Thermo Scientific Dionex UltiMate 3000 Series

Open Autosamplers

OAS-3300TXRS and OAS-3600TXRS

Operating Instructions

(Original Operating Instructions)

Revision: 1.0

Date: June 2012

Doc No. 4828.4550

CE

Declaration of Conformity

(Original Declaration of Conformity)

Product: Thermo Scientific Dionex™ UltiMate™ 3000 - Open Autosampler

Type: **OAS-3300TXRS, OAS-3600TXRS**

Dionex Softron GmbH herewith declares conformity of the above products with the respective requirements of the following regulations:

- Machinery Directive 2006/42/EC
- EMC Directive 2004/108/EC

The protection requirements specified in the low-voltage directive 2006/95/EC are met.

Responsible for the technical CE documentation is the manufacturer.

This declaration is issued for the manufacturer

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by the President, Dr. Peter Jochum.
June 1, 2012

Table of Contents

1 Introduction

1.1 How to Use This Manual

The layout of this manual is designed to provide quick reference to the sections of interest to the reader. However, in order to obtain a full understanding of the OAS-3x00TXRS Open Autosampler, Thermo Fisher Scientific recommends that you review the manual thoroughly before beginning operation.

Almost all descriptions in the manual apply to all OAS-3x00TXRS models in the Thermo Scientific Dionex™ UltiMate™ 3000 series. Therefore, the term "the autosampler" or "the OAS" is used throughout the manual. If some detail applies to only one model, the model is identified by name. The same applies to the descriptions of the Viper™ capillary connections throughout this manual. They apply also to nanoViper™ capillary connections if not otherwise stated.

Notes: The device configuration may vary, for example, the autosampler may be equipped with a three-drawer or six-drawer stack cooler; therefore, not all descriptions necessarily apply to your particular instrument.

It may happen that the representation of a component in this manual is slightly different from the real component. However, this does not influence the descriptions.

The descriptions in this manual refer to autosampler firmware version 4.1.5 and Chromeleon™ 6.80 Service Release 11d. If you want to operate the autosampler with Chromeleon 7, note the information on page 15.

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1.2 Safety Information

The CE Mark label on the autosampler indicates that the instrument is compliant with the related standards.

1.2.1 Symbols on the Instrument and in the Manual

The table shows the symbols used on the instrument and/or manual:

Symbol	Description
	Electrical power is on (–) — L'instrument est mis sous tension (–) and Electrical power is off (**O**)— L'instrument est mis hors tension (**O**)
~	Alternating current—Courant alternatif
	Direct current—Courant continu
	Protective conductor terminal, ground—Conducteur de protection
	Fuse—Fusible
	High voltage, risk of electrical shock—Haut tension, risque de choc électrique
	Pinch point hazard—To avoid injury during autosampler operation, keep your hands away from the syringe. Risque de pincement—Pour éviter des blessures pendant l'opération du passeur d'échantillon, tenez vos mains à distance de la seringue.

Symbol	Description
	Refer to the *Operating Instructions* to prevent risk of harm to the operator and to protect the instrument against damage. Référez-vous à ce manuel pour éviter tout risque de blessure à l'opérateur et/ou protéger l'instrument contre tout dommage.
	WEEE (Waste Electrical and Electronic Equipment) label—For more information, see the WEEE Information section in the "Installation and Qualification Documents for Chromatography Instruments" binder. Étiquette DEEE (Déchets d'Equipements Electriques et Electroniques) — Pour plus d'informations, référez-vous au chapitre WEEE Information dans le classeur "Installation and Qualification Documents for Chromatography Instruments".

At various points throughout the manual, messages of particular importance are indicated by certain symbols:

Tip: Indicates general information and information intended to optimize the performance of the instrument.

Important: Indicates that failure to take note of the accompanying information could cause wrong results or may result in damage to the instrument.

Important: Indique que ne pas tenir compte de l'information jointe peut conduire à de faux résultat ou endommager l'instrument.

Warning: Indicates that failure to take note of the accompanying information may result in personal injury.

Avertissement: Indique que ne pas tenir compte de l'information jointe peut entraîner des blessures corporelles.

1.2.2 General Safety Precautions

When working with analytical instrumentation, you should know the potential hazards of using chemical solvents.

Tips: Before initial operation of the autosampler, make sure that you are familiar with the contents of this manual.

Observe any warning labels on the device and refer to the related sections in these *Operating Instructions*.

For the general safety precautions in French, see page 6.

To avoid the possibility of personal injury or damage to the instrument, observe the following general safety precautions when operating the autosampler or performing maintenance and repair procedures:

- Install the HPLC system in a well-ventilated laboratory. If the mobile phase includes volatile or flammable solvents, do not allow them to enter the workspace.
- All instruments should be on the same ground.
- The autosampler is too heavy and/or bulky for one person alone to handle safely. Therefore, a team effort is required to lift or move the autosampler.
- When connecting the capillaries, make sure that the connectors are free from contaminants. Even minute particles may cause damage to the system (for example, the column).
- If the mobile phase includes volatile or flammable solvents, avoid open flames and sparks.
- If a leak occurs, turn off the instrument and remedy the situation immediately.
- When the panels are removed, dangerous electrical connections will be exposed. Disconnect the autosampler from all power sources before removing the panels. The enclosure should be opened by authorized service personnel only.
- Always replace blown fuses with the fuses recommend by Thermo Fisher Scientific (→ page 127).
- Replace faulty power cords and communication cables.
- Many organic solvents and buffers are toxic. Know the toxicological properties of all mobile phases that you are using.
- The toxicological properties of many samples may not be well known. If you have any doubt about a sample, treat it as if it contains a potentially harmful substance.

- Wear goggles when handling mobile phases or operating the instrument. An eyewash facility and a sink should be close to the unit. If any mobile phase splashes on the eyes or skin, wash the affected area and seek medical attention.
- Dispose of waste mobile phase in an environmentally safe manner that is consistent with all local regulations. Do not allow flammable or toxic solvents to accumulate. Follow a regulated, approved waste disposal program. Never dispose of flammable or toxic solvents through the municipal sewage system
- Use only standard solvents (MS grade) and buffers that are compatible with all parts that may be exposed to solvents. For information about the wetted parts, refer to the Technical Information section (→ page 135).
- In an UltiMate 3000 system, some components are made of PEEK™. While this polymer has superb chemical resistance to most organic solvents, it tends to swell when in contact with trichlormethane ($CHCl_3$), dimethyl sulfoxide (DMSO), or tetrahydrofuran (THF). In addition, it is attacked by concentrated acids, such as sulfuric acid and nitric acid or a mixture of hexane, ethyl acetate, and methanol. Swelling or attack by concentrated acids is not a problem with brief flushing procedures.
- Do not use PEEK tubing that is stressed, bent, or kinked.
- Before interrupting operation for several days or more or when preparing the autosampler for transport, observe the precautions for shutting down the autosampler (→ page 101).
- Use only the spare parts and accessories recommended in this manual. Substituting parts may impair the performance of the instrument.
- Do not use the autosampler in ways other than those described in this manual.

1.2.3 Consignes Générales de Sécurité

Veuillez noter: Avant de commencer à utiliser l'instrument, assurez-vous que vous vous êtes familiarisés avec le contenu de ce manuel.

Observez des étiquettes d'avertissement sur l'appareil et référez-vous aux sections correspondantes dans ce mode d'emploi.

- Veuillez observer les consignes générales de sécurité suivantes lorsque vous utilisez l'instrument ou que vous procédez à des opérations de maintenance:
- Installez le système HPLC dans un laboratoire bien ventilé. Si la phase mobile contient des solvants volatils ou inflammables, empêchez qu'ils ne pénètrent dans l'espace de travail.
- Tous les éléments du système devraient être à la même mis á terre.
- Le passeur d'échantillon est trop lourd et/ou encombrant pour une personne pour soulever ou déplacer seul. Par conséquent, un effort d'équipe est exigé pour soulever ou déplacer l'instrument.
- Lorsque vous connectez les capillaires, assurez-vous que les raccords sont exempts de tout contaminant. Même d'infimes particules peuvent causer des dommages au système (ex. colonne).
- Si la phase mobile contient des solvants volatils ou inflammables, évitez les flammes nues et les sources d'étincelles à proximité.
- Si une fuite survient, arrêtez l'instrument et résolvez le problème immédiatement.
- Quand les capots de protection de l'appareil sont démontés, vous êtes exposés à des connexions électriques sous haute tension deviennent accessibles. Débranchez le passeur d'échantillon de toute source d'alimentation électrique avant de retirer les capots. Ne démontez les capots de protection que si cela est explicitement demandé au cours de ces instructions.
- Remplacez toujours les fusibles grillés par des fusibles de rechange recommandés en ce manuel (→ page 127).
- Remplacez les cordons d'alimentation électrique et les câbles de communication défectueux.
- De nombreux solvants organiques et solutions salines sont toxiques. Informez-vous des propriétés toxicologiques de toutes les phases mobiles que vous utilisez.
- Les propriétés toxicologiques de nombreux échantillons peuvent être mal connues. Au moindre doute concernant un échantillon, traitez-le comme s'il contenait une substance potentiellement dangereuse.

- Portez des lunettes de protection lorsque vous manipulez des phases mobiles ou que vous utilisez l'instrument. Une installation permettant de se laver les yeux ainsi qu'un lavabo doivent se trouver à proximité du système. Si une phase mobile, quelle qu'elle soit, entre en contact avec vos yeux ou votre peau, rincez abondamment la zone affectée à l'eau, puis.
- Débarrassez-vous de tous les déchets de phase mobile de manière écologique, conformément à la règlementation en vigueur au niveau local. Empêchez impérativement l'accumulation de solvants inflammables et/ou toxiques. Suivez un programme d'élimination des déchets règlementé et approuvé. Ne jetez jamais de solvants inflammables et/ou toxiques dans le système municipal d'évacuation des eaux usées.
- Utilisez uniquement des solvants (qualité MS) et des solutions salines compatibles avec les matériaux exposés phase mobiles. Pour des informations sur les matériaux exposés, référez-vous à la section Technical Information (→ page 135)
- Dans un système UltiMate 3000, certaines composantes sont en PEEK™. Bien que ce polymère présente une excellente résistance chimique à la plupart des solvants organiques, il a tendance à gonfler lorsqu'il est en contact prolongé avec du chloroforme (CHCl3), du diméthyle sulfoxyde (DMSO) ou du tétrahydrofurane (THF). De plus, il est attaqué par des acides concentrés tels que l'acide sulfurique et l'acide nitrique ou d'un composé du hexane, éthyle acétate et méthanol. (Ces acides peuvent cependant être utilisés dans le cadre de procédures de nettoyage, à condition que l'exposition soit brève.)
- N'utilisez pas de tubes PEEK écrasés, pliés ou abimés.
- Avant d'interrompre le fonctionnement pendant plusieurs jours ou plus, observez les précautions figurant en Shutting Down the Autosampler (→ page 101).
- Utilisez seulement des pièces de rechange ou des accessoires recommandées en ce manuel. Utilisant d'autres pièces peut affecter les performances de l'instrument.
- N'utilisez pas le passeur d'échantillon de manière autre que celles décrites dans ce manuel.

1.3 Intended Use

The autosampler is an XYZ robotic system offering high flexibility and functionality. The autosampler provides straightforward automation and sample handling in analytical UHPLC (ultra-high performance liquid chromatography) and mass spectrometry applications, especially as part of the UltiMate 3000 system. However, the instrument can also be used with other HPLC systems, if adequate control inputs and outputs are available.

The autosampler is controlled by the **Chromeleon** Chromatography Management System. Being part of the UltiMate 3000 system, the autosampler can also be operated with other data systems, such as

- Analyst® , Compass™/ HyStar™, or Xcalibur™
  To do so, installation of the DCMS^{Link} (Dionex Chromatography Mass Spectrometry Link) software is required in addition to the installation of the data system.
- Empower™
  To do so, installation of the Dionex Instrument Integration software is required in addition to the installation of the data system.

For information about the availability, contact the Thermo Fisher Scientific sales organization for Dionex HPLC Products.

The autosampler should be used only be trained operators in a professional environment. The autosampler is intended for research use only. It is not intended for use in diagnostic procedures. If there is any question regarding appropriate usage, contact Thermo Fisher Scientific before proceeding.

Note that the autosampler may be operated only with recommended accessories and spares parts (→ page 137) and within the technical specifications (→ page 135). Observe the information about the solvent compatibility of the other UltiMate 3000 system modules. For more information, refer to the Operating Instructions for the modules.

Thermo Fisher Scientific cannot be held liable for any damage, material or otherwise, resulting from inappropriate or improper use of the instrument.

1.4 Federal Communications Commission (FCC) Note

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

2 Overview

2.1 Autosampler Configurations

The autosampler is available in the following configurations:

Description	Part No.
OAS-3300TXRS, including • 3-drawer stack cooler (4 °C to 40 °C) for 6 normal well plates (96 or 384 wells) or deep-well plates (96 wells) *or* 6 sample trays for 2 mL vials (54 positions per tray) The shipment includes: ♦ 6 sample trays for 2 mL vials (VT54) ♦ 6 normal well plates (96 wells) ♦ 6 deep-well plates (96 wells) • 3-valve housing with 1 valve drive (Aux valve) • LC injection valve (Valco™/Vici™ Cheminert™, 2-position, 6-port valve, stainless steel, 0.15 mm bore I.D., 1275 bar (18,500 psi)) • Sample loops: 20 µL loop (installed upon shipment) and 2 µL loop • Wash station—Dynamic Load and Wash (DLW) option with 100 µL holding loop (FEP) - installed upon shipment 100 µL high-performance holding loop (stainless steel) - optional	5845.0010
OAS-3600TXRS, same as OAS-3300TXRS, however with 6-drawer stack cooler (4 °C to 40 °C) for 12 normal well plates (96 or 384 wells) The shipment includes a set of 12 normal well plates (96 wells). Note that deep-well plates cannot be used.	5845.0020

Fig. 1 provides an overview of the main autosampler components (→ page 10).

2.2 Main Components

The main components of the autosampler as follows:

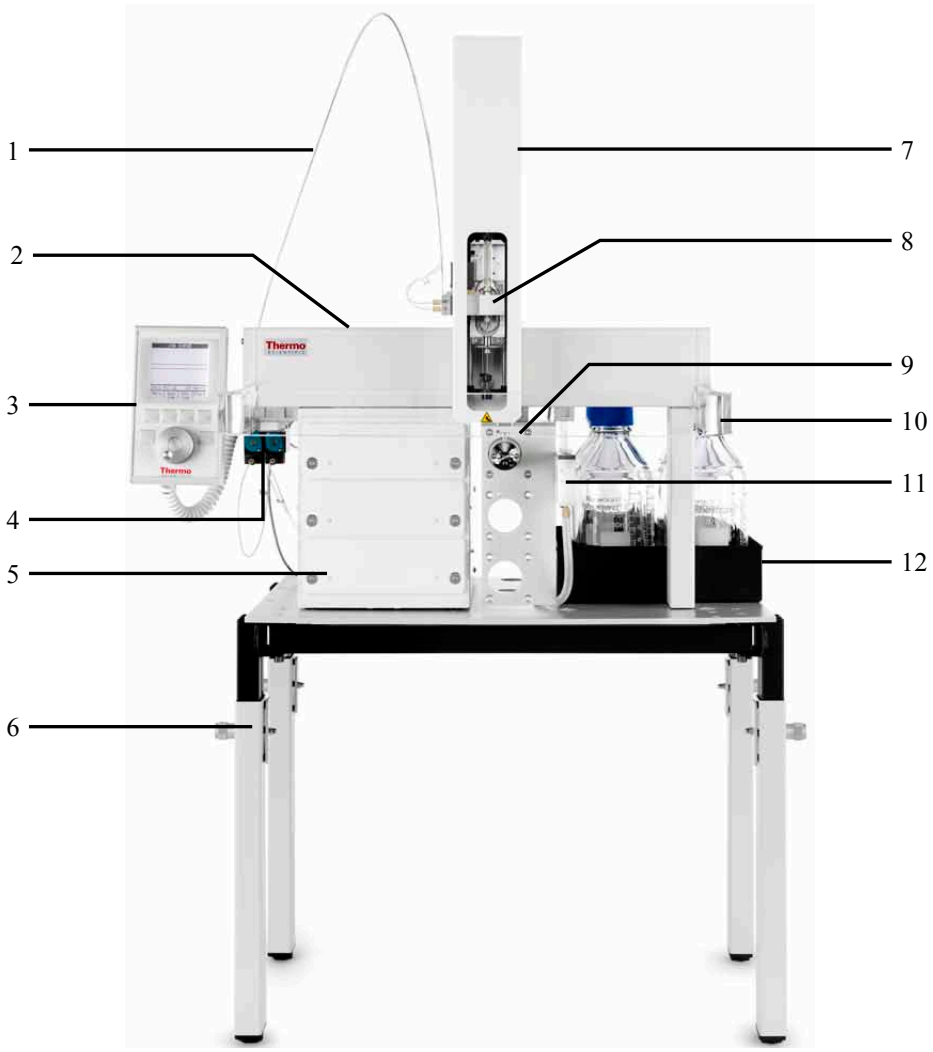


Fig. 1: Main autosampler components (here: OAS-3300TXRS)

No.	Description	No.	Description
1	Guide wire/wash liquid line assembly	2	x-,y-axes assembly
3	Control terminal	4	Pump module (DLW)
5	Stack cooler (3- or 6 drawers)	6	Table
7	Injection unit (z-axis)	8	Syringe holder assembly (DLW)
9	LC injection valve	10	Safety guard (transparent)
11	Wash station (DLW)	12	Reservoir tray

2.3 Rear Panel

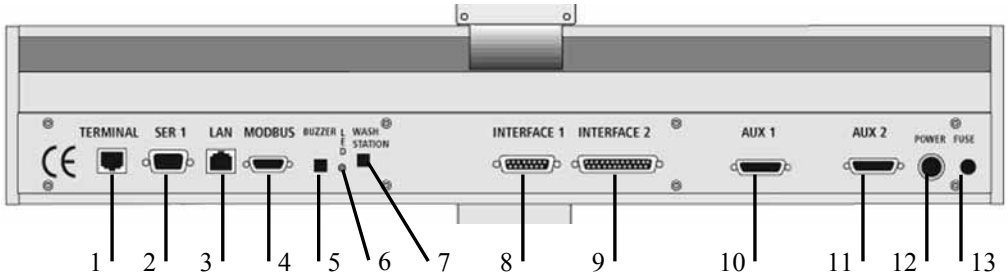


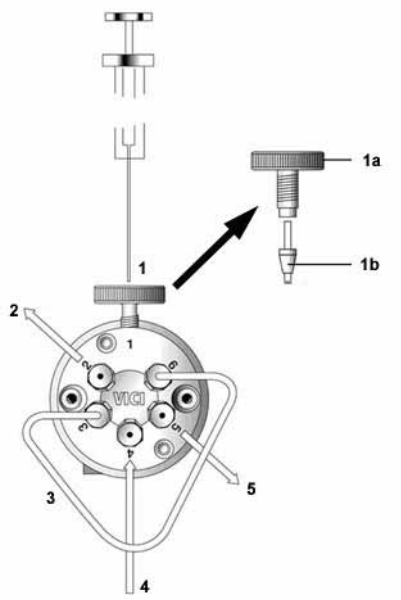
Fig. 2: Rear panel elements (x-axis)

No.	Description
1	Terminal—for connection of the control terminal
2	SER 1—for connection of the data system computer (serial (RS-232) communication; optional)
3	LAN—for connection of the data system computer (LAN (TCP/IP) communication; default)
4	MODBUS—for future use, for example, connection of serial valve drives
5	Buzzer A beep sounds to signal certain autosampler actions, for example, when the autosampler starts moving.
6	LED—indicating the following: LED is off: The autosampler is in normal operating mode. LED is flashing: The autosampler is in Loader Mode, for example, when creating a backup file or updating the firmware. For information about the PAL Loader software, see section 11.3(→ page 154). LED is illuminated: Data transfer is in progress.
7	Wash Station—for connection of the DLW pump module
8	Interface 1—for connection to the UltiMate 3000 pump by using the interconnect cable
9	Interface 2—for future use
10	Aux 1—for connection of a valve drive In the standard configuration of the autosampler, the LC injection valve connects here.
11	Aux 2—for future use, for example, for connection of an additional valve drive
12	Power—for connection of the basic autosampler power supply The stack cooler has a separate power supply (→ page 26).
13	Fuse—containing one fuse rated at 6.3AT/250 V

For information about the pin assignments of the connectors, refer to section 11.2 (→ page 149).

2.4 Injection Valve

The standard injection valve is a Cheminert 2-position, 6-port switching valve with a flat rotary plate and special needle guide. The components are connected to the valve as shown in the picture:



No.	Description	
1	Injection port (port 1) / Valve needle guide fitting, with:	
	No.	**Description**
	1a	Valve needle guide
	1b	Valve needle seal
2	Vent/waste (port 2)	
3	Sample loop (connected to ports 3 and 6)	
4	From pump	
5	To column (port 5)	

Fig. 3: Connections on injection valve

Valve Needle Guide and Valve Needle Seal

All valves have a special valve needle guide fitting (→ Fig. 3, no. 1). The valve needle guide holds the needle seal. This short length FEP tubing forms the seal around the needle. A stainless steel ferrule is tightened around the FEP sleeve to ensure a leak-proof fit.

To ensure reproducible sample injection and minimize carryover, observe the following:

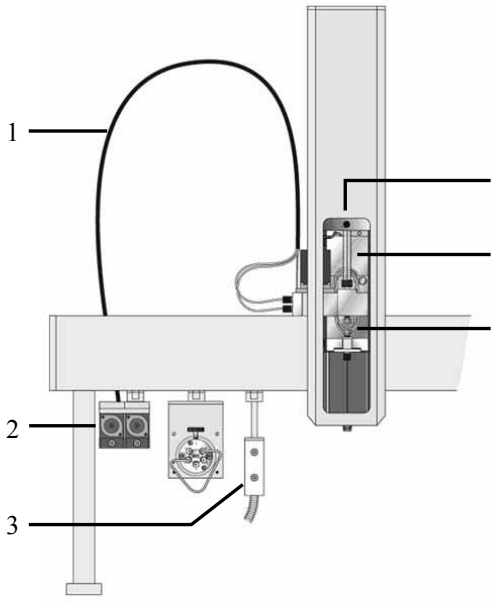
- Test the valve needle seal for tightness at regular intervals (→ page 116).
- Replace the valve needle seal at regular intervals (→ page 116).
- Clean the injection valve at regular intervals (→ page 118).
- Be sure that the needle penetration depth is set correctly (→ page 67).

Sample Loop

In the standard autosampler configuration, the injection valve is shipped with a 20 µL sample loop, which is preinstalled on the valve at the factory, and a 2 µL sample loop as an option. Other loop sizes are also available (→ page 141).

2.5 Dynamic Load and Wash (DLW)

Dynamic Load and Wash (DLW) provides a holding loop between injection needle and syringe as well as a pump module for two different wash liquids.



No.	Description	
1	Guide wire/wash liquid line assembly	
2	Pump module, including two self-priming micro pumps	
3	Wash station	
4	Syringe holder assembly, with	
	No.	**Description**
	4a	Holding loop
	4b	Syringe

Fig. 4: Dynamic Load and Wash - general overview

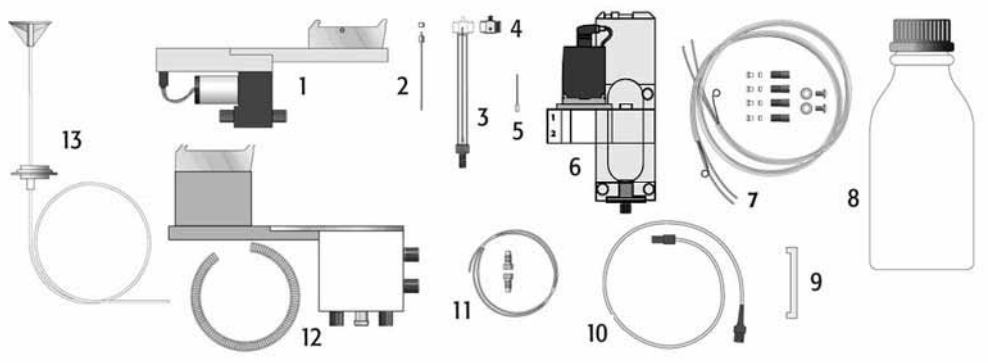


Fig. 5: Dynamic Load and Wash - main components

No.	Description	No.	Description
1	Pump module holder	2	Needle with needle seal
3	Syringe	4	Plunger holder
5	Flow diverter	6	Syringe holder assembly
7	Tubing kit	8	Wash liquid reservoir
9	Needle length guide tool	10	Wash station cable (pump module to basic autosampler)
11	Holding loop (FEP loop; installed in syringe holder assembly upon shipment)	12	Wash station
13	Wash liquid line (reservoir to pump module), including glass inlet filter (40 µm pore size)		

DLW key characteristics:

- The sample solution never contacts the syringe. It is held sandwiched in the holding loop.
- The wash liquids are pumped from back to front into the DLW system to intensely flush all critical parts that are in contact with the sample. For information about the wetted parts, refer to the Technical Information section (→ page 135).

The DLW option consists of two self-priming micro pumps, which are mounted on a dedicated bracket. The pump IN ports are connected to the wash liquid reservoirs; the OUT ports are connected to the DLW manifold. The sample is drawn into the holding loop, thus avoiding that the sample contaminates the DLW actuator/manifold and the syringe. (The DLW manifold and the DLW actuator are also part of the DLW syringe holder assembly. For details, see Fig. 19 on page 29.)

With dynamic load and wash, the syringe and holding loop are preloaded with wash liquid #1 at the cycle start. The sample is picked up and remains separated from wash liquid #1 by an air gap. After the injection, wash liquid #1 is pushed into the holding loop, followed directly by wash liquid #2 to flush the holding loop and critical valve paths.

The DLW syringe holder assembly is moved to the wash station for further cleaning steps and for preparing the syringe and holding loop for the next cycle.

2.6 Chromeleon Software

The autosampler can be controlled by the Chromeleon Chromatography Management System. To control the autosampler, an appropriate Chromeleon version and a **Timebase Class 1** Chromeleon license are required.

In addition, the Instrument Controller Components package (ICC), version 1.6.0.5 or later is required. The package is provided on the Chromeleon DVD and is installed automatically when Chromeleon is installed.

All software details in this manual refer to *Chromeleon 6.80*.

If you want to operate the autosampler with *Chromeleon 7,* refer to the following documents for information about how to perform the related processes in Chromeleon 7 (all documents are included in the Chromeleon 7 shipment):

- Chromeleon 7 Help—provides extensive information and comprehensive reference material for all aspects of the software.
- Quick Start Guide—describes the main elements of the user interface and guides you step-by-step through the most important workflows.
- Reference Card—provides a concise overview of the most important workflows.
- Installation Guide—provides basic information about module installation and configuration. For specific information about how a certain module, refer to the *Chromeleon 7 Instrument Configuration Manager Help*.

Also, note the following:

- Chromeleon 7 terminology is different from the terminology used in Chromeleon 6.80. For details, refer to the 'Glossary - Chromeleon 7,' which is available in the Documents folder of your Chromeleon 7 installation.
- Some functions may not yet be supported in Chromeleon 7.

For information about operating the autosampler from Chromeleon, refer to section 5.2 (→ page 74).

3 Installation

3.1 Facility Requirements

- Make sure that the installation site meets the power and environmental specifications listed in the Technical Information section (→ page 135).
- Avoid locations with extreme changes in temperature (such as direct sunlight or drafts) and high humidity.
- Allow sufficient clearance behind and to the sides of the autosampler for power connections and ventilation (at least 24 cm (10 inch) at the back).

3.2 Unpacking

All electrical and mechanical components of the autosampler are carefully tested before the instrument is shipped from the factory. After unpacking, inspect the instrument for any signs of mechanical damage, which might have occurred during transit.

Tips: Immediately report any shipping damage to both, the incoming carrier and Thermo Fisher Scientific. Shipping insurance will compensate for the damage only if reported immediately.

Keep the original shipping containers and packing material. They provide excellent protection for the instrument in case of future transit. The product warranty will not be honored if the autosampler is shipped in any other packaging.

The autosampler shipment includes several boxes, the number of which may vary, depending on the system configuration:

- One box (usually box 1) contains the 'basic' system, that is, the x-, y-axes assembly, control terminal, injection unit (z-axis), basic autosampler power supply, safety guard, connecting cables, and miscellaneous accessory parts, for example, screwdrivers.
- All other parts, for example, the autosampler table, stack cooler, accessories kit, and so on are shipped in separate boxes.

To unpack the consignment:

1. To unpack the box that contains the basic system:
   a) First, remove the injection unit and any other small accessories boxes *before* you attempt removing the x-, y-axes assembly.
   b) Carefully lift and remove the x-, y-axes assembly. Hold the y-axis in place while you remove the assembly.

c) Set the x-, y-axes assembly aside on a bench.

d) Unpack the remaining small boxes.

2. Unpack all other boxes included in the consignment.

3. Before connecting the autosampler and/or accessories to the power source, wait approximately four hours to allow the instrument to come to room temperature and to allow any condensation that might have occurred during shipping to evaporate. After four hours, check the autosampler and accessories; if condensation still exists, allow the autosampler to continue to warm up (without connecting it to the power source) until the condensation is completely gone.

3.3 Assembling the Autosampler

The autosampler is installed on a table that is included in the shipment. Assemble the table *before* you assemble the autosampler.

To assemble the autosampler, follow the steps below in the given order.

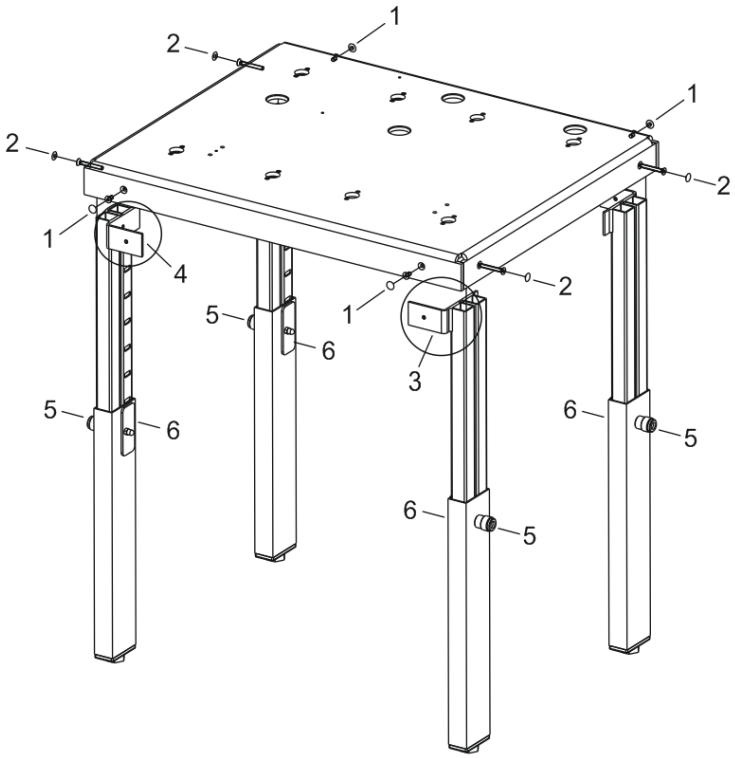
Tip: Use the screwdrivers from the box that contains the basic system to install the different parts, using the screws supplied with parts.

1. Assemble the table (→ page 19).
2. Install the stack cooler (→ page 21).
3. Install the x-axis (→ page 22).
4. Install the injection unit (z-axis) (→ page 23).
5. Install the safety guard and control terminal (→ page 25).
6. Connect the power supplies (→ page 26).
7. Install the LC injection valve (→ page 27).
8. Install the reservoir tray (→ page 27).
9. Install the DLW pump module (→ page 28).
10. Install the DLW syringe holder assembly (→ page 29).
11. Connect the wash liquid reservoirs (→ page 34).
12. Install and connect the DLW wash station (→ page 35).
13. Tighten the valve needle guide (→ page 37).

3.3.1 Assembling the Autosampler Table

To assemble the autosampler table, follow these steps:

1. Locate the table components, that is, the tabletop and legs, four short flat head screws (M5 x 10) and four long flat head screws (M5 x 40), eight screw caps, and an Allen wrench.
2. Attach the legs to the tabletop by using one short and one long screw for each leg as shown in the picture. Note that the table legs are slightly different, depending on the position for which they are intended.



No.	Description
1	Short screws (M5 x 10) and screw caps
2	Long screws (M5 x 40) and screw caps
3	Table leg (to be used on the front right and rear left)
4	Table leg (to be used on the front left and rear right)
5	Screws for table height adjustment
6	Retainer plate for table leg

Fig. 6: Assembling the autosampler table

3. Push the caps onto the screws.
4. Adjust the table height:
   a) Loosen the leg screw (no. 5 in Fig. 6) by turning the screw counterclockwise to the stop.
   b) Push the leg screw in the direction of the leg to release and make the leg freely moveable.
   c) Move the leg to the preferred position. Make sure that the retainer plate clicks properly into position.
   d) Secure the leg by turning the leg screw clockwise to the stop.

   When the autosampler is installed on the table, a team effort will be required for adjusting the table height.

5. *Optional*

   The tabletop is ready for left-side installation of the stack cooler.
   If you want to install the stack cooler on the right side of the tabletop, you have to relocate the foot stops to the appropriate position for right-side installation (→ Fig. 7).

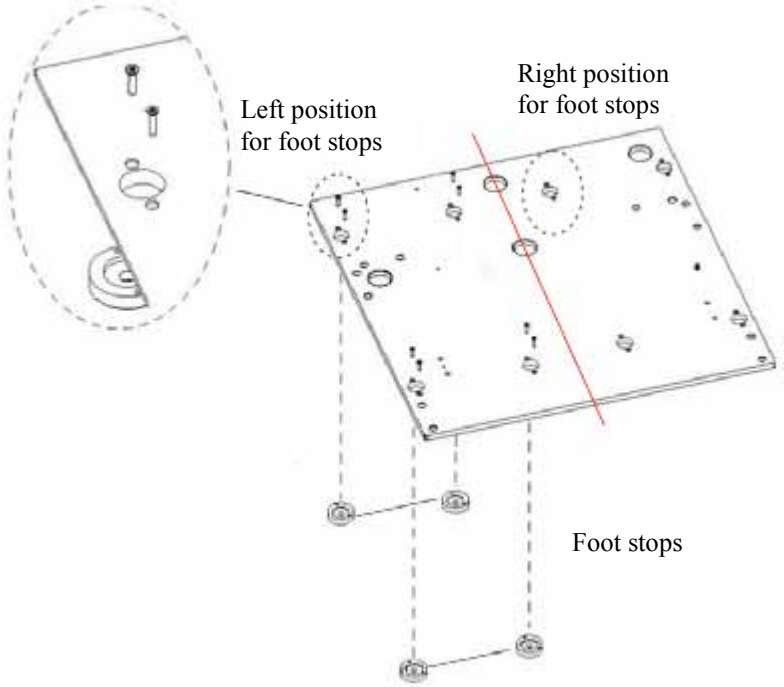


Fig. 7: Relocating the foot stops

3.3.2 Installing the Stack Cooler

The autosampler table is preconfigured for left-side installation of the stack cooler.

Tip: Left-side stack cooler installation works well with the TSQ Quantum™, Vantage™, and Velos™ mass spectrometers. On the Exactive™ mass spectrometer, the ion source is installed on the right side of the mass spectrometer. To minimize the distance between the autosampler injection valve and the Exactive ion source, install the stack cooler on the right side of the table.

1. Decide whether the stack cooler needs to be installed on the left side or right side of the table.

   If you want to install the stack cooler on the right side, relocate the foot stops on the table to the appropriate positions as shown in Fig. 7 (→ page 20).

2. Place the stack cooler onto the table in the desired location. Make sure that the mounting feet reside in the designated cutouts on the foot stops in the table.

3. Secure the stack cooler in place, by using four pan head screws (M5 x 8 mm; included in the shipment). Tighten the screws carefully to avoid overtightening, and thus damage to the rubber adapters on the stack cooler.

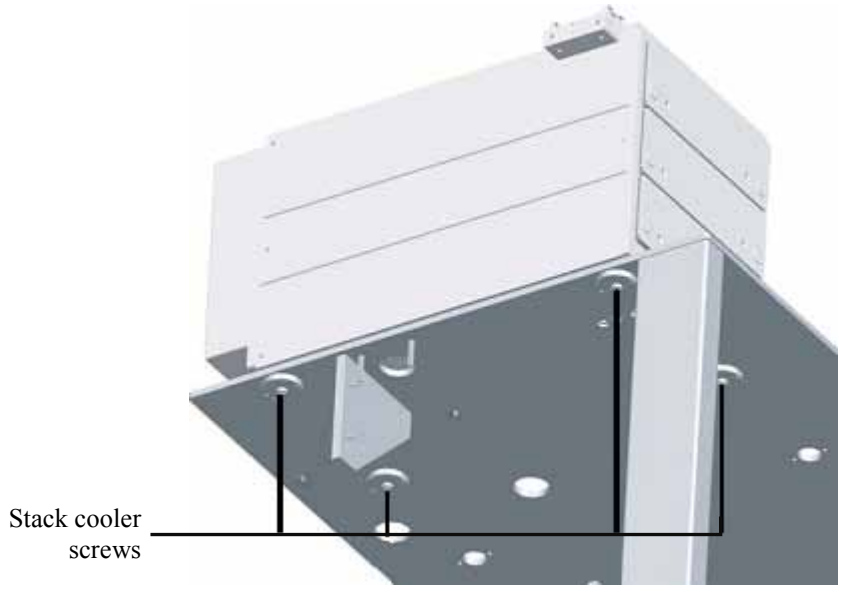


Fig. 8: Stack cooler installed (bottom view)

3.3.3 Installing the x-Axis

1. Attach the separate autosampler leg, by using two pan head screws (M5 x 8 mm; included in the shipment). Tighten the screws carefully to avoid overtightening and thus, damage to the rubber adapters on the leg.

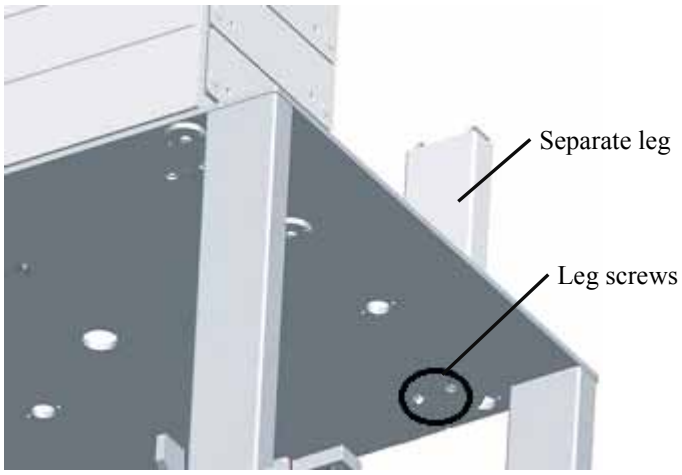


Fig. 9: Separate leg installed (bottom view)

2. Loosen the Torx™ screw on each of the three mounting clamps in which the x-axis is installed. One clamp is on the top of the autosampler leg; the other two clamps are on the sides of the stack cooler, on front left and front right.

3. Carefully lift the x-axis assembly on top of the stack cooler and leg, with the mounting clamps teeth fitting into the grooves on the bottom of the x-axis.

   With left-side installation of the stack cooler, install the x-axis so that the right-hand side of the x-axis is flush with the separate leg. This ensures that the DLW pump module can be installed correctly on the left-hand side of the x-axis in a later step.

4. Make sure that the clamps fit completely into the grooves. Alternately, retighten the Torx screws until the mounting clamps are firmly in place.

5. Verify that the clamps are correctly attached to the x-axis.

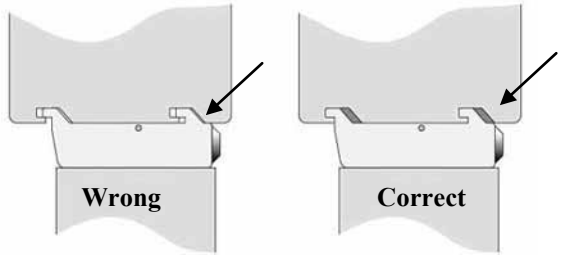


Fig. 10: Mounting clamps

3.3.4 Installing the Injection Unit (z-Axis)

Installation of the injection unit (z-axis) should be performed by two persons. One person should hold the injection unit in place while the other person inserts the mounting screws.

1. Remove the three Torx screws (marked A, B, and C in the picture) that are used to attach the injection unit to the y-axis.

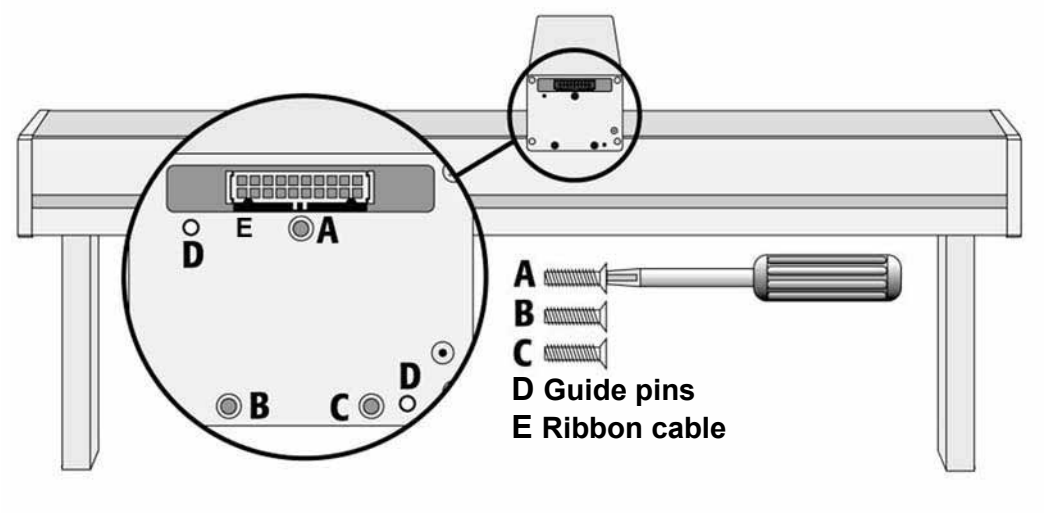
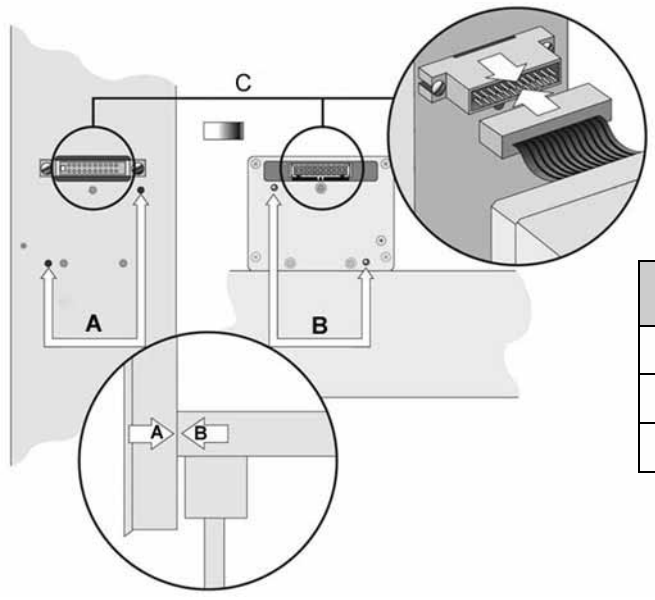


Fig. 11: Injection unit screws and guide pins

2. Connect the ribbon cable E (→ Fig. 11) to the corresponding connector on the injection unit. The cable protrudes from the front end of the y-axis. If it does not, reach to the bottom of the y-axis and pull the cable out with your finger.
3. Hold the injection unit in place against the y-axis. Make sure that the two guide pins on the y-axis fit into the guide holes on the injection unit.



No.	Description
A	Guide holes
B	Guide pins
C	Ribbon cable connection

Fig. 12: Connecting the injection unit ribbon cable

4. Tighten the injection unit to the y-axis:
   a) Place one of the screws onto the end of the supplied Torx driver.
   b) Slide the clear plastic cover on the injection unit all the way to the top.
   c) Locate the three large holes in the black anodized frame attached to the z-axis inside the injection unit.
   d) Slide the frame upwards until the top hole is centered on the top threaded hole at the end of the y-axis.
   e) Insert and securely tighten Torx screw A.

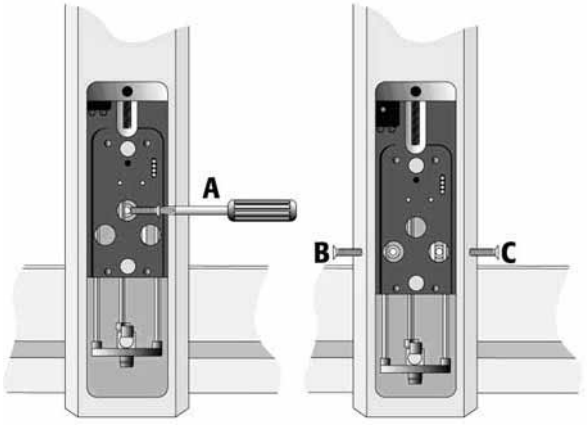


Fig. 13: Inserting the injection unit Torx screws

   f) Insert and tighten the remaining Torx screws B and C, respectively (→ Fig. 13). To insert the screw C into the related hole, you might have to move the elastic cord slightly to the left.

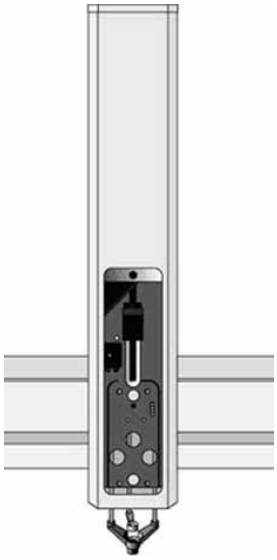


Fig. 14: Injection unit (z-axis) installed

3.3.5 Installing the Safety Guard and Control Terminal

The control terminal can be installed on either the left side or right side of the x-axis. The following steps refer to the left-side installation. A team effort is required for installing the safety guard and control terminal.

1. Together with one end of the safety guard, install the mounting bracket for the control terminal to the left side of the x-axis, by using the longer thumbscrew.

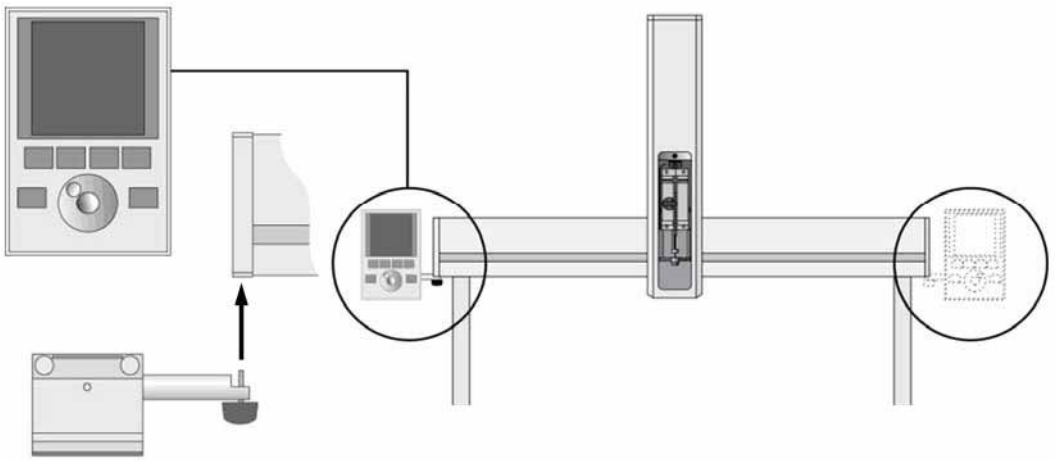


Fig. 15: Installing the control terminal (safety guard not visible)

2. Tighten the other end of the safety guard to the right side of the x-axis, by using the shorter thumbscrew.
3. Connect one end of the white coiled cable to the rear of the control terminal and the other end to the TERMINAL connector on the rear of the x-axis (→ Fig. 2, page 11).
4. The control terminal is usually preinstalled on the mounting bracket during shipment. If it is not, attach the terminal so that the groove on the rear of the terminal sits on the mounting bracket.

For information about how to use the control terminal and the conventions used to enter, edit, and view information, see section 5.3.1 (→ page 83).

3.3.6 Connecting the Power Supplies

The autosampler shipment includes two power supplies: one for the basic autosampler and one for the stack cooler. The power supply for the stack cooler has a built-in control unit with display.

To connect the basic power supply for the autosampler

1. Locate the power supply, the DC power cord, and the AC power cord.
2. Verify that the power supply switch is set to OFF.
3. Connect one end of the DC power cord to the power supply unit and the other end to the POWER connector at the rear of the x-axis (→ Fig. 2, page 11).
4. Connect the female end of the AC power cord to the power supply and then connect the male end to an AC power outlet.

To connect the power supply for the stack cooler

1. Locate the power supply and the AC power cord.
2. Verify that the power supply switch is set to OFF.
3. One end of the DC power cord is preconnected on the stack cooler. Connect the free end of the cable to the connector labeled PELTIER THERMOSTAT on the rear of the power supply.
4. Connect the female end of the AC power cord to the power supply and then connect the male end to an AC power outlet.
5. Set the switch on the power supply to ON.
6. Turning on the power, puts the unit into the self-check mode. Observe the display. After a few seconds, the temperature reading appears on the display.

   For information about how to change the temperature, see section 4.4 (→ page 71).
7. Consider setting the power switch to OFF again.

3.3.7 Installing the LC Injection Valve

The LC injection valve is connected to and controlled through the auxiliary interface (AUX) of the autosampler.

1. Locate the injection valve drive and loosen the screw on the mounting clamp.
   In the standard configuration of the autosampler, the valve drive is installed in a 3-valve housing, with the injection valve and rotor preinstalled on the drive.
2. Attach the 3-valve housing to the x-axis, depending on the installation position of the stack cooler, to the right of the stack cooler (with left-side installation of the stack cooler) or to the left of the stack cooler (with right-side installation of the stack cooler). Observe the following:
   - ♦ IMPORTANT: Allow sufficient clearance (at least 1.5 cm) between the 3-valve housing and the stack cooler to avoid that the injection unit hits the valve housing when moving down to the bottom drawer of the stack cooler.
   - ♦ Make sure that the clamp fits completely into the groove, and tighten the screw.
3. Verify that the clamp is correctly attached to the x-axis (→ Fig. 10, page 22).
4. Connect the control cable from the valve drive to the AUX 1 connector on the rear of the autosampler (→ Fig. 2, page 11).

3.3.8 Installing the Reservoir Tray

The position of the stack cooler determines the position of the reservoir tray.

Place the reservoir tray on the table at the appropriate position as shown in the picture. For secure positioning, make sure that the reservoir foot stops reside properly in the position holes.

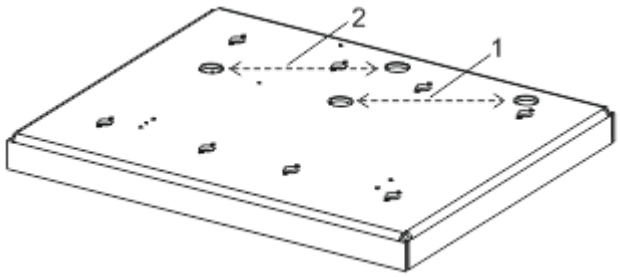


Fig. 16: Installing the reservoir tray

No.	Description
1	Tray position with left-side installation of the stack cooler
2	Tray position with right-side installation of the stack cooler

3.3.9 Installing the DLW Pump Module

The DLW pump module is shipped as a preinstalled assembly consisting of a pump holder with two micro pumps (wash liquid delivery pumps) and wash liquid lines preconnected to the pump out ports. The wash liquid lines are part of the guide wire/wash liquid line assembly that is preconnected also to wash liquid inlet ports on the DLW syringe holder assembly (→ page 29).

The pump module has to be installed on the far left of the x-axis (independent of the position of the stack cooler). The wash liquid lines are connected to the pumps, and thus moving across the pump holder with the injection unit (z-axis) could kink the guide wire.

1. Locate the DLW pump module and loosen the screw on the mounting clamp of pump holder.
2. Attach the pump holder to the x-axis. Make sure that the clamp fits completely into the groove, and tighten the screw.

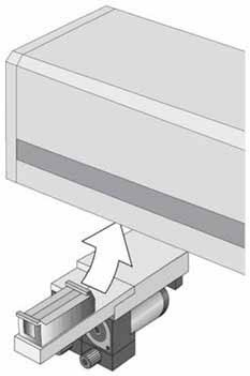


Fig. 17: Installing the pump holder on the x-axis
(here shown without guide wire/wash liquid line assembly)

3. Verify that the clamp is correctly attached to the x-axis (→ Fig. 10, page 22).
4. By using the provided cable, connect the pump holder to the x-axis. Connect one end of the cable to the middle socket on the rear of the pump module and the other end to the WASH STATION connector on the rear of the x-axis.

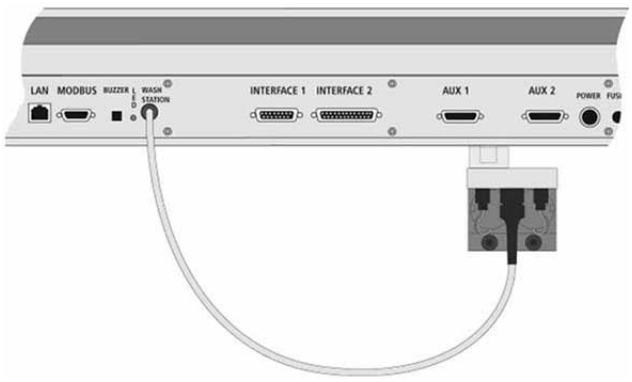
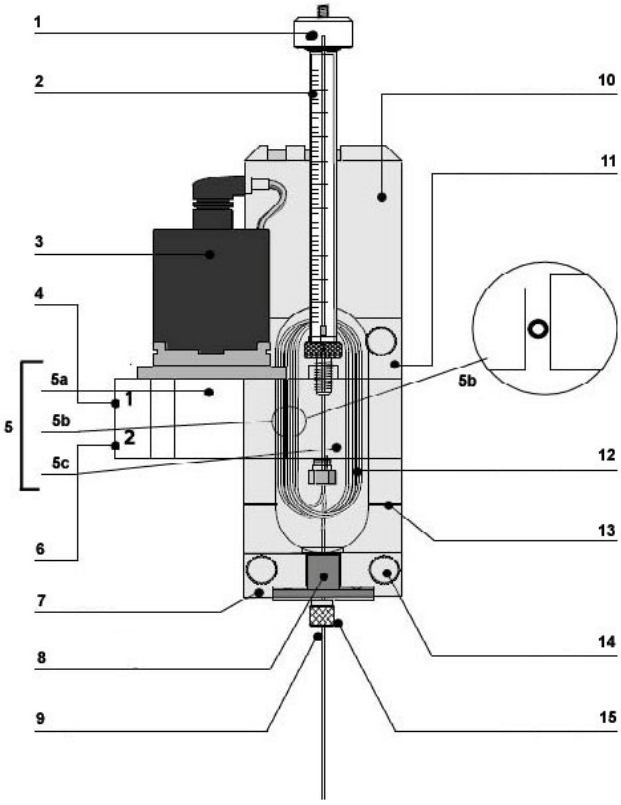


Fig. 18: Pump module connected to the x-axis

3.3.10 Installing the DLW Syringe Holder Assembly

Fig. 19 provides an overview of the DLW syringe holder assembly.



No.	Description
1	Plunger holder
2	Syringe (100 µL)
3	Actuator/solenoid
4	Wash liquid inlet 1
5	Manifold with 5a—Solvent selector 5b—O-ring Polyfluor 5c—Syringe adapter
6	Wash liquid inlet 2
7	Needle adapter block
8	Needle holder assembly
9	Needle guide stop
10	Actuator control PCB
11	Syringe holder
12	Holding loop
13	Positioning guide line
14	Needle adapter holding screws
15	Needle retaining nut

Fig. 19: DLW syringe holder assembly

The DLW syringe holder differs from standard liquid syringe holders: The DLW manifold is attached to the syringe holder. The DLW actuator/solenoid and the holding loop connecting the syringe inlet (bottom) and needle are attached to the DLW manifold. All of these parts are preinstalled at the factory.

The installation sequence includes the following steps:

1. Install the syringe in the syringe holder (→ page 30).
2. Install the syringe holder assembly in the injection unit (→ page 31).

3.3.10.1 Installing the DLW Syringe

The following steps refer to installing the DLW syringe into the syringe holder assembly during initial installation of the autosampler while the syringe holder assembly is not yet installed in the injection unit. To replace the syringe later, that is when the syringe holder assembly is installed in the injection unit, you have to follow the steps in section 7.4 (→ page 121) to avoid damage to the needle.

1. Remove the foil that protects the DLW syringe holder assembly during shipment.
2. The needle has been preinstalled at the factory in the syringe holder assembly.
   However, to avoid damage to the needle during the installation of the syringe holder assembly, remove the needle from the assembly:
   Loosen the needle retaining nut (→ Fig. 19, page 29), remove the needle from the assembly, and set it aside. Be careful not to lose the retaining nut and the needle seal that is installed on the syringe end of the needle.
3. Prime the DLW syringe.
   It is critical that the syringe is primed before installation. Therefore, prime the syringe manually *before* you install it.
4. Remove the protection guide from the syringe holder assembly.
5. Insert the syringe into the holder and tighten the syringe by holding it at the lower metal mount. This is important as holding the glass barrel while tightening may damage the seal where the glass meets the metal.

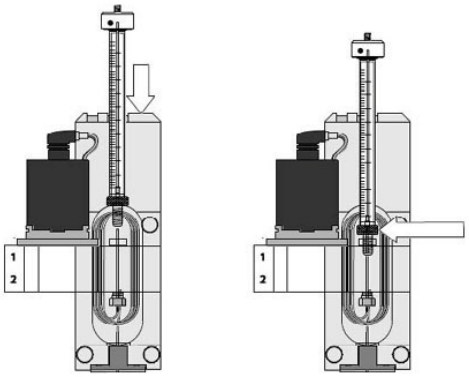
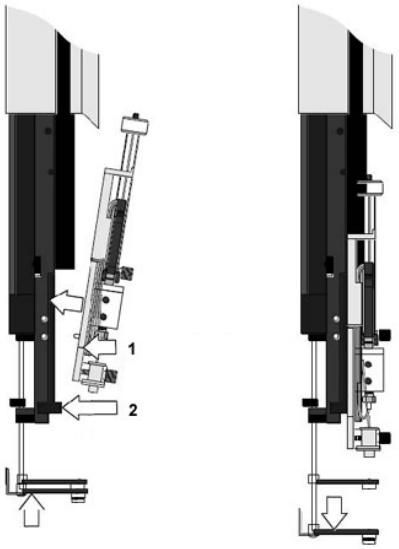


Fig. 20: Installing the syringe into the holder

3.3.10.2 Installing the DLW Syringe Holder Assembly in the Injection Unit

1. *Before* you install the syringe holder assembly, be sure that the needle has been removed (→ step 2, page 30).
2. Thermo Fisher Scientific recommends installing the DLW syringe holder assembly when the autosampler is powered off. When the autosampler is powered off, the injection unit can be moved freely in the x-, y-, and z-directions. If the power to the autosampler is on, power off the autosampler by the power switch on the power supply.
3. With your hand, move the injection unit aside and to the front to allow free movement of the syringe slider.
4. Lower the syringe slider as shown in Fig. 21 to gain space for installing the syringe holder assembly.

   Match the magnetic pins of the syringe holder with the counter positions on the syringe slider. The position of the guide pin holes can be matched with the DLW positioning guide line, which is marked on the syringe plate.



No.	Description
1	DLW positioning guide line
2	Guide pin holes

Fig. 21: Inserting the DLW syringe holder assembly in the injection unit

5. Press the syringe holder assembly firmly against the syringe slider so that the holder clicks into place.

   Do not press against the DLW actuator/solenoid. Its mounting to the DLW manifold is fragile; it might break.

6. Fix the syringe holder assembly to the syringe slider by tightening the knurled screw a few turns.

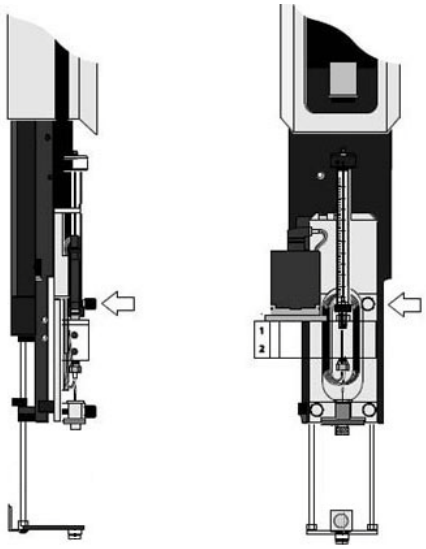


Fig. 22: Fixing the syringe holder to the syringe slider

7. Move the plunger up (plunger holder) until the thread of the screw catches the thread of the plunger bushing and tighten the screw to fix the plunger holder.

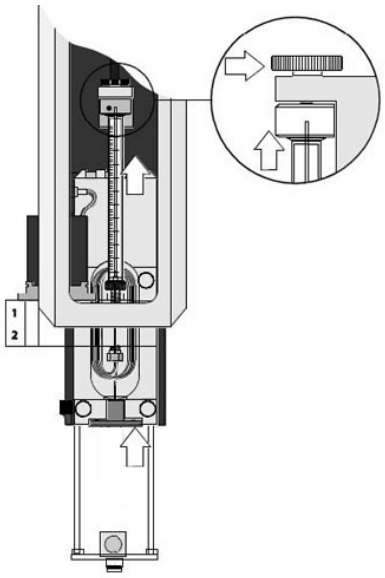


Fig. 23: Connecting the syringe plunger holder

8. Tighten the holding screw to secure the syringe holder position.

9. Reinstall the needle, making sure that the needle is installed leak-tight to the syringe:

   a) Verify that the needle seal is still present on the syringe end of the needle. If you have to reinstall the seal, be careful when slipping it over the needle to avoid that the sharp needle edges cut into the seal, resulting in particles that could clog the needle. Verify that the hole is open and that no particles are in the path.

   b) Verify that the needle retaining nut is still present on the needle. If it is not, slide the nut onto the needle, from the needle tip end.

   c) Unclick the needle holder assembly (→ Fig. 19, page 29), by pulling it toward the front, insert the needle tip into the needle guide, and then click the needle holder assembly back into place.

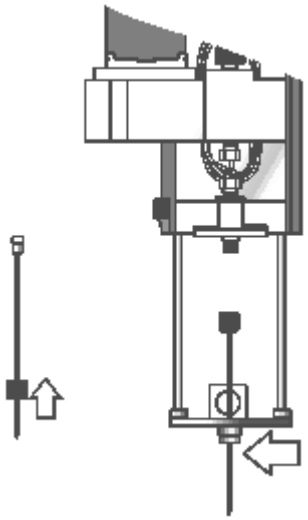


Fig. 24: Inserting the needle

   d) Move the needle up and, by the retaining nut, tighten the needle firmly to the needle holder assembly.

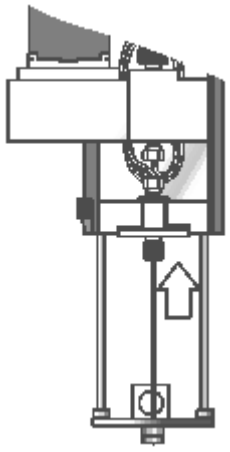


Fig. 25: Tightening the needle

10. Move the lower needle guide carefully up and down to make sure that the needle tip does not catch on the guide.

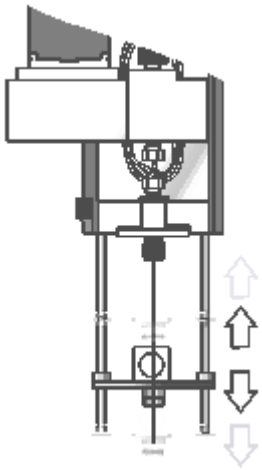
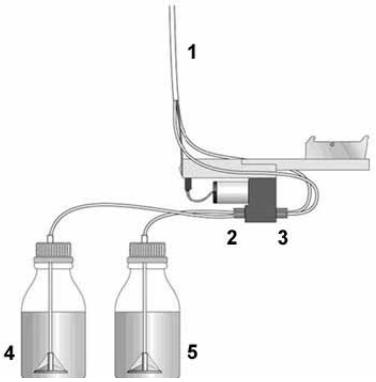


Fig. 26: Moving the needle guide up and down

3.3.11 Connecting the Wash Liquid Reservoirs

Connect the liquid lines from the wash liquid reservoirs to the inlet connectors of the pump module.



No.	Description
1	Guide wire/wash liquid line assembly (preconnected to pump out ports)
2	Pump In ports
3	Pump Out ports
4	Wash liquid 1
5	Wash liquid 2

Fig. 27: Wash liquid reservoirs connected to the pump module

Tip: It may happen that the wash liquid delivery pumps fail to prime at initial operation. Therefore, before connecting the liquid lines to the pump inlet ports, wet the pump at the inlet ports, and only then make the connection.

3.3.12 Installing and Connecting the DLW Wash Station

You can attach the DLW wash station at any position along the x-axis. However, Thermo Fisher Scientific recommends installing the wash station as close as possible to the injection valve to make the travel path of the injection unit from the valve to the wash station as short as possible, and thus to keep the cycle time as brief as possible.

Fig. 28 shows two options for installing the modules, favoring a short connection from the injection valve to the other HPLC system components on the one hand, and having the wash station close to the injection valve on the other hand.

Keep in mind that the DLW pump module must always be installed on the far left of the x-axis (→ page 28).

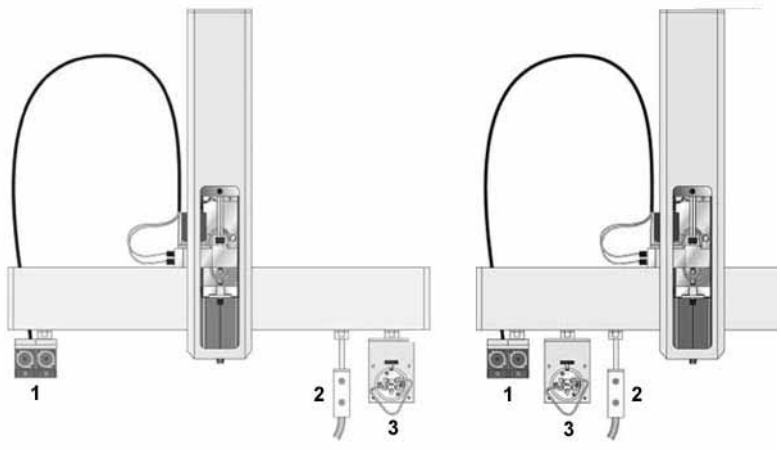


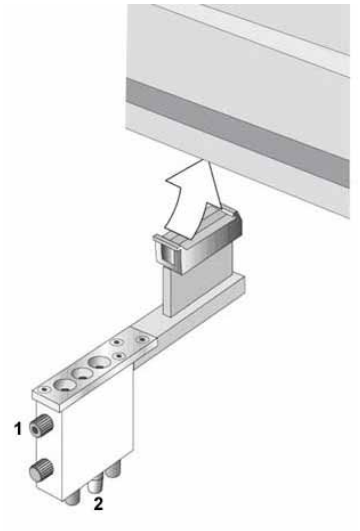
Fig. 28: Options for wash station installation

No.	Description
1	DLW pump module
2	DLW wash station
3	Injection valve

Such a configuration also has the advantage that you can connect the waste line from the injection valve to the front waste inlet of the wash station module.

To install the wash station, follow the steps below:

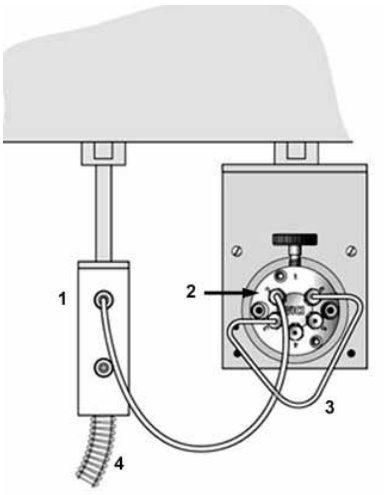
1. Locate the DLW wash station and loosen the screw on the mounting clamp.
2. Attach the wash station to the x-axis at the desired position. Make sure that the clamp fits completely into the groove, and tighten the screw.



No.	Description
1	Connection port for waste line coming from injection valve
2	Connection port for waste tubing to waste container

Fig. 29: Installing the wash station on the x-axis

3. Verify that the clamp is correctly attached to the x-axis (→ Fig. 10, page 22).
4. Connect the waste line from the injection valve to the wash station:
   a) On the injection valve, connect the waste line to port 2.
   b) On the wash station, remove the dummy plug on the upper front waste port (marked 1 in Fig. 29) and connect the waste line from the injection valve to this port, routing the waste line between the valve and the sample loop as shown in Fig. 30.



No.	Description
1	Wash station - upper waste port
2	Injection valve - port 2
3	Sample loop
4	Waste tubing to waste container

Fig. 30: Waste line and waste tubing installed

c) Verify that the lower front waste port is sealed with a dummy plug.

Tip: If your autosampler configuration includes two injection valves, connect the waste line from the second valve to the lower front waste port.

5. Connect the wash station waste tubing:
   a) Remove the dummy plug from the center port at the bottom of the wash station (marked 2 in Fig. 29).
   b) Connect the waste tubing to this port.
   c) Route the free end of the waste tubing into an appropriate waste container. Observe the following:
      - The waste tubing must remain below the connection port and must not be bent or kinked at any point.
      - The waste container must be below the injection valve to allow the liquid to flow off.
      - The free end of the tubing inside the waste container must always be above the liquid level in the waste container at any time.

3.3.13 Tighten the Valve Needle Guide

The valve needle guide is preinstalled on the injection valve. To tighten, turn the needle guide to the stop.

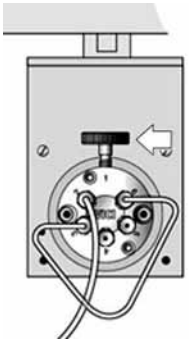


Fig. 31: Valve needle guide

For more information about the valve needle guide, refer to section 2.4 (→ page 12).

3.4 Positioning the Autosampler in the UltiMate 3000 System

When the autosampler is part of an UltiMate 3000 system, you should stack the system modules, for example, as shown in Fig. 32. However, the arrangement of the system modules depends on the application. When connecting the system modules to the Chromeleon data system computer, follow the guidelines provided on the next page.

Fig. 32: Module arrangement for an UltiMate 3000 XRS system (example)

To connect the system modules of an UltiMate 3000 system to the Chromeleon data system computer follow these guidelines:

All modules of the UltiMate 3000 system (except for an SRD-3x00 Solvent Rack) can be connected separately to the Chromeleon data system computer. However, Thermo Fisher Scientific recommends interconnecting the modules whenever possible.

If the UltiMate 3000 system includes the following modules …	**The modules are connected to the Data System Computer as follows:**
OAS-3x00TXRS	Directly
TCC-3000	Directly
VWD-3x00 or FLD-3x00	Directly
LPG-3400XRS	Directly
OAS-3x00TXRS	Directly
TCC-3000	From USB hub on the detector
DAD-3000 or MWD-3000	Directly
LPG-3400XRS	Directly
OAS-3x00TXRS	Directly
TCC-3000	From USB hub on the pump
VWD-3x00 or FLD-3x000	From USB hub on the pump
RS (*not* XRS), SD, or BM pump	Directly
OAS-3x00TXRS	Directly
TCC-3000	From USB hub on the detector
DAD-3000 or MWD-3000	Directly
RS (*not* XRS), SD, or BM pump	From USB hub on the detector

3.5 Connecting the Autosampler

3.5.1 Connecting the Power Cords

The autosampler has two power supplies: one for the basic autosampler system and one for the stack cooler.

Use the power cords included in the autosampler shipment to connect the power supplies to the main power source as described in section 3.3.6 (→ page 26).

3.5.2 Setting Up Communication with the Data System Computer

On the rear panel, the autosampler provides two ports for communication with the Chromeleon data system computer:

- LAN for communication via TCP/IP
- SER1 for serial communication via RS-232

The autosampler is shipped with TCP/IP as the default communication type.

Decide which communication type you want to use and set up the communication as described in the following sections:

- Setting up Ethernet/LAN communication (→ section 3.5.2.1)
- Setting up serial communication (→ page 43)

3.5.2.1 Setting Up Ethernet/LAN Communication

The autosampler is shipped with TCP/IP as the default communication type. Thermo Fisher Scientific recommends using an instrument LAN connection between the autosampler and the Chromeleon data system computer.

This type of connection is independent from the office LAN and requires that

- An additional network interface card is available in the data system computer.
- Different IP addresses are used on the office LAN and on the instrument LAN. Contact your network administrator for information about which IP address ranges can be used for your instrument LAN.

The autosampler is shipped with preset TCP/IP communication settings:

- IP address: 192.168.0.1
- Subnet mask: 255.255.255.0
- Default gateway: 0.0.0.0

These settings may not match the needs of the LAN in which the autosampler will be used and thus, may need to be adapted (see steps below).

Follow this sequence of steps:

1. Verify that the data system computer has an office LAN network card installed and configured.

2. *Depends on the availability of an additional network interface card in the computer*

   A—An additional network interface card needs to be installed

   a) Install the additional network interface card in the computer, following the instructions of the manufacturer.

   b) Configure the network card for the instrument LAN, observing the following:

      - Configure TCP/IP as the only protocol on this network card.
      - Assign the IP address, subnet mask, and gateway.

        Contact your network administrator for information about which settings can be used.

        Thermo Fisher Scientific recommends the following settings:
        IP Address (additional network card): 172.16.0.101
        Subnet mask: 255.255.0.0
        Standard Gateway: 0.0.0.0

        The subnet mask determines which part of the IP address defines the network and which part defines the devices connected to the network.

      - Take a note of the IP address, subnet mask, and standard gateway.
        You will need them in a later step as the settings from the configuration dialog must match the settings on the control terminal.

   B—An additional network interface card is already installed and configured

   Take a note of the IP address, subnet mask, and standard gateway. You will need them later as the settings from the configuration dialog must match the settings on the control terminal.

3. Connect the LAN port on the autosampler to the LAN port on the data system computer:

   - *To control no other instrument but the autosampler from the computer*
     Use the LAN cable that is shipped with the autosampler for the connection.
   - *To control the autosampler and other TCP/IP-enabled instruments from the computer*

     Use an Ethernet hub and standard network cables for the connection.

4. On the control terminal, navigate to the **Communication** menu.
   The path is **Menu >** highlight **Setup** (highlight, but not select by pressing the ENTER button) **> F3** function key (the key is not labeled) > ENTER **>** highlight **Communication** and press the ENTER button.

   Keep in mind that the settings on the control terminal must match the settings from the configuration dialog of the additional network card for the instrument LAN.

   a) Verify that the communication type (**CommPort**) is set to **LAN**. If it is not, change the setting.

b) Check and change the settings for the IP address (**IpAddr1** through **IpAddr4**) as necessary.
Note that the autosampler must have a *unique* IP address. With the recommended Subnet mask setting, the first two groups of digits *must* be identical to the IP address for the network card for the instrument LAN; the fourth group *must* be different.

Example:

IP Address (Additional Network Card)	**IP Address on the Communication menu Enter as follows:**		
172.16.0.**101**	172.16.1.**200**	IpAddr1	172
		IpAddr2	16
		IpAddr3	1
		IpAddr4	**200**

c) Check and change the settings for the subnet mask (**SubNet1** through **SubNet4**) as necessary. The recommended subnet mask setting is: 255.255.0.0
The subnet mask *must* be identical to the subnet mask for the network card for the instrument LAN. The syntax is similar to the IP address (see example above).

d) Do not enter a gateway address (**StdGateway1** through **StdGateway4**). The setting is 0.0.0.0

Tips: The *Chromeleon Help* provides general guidelines and an example step-by-step procedure for setting up TCP/IP control.

The PAL Loader software provides a quick way to check whether communication can be established with the autosampler (→ page 159).

3.5.2.2 Setting Up Serial Communication (Optional)

The preferred type of communication between the autosampler and the Chromeleon data system computer is via an Ethernet/LAN (TCP/IP) connection (→ page 40). If you want to set up serial communication instead, follow the step below. Note that the autosampler cannot be connected via the RS-232 ports on a Thermo Scientific Dionex™ UCI-50 or UCI-100 Universal Chromatography Interface.

1. Connect the SER1 port on the autosampler and a free COM port on the data system computer, using a serial cable (crossed wiring). The following cables are available as an option:

Cable	Part No.
RS-232 connection cable to establish the serial communication between the autosampler and the Chromeleon data system computer:	
RS-232 serial communication cable, 3 m long	6845.0010
RS-232 serial communication cable, 6 m long	6845.0011

The COM port settings are usually defined in the Windows Device Manager (path **Windows\Control Panel\Device Manager\Ports**). The picture shows the standard settings for serial communication.

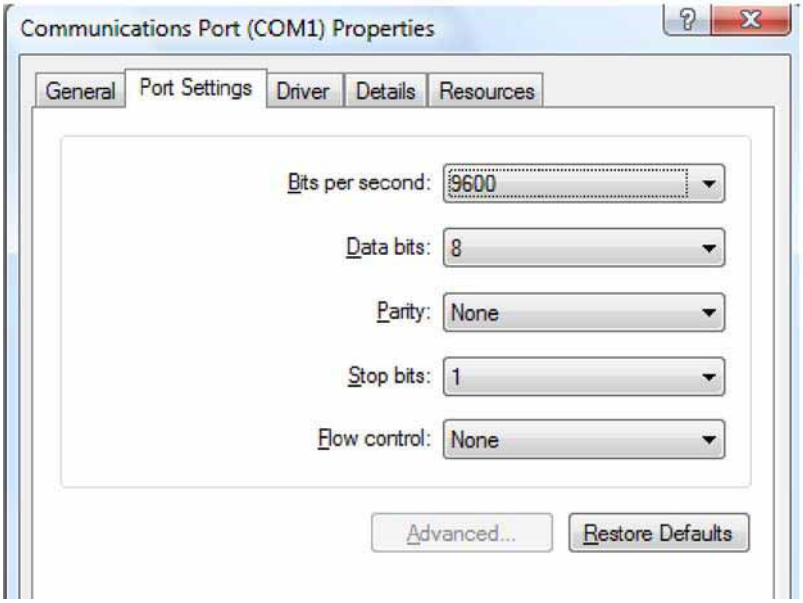


Fig. 33: Port Settings dialog showing the properties for COM1

Note that the application, for example, the PAL Loader software, actively sets the communication parameters and that the baud rate is set for optimized use (→ page 158).

2. On the control terminal, navigate to the **Communication** menu.

   The path is **Menu >** highlight **Setup** (highlight, but not select by pressing the ENTER button) **> F3** function key (the key is not labeled), press ENTER **>** highlight **Communication** and press ENTER.

3. Change the setting for the communication port (**CommPort**) to **SER1**.

Tip: The PAL Loader software provides a quick way to check whether communication can be established with the autosampler (→ page 159).

3.5.3 Interconnecting the Autosampler in the UltiMate 3000 System

The autosampler interconnect cable and one or more additional cables are required to interconnect the autosampler with other UltiMate 3000 system modules in order to allow

- Transmitting the Inject Response signal between the autosampler and the pump
- Synchronizing the injection command with the pump strokes

It depends on the pump which cables must be used:

Cable	Part No.
Autosampler interconnect cable—included in the autosampler shipment	6043.0004
To connect an LPG-3400XRS pump, the autosampler interconnect cable *and* the following cables are required (all included in the accessories kit for the autosampler): Signal synchronization cable to connect the autosampler to the pump for pump stroke synchronization RS-232 cable to connect the autosampler to the RS-232 port on the Chromeleon computer for Inject Response transmission RS-232-USB Interface cable required in addition to the RS-232 cable if an RS-232 port is not available on the computer	 6043.0002 6043.0005 6073.2000
To connect an UltiMate 3000 SD, BM, or RS pump (*not* LPG-3400XRS), the autosampler interconnect cable *and* the following cable are required: Signal synchronization cable to connect the autosampler to the pump for pump stroke synchronization and Inject Response transmission (included in the accessories kit for the autosampler)	6043.0001

Fig. 34 shows the autosampler interconnect cable.

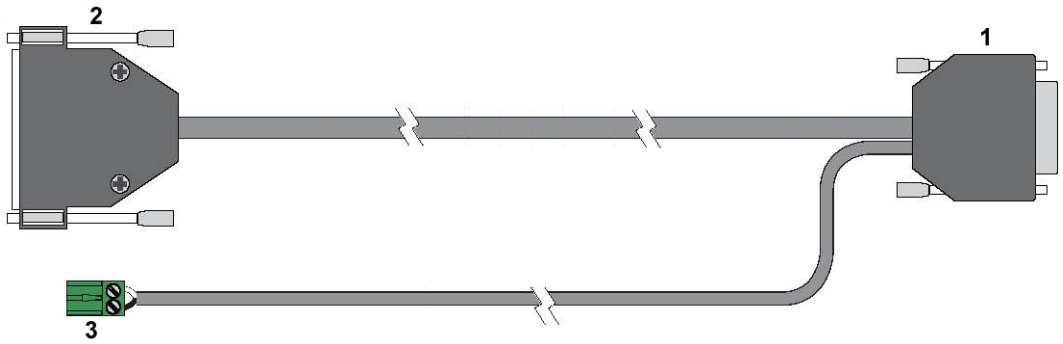


Fig. 34: Autosampler interconnect cable

Connector	Description
1	15-pin Sub-D connector, connects to the autosampler
2	25-pin Sub-D connector, connects to the appropriate signal synchronization cable for connecting the autosampler to an UltiMate 3000 SD, RS, XRS, or BM pump
3	2-pin socket connector, connects, for example, to the RS-232 cable for connecting the autosampler to the RS-232 port on the Chromeleon data system computer and/or to the Start In pins of a mass spectrometer

The steps depend on the UltiMate 3000 pump that you want to connect:

- For an LPG-3400XRS pump, follow the steps further down on this page.
- For an UltiMate 3000 SD, BM, or RS pump, follow the steps on page 47.

To connect an LPG-3400XRS pump

1. Locate the autosampler interconnect cable and the signal synchronization cable (part no. 6043.0002) for the LPG-3400XRS. Both cables are shipped with the autosampler.
2. Connect the 25-pin Sub-D connector of the interconnect cable to the 25-pin Sub-D connector of the signal synchronization cable.
3. Plug the 8-pin terminal connector of the signal synchronization cable into the Digital I/O port on the LPG-3400XRS.
4. Plug the 15-pin Sub-D connector of the interconnect cable into the **Interface 1** port on the autosampler.
5. Connect the RS-232 cable (part no. 6043.0005) to the 2-pin socket connector on the autosampler interconnect cable:

   To attach the wires to 2-pin socket connector, carefully loosen the locking screw on the connector, insert the appropriate wire, and retighten the locking screw. Observe the wire assignment (brown to brown and white to white).
6. *Optional - If the system includes a mass spectrometer*

   In addition to the RS-232 cable, attach the appropriate cable from the mass spectrometer also to the 2-pin socket connector on the autosampler interconnect cable. Observe the wire assignment:

Interconnect Cable	Mass Spectrometer Cable
Brown wire	Input
White wire	Ground

7. Connect the other end of the RS-232 cable to the RS-232 port on the Chromeleon data system computer.

   If an RS-232 port is not available on the data system computer, use an RS-232 to USB Interface cable (part no. 6073.2000) for the connection between the RS-232 cable and a USB port on the computer.

   Only required with the RS-232 to USB Interface cable
   Turn on the power to the data system computer and connect the interface cable to the USB port on the computer. When the interface cable is connected for the first time, you will be prompted to install the USB driver for the cable (recommended driver version: 2.06.00 or later). The driver is available in the **Drivers\W&T RS232-USB Interface Cable** directory on the Chromeleon software DVD.

8. *Optional - If the system includes also a Corona or Coulochem detector*

   In this case, an additional signal synchronization cable is required (part no. 6043.0003; the cable is provided in the accessories kit for the detector). The cable is connected to the 8-pin terminal connector of the signal synchronization cable of the pump. For details about this and about the pin assignments, refer to the *Operating Instructions for the LPG-3400XRS Pump*.

9. To make sure that injection response works properly, specific settings are required in the Chromeleon **Server Configuration** program and/or on the autosampler control terminal. For details, see section 5.4.4 (→ page 98).

10. To make sure that pump stroke synchronization works properly, specific settings are required in the Chromeleon **Server Configuration** program and/or on the autosampler control terminal. For details, see section 5.4.5.1 (→ page 99).

To connect an UltiMate 3000 SD, BM, or RS pump (not LPG-3400XRS)

1. Locate the autosampler interconnect cable and the signal synchronization cable for the UltiMate SD, BM, or RS pump (part no. 6043.0001).
2. Connect the 25-pin Sub-D connector of the interconnect cable to the 25-pin Sub-D connector of the signal synchronization cable.
3. Plug the 15-pin Sub-D connector of the interconnect cable into the **Interface 1** port on the autosampler.
4. Plug the 6-pin Mini-DIN connector of the signal synchronization cable into the **Digital I/O** port **1** (or **2**) on the rear panel of the pump.

   The UltiMate 3000 pump model, detector, and pump/detector combination determine which Digital I/O port is to be used. The table provides the necessary information.

UltiMate 3000 Pump	**Detector = Corona or Coulochem**	**Remarks**	**Dig I/O port on pump to be used for**	
			OAS	**Corona/ Coulochem**
LPG/HPG/ISO	No		Port 1	--
LPG/HPG/ISO	Yes		Port 2	Port 1
DGP	No	Left pump connected with OAS	Port 1	--
		Right pump connected with OAS	Port 2	--
DGP	Yes	Left pump connected with OAS *and* detector	Port 2	Port 1
		Right pump connected with OAS *and* detector	Port 1	Port 2
		Left pump connected with OAS, Right pump connected with detector	Port 1	Port 2
		Right pump connected with OAS, Left pump connected with detector	Port 2	Port 1

5. *Optional - If the system includes a mass spectrometer*

   Attach the appropriate cable from the mass spectrometer to the 2-pin socket connector on the autosampler interconnect cable.

6. To make sure that injection response works properly, specific settings are required in the Chromeleon **Server Configuration** program and/or on the autosampler control terminal. For details, see section 5.4.4 (→ page 98).

7. To make sure that pump stroke synchronization works properly, specific settings are required in the Chromeleon **Server Configuration** program and/or on the autosampler control terminal. For details, see section 5.4.5.1 (→ page 99).

3.6 Setting Up the Autosampler in Chromeleon or DCMSLink

To set up the autosampler in Chromeleon, follow the steps in section 3.6.1. To set up the autosampler with DCMSLink, see section 3.6.2 (→ page 53).

3.6.1 Setting Up the Autosampler in Chromeleon

3.6.1.1 Initial Installation

This section provides brief instructions for setting up the autosampler in Chromeleon. For details about any of these steps, see the *Chromeleon Help*.

Before you begin, be sure that the following prerequisites are fulfilled:

- An appropriate Chromeleon version is installed on the data system computer and the license code is entered. To operate the autosampler with Chromeleon, the Instrument Controller Components package (ICC), version 1.6.0.5 or later is also required. The package is installed automatically when Chromeleon is installed.
- The autosampler is properly connected to the data system computer (→ section 3.5, page 40) and has been turned on by the power switch.

To set up the autosampler in Chromeleon, follow this sequence of steps:

1. Turn on the computer power if it is not yet already on.
2. Open the Chromeleon **Server Monitor** program by double-clicking the Chromeleon Server Monitor icon  on the Windows® taskbar.

   If the Server Monitor icon is not on the taskbar, click **Start** on the taskbar, point to **Programs** (or **All Programs**, depending on the operating system), point to **Chromeleon,** and then click **Server Monitor**.
3. Click **Start** to start the server.
4. Click **Close** to close the Server Monitor window. The Server Monitor icon  appears on the taskbar.

   Tip: Clicking the **Quit Monitor** button quits (exits) the Server Monitor program, but does not stop the server. To stop the server, click **Stop**.
5. Start the Chromeleon **Server Configuration** program by clicking **Start** on the taskbar. Point to **Programs** (or **All Programs**, depending on the operating system), point to **Chromeleon**, and then click **Server Configuration**.
6. If necessary, click the plus sign beside the server name to display the items underneath.

7. Select the timebase to which the autosampler will be assigned, or create a new timebase (on the **Edit** menu, click **Add Timebase**).

8. Open the **Add device to timebase** dialog box. To do so, click **Add Device** on the **Edit** menu or right-click the timebase and click **Add Device** on the menu.

9. On the **Manufacturers** list, click **Dionex HPLC: UltiMate 3000** and on the **Devices** list, click **OAS-3X00TXRS**.

10. In the autosampler configuration dialog, check and change the configuration settings as required. You may reopen the configuration page later again to change the settings (→ page 53).

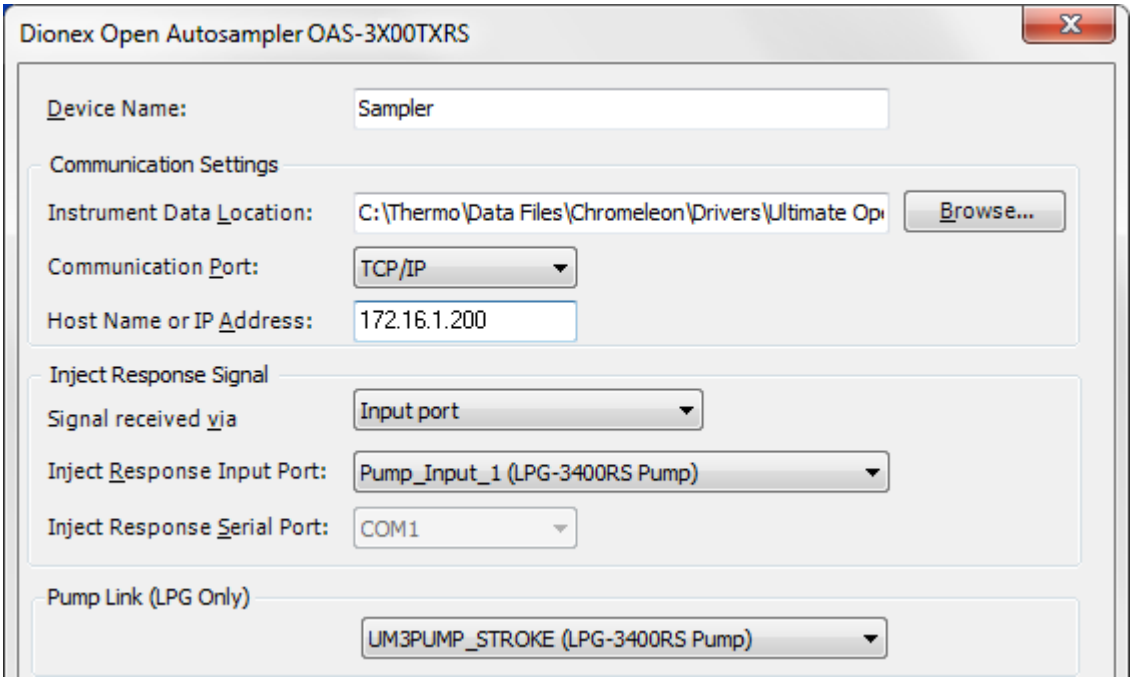


Fig. 35: OAS-3X00TXRS Configuration page

Setting	Description
Device Name	Displays the name used to identify the autosampler in the installation environment and in the Chromeleon client program. Accept the default name (Sampler). If you enter different names, you may have to re-link the controls on the control panels and edit the names in the program files.
Instrument Data Location	Displays the location where the templates for the autosampler methods (cycle files (.cyx)) are stored. The path for the default templates provided by Thermo Fisher Scientific is *C:\Thermo\Data Files\Chromeleon\Drivers\UltiMate Open Autosampler*.

Setting	Description
Communication Port	The preferred type of communication between the autosampler and the data system computer is TCP/IP. However, serial communication is possible as well. If the autosampler is connected to the data system computer via a LAN connection, accept the default setting **TCP/IP** and enter the appropriate host name or IP address in the **Host Name or IP Address** box (see below). If the autosampler is connected via an RS-232 connection, select the **COM** port to which the autosampler is connected on the data system computer. If you change the communication settings, turn the autosampler off and on again to allow the changes to take effect.
Host name or IP Address	*Available only if the **Communication Port** setting is **TCP/IP*** Type the host name or IP address of the autosampler into the box. The IP address of the autosampler (**IpAddr1** (through **IpAddr4**)) can be displayed on the control terminal (→ page 41). For information about the syntax, see the example on page 42.
Signal received via	Specify how the Inject Response signal is transmitted between the autosampler and Chromeleon. Select one of the following alternatives: • **Input port**—Select when operating the autosampler with an UltiMate 3000RS (*not* XRS), SD, or BM pump. With this setting, you have to specify also the input port to which the signal synchronization cable (→ page 47) is connected (see **Inject Response Input Port** below). • **Serial port—**Select when operating the autosampler with an LPG-3400XRS pump With this setting, you have to specify also the COM port (RS-232 port) to which the RS-232 cable or RS-232-USB interface cable is connected (see **Inject Response Serial port** below). For successful signal transmission, additional settings are required in the configuration dialog of the pump and on the autosampler control terminal (→ page 98).
Inject Response Input Port	*Available only if **Signal received via** is set to **Input port** (see above)* Select the input to which the signal synchronization cable is connected (→ page 47), for example, Pump_Input_2. If the input is not available for selection, it has not yet been enabled in the configuration for that device (for example, in the **Properties** dialog for the pump on the **Input** tab). In this case, enable the input to make it available for selection in this box.
Inject Response Serial Port	*Available only if **Signal received via** is **Serial port** (see above)* Select the COM port (RS-232 port) to which the RS-232 cable is connected on the Chromeleon data system computer.

Setting	Description
Pump Link (LPG only)	If the autosampler is linked to an UltiMate 3000 pump that supports pump stroke synchronization, the injection command can be synchronized with the pump strokes. Synchronization ensures that all injections are performed at the same phase of the pump cycle, enhancing the retention time precision with gradient applications. Select the pump to which the autosampler is linked. • *UltiMate 3000 LPG-3400 or DGP-3600 (RS, SD, or BM)* Select, for example: **UM3PUMP_STRK** for an LPG-3400 (RS, SD, or BM) **UM3PUMP_L_STRK** (for the left pump of a DGP-3600) *or* **UM3PUMP_R_STRK** (for the right pump of a DGP-3600). For successful synchronization, additional settings are required in the configuration dialog of the pump and on the autosampler control terminal (→ page 99). Select **None** if synchronization is not possible or not required. In this case, check and change the sync signal setting on the autosampler if required (→ page 100). • *UltiMate 3000 LPG-3400XRS* Select **None**. For successful synchronization, special settings are required on the autosampler control terminal for **Sync Signal** and **TTL_In1** (→ page 99). Select **None** if synchronization is not required. In this case, check and change the sync signal setting on the autosampler if required (→ page 100).

Tip: For additional information about the configuration dialog, click **Help**.

11. Click **OK** to complete the configuration of the autosampler.
12. On the **File** menu, click **Save Installation** and then close the Server Configuration program.

3.6.1.2 Changing the Configuration Settings or Updating the Configuration

You can reopen the configuration page later again to

- Change the settings on the autosampler configuration page (→ Fig. 35, page 50).
- Make changes made to the hardware configuration available in Chromeleon. For example, if you have physically installed a different tray type (sample tray or well plate) and updated the settings on the autosampler control terminal, you have to transfer the new setting to Chromeleon.

1. Start the Chromeleon **Server Monitor** if it is not yet running and then, start the **Server Configuration** program (→ page 49).
2. Right-click the **OAS-3X00TXRS** in the timebase, and then click **Properties** on the menu.
3. *Optional*
   Change the settings as needed. Click **Help** for detailed information about the settings on the configuration page.
4. Click **OK**. Clicking OK makes changes made on the autosampler control terminal available in Chromeleon and/or saves changes made to the settings on the autosampler configuration page.
5. To save the changed configuration, click **Save Installation** on the **File** menu and then close the **Server Configuration** program.

3.6.2 Setting Up the Autosampler in DCMSLink

To set up the autosampler in DCMSLink, refer to *DCMSLink Installation Guide*, which is provided on the DCMSLink DVD in the *Additional Documents\DCMSLink User Documents* folder.

1. Install and configure the DCMSLink software and access the Chromeleon Server Configuration program by following the instructions in the DCMSLink installation guide.
2. In the Server Configuration program, add the autosampler to the timebase and configure the autosampler by following the appropriate steps (step 7 and following steps) in section 3.6.1.1 (→ page 50).

For more information about DCMSLink, refer to the *DCMSLink Quick Start Guide*, which is also provided on the DCMSLink DVD, and to the *DCMSLink Help*.

4 Preparation for Operation (Startup)

4.1 Overview of Actions

⚠ **Important:** When connecting capillaries, make sure that the connectors are free from contaminants. Even minute particles may cause damage to the system.

⚠ **Important:** Lorsque vous connectez les capillaires, assurez-vous que les raccords sont exempts de contaminants. Même d'infimes particules peuvent endommager le système.

When you have unpacked, positioned, and connected the autosampler as described in sections 3.1 through 3.5 (→ page 17 and following pages), prepare the autosampler for operation. Follow this sequence of steps:

1. Establish the fluid connection to the other components in the system. Make sure that all capillaries connected to the valve are vertically guided downward to the UltiMate 3000 system stack.
2. Verify that the wash station waste tubing is properly directed into the waste container (→ page 37).
3. *If you want to operate the autosampler with Chromeleon or DCMSLink*
   Set up the autosampler in Chromeleon (→ page 49) or DCMSLink (→ page 53) if it is not set up already.
4. Define ('teach') the reference positions and make the additional settings and adjustments as described in section 4.3 (→ page 57).
5. Set the temperature for the stack cooler if required (→ page 71).
6. Before using the autosampler for sample analysis, equilibrate the entire system (→ page 71).
7. *Recommended*
   When installation of the autosampler is complete, perform the backup procedure described in section 11.3.3.5 (→ page 160).

Tip: Section 5.4 provides specific information that should be considered for operating the autosampler (→ page 93).

4.2 Tips and Precautions for Connecting Capillaries and Tubing

When connecting capillaries and/or tubing to the autosampler, observe the following general precautions:

- When you connect capillaries or tubing, make sure that the connectors are free from contaminants. Even minute particles may cause damage to the system.
- Different fitting systems are used in an UltiMate 3000 system. Therefore, install the capillaries/tubing and fittings only at the positions for which they are intended.
- Use only the capillaries/tubing shipped with the autosampler or original spare capillaries/tubing from Thermo Fisher Scientific.
- Use Viper capillary connections whenever possible, observing the information in the instructions shipped with the capillary.
- Depending on the fitting connection, also observe the following:
  - *Viper fitting connections*

    Loosen and tighten Viper fitting connections *only* by the black knurled screw and *only* with your hand (do *not* use tools). The knurled screw can easily be removed and reattached to the capillary at any time.

    First, tighten the screw hand-tight. If you observe leakage on the connection, tighten the screw a little further. If leakage continues, remove the capillary, carefully clean the capillary ends by using a cloth or tissue wetted with isopropanol, and reinstall the capillary. If the connection continues to leak, replace the Viper capillary.

    Capillaries with Viper fitting connections can be reused also for a different connection.

  - *Conventional fitting connections (non-Viper)*

    Do not overtighten these fitting connections. If you observe leakage on the connection, tighten a little further.

    If leakage still exists, first consider cleaning the connection port with a cleaning swab (part no. 6040.0006). Replace the capillary and/or fitting if this does not eliminate the problem.

    Reuse used fittings and ferrules only for the same capillary connection. This is to avoid increased dead volume or damage to the system and leakage.

    Also, observe the information in section 6.2.1 (→ page 107).

4.3 Reference Positions and Additional Adjustments

Before you start operating the autosampler for the first time, you have to:

- Define ('teach') the reference positions (object positions) for some autosampler components, such as the stack cooler, wash station, and injection valve.
  For information about the teaching procedures, refer to section 4.3.1.
  Keep in mind that if you move or install a component to a different position, you have to redefine the reference positions.
- Make the additional settings and adjustments required for the sample trays or well plates and adapt the needle penetration depths (→ page 63).

Observe the following:

- *Before* you start the teaching procedures
  - ♦ Be sure that the component for which you perform the teaching procedure is properly installed.
  - ♦ Remove the needle (FEP holding loop only) to avoid damage to the needle. Follow the appropriate steps in section 7.5 (→ page 123) and set the needle aside. Be careful not to lose the retaining nut and the needle seal that is installed on the syringe end of the needle.
  - ♦ *Recommended for re-teaching*
    Be sure that the x-, y- and z-values of all reference points are set to zero *before* you start the teaching procedure for a certain position. To do so, press the **F2 ClearPos** function key for the x-, y-, and z-values of the position for which re-teaching is performed. This eliminates the risk of any damage to any component of the autosampler.
- *When the teaching procedure and adjustments for the trays (sample trays and/or well plates) are complete*
  - ♦ Verify that the needle seal and retaining nut are still present on the needle. If they are not, reinstall them as necessary.
    If you have to reinstall the seal, be careful when slipping it over the needle to avoid that the sharp needle edges cut into the seal, resulting in particles that could clog the needle. Verify that the hole is open and that no particles are in the path.
  - ♦ Reinstall the needle as described in section 7.5 (→ page 123).

4.3.1 Defining the Reference Positions (Object Positions)

Before you start operating the autosampler for the first time, you have to define ('teach') the reference positions (object positions) for the:

- Stack Cooler (→ page 58)
- Wash Station (→ page 60)
- Injection Valve (→ page 62)

You have to redefine the object positions also if you move or install a component to a different position or if you have performed certain maintenance tasks.

The reference positions are defined from the control terminal. For general information about how to use the control terminal and the conventions used to enter, edit, and view information, see section 5.3.1 (→ page 83).

4.3.1.1 Defining the Position of the Stack Cooler

The reference position for the 3-drawer stack cooler is the position hole in the top drawer. For the 6-drawer stack cooler, the reference position is the hole in the second drawer from the top (same level height as for the 3-drawer stack cooler).

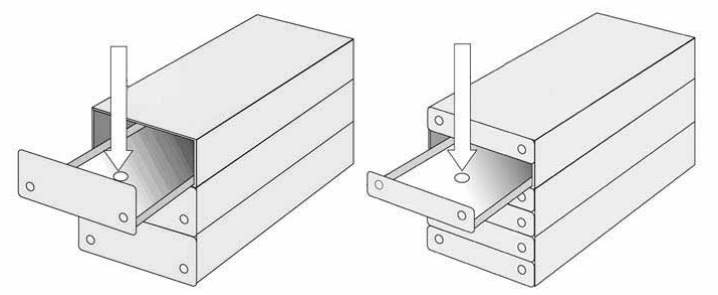


Fig. 36: Reference position for the stack cooler

1. Verify that the needle has been removed and observe the 'Before you start the teaching procedure' information on page 57.
2. Turn on the power to the autosampler. Wait until the Job Queue menu appears.
3. When the Job Queue menu appears, complete the following sequence:

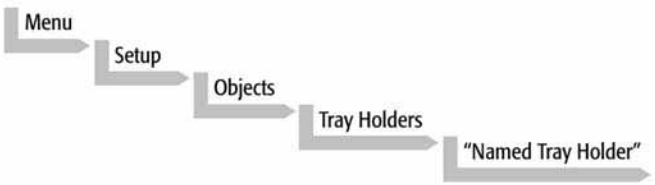


Fig. 37: Accessing the reference position for the stack cooler

where **Named Tray Holder** represents a predefined tray holder, for example, CStack1. After selecting the tray holder, the x-, y-, and z- positions associated with the object are displayed.

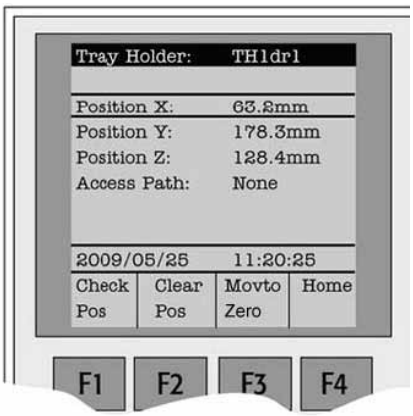


Fig. 38: Reference position for the stack cooler

4. *Recommended for re-teaching*
   Before you start the re-teaching procedure, reset the x-, y-, and z-position values to zero. To do so, select the related position and press the **F2** function key (**ClearPos**).

5. Open the appropriate drawer by hand completely:
   For the 3-drawer stack cooler, open the top drawer; for the 6-drawer stack cooler, open the second drawer (from top).

6. Select **Position X** and press ENTER.
   The injection unit moves to the previously defined *x*-axis position.

7. Rotate the outer knob to adjust the x-axis position to the tray holder reference position.

8. Press the ENTER to enter the Position X value.

9. Repeat step 3 through 5 for **Position Y** and **Position Z.**
   For the z-position: Adjust the position until the bottom of the lower needle guide of the injection unit is flush with the underside of the drawer.

10. Press the **F3** function key (**Movto Zero**) to move the injection unit to the Home position.

11. Verify the defined x-, y-, and z-positions:
    Close the drawer by hand and press the **F1** function key (**Check Pos**). The injection unit moves to the predefined position.

12. Now open the bottom drawer by hand.

13. Take a note of the value for **Position Z**.

14. Turn the z-axis all the way down to check that the black needle guide of the injection unit fits neatly into the position hole of the bottom drawer.

15. Take one of the following actions:
    - If the needle guide fits into the position hole of the bottom drawer, return the z-value of the reference position to its original value (as noted in step 13), press ENTER to confirm the value, and close the bottom drawer.
    - If the needle guide does not fit into the position hole of the bottom drawer, move the injection unit to the home position, close the bottom drawer, and check the installation of the stack cooler to the x-axis. Loosen the mounting clamps and reinstall the stack cooler on the x-axis. Then, start the teaching procedure again.
16. *If no other teaching procedure and/or adjustment needs to be performed*
    Reinstall the needle, observing the information on page 57.

4.3.1.2 Defining the Positions for the Wash Station (Wash and Waste)

Three reference positions—Wash 1, Wash2, and Waste—must be defined for the wash station assembly.

Before you begin, verify that the needle has been removed; observe the information on page 57.

Wash1 and Wash2

The reference positions for Wash1 and Wash2 are the two outer positioning holes on top of the wash station assembly.

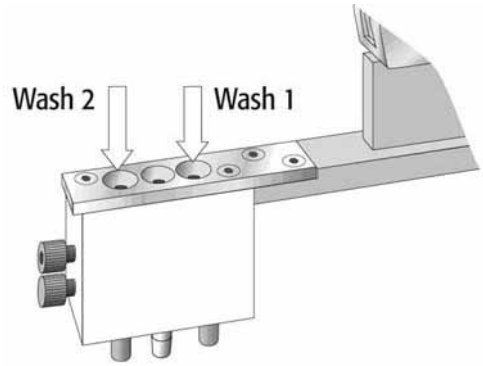


Fig. 39: Reference positions for Wash1 and Wash2

1. On the control terminal, select **Menu > Setup > Objects > Wash Stations > Wash1**.
2. *Recommended for re-teaching*
   Before you start the re-teaching procedure, reset the x-, y-, and z-position values to zero. To do so, select the related position and press the **F2** function key (**ClearPos**).
3. Adjust the x-, y-, and z-positions. The procedure is similar to steps 6 through 9 in section 4.3.1.1 (→ page 59).
    - Adjust the positions until the lower needle guide of the injection unit is centered over the selected Wash position on top of the wash station assembly.

- ♦ Fine-tune the z-position until the bottom of the lower needle guide is flush with the top surface of the wash port notch.

4. Verify the position by pressing the **F1** function key (**Check Pos)**.

5. Repeat the procedure for **Wash2** (path **Menu > Setup > Objects > Wash Stations > Wash2**).

6. Continue with defining the reference position for the waste.

Waste

The reference position for Waste is the center positioning hole on top of the wash station assembly.

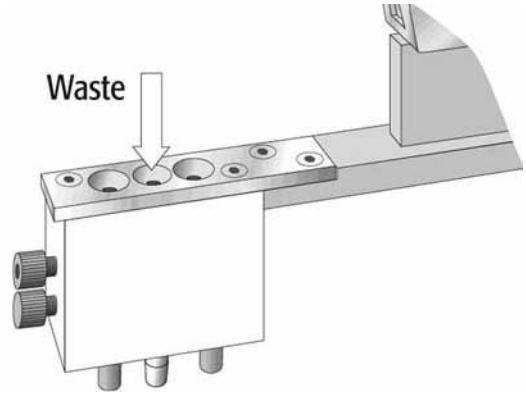


Fig. 40: Reference position for Waste

Note that, in the autosampler firmware, the waste position is considered an 'injector' position and not a wash station position. Therefore, the waste position is defined on the **Injectors** menu.

1. On the control terminal, select **Menu > Setup > Objects > Injectors > Waste**.
2. *Recommended for re-teaching*
   Before you start the re-teaching procedure, reset the x-, y-, and z-position values to zero. To do so, select the related position and press the **F2** function key (**ClearPos**).
3. Adjust the x-, y-, and z-positions. The procedure is similar to steps 6 through 9 in section 4.3.1.1 (→ page 59).
   - ♦ Adjust the positions until the lower needle guide of the injection unit is centered over the Waste position on top of the wash station assembly.
   - ♦ Fine-tune the z-position until the bottom of the lower needle guide is flush with the top surface of the waste port notch.
4. Verify the position by pressing the **F1** function key (**Check Pos)**.
5. *If no other teaching procedure and/or adjustment needs to be performed*
   Reinstall the needle, observing the information on page 57.

4.3.1.3 Defining the Positions for the Injection Valve

The reference position for the injection valve is the valve needle guide fitting on the top valve port.

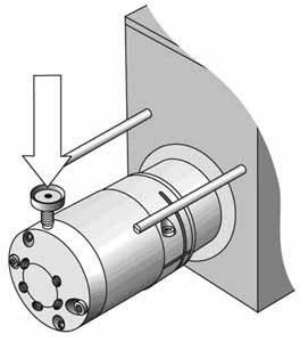


Fig. 41: Reference position for the injection valve

1. Verify that the needle has been removed; observe the information on page 57.
2. On the control terminal, select **Menu > Setup > Objects > Injectors > LC Vlv1**.
3. *Recommended for re-teaching*
   Before you start the re-teaching procedure, reset the x-, y-, and z-position values to zero. To do so, select the related position and press the **F2** function key (**ClearPos**).
4. Adjust the x-, y-, and z-positions. The procedure is similar to steps 6 through 9 in section 4.3.1.1 (→ page 59).
   - Adjust the positions until the lower needle guide of the injection unit is centered on top of the valve needle guide fitting.
   - Fine-tune the z-position so that the bottom of the lower needle guide just touches the valve needle guide fitting. Then, reduce the value by 2.0 mm.

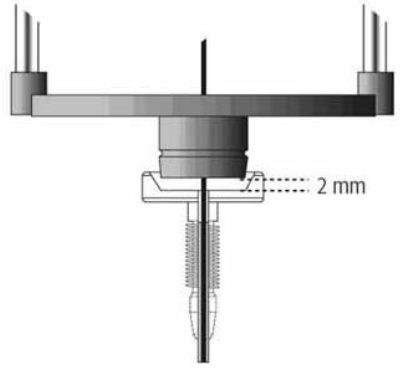


Fig. 42: Positioning the z-axis needle guide on the valve needle guide

5. Verify the position by pressing the **F1** function key (**Check Pos)**.
6. *If no other teaching procedure and/or adjustment needs to be performed*
   Reinstall the needle, observing the information on page 57.

4.3.2 Additional Settings and Adjustments

Before you start operating the autosampler for the first time, you have to make some additional settings and adjustments.

- Sample trays and/or well plates
  Assign the appropriate sample tray or well plate to the tray holder, define the rows and columns, and correct the inclination if necessary (→ page 63)
- Needle penetration depth (→ page 67)
  Assign the needle penetration depth for the vials and/or wells, wash station and waste ports, and valve needle guide fitting.

Before you start the procedures described in this section, be sure that you have defined all reference positions as described in section 4.3.1 (→ page 58).

The settings and adjustments are made from the control terminal. For general information about how to use the control terminal and the conventions used to enter, edit, and view information, see section 5.3.1 (→ page 83).

4.3.2.1 Settings and Adjustments for Sample Trays and Well Plates

First, load the drawers with the sample trays or well plates that you want to use and make the necessary assignments. Afterward, check the vial or well positions at three corners of the sample tray or well plate and correct the inclination if necessary.

To assign the sample trays and/or well plates

1. *Recommended*
   Perform this assignment with the needle being removed; observe the information on page 57.
2. Load the drawers with the sample trays and vials and/or well plates that you want to use.

   Observe the following:

   To avoid damage to the injection unit, always load a drawer with the same tray type (sample tray or well plate). If you have to combine tray types with different height, for example, a deep-well plate with a sample tray with 54 positions (VT54) or normal well plate (MT96 or MT398) in the same drawer, be sure to place the higher one at the front position in the drawer, for example, the deep-well plate in front of the VT54 tray.
3. On the control terminal, select **Menu > Setup > Objects > Trays**.

4. Select the position to which you want to assign the sample tray or well plate, for example, **CStk1-01**.

   The table shows the positions in a 3-drawer stack cooler (OAS-3300TXRS). For the 12 positions of the 6-drawer stack cooler (OAS-3600TXRS), the arrangement is similar.

Select	For the following tray holder:
CStk1-01	Top drawer, front position
CStk1-02	Top drawer, rear position
CStk1-03	Middle drawer, front position
CStk1-04	Middle drawer, rear position
CStk1-05	Bottom drawer, front position
CStk1-06	Bottom drawer, rear position

5. Select the tray (sample tray or well plate) that is physically available at the selected position:

Select	If the following tray is installed:
VT54	Sample tray with 54 positions (for 2 mL vials) (available only with the OAS-3300TXRS)
MT96	Normal well plate with 96 wells
MT384	Normal well plate with 384 wells
DW96	Deep-well plate with 96 wells (available only with the OAS-3300TXRS)
None	No sample tray or well plate installed

   The tray that is defined in this step contains the geometric data for the sample tray or well plate and additional information, such as how many positions are in a row and in a column, thus defining the sample location and sampling sequence. A row is not associated with an x- or y-axis. The picture illustrates this for the sample tray for 54 positions.

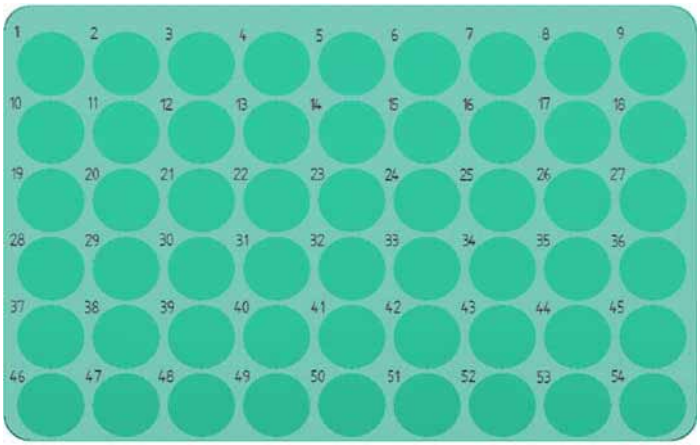


Fig. 43: Positions on the sample tray (here VT54)

6. Perform the assignment for each position in the stack cooler, that is, for all 6 positions of the 3-drawer stack cooler (OAS-3300TXRS) or for 12 positions of the 6-drawer stack cooler (OAS-3600TXRS).

7. On the control terminal, press the **F4** function key to return to the **Job Queue** screen.

8. *Recommended*
   Continue with checking the vial or well positions at three corners of the sample tray or well plate as described on the next page

9. In the Chromeleon **Server Configuration** program, open the configuration dialog for the autosampler (→ page 53) and click **OK** to make the tray configuration available in Chromeleon.

   Tip: If you change the tray type later, you have to update the configuration in Chromeleon in the same way.

To check the vial or well positions and make the necessary adjustments

The autosampler firmware allows you to check whether the surface of the sample tray or well plate is exactly horizontal and planar and to compensate for a possible inclination in the x-, y-, and z-axes.

The following steps describe the procedure for the 54-position sample tray (VT54). However, they are similar for the well plates.

1. Verify that vials are available in the corner positions of the tray (that is positions 1, 9, and 54 on a sample tray with 54 positions (→ Fig. 43, page 64)).

2. On the control terminal, select **Menu > Utilities > Tray**.

3. Select the position of the tray, for example, **CStk1-01**.

4. Verify that the **Tray Type** setting is correct, corresponding to the sample tray or well plate that is physically available in the drawer at the selected tray position. If it is not, change the setting as necessary.

5. Press the **F3** function key (**Movto 001**).

6. A box appears, displaying the following message '**Adjust offset X, Y, Z for Position 001**'. Select **OK** to confirm the message.

7. Adjust the offset of the x-, y-, and/or z-positions if required. The procedure is similar to steps 6 through 9 in section 4.3.1.1 (→ page 59).

   If you need to adjust the x-offset and/or y-offset, you will need to move the needle guide up (adjusting the z-offset by rotating the outer knob counterclockwise will decrease the z-value) so that the needle guide does not descend onto the top of the vial or well plate. After adjusting the offset of the x- and/or y- positions, you need to adjust the offset of the z-position as described in section 4.3.1.1 (→ page 59).

8. To continue with the adjustments for the second corner of the tray, press the **F3** function key again (**Movto 009)**.

9. A box appears, displaying the following message '**Adjust dx-, dy-, dzRow for Position 009**'. Select **OK** to confirm the message.

10. Correct any inclination of the row if necessary by adjusting the **dxRow**, **dyRow**, and/or **dzRow** settings. The procedure is similar to steps 6 through 9 in section 4.3.1.1 (→ page 59).

    If you need to adjust the x-offset and/or y-offset, you will need to move the needle guide up (adjusting the z-offset by rotating the outer knob counterclockwise will decrease the z-value) so that the needle guide does not descend onto the top of the vial or well plate. After adjusting the offset of the x- and/or y- positions, you need to adjust the offset of the z-position as described in section 4.3.1.1 (→ page 59).

11. To continue with the adjustments for the third corner of the tray, press the **F3** function key again (**Movto 054**).

12. A box appears, displaying the following message '**Adjust dx-, dy-, dzCol for Position 054**'. Select **OK** to confirm the message.

13. Correct any inclination of the column if necessary by adjusting the **dxCol**, **dyCol**, and/or **dzCol** settings. The procedure is similar to steps 6 through 9 in section 4.3.1.1 (→ page 59).

    If you need to adjust the x-offset and/or y-offset, you will need to move the needle guide up (adjusting the z-offset by rotating the outer knob counterclockwise will decrease the z-value) so that the needle guide does not descend onto the top of the vial or well plate. After adjusting the offset of the x- and/or y- positions, you need to adjust the offset of the z-position as described in section 4.3.1.1 (→ page 59).

14. Verify each position by repeating steps 5 through 13 above.

15. Perform the assignment for each sample tray or well plate installed in the stack cooler.

    The three corner points are now adjusted for a possible inclination of the tray in any axis. With this, the autosampler firmware interpolates a possible deviation from an ideal axis position for the other vials/wells, caused by variance from the horizontal.

16. Reinstall the needle, observing the information on page 57.

4.3.2.2 Adapting the Needle Penetration Depth

The needle penetration depth defines how deep the needle descends into the related component and has to be adapted for the following autosampler components:

- Needle guide fitting (injection valve) (→ further down on this page)
- Sample vials and/or well plates (→ page 69)
- Wash station positions (Wash1, Wash2, and Waste) (→ page 70)

Before you start the procedures described in this section, be sure that you have

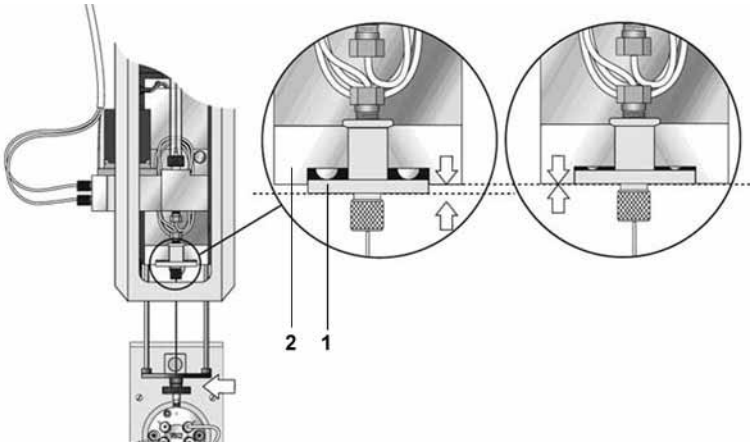
- Defined all reference positions as described in section 4.3.1 (→ page 58)
- Made the necessary settings and adjustments as described in section 4.3.2.1 (→ page 63)
- Reinstalled the needle (→ page 57)

The adjustments are made from the control terminal. For general information about how to use the control terminal and the conventions used to enter, edit, and view information, see section 5.3.1 (→ page 83).

To adapt the needle penetration depth for the needle guide fitting (injection valve)

1. On the control terminal, select **Menu > Setup > Objects > Injectors > LC Vlv1**.
2. *Before* you continue, make sure that the current needle penetration setting is set to zero. Otherwise, damage to the needle might occur.
   To clear the setting, press the **F2** function key (**Clear Pos.**), select **Penetr** in the dialog box that appears, and press ENTER.
3. Press the F1 function key (**Check Pos.**).
   The injection unit moves to the position that has been previously defined during teaching.
4. Select **NeedlePenetr**.
5. *Slowly* rotate the outer knob to adjust the needle penetration depth.
   The needle moves down stepwise into the injection port.
6. When the needle tip enters the valve needle guide, lower the needle even more slowly and observe the needle.

7. Lower the needle until the bottom edge of needle holder assembly is flush with the lower end of the needle adapter block as shown in the picture.



No.	Description
1	Needle holder assembly
2	Needle adapter block

Fig. 44: Setting the needle penetration depth for the needle guide fitting (injection valve)

8. Press ENTER to save the value.
9. Verify the setting by repeating steps 4 through 7.
   If necessary, correct the value and save the new value by pressing ENTER.
10. If you hear a click and the spring-loaded needle holder is completely compressed, stop lowering the needle *immediately*.
11. Rotate the outer knob stepwise in the opposite direction until the bottom edge of the holder assembly is flush with the lower end of the needle adapter block, as shown in Fig. 44.
12. Repeat and verify the needle penetration test.

    Fig. 45 shows the correct and incorrect positioning of the needle tip in the valve inlet port.

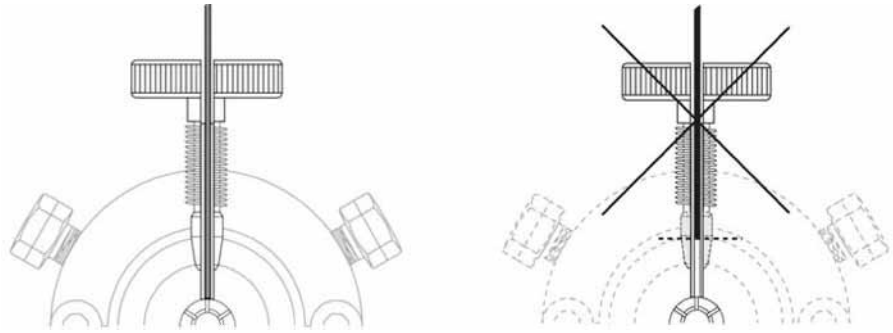


Fig. 45: Valve needle penetration depth

The spring-loaded needle holder presses the square cut needle tip firmly against the bottom of the valve body, and thus ensures a constant seal during the injection process.

To adapt the needle penetration depth for the sample vials and well plates

The following steps describe the procedure for the 54-position sample tray (VT54). However, they are similar for the well plates.

1. Verify that a vial is available at position 1 on a sample tray with 54 positions (→ Fig. 43, page 64).
2. On the control terminal, select **Menu > Utilities > Tray > "Tray name"** (for example, **CStk1-01**).
3. Press the **F3** function key (**Movto 001**).
4. A box appears, displaying the following message '**Adjust offset X, Y, Z for Position 001**'. Select **OK** to confirm the message.
5. Select **NeedlePenetr**. The needle descends into the vial.
6. Verify whether the default setting is appropriate. To do so, push the lower needle guide up by hand and carefully move the vial up and down. Observe the needle tip to see how much space is left between the bottom of the vial and the needle tip.

   The default settings are as follows:

Tray	Default setting
VT54	31 mm
MT96	9.5 mm
MT384	10 mm
DW96	36 mm

7. *If you have to adapt the needle penetration depth*
   Slowly rotate the outer knob to adjust the needle penetration depth. The needle moves down stepwise into the tray. Be careful not to rotate the knob to fast.
8. After you have adjusted the needle penetration depth, press ENTER to save the value.
9. Press the **F4** function key (**Home**) to return to the **Job Queue** screen.
10. Adapt the needle penetration depth individually for each of the installed sample trays and/or well plates.

To adapt the needle penetration depth for the Wash Station (Wash1, Wash2, and Waste)

In general, adjusting the default needle penetration depth values for the Wash Station is not required. The table shows the default settings and the path where to find them.

Position	**Default setting**	**Path**
Wash1	43 mm	Menu > Setup > Objects > Wash Stations > Wash1
Wash2	43 mm	Menu > Setup > Objects > Wash Stations > Wash2
Waste	18 mm	Menu > Setup > Objects > Injector > Waste

4.4 Setting the Temperature for the Stack Cooler

The stack cooler has a separate power supply with built-in control unit and display.

To change the temperature setting, follow these steps:

1. Turn on the power to stack cooler by pressing the power switch on the rear of the stack cooler power supply.

   Turning on the power, puts the unit into the self-check mode. After a few seconds, the temperature reading appears on the display.

2. Press the key labeled **P** briefly (less than two seconds) until **SP1** is displayed.

   Pressing the **P** key for two seconds or longer, takes you to the programming level, which is read-only for the user. Leave the unit untouched for approximately two minutes to return the display to the current temperature reading information. Turn the unit off and on again to reinstate the temperature display.

3. Use the arrow-up and arrow-down keys to change the temperature setting to the preferred value.

4. Press **P** again to save the setting.

Tip: The indicators below the display digits show which relay is in use (OUT1 or OUT2). The arrows indicate whether the unit is heating or cooling.

◄ heating — temperature within range of set point ► cooling

4.5 Equilibrating the System

Before using the autosampler for sample analysis, equilibrate the UltiMate 3000 system:

1. Pump the starting solvent through the entire system until the system is free of any other liquid composition.

2. Heat or cool all temperature-controlled devices to the temperature required for the application.

3. Set the detector wavelengths and turn on the lamps.

4. Monitor the pump pressure and verify that the reading is correct for the application and is stable.

5. Monitor the detector signal and verify that the baseline signal is at the expected reading for your application and is stable.

5 Operation

The autosampler is controlled by the Chromeleon Chromatography Management System. For details, see section 5.2 (→ page 74).

Function keys and menus are also available on the control terminal for the autosampler, for example, for defining the reference positions for the autosampler objects or for viewing and changing the autosampler configuration. For details, see section 5.3 (→ page 83).

Tip: Section 5.4 provides specific information that should be considered for operating the autosampler (→ page 93).

5.1 Power-Up

The autosampler has two power supplies: one for the basic autosampler system and one for the stack cooler. To start the autosampler, turn on the power switches on both power supplies.

When the power to the basic autosampler system is turned on, the following information is displayed for a short time on the control terminal:

- Model name (OAS-3000TXRS)
- Serial number
- Firmware version
- Communication type (LAN or SER1)

Afterward, the Job Queue screen appears.

When the power to the stack cooler is turned on, the temperature setting is displayed on the display of the power unit after a few seconds.

Always turn off the power to both power supplies and disconnect the power cords before performing maintenance procedures or if you have to stop the entire autosampler system in case of emergency.

5.2 Operating the Autosampler with Chromeleon

Before you begin, verify that

1. The autosampler is connected to the Chromeleon computer as described in section 3.5.2 (→ page 40).
2. The autosampler is set up in Chromeleon as described in section 3.6.1.1 (→ page 49).
3. The reference positions for the autosampler objects have been defined as described in section 4.3 (→ page 57).

Before you can operate the autosampler with Chromeleon, you have to connect the timebase in which the autosampler is installed to the Chromeleon client program (→ section 5.2.1).

5.2.1 Connecting to Chromeleon

1. Start the Chromeleon **Server Monitor** and the Chromeleon server if they are not already running (→ page 49).
2. Start the Chromeleon client by clicking the Chromeleon icon  on the desktop.

   If the Chromeleon icon is not on the desktop, click **Start** on the taskbar, point to **Programs** (or **All Programs**, depending on the operating system), point to **Chromeleon,** and then click **Chromeleon**.
3. Connect the Chromeleon client to the timebase in which the autosampler is installed. You can do this from either the control panel for the autosampler (→ page 75) or the **Commands** dialog box (→ page 76).

Note that when the autosampler is connected in Chromeleon, input from the control terminal is still possible except during method processing. While input is disabled, the message "Remote Operation" is displayed on the control terminal.

Before turning off the autosampler by the power switch, always **disconnect** the module in Chromeleon.

5.2.2 Direct Control

Some commands and properties for direct autosampler control are available on the control panel for the autosampler and/or in the **Commands** (F8) dialog box. Direct commands are executed as soon as they are entered. Note that inject parameters cannot be set directly. Therefore, manual injections are not possible.

To open a control panel

1. On the **View** menu, click **Default Panel Tabset** or click the corresponding icon on the toolbar , and then connect to the Chromeleon server.

   Chromeleon creates centralized control panels, called panel tabsets, for all timebases available on the Chromeleon server. A panel tabset provides control panels for the individual instruments in a timebase and, in addition, one or more panels for performing system-wide functions, for example, creating and running sequences. For more information about panel tabsets, see the *Chromeleon Help*.

2. On the **Panel Tabset** for your timebase, click the **Sampler** page (→ Fig. 46).

3. Verify that the autosampler is connected to Chromeleon (the LED next to the **Connect** button is green). If it is not, click **Connect**.

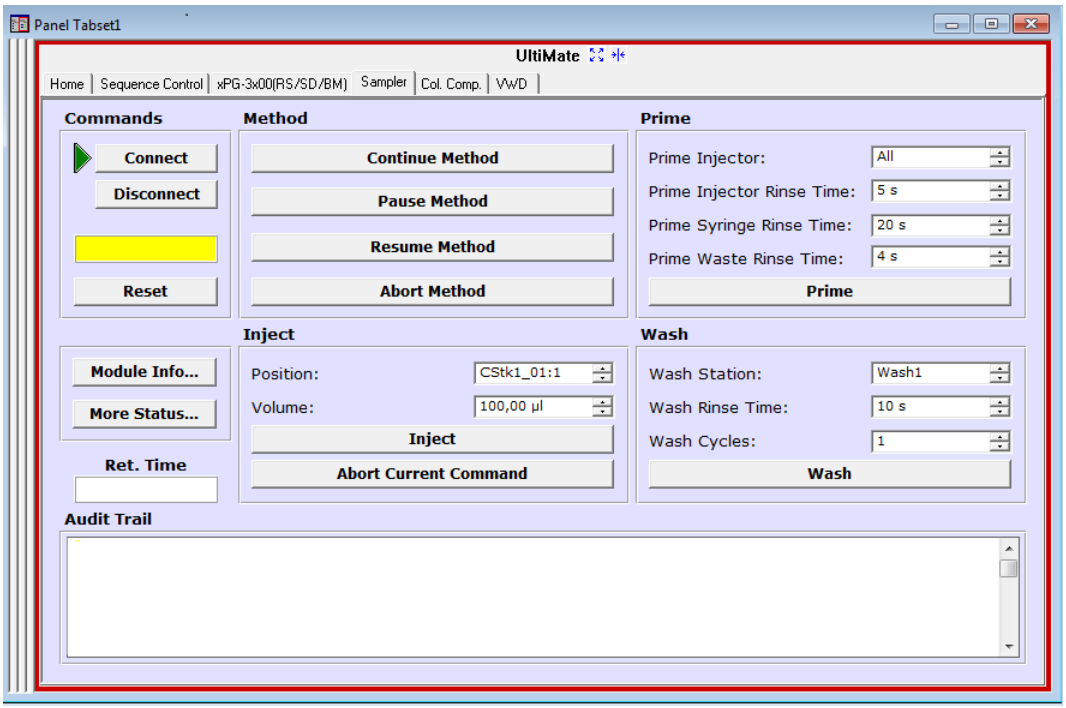


Fig. 46: Autosampler control panel on the Panel Tabset

The control panel provides access to the operating parameters and commands required for routine operation of the autosampler.

To open the Commands dialog box

1. Open a control panel (any panel is possible). To open a control panel, open the Chromeleon Browser and double-click a control panel in the **Dionex Templates/Panels** folder.
2. Connect the control panel to the timebase in which the autosampler is installed. On the **Control** menu, select **Connect to Timebase**, and then select the timebase on the **Timebase** tab. For information about the **Timebase** dialog, click **Help**.

   Tip: The **Control** menu is visible only when a control panel is already open.

3. Press the F8 key or select **Command** on the **Control** menu.
4. To see the parameters and commands that are available for the autosampler, click the plus sign beside **Sampler**.

   The commands and parameters available in the dialog box may vary, depending on the
   - Chromeleon version
   - Options selected in the **Properties** dialog for the autosampler (→ page 50)
   - Display filter level (**Normal**, **Advanced**, or **Expert**)
5. Change the display filter level if necessary. Right-click in the commands list and select the filter level on the menu.
6. Verify that the autosampler is connected to Chromeleon. If it is not, select **Connect** to connect the autosampler.

In addition to the autosampler commands and parameters, the **Commands** dialog box provides access to all of the commands and parameters available for all devices that are installed in the selected timebase.

5.2.3 Automated Control

With automated control, you create a program file (PGM) for automated operation of the autosampler. In addition to programs for sample analysis, you can also create programs for special purposes, for example, to ensure that the system automatically restarts operation as desired after a power failure. For details, see the *Chromeleon Help*.

5.2.3.1 Creating and Starting Programs

Programs can be created automatically with the help of a software wizard ('Program Wizard') or manually by editing an existing program in the Device View of the Program Editor. It is not possible to create a program from the Commands dialog box.

To create a program with the Program Wizard

1. On the **File** menu, select **New**, and then select **Program File**.
   The wizard guides you through program creation. On each wizard page, make the desired settings or accept the default values. For additional information about a page, click **Help**.

On the **Open Autosampler OAS-3X000TXRS [Sampler] Options** page, click **Open Method Editor** and select one of the pre-defined method files (cycle files) from the **Available Cycles** list. For more information about the cycle files, see page 78.

2. After you finish the wizard, Chromeleon automatically creates the corresponding program.

3. To start the program, follow the steps on page 77.

To create a program from the Device View

1. Open an existing program.

   Select and double-click the program you want to open.

   —or—

   On the **File** menu, select **Open**. In the dialog box, select **Program** on the **Object of Type** list and select the program.

2. Change the settings in the program as desired.

   The easiest way is to edit a program is to do this in the Device Views. Click a device icon and change the settings on the device pages. Editing the program in the Device Views ensures correct command syntax.

   If you cannot edit a certain parameter in the Device View, click **Commands** to open the Commands View. The Commands View shows the entire program, listing the control commands in chronological order. Edit the parameter of interest or enter a new parameter. For more information, see the *Chromeleon Help*.

3. To start the program, follow the steps below.

To start a program

A—Program for sample analysis

1. Create a sample list (sequence). A sequence must include the program and a method for evaluating the sample data.

2. Assign the program and method to each sample on the list.

3. Add the sequence to the batch and start the batch.

For information about each of the above steps, see the *Chromeleon Help*.

B—Other programs

Add the program to the batch and start the batch.

5.2.3.2 Using Cycle Files

Cycles are designed for specific applications. An injection cycle consists of the specific operations necessary to process one sample. The cycle operations are repeated for each sample within a sequence.

Observe the following:

- Only the cycles files (.cyx) provided by Thermo Fisher Scientific should be used.
  Using customized cycles that were created by using the CTC Cycle Editor and the appropriate license are allowed, however. If you want to use your own cycle files, observe the information on page 80.
- Users are *not* allowed to edit the cycle files provided by Thermo Fisher Scientific. However, the values for the cycle argument parameters can be adapted to optimize the cycle as required by your application.
- If the default templates have been updated, for example, with a Chromeleon update, open the configuration dialog for the autosampler (→ page 50) and click **OK.** Only then, the updated files will be available for the autosampler in Chromeleon.
- If an incorrect cycle is used
  - ♦ The **Available Cycles** list (in the method editor) will be empty. In this case, you can run Installation Qualification to identify the incorrect file.
  - ♦ The following message is displayed when you run an injection method: *[Abort] {Sampler} Program validation failed. Error description: "Invalid method signature.*

Using default cycle files

The table lists the cycles that are provided in Chromeleon by default. All cycles can be used together with the sample preparation function. This function allows you to prepare the next sample for injection during equilibration or while the current sample is still running. To use this function, select the **Use sample preparation** check box when creating the program.

Cycle File	Description
Priming	Priming cycle for initial and daily routine priming—For additional information, see page 79.
Standard Injection	Standard injection cycle with optimized washing possibilities—For additional information, see page 79.
Fast Injection	Injection cycle optimized for speed and high throughput with less focus on carryover—For additional information, see page 79.
Low Volume Injection	Injection cycle optimized for low sample volumes—For additional information, see page 80.

- **Priming**

  Run the priming cycle for initial and daily routine priming of the wash liquid lines and DLW manifold. Note the following:

  - You can define the intensity of washing by adapting the Clean Time for both wash liquids as needed by your application.
  - When priming the autosampler fluidics at installation, set the clean time to approximately 120 seconds for each wash liquid. After installation, for best results, prime the autosampler before activating the first run. For daily preparation of the autosampler, the clean time can be much shorter. Approximately 20 seconds will be sufficient.
  - You can add an additional cleaning process (Stator Wash) for intensive washing of the injection valve. For more information, see page 81.
  - For partial loop filling, keep the following in mind:
    Mind the composition of wash liquid 1, as the loop is filled with wash liquid 1 in the last rinse step. The wash liquid should have a lower elution power than the solvent gradient starting conditions or sample composition.

- **Standard Injection**

  Standard injection cycle with optimized washing possibilities—Use this cycle to minimize the carryover. Note the following:

  - The autosampler waits for the Sync signal before the injection cycle is started.
  - The injection valve inlet port and the needle are washed with both wash liquids (inside and outside).
  - You can add an additional cleaning process (Stator Wash) for intensive washing of the injection valve. For more information, see page 81.

- **Fast Injection**

  Injection cycle optimized for speed and high-throughput with less focus on carryover—Use this cycle if you want to minimize the autosampler injection time and if carryover is not an issue. This cycle differs from the standard injection cycle in that some steps are left out to shorten the cycle time:

  - The needle is not dipped into the Wash Station Wash 1 after sample pickup and before it moves to the injection valve.
  - The wash steps after injection are reduced to cleaning the valve with wash liquid 1 and wash liquid 2. The needle is flushed in the DLW wash station wash liquid 1 only.
  - Stator Wash (valve toggle) is not available.

- **Low Volume Injection**

  Injection cycle optimized for low sample volumes—Use this cycle for injection volumes of 100 nL to 5 µL. Note that you cannot change the parameter settings for this cycle.

Using Customized Cycle Files

If you want to use cycle files other than those provided in Chromeleon by Thermo Fisher Scientific, you could use cycle files that were created by using the CTC Cycle Editor. To make these files available in Chromeleon:

- Select one of the following alternatives:

  - Copy the files to the directory in which the cycle files provided by Thermo Fisher Scientific are stored, which is *C:\Thermo\Data Files\Chromeleon\Drivers\UltiMate Open Autosampler* by default.

    Afterward, open the configuration dialog for the autosampler (→ page 50) and click **OK.** Only then, the new files will be available in Chromeleon.

  - Copy the files to any other directory. In this case, you have to change the path in the configuration dialog for the autosampler to the new location (→ page 50).

    If you want to use also the default, cycle files from Thermo Fisher Scientific, save a copy in the same directory. If you added the files to the new directory after you have changed the path in the configuration dialog, reopen the configuration dialog and click **OK**. Only then, the files will be available in Chromeleon.

- In addition, keep the following in mind:

  - When you save the autosampler configuration, the cycle files that are available on the data system computer on which the Chromeleon Server Configuration program is running when saving the configuration, become part of the autosampler configuration. These files will then be available in Chromeleon.

  - If you are using cycle files that were created with the Cycle Editor (but which have not been certified by CTC Analytics), the Cycle Editor has to be installed on the same data system computer on which you are running these cycles.

5.2.3.3 Additional Stator Wash Cleaning Step

The Standard Injection cycle and the Priming cycle include an option for the user to toggle the injection valve at the end of the chromatographic run before equilibration of the column to the start conditions.

Set **Stator Wash** to 1 to make the extra cleaning process for the valve, using Valve Toggle, part of the standard cycle. Stator Wash is disabled by default (set to 0).

Standard Injection cycle only
The cycle is written so that the optional valve toggle steps can be executed before re-equilibration of the column. You must synchronize the time to switch the valve with the chromatographic method with the **Delay Stator Wash(s)** parameter. The time that the autosampler pumps the wash liquid 1 and wash liquid 2 into the injection port of the injection valve, through the sample loop, and out to waste, is specified with the **Stator Wash Time Solvent 1** and **Stator Wash Time Solvent 2** parameters. After these wash times have elapsed, the valve is switched back to the start position.

Fig. 47 illustrates the recommended retention time for Stator Wash or valve toggle times.

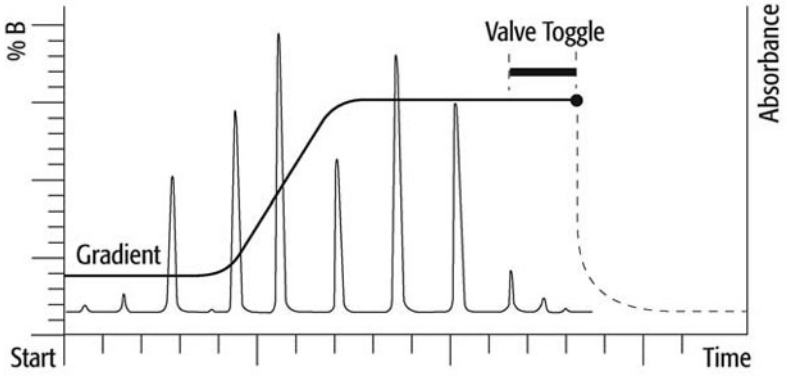


Fig. 47: Timing for the Stator Wash step

From the chromatographic viewpoint, the optional cleaning step is important to understand. Assuming that the valve stator between ports 1 and 6 (for example, a standard Cheminert valve) is contaminated and cannot be cleaned during the injection process, the valve toggle brings the grooves back between the two ports. Flushing the valve with both wash liquids eliminates remaining sample material located between stator ports 1 and 6.

When using this option, keep the following in mind:

- Observe the rules if biofluid samples are injected. The first sample contact should always be with an aqueous solution to avoid protein precipitation. After washing with organic wash liquid (higher elution power), you must flush the autosampler system again with wash liquid 1.
- The first toggle near the end of the chromatographic cycle provides the advantage that the sample loop is already flushed out, first using the mobile phase with a solvent of high elution power (assuming gradient application).

- The second valve toggle follows immediately after finishing the second wash liquid flush. You cannot program a second switching time. The waiting time for the second valve toggle should be long enough so that the entire system is flushed out by both wash liquids.
- Consider the entire delay volume to determine the second valve switch, which is as follows:
  - ♦ Total delay volume with FEP holding loop

    Manifold: 90 µL
    Holding loop (FEP): 108 µL
    Needle: 6.7 µL
    Installed sample loop

    = 205 µL + sample loop volume
  - ♦ Total delay volume with stainless steel holding loop

    Manifold: 90 µL
    Holding loop (stainless steel): 118 µL
    Needle (not applicable as the needle is integrated in the holding loop)
    Installed sample loop

    = 208 µL + sample loop volume
- The second valve toggle (back to the starting condition) should be done before the equilibration time has started. When the valve is switched back, the loop content is ideally a wash liquid of a low elution power.
- With isocratic chromatography, the remaining contaminants might be washed into the system and can build up higher background noise for the column, the detector, or both over a longer period of time.

5.3 Control Terminal

This section describes how the control terminal elements are used and provides an overview of the most important terminal menus.

5.3.1 How to Use the Control Terminal

Fig. 48 shows the control terminal, providing brief overview of terminal elements and the conventions for entering, editing, and viewing information. For details, see the next page.

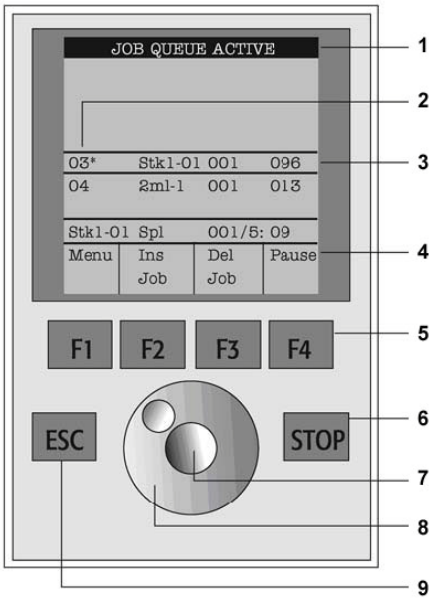


Fig. 48: Control terminal

No.	Description
1	Title bar, indicating the menu title
2	Job number
3	Cursor bar, highlighting an item on a list
4	Function key labels, indicating the function of the related key (F1 through F4)
5	Function keys F1 through F4
6	STOP key: Press to abort an operation.
7	*Scroll knob—Inner knob (= ENTER button)* Press to select an item highlighted by the cursor bar and/or press to confirm or accept the selection, value and so on.
8	*Scroll knob—Outer knob* Rotate to move the cursor bar, scroll through available items or options on a list, or change numeric values.
9	ESC key: Press to return to the previous menu.

Menu Screens

The control terminal displays different menu screens, depending on the operating status of the autosampler, and particular functions that you are accessing. The basic format is identical for all menu screens. The menu title is shown at the top of the screen in the title bar. Underneath the title bar, a list of items is displayed. The date and time, or status, appear in the highlighted area above the function key labels on the bottom of the screen.

Function Key Labels and Function Keys (F1 through F4)

The label directly above each key describes the function of the key, corresponding to the options for a particular menu.
Pressing the function key labeled **Home** always returns you to the **Job Queue** screen.

ESC and STOP keys

Press the **ESC** key to return to the previous menu.
Press the **STOP** key to abort the current operation, for example, to cancel the current cycle, job, or job queue.

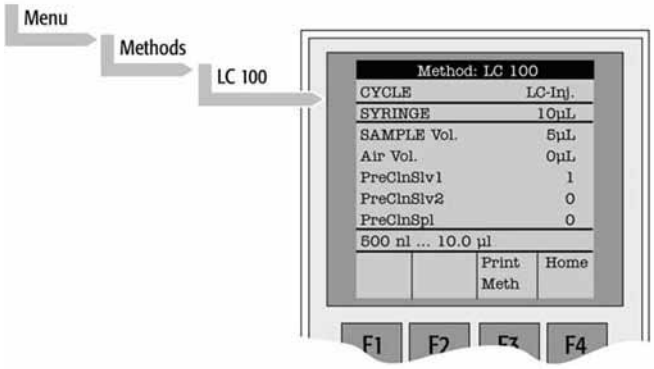
Scroll knob and ENTER button

Use the scroll knob and ENTER button as follows to navigate on the control terminal and view or edit information:

1. Rotate the outer knob to scroll through the items on a list by moving the cursor bar.
2. Press the inner knob (ENTER) to select an item highlighted by the cursor bar.
3. Then, rotate the outer knob to scroll through the options that are available for the selected item or to change a numeric value.
4. Press the inner knob again to confirm your selection (enter the displayed option).
   Pressing the inner knob may be required also in situations where a confirmation is required to continue or complete an operation.

Example

Fig. 49 illustrates the representation of access paths in the manual and the required sequence of steps.



1. On the **Job Queue** screen, press the **F1** key (**Menu**).
2. Rotate the outer knob to highlight **Methods**.
3. Press the ENTER button (inner knob) to select **Methods**.
4. Rotate the outer knob to highlight **LC100**.
5. Press the ENTER button to select **LC100**.

Fig. 49: Accessing a method (example)

5.3.2 Utility Functions

The Utility functions, which are selected from the **Menu** screen, provide quick access to checking operations and parameters that may need to be changed. These functions are available for the actual syringe, trays, injectors, and the wash station. They allow access to key functions without having to set up and execute a Method and Job. The following sections provide a short overview of the most relevant Utility functions.

Keep the following in mind: If the sample processing cycle uses an item, the method value overwrites the Utility value.

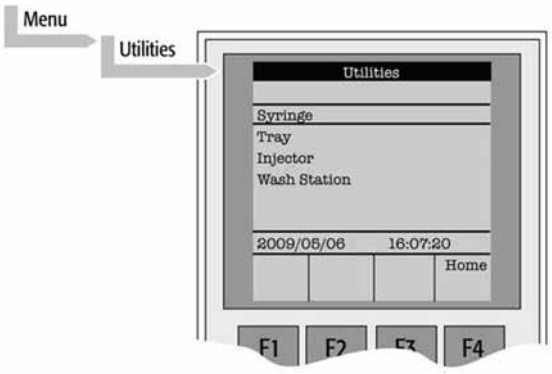


Fig. 50: Selecting Utility functions

5.3.2.1 Syringe

The following utility functions are available for the syringe:

Function Key	Description
F1 Chang Syr	Moves the syringe to a position where the syringe assembly can be completely lowered to facilitate removing of the syringe adapter. When the syringe in this position, you can remove the syringe from the adapter and replace it. A prompt is displayed to specify the new syringe. Install the syringe *before* pressing **Enter**.
F2 Clean Syr	Use to clean or prime the syringe prior to use. After pressing F2, select either **Wash1** or **Wash2**.
F3 Set Pos	Use to define the **Change Syr** position
F4 Home	Moves the injection unit to its Home position; the Job Queue screen appears.

The following items are available for changing the syringe configuration:

Item	Description
Actual ID	Indicates the identification number (ID) of the currently inserted syringe. If the syringe detection system is set to manual, **Syringe: No syringe.** is displayed.
Fill Volume	Controls the liquid level in the syringe. Air bubbles may remain below the plunger after the first pull up. If the plunger moves up and down several times (see Fill Strokes), these air bubbles are worked out. With this operation, you can completely fill the syringe even when using very small sample volumes.

Item	Description
Fill Strokes	Sets the number of fill strokes. All fill strokes, except the last one, use the selected fill volume. If the selected sample volume is higher than the fill volume, the sample volume is used for all fill strokes. If you select zero, the plunger is pulled up only once using the sample volume value.
Pullup Del	Specifies a delay time between sample pullup and ejection while the syringe is filled. When the plunger reaches the zero position during the fill strokes, the system waits half the Pullup Del time. This allows an air bubble to float away from the needle tip. This feature is especially useful for removing any air bubble that may be present in the syringe and for handling viscous fluids.
Fill Speed	Sets the speed with which the plunger is moved in all filling operations of the syringe.
Eject Speed	Sets the speed with which the plunger is moved in all eject operations of the syringe (except sample injection).
Inject Speed	Sets the speed with which the plunger is moved for sample injection. Typically used for Fill Strokes.
Plunger Chnge Pos	Sets the plunger position during the Change Syringe operation. The syringe plunger is moved to a position where you can remove and replace the syringe. You may change the value for different types of syringes.

5.3.2.2 Tray

The following utility functions are available for the tray:

Function Key	Description
F2 Block NdlG	Activates needle guide blocking. Use this function to test the functionality of the solenoid that blocks the needle guide. When the option has been activated, the function of the key changes to **Rel NdlG**, which releases needle guide blocking.
F3 Movto nnn	Serves as a quick check to determine if the x, y, z coordinates are defined correctly for the selected tray. To use this utility, the selected tray, including the sample vials, must be present. After pressing **Movto 001** the injection unit moves to sample position No.1. You can repeat this procedure for the last sample position in the first row and for the last sample position.
F4 Home	Moves the injection unit to its Home position; the Job Queue screen appears.

The following items are available for changing the tray configuration:

Item	Description
Needle Penetr	Specifies how deep the needle descends into the sample vial or well (needle penetration depth). You can change the needle penetration depth for the selected tray by entering the preferred value.
Tray Type	Shows the tray type. If the tray allows the use of different tray types, you can change the type here.
Tray Offset X	Use to correct to the ideal x-position of 'Position 1' if necessary.
Tray Offset Y	Use to correct to the ideal y-position of 'Position 1' if necessary.

Item	Description
Tray Offset Z	Use to correct to the ideal z-position of 'Position 1' if necessary.
dxRow	Use to correct any inclination of a tray (plate) in the x-axis of a row.
dyRow	Use to correct any inclination of a tray (plate) in the y-axis of a row.
dzRow	Use to correct any inclination of a tray (plate) in the z-axis of a row.
dxCol	Use to correct any inclination of a tray (plate) in the x-axis of a column.
dyCol	Use to correct any inclination of a tray (plate) in the y-axis of a column.
dzCol	Use to correct any inclination of a tray (plate) in the z-axis of a column.

5.3.2.3 Injector

The following utility functions are available for the injector:

Function Key	Description
F2 ActValve F2 DeactValve	Switches the injection valve. Note the following: When pressing the F2 ActValve key, the red valve LED illuminates and the key label changes to F2 DeactValve. Pressing the F2 DeactValve returns the valve into the original position. The valve LED is off and the key label changes back to F2 ActValve.
F3 Movto Inj	Moves the injection unit to the selected injector position. With this function, you can access, for example, the injectors, Waste, Waste2, and Flush. Select the **Needle Penetr** parameter on the same screen (see next table) if you want to check or change the injector needle penetration depth.
F4 Home	Moves the injection unit to its Home position; the Job Queue screen appears.

The following items are available for changing the injector configuration:

Item	Description
Needle Penetr	Select to check or change the injector needle penetration value (that is the value how deep the needle descends into the injector (valve needle guide)). To ensure reproducible sample injections and minimize carryover, it is critical that the needle penetration depth be accurately set.

5.3.2.4 Wash Station

The following utility functions are available for the wash station:

Function Key	Description
F3 Movto Wash	Moves the injection unit to the selected wash station port. Select the **Needle Penetr** parameter on the same screen (see next table) if you want to check or change the needle penetration depth for the wash station.
F4 Home	Moves the injection unit to its Home position; the Job Queue screen appears.

The following items are available for changing the wash station configuration:

Item	Description
Needle Penetr	Select to check or change the needle penetration value for the wash station (that is the value how deep the needle descends into the wash station).
Rinse Time	If Rinse Time is activated (value > 0), the solenoid of the wash station opens for the specified time after the needle has been removed from the wash port (after completion of the syringe wash cycle). The wash liquid flows into the wash port without the restriction of the needle; be aware of higher liquid consumption.

5.3.3 Logfile

You cannot read the logfile directly on the terminal display. However, you can print the file by pressing the F3 function key if a serial printer is connected to SER1 port. If a serial printer is not available, use a serial-to-parallel converter.

5.3.4 Info Functions

The Info functions, which are selected from the **Menu** screen, provide quick access to information about hardware, software, maintenance, free objects, and free items. All information, except for maintenance, is read-only.

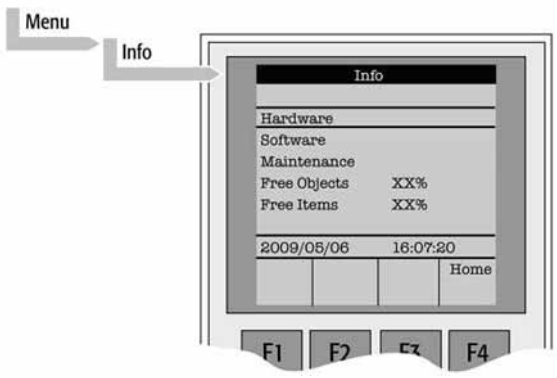


Fig. 51: Selecting Info functions

5.3.4.1 Hardware

The following information is available about the hardware:

Item	Description
CPU SNo	Displays the serial number (S/N) of the APR Control-XT printed circuit board (PCB)
CPU ID	Displays the version number of the APR Control-XT PCB
Moto ID	Also displays the version number of the APR Control-XT PCB

5.3.4.2 Software

The following information is available about the software:

Item	Description
PAL™ Firmware	Displays the firmware version of the autosampler system
Head Firmware	Displays the firmware version of the injection unit
Terminal FW	Displays the firmware version of the control terminal
Altera Firmware	Displays the firmware of the Altera component

5.3.4.3 Maintenance

The following information is available for maintenance:

Item	Description
PlgStrokeCnt	Counts the movements of the syringe plunger. The actual number of strokes is displayed. If the counter reaches the set limit (PlgStrkeLim), a warning is displayed when the next job (run) is started. The system continues but signals the user to verify the syringe conditions. You can restart the counter by resetting it back to zero. A syringe has only one counter. If you change the syringe types, the system continues to count as if it were the same type.
PlgStrokeLim	Sets an upper limit for the number of syringe plunger strokes
Inject Count	Monitors the number of injections. This counter provides helpful information for the decision about when to replace parts in the injector system. The actual number of injections (valve switches) is displayed. If the counter reaches the set limit (Inject Limit), a warning appears when the next job (run) is started. The same counter is used for injector penetrations with a GC technique.
Inject Limit	Sets an upper limit for the number of injections

5.3.4.4 Free Objects/Free Items

In addition to the core software, the autosampler firmware contains data for firmware objects. There are different classes of objects, such as syringes, trays, tray holders, and so on. Each class of objects contains items. The items contain the actual data, such as x-, y-, z-positions.

The data are stored in a flash memory that is backed up by a battery.

To optimize RAM and Flash memory use, the software has a reserved section of memory for each of the objects and object items.

The percentage shown in the Info section indicates how much of the reserved software space is still available.

5.3.5 Setup Functions

The Setup functions, which are selected from the **Menu** screen, provide quick access to the basic autosampler functions (Sounds, Time, and Objects) that you use at installation or if changes have been made over time.

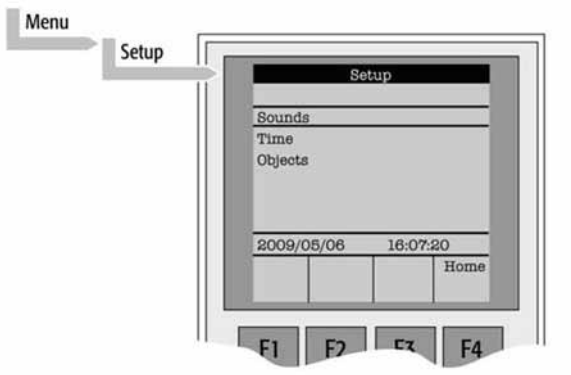


Fig. 52: Selecting Setup functions

5.3.5.1 Sounds

The following functions are available for the sound:

Item	Description
Message Box	A specific dual beep signals that a message box for user intervention appears on the screen. You can turn this beep signal on or off.
Warn Move	A beep sounds at the start of the autosampler movement. Keep this function turned on for safety reasons.
End Cycle	If selected, a beep sounds at the end of a cycle.
End Job	If selected, a beep sounds at the end of a job.

5.3.5.2 Time

The table lists the functions that are available for the time. After setting or resetting the date and/or time, press the F1 function key (SetTime) to save the settings.

Item	Description
Year	Sets the year for the internal autosampler clock
Month	Sets the month for the internal autosampler clock
Day of Month	Sets the day for the internal autosampler clock
Hours	Sets the hours for the internal autosampler clock
Minutes	Sets the minutes for the internal autosampler clock
Seconds	Sets the seconds for the internal autosampler clock

5.3.5.3 Objects

You can directly access common functions for the various autosampler object classes. For a detailed list, see section 11.1 (→ page 145).

5.4 Information for Operating the Autosampler

This section provides specific information that should be considered for operating the autosampler:

- Changes to the hardware configuration (→ section 5.4.1)
- Dynamic Load and Wash (→ section 5.4.2)
- Stack Cooler operation (→ page 95)
- Inject Response (→ page 98)
- Pump Stroke Synchronization (→ page 99)

5.4.1 Changing the Hardware Configuration

If you change the hardware configuration, you have to

1. Adapt the related setting on the autosampler control terminal.
   For example, if you place a different tray type in the front position of the top drawer, select **Menu > Setup > Objects > Trays > CStk1-01** and assign the appropriate tray type.
2. Transfer the new setting to Chromeleon.
   Open the **Properties** dialog for the autosampler in the Chromeleon **Server Configuration** program and click **OK (**→ page 53). Only then, the new tray will be available in Chromeleon.

5.4.2 Dynamic Load and Wash (DLW)

This section provides specific information for Dynamic Load and Wash:

- Priming the wash liquid lines (→ further down on this page)
- Wash liquids, wash liquid reservoirs, and waste container (→ page 94)
- Functionality (→ page 94)

Priming the Wash Liquid Lines

For trouble-free operation, make sure that the two wash liquid lines are free of air bubbles at all times. If the liquid lines are being connected for the first time or during a wash liquid change, you must prime the wash liquid lines properly until air bubbles are no longer visible. For best results, use liquid degassing. For efficient and controllable priming, run the priming cycle from Chromeleon (→ page 78).

Wash Liquids, Wash Liquid Reservoirs, and Waste Container

For the secure and functional positioning of the wash liquid reservoirs, place the reservoirs in the tray that is included in the autosampler shipment. When choosing the wash liquids, keep the following in mind:

- Use good laboratory practice to avoid contaminating the wash liquids and the wash liquid reservoirs.
- Avoid biological growth in pure water by either replacing it regularly or adding a small percentage of organic solvent, such as methanol or acetonitrile.
- Certain buffer solutions can decompose at room temperature when exposed to light. Filtering the wash liquids before filling the reservoir, especially if using salt buffers, is mandatory to avoid any clogging of the liquid paths.
- The wash liquid lines are preconnected on the DLW manifold when the autosampler is shipped (liquid line 1 to port 1 (upper port) and wash liquid line 2 to port 2 (lower port).

  Although a predefined wash liquid line position is not required, problems could occur if wash liquid is refilled or exchanged while the tubing still contains liquid from the previous setup. Therefore, always keep the lines at the same position and carefully prime the entire system.

  Make sure that the order of the line connections, upper or lower, is consistent. In certain applications you cannot mix types of liquids, for example, biofluid sample solution should not contact with highly concentrated organic wash liquid.

When positioning the waste container, observe the following:

- The waste container must be below the injection valve (30 cm or 12 inch or more) to allow the liquid to flow off.
- The waste tubing must remain below the connection port and must not be bent or kinked at any point so that the liquid can flow into the container without restrictions.
- The free end of the tubing inside the waste container must always be above the liquid level in the waste container at any time. Ideally, the tubing should be fixed at the container neck.

DLW Functionality

The following section provides information about the DLW pumps and DLW actuator/solenoid.

The DLW pump module has two self-priming pumps with a suction lift of up to a 3 m water column. The DLW actuator/solenoid separates and completely shuts off the lines in the direction of the syringe (sample loading) or the wash liquid lines. After opening the actuator/solenoid for the wash liquid lines, you can pump the desired wash liquid into the system by activating the corresponding DLW pump. Current applied from the actuator control board to the actuator/solenoid activates a green LED. This activation does not indicate that the solenoid opens or closes.

5.4.3 Stack Cooler Operation

This section provides specific information for operating the stack cooler:

- Temperature control (→ page 95)
- Temperature alarm (→ page 95)
- Temperature stability (→ page 96)
- Condensation build-up (→ page 97)

Temperature Control

Peltier elements cool down and heat up the items in the stack cooler. The cooling/heating capacity of a temperature control device based on the Peltier technique is always related to room temperature. Only a limited maximum temperature difference from ambient temperature can be achieved. The stack cooler should reach a minimum difference of 14 °C (ΔT). The controller provides a temperature setting range of +1 to 45 °C.

This wider control range, which is greater than the specification limits (+4 to 40 °C), provides cooling or heating when the ambient temperature is too high or too low to easily reach the desired temperature. Heating to a higher temperature could be important for metabolism or kinetics studies at the human body temperature level of 37 °C.

The cooling option is usually necessary to protect the sample from ambient temperature during the analytical run time. Stack cooler devices are rarely used to store a sample at a given temperature for a longer time.

The measured and displayed temperature represents the temperature in the cooler compartment and not in the sample liquid. To check the temperature control, you can insert an independent temperature probe from the front by removing one plastic screw from the front cover. Position the probe in the middle of the drawer where the tray separator projects up. Tape the probe to the metal plate of the drawer.

To reach +4 °C in the analytical solution, program a set value lower than +4 °C. The material used for the sample may be glass, polypropylene, polyethylene, or similar polymer products. All of these have excellent insulating properties.

If the sample has to be cooled down to a temperature as low as +4 °C, cool the sample tray in a refrigerator first before placing it into the stack cooler. This shortens the cool-down time considerably.

Temperature Alarm

The stack cooler module is protected by an internal alarm point of 55 °C as the upper limit. Reaching this point in a single fault situation causes the temperature control unit to force cooling automatically to the fullest extent possible. The alarm is not audible. At the same time, a message is displayed. For information about possible messages, see the table on page 106.

A fuse to prevent overheating is built in for unattended automated runs. The Peltier element turns off automatically at +72 ± 5 °C. Only an authorized representative of Thermo Fisher Scientific can replace a damaged over-temperature fuse.

In case of error, perform the following steps:

1. Check the message (→ page 106).
2. Verify that the appropriate power supply is being used for the stack cooler.
3. Turn off the power supply, wait a few minutes, and turn it on again.
4. Verify that the alarm is off. If the alarm is still on, see the related message.

Temperature Stability

The stack cooler is a thermostatted sample tray that keeps the analytical sample below or above ambient temperature. Thermo Fisher Scientific recommends the following guidelines:

- Turn on the stack cooler at least 30 minutes before the analytical routine run is to be started at +10 °C or 75 minutes if operated at +4 °C.
- For high-throughput analysis—typical cycle time of 60 seconds or less per analysis—leave the drawers open between injections.
- For longer cycle times, keep the drawers closed after each sampling.

The preset mode for the stack cooler in combination with the autosampler closes the drawers after sampling during an analytical run. To change the setting:

1. On the control terminal, navigate to Restore Mode: **Menu > F3 Setup > Objects > Trayholders > Cstack > Restore Mode**.
2. Select **Auto** to leave the drawers open or select **Sample** to close them after sampling. Sample is the default setting.
3. Press **Home**.

Condensation Build-Up

Condensation build-up is directly related to the temperature and relative humidity/temperature in 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.

Condensation at the back of the cooler is channeled to the drain outlet labeled Condensation Drain at the lower rear of the stack cooler. The outlet is plugged with a paper filter. This helps to evaporate the collected water in the drain line using the excess heat from the Peltier element. Under normal conditions, a drain line from the outlet to a reservoir bottle is not required.

⚠ **Important:** If a flush gas is used as described below, you are responsible for ensuring that a two-stage safety pressure regulator device is installed between the gas supply and the stack cooler.
Do not use any flammable or explosive gas such as hydrogen.

⚠ **Important:** Si vous utilisez un gaz de rinçage comme indiqué ci-dessous, vous devez installer un détendeur double étage de sécurité entre l'arrivée du gaz et l'élément refroidisseur.
Ne pas utilisez un gaz inflammable ou explosif tel que l'hydrogène.

If you operate the stack cooler under severe conditions, you can use a flow of dry and clean (oil-free) air or nitrogen to dry the drawers continually. Connect the corresponding gas line to the Swagelok fitting (1/8 inch) labeled Flush Gas at the rear of the stack cooler. A flow of approximately 300 to 400 mL/min is required to keep the drawers free of moisture.

If acidic vapor phase is anticipated due to the application, use the same gas line connection to flush a stream of inert gas, such as nitrogen or helium, into the drawers. A stream of a few mL/min can help to prevent corrosion of the rolls.

Thermo Fisher Scientific recommends checking the stack cooler regularly for condensation build-up. It is good practice to clean the inside of the stack cooler when changing the analytical samples, dry out the stack cooler at ambient temperature at regular intervals, and open the drawers 1 cm to 5 cm (0.5 in. to 2.0 in.) for air circulation. The compartment drying frequency depends on surrounding conditions.

5.4.4 Inject Response

The Inject Response signal is transmitted properly only if the prerequisites described below are fulfilled. Only if all settings are correct, signal transmission will be successful.

- The pump is connected to the autosampler as described in section 3.5.3 (→ page 45).
- The inject response signal is properly set on the autosampler. On the control terminal, navigate to the **Out Signals** menu (path: **Menu > Setup > Objects > Out Signals**), select **Injected**, and verify that **Destination** is set to **SW-Out1**. If it is not, change the setting as required.
- *Depending on the pump type*
  - *If the pump is a DGP-3600 or LPG-3400 (RS, SD, or BM*)
    In the Chromeleon Server Configuration program, in the **Properties** dialog for the autosampler (→ page 50), verify that **Signal received via** is set to **Input port** and the port to which the signal synchronization cable is connected is specified in the **Inject Response Input Port** box, for example, Pump_Input_2.
    Keep in mind that the input is available for selection only if it has been enabled in the **Properties** dialog for the pump, on the **Inputs** page. If it is not, enable the input by the check box.
  - *If the pump is an LPG-3400XRS*
    In the Chromeleon Server Configuration program, in the **Properties** dialog for the autosampler (→ page 50), verify that **Signal received via** is set to **Serial port** and that the port is specified in the **Inject Response Serial Port** box.

5.4.5 Synchronizing the Inject Command with the Pump Strokes

If the autosampler is linked to an UltiMate 3000 pump that supports pump stroke synchronization, the injection command can be synchronized with the pump strokes. Synchronization ensures that all injections are performed at the same phase of the pump cycle, enhancing the retention time precision with gradient applications.

5.4.5.1 Using Pump Stroke Synchronization

Synchronization is possible only if the following prerequisites are fulfilled:

- The pump is a DGP-3600 or LPG-3400 pump.
  If it is not, see section 5.4.5.2 (→ page 100).
- The pump is connected to the autosampler as described in section 3.5.3 (→ page 45).
- The synchronization signal is configured on the autosampler. On the control terminal, navigate to the
  - **Sync Signals** menu (path: **Menu > Setup > Objects > Sync Signals**), select **Inject2**, and set **Source** to **TTL-In1**.
  - **Events** menu (path: **Menu > Setup > Objects > Events**) and verify for **TTL-In1** that **Active State** is set to **Low**. If it is not, change the setting as required.
- Transmission of the Inject Response signal is configured as described in section 5.4.4 (→ page 45).
- In the Chromeleon Server Configuration program, in the **Properties** dialog for the autosampler (→ page 50), the pump to which the autosampler is linked is specified in the **PumpLink (LPG only)** box.
- *Only if the pump is a DGP-3600 or LPG-3400 (RS, SD, or BM*)
  - The pump must have firmware version 3.30 or later installed.
  - In the Chromeleon Server Configuration program, in the Properties dialog for the pump, on the **Relays** page, in the **Pump Links** group, the pump is selected by the **OAS-3x00TXRS Sync** check box (→ Fig. 53, page 100).

    Observe the following:
    - If the **Pump Links** group is not available, the timebase includes an earlier version of the pump driver. Delete and reinstall the pump in the timebase.
    - The **Corona Shutdown** check boxes are selected by default.
    - If synchronization *and/or* Corona shutdown are selected, the related relays are controlled by the pump and no longer available in Chromeleon for individual control. If you try to use a relay for more than one function, a message will alert you and you have to change the selection as appropriate.

- With a DGP-3600, stroke synchronization is possible *only* for one pump. To activate stroke synchronization, you have to clear a Corona shutdown check box *first*. Clear the check box for the pump for which Corona shutdown shall not be supported.

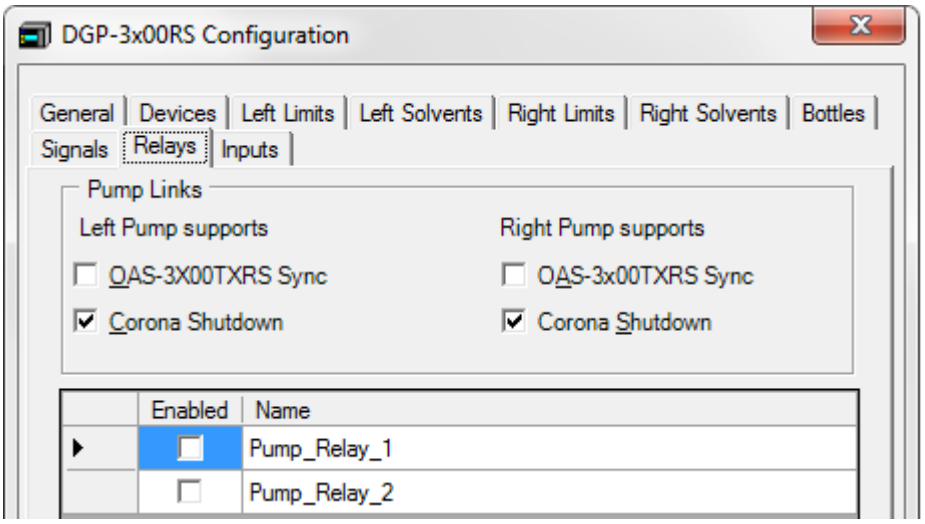


Fig. 53: Relays page (here for a DGP-3600 pump)

Only if all settings are correct, synchronization will be successful.

If you do not want to use synchronization later again, see section 5.4.5.2 (→ page 100).

5.4.5.2 Synchronization Is Not Possible or Not Required

If the UltiMate 3000 system includes a pump that does not support pump stroke synchronization or if synchronization is not required, check and change the following settings as necessary:

- In the Chromeleon Server Configuration program, in the **Properties** dialog for the autosampler (→ page 50), verify that **PumpLink (LPG only)** is set to **None**.
- Verify that the sync signal setting is correct also on the autosampler: On the control terminal, navigate to **Sync Signals** menu (path: **Menu > Setup > Objects > Sync Signals**), select **Inject2**, and verify that **Source** is set to **Immediat**.

5.5 Shutting Down the Autosampler

Observe the following precautions before interrupting the operation or before shipping the autosampler:

- Always turn off the power to the basic autosampler system and the stack cooler and disconnect the power cords before performing maintenance procedures or if you have to stop the entire autosampler system in case of emergency.
- To avoid damage to electrical parts, do not disconnect an electrical assembly while the power to the autosampler is turned on. Once power is turned off, wait approximately 30 seconds before you disconnect an assembly.
- Rinse out any solvents if necessary. If a buffer is used as a part of the mobile phase, flush the system with several volumes of methanol/water (50:50) before it is shut down. This will prevent salt buildup inside the unit.

If you are running Chromeleon, you can set the HPLC system into the standby mode or automate system shutdown. For more information, see the *Chromeleon Help*.

6 Troubleshooting

This section helps you to identify and eliminate the source for problems that may occur during the operation of the autosampler and provides some special considerations for troubleshooting.

If you are unable to eliminate a problem following the instructions given here, contact Thermo Fisher Scientific Service for Dionex HPLC Products.

6.1 Symptoms and Messages

The following table lists symptoms and messages that may occur during autosampler operation along with possible causes and suggests remedial actions. For messages that may appear for the stack cooler, see the next table (→ page 106).

Symptom or Message	Possible Cause	Remedial Action
Detector signal not detected or very low	Clogged syringe	Remove the syringe. Draw and dispense liquid manually. Clean the syringe.
	Clogged needle or holding loop	Clean the needle and/or holding loop or both.
	Bent needle	Inspect and change the needle or syringe if necessary.
	No sample liquid injected	Check and adjust **Needle Penetration** into tray if necessary (→ page 69).
	Sample volume too low	Increase the sample volume.
	Improperly installed valve needle guide and/or needle seal	Check the valve needle guide and seal (→ page 116).
	Valve ports not plumbed correctly to the pump, the detection system, or both.	Check plumbing connections.
	Wrong valve type specified	Check the valve type. On the control terminal, the path is **Menu > Setup > Objects > Injectors > LCVlvl > Valve**.
Flow of mobile phase and/or sample from the wrong ports on LC injection valve	The valve rotor is reversed (180 degrees out of alignment)	Remove the rotor and reinstall in the correct position (→ page 119). For a Cheminert valve, check for marking points.

Symptom or Message	Possible Cause	Remedial Action
Sample backing up on the valve needle guide	Valve ports not plumbed correctly to the pump, detection system, or both	Check plumbing connections.
	Wrong valve type specified	Check the valve type. On the control terminal, the path is **Menu > Setup > Objects > Injectors > LCVlvl > Valve**.
	Needle O.D. too small	Check the needle for the correct gauge (Gauge 22 = 0.72 mm O.D.)
	Leaking valve needle seal	Change valve needle seal (→ page 116).
	Needle penetration depth set incorrectly for the injection valve	Adjust the needle penetration depth for the injection valve (→ page 87).
	The syringe plunger speed set too high, resulting in excessive pressure in inlet	Reduce the inject speed in the method.
Syringe not filling properly	DLW actuator/solenoid not functioning	Liquid path is blocked. Inspect the system for indication of clogging. Prime the system.
		Air bubbles are trapped in the system, caused by loose connections or tubing that is not cut square (→ page 109).
	Worn out syringe plunger tip	Replace syringe plunger (→ page 121). Check if the glass barrel is scratched (damaged). If in doubt, replace the entire syringe (→ page 121).
	DLW flow diverter	Verify that the flow diverter is inserted and that it is inserted in full up position. Verify that the liquid is flowing freely in the tube.
	Fitting removable needle	Check the fixation and seal of the removable needle. Verify the following: The retaining nut seals tight. The seal is properly installed on the syringe end of the needle. The needle entry is free of debris and is not clogged. A needle with correct diameter (gauge 22) is used.
	DLW actuator control PCB may be defective.	Contact Service.

Symptom or Message	Possible Cause	Remedial Action
Sample peaks not reproducible	Dirty syringe or holding loop	Increase the value for the cleaning time in the method, if available, for example, (**Post) Clean Time Solvent 1** and/or (**Post) Clean Time Solvent 2**.
	Syringe pressure differences	Increase **Pullup Delay** value.
	Vacuum created in sample vial.	Reduce sample volume in sample vial.
	Method parameters	Check the recommended Method parameters (→ section 11.1, page 145). First, check these critical parameters: Fill Speed, Pullup Delay, Injection Speed, and Post Inj Delay.
Excessive carryover between samples	Loose, unstable, or wrong connection	Check all connections within the DLW system, such as the needle, holding loop, sample loop connections and so on.
	Inappropriate wash liquids	Use appropriate wash liquids.
	Waste line I.D .too small at injection valve, causing waste liquid to be pulled back, by capillary action, into rotor groove	Replace the waste line with tubing with a larger inner diameter.
	Air gaps not formed. Liquids of different type blending into each other	Verify that the DLW method parameter for **Airgap Volume** is correct. Prime the entire system.
	Dirty needle, holding loop, and/or valve injection port	Increase the value for the cleaning time in the method, if available, for example, (**Post) Clean Time Solvent 1** and/or (**Post) Clean Time Solvent 2**.
	Damaged or grooved valve rotor	Replace the valve rotor (→ page 119).
	Leaking valve needle seal	Replace the valve needle seal (→ page 116).
	Inappropriate composition of the wash liquid	Use appropriate wash liquid. Also, observe the appropriate order when using biological samples: First wash is always an aqueous solution followed by organic wash liquid.

Symptom or Message	Possible Cause	Remedial Action
Excessive carryover between samples (*Cont'd*)	End of holding loop tubing not cut square or nut/ferrule fixation not correct	Check the connections on the holding loop. Verify the following: The pilot distance is appropriate. The tube end is not damaged. The tube end is cut square. The correct nuts and ferrules are used.
	DLW actuator/solenoid may be defective	Verify that the DLW actuator is operating properly, that is, whether the liquid is flowing when active. Test from the control terminal by using the following command: **Utilities > Wash Station**.
	Blocked wash line frits in wash liquid reservoir	Clean the frits in an ultrasonic bath with an appropriate wash liquid. If cleaning does not eliminate the problem, replace the frits. Use fresh wash liquid. Clean the reservoir and tubing carefully.

The table lists the messages that may appear for the stack cooler along with possible causes and suggests remedial actions.

Message	Description	Probable Cause	Remedial Action
-------	Error probe	DC cable disconnected or in short circuit	Verify that the cable between the power supply and the stack cooler is properly connected.
		Connection fault or Probe damaged	Contact Service.
Uuuu	Under range	Measured variable below sensor limit	Check the set point for the preferred temperature (→ page 71).
oooo	Over range	Measured variable above sensor limit	Turn the power supply off and on again to reset the temperature control unit to the normal level. Check the set point for the preferred temperature (→ page 71).
LbA	Loop break alarm	Loop break alarm interrupted	Check the set point for the preferred temperature (→ page 71).
ErEP	EPROM	Error in EPROM	Press the **P** button on the power supply.

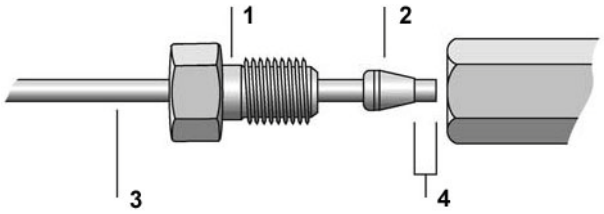
6.2 Special Consideration for Troubleshooting

This section provides special information that should be considered for troubleshooting to help you eliminate the source for possible problems.

6.2.1 Ferrule-Based Tubing Connections

This section describes basic rules to help you prevent issues with ferrule-based tubing connections that are commonly observed in routine practice. Also, observe the information in section 4.2 (→ page 56).

- Nut and ferrule not connected leak tight (→ page 107)
- Incorrect pilot distance (→ page 109)
- Tube not cut square (→ page 109)
- Wrong type of ferrule or nut used (→ page 110)
- Trapped air bubbles (→ page 111)



No.	Description
1	Male nut (internal)
2	Ferrule
3	Tubing
4	Pilot

Fig. 54: Tubing connections

Incorrect tubing connections may lead to:

- Dead volume
- Peak distortion or peak splitting
- Carryover effects

6.2.1.1 Nut and Ferrule Tightening

Observe these rules when tightening nuts and ferrules:

A—Tighten the nut and ferrule stepwise

B—Do not reuse nuts and ferrules for a different connection

A—It is important that you tighten the nut and ferrule stepwise

1. Tighten the nut by hand as much as possible.
2. Continue tightening by using a wrench until you feel resistance. Add one or two more quarter turns to reach the sealing point.
3. Open the connection and remove the assembly to inspect the pilot distance (→ Fig. 54).

4. Reinstall the assembly. First, tighten the nut manually, then use the wrench to reach the same sealing or resistance point as reached in step 2, and then add one additional quarter turn for the final seal.
5. Inspect the seal for indications of leakage when liquid is pumped through the system. If leakage is observed, tighten once more by another quarter turn. Always move from a leaking to a tight seal; never move backward from an over-tightened seal.

Keep the following in mind:

- Do not over-tighten the nut/ferrule. If a connection is leaking, tighten another quarter turn. Step-by-step tightening is the correct approach. Over-tightening even once will damage the seat, and the next connection can be sealed only by applying force. If the seat is damaged, the ferrule is likely to stick. In this case, force or special tools (such as a drill) will be required to remove it.
- If you use different materials, such as a polymer tubing and nut, together with a stainless steel ferrule, over-tightening is always a danger. The ferrule will bite into the polymer tube and block the flow.
- When installing a tube with a narrow bend, typically a loop, connect one end first. Do not simultaneously establish the connection on the other end. After tightening open the connection as described above, start preparing the connection on the other end, without the first connection being established. Reopen the second connection and check the pilot distance. The last step is inserting the complete tubing with the two connections and making a final seal as described further up in this section.
- This stepwise installation is also mandatory for PEEKsil tubing.

B—Do not reuse a nut and ferrule for a different connection

Observe the following:

- Reuse tubing with nuts and ferrules only for the same connection and the specified application. If necessary, shorten the tubing and cut straight, and remove the ferrule.
- This applies also to loops. Do not reuse a loop with another valve or after the stator has been exchanged.
- If a finger-tight nut is installed, replace the nut as well. If a stainless steel nut is used, make sure that you use the correct type.
- Newly installed finger-tight ferrules can hold a backpressure of up to 20 MPa.

6.2.1.2 Incorrect Pilot Distance

Keep these guidelines in mind when establishing a new tubing connection:

1. Slide the nut and ferrule onto the tube. Make sure that the tubing end sticks out approximately 50 mm (2 inch).
2. Press the tubing end firmly into the female counterpart for the connection.
3. Move the nut and ferrule together into the female counterpart for the connection. Make sure to maintain pressure on the tubing to prevent the tubing from slipping backwards, out of position.

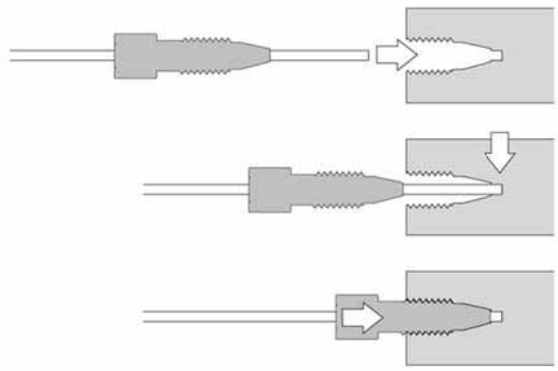


Fig. 55: Pressing the tubing into place (pilot distance)

4. Tighten the nut as described in the section 6.2.1.1 (→ page 107).

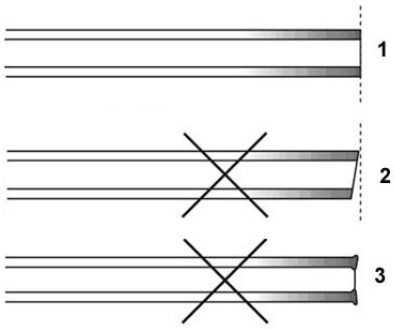
Failure to observe these guidelines leads to incorrect pilot distance, resulting in actual dead volume (not delay volume).

6.2.1.3 Tubing not Cut Square

All tubing has to be cut square. Any deviation causes dead volume, resulting in carryover and other chromatographic effects. This rule is valid for stainless steel, PEEK, or Polymer tubing. Using the correct tool for cutting is the decisive factor:

- Stainless steel tubes are often cut by using cutting pliers. This often leads to an egg-shaped profile, which no longer seals and causes dead volume. Dedicated pliers for HPLC tubing are available on the market; nevertheless, for best results, use precut tubing that is cut smooth, clean, and that is passivated.
- Because polymer tubes, such as PEEK, PTFE, or PFA, are soft, you might choose to cut them with any handy tool. Tubing cutters are available from many manufacturers. However, be sure that the blade provides a clean, right-angle cut. If it does not, use a different technique.

- The most reliable and common way to cut tubing of any material is with a cutter that has an adjustable blade. Carry out the initial turns, readjust the blade, turn once more, and adjust again until approximately half of the tubing wall is cut. Hold the tube on the two sides of the cut with flat-nose pliers and twist the tube until it breaks. You can use the same procedure for polymer tubing by replacing flat-nose pliers with tweezers with a flat tip.

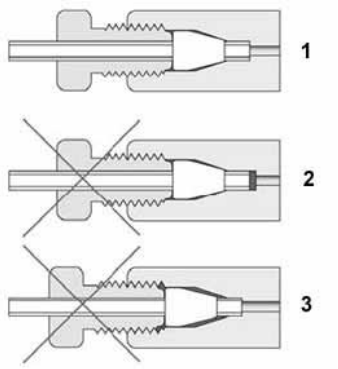


No.	Description
1	Correct: 90° cut
2	Wrong: Angled cut
3	Wrong: Rough or pressed edges

Fig. 56: Tubing cuts

6.2.1.4 Wrong Type of Ferrule or Nut

Do not use a nut or ferrule from a vendor other than those specified for the product. Fig. 57 illustrates the dead volume resulting from using an incorrect nut or ferrule type.



No.	Description
1	Correct: Tubing seats correctly at the bottom
2	Wrong: Tubing does not reach the bottom, thus introducing dead volume
3	Wrong: Tubing reaches the bottom before the ferrule seals

Fig. 57: Dead volume created due to wrong ferrule type

Fig. 58 shows the various forms of ferrules from different manufacturers. Although some of them are close in shape to what you need, they are not close enough to exchange without risk.

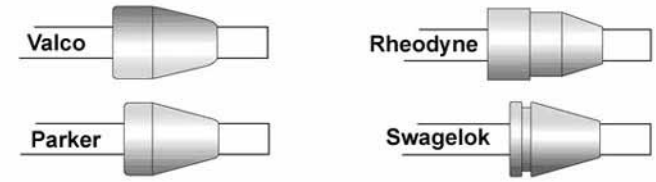


Fig. 58: Ferrule types from different manufacturer

6.2.1.5 Trapped Air Bubbles

It is common practice to wet the connection ports before establishing the connection. The liquid helps to avoid that air bubbles are trapped, which are often tedious to remove or work out of a system.

6.2.2 Wash Liquid Delivery Pumps

The wash liquid delivery pumps can fail to prime at initial operation. In this case, remove the wash liquid lines from the liquid inlet ports, wet the pump at the inlet ports, and then reconnect the wash liquid lines. Dry running the pump for a short time will not harm it.

6.2.3 Operational Qualification and Performance Qualification

Chromeleon supports Operational Qualification and Performance Qualification procedures and provides the required templates allowing you to check and document the performance of the autosampler and the HPLC system. All materials required for performing qualification and detailed instructions are available on request.

7 Maintenance

7.1 General Notes and Safety Precautions

The following sections describe all procedures for the autosampler that the user may perform. All other maintenance and service procedures must be performed by Thermo Fisher Scientific service personnel.

Observe the following precautions:

- Observe all warning notes when carrying out maintenance or repair work.
- Keep in mind that the fluid components of the system may be filled with toxic solvents. Before starting maintenance or repair procedures, rinse toxic solvents from the instrument and put on protective clothing.
- Always turn off the power to the basic autosampler and the stack cooler and disconnect the power cords before performing maintenance procedures.
- To avoid damage to electrical parts, do not disconnect an electrical assembly while the power to the autosampler is turned on. Once power is turned off, wait approximately 30 seconds before you disconnect an assembly.
- Use only the spare parts and accessories recommended in this manual. Substituting parts may impair the performance of the instrument, thereby voiding the product warranty. For more information, see the warranty statement in the terms of sale.
- *Before* returning the autosampler for repair, contact your Thermo Fisher Scientific Service representative for Dionex HPLC products for assistance regarding an RMA (Return Material Authorization) number and appropriate handling and packing.

For instructions on shutting down the autosampler, see page 101.

7.2 Routine and Preventive Maintenance

The autosampler is made of high-quality components and materials to minimize maintenance requirements. All surfaces are resistant to weak acids, alkali, and organic solvents. Nevertheless, immediately wipe up all liquids spilled onto the autosampler surface, using lint-free cloth or paper. If surfaces are exposed for longer periods, these liquids can cause damage.

Perform the maintenance procedures listed in the following table at regular intervals to ensure optimum performance and maximum uptime of the autosampler. The exact maintenance schedule for the autosampler will depend on a number of factors, such as throughput, sample solution, and mobile phase.

Frequency	What you should do ...
Daily	Check the fluid lines for indications of leakage.
	Before you start operating the autosampler, prime the system by running the priming cycle (→ page 79).
	Check the liquid level in the wash liquid reservoirs and refill as needed.
	Check the volume of the liquid in the waste container and empty as needed.
Periodically	Clean the instrument and stack cooler from the outside and from the inside, using only a soft, lint-free cloth, dampened with mild soap and water.
	Visually inspect the stopper and holding magnet of the stack cooler drawers for correct position and good condition.
	Inspect all tubing for possible damage, such as cracks, nicks, cuts, or blockage.
	Check the frits in the wash liquid lines for permeability. Replace the frits in regular intervals when using aqueous wash liquid. Aqueous wash liquid may contaminate the filters with algae and other microorganisms that deposit on the filter frits. Therefore, use fresh wash liquid at regular intervals. Rinse the reservoirs thoroughly before filling them.
	To ensure reproducible sample injection and minimize carry over: • Clean the injection valve at regular intervals to avoid valve contamination (→ page 118). • Test the valve needle seal for tightness at regular intervals (→ page 116). • Replace the valve needle seal at regular intervals. For more information about appropriate intervals, see page 117.

Frequency	What you should do ...
Periodically *(Cont'd)*	Inspect the syringe plunger for indications of leakage on a regular basis and replace the plunger as necessary (→ page 121). The interval depends on the application, throughput, and of the quality of the sample solution (particles) and wash liquids.
	Inspect the needle for indications of damage (for example, whether the needle is bent.) Install a new needle if required (→ page 123).
	Check the functionality of the DLW actuator/solenoid (→ page 106).
Annually	Replace the valve rotor (→ page 119).
	Replace the holding loop (→ page 125).
	Have authorized Service personnel check the autosampler once a year to prevent, for example, contamination and excessive wear.

⚠ **Important:** A cooling fan is installed in the power supply for the stack cooler. Check the functionality of the fan at regular intervals. If the fan fails, the power supply continues to operate, but too high temperatures might damage the system electronics.

⚠ **Important:** Un ventilateur de refroidissement est installé dans le boitier d'alimentation de l'élément refroidisseur. Vérifier le bon fonctionnement du ventilateur à intervalles réguliers. Si le ventilateur ne fonctionne plus, le boitier d'alimentation continue de fonctionner, mais des températures élevées peut provoquer des dégâts dans le système électronique.

7.3 Injection Valve

7.3.1 Valve Needle Seal

Description	Part No.
Valve needle seal for injection valve (set of 10 seals) (Cheminert, 2-position, 6-port, 1275 bar, 18500 psi)	6845.0048

To ensure reproducible sample injection and minimize carryover

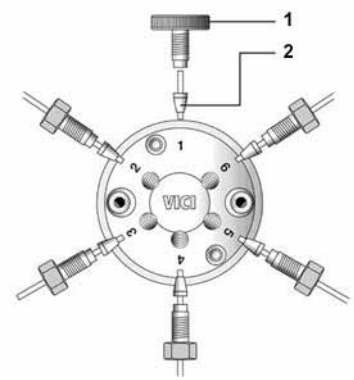
- Test the needle seal for tightness at regular intervals (see further down).
- Replace the needle seal at regular intervals.
  For information about appropriate intervals, see page 117.
- Be sure that the needle penetration depth is set correctly (→ page 87).

Tip: Reproducibility will suffer also when the injection valve is clogged. Consider cleaning the injection valve at regular intervals (→ page 118).

To test the seal for tightness

When you start operating the autosampler, you might want to check the tightness of the seal daily or weekly to gain experience with your specific use related to your application.

1. Remove the needle guide from the valve.



No.	Description
	Valve needle guide fitting with:
1	Valve needle guide
2	Valve needle seal (which is a short length FEP tubing)

Fig. 59: Injection valve with needle guide fitting, including needle guide and needle seal

2. Remove the needle seal from the valve port.
3. With your hand, insert a syringe with the appropriate needle gauge from the top, down into the tube, and past the sealing point of the ferrule.
4. If you observe resistance, continue to use the needle seal.
   If you do not observe resistance, install a new needle seal. Assemble the components as shown in Fig. 59 and tighten the valve needle guide to the stop. Afterward, check and adapt the needle penetration depth for the needle guide fitting as described in section 4.3.2.2 (→ page 67).

Interval to replace the valve needle seal

The interval in which you should replace the needle seal depends on the number of penetrations. However, specifying a maximum number of penetrations is not an appropriate approach. Consider the following factors instead:

- Leak, seal does seal not reliable

  Test the seal for tightness as described on the previous page. If the seal fails the test, replace the seal. Afterward, check and adapt the needle penetration depth for the needle guide fitting as described in section 4.3.2.2 (→ page 67).

- Carryover

  If you suspect contamination of the needle seal with a compound, replace the valve needle seal. Carryover can occur if the sample solution is accidentally dispensed too fast into the valve system. The restriction of the valve and loop might cause backpressure, forcing the sample solution into the inlet port of the valve.

Tip: The autosampler firmware provides a counter for the number of injections performed. The counter monitors the valve switches; it does not monitor the number of penetrations into the injection port. For example, cleaning the valve requires an extra penetration.

You might want to monitor this counter in addition to the test for the needle seal tightness. On the control terminal, the path for accessing the counter is **Menu** > **Info** > **Maintenance** > **Inject Count**.

After a few weeks of routine autosampler operation, a warning limit for the inject counter gradually becomes evident and will be a valuable tool for routine operation. On the control terminal, the path for setting the warning limit is **Menu** > **Info** > **Maintenance** > **Inject Limit**.

7.3.2 Cleaning the Injection Valve

Consider cleaning the injection valve at regular intervals to avoid valve contamination, which may affect the reproducibility of the sample injection.

The Flushing and Injection kit (part no. 6078.4200) includes an appropriate syringe and tubing for cleaning the injection valve manually.

1. Remove the waste line on port 2 on the injection valve.
2. Remove the valve needle guide and valve needle seal from the injection valve (→ Fig. 59, page 116).
3. Fill the syringe with an appropriate cleaning liquid (for example, water or isopropanol) and then connect the syringe to port 2 on the injection valve.
4. Inject the cleaning liquid and absorb any liquid leaving the valve with a lint-free cloth or tissue.
5. From the control terminal, switch the valve into the other position, by completing the following path: **Menu > Utilities > Injector > "Select Injector"**(= LC Vlv 1 for the LC injection valve) **> F2** function key.

   Observe the following:

   - When the valve is in the Inject position, the valve LED is off and the F2 function key is labeled **F2 ActValve**.
   - Pressing the **F2 ActValve** function key switches the valve into the Load position. The valve LED illuminates red and the function key label changes to **F2 DeactValve**.
6. Inject the cleaning liquid and absorb any liquid leaving the valve with a lint-free cloth or tissue.
7. When cleaning is complete, switch the valve back into the original position.
8. Reinstall the valve needle guide and valve needle seal. Assemble the components as shown in Fig. 59 (→ page 116) and tighten the valve needle guide to the stop.
9. Check and adapt the needle penetration depth for the needle guide fitting as described in section 4.3.2.2 (→ page 67).
10. Reconnect the waste line to port 2 on the injection valve.

7.3.3 Replacing the Injection Valve

Description	Part No.
Injection valve, 2-position, 6-port Cheminert valve (1275 bar, 18,500 psi)	6845.0006
Note: The valve comes with the valve needle guide, valve needle seal, and waste line.	

1. Disconnect all liquid lines connected to the injection valve.
2. Unscrew the Torx screw at the valve adapter, which holds the valve to the valve drive.

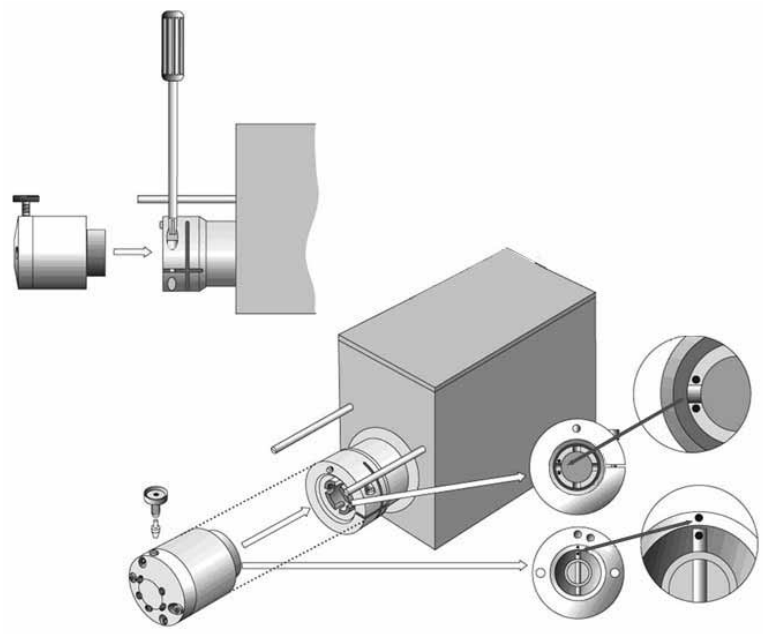


Fig. 60: Replacing the injection valve

3. On the valve drive, verify that the valve guide pin remains at its position and mind the guide marks (→ Fig. 60).
4. Install the replacement valve, as shown in the picture.
5. Install the valve needle guide and valve needle seal. Assemble the components as shown in Fig. 59 (→ page 116) and tighten the valve needle guide to the stop.
6. Check and adapt the reference positions for the injection valve (→ page 62).
7. Afterward, check and adapt the needle penetration depth for the valve needle guide fitting (→ page 67).
8. Reconnect the liquid lines to the valve.

7.3.4 Replacing Valve Stator or Rotor

Description	Part No.
Stator for 2-position, 6-port injection valve (Cheminert) (1275 bar, 18,500 psi)	6845.0005
Rotor for 2-position, 6-port injection valve (Cheminert) (1275 bar, 18,500 psi)	6845.0004

1. Disconnect all liquid lines connected to the injection valve.
2. *If you want to replace the stator*
   Remove the valve needle guide and valve needle seal (→ Fig. 59, page 116) from the stator that you want to replace.
3. Remove the two hex screws that hold the valve stator to the valve body.

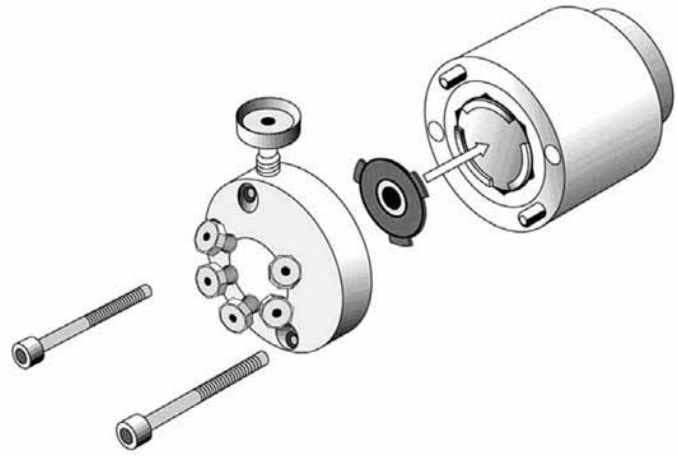


Fig. 61: Replacing the valve stator and/or rotor

4. Carefully lift out the rotor disk with a protected tool (with tips protected to avoid scratching the surface).
5. Insert the new rotor. Mind the size-coded positioning tabs; they prevent you from inserting the rotor upside down.
6. Tighten the hex screws of the stator carefully and evenly to reach a parallel seat of valve stator and body.
7. *If you installed a new stator*
   Install the valve needle guide and valve needle seal. Assemble the components as shown in Fig. 59 (→ page 116) and tighten the valve needle guide to the stop.
8. Check and adapt the needle penetration depth for the valve needle guide fitting (→ page 67).
9. Reconnect the liquid connections on the valve.

7.4 Replacing the DLW Syringe, Plunger or Plunger Holder

Description	Part No.
DLW syringe (100 µL)	6845.0062
Syringe plunger for 100 µL syringe, set of 10	6845.0061
Plunger holder for syringe	6845.0039

1. *Before* you begin, check and, if necessary, change the **Change Syr** position on the control terminal to make sure that it fits your module arrangement. This precaution helps to avoid needle damage during routine operation.

   The position should not be above an object with which the needle could collide, for example, with the injection valve or sample loop. With the standard module arrangement, an appropriate position is:
   Reference = None, Offset X = 0 mm, Offset Y = 130 mm, Offset Z = 80 mm.

   a) On the control terminal, select the following path:
   Menu > **Utilities** > **Syringe** > **F3** function key (**Set Pos.**).

   b) Move the injection unit to a location where no collision can occur with the z-axis by selecting the x-, y-axes appropriately:

   - Select **Position X** and press ENTER. Rotate the outer knob to adjust the x-axis to an appropriate position. Press ENTER to accept the position.
   - Repeat the Position X steps for **Position Y**.

   The value for the z-axis is given as a default and a change of this position is not necessary in standard operation.

2. Release the plunger holder by loosening the screw that fixes the holder.

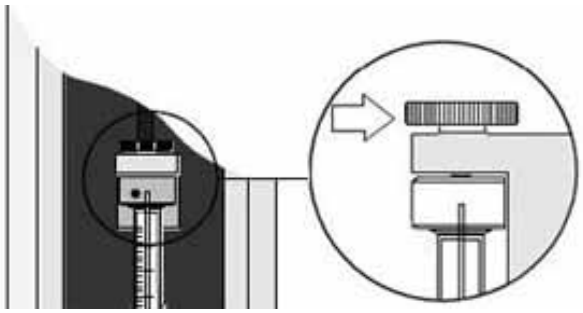


Fig. 62: Releasing the plunger holder

3. Remove the syringe from the syringe holder assembly.
   Remove the syringe by holding it at the lower metal mount to avoid damage to the seal. This is important if you want to reinstall the same syringe later again.

4. *If you want to replace or reuse the plunger holder*

   Remove the plunger holder from the syringe by loosening the Allen screw (→ Fig. 63, page 122) on the holder (Allen key size 6).

5. *If you want to replace the syringe plunger*

   Remove the plunger holder as described in step 4, remove plunger from the syringe, and insert the new plunger.

6. Prepare the (replacement) syringe by installing the plunger holder (→ Fig. 63, page 122):

   a) Move the syringe plunger manually down to the stop position.

   b) Release a little pressure to the plunger tip by pulling the plunger a fraction of a millimeter backward.

   c) Install the plunger holder and tighten the Allen screw firmly (Allen key size 6).

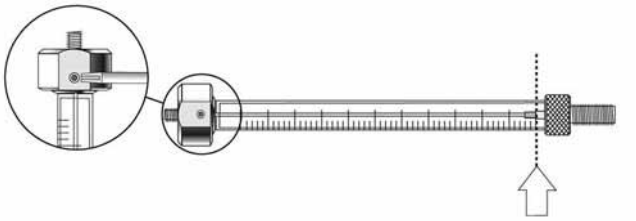


Fig. 63: Installing the plunger holder on the syringe

7. Prime the (replacement) syringe.
   It is critical that the syringe is primed before installation. Therefore, prime every syringe manually *before* you install it.

8. Insert the syringe into the syringe holder assembly and tighten the syringe by holding it at the lower metal mount. This is important as holding the glass barrel while tightening may damage the seal where the glass meets the metal.

9. Move the plunger up (plunger holder) until the thread of the screw catches the thread of the plunger bushing and tighten the screw to fix the plunger holder.

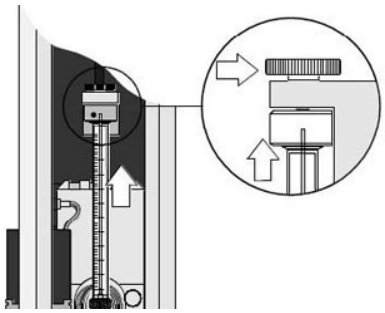


Fig. 64: Fixing the plunger holder

7.5 Replacing the Needle, Needle Seal, or Retaining Nut

Description	Part No.
Needle kit, including 3 needles (gauge 22) and 3 needle seals 1 needle retaining nut	6845.0037

1. Loosen the needle by the needle retaining nut, and then move the needle downward, into the needle guide.

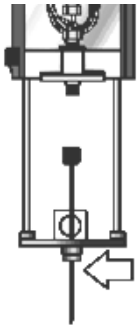


Fig. 65: Removing the needle

2. Remove the retaining nut and set it aside for installation on the replacement needle.
3. Unclick the needle holder assembly, by pulling it toward the front.
4. Move the needle up and out of the syringe holder assembly.
5. Click the needle holder assembly back into place.
6. Slip a replacement needle seal over the syringe end of the replacement needle (→ Fig. 66). Be careful to avoid that the sharp needle edges cut into the seal, resulting in particles that could clog the needle. Verify that the hole is open and no fuzzy (lint) seal particles are in the path.
7. From the needle tip end, slide the retaining nut onto the replacement needle.
8. Insert the needle tip into the needle guide.

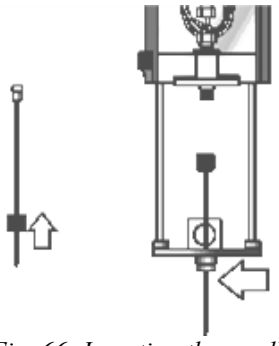


Fig. 66: Inserting the needle

9. Move the needle upward and, by the retaining nut, tighten the needle firmly to the needle holder assembly.

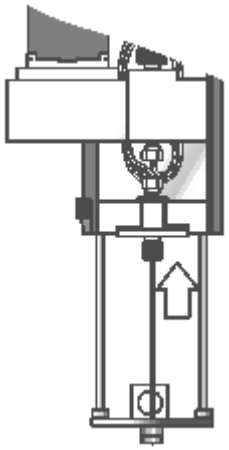


Fig. 67: Tightening the needle

10. Move the lower needle guide carefully up and down to make sure that the needle tip does not catch on the guide.

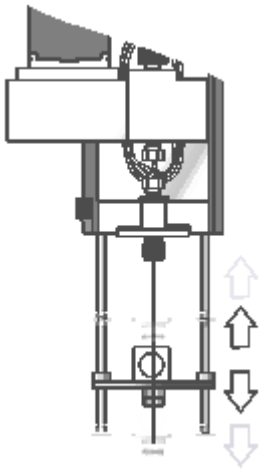


Fig. 68: Moving the needle guide up and down

11. Check and adapt the needle penetration depth for the valve needle guide fitting and for the sample vials or well plates (→ page 67).

7.6 Replacing the DLW Holding Loop (FEP) and/or Flow Diverter

Description	Part No.
DLW holding loop kit (FEP) with 1 holding loop (FEP) with needle holder assembly mounted 1 flow diverter 3 needles	6845.0035
DLW holding loop (FEP) with needle holder assembly mounted	6845.0034
Flow diverter	6845.0032

Thermo Fisher Scientific recommends performing this procedure when the autosampler is powered off. This allows you to move the injection unit aside to allow free movement of the syringe slider.

1. If the power to the autosampler is on, power off the autosampler by the power switch on the power supply.
2. With your hand, move the injection unit aside and to the front to allow free movement of the syringe slider.
3. Remove the needle by following the related steps in section 7.5 (→ page 123).
4. Unscrew the holding loop on the syringe inlet (bottom).

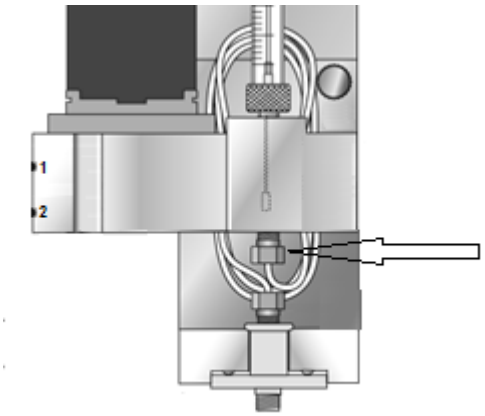


Fig. 69: Unscrewing the holding loop on the syringe inlet

5. If not yet done already, unclick the needle holder assembly by pulling it toward the front.
6. Pull down and remove the holding loop together with the needle holder assembly.

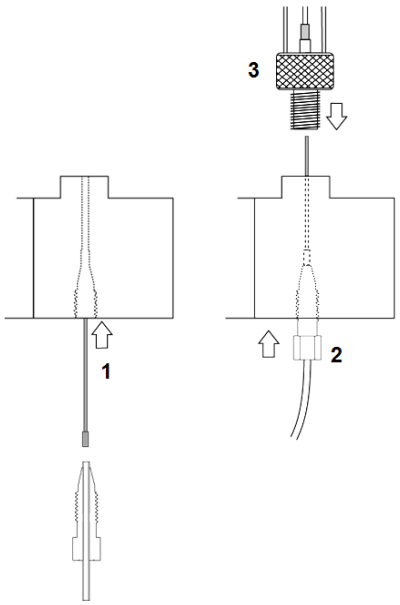
7. *If you want to replace the flow diverter*

   In general, you need not replace the flow diverter when you replace the FEP holding loop. Replace the flow diverter when it is blocked or bent.

   a) Remove the syringe by following the related steps in section 7.4 (→ page 121).

   b) To remove push the flow diverter downward and out of the syringe adapter.

   c) Install the replacement flow diverter as shown in the picture.
   Insert and push up the flow diverter from below, tighten the FEP holding loop to syringe inlet (bottom), and then reinstall the syringe (→ section 7.4, page 121).



No.	Description
1	Flow diverter
2	Holding loop
3	Syringe

Fig. 70: Replacing the flow diverter

8. Install the (replacement) holding loop by following the above steps in the reverse order.

9. Power on the autosampler and check and adapt the needle penetration depth for the valve needle guide fitting and for the sample vials or well plates (→ page 67).

10. Prime the autosampler by running the priming cycle (→ page 79).

7.7 Replacing the Autosampler Fuse

Description	Part No.
Fuse (6.3 AT, 250 V), set of 10 fuses	6845.0017

Warning: Before replacing the fuse, turn off the autosampler by the main power switch. Be sure to disconnect the power cord from its source.

Avertissement: Avant de remplacer les fusible, arrêtez le passeur d'échantillon. Assurez-vous de bien débrancher le cordon d'alimentation de la source secteur.

The fuse is located in the fuse cartridge on utmost right on the autosampler rear panel (→ Fig. 2, page 11).

1. To open the fuse cartridge, simultaneously press in and turn the cap that closes the cartridge.
2. Replace the fuse with a fuse of the appropriate rating.

   Important: Use only the fuses indicated in the table.

   Important: Utilisez uniquement les fusibles indiqués ci-dessous.

3. Close the fuse cartridge, by simultaneously pressing in and turning the cap.

8 Modifying the Autosampler

The autosampler is shipped with an FEP holding loop pre-installed in the syringe holder assembly. However, the shipment also includes a stainless steel holding loop. Note that with the stainless steel loop, the needle is part of the loop and cannot be removed.

If you want to replace the FEP holding loop with the stainless steel loop, follow the steps further down on this page. If you have to install a replacement stainless steel loop later, see page 132.

To replace the FEP loop with the stainless steel loop

1. Thermo Fisher Scientific recommends performing the replacement procedure when the autosampler is powered off. This allows you to move the injection unit aside to allow free movement of the syringe slider.

   If the power to the autosampler is on, power off the autosampler by the power switch on the power supply.

2. With your hand, move the injection unit aside and to the front to allow free movement of the syringe slider.

3. Remove the needle by following the related steps in section 7.5 (→ page 123).

4. Remove the syringe holder assembly from the injection unit:

   a) Lower the syringe slider to gain space for removing the syringe holder assembly (→ Fig. 21, page 32).

   b) Remove the guide wire/wash liquid line assembly from the DLW syringe holder assembly:
   Disconnect the wash liquid lines from the inlet ports on the manifold, and then remove the guide wire. To do so, loosen the screw (Torx 10) on the rear of the DLW manifold. Be careful not to lose the screw and washer. You will need them for reinstallation of the assembly.

   c) Release the plunger holder by loosening the screw that fixes the plunger holder (→ Fig. 62, page 121).

   d) Loosen the holding screw that secures the syringe holder assembly in position (→ Fig. 22, page 32).

   e) Unclick the syringe holder assembly from the injection unit (→ Fig. 21, page 32).
   Do not press against the DLW actuator/solenoid. Its mounting to the DLW manifold is fragile; it might break.

5. Remove the syringe by following the related steps in section 7.4 (→ page 121).

6. Remove the FEP holding loop and flow diverter by following the appropriate steps in section 7.6 (→ page 125).

7. Unscrew and remove the needle adapter block (→ Fig. 19, page 29).
8. In the autosampler shipment, locate the stainless steel holding loop, needle holder assembly, and retaining nut.
9. Prepare the holding loop:
   a) Insert the holding loop into the needle holder assembly.
   b) Slide the retaining nut onto the needle end of the holding loop and tighten to the needle holder assembly (→ Fig. 71, page 130).

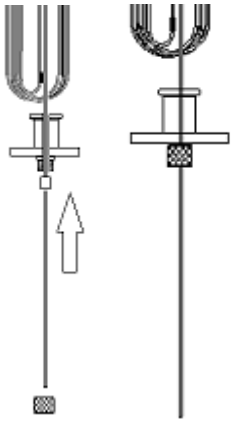


Fig. 71: Preparing the stainless steel holding loop

10. Push up the holding loop into the syringe holder assembly and tighten the loop to the DLW manifold.

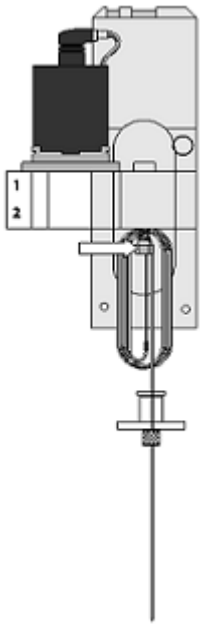


Fig. 72: Tightening the stainless steel holding loop

11. Reinstall the needle adapter block. Be careful to avoid that the needle is bent.

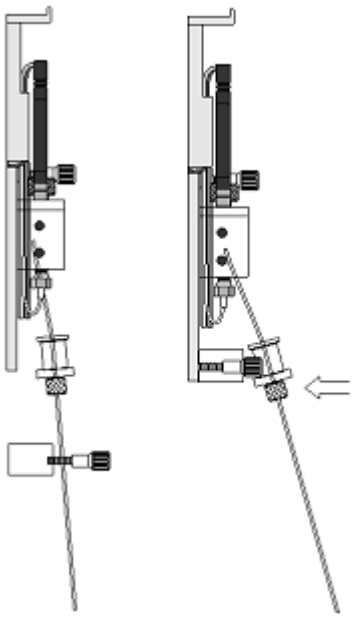


Fig. 73: Tightening the needle adapter block

12. Click the needle holder assembly back into place.

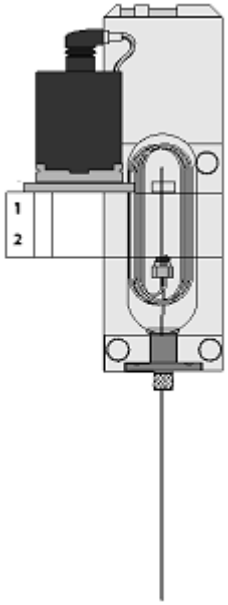


Fig. 74: Needle holder assembly clicked back into place

13. Reinstall the syringe by following the related steps in section 7.4 (→ page 121).

14. Reconnect the guide wire/wash liquid line assembly to the syringe holder assembly:
    a) Orient the guide wire in the groove of the block at the rear of the DLW manifold.
    b) Connect the guide wire by using the Torx 10 screw and washer.
    c) Verify that the wire tension is sufficient to keep the tubing in an upright position, but that it is low enough for moving the syringe holder manually along the x-axis.
    d) Reconnect the wash liquid lines to the inlet ports from which they were removed.
15. Reinstall the syringe holder assembly in the injection unit. The procedure is similar to installing the syringe holder assembly with FEP holding loop. Follow the appropriate steps in section 3.3.10.2 (→ page 31).
16. Power on the autosampler and check and adapt the needle penetration depth for the valve needle guide fitting and for the sample vials or well plates (→ page 67).
17. Prime the autosampler by running the priming cycle (→ page 79).

To install a replacement stainless steel loop

Description	**Part No.**
DLW holding loop (stainless steel), including PEEK hex-head nut and lock nut for needle adapter	6845.0029

1. Thermo Fisher Scientific recommends performing the replacement procedure when the autosampler is powered off. This allows you to move the injection unit aside to allow free movement of the syringe slider.
   If the power to the autosampler is on, power off the autosampler by the power switch on the power supply.
2. With your hand, move the injection unit aside and to the front to allow free movement of the syringe slider.
3. Remove the syringe holder assembly from the injection unit:
    a) Lower the syringe slider to gain space for removing the syringe holder assembly (→ Fig. 21, page 32).
    b) Remove the guide wire/wash liquid line assembly from the DLW syringe holder assembly:
    Disconnect the wash liquid lines from the inlet ports on the manifold, and then remove the guide wire. To do so, loosen the screw (Torx 10) on the rear of the DLW manifold. Be careful not to lose the screw and washer. You will need them for reinstallation of the assembly.
    c) Release the plunger holder by loosening the screw that fixes the plunger holder (→ Fig. 62, page 121).

d) Loosen the holding screw that secures the syringe holder assembly in position (→ Fig. 22, page 32).

e) Unclick the syringe holder assembly from the injection unit (→ Fig. 21, page 32). Do not press against the DLW actuator/solenoid. Its mounting to the DLW manifold is fragile; it might break.

4. Remove the syringe by following the related steps in section 7.4 (→ page 121).
5. Unclick the needle holder assembly, by pulling it toward the front.
6. Unscrew and remove the needle adapter block (→ Fig. 19, page 29).
7. Unscrew the holding loop from the DLW manifold and pull out the holding loop (→ Fig. 72, page 130).
8. Loosen and remove the retaining nut that secures the needle end of the holding loop to the needle holder assembly. Set the needle holder assembly aside, you will need it for the replacement loop.

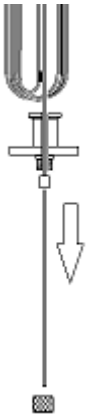


Fig. 75: Removing the retaining nut for the needle

9. Remove the holding loop.
10. To install the replacement holding loop, follow steps 9 through 17 on page 130.

9 Technical Information

Injection Methods	Pushed-loop injections, either full-loop or partial-loop filling
Linearity	Correlation coefficient R > 0.9999 at 4, 6, 8, 10, and 12 µL (partial-loop injections), 20 µL sample loop, benzophenone in water/MeOH (50:50)
Precision	RSD ≤ 0.5% for 2 µL full-loop injections, 2 µL sample loop, 100 µL syringe, caffeine in water/ACN (90/10), 0.1% TFA RSD ≤ 0.5% for 10 µL partial-loop injections, 20 µL sample loop, 100 µL syringe, caffeine in water/ACN (90/10), 0.1% TFA RSD < 0.5% for 1 µL partial-loop injections, 2 µL sample loop, 100 µL syringe, caffeine in water/ACN (90/10), 0.1% TFA
Carry over	< 0.004% (typically < 0.003%) chlorohexidine (UV) in water/ACN (90:10), 0.1% TFA for 2 µL full-loop injection, 2 µL sample loop, 100 µL syringe, with DLW-2 option with two wash liquids
Sample capacity	Depending on the configuration OAS-3300TXRS: Six trays with 54 positions for 2 mL vials Six normal well plates with 96 or 384 wells or Six deep-well plates with 96 wells Combination of trays and well plates OAS-3600TXRS: Twelve normal well plates with 96 or 384 wells
Sample thermostatting	4 to 40 °C
Injection range	0.1–20 µL
Wash station	PAL DLW-2 option with two wash liquids
Weight	Table: 16 kg (35 lb) Autosampler: 18 kg (39.7 lb)
Dimensions (h x w x d)	Table: 448 - 688 x 627 x 558 mm (17.6 - 27.1 x 24.7 x 21.9 in.) Autosampler including safety shield and control terminal: 648 × 676 × 718 mm (25.5 × 26.6 × 28.3 in.)
PC connection	All functions controllable via Ethernet/LAN, RS-232/USB
Safety features	Safety guard
User input/display	Control terminal LEDs for monitoring the operation mode of the autosampler and the switching position of the valve
GLP	In Chromeleon: All system parameters are recorded in the Chromeleon Audit Trail
Wetted parts	Fluorinated ethylene-propylene (FEP), PEEK, Perfluoro elastomer (FFPM), Perfluoralkoxylalkan (PFA), Polyvinylidene fluoride (PVDF), Polyethylene (PE), Polytetrafluorethylene (PTFE), Perfluor, Ryton® PPS, Simriz™, stainless steel, Valcon H, Valflon®

OAS-3x00TXRS **Main system power supply**	Input line voltage: Grounded AC, 100 to 240V Input line frequency: 50/60 Hz Input power: 4A Output voltage: 36 VDC Output current: 4.16A
Emission sound pressure level	Typically < 65 dB(A) in 1-m-distance
Environmental and operating conditions	Range of use: Indoor use Temperature: 4 °C to 40 °C (39 °F to 104 °F) Air humidity: 75% rel. humidity, non-condensing Overvoltage category: II Pollution degree: 2

Technical information: June 2012
All technical specifications are subject to change without notice.

10 Accessories, Spare Parts, and Consumables

Accessories, spare parts, and consumables for the autosampler are always maintained at the latest technical standard. Therefore, part numbers are subject to alteration. However, updated parts will always be compatible with the parts they replace.

10.1 Standard Accessories

The standard accessories listed in the following sections are shipped with the autosampler in a separate accessories kit (content subject to change without notice). Some parts listed in the table are included in one of the spare part kits. For information about these kits, see section 10.3 (→ page 142). The part number always refers to the packing unit. For more information, contact the Thermo Fisher Scientific sales organization for Dionex HPLC Products.

For part number information about other parts that are included in the autosampler shipment but are not part of the accessories kits, for example, the autosampler interconnect cable or, with an OAS-3300TXRS, the sample trays, see section 10.3 (→ page 142).

10.1.1 OAS-3300TXRS

Description	Part No.	Qty in the accessories kit
OAS-3300 TXRS		
Solvent supply line filter, including: Filter holder (top and bottom parts) and filter frit (stainless steel, porosity: 10 µm) These filters are intended for use with solvent supply lines for the UltiMate 3000 SD, RS (*not* XRS), and BM pumps.	Included in 6268.0115 Included in 6268.0110	4
Set of 4 solvent supply lines (2.5 m length each) for UltiMate 3000 XRS system with an SD, RS (*not* XRS), or BM pump	n.A.	1
Set of 4 solvent supply lines (2.5 m length each) for UltiMate 3000 XRS system with an LPG-3400XRS pump When using these solvent supply lines, remove the filters from the 2.0 m long solvent supply lines that are provided in the accessories kit for the LPG-3400XRS pump and install them on this tubing.	n.A.	1
Sample vial, 1.8 mL, amber	6000.0072	100
Crimp cap, 11 mm, silicone slotted	6000.0076	100
Normal well plate (96 wells)	6820.4100	6
Deep-well plate (96 wells)	6820.4101	6

Description	Part No.	Qty in the accessories kit
Menu pen	6300.0100	1
Solvent reservoir, 1 L	Included in 2270.0012	4
Bottle cap for solvent reservoir	Included in 2270.0012	4
Cap (to close the holes in the solvent reservoir caps)	Included in 6000.0047	20
Retaining guide (for solvent reservoir)	Included in 6000.0042	4
Viper capillary kit for OAS-3x00XRS, including 1 capillary (0.1 x 550 mm ((I.D. x L), SST, Viper) e.g. to connect the OAS to the TCC-3000 (bottom-up stack configuration) 1 capillary (0.1 x 650 mm (I.D. x L), SST, Viper) e.g. to connect the OAS to the TCC-3000 (top-down stack configuration) 1 capillary (0.065 x 650 mm (I.D. x L), PEEK, Viper e.g. to connect the TCC-3000 to a mass spectrometer (Exactive configuration) 1 capillary (0.065 x 850 mm (I.D. x L), PEEK, Viper e.g. to connect the TCC-3000 to a mass spectrometer (TQ configuration) 1 capillary (0.13 x 850 mm (I.D. x L), SST, Viper, e.g. to connect the pump to the OAS (bottom-up stack configuration)	6845.2301	1
CD UltiMate 3000 XRS Open Autosampler including, for example, PAL Loader software	n.A.	1
Cable, signal synchronization cable to connect the autosampler to an UltiMate 3000 SD, RS, or BM pump (*not* LPG-3400XRS) for pump stroke synchronization and Inject Response transmission	6043.0001	1
Cable, signal synchronization cable to connect the autosampler to an LPG-3400XRS for pump stroke synchronization	6043.0002	1
Cable, RS-232 cable to connect the autosampler to the RS-232 port on the Chromeleon computer for Inject Response transmission *Note*: If an RS-232 port is not available on the computer, the RS-232-USB-Interface cable is required in addition to the RS-232 cable.	6043.0005	1
Cable, RS-232-USB Interface cable required in addition to the RS-232 cable (part no. 6043.0005) if an RS-232 port is not available on the computer	6073.2000	1
(Double) open-end wrench (size ¼" x 5/16")	6000.0051	1
Allen wrench (size 9/64")	6000.0053	1

10.1.2 OAS-3600TXRS

Description	Part No.	Qty in the accessories kit
OAS-3600 TXRS		
Solvent supply line filter, including: Filter holder (top and bottom parts) and filter frit (stainless steel, porosity: 10 µm) These filters are intended for use with solvent supply lines for the UltiMate 3000 SD, RS (*not* XRS), and BM pumps.	Included in 6268.0115 Included in 6268.0110	4
Set of 4 solvent supply lines (2.5 m length each) for UltiMate 3000 XRS system with an SD, RS (not XRS), or BM pump.	n.A.	1
Set of 4 solvent supply lines (2.5 m length each) for UltiMate 3000 XRS system with an LPG-3400XRS pump When using these solvent supply lines, remove the filters from the 2.0 m long solvent supply lines that are provided in the accessories kit for the LPG-3400XRS pump and install them on this tubing.	n.A.	1
Normal well plate (96 wells)	6820.4100	12
Menu pen	6300.0100	1
Solvent reservoir, 1 L	Included in 2270.0012	4
Bottle cap for solvent reservoir	Included in 2270.0012	4
Cap (to close the holes in the solvent reservoir caps)	Included in 6000.0047	20
Retaining guide (for solvent reservoir)	Included in 6000.0042	4
Viper capillary kit for OAS-3x00XRS, including 1 capillary (0.1 x 550 mm (I.D. x L), SST, Viper) e.g. to connect the OAS to the TCC-3000 (bottom-up stack configuration) 1 capillary (0.1 x 650 mm (I.D. x L), SST, Viper) e.g. to connect the OAS to the TCC-3000 (top-down stack configuration) 1 capillary (0.065 x 650 mm (I.D. x L), PEEK, Viper e.g. to connect the TCC-3000 to a mass spectrometer (Exactive configuration) 1 capillary (0.065 x 850 mm (I.D. x L), PEEK, Viper e.g. to connect the TCC-3000 to a mass spectrometer (TQ configuration) 1 capillary (0.13 x 850 mm (I.D. x L), SST, Viper, e.g. to connect the pump to the OAS (bottom-up stack configuration)	6845.2301	1
CD UltiMate 3000 XRS Open Autosampler including, for example, PAL Loader software	n.A.	

Description	Part No.	Qty in the accessories kit
Cable, signal synchronization cable to connect the autosampler to an UltiMate 3000 SD, RS, or BM pump (*not* LPG-3400XRS) for pump stroke synchronization and Inject Response transmission	6043.0001	1
Cable, signal synchronization cable to connect the autosampler to an LPG-3400XRS for pump stroke synchronization	6043.0002	1
Cable, RS-232 cable to connect the autosampler to the RS-232 port on the Chromeleon computer for Inject Response transmission *Note*: If an RS-232 port is not available on the computer, the RS-232-USB-Interface cable is required in addition to the RS-232 cable.	6043.0005	1
Cable, RS-232-USB Interface cable required in addition to the RS-232 cable (part no. 6043.0005) if an RS-232 port is not available on the computer	6073.2000	1
(Double) open-end wrench (size ¼" x 5/16")	6000.0051	1
Allen wrench (size 9/64")	6000.0053	1

10.2 Optional Accessories

Optional Accessory	**Part No.**
Sample loop, 100 µL, for Cheminert valve	755.CSL100
Viper capillary kit for LPG-3400XRS The kit includes 2 Viper SST capillaries (one each 0.1 x 350 mm and 0.13 x 550 mm (I.D. x L)) 1 Viper PEEK capillary (0.065 x 250 mm (I.D. x L))	6043.2301
RS-232 connection cable to establish the serial communication between the autosampler and the Chromeleon data system computer: RS-232 connection cable, 3 m long RS-232 connection cable, 6 m long	 6845.0010 6845.0011
Flushing and Injection kit The kit includes a syringe and appropriate tubing for cleaning the injection valve.	6078.4200

10.3 Consumables and Spare Parts

The part number always refers to the packing unit. For more information, contact the Thermo Fisher Scientific sales organization for Dionex HPLC Products.

Description	Part No.
Allen wrench (size 9/64")	6000.0053
Cable, autosampler interconnect cable	6043.0004
Cable, control cable to connect the injection valve drive to the AUX connector on the autosampler	6845.0008
Cable, LAN cable to connect the autosampler to the data system computer	6043.0006
Cable, power cord (DC) to connect autosampler power supply to the autosampler	6845.0009
Cable, RS-232 cable to connect the autosampler to the RS-232 port on the Chromeleon computer for Inject Response transmission *Note*: If an RS-232 port is not available on the computer, the RS-232-USB-Interface cable (part no. 6073.2000) is required in addition to the RS-232 cable.	6043.0005
Cable, RS-232 serial communication cable (serial communication between the autosampler and the Chromeleon data system computer): RS-232 connection cable, 3 m long RS-232 connection cable, 6 m long	 6845.0010 6845.0011
Cable, RS-232-USB Interface cable required in addition to the RS-232 cable (part no. 6043.0005) if an RS-232 port is not available on the computer	6073.2000
Cable, signal synchronization cable for connecting a Corona or Coulochem detector	6043.0003
Cable, signal synchronization cable to connect the autosampler to an UltiMate 3000 SD, RS, or BM pump (*not* LPG-3400XRS) for pump stroke synchronization and Inject Response transmission	6043.0001
Cable, signal synchronization cable to connect the autosampler to an LPG-3400XRS for pump stroke synchronization	6043.0002
Cable, to connect the control terminal to the autosampler	6845.0012
Capillaries, Viper, for OAS-3x00TXRS *A—Viper capillaries* Capillary (0.1 x 550 mm (I.D. x L), SST, Viper) e.g. to connect the OAS to the TCC-3000 (bottom-up stack configuration) Capillary (0.1 x 650 mm (I.D. x L), SST, Viper) e.g. to connect the OAS to the TCC-3000 (top-down stack configuration) Capillary (0.065 x 650 mm (I.D. x L), PEEK, Viper e.g. to connect the TCC-3000 to a mass spectrometer (Exactive configuration) Capillary (0.065 x 850 mm (I.D. x L), PEEK, Viper e.g. to connect the TCC-3000 to a mass spectrometer (TQ configuration Capillary (0.13 x 850 mm (I.D. x L), SST, Viper, e.g. to connect the pump to the OAS (bottom-up stack configuration) *B—Viper capillary kit* Viper capillary kit for OAS-3x00TXRS (content as in *A—Viper capillaries)*	 6040.2255 6040.2265 6041.5665 6041.5685 6040.2330 6845.2301

Description	Part No.
Cleaning swabs	6040.0006
Flow diverter	6845.0032
Flushing and Injection kit The kit includes a syringe and appropriate tubing for cleaning the injection valve.	6078.4200
Fuses (6.3AT), set of 10 fuses	6845.0017
Holding loop (FEP) with needle adapter mounted	6845.0034
Holding loop kit (FEP) with 1 holding loop (FEP) and needle adapter 1 flow diverter 3 needles	6845.0035
Holding loop (stainless steel), including PEEK hex-head nut and lock nut for needle adapter	6845.0029
Injection valve needle seal (transparent FEP tubing), gauge 22, set of 10 seals for injection valve (Cheminert, 2-position, 6-port, 1275 bar, 18500 psi)	6845.0048
Injection valve, 2-position, 6-port valve (Cheminert, 1275 bar, 18,500 psi) *Note*: The valve comes with a kit including valve needle guide, valve needle seal, and waste line.	6845.0006
Menu pen	6300.0100
Needle kit, including 3 needles (gauge 22) and 3 needle seals 1 needle retaining nut	6845.0037
Needle seal for injection valve → *Injection valve needle seal*	
(Double) open-end wrench (size ¼" x 5/16")	6000.0051
Plunger for 100 µL DLW syringe (set of 10)	6845.0061
Plunger holder for DLW syringe	6845.0039
Power cord (DC) to connect autosampler power supply to the autosampler → *Cable, power cord*	
Power supply unit for basic autosampler (150 Watt, 100-240V)	6845.0014
Power supply unit for stack cooler (100-240V)	6845.0015
Reservoir tray	6845.0016
Rotor for 2-position, 6-port injection valve (Cheminert) (1275 bar, 18,500 psi)	6845.0004
Safety guard (for installation details, see section 3.3.5, page 25)	6845.0020
Safety guard screw kit	6845.0021
Sample loop, 100 µL, for Cheminert valve	755.CSL100
Sample loop, 2 µL, for Cheminert injection valve	755.CSL2
Sample loop, 20 µL, for Cheminert injection valve	755.CSL20
Sample tray (VT54) for 2 mL vials (54 positions per tray), set of 6 trays	6845.0055

Description	Part No.
Stator for 2-position, 6-port injection valve (Cheminert) (1275 bar, 18,500 psi)	6845.0005
Syringe, 100 µL	6845.0062
Table for OAS-3x00TXRS	6845.2001
Vial caps, 11 mm (crimp cap with slotted silicone septum); 100 caps	6000.0076
Vial, 1.8 mL, amber	6000.0072
Wash liquid aspiration kit, including Wash liquid line (reservoir to pump module) with glass inlet filter (40 µm pore size)	6845.0026
Waste line kit for injection valve	6845.0058
Waste tubing (wash station)	6845.0057
Well plate, deep-well plate (96 wells)	6820.4101
Well plate, normal well plate (96 wells)	6820.4100

11 Appendix

11.1 Menu Screens Overview

Fig. 76 through Fig. 79 provide an overview of the control terminal menus.

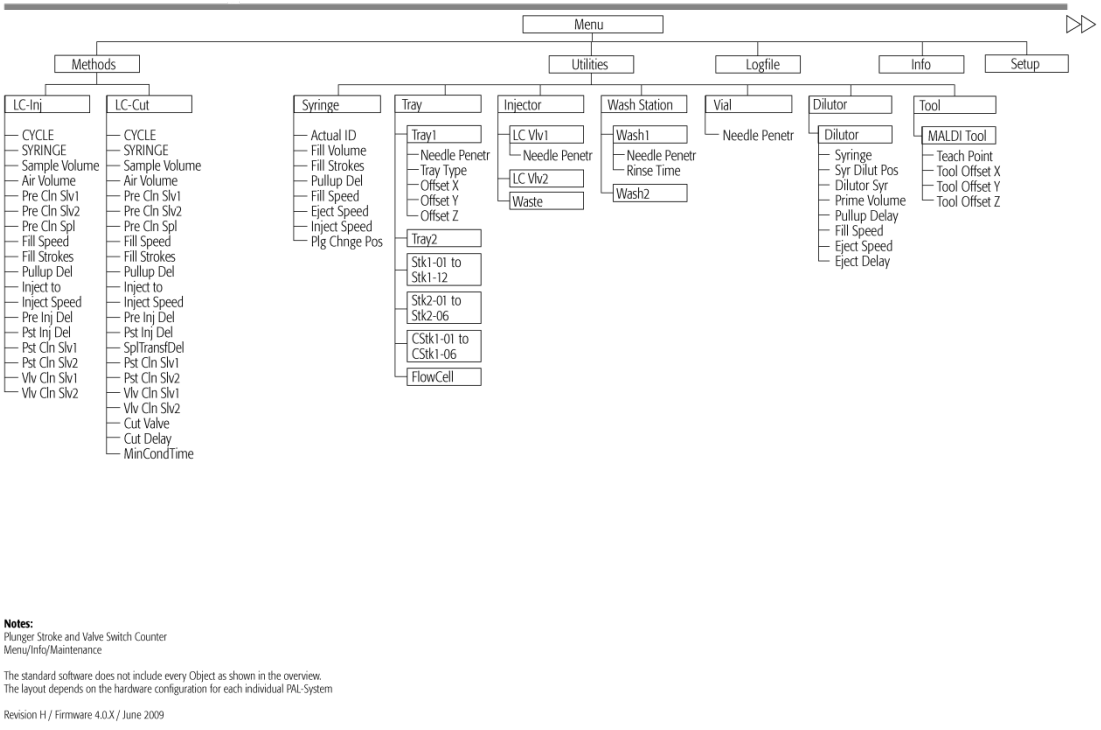
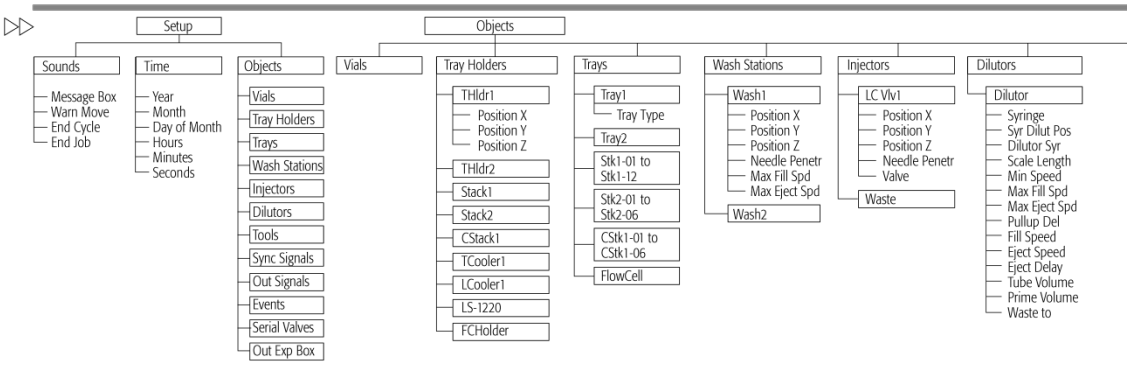


Fig. 76: Menu overview, page 1



Note:
The standard software does not include every Object as shown in the overview.
The layout depends on the hardware configuration for each individual PAL-System

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Fig. 77: Menu overview, continued

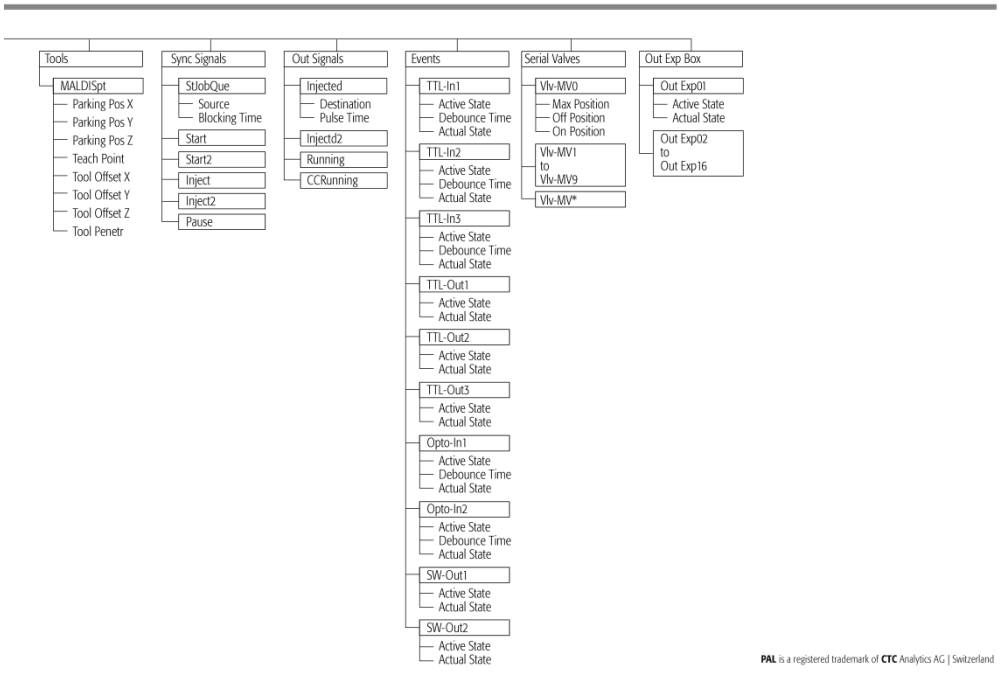
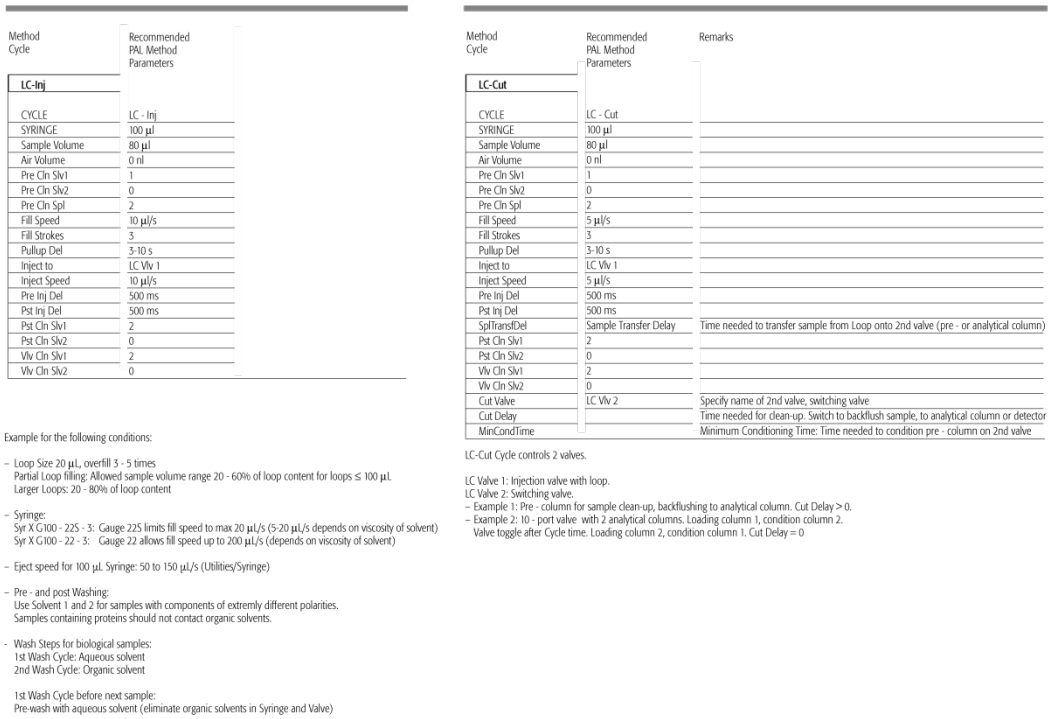


Fig. 78: Menu overview, continued



Method Cycle	Recommended PAL Method Parameters
LC-Inj	
CYCLE	LC - Inj
SYRINGE	100 µl
Sample Volume	80 µl
Air Volume	0 nl
Pre Cln Slv1	1
Pre Cln Slv2	0
Pre Cln Spl	2
Fill Speed	10 µl/s
Fill Strokes	3
Pullup Del	3-10 s
Inject to	LC Vlv 1
Inject Speed	10 µl/s
Pre Inj Del	500 ms
Pst Inj Del	500 ms
Pst Cln Slv1	2
Pst Cln Slv2	0
Vlv Cln Slv1	2
Vlv Cln Slv2	0

Example for the following conditions:

- Loop Size 20 µL, overfill 3 - 5 times
  Partial Loop filling: Allowed sample volume range 20 - 60% of loop content for loops ≤ 100 µL
  Larger Loops: 20 - 80% of loop content
- Syringe:
  Syr X G100 - 225 - 3: Gauge 225 limits fill speed to max 20 µL/s (5-20 µL/s depends on viscosity of solvent)
  Syr X G100 - 22 - 3: Gauge 22 allows fill speed up to 200 µL/s (depends on viscosity of solvent)
- Eject speed for 100 µL Syringe: 50 to 150 µL/s (Utilities/Syringe)
- Pre - and post Washing:
  Use Solvent 1 and 2 for samples with components of extremly different polarities.
  Samples containing proteins should not contact organic solvents.
- Wash Steps for biological samples:
  1st Wash Cycle: Aqueous solvent
  2nd Wash Cycle: Organic solvent

  1st Wash Cycle before next sample:
  Pre-wash with aqueous solvent (eliminate organic solvents in Syringe and Valve)

Method Cycle	Recommended PAL Method Parameters	Remarks
LC-Cut		
CYCLE	LC - Cut	
SYRINGE	100 µl	
Sample Volume	80 µl	
Air Volume	0 nl	
Pre Cln Slv1	1	
Pre Cln Slv2	0	
Pre Cln Spl	2	
Fill Speed	5 µl/s	
Fill Strokes	3	
Pullup Del	3-10 s	
Inject to	LC Vlv 1	
Inject Speed	5 µl/s	
Pre Inj Del	500 ms	
Pst Inj Del	500 ms	
SplTransfDel	Sample Transfer Delay	Time needed to transfer sample from Loop onto 2nd valve (pre - or analytical column)
Pst Cln Slv1	2	
Pst Cln Slv2	0	
Vlv Cln Slv1	2	
Vlv Cln Slv2	0	
Cut Valve	LC Vlv 2	Specify name of 2nd valve, switching valve
Cut Delay		Time needed for clean-up. Switch to backflush sample, to analytical column or detector
MinCondTime		Minimum Conditioning Time: Time needed to condition pre - column on 2nd valve

LC-Cut Cycle controls 2 valves.

LC Valve 1: Injection valve with loop.
LC Valve 2: Switching valve.
- Example 1: Pre - column for sample clean-up, backflushing to analytical column. Cut Delay > 0.
- Example 2: 10 - port valve with 2 analytical columns. Loading column 1, condition column 2.
  Valve toggle after Cycle time. Loading column 2, condition column 1. Cut Delay = 0

Part No.: PAL FirmOverHTC-H

Fig. 79: Menu overview, continued

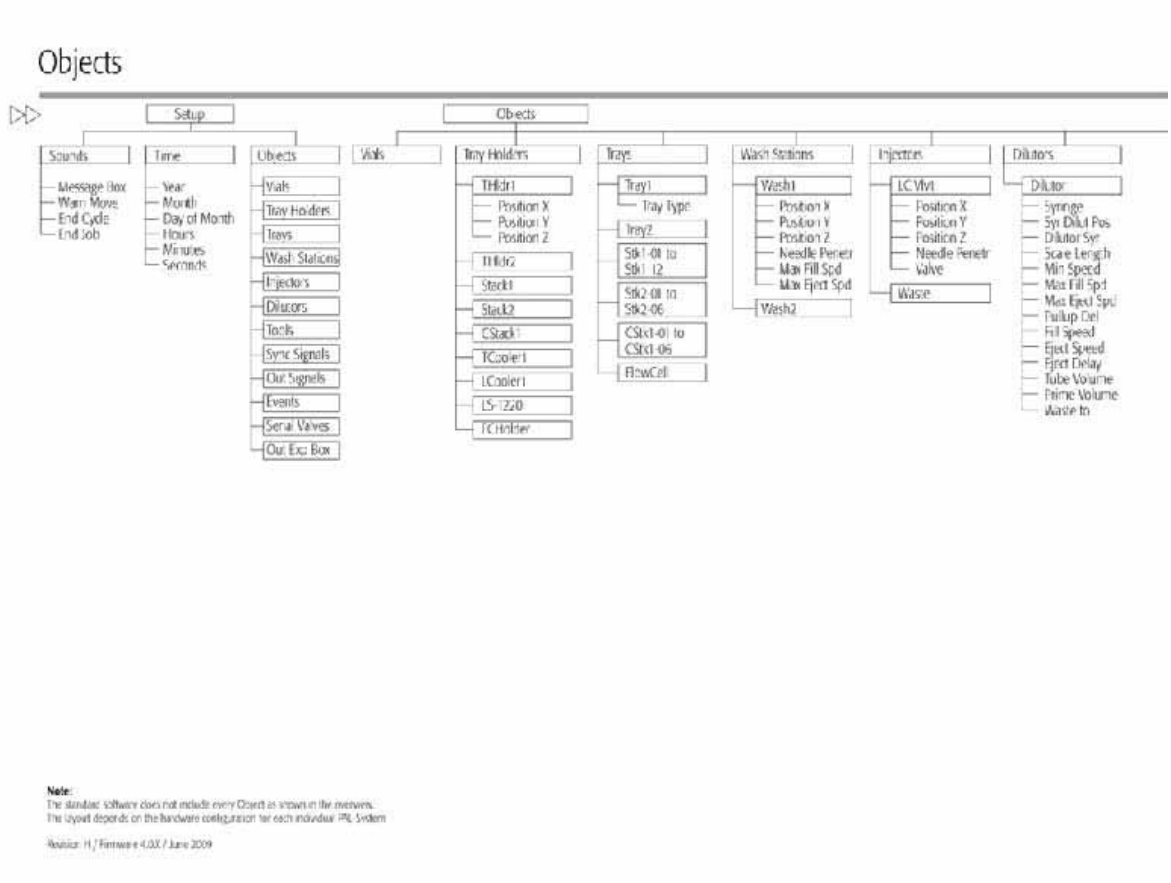


Fig. 80: Menu overview, continued

11.2 Pin Assignments

11.2.1 SER1 Connector

The picture and table show the pin assignment for the 9-pin SER1 connector.

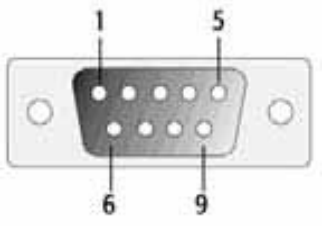


Fig. 81: SER1 connector

Pin	Signal Name
1	NC
2	RXD
3	TXD
4	DTR bridged with pin 7, special ground, do not alter
5	GND
6	NC
7	RTS, bridged with pin 4, do not alter
8	NC
9	NC

Fig. 82: Pin assignment—SER1 connector

11.2.2 Interface 1 Connector

The picture and table show the pin assignment for the 15-pin Interface 1 connector.

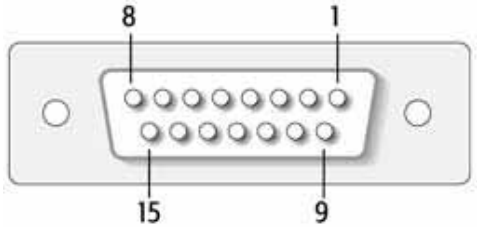


Fig. 83: Interface 1 connector

Pin	Signal Name
1	Pwr-Out1 +
2	Pwr-Out2 +
3	SW-Out1 NO
4	SW-Out1 COM
5	SW-Out2 NO
6	Opto-In1 +
7	TTL_In1
8	GND
9	Pwr-Out1 -
10	Pwr-Out2 -
11	TTL_In2
12	SW-Out2 COM
13	TTL_In3
14	Opto-In1 -
15	+5V

Fig. 84: Pin assignment—Interface 1 connector

11.2.3 Interface 2 Connector

The picture and table show the pin assignment for the 25-pin Interface 2 connector.

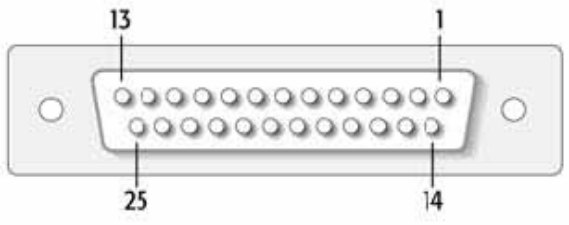


Fig. 85: Interface 2 connector

Pin	Signal Name
1	TTL-In1
2	TTL-In2
3	TTL-In3
4	TTL-Out1
5	TTL-Out2
6	TTL-Out3
7	Opto-In1 +
8	Opto-In2 +
9	SW-Out1 NO-
10	SW-Out2 NO
11	Pwr-Out1 +
12	Pwr-Out2 +
13	+5V
14-19	GND-
20	Opto-In1 -
21	Opto-In2 -
22	SW-Out1 COM-
23	SW-Out2 COM
24	Pwr-Out1 -
25	Pwr-Out2 -

Fig. 86: Pin assignment—Interface 2 connector

11.2.4 AUX 1 and AUX 2 Connectors

The picture and table show the pin assignment for the 20-pin AUX 1 and AUX 2 connectors.

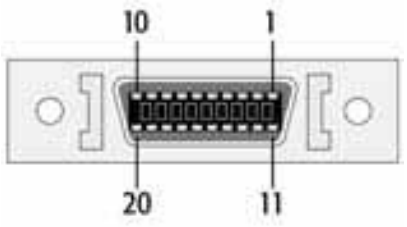


Fig. 87:AUX 1 and AUX 2 connectors

Pin	Signal Name
1,2	Motor A1
3,4	Motor B1
6	Temp +
7	Sens
8,9	Heater
11,12	Motor A2
13,14	Motor B2
16	Temp +
17	+5V
15,18,19	GND
20,10	36V

Fig. 88:Pin assignments—AUX 1 and AUX 2 connectors

11.2.5 MODBUS Connector

The picture and table show the pin assignment for the 14-pin MODBUS connector.

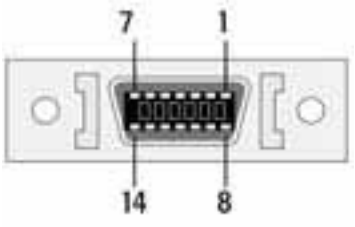


Fig. 89: MODBUS connector

Pin	Signal Name
1	TXD
2-7	+36V
8	RXD
9-14	GND

Fig. 90: Pin assignment—MODBUS connector

11.3 PAL Loader Software

The purpose of the PAL Loader software is to create a backup file for the entire autosampler firmware. The core software (firmware) and all PAL Firmware Objects, including all settings (Items), local methods, and jobs, are saved as one file. In addition, the PAL Loader software is used to transfer the firmware or a complete backup file to the autosampler.

The descriptions in this section refer to PAL Loader software version 2.1.1.

11.3.1 Installing the PAL Loader Software

The PAL Loader software can be used with the following operating systems: Windows 7, Windows Vista®, Windows XP, or Windows 2000. It does not support earlier Windows versions. The software is provided on the UltiMate 3000 XRS Open Autosampler CD that is included in the accessories kit for the autosampler.

The PAL Loader.exe file is embedded in a wizard software package. To start the wizard, double-click **Setup PALloader.exe**. Starting the wizard will execute the installation software.

The default installation path is ***drive*:\Program Files\PAL\Loader**.

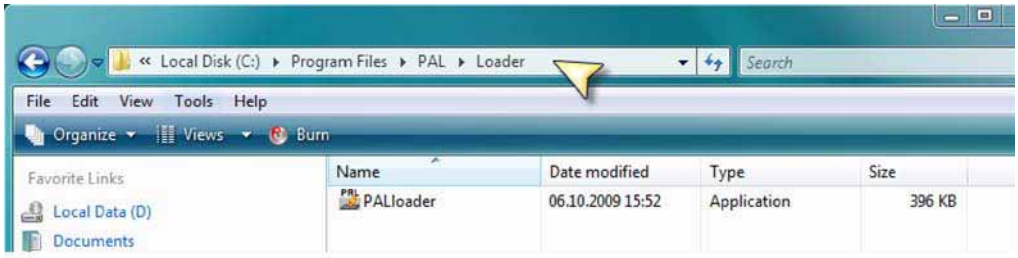


Fig. 91: Installation path for the PAL Loader software

The two subfolder, Backup and Update, are created automatically in the following directory: ***drive*:\Users\Public\Public Documents\PAL\Loader**. The directory allows writing temporary files, with no write protection, and in a network environment, the User Profile is always provided for the user at logon.

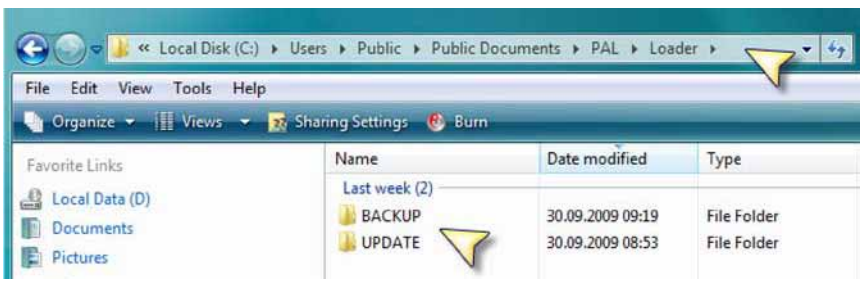


Fig. 92: Installation path for public documents

An INI file is created during the installation and stored in the following directory: ***drive*:\ProgramData\PAL\Loader**.

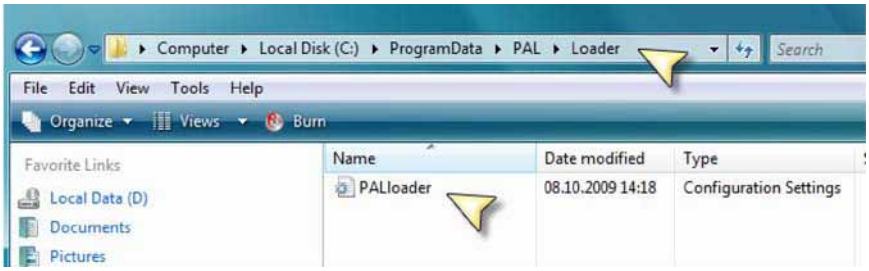


Fig. 93: Installation path for the PAL Loader INI File

Note that the Program Data folder can be hidden in a standard installation of the Windows Operating system.

11.3.2 Creating and Assigning Shortcuts

The PAL Loader software allows the administration of several autosamplers from a single computer, by creating multiple shortcuts from the PALloader.exe and making them available on the desktop. Each shortcut can be assigned to a specific TCP/IP address or COM port. A mix of the two communication protocols is possible as well.

Create the shortcut to the desktop, right-click the shortcut icon, and then select **Properties** on the menu. For information about how to handle multiple shortcuts, see page 157.

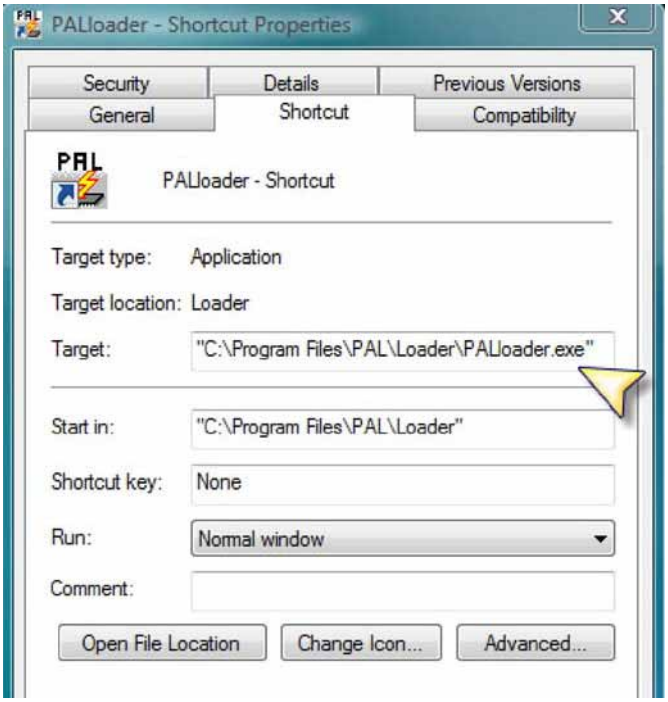


Fig. 94: Shortcut Properties dialog

The Target command line uses the installation path of the PAL Loader software ***drive*:\Program Files\PAL\Loader\PALloader.exe**.

Tip: Create the shortcut from the data application file located in the above path (from the Windows Explorer) and not from a PAL Loader desktop icon.

To create a dedicated shortcut for serial communication, observe the information on further down on this page.

Dedicated shortcut for serial communication

Extend the entry in the Target box by adding the communication type and COM port:

… .exe" /CommunicationType=0 /ComPort=x

Where:

- Type=0: Serial Communication Protocol
- x= Com Port Number

Mind the syntax (→ Fig. 95).
There is a space after ….exe followed by a slash (not a backslash) and there is another space and slash after …Type=0.

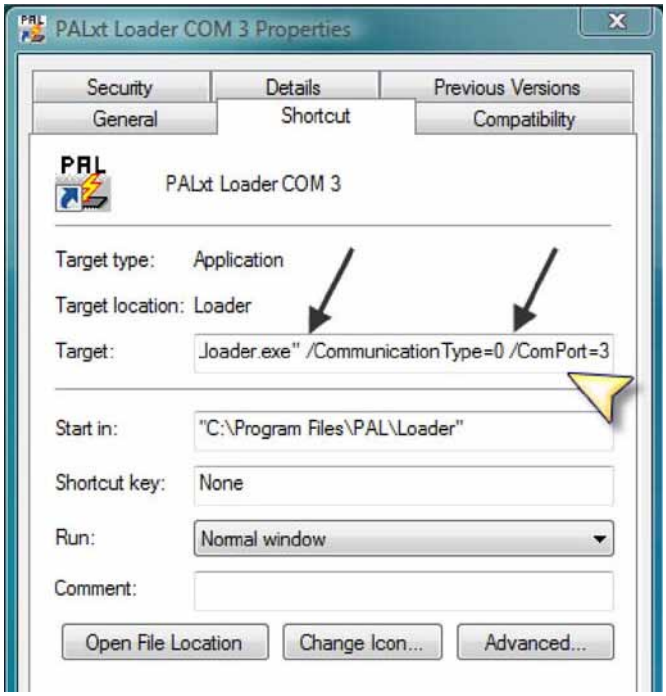


Fig. 95: Target command line extended for serial communication

Handling Multiple Shortcuts

Create the shortcuts as described further up in this section. Assign each shortcut a unique name. To do so, right-click the shortcut icon, select **Rename** on the menu, and enter type the preferred name. The picture shows an example for two LAN shortcut icons with IP address 20 and 21 and two serial communication shortcut icons with COM port number 1 and 3.

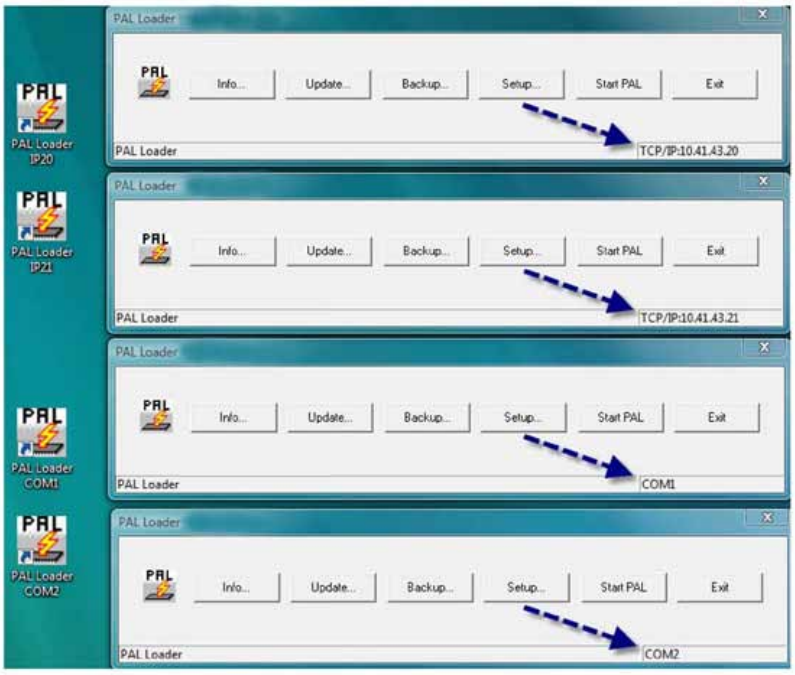


Fig. 96: Multiple shortcuts (example)

If several PAL Loader applications are open and you close them one after the other, the address of the application that is closed last is written back to the INI file.

Reopening any of the PAL Loader applications with a dedicated communication protocol and address (port) will use the specified setting and overwrite the INI-file settings.

11.3.3 Operating the PAL Loader Software

Keep in mind that if the autosampler is operated with Chromeleon, you have to terminate communication between the autosampler and Chromeleon ('disconnect') to allow communication between the PAL Loader software and the autosampler.

11.3.3.1 Starting the PAL Loader Software

To start the PAL Loader software, click the PAL Loader icon on the desktop. The startup dialog shows various application buttons and, on the status bar, displays the communication mode that was previously used.

Fig. 97: PAL Loader startup dialog

11.3.3.2 Setting Up Communication

To open the dialog for the communication settings, click **Setup**. Check and change the setting if required. For setting up LAN communication between the autosampler and the PAL Loader software, click **TCP/IP** and enter the IP address of the autosampler in the **Hostname or IP Address** box.

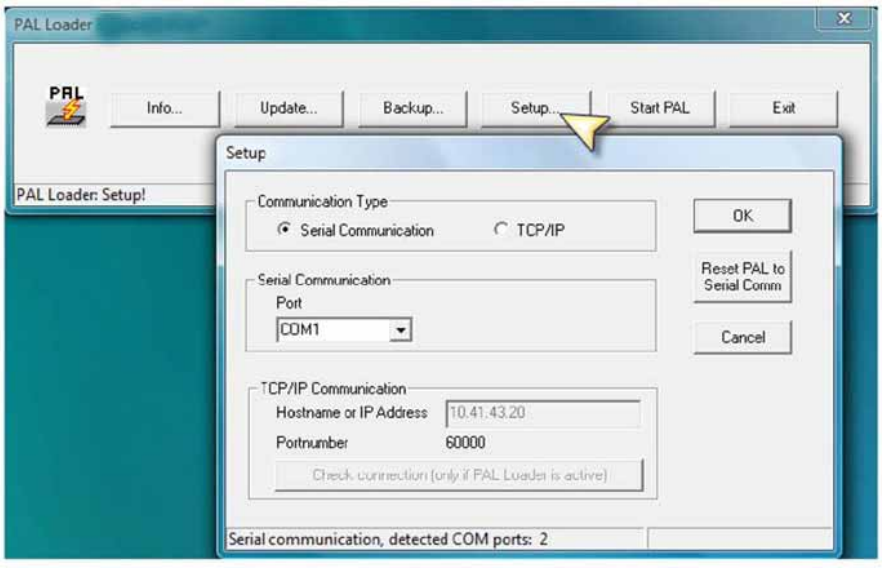


Fig. 98: Setup dialog for communication settings

If the autosampler is controlled via serial communication, click **Serial Communication** and select the port. The COM port can be selected by the user. The message displays the number of COM ports detected. The port settings are usually defined in the Windows Device Manager

(path **Windows\Control Panel\Device Manager\Ports**). For the standard settings for serial communication, see Fig. 33 (→ page 43). Note that the PAL Loader software actively sets the communication parameters and the baud rate is set for optimized use.

11.3.3.3 Establishing Communication

Now check whether communication can be established with the autosampler by clicking **Info**.

Once communication is established, the PAL Loader becomes active on the autosampler, indicated also by the message 'Loader is active' on the control terminal of the autosampler.

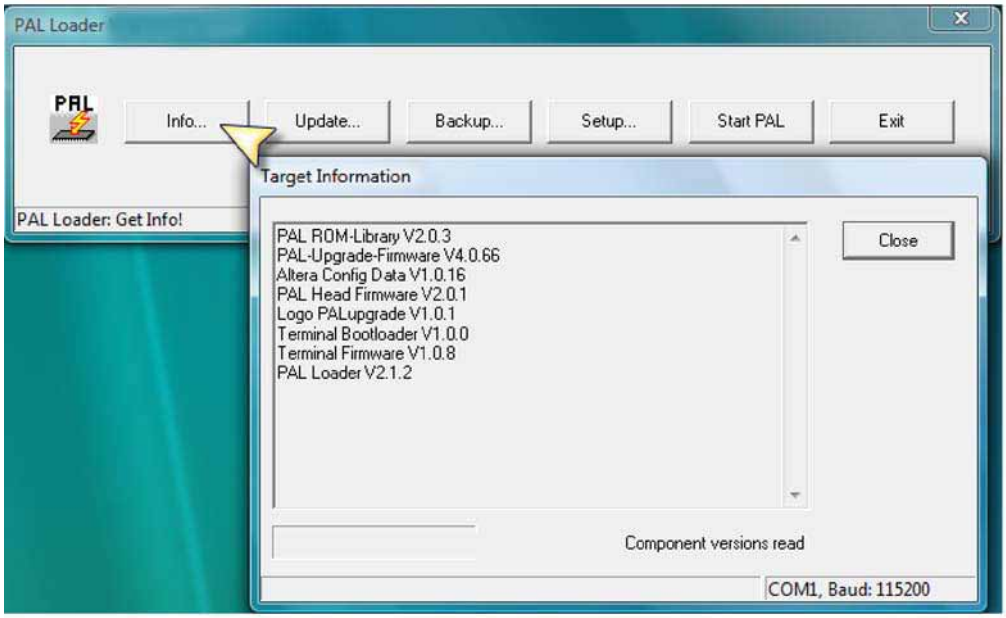


Fig. 99: Target Information box (here for serial communication)

If the autosampler is operated with Chromeleon, you have to terminate communication between the autosampler and Chromeleon ('disconnect') first to allow communication between the PAL Loader software and the autosampler.

Tip: The Target Information list displays the versions of the different autosampler components. The various types of information received might be important for troubleshooting. For example, if the line for the PAL Firmware version is not shown, the firmware is most likely corrupt.

When the PAL Loader application receives information from the autosampler, the LED on the rear panel of the autosampler is flashing red (→ page 11).

11.3.3.4 Resetting the Autosampler to Serial Communication

If the autosampler communication is set to LAN and if, for any reason, the autosampler firmware became corrupt, you can reset or force back the communication protocol to Serial. In the **Setup** dialog, click **Reset PAL to Serial Comm** (→ Fig. 98, page 158).

11.3.3.5 Creating a Backup File

Perform the backup procedure after initial installation of the autosampler. In addition, back up the system periodically to ensure that an updated configuration file (PAL Firmware backup) is available for the autosampler at any time. To reload a backup file, follow the steps in section 11.3.3.6 (→ page 162).

Observe the following:

- Do *not* move any part of the autosampler, such as the y-z-axis assembly. This will delay the completion, could result in a message and/or freeze the dialog, or might stop the process completely.
- This may happen also if the computer is busy with other tasks at the same time. Therefore, avoid using any other computer functions while the backup file is created.

1. Verify that the computer and the autosampler are properly connected (→ page 40) and that communication can be established (→ page 159).
2. Double-click the PAL Loader icon to open the startup dialog (→ Fig. 97, page 158).
3. Click **Backup** to open the Backup Target Memory dialog.

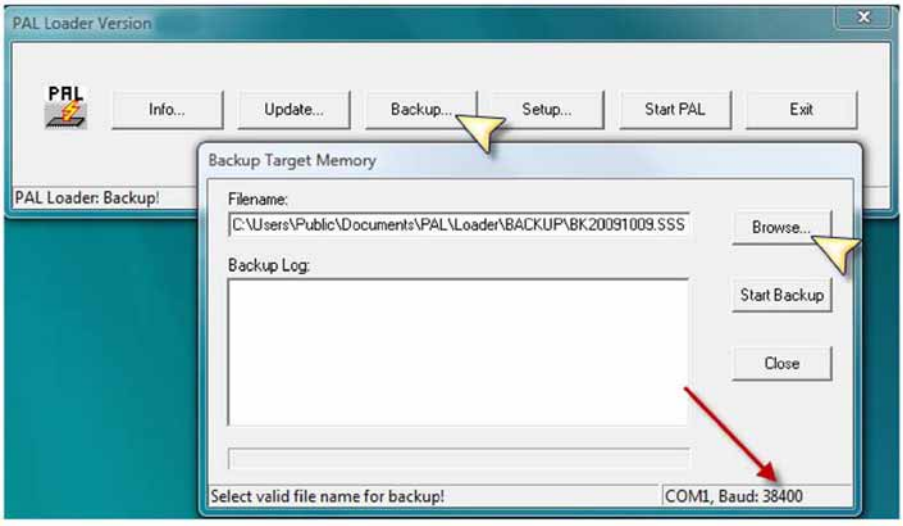


Fig. 100: Backup Target dialog

The dialog shows the path (storage location) and file name for the new backup file. The default name is **BKdate.sss** (with the date: YYYYMMDD). The default storage path is ***drive*:\Users\Public\Public Documents\PAL\Loader\BACKUP**.

You can customize the path and/or file name.

Tip: With serial communication, the baud rate that was used last is displayed on the status bar of the dialog, here a rate of 38400. Do not confuse this with the COM port setting, which is a baud rate of 9600. The application optimizes the speed, depending on workload and processor capabilities. The dynamic increase in the baud rate can be as high as 115200. The baud rate that was used last is written back to the PAL Loader INI file.

4. Click **Start Backup**. The backup takes approximately 3 to 5 minutes.

   A backup file is created, the RAM and flash memory are backed up, and the newly created file is closed. The backup is complete when the message 'Backup of target memory successful' is displayed.

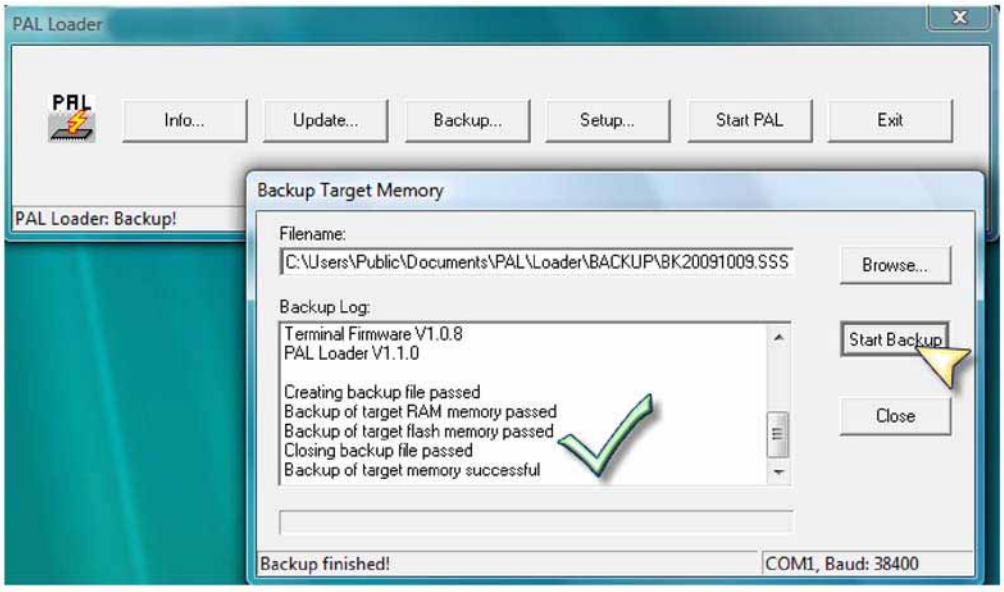


Fig. 101: Backup completed successfully

   If you receive the message 'Backup of target memory not successful', repeat the last step and check the communication by clicking **Info** in the startup dialog (→ Fig. 99, page 159).

5. To close the Backup dialog, click **Close**.

6. Deactivate the PAL Loader software and reboot the autosampler. To do so, click **StartPAL** and then click **Exit**.

11.3.3.6 Updating the Firmware / Reloading a Backup File

When updating the autosampler firmware or reloading a backup file, observe the following:

- Always create a backup file (→ page 160) *before* updating the firmware. This backup file is for backup purposes only. If an important point is overlooked, recovery is possible by reloading the backup file onto the autosampler.
- When updating the firmware, the object positions and communication parameters are reset to initial values and the serial number of the autosampler is lost.

  Therefore, *before* starting the firmware update, write down the

  - Communication parameters (→ section 3.5.2, page 40)
    The path is **Menu >** highlight **Setup** (highlight, but not select by pressing the ENTER button) **> F3** function key (the key is not labeled) > ENTER **>** highlight **Communication** > ENTER.
  - Serial number
    The path is **Menu >** highlight **Setup** (highlight, but not select by pressing the ENTER button) **> F3** function key (the key is not labeled) > ENTER **>** highlight **Ident** > ENTER > **SystemSNo**.

  After the firmware update, you have to restore the communication parameters and serial number manually, redefine the reference positions (object positions) and make the additional adjustments as described in section 4.3 (→ page 57).
- In addition, parameter settings or methods are overwritten or lost. This is especially important for users who work directly from their local terminal and create methods and jobs within the autosampler. In such cases, ensure that the methods are saved *before* starting an update procedure.
- Do *not* move any part of the autosampler, such as the y-z-axis assembly. This will delay the completion, could result in a message and/or freeze the dialog, or might stop the process completely. This may happen also if the computer is busy with other tasks at the same time. Therefore, avoid using any other computer functions while the update is running.

Follow these steps:

1. Verify that the computer and the autosampler are properly connected (→ page 40) and that communication can be established (→ page 159).
2. Double-click the PAL Loader icon to open the startup dialog (→ Fig. 97, page 158).
3. Click **Update** to open the Update Flash Memory dialog.

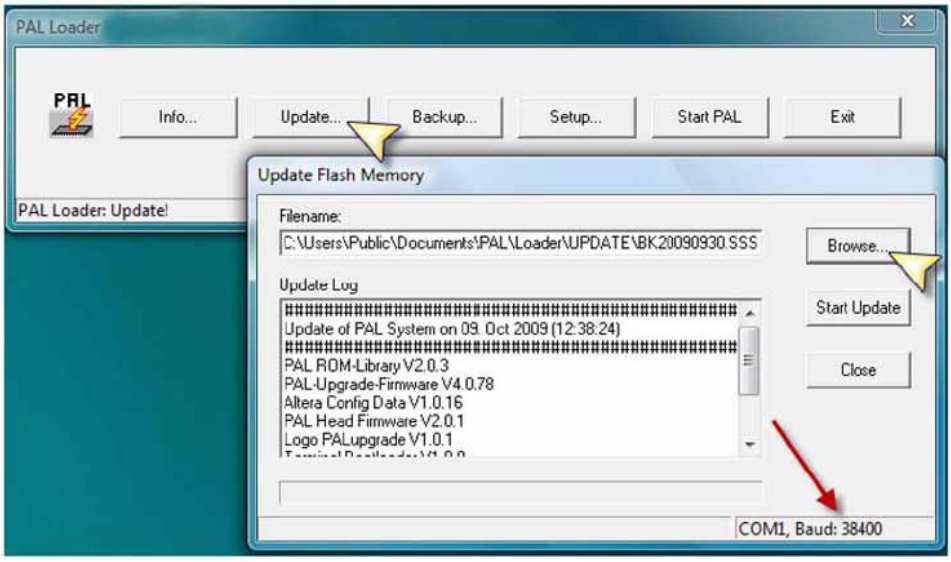


Fig. 102: Update Flash Memory dialog

Tip: With serial communication, the baud rate that was used last is displayed on the status bar of the dialog, here a rate of 38400. Do not confuse this with the COM port setting, which is a baud rate of 9600. The application optimizes the speed, depending on workload and processor capabilities. The dynamic increase in the baud rate can be as high as 115200. The baud rate that was used last is written back to the PAL Loader INI file.

4. Click **Browse** and navigate to the file (*.sss) that you want to install.

5. Load the file by dragging it to the update window.

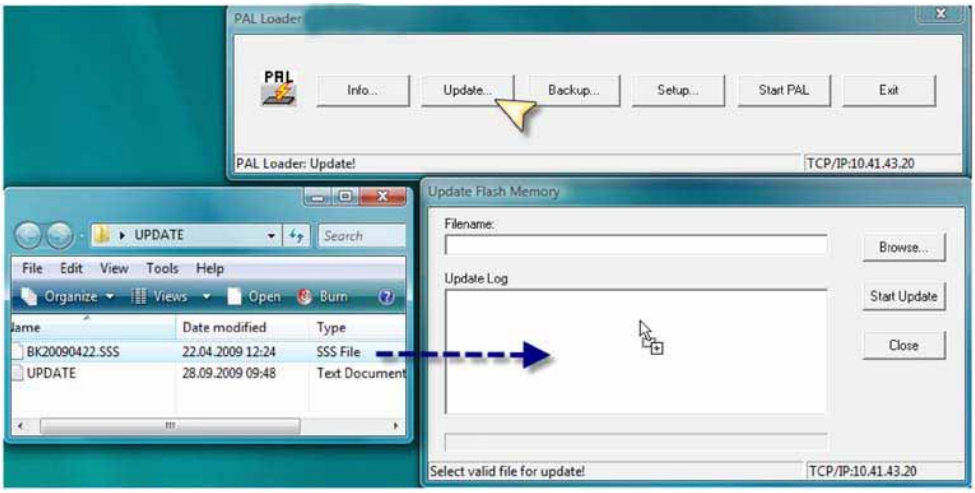


Fig. 103: Loading the file for the update

6. Click **Start Update**. The update takes approximately 3 to 5 minutes.

   The RAM and flash memories are erased and replaced with the new data. The update is complete when the message 'Update of target memory succeeded' is displayed.

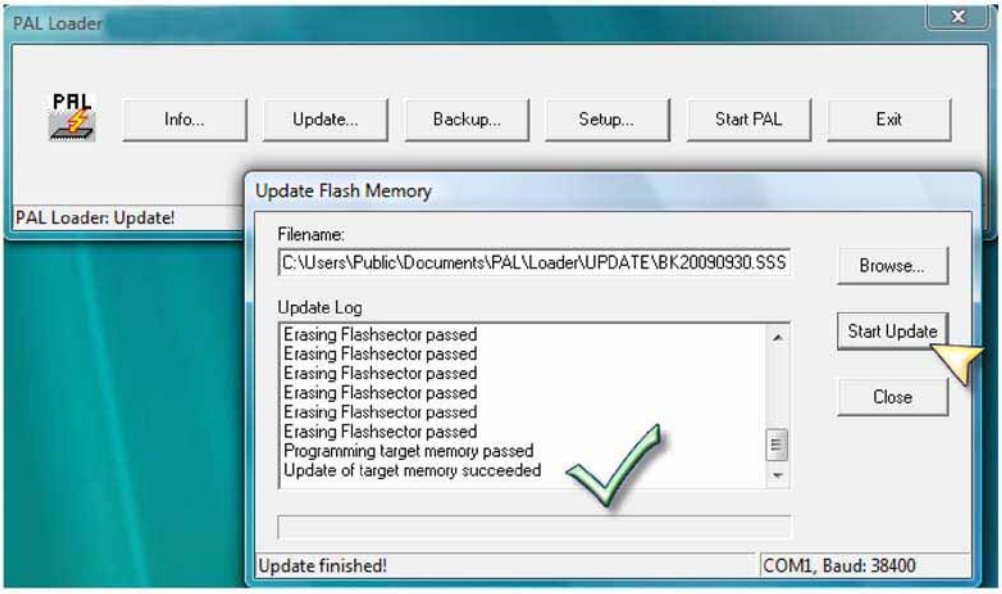


Fig. 104: Update completed successfully

   If there is a problem, a message similar to the following appears 'Programming target memory failed at 0x000A2D00'. The Update log entry memory failed ####.

   Retry by either repeating the last step or performing the update procedure again with a different file. You might want to check the communication by clicking **Info** in the startup dialog (→ Fig. 99, page 159).

7. To close the Update Flash Memory dialog, click **Close**.

8. Deactivate the PAL Loader software and reboot the autosampler. To do so, click **StartPAL** and then click **Exit**.

9. On the autosampler control terminal, reenter the serial number and communications settings. For path information, see page 162.

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