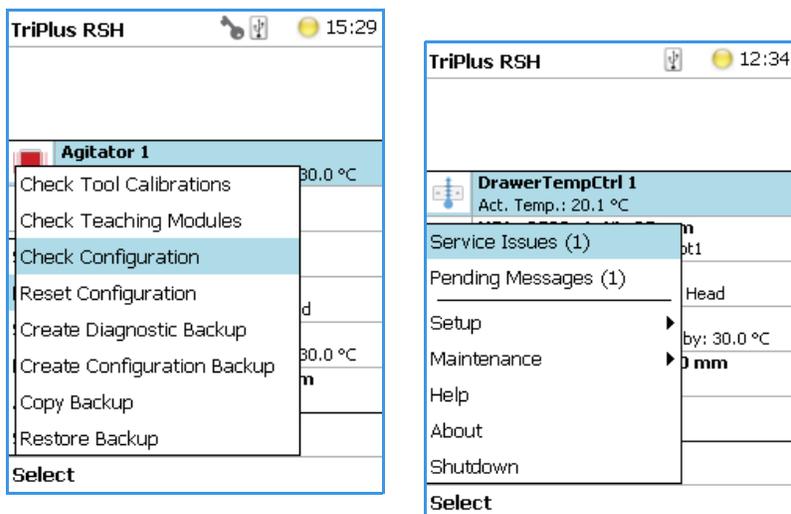
After Completion of the Restore Process

For a Restore process either the **Configuration Backup** or the **Diagnostic Backup** file can be used. The **Data Base** (Configuration) is stored in both types of backup files.

When the correct file is re-loaded to the corresponding TriPlus 100 Liquid Sampler system, it is not necessary to run the **Installation Wizard** again. However, it is recommended to **Check Configuration** if a Pending Message or a Service Issue signals any inconsistency. Access level **Extended User** is required.

4 TriPlus 100 Liquid Sampler Firmware

Update and Downgrade Functions



Update and Downgrade Functions

The term **Update** is solely used for a file provided by Thermo Fisher Scientific to upgrade or update the Firmware version.

The difference between the **Restore** and **Update** functions is that the **Restore** process always originates from a known backup file from the same TriPlus 100 Liquid Sampler system. This means that the Configuration Software and the key encryption will match.

The **Update** function is defined as a process to upgrade the entire Firmware, or parts of it. To correctly upgrade the software, you must have a fully compatible software package. Fully compatible means that the device firmware matches the Application and the Operating System (OS).

Thermo Fisher Scientific provides one file with the extension ***.cont**. Different software packages (***.pack**) can be integrated, these individual packages are matched for compatibility.

For details about updating and downgrading the Firmware see the following procedures:

- “[Updating the Firmware](#)” on [page 93](#)
- “[Downgrading the Firmware](#)” on [page 95](#)

Updating the Firmware

The prerequisites for a successful **Update** process are the follows:

- Confirm that the Configuration or Diagnostic Backup File from the current software version is available.
This is a safety measure to maintain the possibility of returning back to the original state. The backup file should be stored on the USB Stick (not in the directory Autorun), or on any other safe drive outside of the TriPlus 100 Liquid Sampler system.
- Use a Firmware package as provided by Thermo Fisher Scientific.
Important: There must be a file with the extension ***.cont**.
- The Firmware package has to match with the key.
- If the software file is not already included in the directory **Autorun**, create the directory Autorun, and load the file ***.cont** into it. You must spell **Autorun** correctly.
- Load this directory Autorun onto the USB Stick.

Note Ensure that only one ***.cont** file is placed in the folder Autorun.

The text file **force.txt** is not required for an Update Process but it is essential for the Downgrade Process.

Updating Process

The **Update** process is not performed through the handheld controller menu dialog.

An Update package always contains the device Firmware, the Application Software, and the Operating System (OS). A neutralized data bank for the Configuration is also included in the package.

A software set of **Presets** is part of the ***.cont** file. These presets contain the Input/Output Signals, the I/O Interface settings, and so on.

The Update file is an encapsulated archive file with the file extension ***.cont**.

❖ To update the Firmware

1. If the software file is not already included in the directory Autorun, create the directory Autorun, and load the file ***.cont** into it.

Note Important: You must correctly spell **Autorun**.

2. Load the directory **Autorun** onto the USB Stick.
3. Turn **OFF** the power from the TriPlus 100 Liquid Sampler system.

4. Insert the USB Stick in the USB connector from the control board, on the back of the TriPlus 100 Liquid Sampler.
5. Power ON the TriPlus 100 Liquid Sampler system.
6. Start the automated execution of the Update process:

Loading such a file to the TriPlus 100 Liquid Sampler from the USB Stick will store the file in the flash memory, SD card. Next, the various software files are installed in TriPlus 100 Liquid Sampler, and those provided by the new *.cont file compared. If a newer version is detected, the older version will be replaced.

7. After the Update process has been successfully completed, check the **Menu Item About** to confirm that the software version has been installed and activated.

Note The USB Symbol in the status bar of the screen indicates that a USB device is connected.

8. Remove the USB Stick. This avoids another software installation after a reboot of the TriPlus 100 Liquid Sampler.
9. Select the **Maintenance** menu item, then **Reset Configuration**. Select the dedicated configuration for the TriPlus 100 Liquid Sampler system. This task loads the **Presets** including the neutralized data base. This provides the software with a well-defined starting position.
10. The Status Bar of the handheld controller (or virtual handheld controller), displays an envelope icon for Pending Messages, Service Issues, or both.

The reason for this message is that in step the data base has been neutralized. This means that you must calibrate the TriPlus 100 Liquid Sampler system, and teach all positions of the X-, Y-, and Z-axes.

Select the access level **Extended User**. Follow the installation wizard using the path **Options | Service | Installation**.

11. After successful installation setup and testing of the TriPlus 100 Liquid Sampler, we recommend creating a **Configuration Backup** (last wizard item).
12. Copy the **Backup File** directly onto the USB Stick. Path: **Options | Maintenance | Copy Backup**.

This step is recommended because only one backup file is stored on the SD card. Creating another backup file will overwrite the first version.

It is good practice to store the configuration backup in a safe place, if possible on a network-server. You should to keep an authorized configuration backup outside of your premises.

To copy a configuration backup from the SD card, insert the USB Stick into the jack **USB Host. Type A** at the control, on the back of the TriPlus 100 Liquid Sampler. Select the process **Copy Backup** and follow the dialog.

Note It is mandatory that the used USB Stick that you use has one partition only. If you define two partitions, subsequent errors will occur. The access to the TriPlus 100 Liquid Sampler will be denied.



CAUTION The Firmware Update package (*.cont file) has to be compatible with the key installed. When a mismatch is found, the update routine will either stall or the TriPlus 100 Liquid Sampler will power up without going through the upgrade. Always check under About to verify that the software version has been installed.

Downgrading the Firmware

It is possible safely downgrading the Firmware when considering the following points. Downgrading from a specific software version to a lower one has to be thought through carefully.

The prerequisites for a successful **Downgrade** process are the follows:

- Confirm that the Configuration or Diagnostic Backup File from the current software version is available.
This is a safety measure to maintain the possibility of returning back to original state. The backup file should be stored on the USB Stick (not in the directory Autorun), or on any other safe drive outside of the TriPlus 100 Liquid Sampler system.
- Confirm that the Backup File from this particular TriPlus 100 Liquid Sampler System lower level software version is available.
- Confirm that the Backup File matches the key and whether it is a Thermo Fisher Scientific key or OEM specific key.
- Use a Firmware package as provided by Thermo Fisher Scientific.
Important: The file must be a file with the extension *.cont.
- The Firmware package has to match with the key.
- If the software file is not already included in the directory **Autorun**, create the directory Autorun, and load the file *.cont into it. You must spell **Autorun** correctly.
- Load this directory Autorun onto the USB Stick.

Downgrading Process

Note The **Downgrade** process is not carried out through the handheld controller menu dialog.



WARNING Downgrading using a Backup or a Restore Backup File

It is not possible and strictly prohibited by the software to perform a **Downgrade** through the use of a **Backup** or a **Restore Backup** file created from a previous version of the TriPlus 100 Liquid Sampler. If a downgrade is necessary, it has to be performed step-by-step following the appropriate procedure:

- **Step1:** Downgrade first by using an original file **Firmware** package with the extension ***.cont**.
- **Step2:** Use a **Backup** or a **Restore Backup** file of the TriPlus 100 Liquid Sampler system, previously made using the same software version as the downgrade.

Use the file with the required software version as provided by Thermo Fisher Scientific, and follow the following step:

❖ **To downgrade the Firmware**

1. If the software file is not already included in the directory **Autorun**, create the directory **Autorun**, and load the file ***.cont** into it.

Note Important: You must correctly spell **Autorun**.

2. Add the text file **force.txt** to the directory **Autorun** to force a downgrade of the Operating System (OS) software. This suppresses the comparison of the files, and performs installation of the replacement.

Note The file **force.tx** has also to be present if the key has been changed or replaced.

To create the Text File **Force.txt** proceed as follows:

- a. Open the Window Explorer or the Windows Desktop.
- b. From the context menu, select **New > Text Document**. Save it as **force**.

The text document does not require any content, but its presence in the directory **Autorun** is mandatory.



CAUTION If the **force** command does not show any effect, check if the name has been typed as **force.txt** and the windows Software does add the extension ***.txt** afterward. This would name the file **force.txt**. This software cannot recognized this filename will ignore it.

Note The text file **force.txt** will be deleted in the directory **Autorun** on the USB Stick before the ***.cont** file is transferred to the SD card. The reason for erasing the file is to avoid an endless loop if the USB Stick is left in the USB connector of the control board.

Please note that the file **force.txt** has to be added again into the directory **Autorun** in case the downgrade process has to be repeated.

3. Load the directory **Autorun** onto the USB Stick.

4. Turn **OFF** the power from the TriPlus 100 Liquid Sampler system.
5. Insert the USB Stick in the USB connector from the control board on the back of the TriPlus 100 Liquid Sampler system.
6. Power **ON** the TriPlus 100 Liquid Sampler.
7. Start the automated execution of the Downgrade process:

Loading such a file to the TriPlus from the USB Stick will cause the file be stored in the flash memory, SD card. In the next step, the various software packages are checked for compatibility and if they are compatible, the new packages will be installed.

If a newer version is detected, the older version will be replaced.

8. The text file **force.txt** will be deleted in the directory Autorun on the USB Stick before the ***.cont** file is transferred to the SD card. The reason for erasing the file is to avoid an endless loop if the USB Stick is left in the USB connector of the control board.

Note You must add the file **force.txt** to the directory Autorun again if you must repeat the downgrade process.

9. The TriPlus 100 Liquid Sampler is booted automatically after installing the software. Remove the USB Stick. This avoids another software installation after a reboot of the TriPlus 100 Liquid Sampler.
10. After the Downgrade process has been successfully completed, check the Menu Item **About** to confirm that the software version has been installed and activated.

Note The USB Symbol in the status bar of the screen indicates that a USB device is connected.

11. Select the **Maintenance** menu item, then **Reset Configuration**. Select the dedicated configuration for the TriPlus 100 Liquid Sampler system.
This task loads the **Presets** including the neutralized data base. This provides the software with a well-defined starting position.
If a Backup file of the lower-level software version is available, you must load this file by using the backup procedure as described above.

Important: The backup file must have been originally created by the same TriPlus 100 Liquid Sampler. The backup file contains the Configuration software, which includes the data bank for the configuration. Calibration of the drives and X-, Y-, and Z-axes position values are stored in the data bank and are available.



CAUTION Only perform this step if you know with certainty the source of the backup and that the configuration of the TriPlus 100 Liquid Sampler system has not been altered in the meantime.

12. The Status Bar of the handheld controller (or virtual handheld controller), displays an envelope icon for Pending Messages, Service Issues, or both.

The reason for this message is that in step the data base has been neutralized. This means that you must recalibrate the TriPlus 100 Liquid Sampler system, and teach all positions of the X-, Y-, and Z-axes.

Select the access level **Extended User**. Follow the installation wizard with the path:

Options | Service | Installation.

13. After successful installation setup and testing of the TriPlus 100 Liquid Sampler system, it is highly recommended that you create a Configuration Backup (last wizard item) and copy the file directly onto the USB Stick. Use the path **Options | Maintenance | Copy Backup.**

This step is recommended because only one backup file is stored on the SD card. Creating another backup file overwrites the previous version.

It is good practice to store the configuration backup in a safe place, if possible on a network-server. You should to keep an authorized configuration backup outside of your premises.

To copy a configuration backup from the SD card, insert the USB Stick into the jack **USB Host. Type A** at the control, on the back of the instrument. Select the process **Copy Backup** and follow the dialog.

Note It is mandatory that the USB Stick used has only one partition. The Autorun function checks for Disk1. If two partitions are defined, will occur. The access to the TriPlus 100 Liquid Sampler system will be denied.

Note The USB Symbol in the status bar of the screen indicates that a USB device is connected.

After Completion of an Update or a Downgrade Process

It is important to understand that the **Data Base** will be neutralized by using the ***.cont** file for both processes. As a consequence, it is mandatory to run the **Installation Wizard** to Calibrate Motors, Set Reference Point, and so on.

By using the **Maintenance** menu item **Reset Configuration** resets the configuration to that of a standard application package, the length of the standard or extended X-axis, and the predefined I/O signal settings.

It is highly recommended that you use the **Presets** function as a first step.

After a successful Update or Downgrade of the Firmware, perform the next procedure:

❖ To reset the configuration after completing an update or a downgrade process

The access level **Extended User** Level is required.

1. From **Maintenance** item select the menu item **Reset Configuration.**

2. Press **Options** and from the pull-up menu select the item **Setup | Modules**:
 - Check the availability of the active modules.
 - Add all required passive modules.
 - Check or add if necessary in the following order:
 - Signals
 - I/O Interface
 - Chromatograph System
3. From the start screen select the required tool, press **Enter**, and select menu item **Needle Guide Type**.
4. **Press Options**, and from the pull-up menu select the item **Service | Installation**, and follow step-by-step the **Installation Wizard**.
5. Make a **backup file**, and copy the created file onto the USB Stick.

Maintenance

This chapter provides guidelines for maintaining the TriPlus 100 Liquid Sampler system and its modules.

Contents

- Routine Maintenance
- Preventative Maintenance
- Working with Hazardous Material and Decontamination
- Sampler Removal from the GC
- Emptying of the Waste Container
- External Cleaning of the Sampler
- Cleaning the Interior of the Head
- Cleaning of the Syringe
- Maintaining a Fast Wash Station
- Maintaining an Agitator
- Maintaining a Vortexer
- Maintaining a Barcode Reader
- Maintaining a Liquid Cooler Tray Holder
- Maintaining a Temperature Controlled Drawer

Routine Maintenance

Regular maintenance procedures help to ensure the accuracy and precision of the TriPlus 100 Liquid Sampler. Suggested intervals of maintenance procedures are included to ensure uninterrupted operations.

If you use the system extensively (for example, nights and weekends), or if you use corrosive solvents, you must to perform the maintenance procedures more frequently.

Table 15. Maintenance Steps (Sheet 1 of 2)

Maintenance Step	Interval
Cleaning the TriPlus 100 Liquid Sampler system including the surfaces of all modules. Use only a soft lint-free cloth dampened with mild soap and water.	Weekly or as needed.
Clean syringe.	Daily or as needed.
Replace the syringe plunger.	<p>The Syringe Plunger for a liquid syringe (Metal Plunger sealing against glass) should be cleaned on a regular basis with an aqueous alcohol solution.</p> <p>Be aware that this plunger type should not be used for samples with a high amount of matrices or for clinical or residue analysis.</p> <p>A polymer plunger tip would be more suitable.</p> <p>The Syringe Plunger for a gas tight syringe (polymer tip) has to be replaced on a regular basis.</p> <p>The interval is highly dependent on the application, throughput, quality of sample solution (particles, and so on), and type of washing solvent.</p> <p>It is advisable to check the tightness of the plunger on a regular basis to gain experience with the application.</p>
Wash and Waste Solvent reservoirs (Standard or Large Wash Module)	Weekly or as needed. Replace the septum to avoid carry-over.

Table 15. Maintenance Steps (Sheet 2 of 2)

Maintenance Step	Interval
Wash and Waste Solvent reservoirs (Fast Wash Module)	Weekly or as needed. <ul style="list-style-type: none"> • Check the solvent frit for contamination or biological growth in the solvent reservoir bottle. • Check solvent lines and connectors for integrity. • Check glass liners in the wash block for integrity and ensure free flow in the wash block. • Check waste line for blockage.
Cleaning the TriPlus 100 Liquid Sampler when working with hazardous material.	For regular cleaning and maintenance or after a spill. See “Working with Hazardous Material and Decontamination” on page 104.

Preventative Maintenance

Planned Preventative Maintenance (PM) is a procedure to protect and maintain the operating performance of the TriPlus 100 Liquid Sampler system. The objective of the PM document is to define Preventative Maintenance (PM) requirements and acceptance criteria for the System.

A Preventative Maintenance check must always precede the annual Qualifications Test. This measure reduces the risk of failing the Qualifications Test.

Successful completion of this Preventative Maintenance check provides assurance that the TriPlus 100 Liquid Sampler system is still running according to Thermo Fisher Scientific’ specifications. Failure to implement the PM check can compromise the reliability of the TriPlus 100 Liquid Sampler system over the long term.

The PM check is not a substitute for a specific repair or hardware upgrades, and does not serve as part of a general overhaul. It is considered an initial, preparatory step for any OQ/testing that may follow.

Contact your Thermo Fisher Scientific representative to perform an annual preventative maintenance on the TriPlus 100 Liquid Sampler system.



IMPORTANT There are no operator-serviceable or replaceable parts inside the Power Module of the TriPlus 100 Liquid Sampler system. In case of a failure, contact your Thermo Fisher Scientific representative.

Working with Hazardous Material and Decontamination



WARNING It is your responsibility to handle hazardous chemicals, or biological compounds including (but not limited to) bacterial or viral samples, and the associated waste safely, according to international and local regulations.

When working with hazardous materials such as radioactivity, 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 must be taken immediately. Therefore, the chemicals or solvents needed for decontamination must be on hand.

Any parts of the equipment which can potentially be contaminated, such as the sample vial rack, syringe tool, wash module, 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 the TriPlus 100 Liquid Sampler system.

It is your responsibility to handle hazardous chemicals or biological compounds (including, but not limited to, bacterial or viral samples and the associated waste), safely and in accordance with international and local regulations.

Sampler Removal from the GC



WARNING This operation must be performed by TWO persons who must stand each on one side of the X-axis.

❖ To remove the sampler from the GC

1. Switch Off the power module that supplies the instrument, then disconnect the power cable.
2. Disconnect the cable from the connector marked **Power** at the backside of the TriPlus 100 Liquid Sampler.
3. Unscrew and remove the screws that are fixing the two support bars on the GC cover.
4. Put your hands under the X-axis, then carefully lift the sampler.
5. Place the sampler over an appropriate flat surface.
6. Reassemble the sampler on the GC, performing the inverse sequence.

Emptying of the Waste Container



WARNING Before using dangerous substances (toxic, harmful, and so on), read the hazard indications and information reported in the Safety Sheet supplied by the manufacturer referring to the relevant CAS (Chemical Abstract Service) number.

❖ **To empty the waste container**

1. If necessary, move the head to have free access to the washing and waste tray.
2. Take out the container, and remove the cap and empty the container.
3. Put on the cap again and reposition the container into its seat.

External Cleaning of the Sampler



WARNING The external cleaning must be performed with the instrument off and the power cord disconnected. Avoid using solvents and spraying on electrical parts. For the removal of possible dangerous substances (toxic, harmful, and so on), read the hazard indications and information reported in the Safety Sheet supplied by the manufacturer referring to the relevant CAS (Chemical Abstract Service) number. Use proper protective gloves.

❖ **To clean externally the sampler**

1. Clean the instrument on the outside with a water and soap solution or with a household non abrasive product. Pay special attention when cleaning the back side of the sampling unit. Do not spray, but clean using a cloth imbued with the same substance.
2. Dry with a clean cloth.

In case you suspect that any substance used for cleaning or submitted to analysis may have entered the instrument, though it is very unlikely, you shall immediately switch off the instrument and call the authorized Technical Service for proper action.

Cleaning the Interior of the Head



CAUTION DO NOT use a silicon spray to clean any spindle. Use dry, lint-free wipes or cloths to clean a spindle. DO NOT use grease for all spindles built-in the head. The guiding bushings have Teflon coating inside to ensure smooth movement. Detailed instructions are provided in the Preventive Maintenance procedure.

Cleaning of the Syringe

The syringe cleaning is advisable every 100-200 samples, particularly if the sample analyzed contains solids in suspension, or if poorly lubricant solvents are used, such as water and methanol.

❖ To clean the syringe

1. Remove the syringe from the Syringe Adapter.
2. Completely take out the syringe plunger and clean it gently using a soft cloth or a paper tissue.
3. Reintroduce the syringe plunger and gently move it repeatedly along its whole travel drawing an organic solvent (for example Hexane).
4. Reinstall the syringe into the Syringe Adapter.

Maintaining a Fast Wash Station



WARNING Before any maintenance step is initiated, power down the TriPlus 100 Liquid Sampler system.

Table 16. Fast Wash Station Maintenance

Maintenance Step	Interval
Cleaning the outside of the Fast Wash Station: Use only a soft lint-free cloth dampened with mild soap and water.	Weekly or as needed.
Check the integrity of the lines and connections.	Daily or as needed.
Check the flow of the solvent and check for any blockage.	Daily or as needed.
Check the cleanliness of the solvent frit in the solvent reservoir bottle.	Daily or as needed.

Maintaining an Agitator



WARNING Before any maintenance step is initiated, power down the TriPlus 100 Liquid Sampler system and ensure that the temperature inside the unit is below 50 °C to avoid any burns.

Table 17. Agitator Maintenance

Maintenance Step	Interval
Cleaning the outside of the Agitator: Use only a soft lint-free cloth dampened with mild soap and water.	Weekly or as needed.
Check opening and closing of the lid. Move the lid manually back and forth to ensure smooth movement.	Weekly or as needed.

As a standard procedure, the replacement of the agitator belt is recommended.

Maintaining a Vortexer



WARNING Before any maintenance step is initiated, power down the TriPlus 100 Liquid Sampler system and ensure that the temperature inside the unit is below 50 °C to avoid any burns.

Table 18. Vortexer Maintenance

Maintenance Step	Interval
Cleaning the outside of the Vortexer: Use only a soft lint-free cloth dampened with mild soap and water.	Weekly or as needed.

As a standard procedure, the replacement of the toothed motor belt is recommended.

Maintaining a Barcode Reader



WARNING Before any maintenance step is initiated, power down the TriPlus 100 Liquid Sampler system and ensure that the temperature inside the unit is below 50 °C to avoid any burns.

Table 19. Barcode Reader Maintenance

Maintenance Step	Interval
Cleaning the outside of the Barcode Reader: Use only a soft lint-free cloth dampened with mild soap and water.	Weekly or as needed.

It is recommended to perform the Preventive Maintenance test at least after a year. The major point tested for the Barcode Reader is the successful reading, and interpretation of a barcode label. The general cleanliness and condition of the module are also verified.

Maintaining a Liquid Cooler Tray Holder

Condensation build-up is directly related to the temperature and relative humidity in the ambient air (dew point). Long term tests showed very little build-up of condensation in an environment of relative humidity up to 60% and 22 ± 2 °C ambient temperature. If condensation is observed, clean the compartment on a regular basis as needed. Drainage for condensation is not available, the compartment is a closed system.



CAUTION Before any maintenance step is initiated, power off the TriPlus 100 Liquid Sampler system.

Table 20. Liquid Cooler Tray Holder Maintenance

Maintenance Step	Interval
Cleaning the outside of the Liquid Cooled Tray Holder: Use only a soft lint-free cloth dampened with mild soap and water.	Weekly or as needed.
Clean and dry the inside of the compartment. Moisture build-up.	Daily or as needed.
Check condition of hose and connections.	Monthly or as needed.

It is recommended to perform the Preventive Maintenance test at least after a year. The major point tested for the Liquid Cooled Tray Holder is its general cleanliness and conditions.

Maintaining a Temperature Controlled Drawer

Condensation build-up is directly related to the temperature and relative humidity in the ambient air (dew point). Long term tests have shown very little build-up of condensation in an environment with relative humidity up to 60% and ambient temperatures of 22 ± 2 °C. If condensation is observed, clean the compartment on a regular basis as needed.



CAUTION Before any maintenance step is initiated, power down the TriPlus 100 Liquid Sampler system.

Table 21. Temperature Controlled Drawer

Maintenance Step	Interval
Clean the outside of the instrument. Use only a soft, lint-free cloth dampened with mild soap and water.	Weekly or as needed.
Clean and dry the inside of the instrument if necessary, including compartments, rolls and rails. Use only a soft, lint-free cloth.	Daily or as needed.
Clean and grease the rolls and the rails*. *Recommended Grease <ul style="list-style-type: none"> • Grease: AL Lub Kit: approx. 8 g grease and brush • Grease Temperature Range: -130 to +150/+200 °C 	After a year, if the system is not exposed to acidic vapor. If acids are used for the sample solution and the Stack Cooler is exposed to the vapor, cleaning should be done more frequently, as required. A positive stream of inert gas, such as nitrogen, clean and dry air or helium, can prevent corrosion, Condensation Build-up.
Verify the position and condition of the stopper and holding magnet of the drawer(-s).	Monthly or as needed.

Troubleshooting

This chapter gives a quick overview of possible causes and recommended actions which can be taken to eliminate an erratic behavior.

Contents

- [General Points Related to TriPlus 100 Liquid Sampler](#)
- [Firmware Related Points](#)
- [LAN Communication Problems using Direct Connection](#)
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General Points Related to TriPlus 100 Liquid Sampler

Table 22 provides general troubleshooting guidelines regarding the TriPlus 100 Liquid Sampler:

Table 22. General Points Related to TriPlus 100 Liquid Sampler - Troubleshooting Guideline

Symptom or Error Message	Possible Cause	Recommended Action
Active module not recognized, not visible on Handheld Controller or Virtual Handheld Controller.	Cable from active module to BUS connector not connected or defective.	Check the cable and the connections from the active module in question to the BUS connector, or to another active module. Restart the TriPlus 100 Liquid Sampler system, if still not recognized, restore the Firmware.
	Software.	
	Device firmware not loaded or not on current level to match with Firmware version.	Restore the configuration backup. Reload a complete new Firmware package.
Liquid Syringe wears out rapidly.	Liquid syringe not primed.	Do not insert a liquid syringe without priming with the solvent which will be used by the application.
Plunger cannot be coupled.	Plunger Coupling Adapter in closed position.	The Plunger Coupling Adapter has to be opened manually. Move the Releasing Holding Pin from the Plunger Adapter manually up and down to force the Ejector to be moved. If necessary use an adequate tool (maybe an syringe plunger adapter) to check the spring.
Plunger cannot be ejected	Plunger bent	If the manual ejection of the syringe plunger adapter fails, the plunger still sticks to the coupling. Check the plunger condition, the Ejector movement in the Plunger Coupling Adapter, or both.
Time and Date wrong	Low Battery on the control PCB.	Ask the representative of Thermo Fisher Scientific for a service. If battery voltage is lower than 3 V the battery is suspect and if lower than 2 V the battery has to be replaced.
Head misses a position (Module, Vial, and so on)	X-,Y-, and Z-axes positions are off	Check teaching positions. Note, in case of Thermo Trace Injectors it is necessary to check the positions again after the GC system has reached the operating temperature.
		Check configuration for a possible mismatch with specified Tray Holder, Tray (Rack Type or Well Plate Type) and Vial Type and Needle Guide Type.

Firmware Related Points

Table 23 provides troubleshooting guidelines regarding the Firmware.

Table 23. Firmware - Troubleshooting Guideline

Symptom or Error Message	Possible Cause	Recommended Action
Backup/Restore not possible	Use of handheld controller and virtual handheld controller in parallel during backup/restore	Do not use handheld controller and virtual handheld controller in parallel during backup/restore
Update, Downgrade, or both processes are not possible.	Key does not match with file to update or downgrade. *.pack' file used instead of *.cont file. *.cont not in File directory Autorun. Force.txt file not used for downgrading. USB Stick with more than one partition used.	Carefully find any source of mismatch. If not successful: Check for any Pending Message or Service Issue. Create a Diagnostics File, and send it for evaluation to your representative from Thermo Fisher Scientific.
Red LED at Control Board is blinking continuously.	- Firmware update error - Hardware error	Reboot the sampler Reinstall the firmware
Error Message: An error stops the program. Please reboot. Application is corrupt.	Key changed or replaced.	When the key of the system is changed or replaced, it is mandatory use the text file force.txt to install Firmware. This is true for Updates or Downgrading.

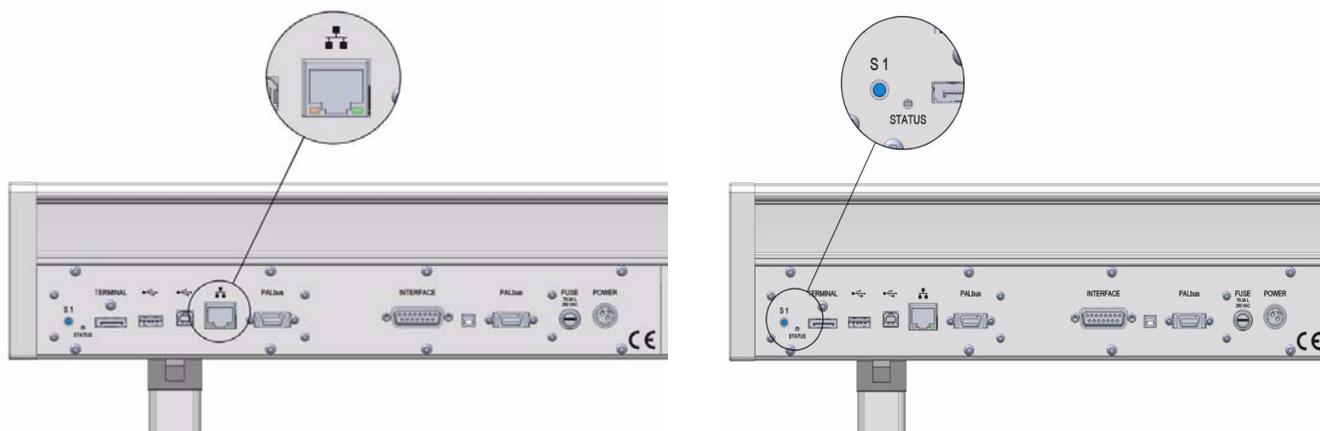
LAN Communication Problems using Direct Connection

Table 24 provides troubleshooting guidelines regarding the LAN direct connection.

Table 24. LAN Direct Connections Troubleshooting Guideline

Symptom or Error Message	Possible Cause	Recommended Action
LAN communication See “Establishing Communication with the Computer” on page 55 for details.	Network cable may not be plugged into: TriPlus 100 Liquid Sampler Company network or PC	Check if the network cable is plugged into the sampler and the local company network or PC.
	Verify that the IP Address is correct.	Check the IP Address settings in the computer and in the system. Is DHCP mode active?
	Verify that the Basic Communication is possible.	Check the status of the LED. See Figure A. Use the ping command to verify the communication. Details are described in the section Corporate Network.
Red LED at Control Board is blinking continuously. ‘STATUS’ LED	Firmware update error Hardware error	Reboot the sampler. Reinstall the firmware. See Figure B.

Figure 62. LAN Communication, Detail LED, Reset Button, and Status LED



LAN Communication Problems within Corporate Network

Table 25 provides troubleshooting guidelines regarding the LAN Corporate Network.

Table 25. LAN Corporate Network Troubleshooting Guideline

Symptom or Error Message	Possible Cause	Recommended Action	
Red LED at Control Board is blinking continuously.	Firmware update error	Reboot the sampler	
	Hardware error	Reinstall the firmware	
LAN communication	Network cable may not be plugged into: TriPlus 100 Liquid Sampler Company network or PC	Check if the network cable is plugged into the sampler and the local company network or PC. Ask your local Network administrator for assistance with TCP/IP settings.	
	Verify the correctness of: IP Address Subnet Mask Default Gateway	Check the settings in the computer and in the TriPlus 100 Liquid Sampler. The Default Gateway setting is required in a corporate network. The network administrator has to be contacted for support.	
	If DHCP mode is used, check settings.	Check DHCP settings.	
	Verify that the Basic Communication is possible.	Check the status of the LED. Use the ping command to verify the communication. See Table 26 .	
	Communication problem related corporate network.		Check LAN cables. Reboot the Switch (hub if used).
			Simplify the setup by making the direct connection as described in section “ Setting Up the Direct Connection ” on page 56 . Be aware that the IP settings in the computer and TriPlus 100 Liquid Sampler must be changed accordingly.
			If direct connection is not successful: <ul style="list-style-type: none"> replace the LAN cables replace the workstation (computer) reload the Firmware replace the control PCB
	If direct connection is successful: <ul style="list-style-type: none"> replace the switch (hub if used) ask network administrator for support. 		
Latency time in network		The Firmware accepts a rather high latency time. However if the latency time within a network is above 500 ms it should be evaluated.	

LAN Communication Problems Related to Network Interface Card (NIC)

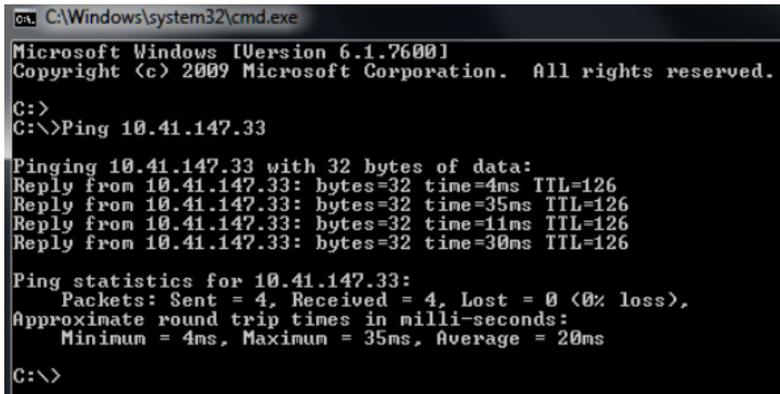
A network interface controller (also known as a network interface card, network adapter, LAN adapter and by similar terms) is a computer hardware component that connects a computer to a computer network. It is called here in short form NIC.

Table 26 provides troubleshooting guidelines regarding the LAN Network Interface Card.

Table 26. LAN Network Interface Card Troubleshooting Guideline 1 (Sheet 1 of 2)

Symptom or Error Message	Possible Cause	Recommended Action
No LAN communication	Network cable not plugged in.	Check connections.
	Network cable plugged in into the wrong NIC.	It is possible that more than one NIC is present on the PC. Select network connections settings on the computer, plug in the cable, and check if the status changes from unplugged to connected.
	IP address setting in the TriPlus 100 Liquid Sampler wrongly assigned.	Check the IP address entered on the Handheld Controller (or Virtual Handheld Controller.
	IP address setting in the CDS software wrongly assigned.	Check the IP address entered on the CDS software.
	Subnet Mask wrongly assigned.	Ask network administrator for details.
	Default Gateway wrongly set	Ask network administrator for details.
	IP address on PC NIC not valid	The IP address has to be in the correct range such that both the instrument and the PC are in the same network and subnetwork.
Wrong cLAN cable	<p>Straight wired Cat. 5 LAN cable is used for most setups. The only exception is if a direct connection from PC to instrument is used and the NIC does not have Auto-negotiation or Auto-sensing (the possibility to detect the correct transmission parameters and set them accordingly between NICs).</p> <p>The network administrator may support and check:</p> <ul style="list-style-type: none"> • MDI-X • Auto MDI(X) <p>Ports are used within the network. Check if straight or crossed wired cable (vice-versa) solves the problems, or work with a corresponding LAN adapter (MDI) to test the communication.</p>	

Table 26. LAN Network Interface Card Troubleshooting Guideline 1 (Sheet 2 of 2)

Symptom or Error Message	Possible Cause	Recommended Action
No LAN communication (Continued)	Check the communication by using the Ping command. Ping is a command used in the command prompt of Windows. Start the program CMD and a black window will appear. Type in ping [IP-Address of the TriPlus 100 Liquid Sampler] and press enter. Figure 63 shows a successful communication with the TriPlus 100 Liquid Sampler and confirms that the Network requirements for communication are fulfilled.	
	Figure 63. Ping Command	
		
LAN Communication interrupted or unstable	Firewall or Virus Scanner activated.	Check for any installed firewall or virus scanner software which may cause interferences. For details see the section “ Hardware and Software Requirements ” on page 4 .
	Screen Saver activated.	Check for any monitor screen saver which may cause interferences. The best screen saver is turning off the monitor. For details see the section “ Hardware and Software Requirements ” on page 4 .
	Computer hard disk power management activated.	Check if the power management option is turned off. “ Hardware and Software Requirements ” on page 4 .

Troubleshooting Check for LAN Communication

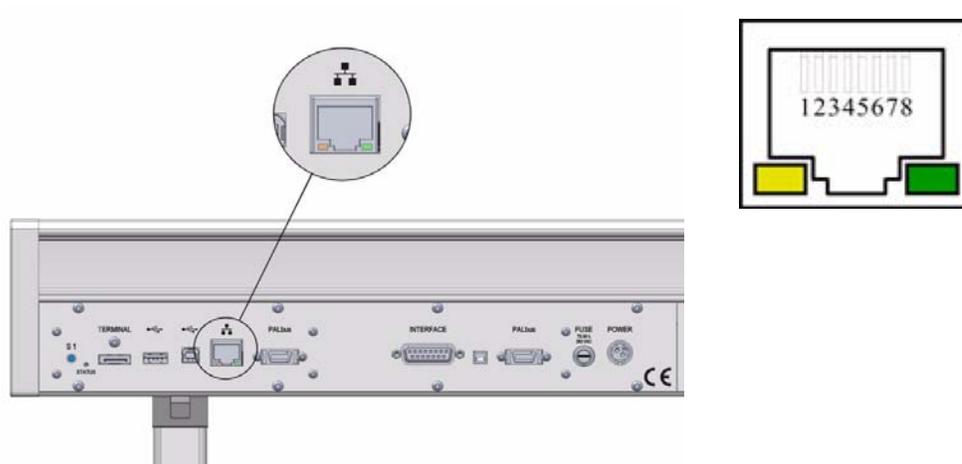
When the network cable is not connected and a LAN communication is not established, the previously entered network settings are maintained. The system will recognize that no network communication is established or possible.

❖ To check Lan Communication

1. Check the connections of the LAN cable. The default addresses or the last addresses to be defined and stored should be visible after reentering the **Setup Network** screen.

2. Check the LEDs on the Ethernet connector at the back of the TriPlus 100 Liquid Sampler.

Figure 64. LAN Communication LEDs

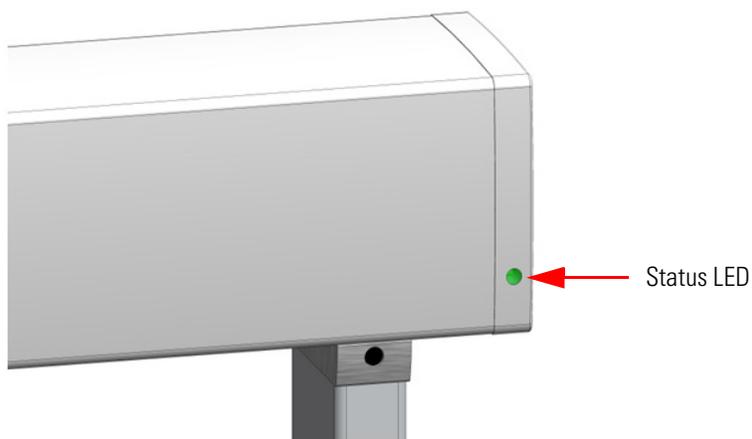


- **The LED on the left** — Status LED. Yellow color indicates that the current is applied to the connector.
- **The LED on the right** — Indicates the Ethernet communication status. Green blinking status indicates that the Ethernet communication is established.

System Status LED at Status Bar or at X-Axis Side Cover

The LED light on the right side cover of the X-axis shows the identical status as the Status Light displayed on the Handheld Controller. See [Figure 65](#).

Figure 65. Side Cover Status LED



[Table 27](#) lists the different LED statuses and the corresponding tasks or errors.

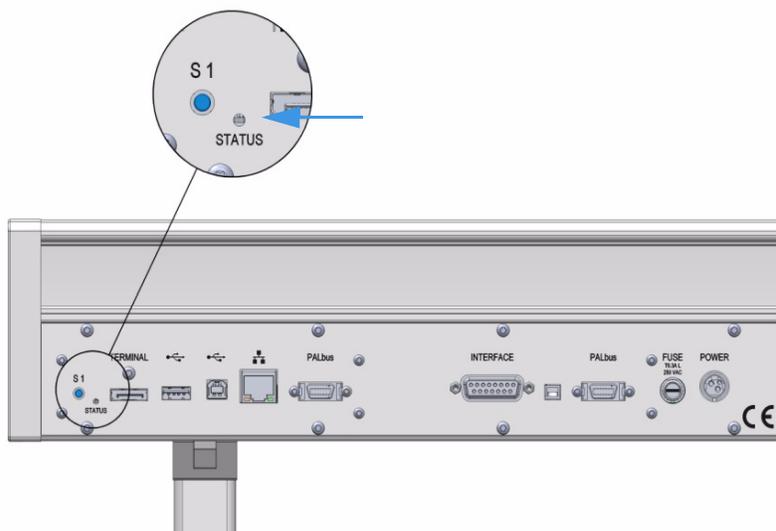
Table 27. LED Status

TriPlus 100 Liquid Sampler Status	LED Color	LED Status
Successful Booting Process		
Power Off	Off	Off
System booting		Blinking fast
Updating Software		Blinking fast
Start loading application software		Blinking normal
Application working		Solid On
Application Ready		Solid On
Errors during Booting Process		
Software failed to start application		Solid On
Application software is not installed		Solid On
Fatal error		Solid On
LED Status during Operation		
Configuration error		Blinking normal
Activity execution error		Solid On
Backup / Restore executed		Blinking normal
Manual operation (waiting for inputs)		Solid On
System working		Blinking normal
System Ready / Idle		Solid On
Fatal error		Solid On

LED Status at Control Board

The status LED at the back of the TriPlus 100 Liquid Sampler has limited functionality. See

Figure 66. Control Status LED and Reset Button



During the booting-up process, the following status changes can be observed in [Table 28](#).

Table 28. LED Status

TriPlus 100 Liquid Sampler Status	LED Color	LED Status
Successful Booting Process		
Power Off	Off	Off
System booting		Solid On
Software OS Initialized		Blinking fast
Application Software Initialized		Blinking normal
System Ready		Solid On

Observing the status of the control LED is also important when restoring the network settings to factory default. See [“Restoring Factory Default Network Settings”](#) on [page 59](#).

Fast Wash Station Troubleshooting

This section lists the most important points to overcome a faulty or problematic situation.



CAUTION Before starting any repair step, power off the TriPlus 100 Liquid Sampler.

Table 29. Fast Wash Station Troubleshooting

Observation	Recommended Action
Syringe Needle bending.	Check the teaching position for X-, Y-, and Z-Axes.
Solvent flow not sufficient.	Check the position of the solvent reservoir bottles. Level should not be lower than 50 cm from the Micro Pump of the station. Check the cleanliness of the solvent frits.
Air bubbles in solvent lines.	Check the solvent levels in the reservoir bottles. Check the position of the solvent reservoir bottles. Level should not be lower than 50 cm from the Micro Pump of the station. Check the cleanliness of the solvent frits. Check the flow by using the task PrimeWashLiner .
Solvent flow blocked.	Check the electrical connections from the station to the Bus (or daisy chaining to the next module). Check the position of the solvent reservoir bottles (see the point above). Check the solvent level in the reservoir bottles. Check the cleanliness of the solvent frits. Activate the priming function (path described above) and check for the blockage.
Waste line blocked.	Check the position of the Waste line in the waste container. Is the end of the line within the liquid or above it? Check for any particles which may hinder free flow of the solvent.
Wash Block leaking.	Check the composition of the wash solvents. Be aware of the material used for the various parts of the Fast Wash Station.

Agitator Troubleshooting

This section lists the most important points to overcome a faulty or problematic situation.



CAUTION Before starting any repair step, power off the TriPlus 100 Liquid Sampler, and ensure the temperature inside the unit is below 50 °C to avoid any burns.

Table 30. Agitator Troubleshooting

Observation	Recommended Action
Module does not respond to initiation step.	<p>Check control cable connections.</p> <p>Check the availability of the Agitator module within the software.</p> <ul style="list-style-type: none"> • If not available, is the TriPlus 100 Liquid Sampler configuration laid out for liquid injection only? • If necessary load a configuration backup prepared for the liquid and headspace technique. <p>Check for Pending Message and take corrective actions if necessary.</p>
Module responds to the initiation step but the block does not turn.	<p>Check the condition of the Agitator belt. If necessary, replace the belt.</p>
Heating of module does fail	<p>Check if the standby Temperature can be altered. If this is not possible, check following points:</p> <ul style="list-style-type: none"> • Temperature display -999 °C: PT 1000 defective. • Pending Message at power-up of system: Heating cartridge or over temperature fuse defective
Vial broken; spill in the Agitator compartment.	<p>Power down the TriPlus 100 Liquid Sampler and disconnect the Agitator module.</p> <p>Carefully investigate the damage and try to clean the compartment as best as possible.</p> <p>When in doubt, contact your Thermo Fisher Scientific representative.</p> <p>Be prepared to provide all information concerning the type of solvent (such as an acid), and extent of the spill.</p>

Vortexer Troubleshooting

This section lists the most important points to overcome a faulty or problematic situation.



CAUTION Before starting any repair step, power off the TriPlus 100 Liquid Sampler.

Table 31. Vortexer Troubleshooting

Observation	Recommended Action
Module does not respond to initiation step.	<p>Check control cable connections.</p> <p>Check the availability of the Vortexer module within the software. If not available, load a configuration backup prepared with the Vortexer device firmware.</p>
Module responds to the initiation step but the block does not turn.	<p>Check the condition of the Vortexer toothed motor belt. If necessary, replace the belt.</p>
Mixing of module does fail.	<p>Check for Pending Message at power-up of the sampler. Vortex-Driver may have failed.</p>
Vial broken, spill in the Vortexer collection pan.	<p>Power down the TriPlus 100 Liquid Sampler and disconnect the Vortexer module.</p> <p>Carefully investigate the damage and try to clean the compartment as best as possible.</p> <p>When in doubt, contact your Thermo Fisher Scientific representative. Be prepared to provide all information concerning the type of solvent (such as an acid?) and the extent of the spill.</p>

Barcode Troubleshooting

This section lists the most important points for overcoming a faulty or a problematic situation.



CAUTION Before starting any repair step, power off the TriPlus 100 Liquid Sampler, and ensure the temperature inside the unit is below 50 °C to avoid any burns.

Table 32. Barcode Troubleshooting

Observation	Recommended Action
Module does not respond to initiation step.	<p>Check control cable connections.</p> <p>Check the availability of the Barcode Reader module within the software. If not available, is the TriPlus 100 Liquid Sampler configuration laid out for a cycle excluding the Barcode Reader? If necessary load a configuration backup prepared for the Barcode Reader device.</p> <p>Check for Pending Message and take corrective actions if necessary.</p>
Barcode not readable	<p>Check the horizontal orientation of the barcode lines.</p> <p>Check the barcode length, minimum 18 mm for use with a 20 mL vial.</p> <p>Check the type of the barcode symbol. See Approved Barcode Label in the <i>TriPlus 100 Liquid Sampler User Guide</i>.</p> <p>Check the barcode length, minimum 19 mm for use with a 20 mL vial.</p> <p>Check the label quality</p> <p>Check the print quality of the barcode lines.</p> <p>Check the density of the barcode lines.</p> <p>Check if barcode is 1D; 2D barcodes cannot be decoded.</p>
Barcode not identified	<p>Is a barcode label attached?</p> <p>Is the barcode oriented such that the bars are in a horizontal direction? Any shifted angle?</p> <p>Is the label of correct quality?</p> <ul style="list-style-type: none"> • Is the background white for contrast? • Is it burned (blackened) from elevated temperature, for example Agitator? • Is the surface wet (moisture)? Is there a reflection?

Liquid Cooled Tray Holder Troubleshooting

This section lists the most important points to overcome a faulty or problematic situation.



CAUTION Before starting any repair step, power down the TriPlus 100 Liquid Sampler.

Table 33. Liquid Cooled Tray Troubleshooting

Observation	Recommended Action
Syringe Needle bent	Are the X-, Y-, Z- Positions correctly taught? Check the cover type; is the cover correct for desired?

Temperature Controlled Drawer Troubleshooting

This section lists the most important points to overcome a faulty or problematic situation.



CAUTION Before starting any repair step, power down the TriPlus 100LS.

Table 34. Temperature Drawer Troubleshooting (Sheet 1 of 3)

Observation	Recommended Action
The Drawer does not open or not close reliably.	Manually check the movement of the drawer. Are any restrictions felt? If yes, investigate for the reason. Clean the rolls and rails, grease these parts again and check the movement after cleaning. If still not satisfactory, is there mechanical damage? When this is confirmed contact your Thermo Fisher Scientific representative for technical assistance.

Table 34. Temperature Drawer Troubleshooting (Sheet 2 of 3)

Observation	Recommended Action
Opening of the drawer not reliable.	<p>Besides the points discussed above, another reason for problems with opening of the drawer could be the Stack Drawer Magnet, connected to the lower needle guide of the Tool.</p> <p>Is the magnet out of alignment, is its attachment no longer square? If not, try bring it back to square.</p> <p>Other possibilities are that the protective foil for the magnet is damaged, the magnet is corroded or the tool has been exposed to higher temperatures and the magnetic force has been lost.</p> <p>Check manually if it is possible to open the drawer. If it is obvious that the Stack Drawer Magnet is the source of the problems ask your Thermo Fisher Scientific representative for technical assistance.</p>
Drawer does not stay in closed position.	<p>The drawer is kept in position by a magnet installed at the back of the unit (inside of the compartment).</p> <p>If this magnet has become loose, it is possible that the drawer slides out of the closed position in a random manner.</p> <p>If this is the case, ask your Thermo Fisher Scientific representative for technical assistance.</p>
Temperature Controlled Drawer cannot be cooled or heated anymore.	<p>Check all cables and their connections. Can the module be recognized by the software (BUS)?</p> <p>Is the Standby Temperature set properly? If these points are confirmed, check the Actual Temperature or if any error message occurred.</p> <p>It is possible that the fan is no longer working or there is a blown over-temperature fuse.</p> <p>When in doubt, ask your Thermo Fisher Scientific representative for technical assistance.</p>

Table 34. Temperature Drawer Troubleshooting (Sheet 3 of 3)

Observation	Recommended Action
Power Supply Problem	<p>Is the Temperature Controlled Drawer connected to the same power module as the TriPlus 100 Liquid Sampler? If yes, use the second power module, provided with the Temperature Controlled Drawer.</p> <p>Is the power module connected, turned on and the green LED ON (at outlet side)?</p> <p>If these points are verified but the problem remains, ask your Thermo Fisher Scientific representative for technical assistance.</p>

There are no operator-serviceable or replaceable parts inside the power supply. In case of failure, contact your Thermo Fisher Scientific representative.

