

# Thermo Scientific Dionex UltiMate 3000 Series

## Autosampler Column Compartment ACC-3000

### Operating Instructions (Original Operating Instructions)



Revision: 1.4

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## Declaration of Conformity

(Original Declaration of Conformity)

**Product:** Thermo Scientific Dionex UltiMate 3000 -  
Autosampler Column Compartment

**Types:** ACC3000 and ACC-3000T

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

- Low-Voltage Directive 2006/95/EC
- EMC Directive 2004/108/EC

The electrical safety of the products was evaluated based on the following standard:

- DIN EN 61010-1:2010  
Safety requirements for electrical equipment for measurement, control and laboratory use, Part 1: General Requirements

The Electromagnetic Compatibility (EMC) of the products was evaluated based on the following standard:

- DIN EN 61326:2006  
Electrical equipment for measurement, control and laboratory use  
EMC Requirements

This declaration is issued for the manufacturer

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September 2, 2013



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# 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 your Thermo Scientific™ Dionex™ ACC-3000 Autosampler Column Compartment, Thermo Fisher Scientific recommends that you review the manual thoroughly before beginning operation.

The descriptions in this manual apply to the following instruments in the UltiMate™ 3000 ACC-3000 series:

- ACC-3000
- ACC-3000T

The following conventions apply to the descriptions throughout this manual:

- The term "the device" or the autosampler" is used throughout the manual. If some detail applies to only one autosampler model or one version, the model or version is identified by name.
- If not otherwise stated, the descriptions for the
  - ◆ ACC-3000 apply also to the version with sample thermostating option (ACC 3000T).
  - ◆ Viper™ capillary connections apply also to nanoViper™ and possible other Viper capillary connections.
- The device configuration may vary, for example, the autosampler may have a thermostatted carousel. Therefore, not all descriptions necessarily apply to your particular instrument.
- The representation of a component in this manual may be different from the real component. However, this does not influence the descriptions.
- The descriptions in this manual refer to firmware version 4.13 and Chromeleon™ 6.80 Service Release 13. If you want to operate the autosampler from Chromeleon 7, note the information on page 29.

This manual is provided "as is". Every effort has been made to supply complete and accurate information and all technical specifications have been developed with the utmost care. The information contained in this manual should not be construed as a commitment by Thermo Fisher Scientific. Thermo Fisher Scientific assumes no responsibility for any errors that may appear in this document that is believed to be complete and accurate at the time of publication and, in no event, shall Thermo Fisher Scientific be liable for incidental or consequential damages in connection with or arising from the use of this document. We appreciate your help in eliminating any errors that may appear in this document.

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## 1.2 Safety Information




The CE Mark and cTUVus labels on the autosampler indicate 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:

Symbol	Description
	Alternating current—Courant alternatif
	Power supply is on (–) — L'instrument est mis sous tension (–) and Power supply is off (O)— L'instrument est mis hors tension (O)
	Pinch point hazard—Risque de pincement
	Label according to the "Measures for Administration of the Pollution Control of Electronic Information Products" (China RoHS) guideline Étiquette "Measures for Administration of the Pollution Control of Electronic Information Products" (China RoHS)
	Refer to the <i>Operating Instructions</i> 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'Équipements Électriques 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, the following symbols indicate messages of particular importance:


-  **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 Safety Precautions

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

 **Tips:** Before initial operation of the autosampler, make yourself familiar with the contents of this manual.

For the safety precautions in French, see page 7.

 **Warning:** All users of the device must observe the following safety precautions and all additional safety precautions in this manual to avoid the possibility of personal injury or damage to the device when operating the device or carrying out any maintenance or service procedures.

Observe any warning labels on the autosampler and see the related sections in these *Operating Instructions*.

- **Protective equipment**

When performing any work on or near the HPLC system, wear personal protective equipment (protective clothing, safety gloves, safety glasses) as required by the hazard of the mobile phase and sample. For information about the proper handling of a particular substance and for advice on specific hazards, refer to the material safety data sheet for the substance you are using. Observe the guidelines of Good Laboratory Practice (GLP).

An eyewash facility and a sink should be close to the device. If any substance splashes on the eyes or skin, wash the affected area and seek medical attention.

- **Hazardous substances**

Many organic solvents, mobile phases, and samples are harmful to health. Be sure that you know the toxic and infectious properties of all substances that you are using. You may not know the toxic or infectious properties of many substances that you are using. If you have any doubt about a substance, treat it as if it contains a potentially harmful substance. For advice on the proper handling of a particular substance, refer to the Safety Data Sheet (SDS) of the manufacturer. Observe the guidelines of Good Laboratory Practice (GLP).

Dispose of waste substance in an environmentally safe manner that is consistent with all local regulations. Do not allow flammable, toxic, and/or infectious substances to accumulate. Follow a regulated, approved waste disposal program. Never dispose of flammable, toxic, and/or infectious substances through the municipal sewage system.

- **Hazardous gases**

Install the HPLC system in a well-ventilated laboratory. If the mobile phase or sample includes volatile or flammable solvents, do not allow them to enter the workspace. If the mobile phase or sample includes volatile or flammable solvents, avoid open flames and sparks.

- **Electrostatic discharge**

Discharge of electrostatic energy may lead to sparking and can constitute a fire hazard. Keep in mind that liquid flowing through capillaries can generate static electricity. This effect is particularly pronounced in insulating capillaries and with non-conductive solvents (for example, pure acetonitrile).

Take appropriate measures to prevent the generation of static electricity near the HPLC system. For example, make sure that the air humidity level in the laboratory is sufficiently high and provide proper ventilation, wear anti-static clothing or shoes, prevent accumulation of air bubbles in waste lines, and use grounded waste containers. Use only non-conductive capillaries to direct solvents into the waste container. With electrically conductive capillaries, make sure that they are properly grounded.

- **Self-ignition of solvents**

Do not use solvents for which the self-ignition temperature is below 150 °C. In case of leakage, these solvents may self-ignite on a hot surface.

- **Capillaries, capillary connections, open connections**

- ◆ Capillaries, especially non-metallic capillaries may burst, slip out of their fittings or may not be screwed in. This may result in substances spraying out of the open connections.

- ◆ In an UltiMate 3000 system, some components are made of PEEK™. This polymer has superb chemical resistance to most organic solvents. However, it tends to swell when in contact with trichloromethane (CHCl<sub>3</sub>), 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. In both cases, capillaries may start leaking or they can burst. Swelling or attack by concentrated acids is not a problem with brief flushing procedures.

- ◆ Do not use tubing that is stressed, bent, kinked, or damaged.

- ◆ Capillary connections can be contaminated by harmful substances or harmful substances can escape from open connections.

- Disconnect the device from all power sources before removing the panels. When the panels are removed, dangerous electrical connections will be exposed. The enclosure must be opened only by Thermo Fisher Scientific service personnel.


- Replace faulty communication cables.


- Replace faulty power cords. Never use a power cord other than the power cords provided for the device.

- Always replace blown fuses with original spare part fuses authorized by Thermo Fisher Scientific.
- Use only the original spare parts and accessories authorized for the device by Thermo Fisher Scientific.
- Avoid looking directly into the sample compartment light LED. Do not use light focusing instruments for viewing the light beam. The high luminosity of the lamp can be harmful to the eyes.
- The autosampler is primed with 2-propanol. During initial operation of the autosampler, make sure that the solvents used are miscible with 2-propanol. Otherwise, follow the appropriate intermediate steps.
- A team effort is required to lift or move the autosampler. The autosampler is too heavy and/or bulky for one person alone to lift or move safely.
- When lifting or moving the autosampler, always lift by the bottom or sides of the unit, with the front panel being closed. This is to avoid damage to the instrument.
- The front panel tilts upward. The open front panel door is not designed to carry weight. Do not place any objects on the open door.
- To avoid personal injury, do not reach inside the sample compartment during a running analysis.
- Use only standard solvents (minimum HPLC grade) and buffers that are compatible with all parts that may be exposed to solvents.
- If a leak occurs, turn off the instrument and remedy the situation immediately.
- Before interrupting operation for several days or more or when preparing the autosampler for transport, observe the precautions for shutting down the autosampler (→ page 94).
- Do not use the autosampler in ways other than those described in this manual.
- Keep the operating instructions near the device to be available for quick reference.

### 1.2.3 Consignes de Sécurité

Si vous utilisez d'instrumentation analytique, vous devez connaître les risques d'utilisation de produit chimiques.

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

 **Avertissement:** Toutes les personnes utilisant l'instrument doivent observer les consignes de sécurité suivantes et dans les autres chapitres de ce manuel pour éviter une mise en danger de sa personne ou de dommage à l'instrument pendant l'utilisation et des opérations de maintenance ou service de l'instrument.

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

- **Equipment de protection**

Pour tous les travaux sur le système HPLC ou à proximité, portez l'équipement de protection personnel (vêtements de protection, gant de sécurité, lunettes de protection) qui correspond aux risque découlant de la phase mobile et/ou de l'échantillon. Pour les informations sur la manipulation correcte des composés et des recommandations pour les situations de risque spécifiques, veuillez consulter la fiche de données de sécurité des substances que vous utilisez. Veuillez respecter des directives des Bonnes Pratiques de Laboratoire (BPL).

Une installation permettant de se laver les yeux ainsi qu'un lavabo doivent se trouver à proximité du système. Si une substance, quelle qu'elle soit, entre en contact avec vos yeux ou votre peau, rincez abondamment la zone affectée à l'eau, puis.

- **Substances dangereuses**

De nombreux solvants organiques, phases mobiles et échantillons sont nuisibles à la santé. Informez-vous de propriétés toxicologiques et infectieuses de toutes les substances que vous utilisez. Les propriétés toxicologiques et infectieuses de nombreuses substances peuvent être mal connues. Au moindre doute concernant une substance, traitez-la comme s'il contenait une substance potentiellement dangereuse. Pour des instructions comment utiliser correctement des composés particuliers, veuillez consulter à la fiche de données des sécurités du fabricant respectif. Veuillez respecter des directives des Bonnes Pratiques de Laboratoire (BPL).

Débarrassez-vous de tous les déchets de substances de manière écologique, conformément à la réglementation en vigueur au niveau local. Empêchez impérativement l'accumulation de solvants inflammables, toxiques et/ou infectieux. Suivez un programme d'élimination des déchets règlementé et approuvé. Ne jetez jamais de solvants inflammables, toxiques et/ou infectieux dans le système municipal d'évacuation des eaux usées.

- **Gaz dangereux**

Installez le système HPLC dans un laboratoire bien ventilé. Si la phase mobile ou l'échantillon contient des solvants volatils ou inflammables, vous devez assurer qu'ils ne pénètrent dans l'espace de travail. Si la phase mobile ou l'échantillon contient des solvants volatils ou inflammables, évitez les flammes nues et les sources d'étincelles à proximité.

- **Décharge électrostatique**

Décharge électrostatique peut provoquer la formation d'étincelles et peut présenter un risque d'incendie. Veuillez noter que des solvants fluides dans les capillaires peuvent se charger automatiquement. Cet effet se peut produire particulièrement forte dans les capillaires isolants et avec des solvants non-conducteurs (par exemple, l'acetonitrile pur).

Prenez des mesures appropriées pour éviter les charges électrostatiques à proximité du système HPLC. Par exemple, s'assurez qu'il y a une humidité de l'air suffisante et une ventilation adéquate dans le laboratoire, portez des vêtements ou équipement de protection antistatique, évitez l'accumulation de bulles d'air dans les lignes de déchets et utilisez des réservoirs à déchets mis à la terre.

Utilisez uniquement des capillaires non-conducteurs pour diriger solvants au réservoir de déchets. Capillaires électriquement conducteur devrait être mis à la terre.

- **Inflammation spontanée des solvants**

N'utilisez aucun solvants avec une température d'auto-inflammabilité inférieure à 150° C. Si une fuite se produit, ces solvants peuvent s'auto-enflammer au contact d'une surface chaude.

- **Capillaires, connecteur capillaires, connexions ouvertes**

- ◆ Des capillaires, en particulier les capillaires non-métalliques, pourraient fendre ou glisser des connecteurs ou ne peuvent pas être vissés. Ceci peut en résulter aussi que des substances pourraient jaillir des connexions ouvertes.

- ◆ 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 (CHCl<sub>3</sub>), 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. Ceci peut causer des capillaires de fuite ou risquer des capillaires d'éclater. Ces acides peuvent cependant être utilisés dans le cadre de procédures de nettoyage, à condition que l'exposition soit brève.

- ◆ N'utilisez pas de capillaires écrasés, pliés, abimés ou endommagés.

- ◆ Les connecteurs capillaires pour pourrait être contaminé par des substances dangereuses ou des substances dangereuses pourrait sortir des connexions ouvertes.



- 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. Les capots de protection devraient être démontés uniquement par le personnel de service de Thermo Fisher Scientific.
- Remplacez les câbles de communication défectueux.
- Remplacez les cordons d'alimentation électrique défectueux. Utilisez uniquement les cordons d'alimentation électrique spécifique à l'instrument.
- Remplacez toujours les fusibles grillés par des fusibles de rechange autorisés par Thermo Fisher Scientific.
- Utilisez seulement des pièces de rechange originales et des accessoires autorisés par Thermo Fisher Scientific.
- Ne regardez jamais directement la DEL pour l'éclairage intérieur dans le passeur d'échantillon et ne regardez pas du faisceau lumineux par des instruments qui focalisent le rayon lumineux. L'intensité lumineuse de la lampe peut être nocive pour les yeux.
- Le passeur d'échantillon est stocké sous 2-propanol. Au cours démarrage du passeur d'échantillon, assurez-vous que les solvants utilisés soient miscibles avec le 2-propanol. Sinon, suivez les étapes intermédiaires appropriées.
- Vous ne devriez pas soulever le passeur d'échantillon seul. Le passeur d'échantillon est trop lourd et trop encombrant pour une seule personne.
- Lorsque vous soulevez ou déplacez le passeur d'échantillon, soulevez toujours par le bas ou les côtés, avec le panneau avant fermé afin de ne pas endommager l'instrument.
- Ne placez aucun objet lourd sur la porte ouverte du panneau avant. Ceci pourrait endommager la porte.
- Afin d'éviter des blessures corporelles, ne mettez pas la main à l'intérieur du compartiment à échantillons lorsqu'une analyse est en cours.
- Utilisez uniquement des solvants (qualité HPLC) et des solutions salines compatibles avec les matériaux exposés phase mobiles.
- Si une fuite survient, arrêtez l'instrument et résolvez le problème immédiatement.
- Avant d'interrompre le fonctionnement pendant plusieurs jours ou plus, observez les précautions figurant en Shutting Down the Autosampler (→ page 94).
- N'utilisez pas le passeur d'échantillon de manière autre que celles décrites dans ce manuel.
- Conservez ce manuel à proximité de l'instrument pour pouvoir le consulter facilement.

### 1.3 Intended Use

For Research Use Only. Not for use in diagnostic procedures.

The device is designed to be operated only by qualified and authorized personnel. All users must know the hazards presented by the device and the used substances.

The autosampler has been designed for laboratory research use in analytical HPLC (high performance liquid chromatography) applications and provides straightforward automation and sample handling. The autosampler is part of the UltiMate 3000 system, but can be used also with other HPLC systems if adequate control inputs and outputs are available. A PC with USB port is required.

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

- Xcalibur™, Compass™/HyStar™ or Analyst®  
To do so, installation of the DCMS<sup>Link</sup> (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.

Observe the following when using the autosampler:

- The autosampler must be operated only with the accessories and spare parts as recommended by Thermo Fisher Scientific (→ page 137) and within the technical specifications (→ page 135).
- *Injection valves*
  - Buffer concentration: Typically up to 1 mol/L (< 0.1 mol/L chloride ions)
  - pH range: Depending on the rotor seal in the injection valve (→ page 124).
- In addition, 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.

If there is any question regarding appropriate usage, contact Thermo Fisher Scientific before proceeding. Thermo Fisher Scientific cannot be held liable for any damage, material or otherwise, resulting from inappropriate or improper use of the instrument.



**Warning:**

If the device is used in a manner not specified by Thermo Fisher Scientific, the protection provided by the device could be impaired. Thermo Fisher Scientific assumes no responsibility and will not be liable for operator injury and/or instrument damage. Whenever it is likely that the protection is impaired, the instrument must be disconnected from all power sources and be secured against any intended operation.



**Avertissement:**

Si l'instrument est utilisé de façon non spécifiée par Thermo Fisher Scientific, la protection prévue par l'instrument pourrait être altérée. Thermo Fisher Scientific n'assume aucune responsabilité et ne sera pas responsable des blessures de l'opérateur et/ou des dommages de l'instrument. Si la protection de l'instrument n'est pas garanti à tout moment, débranchez l'instrument de toutes les sources d'alimentation électrique et assurez-vous que l'instrument n'est pas utilisé involontairement.

## **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 Unit Description

Being part of the UltiMate 3000 system, the autosampler is a cost-effective solution for routine HPLC analysis, especially in the pharmaceutical, food and beverage, and environmental areas.

- The autosampler uses the pulled-loop injection principle (→ page 15) to achieve highest injection accuracy and reproducibility.
- The autosampler supports the full-loop and partial loop injection modes (→ page 81). Full-loop injections provide maximum reproducibility as the sample loop is completely filled with sample. With partial-loop injections less sample is required than with full-loop injections as the sample loop is filled with sample only partially. In addition, the injection volume is freely selectable and variable without the need of installing a sample loop with a different volume.
- The carousel can handle any combination of different vial sizes (→ page 25), which can be used in the same autosampling sequence.
- The column compartment provides room for one column with a maximum length of 30 cm and a maximum outer diameter of 18.5 mm.
- The column can be warmed up to max. 50 °C. The lower heating limit is 5 °C above the ambient temperature.
- Temperature control allows keeping the column temperature constant if the ambient temperature changes during the analysis.
- Eluent preheating in the column chamber allows bringing the eluent to the column temperature before the eluent enters the column (→ page 50). This is to avoid temperature gradients on the column.
- Various safety and monitoring features are provided for optimum system performance and reliability (→ page 30).
- The autosampler can be fully controlled by the Chromeleon Chromatography Management System, allowing you to randomly access samples, use several standards per analysis sequence, or set variable injection volumes and numbers of replicates for each sample.
- The autosampler is designed for easy access to the fluid components, allowing fast and reliable maintenance while the instrument remains in the UltiMate 3000 system stack.

- The autosampler is available also with temperature control for sample cooling and sample heating (→ page 17).
- All parts that may be exposed to solvents are made of materials that provide optimum resistance to the most commonly used solvents and buffer solutions.
- A transparent front cover is available as an option (part no. 6820.1427). The front cover allows you to close the sample compartment, for example, to prevent dust or other particles from entering.

## 2.2 Operating Principle

The picture illustrates how the autosampler operates:

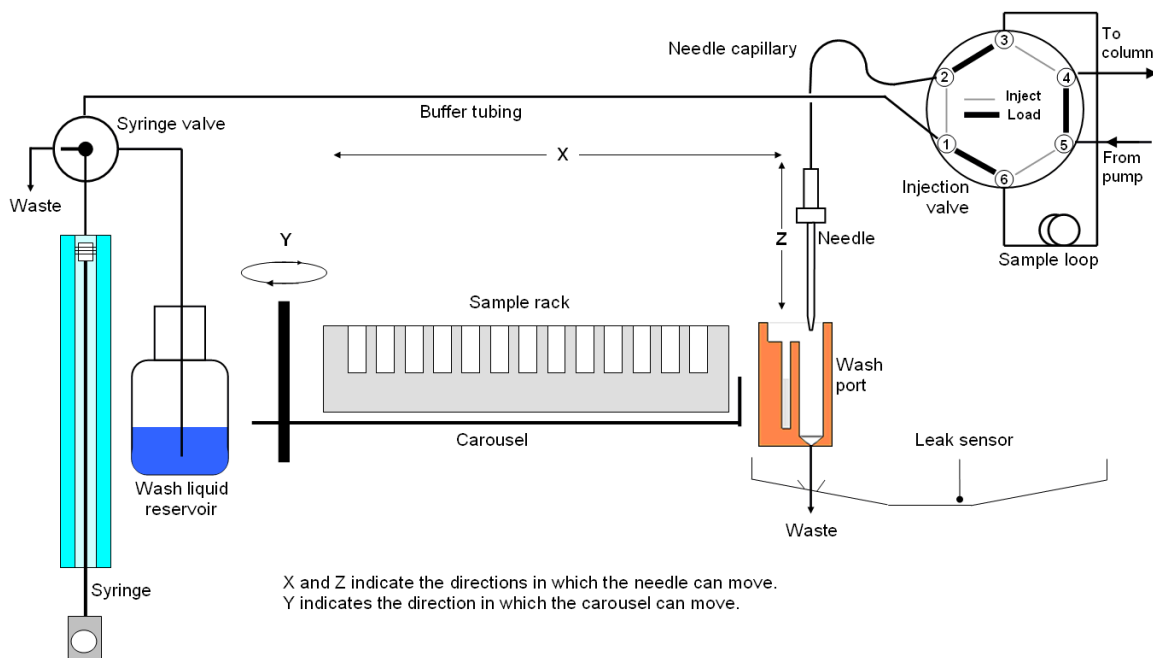


Fig. 1: Principle of operation

The autosampler uses the pulled-loop injection principle: While the injection valve is still in the **Inject** position, the syringe aspirates sample from the vial into the buffer tubing, thus, filling the entire needle capillary with sample. Then, the injection valve is switched into the **Load** position. The sample is drawn by the syringe through the needle and needle capillary and placed in the sample loop. Afterward, the injection valve is switched to the **Inject** position, directing the solvent flow from the sample loop through the high-pressure flow path to the column.

The sample is transported onto the column in back flush mode: In the **Load** position, the sample is drawn into the sample loop toward the syringe. In the **Inject** position, the sample flow is in the opposite direction.

The autosampler includes the following components:

Component	Description
Injection valve and sample loop	Sample is directed through the injection valve and sample loop to the mobile phase.
Needle and needle capillary	The needle draws the sample and transports it to the sample loop.
Wash port	The wash port is used to rinse the needle from the outside with wash liquid.
Carousel	The carousel holds the vial trays.
Syringe	The syringe aspirates sample from the vial into the a) buffer tubing (the injection valve is in the <b>Inject</b> position). b) sample loop (the injection valve is in the <b>Load</b> position).
Buffer tubing	The buffer tubing establishes the fluid connection between the syringe and the sample loop (the injection valve is in the <b>Load</b> position) or between the syringe and the needle capillary and needle (the injection valve is in the <b>Inject</b> position).
Wash liquid	After the injection, the wash liquid is used to remove the sample and the mobile phase from the buffer tubing. If the injection is interrupted, the wash liquid can be used to remove the sample from the needle and buffer tubing.
Leak sensor	The leak sensor detects liquid leaks in the fluid connections. The leak sensor is installed in a tray. The sensor reports a leak when a certain level of liquid is reached in the tray.



## 2.3 Autosampler Configurations

### 2.3.1 Overview

The autosampler is available in the following configurations:

Autosampler	Part No.
ACC-3000 <i>without</i> sample thermostating	5830.0010
ACC3000T <i>with</i> sample thermostating	5830.0020

The autosampler is shipped with a 250  $\mu$ L syringe and a 20  $\mu$ L sample loop.

For information about the available as an option, see page 139.

### 2.3.2 Autosampler with Sample Thermostating Option

The autosampler is available also with temperature control for sample thermostating. Electronic Peltier elements cool or heat the carousel and all its components to the selected temperature, thus allowing precise equalization of the sample temperature. Additional supplies, such as cooling water and compressed air, are not required.

The autosampler with sample thermostating option allows sample cooling by max. 15 °C from ambient. The lower temperature limit is +8 °C. In addition, the samples can be warmed to max. +45 °C.

Observe the following

- To remove any condensation that may collect in the carousel, you can connect a waste line (drain tube) to bottom right drain port (rear port) underneath the autosampler (→ Fig. 22, page 55). The thermostatted autosampler is equipped with active condensation drainage (via a pump).
- The drain tube must remain below the drain port. Otherwise, the liquid may flow back into the interior and cause damage to the autosampler.
- In case of increased condensation, clean the carousel regularly to prevent impurities in the tray.

For information about how to turn on sample thermostating, see page 85.

### 2.3.3 Proper Syringe, Buffer Tubing and Sample Loop Combinations

The following table provides information about the recommended combinations of a syringe, sample loop, and buffer tubing.

<b>Syringe</b> (For part nos., see page 114)	<b>Sample Loop</b> (For part nos., see page 121)
250 $\mu$ L	20 $\mu$ L
250 $\mu$ L	50 $\mu$ L
1000 $\mu$ L	200 $\mu$ L

If you want to use a combination of a syringe and sample loop other than those mentioned above, select the syringe size in such a way that enough sample can be drawn also for full-loop injections ( $\rightarrow$  page 81). It is possible to fill the entire sample loop with sample only when the sample has already reached port 2 of the injection valve before the valve is switched into the **Load** position.

**i** **Tip:** The autosampler is shipped with a 250  $\mu$ L syringe and a 20  $\mu$ L sample loop. You can use this syringe also when you install the 200  $\mu$ L sample loop from the accessories kit. However, Thermo Fisher Scientific recommends installing a 1000  $\mu$ L syringe if your application requires full-loop injections.

## 2.4 Interior Components

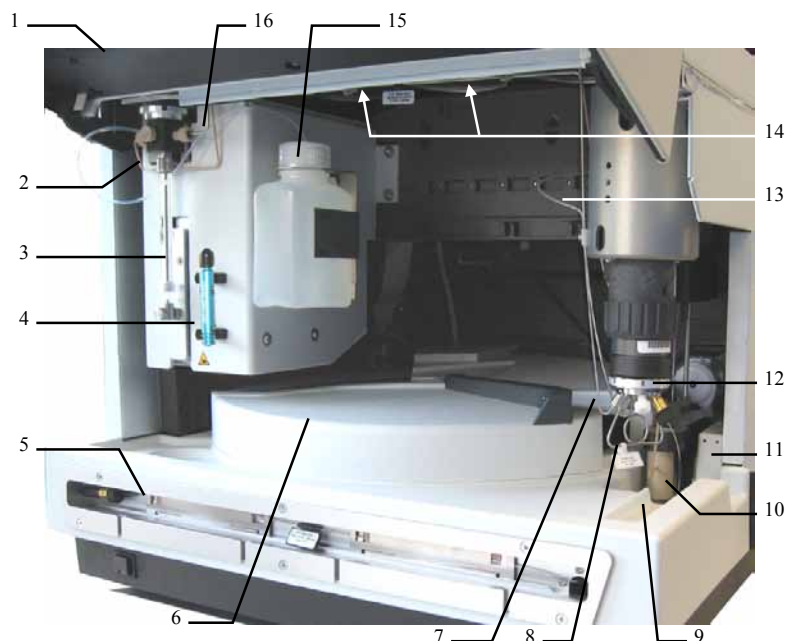


Fig. 2: Interior components

No.	Description
1	Front panel (tilted upward)
2	Syringe valve (→ page 54)
3	Syringe
4	Menu pen
5	Column chamber (→ page 28)
6	Movable cover for the carousel To access to the samples in the carousel, grasp and move the cover at the black bar to the left. To close the carousel, move the cover to the right until it contacts the needle arm. The needle arm opens and closes the cover automatically for sampling.
7	Needle capillary, connecting the needle and the injection valve
8	Sample loop
9	Drip tray (→ detailed view in Fig. 3, page 20)
10	Wash port (→ Fig. 3, page 20)
11	Leak sensor (→ page 26)
12	Injection valve (→ page 27)
13	Tubing from syringe valve to wash port (drainage)
14	Compartment lights (here hidden by the front panel; → page 26)
15	Option: Wash liquid bottle (for 125 mL of wash liquid) (→ page 53)
16	Buffer tubing

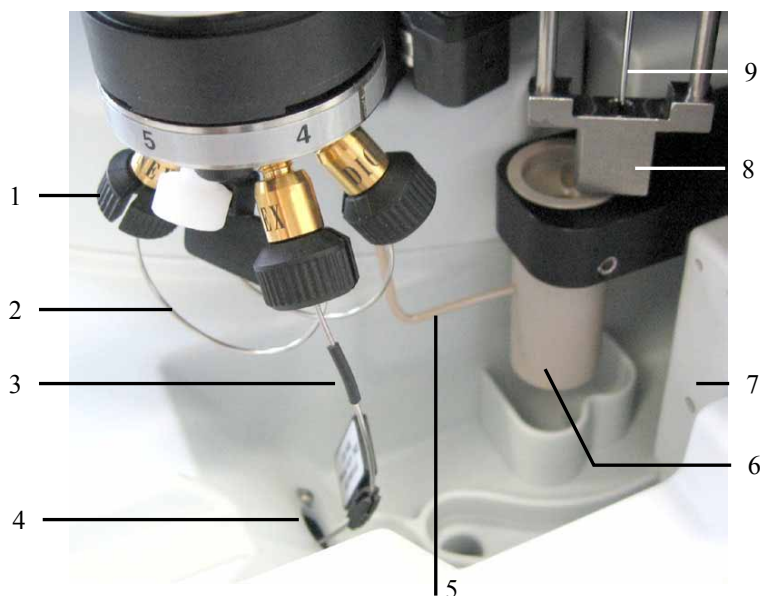


Fig. 3: Drip tray

No.	Description
1	Injection valve (→ page 27)
2	Sample loop, connected to ports 3 and 6 on the injection valve
3	Port for connecting the capillary to the column inlet (port 4)
4	Passage to the column chamber For the shortest possible connection from the injection valve to the column chamber, route the capillary to the column inlet through this passage.
5	Tube from syringe valve to wash port (drainage)
6	Wash port The drain port on the bottom right of autosampler discharges the liquid from the wash port (→ page 55)
7	Leak sensor (→ page 26)
8	Vial pusher—the vial pusher is fitted with a sensor for automatic vial detection (→ page 93). In addition, septa particles adhering to the needle are removed when the needle exits the vial.
9	Needle

## 2.5 Front Panel Elements

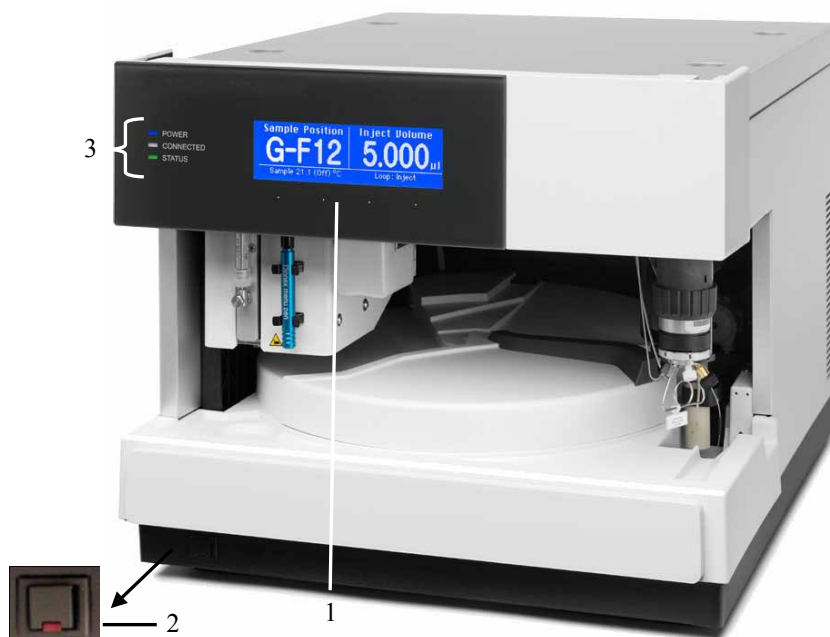


Fig. 4: ACC-3000 front view

No.	Element	Description
1	Display	Shows information about the autosampler: <ul style="list-style-type: none"> <li>- General information upon power-up (→ page 63)</li> <li>- Status screen (→ page 64)</li> <li>- Various functions and menus (→ pages 73 and 75)</li> <li>- Messages (→ page 100)</li> </ul>
2	Standby button	Switches the autosampler to Standby mode (the LED is lighted). To cancel Standby mode and resume operation, press the Standby button again (the LED is not lighted). <b>Note:</b> To allow the autosampler to change the mode, press and hold the Standby button for one second.
3	<b>Status LEDs</b>	
	Power	The LED is blue when the autosampler is turned on.
	Connected	The LED is green when the autosampler is connected in Chromeleon.
	Status	The LED is red when an error has been detected. A message appears on the display. <i>Only ACC-3000T:</i> The LED is yellow when the target temperature for sample thermostating has not yet been reached. Otherwise, the LED is green.

## 2.6 Rear Panel



Fig. 5: Rear panel view (here: ACC-3000T)

No.	Description
1	Main power switch (→ page 23)
2	Fuse cartridge (→ page 23)
3	Main power receptacle (→ page 36)
4	Type label
5	USB (Universal Serial Bus, USB 1.1) port for connection to the Chromeleon computer (→ page 23)
6	USB hub (3 additional USB ports, USB 1.1) Depending on the UltiMate 3000 system configuration, for connection of one UltiMate 3000 module each or for connection of one USB hub each (→ page 23)
7	Digital I/O ports for communication with external devices in Chromeleon (→ page 23)
8	(ACC-3000T only): Cooling fans

### 2.6.1 Power Switch

The main power switch is on the rear panel. The main power switch is used to turn the autosampler on or off.


### 2.6.2 Fuse Cartridge


The fuse cartridge contains two slow-blow fuses, depending on the autosampler model rated at 2 A, 250 V (ACC-3000) or 4 A, 250 V (ACC-3000T). For information about how to change the fuses, see page 131.

### 2.6.3 USB Port (USB 1.1)

The Chromeleon Chromatography Management System can use a USB connection to control the autosampler. Data is transferred digitally via the appropriate USB cable (→ page 35).

Depending on the configuration of the UltiMate 3000 system, you can use the internal 3-port USB hub (→ Fig. 5, no. 6) to connect other modules in the UltiMate 3000 system or external USB hubs.

 **Important:** Thermo Fisher Scientific recommends using these USB ports for connections to Dionex instruments only. Thermo Fisher Scientific cannot guarantee correct functioning if instruments from other manufacturers are connected.

 **Important:** Thermo Fisher Scientific recommande d'utiliser les ports USB uniquement pour les raccordements aux instruments Dionex. Thermo Fisher Scientific ne peut garantir le bon fonctionnement si les instruments d'autres fabricants sont raccordés.

For information about how to connect the autosampler to the Chromeleon computer, see sections 3.4.1 and 3.4.2 (→ page 35).

### 2.6.4 Digital I/O Ports

The 6-pin Mini-DIN ports on the rear panel can be used in Chromeleon to exchange digital signals with external devices. To connect an external device to the autosampler, use a 6-pin Mini-DIN signal cable (part no. 6000.1004). For information about how to connect the digital I/O, see page 36. For information about the functions of the connector pins and pin assignment, see page 145.

## 2.7 Carousel, Sample Trays, and Vials

The carousel has three color-coded segments (red, green, and blue) and can hold any three vial trays in any tray combination. For information about how to install a vial tray, see page 57.



Fig. 6: Vial trays (examples)

The following tray types are available:

Description	Part No.
Tray for 40 vials (1.8 mL or 2 mL)	6820.4070
Tray for 40 vials ( <i>conical</i> , 1.1 mL)	6820.4087
Tray for 40 vials (Eppendorf, 1.5 mL)	6820.4094
Tray for 40 vials (Eppendorf, 0.5 mL)	6820.4096
Tray for 10 vials (10 mL)	6820.4086
Tray for 22 vials (4 mL)	6820.4084
Tray for 72 vials ( <i>cylindrical</i> , 1.2 mL)	6820.4090
Tray for 72 vials ( <i>cylindrical</i> , 0.3 mL)	6820.4091
Tray for 72 micro dialysis vials (0.3 mL)	6820.4097

In addition, each color-coded segment can accommodate one vial holder that can hold five 10 mL vials, such as reagent vials (→ page 58).



The table lists the vials: that are recommended by Thermo Fisher Scientific along with the required minimum and maximum container heights:

Vial (Min. - Max. Heights)	Description	Part No.
Vials (31 - 43 mm)	Cylindrical vial up to 1.8 mL (O.D. < 12 mm) for example, 250 µL vials Caps and septa for 250 µL vials for 40-position tray (part no. 6820.4070)	6820.0029 6820.0028
1.2 mL vials (31 - 43 mm)	Cylindrical vial Crimp cap Septum (silicone/PTFE, slotted) for 72-position tray (part no. 6820.4090)	6000.0062 6000.0064 6000.0061
1.1 mL vials (31 - 43 mm)	Conical vial Crimp cap and slotted silicone/PTFE septum for 40-position rack (part no. 6820.4087)	6000.0077 6000.0076
1.8 mL vials (31 - 43 mm)	1.8 mL vial Crimp cap and septum for 40-position tray (part no. 6820.4070)	6000.0072 6000.0071
2 mL vials (31 - 43 mm)	2 mL vial Cap and Septum (silicone) for 40-position tray (part no. 6820.4070)	6000.0060 6000.0057 6000.0058
4 mL vials (36 - 48 mm)	4 mL vial with Screw cap and Septum (silicone/PTFE) for 22-position tray (part no. 6820.4084)	6000.0074 6000.0073 6000.0075
10 mL vials (38 - 50 mm)	Cylindrical vial with cap and septum for 10-position tray (part no. 6820.4086) for 5-position holder (part no. 6820.4073)	6820.0023

Observe the following:


- Using septa other than those mentioned above may block the capillaries or affect chromatographic results.
- Eppendorf vials must be uncapped.
- If you want to use *uncapped* 10 mL vials, installation of the vial pusher adapter is recommended (part no. 6820.2402). When you install the adapter, you *have to* disable the automatic tray test (→ page 93).
- If you want to use vials other than those listed in the table, observe the required minimum and maximum heights.

## 2.8 Compartment Lights

Two lights on the inside front panel illuminate the sample compartment during autosampler operation. To avoid personal injury when you reach inside the sample compartment, the lights signal needle arm movement. Before the needle arm moves to a different position, the lights turn off and on again.


## 2.9 Fluid Connections

The front panel tilts upward to provide easy access to the fluid connections in the autosampler (→ Fig. 2, page 19). The open front panel locks in the topmost position.

 **Important:** The open front panel is not designed to carry weight. Therefore, do not place any objects on the open front panel door.

For the fluid connections, use only the capillaries shipped with the autosampler and original Dionex spare capillaries.

To avoid increased dead volume, reuse fittings and ferrules only for the same capillary connection.

 **Important:** Ne placez aucun objet sur la porte ouverte du panneau avant. Ceci peut endommager la porte.

Utilisez uniquement les capillaires fournis avec le passeur d'échantillon et les capillaires de rechange d'origine Dionex.

La réutilisation des raccords et férules n'est possible que pour la connexion capillaire d'origine, afin d'éviter l'apparition de volumes morts.

## 2.10 Leak Sensor

A leak sensor is installed inside the autosampler. When leak detection is enabled, the leak sensor reports a leak if liquid collects in the drip tray under the fluid connections. The **Status** LED on the front panel door changes to red. A message appears on the autosampler display and in the Chromeleon Audit Trail. In addition, depending on the leak sensor mode setting, a beep alerts you (→ page 88).

When the leak sensor reports a leak, eliminate the cause for the leakage and dry the leak sensor (→ page 113). If the sensor is not dry, the **Status** LED remains red. To remove the message from the display, select **Clear** on the navigation bar (→ page 77).

## 2.11 Injection Valve

The autosampler is shipped with a 2-position, 6-port injection valve that is suitable for pressures < 62 MPa (9000 psi). The valve has two operating positions: **Load** and **Inject**. While the injection valve is in the **Load** position, sample is drawn by the syringe, through the needle and needle capillary, into the sample loop. In the **Inject** position, the solvent flow is directed from the sample loop through the high-pressure circuit to the column.

The components are connected to the valve as follows:

Port	Connect the ...	Port	Connect the ...
1	Syringe/buffer tubing	4	Column capillary
2	Needle/needle capillary	5	Pump capillary
3	Sample loop	6	Sample loop

For maintenance information, see section 7.7 (→ page 122).

## 2.12 Column Chamber

A removable panel on the front of the autosampler provides easy access to the column chamber and the components inside.

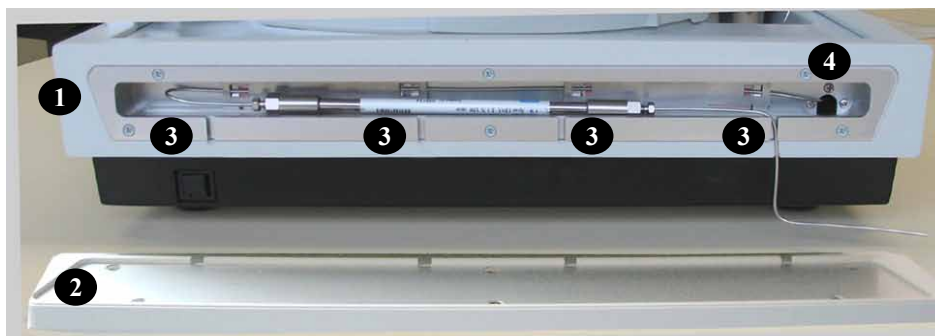


Fig. 7: View into the column chamber

No.	Description
1	Column chamber
2	Removable panel
3	Capillary slots to route the capillary from the column outlet to the outside
4	Passage from the drip tray to the column chamber For the shortest possible connection from the injection valve to the column chamber, route the capillary to the column inlet through this passage.

The column chamber can house one column with a maximum length of 30 cm and a maximum outer diameter of 18.5 mm.

In addition, you can bring the eluent to the column temperature before the eluent enters the column. The capillary to the column inlet needs to be attached to the inside rear panel of the column chamber. The thermal radiation of the rear panel brings the eluent in the capillary to the temperature of the column chamber. This is to avoid temperature gradients on the column.


For information about how to connect the column, see section 4.3 (→ page 50).

## 2.13 Chromeleon Software

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

Two modes of software control are available:

- *Direct Control*  
With direct control, you select operating parameters and commands in the **Commands** (F8) dialog box. Direct commands are executed as soon as they are entered. For routine operation, most parameters and commands are available also on a control panel. For more information about direct control, see page 68.
- *Automated Control*  
With automated control, you create a program (or PGM File). This is a list of control commands, executed in chronological order, for automated operation of the autosampler. Programs can be created automatically with a software wizard or manually by editing an existing program. For more information about automated control, see page 71.

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

If you want to operate the autosampler from Chromeleon 7, refer to the following documents for information about how to perform the 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 to install 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.

## 2.14 System Wellness and Predictive Performance

System Wellness monitors the health of the autosampler. The autosampler supports several performance and reliability features that can help you detect small problems before they turn into big ones:

- Internal monitoring of all mechanical operations
- Automatic self test upon power-up
- Automatic vial detection (→ page 93)
- Leak sensor (→ page 26)
- Monitoring of the cooling performance by three temperature sensors (ACC-3000T)

When an error is detected, the **Status** LED on the front panel changes to red and a message appears on the autosampler display (→ page 100).

When the autosampler is operated from Chromeleon, additional functions for estimating the lifetime of consumables and monitoring and recording service and (re)qualification information (= predictive performance) are available (→ page 90).

## 3 Installation

### 3.1 Facility Requirements

The installation site must meet the following requirements:

- The main power switch and the main power receptacle are on the rear panel. Make sure that
  - ◆ Free and unrestricted access to the main power switch is ensured at all times.
  - ◆ The power cord of the device can be easily reached and disconnected from the power line at all times. Provide sufficient space behind the device to unplug the cable.
- Make sure that the installation site meets the power and environmental specifications listed in the Technical Information section (→ page 135).
- Install the autosampler in the laboratory on a stable surface that is free of vibrations.
- Make sure that the surface is resistant to solvents.
- 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.

### 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.

**i** **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 container and packing material. They provide excellent protection for the autosampler in case of future transit. The product warranty will not be honored if the autosampler is shipped in any other packaging.

1. Place the shipping container on the floor and remove the accessories kit and the power cord. All moving parts of the rotary unit (sample racks) are shipped in a separate box.

2. Grasp the autosampler by the sides. Slowly and carefully, pull the instrument out of the shipping container and place it on a stable surface.

**⚠ Important:** A team effort is required to lift or move the autosampler. The autosampler is too heavy and/or bulky for one person alone to lift or move safely.

To prevent the unit from falling, lift the unit by the sides. Do not lift the autosampler by the packing material. When lifting or moving the autosampler, always lift by the bottom or sides of the unit.

**⚠ Important:** Vous ne devriez pas soulever le passeur d'échantillon seul. Le passeur d'échantillon est trop lourd et trop encombrant pour une seule personne.

Lorsque vous soulevez ou déplacez le passeur d'échantillon, soulevez toujours par le bas ou les côtés, avec le panneau avant fermé afin de ne pas endommager l'instrument. Lorsque vous soulevez ou déplacez le passeur d'échantillon, soulevez toujours par le bas ou les côtés.

3. Remove the foam spacers, and then remove the polythene packaging.
4. Remove the foam inserts that protect the autosampler during shipment.
  - ◆ Remove the foam insert that secures the needle arm and carousel
  - ◆ Tilt the front panel upward and remove the two foam inserts securing the front panel.
5. Before connecting the autosampler 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; 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 Positioning the Autosampler in the UltiMate 3000 System

When the autosampler is part of an UltiMate 3000 system, stack the system modules (→ Fig. 8) and interconnect them on the rear panel (→ Fig. 9). The arrangement of the system modules depends on the application.

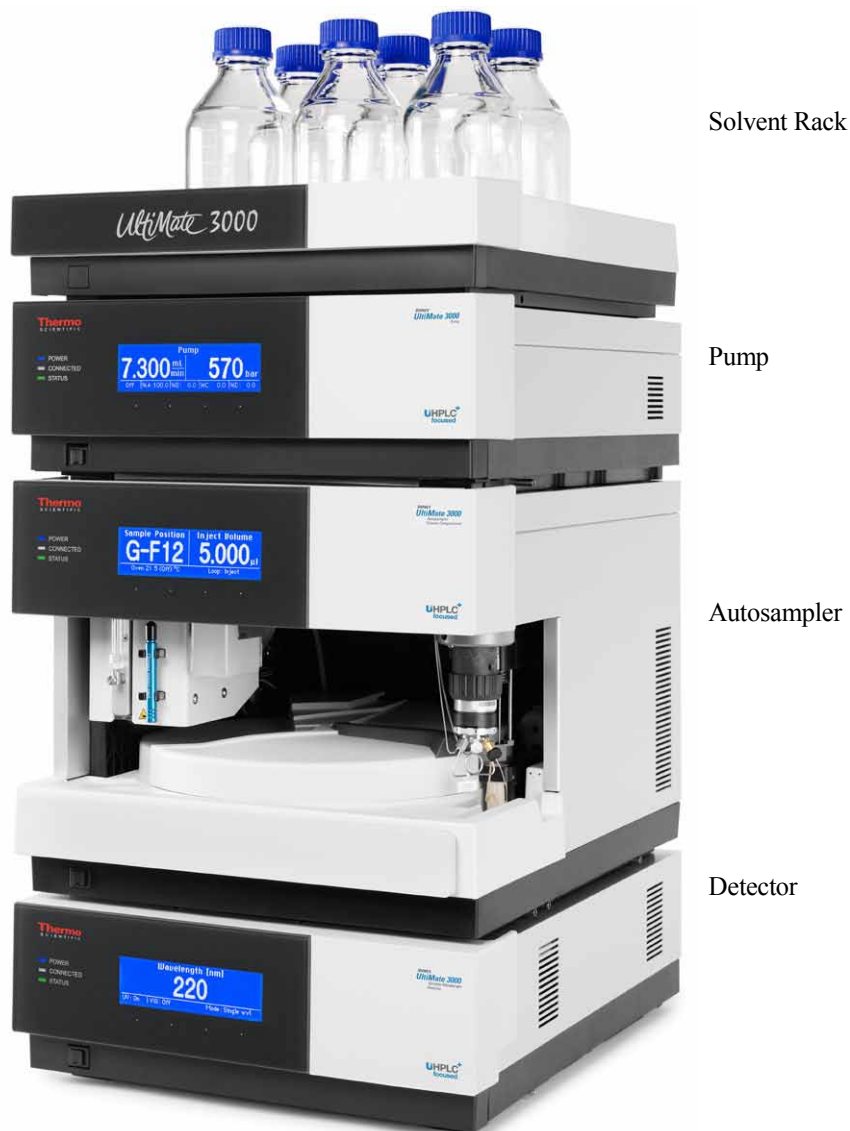


Fig. 8: Module arrangement for an UltiMate 3000 system (example)

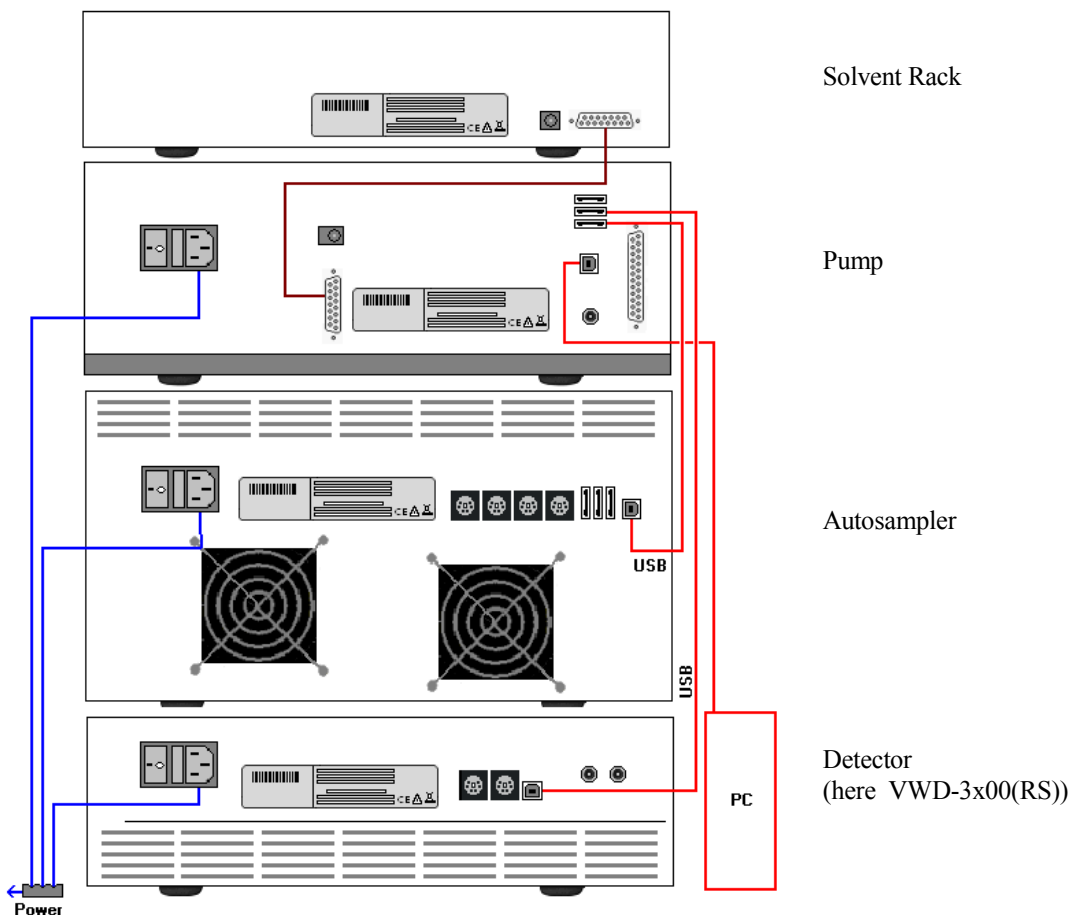


Fig. 9: Rear panel connections on an UltiMate 3000 system (example)

Apart from the Solvent Rack, all modules of the UltiMate 3000 system can be connected separately to the computer. However, Thermo Fisher Scientific recommends interconnecting all modules, and then connecting the system to the Chromeleon computer via only one connection.

If the system includes a VWD-3x00(RS), use the hub on the pump for the connection.

If the system includes a DAD-3000(RS) or MWD-3000(RS) detector, use the hub on the detector.

## 3.4 Connecting the Autosampler

### 3.4.1 General Information

*If you want to operate the autosampler from Chromeleon*

Before you connect the autosampler to the USB port on the Chromeleon computer and turn on the autosampler power, verify that Chromeleon is installed on the computer and that the license code is entered. Only if you install Chromeleon first, the USB driver for the autosampler is automatically loaded and the Windows<sup>®</sup> operating system can detect the autosampler when the power is turned on.


### 3.4.2 Connecting the USB Cable

Connect the autosampler to the Chromeleon computer via the USB ports on the rear panel (→ Fig. 5, page 22). Select one of the following alternatives:

- Connect the autosampler directly to the USB port on the Chromeleon computer.
- Connect the autosampler to the internal USB port on another module in the UltiMate 3000 system that is connected to the Chromeleon computer.
- Connect the autosampler to the Chromeleon computer via an external USB hub.

To ensure trouble-free operation, use only these cables for the connection:

Cable	Part No.
USB cable, type A to type B High Speed USB 2.0 (cable length: 1m)	6035.9035 (shipped with the autosampler)
USB cable, type A to type B High Speed USB 2.0 (cable length: 5m)	6911.0002

 **Tip:** The USB standard limits the USB cable length to 5 meters. Each USB device can be separated from the computer or next USB hub by no more than 5 meters.

### 3.4.3 Connecting the Power Cord

Use the power cord shipped with the autosampler to connect the instrument to the main power source. Connect the power cord from the main power receptacle on the rear panel (→ Fig. 5, page 22) to the power source that is connected to a true ground. You need not adapt the line voltage to local voltage requirements.



**Warning:** Never use a power cord other than the power cords provided for the device.

Do not use multiple sockets or extension cords. Using defective multiple sockets or extension cords may cause personal injury or damage to the device.



**Avertissement:** Utilisez uniquement les cordons d'alimentation électrique spécifique à l'instrument.

N'utilisez pas des blocs multiprise ou des câbles prolongateurs. Cela pourrait entraîner des blessures corporelles ou endommager l'instrument.

### 3.4.4 Connecting the Digital I/O

To connect an external device to the digital I/O ports on the rear panel, use a 6-pin mini-DIN cable (part no. 6000.1004).


1. Plug the 6-pin connector of the mini-DIN cable into the **Digital I/O port 1 (2, 3, or 4)**. For information about the functions of the connector pins and pin assignment, see page 145.
2. For each relay output or digital input to be used, connect the appropriate signal wire and ground wires to the corresponding connectors on the external device (→ documentation provided with the external device).
3. When configuring the autosampler in the Chromeleon **Server Configuration** program (→ page 37), make the following settings:
  - On the **Relays** page, select the corresponding relay output (→ page 44).
  - On the **Inputs** page, select the corresponding digital input (→ page 44).

## 3.5 Setting Up the Autosampler in Chromeleon


This section provides brief instructions for setting up the autosampler in Chromeleon. For details about any of these steps, see the *Chromeleon Help*. For information about how to set up the autosampler in DCMSLink, see section 3.6 (→ page 45).

**i** **Tip:** When the autosampler is connected to the Chromeleon computer, verify that the Chromeleon software is installed *before* turning on the autosampler power for the first time. Only then, the Windows<sup>®</sup> operating system will detect the autosampler automatically when the autosampler power is turned on.

### 3.5.1 Loading the USB Driver for the Autosampler

1. Turn on the computer power, if it is not already on.
2. Under Windows Vista<sup>®</sup> (Windows<sup>®</sup> XP, Windows<sup>®</sup> 7, or Windows<sup>®</sup> Server 2008) log on as a
  - Local administrator if the computer is a local computer.
  - User with local computer administrator privileges if the computer is a network computer.
3. 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**.

4. Click **Start** to start the server.
5. Click **Close** to close the Server Monitor window. The Server Monitor icon  appears on the taskbar.

**i** **Tip:** Clicking the **Quit Monitor** button quits (exits) the Server Monitor program, but does not stop the server. To stop the server, click **Stop**.

6. Turn on the main power switch on the rear panel of the autosampler.
7. *Windows Vista, Windows 7, and Windows Server 2008* will automatically detect the new autosampler and perform the USB installation.

If Windows fails to detect the autosampler and launches a wizard instead, this indicates that you connected the autosampler to the computer and turned on the power for the first time *before* you installed Chromeleon.

To resolve the problem:

- a) Click **Cancel** to exit the wizard.
- b) Turn off the autosampler.
- c) Install Chromeleon.
- d) Turn on the power to the autosampler. Windows will now detect the autosampler and install the USB software for the autosampler automatically.

*Windows XP*

will automatically detect the new autosampler and launch the **Found New Hardware Wizard**, which guides you through the USB installation. Select the following options:

- a) If asked whether Windows can connect to Windows Update to search for software, select **No, not this time**.
- b) Accept the default option (**Install the software automatically**) and click **Next>**.
- c) Click **Finish** when the wizard reports that the software for the autosampler has been installed.

If Windows fails to detect the autosampler and a message box asks for a USB configuration file (cmwdmusb.inf), this indicates that you connected the autosampler to the computer and turned on the power for the first time *before* you installed Chromeleon.

To resolve the problem:

- a) Click **Cancel** in the Windows message box.
- b) Turn off the autosampler.
- c) Install Chromeleon.
- d) Turn on the power to the autosampler. Windows will now automatically detect the autosampler and launch the **Found New Hardware Wizard**.

### 3.5.2 Installing the Autosampler

After the USB software for the autosampler has been installed (→ page 37), install and configure the autosampler in Chromeleon:

1. Start the Chromeleon **Server Monitor** and the Chromeleon Server (→ page 37) if they are not yet running.
2. 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**.
3. If necessary, click the plus sign beside the server name to display the items underneath.
4. Select the timebase to which the autosampler will be assigned, or create a new timebase (on the **Edit** menu, click **Add Timebase**).
5. 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.
6. On the **Manufacturers** list, click **Dionex HPLC: UltiMate 3000** and on the **Devices** list, click **ACC-3000 Autosampler Column Compartment**.
7. A wizard guides you through the installation. Chromeleon connects to the autosampler and transfers the settings from the instrument firmware to Chromeleon, setting the options on the wizard pages accordingly.
8. On each wizard page, verify that the settings are correct and select additional settings if needed. For a description of the wizard pages, see section 3.5.3.1 (→ page 40).
9. Click **Finish** to complete the installation of the autosampler.
10. On the **File** menu, click **Save Installation** and then close the Server Configuration program.

### 3.5.3 Configuring the Autosampler

#### 3.5.3.1 Initial Installation

During the installation, Chromeleon connects to the autosampler and transfers the settings from the instrument firmware to Chromeleon, setting the options on the wizard pages accordingly. Verify that the standard settings are correct and make additional settings if needed. You may reopen the configuration pages later again to change the settings (→ page 44).

**i** **Tip:** Changing the settings for a specific application in the **Commands** dialog box, in a program file (PGM), or on a control panel, will not change the standard settings on the configuration pages.

For additional information about a page, click **Help**.

#### General Page

The **General** page displays the general instrument parameters.

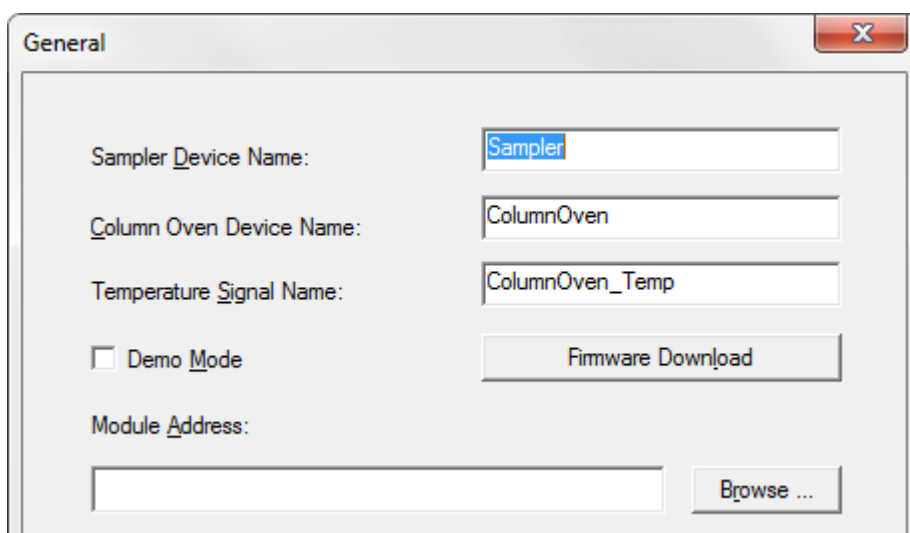


Fig. 10: General page

- **Sampler Device Name, Column Oven Device Name, and Temperature Signal Name**  
Display the names used to identify the autosampler, column oven, and temperature signal of the column oven in the installation environment and in the Chromeleon client program. To control these items with the existing control panels, accept the default names. 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.



- **Demo Mode**

Verify that the check box is cleared. In the Demo Mode, Chromeleon simulates the functions of the autosampler. If the Demo Mode is enabled, the **Module Address** input field will be unavailable. If you exit this page without having entered a module address, the Demo Mode will be enabled automatically.

- **Module Address**

To enter the module address of the autosampler, click **Browse** and then double-click the autosampler that you want to use. The address is automatically entered in the **Module Address** field.

- **Firmware Download**

Clicking this button updates the autosampler firmware with the version available in Chromeleon. (The button appears dimmed if the Demo Mode is enabled.)

The autosampler is shipped with the most recent firmware version. If a firmware update is ever required, follow the steps in section 7.10 (→ page 132).

When you leave the **General** page during initial installation of the autosampler (with the Demo Mode being disabled), Chromeleon attempts to connect to the autosampler and to retrieve the settings from the autosampler firmware, and then sets the options on the corresponding pages of the installation wizard accordingly. Confirm the message with **OK**.

## Segments / Pump Link Page

This page indicates which vials are installed in the red, green, and blue segment. If your UltiMate 3000 system includes a pump of the UltiMate 3000 pump series, you can link the autosampler to the pump.

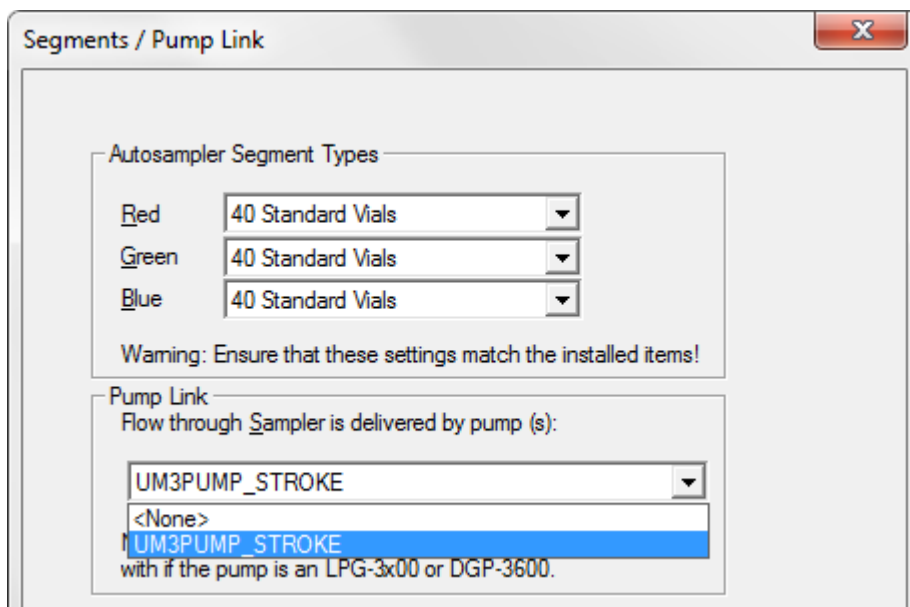


Fig. 11: Segments / Pump Link page  
(here: when the UltiMate 3000 system includes a LPG-3400 pump)

- **Autosampler Segment Types**  
Shows which vials are installed in the red, green, and blue segment (standard configuration). Verify that the settings match the installed vials. If you later install different vials, you have to adapt the settings in Chromeleon accordingly (→ page 86).
- **Pump Link**  
On the **Flow through sampler is delivered by pump(s)** list, select the pump to which the autosampler is linked. The list shows all pumps that are installed in the timebase.
  - ◆ *If the UltiMate 3000 system includes a DGP-3600 pump*  
Select **UM3PUMP\_L\_STRK** to link the autosampler to the left pump. To link the autosampler to the right pump, select **UM3PUMP\_R\_STRK**.
  - ◆ *If the UltiMate 3000 system includes a pump other than a DGP-3600*  
Select **UM3PUMP\_STROKE**.
  - ◆ *If you do not want to link the autosampler to a pump*  
Select **<None>**.

Only if the autosampler is linked to a DGP-3600 or LPG-3400 pump on this page, synchronization of the injection command with the strokes of the pump will be possible. In the Chromeleon Client program, you can then set whether you want to use synchronization and you can select a different pump if necessary (→ page 83).

## Options Page

This page displays the installed options.

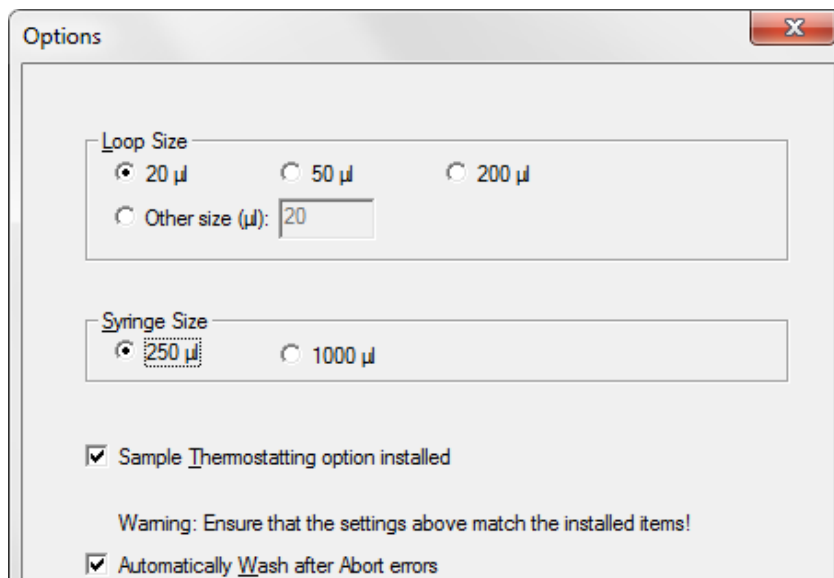


Fig. 12: Options page

- **Loop Size**—shows the sample loop volume.
- **Syringe Size**—shows the syringe volume.
- **Sample Thermostating option installed**  
Indicates that the autosampler is an ACC-3000T with temperature control for sample thermostating.
- **Automatically Wash after Abort errors**  
The check box is selected by default. Accept this setting to have Chromeleon automatically perform a wash cycle when an abort error occurred.

Each time the autosampler is connected in Chromeleon, the settings on the **Segments / Pump Link** and **Options** pages are compared to the instrument configuration reported by the autosampler upon connect. If the instrument configuration and the settings in Chromeleon do not match, the autosampler is disconnected in Chromeleon and a message appears in the Audit Trail. Check and match the settings if necessary by clicking either **Retrieve configuration from module** or **Send configuration to module** on the **General** page (→ page 44).

## Relays Page

The **Relays** page lists all available relays (Relay\_1 to Relay\_4). Select a check box to enable the corresponding relay. If a check box is cleared, the relay will not be available in Chromeleon. To change the name of a relay, select the relay, press the **F2** button on the keyboard, and overwrite the existing name.

## Inputs Page

The **Inputs** page lists all available digital inputs (Input\_1 to Input\_4). Select a check box to enable the corresponding remote input. If a check box is cleared, the input will not be available in Chromeleon. To change the name of an input, select the input, press the **F2** button on the keyboard, and overwrite the existing name.

### 3.5.3.2 Changing the Configuration Properties

To change the default configuration settings, reopen the configuration pages.

1. Start the **Server Configuration** program (→ page 39).
2. Right-click the **ACC-3000 Autosampler Column Compartment** in the timebase and click **Properties** on the menu.
3. Change the settings as needed. For a description of the wizard pages, see section 3.5.3.1 (→ page 40).

Note that Chromeleon provides two more buttons on the **General** page. They allow you to match the configuration of the autosampler with the settings in Chromeleon:

Button	Description
<b>Send configuration to module</b>	Click to transfer the settings from the Chromeleon <b>Segments / Pump Link</b> and <b>Options</b> pages to the autosampler.
<b>Retrieve configuration from module</b>	Click to transfer the current autosampler configuration to Chromeleon. The settings on the <b>Segments / Pump Link</b> and <b>Options</b> pages will be updated accordingly. This is necessary only if you connect a different autosampler or if automatic matching was not performed correctly when the wizard was started.

In addition to the pages provided during the initial installation of the autosampler, Chromeleon provides an **Error Levels** page. This page classifies the severity of any errors that occur. It is generally not necessary to change the standard settings.

4. To save the changed configuration, click **Save Installation** on the **File** menu and then close the **Server Configuration** program.

### 3.6 Setting Up the Autosampler in DCMSLink

1. Install and configure the DCMSLink-Software (→ *DCMSLink Installation Guide*). The Guide is provided on the DCMSLink DVD in the *Additional Documents\DCMSLink User Documents* folder.
2. Access the Chromeleon **Server Configuration** program (→ *DCMSLink Installation Guide*).
3. Add the autosampler to a timebase. The steps in section 3.5.2 apply equally (→ page 39).
4. Configure the autosampler. The steps in section 3.5.3 apply equally (→ page 40).

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



## 4 Preparation for Operation (Startup)

### 4.1 Overview of Actions

**⚠ Important:** The autosampler is filled with 2-propanol when it is shipped from the factory. During initial operation, make sure that the solvents used are miscible. Otherwise, use an appropriate intermediate solvent.

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

**⚠ Important:** Le passeur d'échantillon est stocké sous 2-propanol. Au cours du démarrage du passeur d'échantillon, assurez-vous que les solvants utilisés soient miscibles avec le 2-propanol. Sinon, suivez les étapes intermédiaires appropriées.

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 (→ sections 3.1 through 3.4, page 31 and following pages), prepare the autosampler for operation:

1. Establish the fluid connection to the pump.
2. Establish the fluid connection to the column and place the column in the column chamber (→ page 50).
3. Check the plumbing on the injection valve (→ page 27).
4. Connect the wash liquid lines (→ page 51).
5. Check the plumbing on the syringe valve (→ page 54).
6. Connect drain tubing (→ page 55).
7. *If you want to operate the autosampler from Chromeleon*  
Set up the autosampler in Chromeleon if it is not already set up (→ page 37).
8. Turn on the autosampler (→ page 63).
9. Prime the syringe (→ page 55).
10. Install and load the vial trays (→ page 57).
11. Load the 5-position vial holders for the 10 mL vials (→ page 58).
12. Turn on and set the temperature for column thermostating (→ page 84).

13. *ACC-3000T only*  
Turn on and set the temperature for sample thermostating if applicable (→ page 85).
14. Check and change the leak detection setting if applicable (→ page 88).
15. Adjust the brightness and contrast of the autosampler display if applicable (→ page 88).
16. Before using the autosampler for sample analysis, equilibrate the entire system (→ page 60).

## 4.2 Tips and Precautions for Connecting Capillaries

When connecting capillaries to the autosampler, observe the following general precautions:

- Observe the precautionary statements for capillaries and capillary connections in section 1.2.2 (→ page 4).
- When you connect capillaries, be 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. Install the capillaries and fittings only at the positions for which they are intended.
- Use only the capillaries shipped with the autosampler or original Dionex spare capillaries.
- Use Viper capillary connections whenever possible. Observe 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 knurled screw and *only* with your hand (do *not* use tools).  
First, tighten the screw hand-tight. If you observe leakage on the connection, tighten the screw a little further. If leakage persists, 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.



**i** **Tips:** You can reuse capillaries with Viper fitting connections also for a different connection.

If the knurled screw is a black screw (as shown in Fig. 13), you can remove it from the capillary and reattach it later again.



Fig. 13: Viper fitting (example)

◆ *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 clean the connection port with a cleaning swab (part no. 6040.0006). Replace the capillary and/or fitting if this does not eliminate the problem.

To avoid increased dead volume or damage to the system and leakage, reuse fittings and ferrules only for the same capillary connection.

### 4.3 Connecting the Column

A removable panel on the front of the autosampler provides easy access to the column chamber.



Fig. 14: View into the column chamber

1. Remove the panel from the column chamber.
2. The capillary for eluent preheating (Viper capillary, 0.18 x 550 mm I.D. x L, SST) is connected to the injection valve and preinstalled in the column chamber at the factory (→ Fig. 14). Connect the free end of the capillary to the column inlet.
3. Connect an appropriate capillary to the column outlet.
4. Place the column in the column chamber. Route the capillary from the column outlet to the outside through one of the capillary slots.



Fig. 15: Column in column chamber

5. Close the column chamber with the panel.



Fig. 16: Closed column chamber (on the right: bottom view of the chamber panel)

6. Turn on column thermostating and set the temperature (→ page 84).

## 4.4 Connecting the Wash Liquid Lines

Thermo Fisher Scientific recommends that you degas the wash liquid on a continuous basis. If the UltiMate 3000 system includes a LPG-3400 pump or an appropriate SRD-3x00 Solvent Rack, degas the wash liquid online via the degasser of the pump or Solvent Rack (→ section 4.4.1).

If online degassing is not possible, for example, because the UltiMate 3000 system includes a semipreparative HPG-3200P pump, connect the wash liquid bottle from the autosampler accessories kit (→ page 53).

### 4.4.1 Connecting the Wash Liquid Lines for Online Degassing

Select one of the following alternatives:

- If a free degassing channel is available, connect the wash liquid line directly to the degasser (see below). In this case, the wash liquid can be any appropriate liquid.
- If a free degassing channel is not available, connect the wash liquid line to the degasser via the UltiMate 3000 system pump (→ page 52). In this case, one of the solvents delivered by the pump must also be an appropriate wash liquid.

All parts required for connecting the wash liquid lines are provided in the Online Degas Wash kit, which is included in the autosampler accessories kit.

#### To connect the wash liquid lines directly to the degasser

1. Fill a reservoir with an appropriate wash liquid.
2. First, prepare and install wash liquid line in the wash liquid reservoir, and then, connect the free end of the line to the degasser inlet. (The procedure is identical to connecting the solvent lines. For details, see *Connecting the Solvent Reservoirs* in the *Operating Instructions* for the pump or Solvent Rack of the UltiMate 3000 system.)
3. Place the reservoir in the tray of the Solvent Rack
4. Connect the long tube from the Online Degas Wash kit to the syringe valve.

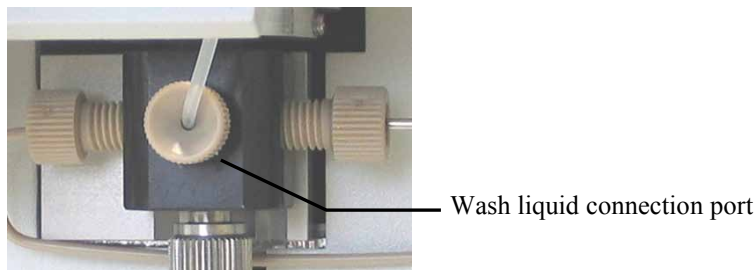


Fig. 17: Wash liquid line connected to the syringe valve

5. Use a capillary cutting tool to cut the free end of the tube to the appropriate length for your application. Make sure to cut square.
6. Connect the free end of the wash liquid line to the degasser outlet. Use the knurled nut and fitting from the Online Degas Wash kit for the connection.
7. Prime the syringe until all air bubbles are gone (→ page 55).

**To connect the wash liquid lines to the degasser via the UltiMate 3000 system pump**

1. Fill the wash liquid reservoir with an appropriate wash liquid.
2. First, prepare the wash liquid line and install the tube in the wash liquid reservoir. Then, connect the free end of the tube to the degasser inlet. (The procedure is identical to connecting the solvent lines. For details, see *Connecting the Solvent Reservoirs* in the *Operating Instructions* for the pump or Solvent Rack.)
3. Place the reservoir in the tray of the Solvent Rack
4. Connect the long tube from the Online Degas Wash kit to the syringe valve (→ Fig. 17, page 51).
5. Connect the free end of the tube with the Tee piece from the Online Degas Wash kit.
6. Disconnect the tube from the degasser outlet to the pump on the proportioning valve (or pump inlet, depending on the pump type). Reconnect the tube from the degasser outlet to the Tee piece.
7. Connect the Tee piece to the proportioning valve or pump inlet, using the short tube from the Online Degas Wash kit.

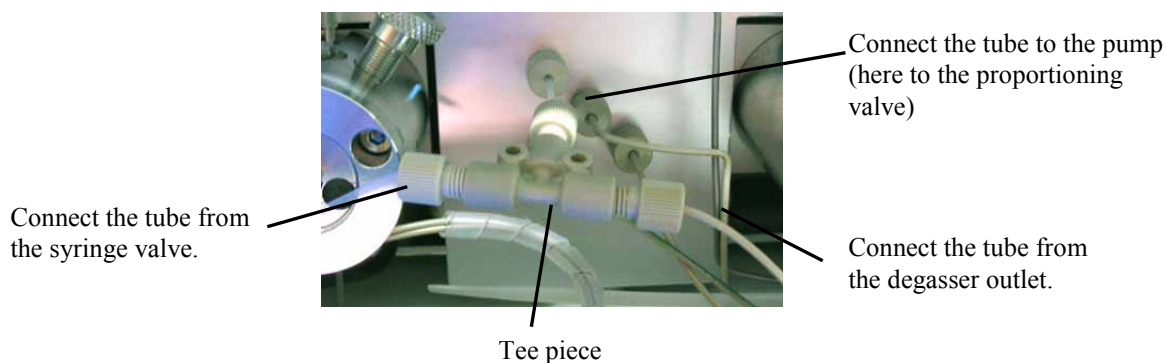


Fig. 18: Example for connecting the wash liquid via the pump

8. Prime the syringe until all air bubbles are gone (→ page 55).

#### 4.4.2 Connecting the Wash Liquid Bottle

If it is not possible to degas the wash liquid online in the UltiMate 3000 system, install the 125 mL wash liquid bottle from the autosampler accessories kit. The wash liquid bottle is installed in the sample compartment. The holding clip on the bottle (→ Fig. 20) is preinstalled at the factory.

1. Fill the bottle with an appropriate wash liquid. Before using the wash liquid, degas it either in an ultrasonic bath or on a continuous basis with a vacuum filtration device.
2. Verify that the wash liquid line is installed in the wash liquid bottle, through the opening in the reservoir cap, and that it extends deep enough into the bottle, preferably to the bottom. (You can easily check this by holding the bottle against the light.)
3. Connect the free end of the line to the syringe valve (→ Fig. 19).

**i Tip:** To prevent air from entering the system, verify that the tube is completely filled with the wash liquid *before* you connect the tube to the syringe valve. To fill the tube with the liquid, cover the ventilation hole in the bottle with your thumb while squeezing the bottle. Pressure builds up in the bottle, thus filling the tube with the liquid.

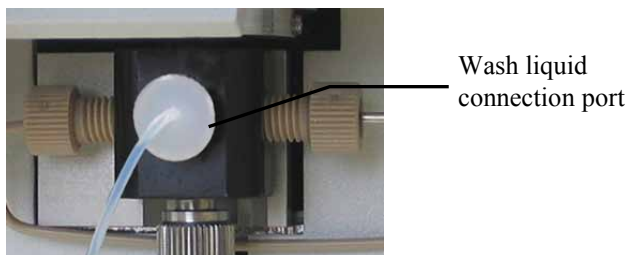


Fig. 19: Wash liquid line connected to the syringe valve

4. Insert the assembly of wash liquid bottle and holding clip into the holder in the sample compartment. The holding clip must lock in place.

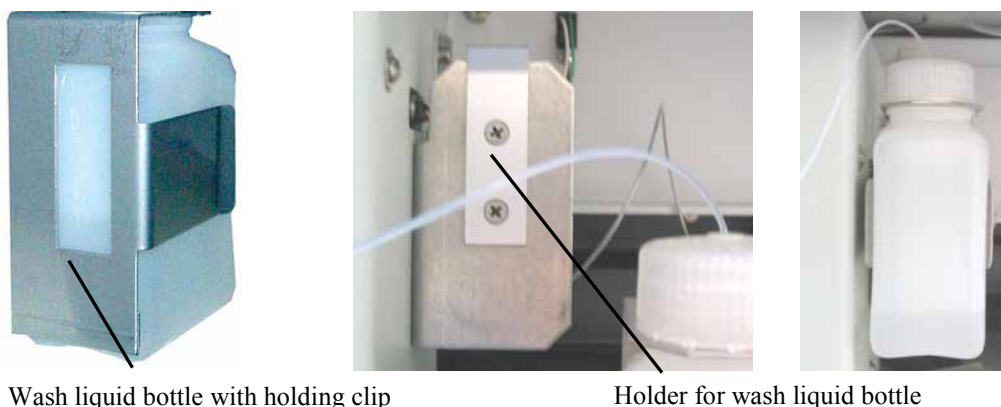


Fig. 20: Installing the wash liquid bottle in the autosampler

5. Prime the syringe until all air bubbles are gone (→ page 55).

To refill the wash liquid bottle or to exchange the wash liquid, hold the bottle including the holding clip and push both parts vertically toward the top (avoid tilting). The holding clip disengages. Remove the bottle with the holding clip from the autosampler.

**i** **Tip:** If more wash liquid is required for your application, connect a longer tube (with flanged end for the valve fitting) and place a larger reservoir beside the autosampler or into the tray of the Solvent Rack. (You can use, for example, the tubing from the Online Wash Degas Kit, which is included in the autosampler accessories kit.) To fill the longer tube, you may have to repeat the priming procedure several times.

## 4.5 Connections on the Syringe Valve

On the syringe valve, verify that the buffer tubing, syringe, wash liquid, and tubing from the syringe valve to the wash port (drainage) are properly connected. If they are not, tighten the connections more.

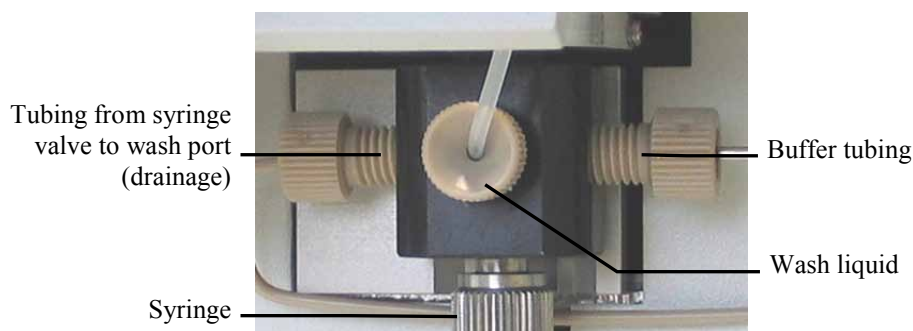


Fig. 21: Connections on the syringe valve

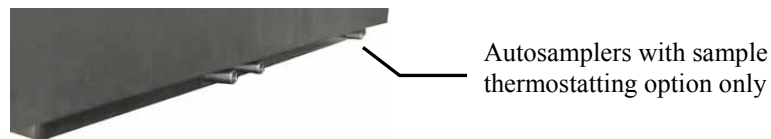
If you tightened the syringe or wash liquid connection, prime the syringe to remove air bubbles trapped in the syringe, syringe valve, and wash liquid lines (→ page 55).

If you tightened the buffer tubing, perform a wash cycle to remove also air bubbles trapped in the buffer tubing. To perform the wash cycle, perform the **Wash** command in Chromeleon. As an alternative, on the autosampler display, show the function keys and select **Wash** or select **Wash** on the **Control** menu.

## 4.6 Connecting Drain Tubing

To discharge liquid leaks and waste, the autosampler has two or three drain ports at the bottom right of the instrument (depending on the autosampler version).

- The autosampler without sample thermostating option has *two* drain ports. The syringe waste, wash waste, and liquid leaks are routed inside the autosampler to the drain ports.
- The autosampler with sample thermostating option has *three* drain ports. The syringe waste, wash waste, and liquid leaks are routed inside the autosampler to the front ports. Condensation that collects in the carousel is routed to the rear port.



*Fig. 22: Drain ports*

Direct liquid leaks to waste via the drain system of the UltiMate 3000 system, using the components from the drain kit. The kit is shipped with the pump of the UltiMate 3000 system and can be ordered separately (part no. 6040.0005). The kit includes all required components and detailed installation instructions.

## 4.7 Removing Air Bubbles from the Syringe (Priming)

Air bubbles in the syringe may considerably affect the measurement results. To prime the syringe and remove air bubbles trapped in the syringe, select one of the following alternatives:

- Prime the syringe from Chromeleon.
- Prime the syringe from the autosampler display.

During the prime cycle, air bubbles trapped in the syringe valve and in the wash liquid lines are removed, also.

### To prime the syringe from Chromeleon

1. In Chromeleon, open the **Commands** dialog box for the autosampler.
2. Under **Sampler**, click **PrimeSyringeNumber**. Enter how often the syringe is filled and emptied during the prime cycle.
3. Execute the **PrimeSyringe** command until the air is completely removed from the syringe (no air bubbles to be seen). Use degassed wash liquid if necessary.
4. If you cannot remove the air from the syringe, see the **Troubleshooting Tip** below.

### To prime the syringe from the autosampler display

1. Show the function keys and select **Prime**.
2. Prime the syringe until the air is removed completely (no air bubbles to be seen). Use degassed wash liquid if necessary.
3. If you cannot remove the air from the syringe, see the **Troubleshooting Tip** below.

### Troubleshooting Tip

1. Remove the syringe as described in Replacing the Syringe (→ page 114).
2. Fill a beaker with wash liquid or a mixture of isopropanol and water (50:50).
3. Place the threaded end of the syringe into the beaker.
4. Push the plunger completely into the syringe body and move the syringe several times rapidly to dislodge any air bubbles that might have gathered at the syringe inlet.
5. Fill the syringe several times completely. Push the plunger up and pull down rapidly with short movements to dislodge the bubbles.
6. Fill the syringe completely. Hold the syringe vertically and push a small amount of liquid out the top to make sure that no air is present.
7. Reinstall the syringe as described in Replacing the Syringe (→ page 114).
8. Perform a wash cycle. Perform the **Wash** command in Chromeleon. As an alternative, on the autosampler display, show the function keys and select **Wash** or select **Wash** on the **Control** menu.

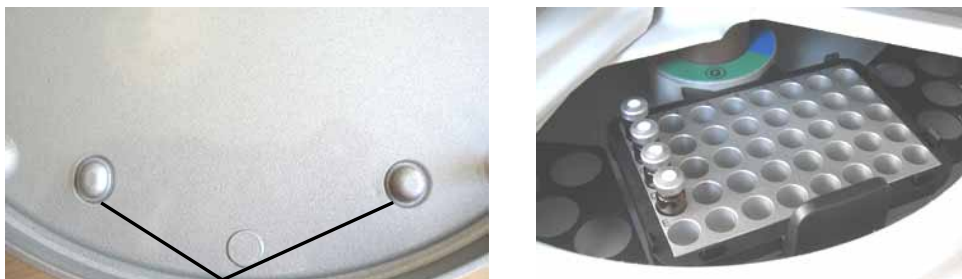


## 4.8 Installing and Loading the Vial Tray

The autosampler is designed to enable easy sample loading. For information about available vial trays, see the table on page 24.

- STOP Warning:** To avoid personal injury, do not reach inside the sample compartment during a running analysis.
- STOP Avertissement:** Afin d'éviter des blessures corporelles, ne mettez pas la main à l'intérieur du compartiment à échantillons lorsqu'une analyse est en cours.

1. Move the carousel cover to the utmost left.
2. Rotate the segment of interest (red, green, or blue) to the front. Select one of the following alternatives:
  - Manually turn the carousel until the segment is in front.
  - Show the function keys and select **Rotate** until the segment is in front.
  - On the **Control** menu, select **Rotate**, and then select **R**, **G**, or **B**.
  - In Chromeleon, open the **Commands** dialog box, select **InitiateChangeVial**, and then click **BlueTray** (or **GreenTray** or **RedTray**) on the **Tray** list.
3. Insert the vial tray in the carousel (→ Fig. 23). Make sure that the pins on the carousel bottom lock in the tray bottom.



Locking pins on the carousel bottom

Fig. 23: Inserting a vial tray

As a standard, each color-coded segment also accommodates one 5-position vial holder for 10 mL vials, such as reagent vials. If you operate the carousel *as an exception without* these holders, be sure to align the positioning bracket of the tray with the right end of the segment color.

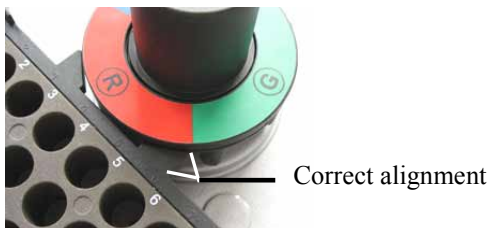


Fig. 24: Vial tray alignment

4. Load the tray with the appropriate vials (→ page 25).
5. Move the carousel cover back to the right until contact is established to the needle arm.
6. *When the autosampler is operated from Chromeleon*
  - a) In Chromeleon, check and change the vial settings for the three segments if necessary (→ page 86). The needle might be damaged if the installed vials do not match the settings in Chromeleon.
  - b) Adapt the **SampleHeight** if necessary (→ page 91). Pay special attention to the information about **SampleHeightOffset** on page 92.

## 4.9 Loading the 5-Position Vial Holder

When the autosampler is shipped, each color-coded segment in the carousel also accommodates one 5-position vial holder for 10 mL vials, for example, reagent vials. Load the holder with the appropriate 10 mL vials (→ page 25).

As an alternative, you can load the holders also with 2 mL vials. In this case, you have to install the adapter (part no. 6820.4092) first.



**Warning:**

To avoid personal injury, do not reach inside the sample compartment during a running analysis.



**Avertissement:**

Afin d'éviter des blessures corporelles, ne mettez pas la main à l'intérieur du compartiment à échantillons lorsqu'une analyse est en cours.

1. Move the carousel cover to the utmost left.
2. Rotate the segment of interest (red, green, or blue) to the front. Select one of the following alternatives:
  - Manually turn the carousel until the segment is in front.
  - Show the function keys and select **Rotate** until the holder is in front.
  - On the **Control** menu, select **Rotate**, and then select **R**, **G**, or **B**.
  - In Chromeleon, open the **Commands** dialog box, select **InitiateChangeVial**, and then click **BlueVials** (or **GreenVials** or **RedVials**) on the **Tray** list.
3. Load the holder with the appropriate vials (10 mL or 2 mL) (→ page 25).
4. Move the carousel cover back to the right until contact is established to the needle arm.

5. *If the autosampler is operated from Chromeleon*

Check and adapt the **SampleHeight** if necessary (→ page 91). If you are using 2 mL vials, you *have* to adapt the value for **SampleHeightOffset\_T** (→ page 92) to avoid damage to the needle.

When loading the vial holder, install vials of the same type in all five positions.

## 4.10 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.

Perform system equilibration in Chromeleon or select the required commands and parameters on the front panel menus of the instruments.

### To equilibrate the system from Chromeleon

- Select and perform the operating commands and parameters from the **Commands** dialog box.
- Create and run an equilibration program to automate the process (→ page 71).
- Use the SmartStartup Wizard to create and run the equilibration program (see below).

### To create the equilibration program with the SmartStartup Wizard

The SmartStartup Wizard in Chromeleon guides you through the process of creating and running an equilibration program.

1. To open the wizard, select **SmartStartup** on the **Batch** menu.
2. Follow the instructions as they appear on each page of the wizard. For additional information about a page, click **Help**.
3. After you finish the wizard, Chromeleon
  - ◆ Generates an equilibration program and sequence.
  - ◆ Opens the equilibration control panel for the instruments in the timebase (→ Fig. 25, page 61).
  - ◆ Opens the **Start Batch on** dialog box.

Click **Start** to begin equilibration.

The equilibration panel shows the equilibration status of each instrument in the system.

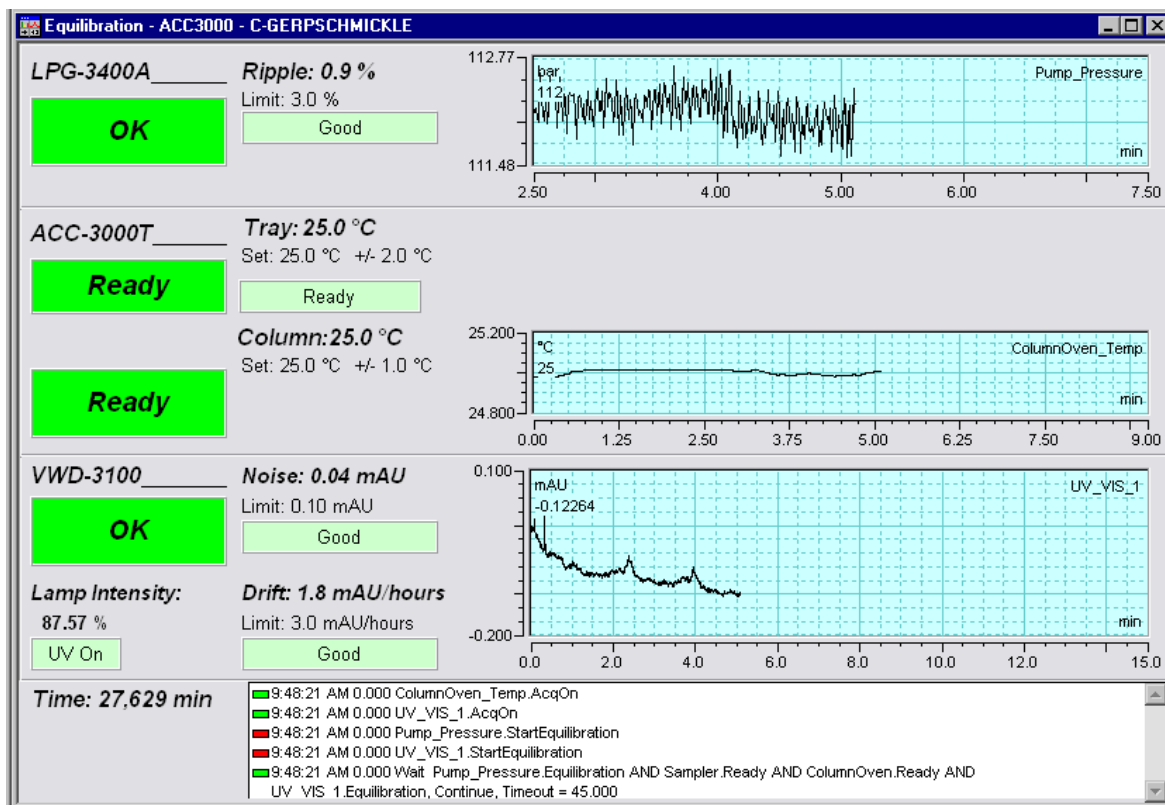


Fig. 25: Equilibration panel

### To equilibrate the system from the front panel menus

Select and perform the operating commands and parameters on the front panel menus of the instruments. For information about the autosampler menus, see section 5.5.2 (→ page 75). For information about the menus of other system modules, see the *Operating Instructions* for the module.



## 5 Operation and Maintenance

The autosampler can be controlled from the Chromeleon Chromatography Management System. For details, see section 5.4 (→ page 67).

In addition, function keys and menus on the autosampler display allow you to perform certain actions directly from the autosampler, for example during initial installation or for diagnostics and maintenance work. For example, you can

- Perform certain functions (rotate the carousel)
- Execute certain commands (wash, approach service positions)
- Set parameters (leak sensor mode, target temperatures for column and sample thermostating)
- View diagnostic information
- View and change the autosampler configuration

For details, see section 5.5 (→ page 73).

### 5.1 Power-Up

To start the autosampler for the first time, turn on the main power switch on the rear panel of the autosampler. The following sequence of events occurs when the autosampler is powered up:

- For a short time, general information about the autosampler appears on the autosampler display: device type, serial number, bootloader and firmware versions.
- The autosampler runs a series of internal tests. During these self-diagnostics, all of the main components are checked. When testing is complete and has been successful, the initial screen changes to the status screen (→ page 64).
- If an error is detected, the autosampler is not ready for analysis. The **Status** LED on the front panel changes to red and a message appears on the autosampler display. If the autosampler is operated from Chromeleon, the message is also logged in the Chromeleon Audit Trail. Turn off the autosampler, take appropriate remedial action (→ page 99), and turn on the autosampler again.

For routine operation, leave the main power switch on. For routine on/off control, use the standby button on the front of the autosampler (→ page 21). Press and hold the button for one second to allow the autosampler to change the mode. Turn the main power switch off when instructed to do so, for example, before performing a service procedure.

## 5.2 Status Screen

When the self test was successful, the initial screen changes to the status screen.

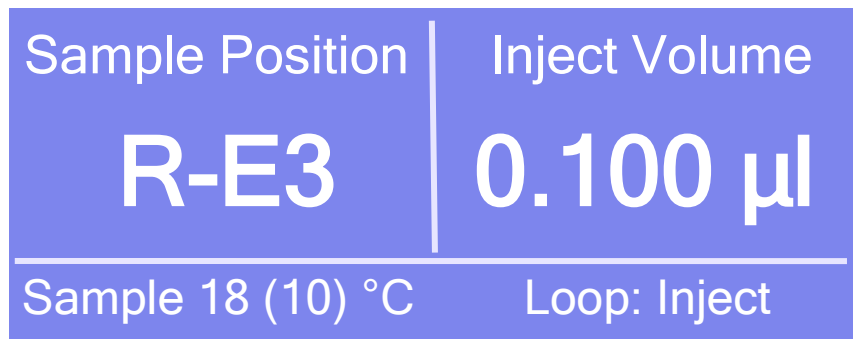


Fig. 26: Status screen

The status screen shows the following information:

- Sample position  
For information about the sample position, see page 65.
- Injection volume
- Actual temperature and target temperature (in brackets) for
  - ◆ column thermostating (= oven)
  - ◆ *ACC-3000T only*  
sample thermostating (= sample)  
The oven and sample temperatures appear alternately on the screen.
- Valve position (Loop: Inject or Load)

You can adapt the screen brightness and contrast to your requirements if necessary (→ page 88).



### 5.3 Sample Positions

The segments in the carousel are color-coded: R for red, G for green, and B for blue. This information is part of the sample position.

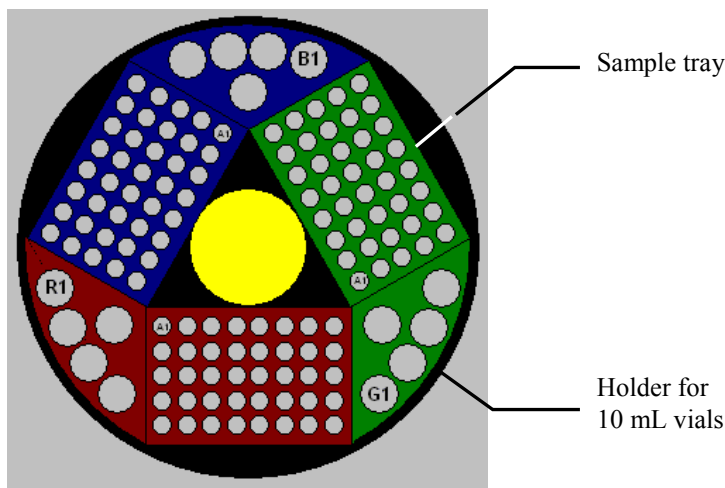


Fig. 27: Sample position (here: rack preview from Chromeleon)

For details about the vial positions on a tray, see below. For information about the positions in the 5-position vial holder, see page 66.

**Tip:** The autosampler supports automatic vial detection. For details, see page 93.

#### Sample Positions on the Vial Tray

The character defining the segment that accommodates the vial comes first (R, G, or B), followed by a letter and a digit, as in a system of coordinates. The letters specify the individual rows from the inner to the outer row. The digits specify the position of the sample in the row. The numbering is from the left to the right.

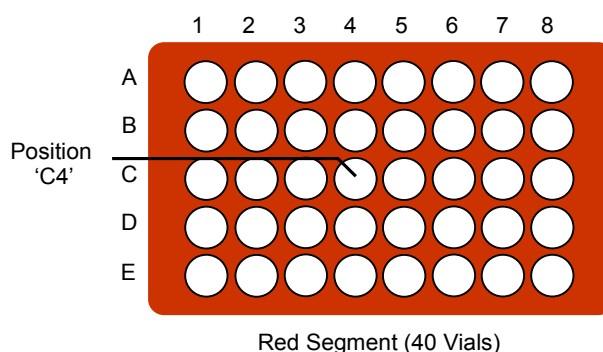


Fig. 28: Example for sample numbering (here: 40-vial tray)

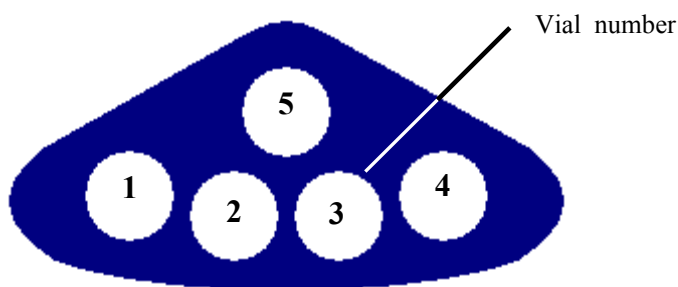
**Example**

Sample position R-C4 (RC4 in Chromeleon) indicates that the vial is in the

- red segment (R)
- third row (C) in the segment
- fourth position from the left (4) in the row

**Positions in the 5-Position Vial Holder**

For the 10 mL vials, the character defining the segment that accommodates the vial comes first (R, G, or B), followed by a digit (1-5).



*Fig. 29: Positions in the 5-position vial holder*

**Example**

Position B3 indicates that the vial is in the

- blue segment (B)
- third hole (3)

## 5.4 Operation from Chromeleon

Before you begin, verify that


1. The Chromeleon software is installed on the computer and the license code is entered.
2. The autosampler is connected to the Chromeleon computer via a USB connection.
3. The autosampler is set up in Chromeleon (→ page 37).

Before you can operate the autosampler from Chromeleon, you have to connect the timebase in which the autosampler is installed to the Chromeleon client program (→ page 67).

Two modes of software control are available:

- *Direct control* with the parameters and commands in the **Commands** dialog box (F8 box) or on a control panel (→ page 68)
- *Automated control* with a control program (PGM) (→ page 71)

### 5.4.1 Connecting to Chromeleon

1. Start the Chromeleon **Server Monitor** and the Chromeleon server if they are not already running (→ page 37).
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. For details about how to do this from the **Commands** dialog box, see page 68. For details about how to do this on a control panel, see page 69.

When the autosampler is correctly connected to Chromeleon:

- The **Connected** LED on the front panel is green.
- Front panel input is disabled. However, it is still possible to rotate the carousel via the **Rotate** key.

- Functions for estimating the lifetime of consumables and monitoring and recording service and (re)qualification information are provided (→ page 90).
- The **Standby** button on the front panel remains active.


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

### 5.4.2 Direct Control

With direct control, you select operating parameters and commands in the **Commands** (F8) dialog box. Direct commands are executed as soon as they are entered. For routine operation, most parameters and commands are available also on a control panel.

#### To open the Commands dialog box for the autosampler

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 vary, depending on the

- ◆ Chromeleon version
- ◆ Options selected in the **Properties** dialog for the autosampler (→ page 40)
- ◆ 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.

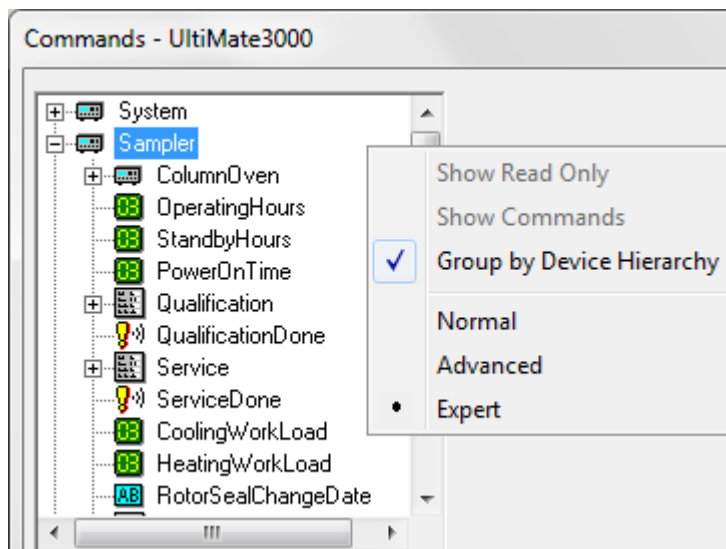


Fig. 30: Commands dialog box

6. Verify that the autosampler is connected to Chromeleon. If it is not, select **Connect** to connect the autosampler.

For a list of the commands and properties that are supported for the autosampler, see the *Chromeleon Help*. 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.

### 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 (→ Fig. 31, page 70), 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 Column Compartment** page (→ Fig. 31).

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

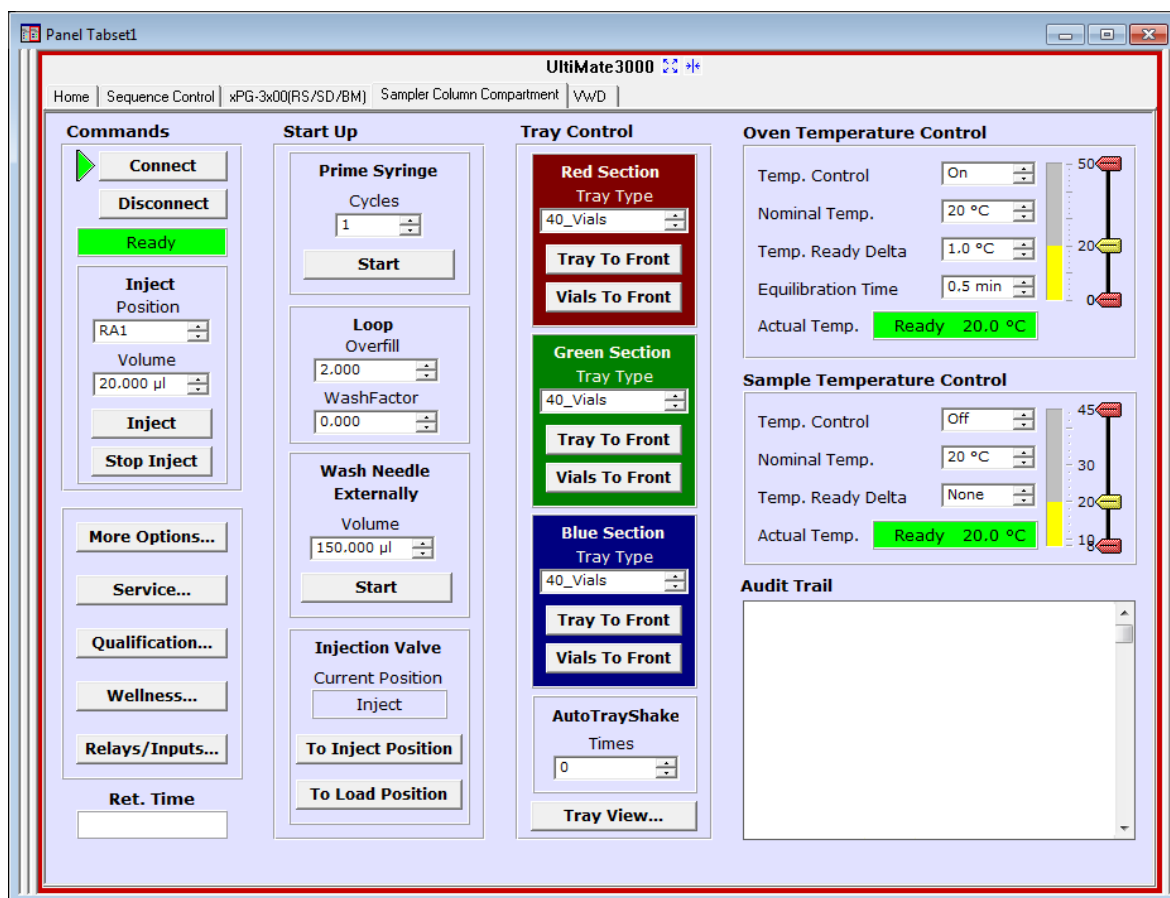


Fig. 31: Autosampler Control Panel on the Panel Tabset

The control panel provides access to the operating parameters and commands required for routine operation of the autosampler. Additional functions are available in the **Commands** dialog box. To open the **Commands** box from the panel tabset, select **Command** on the **Control** menu.

### 5.4.3 Automated Control

With automated control, you create a program file (PGM) for automated operation of the autosampler. Programs can be created automatically with the help of a software wizard or manually by editing an existing program.

In addition to programs for sample analysis, you can also create programs for special purposes, for example, to automate system shutdown (→ page 95) or to ensure that the system automatically restarts operation as desired after a power failure. For details, see the *Chromeleon Help*.

#### 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, accept or change the settings as appropriate. For additional information about a page, click **Help**.

2. After you finish the wizard, Chromeleon automatically creates the corresponding program.
3. To start the program, follow the steps on page 72.

#### To create a program manually

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.

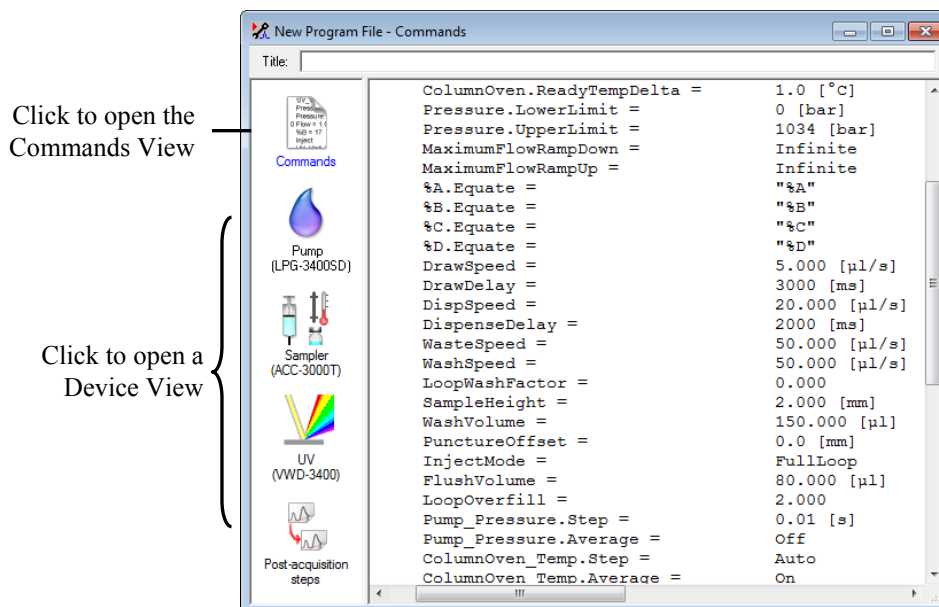


Fig. 32: Chromeleon program file (here: program shown in the Commands view)

2. Change the program settings as needed.

The easiest way is to edit a program in the Device Views (→ Fig. 32). 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**

#### *Program for sample analysis*

1. Create a sample list (sequence). A sequence must include the program and a method for evaluating the sample data (for example, for peak identification, area determination, and amount determination).
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*.

#### *Other programs*

Add the program to the batch and start the batch.



## 5.5 Display Screens (Function Keys and Menus)

Via the function keys and menus that are available on the autosampler display, you can make settings or execute commands directly from the autosampler.

For information about the function keys, see section 5.5.1 and page 76. For information about the menus, see section 5.5.2 (→ page 75).

### 5.5.1 Showing the Function Keys

Four white spots on the front panel mark the positions of four function keys: **Menu**, **Rotate**, **Wash**, and **Prime**. To show the keys, touch the position of the utmost left spot on the autosampler display with the menu pen (part no. 6300.0100). The menu pen is included in the autosampler shipment.



Fig. 33: Showing the function keys

The function keys replace the information in the bottom line of the status screen. If no key is selected, the bottom line of the status screen is restored after about 5 seconds.

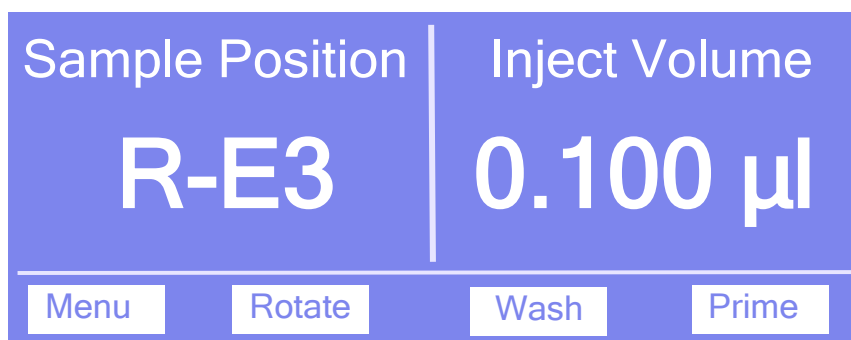


Fig. 34: Function keys

To ...	Select ...
Open the <b>Main</b> menu (→ page 77).	Menu
Rotate the carousel to the next segment. The needle withdraws from the vial first if necessary.	Rotate
Start a wash cycle. The needle is rinsed with the wash liquid (from both the inside and outside). The wash volume is the volume specified under <b>Wash</b> on the <b>Control</b> menu (→ page 78).	Wash
Remove air bubbles from the syringe valve and syringe. During the prime cycle, liquid is drawn and dispensed several times. For more information about how to prime the syringe, see section 4.7 (→ page 56).	Prime

Front panel input is disabled when the autosampler is connected in Chromeleon. However, you can still rotate the carousel via the **Rotate** key.

## 5.5.2 Autosampler Menus

Fig. 35 shows an overview of the autosampler menus. For information about the general menu layout and structure, see page 76. For information about the commands and parameters that are supported by the menus, see sections 5.5.2.2 through 5.5.2.6 (→ page 77 and following pages).



Fig. 35: Autosampler menus (here ACC-3000T)

### 5.5.2.1 General Menu Layout and Structure

In general, the menu layout is as follows:

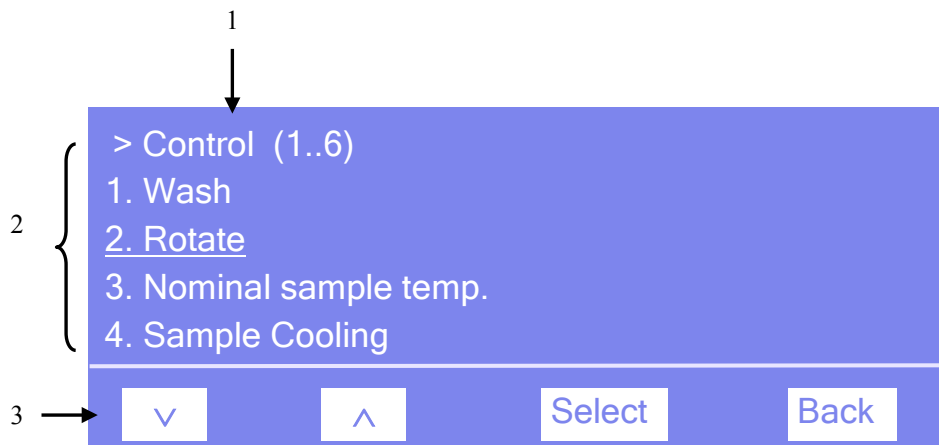


Fig. 36: Menu layout (here: Control menu)

No.	Description
1	Shows the menu name and the number of items on the menu list.
2	The menu items appear on a list and are numbered consecutively. The selected item is underlined.
3	Navigation bar

Select an item with the arrow up or down key—the selected item is underlined. Confirm your selection with **Select**. **Back** returns you to the previous menu level. The selected menu item or parameter determines which keys appear on the navigation bar:

To ...	Select...
Return to the previous entry on a list. If the list contains 5 or more items, you can use the arrow up key to scroll up through the list, after reaching the first line (→ <b>Key autorepeat</b> , page 80).	^
Increment numerical values.	^
Proceed to the next entry on a list. If the list contains 5 or more items, you can use the arrow down key to scroll down through the list, after reaching the fourth line (→ <b>Key autorepeat</b> , page 80).	∨
Proceed to the next figure in a number. Any decimal point is skipped.	>
Confirm the selection and activate the input field if applicable. If an item is read-only, the <b>Select</b> key will not be available.	Select
Return to the previous menu level.	Back
Perform the command.	Execute
Confirm the selection or input.	OK
Cancel the action and restore the last value.	Cancel
<b>Note:</b> Depending on the selected option, specific keys may replace these general keys.	

If an error is found, one or more messages appear on the autosampler display. In this case, the **Prev**, **Next**, and **Clear** keys appear on the navigation bar.

To ...	Select ...
Return to the previous message.	Prev
Proceed to the next message.	Next
Remove the message from the display.	Clear

### 5.5.2.2 Main Menu

The **Main** menu provides top-level access to the menu structure. To open the **Main** menu, show the function keys and select **Menu** (→ page 73).

From the **Main** menu, you can open the following menus:

- **Control**  
On the **Control** menu, you can make the different settings for autosampler operation (→ page 78).
- **Maintenance**  
On the **Maintenance** menu, you can make the settings required for the maintenance procedures and perform the related commands (→ page 78).
- **Diagnostics**  
The **Diagnostics** menu provides information for diagnostic purposes (read-only). In addition, you can perform a self-test for the autosampler (→ page 79).
- **Configuration**  
The **Configuration** menu provides information about the autosampler configuration and allows you to make the required settings or perform the related commands (→ page 80).

The autosampler type determines which commands and parameters are available on the menus.

### 5.5.2.3 Control Menu

On the **Control** menu, you can make different settings for autosampler operation.

You can specify the wash volume, start a wash cycle, and rotate the carousel to move the segment of interest to the front. In addition, you can set the target temperatures for sample thermostating (ACC-3000 only) and column thermostating/eluent preheating and turn the related functions on and off.

To ...	Select ...
Specify the wash volume and start the wash cycle. The needle is rinsed with the wash liquid (from the inside and from the outside).	Wash
Select a segment (R = red, G = green, B = blue) and move it to the front. The vial tray and the 5-position holder of this segment are alternately moved to the front. The needle is withdrawn from the vial first if necessary.	Rotate
Set the temperature for sample thermostating.	Nominal sample temp.
Turn sample thermostating on or off.	Sample cooling
Set the temperature for column thermostating.	Nominal oven temperature
Turn column thermostating on or off.	Oven

### 5.5.2.4 Maintenance Menu

On the **Maintenance** menu, you can make the settings required for the maintenance procedures and perform the related commands.

To ...	Select ...
Move the syringe up or down. In addition, the volume that is in the syringe is displayed.	Syringe
Move the needle down or into the maintenance position.	Needle position
Set the position to which the wash liquid is directed.	Dispense destination
Switch the injection valve into the selected position (Inject or Load).	Inject valve

### 5.5.2.5 Diagnostics Menu

The **Diagnostics** menu provides information for diagnostics purposes (read-only). In addition, you can perform a self test.

To ...	Select ...
Start self-diagnostics. If an error or mechanical fault is detected, the <b>Status</b> LED on the front panel changes to red and a message appears on the front panel display.	Self test
See the current sample temperature.	Real sample temperature
See the coolant temperature.	Coolant temperature
See the heat sink temperature.	Heat sink temperature
See the load of cooling power (in per cent).	Cooling power
See the load of the cooling pump (in per cent).	Coolant pump power
See the load of the fan (in per cent).	Fan power
See the current temperature in the column chamber.	Real oven temperature
See the autosampler model.	Model
See which firmware version is installed.	Firmware version
See the bootloader version.	Bootloader version
See the serial number of the autosampler.	Serial number

### 5.5.2.6 Configuration Menu

The **Configuration** menu provides information about the autosampler configuration and allows you to make the required settings or change the settings.

To ...	Select ...
<p>Set the display and key parameters:</p> <p><b>Brightness</b>—sets the screen brightness. The input is in per cent.</p> <p><b>Contrast</b>—sets the screen contrast. The input is in per cent.</p> <p><b>Key sound</b>—sets whether an acoustic beep sounds when you select a key:</p> <p><b>On</b>—yes or <b>Off</b>—no.</p> <p><b>Key autorepeat</b>— sets whether the keystroke is automatically repeated when you remain on a key for a longer period, for example, to change a value quickly (<b>On</b> = yes or <b>Off</b> = no).</p>	Display & soft keys
<p>Set whether leak detection is performed and how you are alerted in case of an alarm:</p> <p><b>Enabled</b>—activates leak detection. When a leak is detected, a message appears on the autosampler display and a beep sounds.</p> <p><b>Silent</b>—activates leak detection. When a leak is detected, a message appears on the autosampler display, but no beep sounds.</p> <p><b>Disabled</b>—deactivates leak detection.</p>	Leak sensor mode
Specify which vials are installed in the related segment.	Red (Green, Blue) tray
<p>Restore the factory settings.</p> <p>In the <b>Reset to factory defaults?</b> dialog box, select <b>OK</b> to confirm the restore or select <b>Cancel</b> to keep your settings.</p>	Reset to factory defaults



## 5.6 Settings for Operating the Autosampler

This section provides information about settings and functions that should be considered for operating the autosampler:

Operational Settings	See page
Setting the injection mode	See further down
Linking the autosampler to the pump	83
Synchronizing the Inject command with the pump strokes	83
Turning on column thermostating	84
Turning on sample thermostating	85
Changing the carousel configuration	86
Setting the injection parameters and starting the injection	86
Detecting liquid leaks	88
Adjusting the screen brightness and contrast	88
Wash cycle	89
SmartStartup and SmartShutdown	89
Recommendations for operation	89

Note also the special functions that are available in Chromeleon (→ page 90).

### 5.6.1 Setting the Injection Mode

The autosampler supports the full-loop and partial-loop injection modes. Select the injection mode in Chromeleon. To set the injection mode from the Commands dialog box, follow the steps below. The required parameters are available also in the program wizard and on the control panel for the autosampler.

1. Open the program wizard (→ page 71).
2. On the **Sampler Options** page, select the injection mode from the **Inject Mode** list. Select **FullLoop** or **Partial**.

**Full-loop injections** provide maximum reproducibility as the sample loop is completely filled with sample. The required amount of sample is

$$\text{FlushVolume} + \text{Volume} \times \text{LoopOverflow}$$

With **Partial loop injections**, less sample is required as the sample loop is filled with sample only partially. In addition, the injection volume is freely selectable and variable without the need of installing a sample loop with a different volume. The required amount of sample is

$$\text{FlushVolume} + \text{Volume}$$

Parameter	Description
FlushVolume	Sets the flush volume. The default volume is 80 µL. Smaller flush volumes can be programmed, but this may result in decreased accuracy. Flush volumes < 40 µL should not be used.
Volume	Sets the injection volume. For full-loop injections, <b>Volume</b> is the volume of the sample loop.
LoopOverfill (for full-loop injections only)	Determines the volume that is drawn through the loop prior to injection. The default factor is 2, which means that the loop is flushed once and then filled.

3. The parameters listed in the table are preset to default values for the different sample loops. The default values are optimized for water as solvent. If you use a different solvent, check and change the parameters as required by your application.

Parameter	Description	Default Values for Sample Loops With a Volume of	
		20 µL, 50 µL	200 µL
DispSpeed	Sets the speed of the syringe used for dispensing the sample	20 µL/s	20 µL/s
DrawSpeed*	Sets the speed of the syringe used for drawing the sample	5 µL/s	10 µL/s
DrawDelay	Sets the time that the needle remains in the vial after drawing the sample	3 ms	3 ms
WashSpeed	Sets the speed of the syringe for the wash cycle	50 µL/s	50 µL/s
WasteSpeed	Sets the speed of the syringe used for expelling liquid to the waste.	50 µL/s	50 µL/s
PunctureOffset	The carousel moves by the specified value while the needle is in the septum, enlarging the hole in the septum and equalizing the pressure. This is especially important for vials with unslitted septa and with large injection volumes.	Not applicable	3 mm

\* Higher values as possible, depending on the gas content of the sample and the injection mode.

For information about the distribution of the liquids and the switching sequence, see page 143 for full-loop injections or to page 144 for partial loop injections.

### 5.6.2 Linking the Autosampler to the Pump

If the UltiMate 3000 system includes an UltiMate 3000 series pump, you can link the autosampler with the pump that delivers the flow in which the sample is injected. If the pump is a DGP-3600 or LPG-3400 low-pressure gradient pump, synchronization of the injection command with the strokes of the pump will be available (→ section 5.6.3).

In the **Server Configuration** program, select the pump to which the autosampler is linked by default.

1. Start the **Server Configuration** program (→ page 39).
2. Right-click the autosampler in the timebase and select **Properties** on the menu.
3. On the **Segments / Pump Link** page, on the **Flow through sampler is delivered by pump(s)** list, select the pump to which the autosampler is linked (→ page 42). This is the standard setting.

### 5.6.3 Synchronizing the Inject Command with the Pump Strokes

*Only when the UltiMate 3000 system includes a DGP-3600 or LPG-3400*

Synchronization of the injection command with the strokes of the pump will be possible only when you link the autosampler to a DGP-3600 or LPG-3400 pump in the Chromeleon **Server Configuration** program (→ section 5.6.2). Synchronization ensures that all injections are performed at the same phase of the pump cycle, enhancing considerably the retention time precision with gradient applications.

In the **Commands** dialog box, in a program, or on the control panel for the autosampler (under **More Options**), you can then set whether you want or do not want to use synchronization and you can select a different pump.

- Set **SyncWithPump** to **Off** if you do not want to use synchronization.
- **Pump Device** shows the name of the pump with which synchronization will be performed. If you want to use a different pump, type the name of the pump in the input field. (Use the name specified for the pump in the Server Configuration program.) Verify that **SyncWithPump** is set to **On**.

### 5.6.4 Turning On Column Thermostatting

Turn column thermostatting on and off and set the temperature in Chromeleon or on the autosampler display.

#### To turn on column thermostatting from Chromeleon

1. Open the **Commands** dialog box for the autosampler.
2. Select **ColumnOven** and **Temperature**.
3. Under **Nominal**, enter the temperature. Entering a temperature sets **TempCtrl** to **On** if it is not yet on.

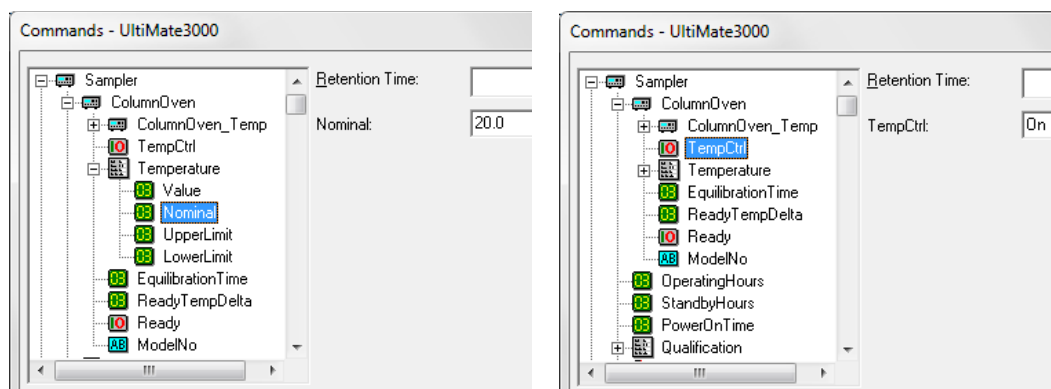


Fig. 37: Turning on column thermostatting

If you do not want to use column thermostatting for a certain application, set **TempCtrl** to **Off**.

If you want to activate column thermostatting later again, set **TempCtrl** to **On**. When you change the temperature setting under **Nominal**, Chromeleon sets **TempCtrl** automatically to **On**.

#### To turn on column thermostatting from the autosampler display

1. Select the **Control** menu.
2. Select **Nominal oven temperature** and enter the temperature.
3. To turn on column thermostatting, select **Oven** and **On**.

Set **Oven** to **Off** if you want to work without column thermostatting later again.

### 5.6.5 Turning On Sample Thermostatting

*ACC-3000T only*

Turn sample thermostatting on and off and set the temperature in Chromeleon or on the autosampler display.

#### To turn on sample thermostatting from Chromeleon

1. Open the **Commands** dialog box for the autosampler.
2. Select **Temperature**, and then select **Nominal** and enter the temperature.  
Entering a temperature sets **TempCtrl** to **On** if it is not yet on.

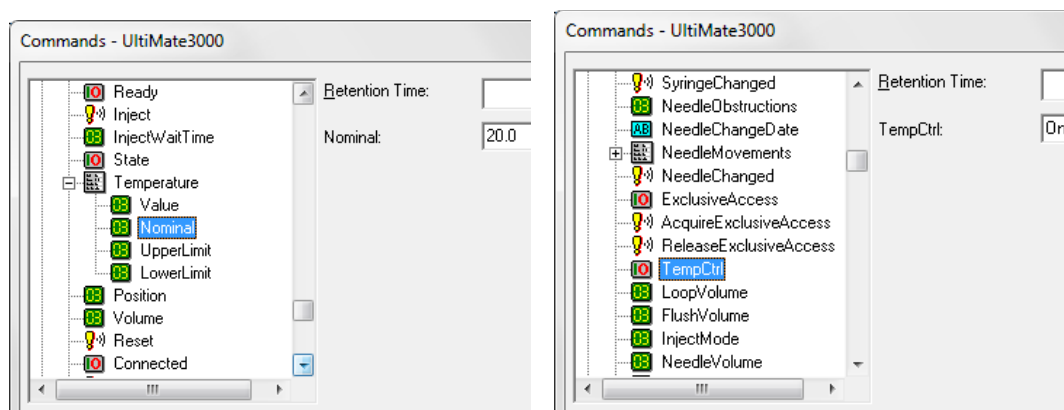


Fig. 38: Turning on sample thermostatting

If you do not want to use sample thermostatting for a certain application, set **TempCtrl** to **Off**.

If you want to activate thermostatting later again, set **TempCtrl** to **On**. When you change the temperature setting under **Nominal**, Chromeleon sets **TempCtrl** automatically **On**.

#### To turn on sample thermostatting from the autosampler display

1. Select the **Control** menu.
2. Select **Nominal sample temperature** and enter the temperature.
3. To turn on sample thermostatting, select **SampleCooling** and **On**.

If you want to work without sample thermostatting later again, set **SampleCooling** to **Off**.

### 5.6.6 Changing the Carousel Configuration

During initial installation of the autosampler in Chromeleon, the standard configuration of the carousel is specified on the **Segments / Pump Link** page in the Chromeleon **Server Configuration** program. If you later install different vials, you have to update the settings in Chromeleon accordingly:

- *If you want to update the standard configuration*  
Update the settings on the **Segments / Pump Link** page in the Chromeleon Server Configuration program (→ page 42).
- *If you do not want to change the standard configuration, update the settings in the Chromeleon Client program.*

Select one of the following alternatives:


- ◆ Open the **Commands** dialog box, select **RedTray**, **GreenTray**, or **BlueTray**, and click the new vials on the input list.
- ◆ Open the control panel for the autosampler. Under **Red Section**, **Green Section**, or **Blue Section**, click the new vials on the **Tray Type** list.

If the settings in Chromeleon do not match the installed vials, the needle may be damaged.

### 5.6.7 Setting the Injection Parameters and Starting the Injection


You can execute the inject command from Chromeleon either manually or as part of a program. The autosampler reports to Chromeleon when injection is complete.

#### To execute the inject command manually

 **Tip:** First, verify that the injection mode is set to either **Partial** or **FullLoop**. You can check and change this setting if necessary in the **Commands** dialog box (click **Inject Mode**) or on the control panel for the autosampler (click **More Options** and see **Inject Mode** under **General / Injection**).

Select one of the following alternatives to enter the injection parameters and start injection:

- **Commands** dialog box  
Select **Inject**. Click **Position** and enter the sample position. Click **Volume** and enter the volume for the injection. To start the injection, click **Execute**.

- Control panel for the autosampler  
Under **Inject**, enter the sample position and volume for the injection. To start the injection, click **Inject**.
- **Control** menu or **Online** taskbar  
*The Control menu and the Online taskbar are available only when a control panel is open and connected to the timebase in which the autosampler is installed.*  
Select **Inject** on the **Control** menu or click the **Inject** icon  on the **Online** taskbar. Enter the sample position and injection volume in the dialog box. To start the injection, click **OK**.

### To include the Inject command in a program

To perform an injection from a program, the program must include the following line

```
0.000 Inject
```

indicating that the inject command is performed at the retention time of 0.000 minutes. When you create the program with the Program Wizard (→ page 71), the **Inject** command is included automatically.

Specify the sample position and volume for the injection in the sequence and start the program (→ page 72).

### 5.6.8 Detecting Liquid Leaks in the Autosampler

Activate and deactivate leak detection in Chromeleon or on the autosampler display. Leak detection does *not* abort the running analysis.

#### To turn on leak detection from Chromeleon

1. Open the **Commands** dialog box for the autosampler.
2. Under **LeakSensorMode**, select **Enabled** or **Silent**.

**Enabled**—activates leak detection. When the leak sensor reports a leak

- ◆ the **Status** LED on the autosampler display changes to red.
- ◆ a message appears in Chromeleon and on the autosampler display.
- ◆ a beep sounds.

**Silent**—activates leak detection. When the leak sensor reports a leak

- ◆ the **Status** LED on the autosampler display changes to red.
- ◆ a message appears in Chromeleon and on the autosampler display (no beep sounds).

**Disabled** deactivates leak detection.

#### To turn on leak detection from the autosampler display

1. Show the function keys and select **Menu**.
2. Select the **Configuration** menu and select **Leak sensor mode**.
3. Select **Enabled**, **Silent**, or **Disabled**. (For details, see further up in this section.)

### 5.6.9 Adjusting the Screen Brightness or Contrast

You can adjust the screen brightness or screen contrast to your requirements on the autosampler display or from Chromeleon.

- In Chromeleon, open the **Commands** dialog box for the autosampler (→ page 68). Select **Brightness** and change the value for the screen brightness and/or select **Contrast** and change the value for the screen contrast as appropriate.
- On the autosampler menu, select the **Configuration** menu and then select **Display & soft keys** (→ page 80). Select **Brightness** and change the value for the screen brightness and/or select **Contrast** and change the value for the screen contrast as appropriate.



### 5.6.10 Wash Cycle

During the wash cycle, the needle is rinsed from the inside with the volume specified under **WashVolume**. (To ensure a proper wash cycle, set WashVolume to a value > 0.) During the wash cycle, the needle descends into the wash port. In this way, the needle is also rinsed from the outside.

When the autosampler is operated from Chromeleon, a wash cycle is performed automatically after each injection. In addition, you can start a wash cycle manually (→ page 120).

Thermo Fisher Scientific recommends using degassed wash liquid. Observe the instructions for connecting the wash liquid (→ page 51).

### 5.6.11 SmartStartup and SmartShutdown

The **SmartStartup** wizard (→ page 60) assists you in automating regular routine tasks. With SmartStartup, the different modules of the UltiMate 3000 system are turned on automatically and in a controlled manner. With the autosampler with sample thermostating option, for example, the carousel and all its components are heated or cooled to the selected temperature. In addition, SmartStartup can purge the pump of the HPLC system automatically, flush the column, and perform system equilibration. Important module parameters are monitored. When the modules operate within these limits, the sample sequence, which was set up before, can be started automatically. SmartStartup can be used at any time.

If you have to interrupt system operation, use the **SmartShutdown** wizard to create a program to set the HPLC system into standby mode or to automate shutdown of the system (→ page 95).

### 5.6.12 Recommendations for Operation

Perform the following actions at regular intervals, especially after longer periods of autosampler inactivity:

- Check whether gas bubbles are present in the syringe. Prime the syringe if necessary (→ page 56).
- Perform a wash cycle.  
Perform the **Wash** command in Chromeleon. As an alternative, on the autosampler display, show the function keys and select **Wash** (→ page 73) or select **Wash** on the **Control** menu (→ page 78).

## 5.7 Special Chromeleon Functions

This section provides a short overview of some special functions that are available for the autosampler in Chromeleon.

To learn more about ...	See page ...
Predictive Performance	See further down
Defining the needle height (Sample Height)	91
Moving the tray before drawing the sample (Tray Shake)	93
Venting the vial	93
Operational Qualification and Performance Qualification	93
Automatic Tray Test	93
Automatic vial detection	93

These functions are available in the **Commands** dialog box (unless otherwise noted). In addition, some functions are available also on the control panel for the autosampler. For additional information about a function, see the *Chromeleon Help*.

### 5.7.1 Predictive Performance

Predictive Performance provides various functions for estimating the lifetime of consumables and monitoring and recording service and (re)qualification information.

#### Commands Dialog Box

Open the **Commands** dialog box (→ page 68) and enter the limits for the predictive performance parameters. For a complete list of available commands and parameters, see the *Chromeleon Help*. To keep the predictive performance information up-to-date, perform the following commands:

After you have ...	Perform the following command ...
Replaced the needle	NeedleChanged
Replaced the rotor seal	RotorSealChanged
Replaced the syringe	SyringeChanged
Serviced the autosampler (for example, annual maintenance)	ServiceDone
Performed instrument qualification	QualificationDone

These commands reset the related counters and update the information when the action was performed.

## Control Panel

To see the predictive performance commands and parameters from the control panel for the autosampler, click **Wellness**, **Qualification**, and **Service**. On these sub-panels, you can enter the limits and reset the counters. In addition, wellness bars provide visual indicators of qualification and service periods. The color-coding of the wellness bars provides information about the status:

Color	Description
Green	OK.
Yellow	The value will soon reach the specified limit and/or the related component needs servicing or should be replaced soon.
Orange	(Only for monitoring Qualification properties) The value has reached the specified limit. However, a Grace Period has been specified during which the component may still be operated.
Red	The value has reached the specified limit or the specified grace period has expired. Replacement, servicing, or qualification of the component is overdue. The component can no longer be operated and it is not possible to start a batch.

In addition, a message appears in the Chromeleon Audit Trail when a limit has been reached.

### 5.7.2 Defining the Needle Height (Sample Height)

The **SampleHeight** parameter specifies the distance (in mm) between the bottom of the vial, as measured from the interior, and the tip of the needle. This value defines how deep the needle descends into the vial for sampling.

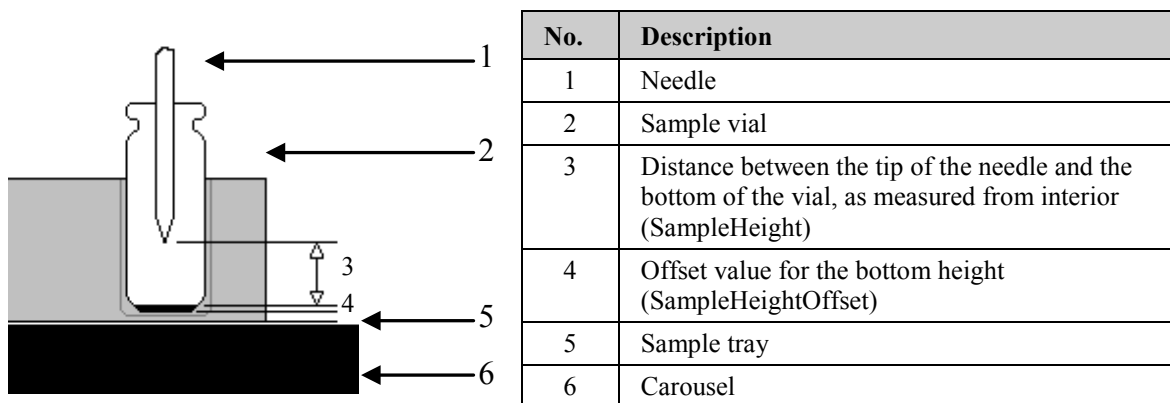


Fig. 39: Defining the needle height

With **SampleHeight = 0**, the needle reaches the bottom of the vial. However, different vial types may have different absolute bottom heights. Thus, the needle may unintentionally hit the bottom of the vial when you switch from one vial type to another. The needle may be damaged. The needle tip is fragile and can easily be deformed.


To allow you to use the same sample height setting for all supported vial types, sample height offset values are available for each vial type (→ tables below). When the needle descends into a specific sample container, Chromeleon considers this offset, based on carousel configuration. With these default values, the needle does not touch the bottom of the vial even if **SampleHeight** is set to 0 mm.


When the autosampler is shipped, the following values are pre-set:


Vial	SampleHeightOffset_XX [mm]
1.2 mL vials	SampleHeightOffset_72 = 2.0
2 mL vials	SampleHeightOffset_40 = 2.0
4 mL vials	SampleHeightOffset_22 = 2.0
10 mL vials (in the tray)	SampleHeightOffset_10 = 2.0
10 mL vials (in 5-position holder)	SampleHeightOffset_T = 2.0

When using the following vials, you have to adapt the values (→ table):

For Vial	SampleHeightOffset_XX [mm]
0.3 mL micro dialysis vials	SampleHeightOffset_72 = 13.0
0.3 mL <i>cylindrical</i> vials	SampleHeightOffset_72 = 2.0
0.5 mL vials ( <i>Eppendorf</i> )	SampleHeightOffset_40 = 14.0
1.5 mL vials ( <i>Eppendorf</i> )	SampleHeightOffset_40 = 2.0
2 mL vials (used with adapter 6820.4092 in the 5-position vial holder)	SampleHeightOffset_T = 9.0

 **Important:** To avoid damage to the needle, do not set **SampleHeight** and **SampleHeightOffset\_XX** to 0 when a vial is installed.

 **Important:** Pour éviter d'endommager l'aiguille, ne réglez pas **SampleHeight** et **SampleHeightOffset\_XX** sur 0 lorsqu'un portoir d'échantillons est installé.

 **Tip:** If you want to sample only *once* from a vial, select the **SampleHeight** value in such a way that the needle is lowered into the vial only as deep as required; thus, further reducing sample carry-over.

### 5.7.3 Moving the Tray before Drawing the Sample (Tray Shake)

To allow rehomogenization of the sample, especially after longer idle times, Chromeleon supports tray shake. To mix the analyte thoroughly before the sample is drawn, the tray is moved rapidly one or more times. Tray shake avoids changes in the peak area due to local changes in the concentration of the analyte in the sample container (for example, caused by condensation in the headspace).

The function is disabled by default (**AutoTrayShakeTimes** = 0). Enter a value to specify how often the tray is shaken before the sample is drawn.

### 5.7.4 Venting the Vial

To enhance the reproducibility, set the **PunctureOffset** parameter.

The carousel moves by the specified value while the needle is in the septum, thus enlarging the hole in the septum and equalizing the pressure. This is especially important for vials with unslitted septa and with large injection volumes.

### 5.7.5 Operational Qualification and Performance Qualification

To check and document the performance of the HPLC system, perform Operational Qualification and Performance Qualification. All materials required for performing qualification and detailed instructions are available on request.

### 5.7.6 Automatic Tray Test

The automatic tray test checks whether the vial installed in the segment from which the next injection shall be performed matches the configuration settings. If this is not the case, the needle may be damaged. The test is performed once per segment whenever the first injection is performed from a segment after manual interference.

The function is enabled by default. If you do not want to use this function, set **EnableTrayTest** to **Disabled**. If the adapter (part no. 6820.2402) is installed on the vial pusher, the automatic tray test *must* be disabled.

### 5.7.7 Automatic Vial Detection

The vial pusher (→ Fig. 3, page 20) is fitted with a sensor for automatic vial detection monitoring. The sensor checks whether the vial pusher descends onto a vial. If no vial is present at the specified position, a message appears on the autosampler display and in the Chromeleon Audit Trail.

## 5.8 Shutting Down the Autosampler

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

- 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 interrupt operation for more than one week, fill the autosampler with methanol or a similar alcohol, such as 2-propanol or ethanol. If the solvents in the autosampler are not miscible with water, use an appropriate intermediate solvent.
- If you want to move or ship the autosampler, you *have to*
  - ◆ Remove the movable parts of the carousel (vial trays and vials). If installed, remove the wash liquid reservoir.
  - ◆ Secure the needle arm and carousel cover with the foam insert (→ *Packing Instructions*).

**⚠ Important:** *This is a must!* To avoid damage to the needle and wash port, move the needle and needle arm into the correct position (needle arm on the right and needle out of the needle seat and wash port). Either press the **Standby** button on the front of the autosampler or perform the **Standby** command in Chromeleon. Then, turn off the autosampler and secure the needle arm.

**⚠ Important:** *C'est a doit!* Afin d'éviter tout dommage à l'aiguille, prenez soin de parquer l'aiguille en position haute avant d'installer le bloc de mousse, en utilisant le bouton Stand-by du panneau de commande du passeur ou le command Standby dans Chromeleon.

- Ship the autosampler only in the original shipping container and observe the packing instructions.

If the original shipping container is not available, you can order appropriate shipping containers and packing material from the Thermo Fisher Scientific sales organization for Dionex HPLC Products. The packing instructions are included in the "Installation and Qualification Documents for Chromatography Instruments" binder; they are available also on request.

Shipping the unit in any other packaging automatically voids the warranty.

From Chromeleon, you can set the autosampler and HPLC system into the standby mode or automate system shutdown (→ page 95).

### Standby Program

A standby program sets the HPLC system into standby mode. The main program steps are:

- At the end of the program, the program automatically reduces the flow.
- The program reduces temperature of all temperature-controlled modules in the system.

From the standby mode, you can reactivate the application very quickly.

### Shutdown Program

A shutdown program automates shutdown of the HPLC system. The main program steps are:

- At the end of the program, the program automatically reduces the flow.
- The program turns off certain system components and functions (for example, detector lamps, temperature control).

### To create a standby or shutdown program

Select one of the following alternatives:

- Select and perform the operating commands and parameters from the **Commands** dialog box (→ page 68).
- Create and run a corresponding program to automate the process (→ page 71).
- Use the SmartShutdown Wizard to create and run the program (see further down).

### To create the program with the SmartShutdown wizard

1. To open the wizard, click **SmartShutdown** on the **Batch** menu.
2. Follow the instructions as they appear on each page of the wizard. For additional information about a page, click **Help**.
3. After you finish the wizard, Chromeleon
  - ◆ Creates the program and saves it in the timebase for which you create the program.
  - ◆ Opens the **Start Batch on** dialog box.

To run the program, select the program and click **Start**.

For more information about the SmartShutdown wizard, see the *Chromeleon Help*.

## 5.9 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.

Frequency	What you should do ...
<b>Daily</b>	Before you start operating the autosampler, inspect the fluid lines for air bubbles. Degas the wash liquid (→ page 51).
	Check the fluid lines for signs of leakage.
	Check the fluid connections for signs of salt deposits.
	When using buffer solutions, flush the system thoroughly after use with a solvent that does not contain buffers or salts.
<b>Periodically</b>	<p>Inspect the tubing for possible damage, such as cracks, nicks, cuts, or blockage.</p> <p>Remove the sample racks. If necessary, remove also the 5-position vial holders. Inspect the carousel for deposits. Remove deposits by using a cloth or paper.</p> <p>This inspection is especially important for autosamplers with sample thermostating option because a clean carousel enhances the cooling performance</p>
	Check the drain holes on the injection valve (→ Fig. 48 page 123) for liquid droplets, indicating valve leakage. For remedial actions, see page 123.
	Drain tubing is connected to the drain ports on the bottom right of the autosampler (→ page 55). Verify that the tubes are unclogged and routed below the drain ports. Empty the waste container as needed.



Frequency	What you should do ...
<b>Annually</b>	Inspect and replace the following components if necessary: <ul style="list-style-type: none"><li>- Plumbing on the injection valve (→ page 27)</li><li>- Plumbing on the syringe valve (→ page 54)</li><li>- Needle (→ page 118)</li><li>- Injection valve seals (→ page 122)</li></ul>
	<i>Recommended:</i> Have authorized Service personnel perform preventive maintenance once a year.

 **Tip:** Chromeleon supports functions for estimating the lifetime of consumables (→ page 90).



## 6 Troubleshooting

### 6.1 Overview


The following features help you to identify and eliminate the source for problems that may occur during the operation of the autosampler or an UltiMate 3000 system.

#### Status LEDs

The status LEDs (light emitting diodes) on the front panel provide a quick visual check of the operational status of the autosampler. They indicate whether the autosampler is turned on, connected in Chromeleon, and operating properly (→ page 21).

#### Error Messages

If a fault or error is detected during the operation of the autosampler, a message appears on the autosampler display. Check the Messages on the Autosampler Display section for recommended courses of action (→ page 100). If the autosampler is operated from Chromeleon, the message is also displayed in the Chromeleon Audit Trail.

 **Tip:** For information about operating problems that might occur during the operation of an UltiMate 3000 system, see Operating Problems (→ page 105).

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

## 6.2 Messages on the Autosampler Display

Each time a fault or error occurs during the operation of the autosampler, the **Status** LED on the front panel changes to red and a message appears on the autosampler display. In this case, the **Prev**, **Next**, and **Clear** keys appear on the navigation bar.

To ...	Select ...
Return to the previous message.	Prev
Proceed to the next message.	Next
Remove the message from the display.	Clear

These keys are active also when the autosampler is connected in Chromeleon.

When the autosampler is operated from Chromeleon

- The message is also displayed in the Chromeleon Audit Trail. Some of the messages listed in the table are identical for the different drives. In the Chromeleon Audit Trail, these messages start with the drive to which the message relates: Carousel, syringe drive, needle drive, or horizontal drive. Therefore, in the table, these messages are listed as: (Drive): message.
- Messages on the autosampler display can also be removed via the **ClearDisplayError** command in Chromeleon.

The following table lists autosampler-related messages along with appropriate remedial actions. In addition to the messages in the table, other messages may appear. In this case, note the exact wording of the message and contact Thermo Fisher Scientific Service for Dionex HPLC Products if you are unable to eliminate the problem.

Message	Remedial Action
24V power failure	Turn the autosampler off and on again by pressing the power switch on the rear of the autosampler or perform a self test.
(Drive): End point not reached	Turn the autosampler off and on again by pressing the power switch on the rear of the autosampler or perform a self test.
(Drive): Error updating motor controller firmware	Turn the autosampler off and on again by pressing the power switch on the rear of the autosampler or perform a self test.
(Drive): Home position not found	Turn the autosampler off and on again by pressing the power switch on the rear of the autosampler or perform a self test.
(Drive): Home sensor malfunction	Turn the autosampler off and on again by pressing the power switch on the rear of the autosampler or perform a self test.
(Drive): Needle sensor malfunction	Turn the autosampler off and on again by pressing the power switch on the rear of the autosampler or perform a self test.
(Drive): No communication	Turn the autosampler off and on again by pressing the power switch on the rear of the autosampler or perform a self test.

<b>Message</b>	<b>Remedial Action</b>
(Drive): Not initialized	Turn the autosampler off and on again by pressing the power switch on the rear of the autosampler or perform a self test.
(Drive): Not ready	Turn the autosampler off and on again by pressing the power switch on the rear of the autosampler or perform a self test.
(Drive): Obstruction detected	The vial pusher may be obstructed or the needle may be obstructed when descending into the vial. Remove the obstruction. The needle descends onto the rim of the vial and does not enter the septum. In Chromeleon, check whether the settings on the Segments / Pump Link page (→ page 42) match the vial actually used in the autosampler.
(Drive): Stop condition at start	Turn the autosampler off and on again by pressing the power switch on the rear of the autosampler or perform a self test.
A self test is required	Turn the autosampler off and on again by pressing the power switch on the rear of the autosampler or perform a self test. The autosampler will not be ready for operation until the self test is successful. If a fault or mechanical failure is detected during the self test, a message appears.
Carousel temperature sensor malfunction	Turn the autosampler off and on again by pressing the power switch on the rear of the autosampler or perform a self test.
Command input overflow	Perform a driver update or firmware update.
Command queue overflow	The user-defined program is too long. Shorten the program.
Command syntax error	Perform a driver update or firmware update.
Command was aborted	The command was aborted by the user. Perform the command again if necessary.
Coolant temperature sensor malfunction	Turn the autosampler off and on again by pressing the power switch on the rear of the autosampler or perform a self test.
Cooling system overheated.	Verify that the ventilation slots are not obstructed. Turn the autosampler off and on again or perform a self test.
DVC position error	Verify that the injection valve is not blocked. Check the spanner on the injection valve. If the spanner has been tightened too firmly, the valve cannot switch. Loosen the spanner a bit. Turn the autosampler off and on again by pressing the power switch on the rear of the autosampler or perform a self test. Verify that the pod is installed correctly. Reinstall the pod if necessary (→ page 124).
DVC (+ <i>additional text</i> ) — or — Error updating I2C controller firmware	Turn the autosampler off and on again by pressing the power switch on the rear of the autosampler and retry. Reinstall the firmware or perform a firmware update (→ page 41) if necessary.
EEprom serialization error	Perform a firmware update.
Heat sink temperature sensor malfunction	Turn the autosampler off and on again by pressing the power switch on the rear of the autosampler or perform a self test.
Illegal command parameter	Perform a driver update or firmware update.

Message	Remedial Action
Illegal syringe speed	The specified syringe speed is not allowed. Change the syringe speed.
Illegal value	Perform a driver update or firmware update.
Inject port missed	Verify that the needle is installed and intact. Replace the needle if necessary (→ page 118). Turn the autosampler off and on again by pressing the power switch on the rear of the autosampler or perform a self test.
Inject volume must be equal to loop volume (The message appears only in full-loop injection mode.)	The injection volume does not match the volume of the sample loop. Change the injection volume.
Internal update. nn% finished. Do not interrupt (where nn = value)	An internal update is performed. The percentage reports the degree of completion. Wait until the update is complete.
Leak detected.	The leak sensor has reported a leak. Find and eliminate the leak. Dry the leak sensor and the tray (→ page 113).
Motor switching valve malfunction	Check the spanner on the injection valve. If the spanner has been tightened too firmly, the valve cannot switch. Loosen the spanner a bit. Turn the autosampler off and on again by pressing the power switch on the rear of the autosampler or perform a self test.
Motor switching valve timeout	Turn the autosampler off and on again by pressing the power switch on the rear of the autosampler or perform a self test.
Needle home position not found	Turn the autosampler off and on again by pressing the power switch on the rear of the autosampler or perform a self test.
Needle home sensor malfunction	Turn the autosampler off and on again by pressing the power switch on the rear of the autosampler or perform a self test.
Needle malfunction	Turn the autosampler off and on again by pressing the power switch on the rear of the autosampler or perform a self test.
Property is protected	You tried to change a protected property. Some properties are protected; the user cannot change them.
Property is read only	You tried to change a read-only property. Some properties are read-only; the user cannot change them.
Reagent vial not found	There is no reagent vial at the specified position. Place a vial at the specified position or specify a different position.
Remote control not enabled	The autosampler was disconnected in Chromeleon. Reestablish the connection ("Connect"). Perform a driver update or firmware update
Sample height out of reach	With the installed vial, the needle cannot reach the specified sample height. Install an appropriate vial or change the sample height setting (→ page 91).
Syntax error	Perform a driver update or firmware update.

<b>Message</b>	<b>Remedial Action</b>
Syringe is not empty	The syringe is not empty at the beginning of the injection. To empty the syringe, turn the autosampler off and on again by pressing the power switch on the rear of the autosampler or perform a self test.
Syringe is too empty	The volume to be dispensed is larger than the volume that was previously drawn. Change the program (volume to be dispensed $\leq$ drawn volume).
Syringe is too full	The syringe contains too much liquid. Thus, it cannot draw the specified volume. Turn the autosampler off and on again by pressing the power switch on the rear of the autosampler or perform a self test.
Syringe valve malfunction	Check the syringe valve. Verify that the connections on the valve are not over-tightened.
Temperature difference too large. Probable coolant circuit malfunctions	If the carousel is open, close the cover. Turn the autosampler off and on again by pressing the power switch on the rear of the autosampler or perform a self test.
The buffer loop is not empty at the beginning of an inject command	To empty the buffer loop, perform a Wash cycle ( $\rightarrow$ page 120) with the injection valve being in Load position.
The device is busy	The autosampler is already executing another command. Wait until the autosampler has executed the command. Retry.
The volume is too large	The volume to be drawn is larger than the volume that the syringe can hold. Change the volume.
Unknown command	Perform a driver update or firmware update.
Unknown property	Perform a driver update or firmware update.
Unknown vial position	The specified position does not exist in the current configuration. Check and change the segment settings if necessary ( $\rightarrow$ <b>Segments / Pump Link</b> , page 42).
USB interface is not ready	The USB connection could not be established. Check the USB connection. If a cable is defective, replace the cable.
Vial not found	No vial present at the specified position. Place a vial at the specified position or specify a different position.  The message appears also if your vials do not meet the minimum height requirements ( $\rightarrow$ page 25). Use the vials listed on page 25.  The segment type is wrong. Check and correct the segment settings if necessary ( $\rightarrow$ <b>Segments / Pump Link</b> , page 42).
Vial pusher malfunction	Turn the autosampler off and on again by pressing the power switch on the rear of the autosampler or perform a self test.
Vial pusher obstructed	Inspect the vial pusher for blockage. Remove any obstacles.

Message	Remedial Action
Wash port missed	Turn the autosampler off and on again by pressing the power switch on the rear of the autosampler or perform a self test.
Wrong tray type detected	Automatic tray detection reports that the vials specified on the Segments / Pump Link page in Chromeleon do not match the vials actually installed. Check and correct the segment settings if necessary (→ <b>Segments / Pump Link</b> , page 42). This message appears also if your vials do not meet the minimum height requirements (→ page 25). Use the vials listed on page 25.

If the autosampler is operated from Chromeleon and if communication between Chromeleon and the autosampler cannot be established, messages appear in the Chromeleon Audit Trail.

Message	Remedial Action
ACC-3000@USB-01610103 - Device not found on the USB.	The USB connection between the autosampler and the Chromeleon server may be interrupted. Check the USB connection. The power supply to the autosampler may be interrupted. Check the power supply connection of the autosampler.
Error opening ACC-3000 @USB-01610103 – The System cannot find the file specified	The USB connection between the autosampler and the Chromeleon server may be interrupted. Check the USB connection. The power supply to the autosampler may be interrupted. Check the power supply connection of the autosampler.
Error issuing control request to ACC-3000@USB-01610103	The Chromeleon server cannot connect to the specified autosampler. Check the USB connection. Check the power supply connection of the autosampler. Remove the autosampler specified in the message from the server configuration or else, select a different autosampler from the list of available autosamplers in the server configuration program (via Properties > Browse).
Error reading from ACC-3000 @USB-01610103 Data error (cyclic redundancy check)	Check the USB connection. The connection to the next hub must not exceed 5 m. The overall connection length, including the hub connections must not exceed 30 m. Replace any defective USB cable. Replace a defective hub.
Error reading from ACC-3000 @USB-01610103	The USB connection between the autosampler and the Chromeleon server may be interrupted. Check the USB connection. The power supply to the autosampler may be interrupted. Check the power supply connection of the autosampler.



## 6.3 Operating Problems

The table provides information about common operating problems that might occur with the UltiMate 3000 system and lists probable causes, as well as remedial actions.

For additional information and remedial actions, refer to the manuals for the other modules of an UltiMate 3000 system.

Problem	Probable Cause	Remedial Action
No information appears on the autosampler display.	<p>The instrument is not connected to the mains.</p> <p>The power is turned off.</p> <p>The instrument is in standby mode.</p> <p>The brightness or contrast is not adjusted correctly.</p> <p>The fuses blow.</p> <p>Replacement fuse blows immediately.</p> <p>An error occurred in the electronic system.</p>	<p>Connect the power cord.</p> <p>Turn on the power.</p> <p>Press the Standby button on the front panel.</p> <p>Adjust the brightness and contrast (→ page 88).</p> <p>Replace the fuses (→ page 131).</p> <p>Contact Service.</p> <p>Contact Service.</p>
The autosampler does not work correctly when controlled from Chromeleon.	<p>There is no connection between the instrument and the Chromeleon computer.</p> <p>The USB port on the computer is not ready for operation.</p>	<p>Check the USB cable and connection to the computer.</p> <p>Check the USB port on the computer.</p>
No flow	<p>The system is leaking.</p> <p>The solvent is old, degraded, or of poor quality.</p> <p>Contamination occurs somewhere in the system.</p> <p>For additional causes, refer to the operating instructions for your pump.</p>	<p>Find and eliminate the leak.</p> <p>Use fresh and appropriate solvents (HPLC-quality).</p> <p>Flush the system with an appropriate solvent.</p> <p>→ <i>Pump manual</i></p>
The system has very high backpressure.	<p>One or more capillaries in the system are blocked or damaged by bending.</p> <p>For additional causes, refer to the operating instructions for your column compartment.</p>	<p>Check the capillaries in the system step-by-step from the detector to the pump. Replace the capillaries as needed.</p> <p>→ <i>TCC manual</i></p>

Problem	Probable Cause	Remedial Action
High baseline drift	<p>The column is contaminated.</p> <p>The system is not sufficiently equilibrated.</p> <p>The solvent is degraded or inhomogeneous.</p> <p>The environmental conditions are unstable.</p> <p>The mobile phase is delivered in circles.</p> <p>For additional causes, refer to the operating instructions for your detector.</p>	<p>Clean or replace the column.</p> <p>Flush the system until equilibration. Usually, a volume of 5–10 times the column volume will be sufficient.</p> <p>Before you start an analysis, be sure that the eluents are already homogenized in the reservoirs. Use fresh solvent and check the eluent filter frits. In aqueous solvents, growth of microorganisms is possible.</p> <p>Make sure that the temperature and the humidity are constant. Avoid draft. On the detector, verify that the lamp and flow cell covers are properly installed and that the front panel door is closed.</p> <p>Direct the mobile phase to waste.</p> <p>→ <i>Detector manual</i></p>
High noise level, non-periodic baseline fluctuation	<p>The solvent is degraded or of poor quality/purity.</p> <p>For additional causes, refer to the operating instructions for your detector.</p>	<p>Use fresh and appropriate solvents (HPLC-quality).</p> <p>→ <i>Detector manual</i></p>
Periodic baseline fluctuation, pulsation	<p>There are pressure fluctuations from the pump.</p> <p>There are air bubbles in the system.</p>	<p>Prime the pump; check general function (→ <i>Pump manual</i>).</p> <p>Prime the system (→ <i>Pump manual</i>).</p>
Peak tailing	<p>The extra column volume is too large.</p> <p>There are bad capillary connections.</p>	<p>Use short capillaries with an appropriate inner diameter.</p> <p>Replace the capillaries. Consider installing Viper capillaries.</p>

<b>Problem</b>	<b>Probable Cause</b>	<b>Remedial Action</b>
Peak Broadening, increased dead time	<p>A capillary with too large an inner diameter is used.</p> <p>The capillaries are clogged or there are bad capillary connections.</p> <p>The filter frits on the solvent lines are clogged.</p> <p>The sample loop is clogged.</p> <p>The proportioning valve of the pump is defective.</p> <p>The column is overloaded or contaminated.</p> <p>The solvent is degraded.</p> <p>For additional causes, refer to the operating instructions for your detector.</p>	<p>Change the capillary. Use a capillary with an appropriate inner diameter.</p> <p>Replace the capillaries. Consider installing Viper capillaries.</p> <p>Check the filter for permeability. Replace the filter frit if necessary (→ <i>Pump manual</i>).</p> <p>Replace the sample loop (→ page 121).</p> <p>Contact Service.</p> <p>Clean or replace the column.</p> <p>Use fresh solvent.</p> <p>→ <i>Detector manual</i></p>
Reproducible ghost peaks appear in the chromatogram.	<p>The degassing channels are contaminated.</p> <p>The solvents are old, degraded or of poor quality/purity.</p> <p>Contamination occurs somewhere in the system.</p>	<p>Rinse the degassing channels (→ <i>Solvent Rack</i> or <i>Pump manuals</i>).</p> <p>Use fresh and appropriate solvents (HPLC-quality).</p> <p>Flush the system by using an appropriate solvent.</p>
Additional peaks appear in the injection peak.	<p>With gradients, the equilibration time after the flush cycle is too short.</p> <p>The dead volume is too high.</p>	<p>Increase the equilibration time.</p> <p>Eliminate dead volume.</p>
Some broad ghost peaks appear in the chromatogram.	<p>There are late eluting peak from a previous analysis.</p>	<p>Extend the run time. Increase the elution strength of the gradient (higher organic content). At the end of the run, flush column with a strong eluent.</p>
Spikes	<p>There is electrical interference from other modules.</p>	<p>Isolate the electrical circuit from strong current consumers. Consider installing an uninterruptible power supply (UPS).</p>

Problem	Probable Cause	Remedial Action
Spikes ( <i>Cont'd</i> )	<p>The column temperature is significantly above the boiling point of the mobile phase.</p> <p>For additional causes, refer to the operating instructions for your detector.</p>	<p>Install a restrictor at the flow cell outlet. If possible, use a post-column cooler (→ <i>TCC manual</i>).</p> <p>→ <i>Detector manual</i></p>
Negative peaks	<p>The sample solvent and mobile phase differ in composition.</p> <p>Absorption of the solute is lower than the absorption of mobile phase.</p>	<p>Dissolve the sample in the mobile phase.</p> <p>Select a different wavelength. Use a mobile phase with less UV background absorption.</p>
High carry-over	The needle is subject to wear.	Replace the needle (→ page 118).
Poor reproducibility with higher volumes	There is too much negative pressure in the vial.	In Chromeleon, set the <b>PunctureOffset</b> parameter. The carousel moves by the specified value while the needle is in the septum, enlarging the hole in the septum and equalizing the pressure.
Poor peak area precision	<p>The autosampler draws air from the vial.</p> <p>There are air bubbles in the syringe.</p> <p>There are air bubbles in the flow path between the needle and the syringe.</p> <p>The draw speed is too high.</p> <p>The gas content of the sample is too high or saturated.</p> <p>The needle is clogged or the needle tip is deformed.</p> <p>The capillary connections are not installed properly or they are not tight.</p>	<p>There is not enough amount of sample in the vial, the sample height setting is incorrect (→ page 91), or there are too many replicates.</p> <p>Prime the syringe (→ page 55).</p> <p>Perform a wash cycle (→ page 78). Non-degassed wash liquid is used. Degas the wash liquid (→ page 51).</p> <p>Reduce the draw speed.</p> <p>Reduce the draw speed. Degas the sample if possible.</p> <p>Replace the needle (→ page 118).</p> <p>Check and tighten the capillary connections.</p>


<b>Problem</b>	<b>Probable Cause</b>	<b>Remedial Action</b>
<p>Poor peak area precision (<i>Cont'd</i>)</p>	<p>The autosampler, the injection valve, or the syringe valve is not tight.</p> <p>Carry-over occurs in the system.</p> <p>There are dead volumes in the capillary connections.</p> <p>The piston seals are not tight.</p> <p>There are air bubbles in the working head.</p> <p>There is pump pulsation.</p> <p>The gradient is irreproducible.</p> <p>The sample is unstable and decomposes.</p> <p>Baseline fluctuations</p> <p>The environmental conditions are unstable.</p> <p>Contamination occurs somewhere in the system.</p>	<p>Inspect the autosampler and the connections on the injection valve or syringe valve. Tighten leaking connections. The injection valve or syringe valve may be defective. For the injection valve, see section 7.7 (→ page 122). If the syringe valve is defective, contact Service.</p> <p>Flush the needle using an appropriate solvent.</p> <p>Replace the fittings. Make sure that the capillaries are connected correctly. Consider installing Viper capillaries.</p> <p>Replace the seals (→ <i>Pump manual</i>).</p> <p>Purge the pump; check general function (→ <i>Pump manual</i>).</p> <p>Use degassed solvents.</p> <p>Change the gradient. Check the pump function and degassing. Check the frits in the solvent lines for obstruction and exchange as necessary.</p> <p>Use new sample or change the conditions. Thermostate the sample in the autosampler if possible.</p> <p>See the remedial actions provided in the related baseline sections further up in this table.</p> <p>Make sure that the temperature and air humidity are constant. Consider using a column thermostat. Avoid draft.</p> <p>Flush the system by using an appropriate solvent.</p>




## 7 Service

### 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 only by Thermo Fisher Scientific service personnel.

 **Warning:** The fluid components of the device may be filled with solvents that are harmful to health. In the same way, harmful substances may be present at the wetted parts. Wear appropriate personal protective equipment. Rinse the fluid components with an appropriate solvent to remove harmful substances.

For information about the proper handling of a particular substance and for advice on specific hazards, refer to the material safety data sheet for the substance you are using. Observe the guidelines of Good Laboratory Practice (GLP).

 **Avertissement:** Les composants fluidiques de l'instrument peuvent être remplis de solvants nocifs. De la même, des substances nocives peuvent être présents sur les pièces en contact avec le fluide. Portez l'équipement de protection personnel approprié. Rincez les composants fluidiques avec un solvant approprié afin d'éliminer les substances nocives.

Pour les informations sur la manipulation correcte des substances et des recommandations pour les situations de risque spécifiques, veuillez consulter la fiche de données de sécurité des substances que vous utilisez. Veuillez respecter des directives des Bonnes Pratiques de Laboratoire (BPL).

*Before starting maintenance or service procedures, observe the following precautions:*

- For all service and repair procedures, observe all precautionary statements provided in these operating instructions.
- When performing maintenance or repair work on the fluid components, you have to move the syringe and needle in the appropriate position first. Follow the instructions in the service sections. To avoid damage to the syringe and instrument, do not place any objects under the syringe plunger.
- Use only the original spare parts authorized for the device by Thermo Fisher Scientific.

- Before returning any instrument for repair, contact Thermo Fisher Scientific Service for Dionex HPLC Products. An RMA (Return Material Authorization) number is required to track your instrument. Always use the original shipping container. Observe the packing instructions when shipping the autosampler. Shipping the instrument in anything other than the original packaging voids the warranty.

If the original shipping container is not available, appropriate shipping containers and packing material can be ordered from the Thermo Fisher Scientific sales organization for Dionex HPLC Products. The packing instructions are included in the "Installation and Qualification Documents for Chromatography Instruments" binder. They are available also on request.

For instructions on shutting down the autosampler, see page 94.



## 7.2 Drying the Leak Sensor (Eliminating Leakage)

If liquid collects in the drip tray under the fluid connections, the leak sensor inside the autosampler reports a leak.

1. Turn off the autosampler.
2. Inspect the autosampler for signs of leakage. Tighten or replace leaking connections.
3. With a cloth or tissue, absorb any liquid that has collected in the drip tray.

**⚠ Important:** Be careful. Do not bend or damage the sensor.

**⚠ Important:** Assurez-vous que vous ne tordez, ni n'endommagez le capteur.



*Fig. 40: Drying the leak sensor*

4. Allow the sensor to adjust to the ambient temperature for a few minutes.
  5. Turn on the autosampler.
  6. If no error is reported after turning on the autosampler, operation can be resumed.
- i Tip:** If the sensor is not dry, the **Status** LED remains red. If a message appeared on the autosampler display, select **Clear** on the navigation bar to remove the message from the display (→ page 77).

## 7.3 Replacing the Syringe

Description	Part No.
250 $\mu\text{L}$ syringe	6822.0003
1000 $\mu\text{L}$ syringe	6822.0005

1. Move the syringe down.  
On the autosampler display, select the **Maintenance** menu, and then select **Syringe and Down** —or— in Chromeleon, perform the **InitiateChangeSyringe** command.
2. Tilt the front panel upward.
3. Unscrew the syringe plunger mounting screw with an open-end wrench (size 8). Remove the screw with your hand. Keep the screw for the installation of the replacement syringe.

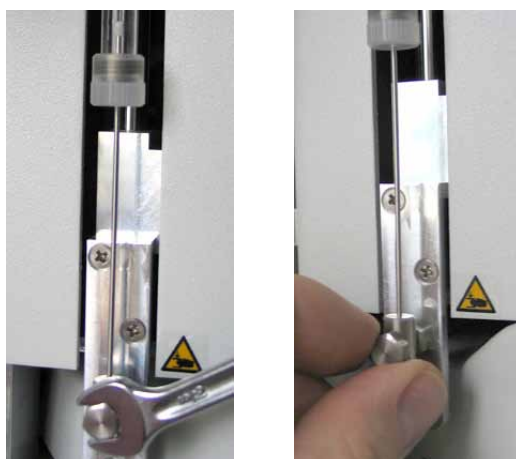


Fig. 41: Disconnecting the syringe on the plunger

4. Unscrew and remove the syringe from the syringe valve.

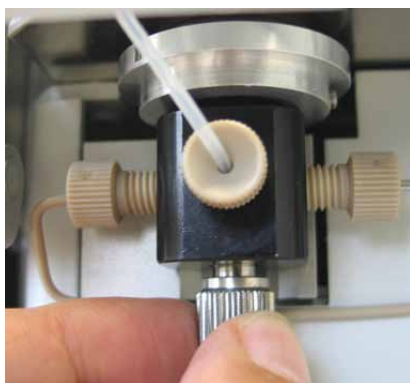


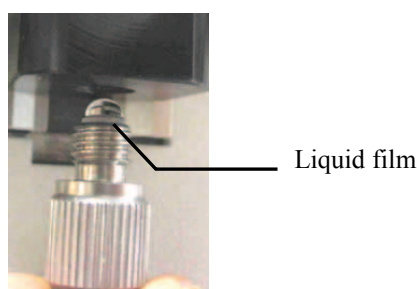
Fig. 42: Removing the syringe from the syringe valve

5. Verify that the gasket in the syringe valve is still in place. For example, look into the lower bore with a mirror. If the gasket is lost or damaged, install a new gasket *before* connecting the replacement syringe. A new gasket is shipped with the replacement syringe, but is available also as a separate part (part no. 6822.0009 for 5 gaskets).

**⚠ Important:** Be sure that only one gasket is installed in the syringe valve. If you install two or more gaskets, the valve will be damaged.

**⚠ Important:** Vérifiez que seulement un joint est installé dans la valve de seringue. Si vous installez deux joints la seringue risque d'être endommagée.

6. To remove the air from the replacement syringe, fill the syringe, by using a plastic syringe, or follow the steps below:
  - a) Fill a beaker with wash liquid or a mixture of isopropanol and water (50:50).
  - b) Place the threaded end of the syringe into the beaker.
  - c) Push the plunger completely into the syringe body and move the syringe several times rapidly to dislodge any air bubbles that might have gathered at the syringe inlet.
  - d) Fill the syringe several times completely. Push the plunger up and pull down rapidly with short movements to dislodge the bubbles.
7. Fill the replacement syringe completely.
8. Orient the syringe with the threaded end toward the top and position the syringe under the valve.
9. While holding the syringe vertically, push a small amount of liquid out the top to make sure that no air is present, and then screw the syringe into the valve.





*Fig. 43: Liquid film covering the threaded end of the syringe*

10. Align the syringe plunger. Hand-tighten the mounting screw. Use an open-end wrench to tighten the screw a little more.
11. Tilt the front panel downward.

12. Move the syringe up.

On the autosampler display, select the **Maintenance** menu, and then select **Syringe** and **Up—or—** in Chromeleon, perform the **TerminateChangeSyringe** command.

 **Important:** Before executing either command, verify that the syringe is installed correctly. If it is not, moving the syringe plunger upward may cause damage to the syringe.

 **Important:** Avant d'exécuter n'importe quelle commande, vérifiez que la seringue est installée correctement sinon la seringue risque d'être endommagée au cours du déplacement du piston.

13. Flush the replacement syringe several times (→ section 4.7, page 56).

Air in the syringe can influence the measurement results considerably. Before you start the analysis, the syringe must be free of air. If air bubbles are still to be seen in the syringe, repeat the flush procedure

14. If the size of the replacement syringe is different from the size of the syringe you replaced:

◆ In the Chromeleon **Server Configuration**, on the **Options** page for the autosampler, verify that the syringe size matches the syringe installed in the autosampler (→ page 43). If it does not, change the setting. Transfer the new configuration to the autosampler. On the **General** page, click **Send configuration to module** (→ page 40).

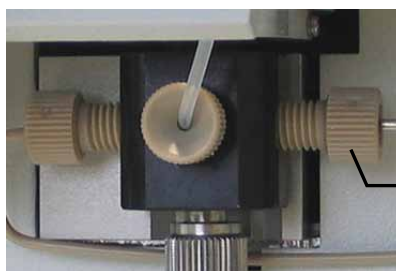
◆ Verify that you have installed an appropriate sample loop (→ page 18).

15. Update the service information in Chromeleon. Perform the **SyringeChanged** command.

## 7.4 Replacing the Buffer Tubing

Description	Part No.
Buffer tubing (> 250 µL), Viper	6820.2468

1. Tilt the front panel upward.
2. Unscrew the buffer tubing from the syringe valve.



Unscrew the buffer tubing from this port on the syringe valve.

Fig. 44: Buffer tubing on the syringe valve

3. The buffer tubing is secured in a clip on the injection valve support. Open the clip and remove the buffer tubing.
4. Disconnect the buffer tubing from the injection valve.
5. To avoid that air enters the system during the installation of the replacement buffer tubing, install the tubing while a wash cycle is running (wear appropriate protective gloves):
  - a) Perform a wash cycle with a wash volume of 1 to 2 mL. From Chromeleon, perform the wash cycle via **Wash** and **WashVolume**. As an alternative, on the autosampler display, show the function keys and select **Wash** or select **Wash** on the **Control** menu.
  - b) Screw the buffer tubing into the syringe valve when the wash liquid starts leaving connection port on the syringe valve. With a cloth or tissue, absorb any wash liquid that might have left the valve.
  - c) Connect the buffer tubing to the injection valve when the wash liquid starts leaving free end of the buffer tubing. With a cloth or tissue, absorb any wash liquid that might have left the valve.
6. Fix the buffer tubing in the clip collar on the injection valve support.
7. Tilt the front panel downward.

## 7.5 Needle and Needle Capillary

### 7.5.1 Replacing the Needle or the Needle Capillary

Description	Part No.
Needle	6820.2403
Needle capillary	6830.2446

**STOP** **Avertissement:** The needle has a very sharp tip and may be contaminated by harmful substances. Be careful to avoid personal injury. Rinse the needle to remove harmful substances.

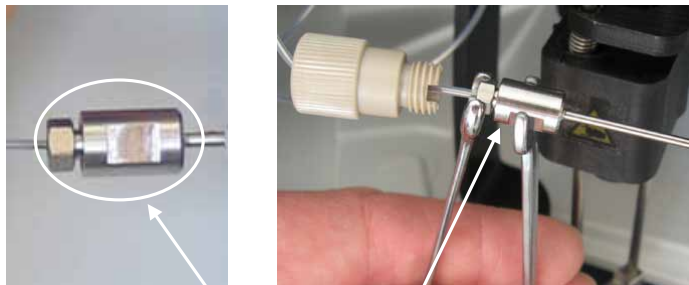
**STOP** **Avertissement:** L'aiguille a une pointe très pointue. Faites attention de ne pas vous blesser. Rincez l'aiguille afin d'éliminer les substances nocives.

1. Move the needle into the appropriate position for needle replacement (needle upward and needle arm to the left).  
On the autosampler display, select the **Maintenance** menu, and then select **Needle Position** and **Maintain**—*or*—in Chromeleon, perform the **InitiateChangeNeedle** command.
2. Tilt the front panel upward.
3. The needle capillary is secured in a clip on the injection valve support. Open the clip and remove the needle capillary.
4. Disconnect the needle capillary from the injection valve.
5. A beige screw locks the assembly of needle and needle capillary in the needle holder. Loosen the screw. Pull the assembly toward the top to remove it from the needle holder. Be careful; the components may easily be bent.



Fig. 45: Removing the needle from the needle holder

6. Disconnect the needle from the needle capillary, by using the two open-end wrenches from the accessories kit (sizes 3/16" and 5.5 mm).



Connection between needle capillary and needle

*Fig. 46: Disconnecting the needle from the needle capillary*


7. Be careful when you connect the (new) needle to the (new) needle capillary. The needle has a very sharp tip. Be careful to avoid personal injury.  
To facilitate the installation two persons should establish the connection between the needle and the needle capillary. Push the needle capillary into the needle as far as it will go in. Hold both parts in this position while tightening the connection with the open-end wrenches.
8. Insert the assembly in the needle holder and tighten the locking screw.
9. Connect the needle capillary to the injection valve.
10. Secure the needle capillary on the injection valve support.
11. Return the needle arm and needle to the starting positions.  
On the autosampler display, select the **Diagnostics** menu, and then select **Self test** — *or*—in Chromeleon, perform the **SelfTest** command.
12. Update the service information in Chromeleon. Perform the **NeedleChanged** command.

### 7.5.2 Washing the Needle Manually

To wash the needle manually (both from the inside and outside), select one of the following alternatives:

#### To wash the needle manually from Chromeleon

1. Open the **Commands** dialog box (→ page 68).
2. Under **Sampler**, click **WashVolume**. Enter the wash volume to be used for the wash cycle.
3. Click **WashSpeed** and enter the syringe speed for the wash cycle.
4. Specify the injection valve position for the wash cycle. Click **InjectValveToInject** or **InjectValveToLoad**. With **InjectValveToLoad**, the wash cycle includes also the sample loop.
5. Perform the **Wash** command.

 **Tip:** The autosampler performs a wash cycle automatically after each injection, by using the volume specified under **WashVolume**.

#### To wash the needle manually from the autosampler display

- Show the function keys and select **Wash**. The wash volume is the volume specified under **Wash** on the **Control** menu.
- Select the **Control** menu and select **Wash**. Enter the wash volume and start the wash cycle.



## 7.6 Replacing the Sample Loop

Description	Part No.
20 µL sample loop, Viper	6830.2414
50 µL sample loop, Viper	6830.2416
200 µL sample loop, Viper	6830.2418

1. Switch the injection valve into the **Load** position.  
On the autosampler display, select the **Maintenance** menu, and then select **Inject valve** and **Load**—*or*—in Chromeleon, perform the **InjectValveToLoad** command.
2. Disconnect the sample loop from the injection valve.
3. Connect the replacement sample loop to ports 3 and 6 on the injection valve.
4. If the volume of the replacement sample loop is different from the volume of the sample loop you replaced:
  - ◆ In the Chromeleon **Server Configuration**, on the **Options** page for the autosampler, verify that the sample loop volume matches the volume of the sample loop installed in the autosampler. If it does not, change the setting. Transfer the new configuration to the autosampler. On the **General** page, click **Send configuration to module** (→ page 40).
  - ◆ Verify that you have installed an appropriate syringe (→ page 18).

## 7.7 Injection Valve

The autosampler is shipped with a 2-position, 6-port injection valve (→ page 27). To ensure optimum operation of the valve, observe the following guidelines:

- The valve should not be used with concentrated formic acid.
- Operating, storing, or shipping the valve below 0 °C with water in the fluid passages may cause failure of the sealing surfaces.
- To connect the capillaries to the injection valve, use Viper capillary connections whenever possible; else install only the ferrules and fitting nuts from the autosampler accessories kit or original Dionex spare parts.

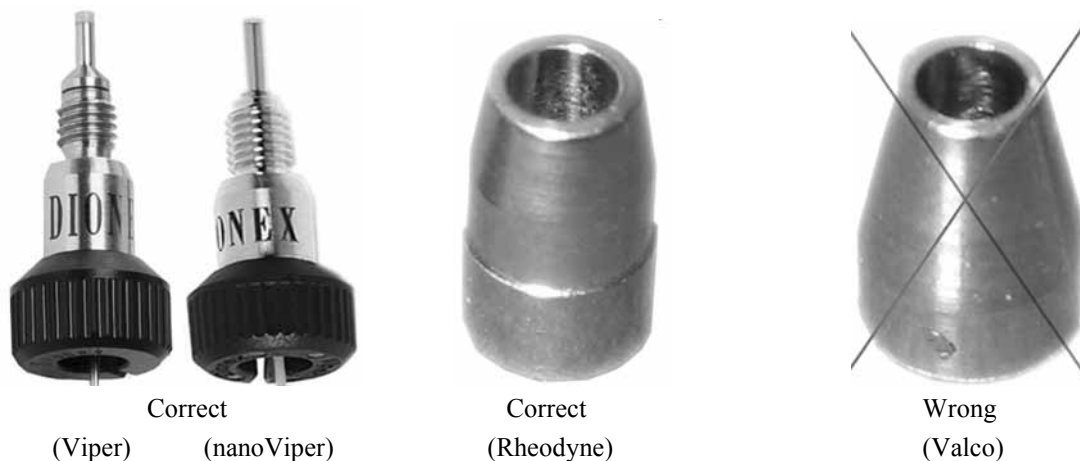


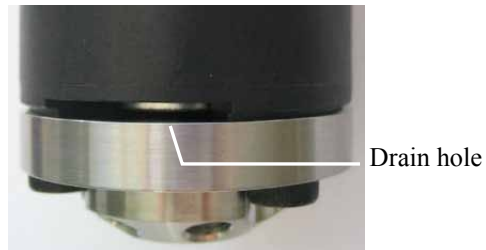
Fig. 47: Viper fitting connections and other valve ferrules

Maintenance requirements are kept to a minimum. In most instances, cleaning the valve by flushing all lines with an appropriate solvent will be sufficient. The samples and the mobile phases that are used determine which solvent is to be used for flushing.

The seals (rotor seal and stator face seal) are consumables; replace them as necessary.

### 7.7.1 Inspecting the Injection Valve for Leakage

Several drain holes are provided on the stator ring. If liquid droplets appear on one or more drain holes, this may indicate valve leakage.



*Fig. 48: Drain hole on the injection valve*

Possible remedial actions:

- Replace the rotor seal or rotor seal and stator face seal (→ page 124).
- Replace the stator (→ page 126).
- Replace the valve pod (→ page 124).

## 7.7.2 Replacing the Valve Pod

Description	Part No.
Pod for injection valve Suitable for pressures < 62 MPa (9000 psi) The rotor seal in the valve pod is suitable for pH values 0 - 14.	6822.0051

1. Switch the injection valve into the **Inject** position.  
On the autosampler display, select the **Maintenance** menu, and then select **Inject valve** and **Inject**—*or*— in Chromeleon, perform the **InjectValveToInject** command.
2. Disconnect all liquid lines connected to the injection valve.
3. Unscrew and remove the locking ring ("spanner") using only your hand (do not use a wrench).

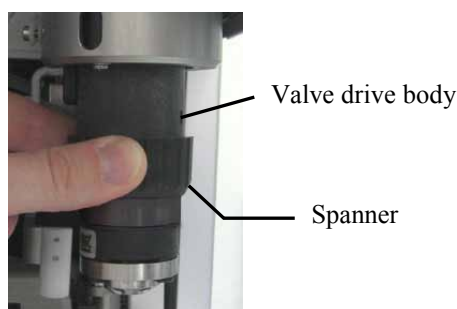


Fig. 49: Removing the spanner

4. Grasp the pod and pull downward firmly to remove the pod from the valve drive body.
5. Align the locating pin on the replacement pod with the matching opening in the valve drive body. Push the pod completely into the body.



Fig. 50: Aligning the locating pin

If you cannot push the pod completely into the valve drive body, refer to the Troubleshooting Tip below.

6. Tighten the spanner firmly with your hand (use no tool). If the spanner is too tight, the valve may not switch. If you attempt to switch the valve, a message appears, for example, motor switching valve malfunction.
7. When the valve pod is replaced, the rotor seal is also replaced. Therefore, in Chromeleon, update the service information for the rotor seal. Perform the **RotorSealChanged** command.

### **Troubleshooting Tip**

If you cannot push the pod completely into the valve drive body, the position of the valve coupling does not match the position of the valve drive. To remedy the situation:

1. Switch the valve into the **Load** position and try again.
2. If you still cannot the push the pod completely into the valve drive body, the valve coupling is not aligned properly. Turn the coupling by hand until you can push the pod completely into the body.

### 7.7.3 Replacing the Valve Stator

Description	Part No.
Stator for injection valve	6840.0011

1. Remove the valve pod (→ page 124).
2. Remove the three stator screws located in the stator, using a hexagon wrench (size 3/32"). Remove the screws simultaneously to avoid that the stator gets jammed.

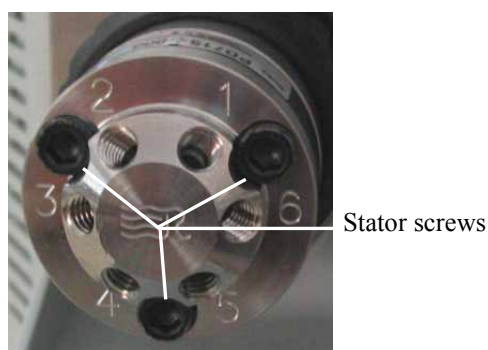


Fig. 51: Stator screw

3. Remove the stator from the valve pod.
4. Mount the replacement stator on the valve so that the stator locating pins in the valve body enter the matching holes in the stator.
5. Insert the stator screws. Tighten each screw firmly (no more than 0.7 Nm).
6. Reinstall the valve pod (→ page 124).

### 7.7.4 Replacing the Rotor Seal

Description	Part No.
Rotor Seal (RheBuild <sup>®</sup> ) kit (suitable for pH values 0 - 14), including 1 rotor seal, hexagon wrench, and installation instructions	6840.0012

Observe the following precautions when replacing the rotor seal:

- To avoid scratches on the valve surfaces, do not use pointed or sharp-edged tools to remove or install a seal. Even minute scratches may result in poor sealing performance of the valve.
- When mounting a new seal, be careful to avoid contamination on the valve parts. Even minute particles may cause damage to the valve and result in poor sealing performance

1. Remove the valve pod (→ page 124).
2. Remove the stator (→ page 127).
3. Remove the rotor seal.

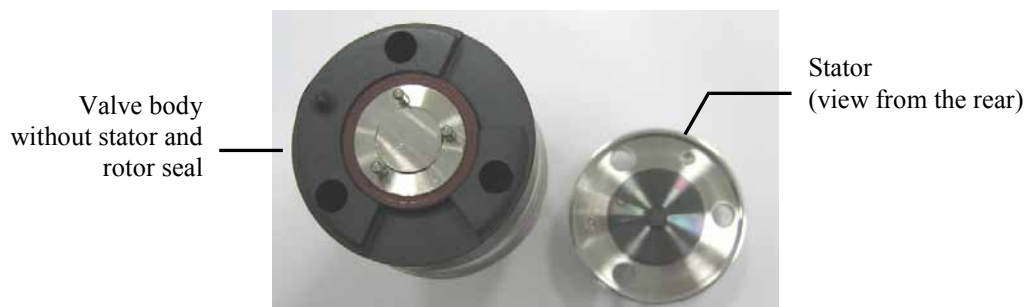


Fig. 52: Valve body without rotor seal and stator

4. Mount the replacement rotor seal on the valve body with the grooves facing the stator. The three pins on the shaft assembly fit into the matching holes in the rotor seal only one way.

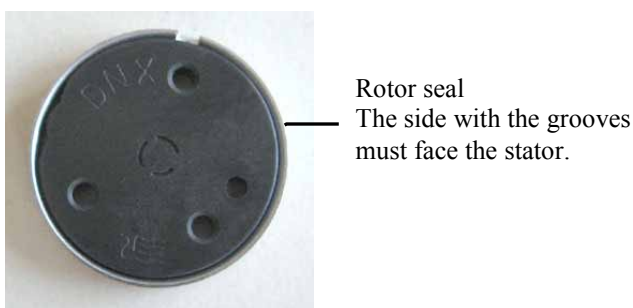


Fig. 53: Rotor seal

5. Reinstall the stator (→ page 127).
6. Reinstall the valve pod (→ page 124).
7. Update the service information in Chromeleon. Perform the **RotorSealChanged** command.



## 7.8 Replacing the Capillary for Eluent Preheating

Description	Part No.
Capillary for eluent preheating (Viper capillary, 0.18 x 550 mm I.D. x L, SST)	6040.2355

1. Remove the panel from the column chamber.
2. A clip attaches the capillary in the column chamber.  
First, remove the attachment clip from the upper slot, using an appropriate tool, for example, a thin flat-blade screwdriver. Then, remove the clip from the bottom slot with your hand.  
Remove the capillary from the clip.



Fig. 54: Removing the attachment clip from the rear panel

3. Disconnect the capillary from the column inlet and on the injection valve. Remove the capillary from the autosampler.
4. Route the replacement capillary through the passage in the drip tray.
5. Connect the capillary to the injection valve.
6. Insert the capillary into the attachment clips.

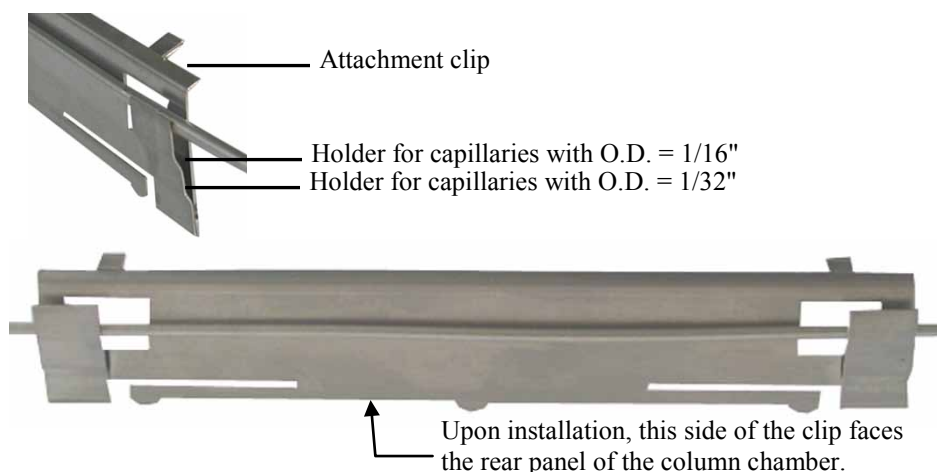
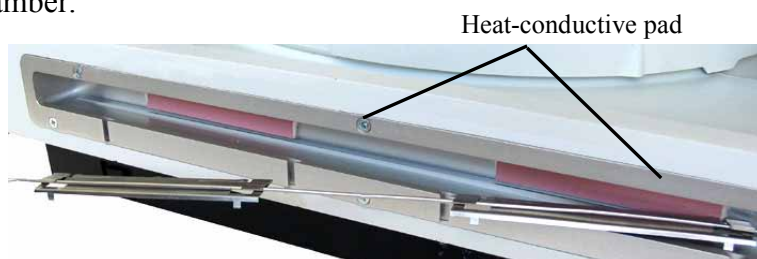


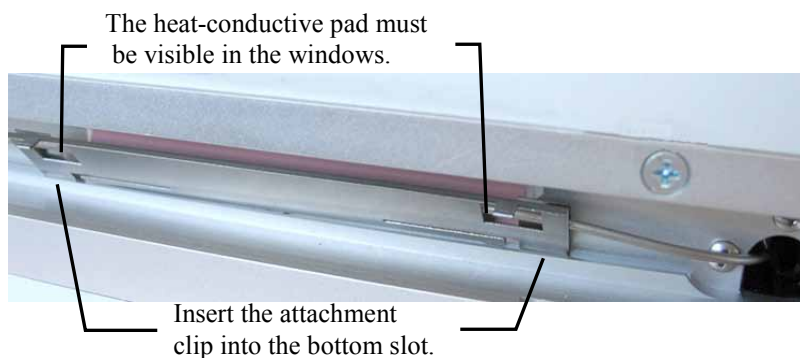
Fig. 55: Inserting the capillary into the attachment clip

- Align the attachment clips with the heat-conductive pads on the rear panel of the column chamber.



*Fig. 56: Aligning the attachment clips*

- Insert the attachment clips in the bottom slot on the rear panel. Verify that you can see the heat-conductive pad in the clip windows.



*Fig. 57: Inserting the attachment clip into the bottom slot*

- Press the attachment clips into the upper slot, with your hand or by using an appropriate tool, such as a thin flat-bladed screwdriver.



*Fig. 58: Pressing the attachment clip into the upper slot*

- Connect an appropriate capillary to the column outlet. Place the column in the column chamber.
- Route the capillary from the column outlet to the outside through one of the capillary slots (→ Fig. 15, page 50)
- Close the column chamber with the panel (→ Fig. 16, page 50).

## 7.9 Replacing the Main Power Fuses

**STOP** **Warning:** Turn off the autosampler. Disconnect the power cord from its source.

**STOP** **Avertissement:** Arrêtez le passeur d'échantillon. Débranchez le cordon d'alimentation de la source secteur.

1. Remove the fuse cartridge, using a small screwdriver.



Fig. 59: Fuse cartridge

2. Replace the fuses with fuses of the appropriate rating.

**STOP** **Warning:** Always install two fuses. Use only the fuses indicated in the following table.

**STOP** **Avertissement:** Installez toujours deux nouveaux fusibles. Utilisez uniquement les fusibles indiqués ci-dessous.

Description	Part No.
<b>ACC-3000:</b> Fuse, 2A, slow-blow, 5 x 20 mm, 250 V	Included in Fuses Kit, part no. 6820.0026. For information about which fuses are contained in the kit, see section 9.3 (→ page 140).
<b>ACC-3000T:</b> Fuse, 4A, slow-blow, 5 x 20 mm, 250 V	

3. Reinstall the fuse cartridge.
4. Reconnect the power cord to its source. Turn on the autosampler.


## 7.10 Updating the Autosampler Firmware

The autosampler is shipped with the most recent firmware version. The autosampler firmware is also included in Chromeleon.

To check which firmware version is installed in the autosampler and which version is included in Chromeleon:


- *Firmware version installed in the autosampler*
  - Turn on the autosampler via the main power switch on the rear panel. On the front panel display, general information about autosampler appears, including the firmware version.
  - On the **Main** menu, select **Diagnostics** (→ page 79), and then select **Firmware version**.
- *Firmware-Version in Chromeleon*

In the Windows Explorer, in the **IQ** folder of your Chromeleon installation, locate the **IQReport.log** file. In the file, search for UM3\_WPS.hex.

 **Tip:** When updating the firmware via Chromeleon, this information is provided also during the download.


Whenever a new firmware version is released for the autosampler, the new version will be provided with the next Chromeleon Service Release and described in the release notes.

The new firmware will *not* be downloaded automatically to the autosampler when you install a Chromeleon Service Release. To update the firmware in the autosampler, follow the steps below:

 **Important:** To ensure that the download is successful, make sure that the communication between the autosampler and Chromeleon is *not* interrupted during the download and that you do *not* turn off the autosampler.

1. Before you begin verify that:
  - ◆ The autosampler is connected in Chromeleon.
  - ◆ The Chromeleon server is in *running idle* mode. All processes on the Chromeleon server PC and in Chromeleon have been stopped.
2. Start the **Server Configuration** program (→ page 39).
3. Right-click the autosampler in the timebase and click **Properties** on the menu.


4. On the **General** page (→ page 40), click **Firmware Download**. A message displays the firmware version that is currently installed in the autosampler and the version that will be downloaded from Chromeleon.

 **Tip:** If the autosampler comes with a newer firmware than the version included in Chromeleon, do *not* downgrade the firmware. Older firmware may be incompatible with new hardware revisions.

5. Click **Yes** to start the download. (Click **No** to cancel the action.)

The download can take several minutes. The download is complete when **Download completed successfully** appears in the Messages Server window in the Chromeleon Server Configuration program. The message appears also in the Chromeleon Audit Trail.

If the download was not successful, one or more messages appear in the Audit Trail. In this case, turn off the autosampler. Turn on the autosampler again and repeat the above steps. If the download fails again, contact Thermo Fisher Scientific Service for Dionex HPLC Products.

 **Tip:** When the download from Chromeleon is complete, an internal download may be performed in the autosampler. If this is the case, you can monitor the progress on the autosampler display. Do *not* turn off the autosampler until the internal download is complete.



## 8 Technical Information

<b>Injection principle</b>	Pulled loop
<b>Injection mode</b>	Full-loop and partial-loop
<b>Full-loop injection volume</b>	20, 50, and 200 µL
<b>Injection volume range</b>	0...50% of installed sample loop in partial-loop mode
<b>Syringe size</b>	250 µL and 1000 µL
<b>Linearity</b>	Correlation coefficient >0.9995, RSD<1% in partial-loop mode for 1 - 10 µL (20 µL sample loop) Correlation coefficient >0.9995, RSD<0.5% in partial-loop mode for 1 - 100 µL (200 µL sample loop)
<b>Precision</b>	<0.25% RSD in full-loop mode (20 µL sample loop) Typically <0.3% in partial-loop mode @ 5 µL (20 µL sample loop)
<b>Carry over</b>	<0.02% with caffeine
<b>Sample temperature range (ACC-3000T)</b>	8 °C to 45 °C, max. 15 °C below ambient
<b>Sample capacity</b>	216 x 0.3 mL vials, 120 x 1.1 mL conical vials, 216 x 1.2 mL vials, 120 x 1.8 mL or 2.0 mL vials, 66 x 4 mL vials, 30 x 10 mL vials and/or 120 x 0.5 mL or 1.5 mL Eppendorf tubes (open, uncapped) + 15 x 10 mL vials
<b>Column temperature range</b>	5 °C above ambient to 50 °C
<b>Weight</b>	ACC-3000: 19 kg (42 lb) ACC-3000T: 24 kg (53 lb)
<b>Dimensions (h x w x d)</b>	36 ×42 ×51 cm (14.2 ×16.5 ×20 in.)
<b>PC connection</b>	All functions controllable via USB 1.1; Integrated USB hub with three free USB ports
<b>I/O interfaces</b>	4 digital inputs, 4 programmable relay outputs
<b>Safety features</b>	Leak sensor Automatic vial detection Internal monitoring of all mechanical operations, ACC-3000T: Monitoring of the function and cooling performance by 3 temperature sensors
<b>User input/display</b>	LCD-indicating system parameters Standby button 3 LEDs for status monitoring (Power, Connected, Status) 4 keys for operation during initial installation, for diagnostics and maintenance

<b>GLP</b>	In Chromeleon: Full support of automatic equipment qualification (AutoQ™) and System Functions for estimating the lifetime of consumables (Predictive Performance) All system parameters are recorded in the Chromeleon Audit Trail
<b>Wetted parts</b>	Stainless steel, PEEK (wash liquid path: ECTFE, ETFE, PTFE, PCTFE, glass)
<b>Power requirements</b>	100–120 V, 60 Hz; 200–240 V, 50 Hz; max. 150 W (ACC-3000), max. 320 W (ACC-3000T)
<b>Emission sound pressure level:</b>	Typically < 65 dB(A) in 1-m-distance
<b>Environmental conditions</b>	Range of use: Indoor use Temperature: 10 °C to 35 °C (50 °F to 95 °F) Air humidity: 80% rel. humidity, non-condensing Overvoltage category: II Pollution degree: 2

Technical information: September 2013

All technical specifications are subject to change without notice.



## 9 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.

### 9.1 Standard Accessories

The following accessories are shipped with the autosampler. (The list is 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 9.3 (→ page 140).

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.	Quantity in the accessories kit
<b>ACC-3000 and ACC-3000T accessories kit, including:</b>		
Online degas wash kit (The kit includes all tubes and fittings required to connect the wash liquid for online degassing.)	6820.2450	1
Sample loop, 200 µL, Viper When using the 200 µL sample loop, verify that the installed syringe is appropriate for your application (→ page 18).	6830.2418	1
Tray (for 40 vials, O.D. < 12 mm)	6820.4070	3 trays
Wash liquid reservoir	Included in 6820.4075	1 reservoir
Fuse, 2 A, slow-blow (5 x 20 mm)	Included in 6820.0026	2 fuses
Fuse, 4 A, slow-blow (5 x 20 mm)	Included in 6820.0026	2 fuses
Fuse, 10 A, slow-blow (6.3 x 32 mm)	Included in 6820.0026	1 fuses
(Double) open-end wrench (size ¼" x 5/16")	6000.0051	1
Open-end wrench (5.5 mm)	6146.1225	1
Open-end wrench (3/16")	6146.1231	1
Hexagon wrench (9/64" )	6000.0053	1
Hexagon wrench (2.5 mm)	6146.2625	1
1.8 mL vial (amber)	Included in 6000.0072	10 vials
Crimp cap and septum for 1.8 mL vial	Included in 6000.0071	10 vials
2 mL vial, screw top (cylindrical, amber)	Included in 6000.0060	10 vials
Screw cap, white, for 2 mL vial	Included in 6000.0057	10 caps
Seal, red, for 2 mL vial	Included in 6000.0058	10 seals

<b>Description</b>	<b>Part No.</b>	<b>Quantity in the accessories kit</b>
10 mL vial (cylindrical) with crimp cap and seal	Included in 6820.0023	15 vials
250 µL vial (polypropylene)	Included in 6820.0029	10 vials
Cap for 250 µL polypropylene vial	Included in 6820.0028	10 vials
USB cable, type A to type B High Speed USB 2.0 (cable length: 1m)	6035.9035	1

## 9.2 Optional Accessories

Optional Accessory	Part No.
Adapter for 5-position holders, to be used for 2 mL vials <i>Note:</i> When using 2 mL vials in the 5-position holder, you <i>have</i> to adapt the value for <b>SampleHeightOffset_T</b> (→ page 92). Otherwise, the needle will be damaged.	6820.4092
Adapter for vial pusher The adapter is recommended for uncapped 10 mL vials. <i>Note:</i> When the adapter is installed, the automatic tray test <i>must</i> be disabled (→ page 93).	6820.2402
Capillary kit (Viper, SST) for an UltiMate 3000 Standard system (single stack setup) including an ISO-3100SD, LPG-3400SD or DGP-3600SD The kit includes 3 Viper SST capillaries with I.D. x L. 0.18 x 250 mm, 0.18 x 350 mm, and 0.18 x 450 mm (1 capillary each).	6040.2302
Capillary kit (Viper, SST) for an UltiMate 3000 Standard system (single stack setup) including an HPG-3200SD or HPG-3400SD The kit includes 3 Viper SST capillaries with I.D. x L. 0.18 x 250 mm, 0.18 x 350 mm, and 0.18 x 550 mm (1 capillary each).	6040.2309
Drain kit for UltiMate 3000 systems The kit includes all components required for system drainage and detailed installation instructions.	6040.0005
Front cover, transparent To close the sample compartment and prevent dust and other particles from entering	6820.1427
Sample loop (50 µL)** Signal cable (6-pin Mini-DIN)	6830.2442 6000.1004
Syringe (1000 µL)**	6822.0005
<i>Tray for</i> 10 x 10 mL vials 22 x 4 mL vials 40 x 1.1 mL vials ( <i>conical</i> ) 40 x 1.5 mL vials ( <i>Eppendorf</i> )* 40 x 0.5 mL vials ( <i>Eppendorf</i> )* 72 x 1.2 mL vials ( <i>cylindrical</i> ) 72 x 0.3 mL vials ( <i>cylindrical</i> ) 72 x 0.3 mL micro dialysis vials * The Eppendorf vials must be uncapped.	6820.4086 6820.4084 6820.4087 6820.4094 6820.4096 6820.4090 6820.4091 6820.4097

\*\* Verify that you have also installed an appropriate syringe (→ page 18).

## 9.3 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.
Adapter for 5-position holder, to be used for 2 mL vials <i>Note:</i> When using 2 mL vials in the 5-position holder, you <i>have</i> to adapt the value for <b>SampleHeightOffset_T</b> (→ page 92). Otherwise, the needle will be damaged.	6820.4092
Adapter for vial pusher The adapter is recommended for uncapped 10 mL vials. <i>Note:</i> When the adapter is installed, the automatic tray test <i>must</i> be disabled (→ page 93).	6820.2402
Hexagon wrench (size 2.5 mm)	6146.2625
Hexagon wrench (size 9/64" )	6000.0053
Attachment clip to clip the column capillary to the rear panel of the column chamber for eluent preheating	6830.5208
Buffer tubing, > 250 µL, Viper	6820.2468
Capillary from pump to autosampler (Viper capillary, 0.18 x 450 mm I.D. x L, SST)	6040.2365
Capillary from injection valve to column inlet (Viper capillary, 0.18 x 550 mm I.D. x L, SST)	6040.2355
Capillary kit (Viper, SST) for an UltiMate 3000 Standard system (single stack setup) including an ISO-3100SD, LPG-3400SD or DGP-3600SD The kit includes 3 Viper SST capillaries with I.D. x L. 0.18 x 250 mm, 0.18 x 350 mm, and 0.18 x 450 mm (1 capillary each).	6040.2302
Capillary kit (Viper, SST) for an UltiMate 3000 Standard system (single stack setup) including an HPG-3200SD or HPG-3400SD The kit includes 3 Viper SST capillaries with I.D. x L. 0.18 x 250 mm, 0.18 x 350 mm, and 0.18 x 550 mm (1 capillary each).	6040.2309
Column chamber panel (for autosamplers with serial number 8010458 and higher)	6830.5213
Cleaning swabs (pack of 10)	6040.0006
Ferrules and Fittings kit (SR/FS-7), including: 6 fitting screws (FS-7, 1/16", stainless steel) 6 ferrules (SR-7, 1/16", stainless steel)	6822.0012
Fuses Kit, including: 2A fuse, slow-blow, 5 x 20 mm (10 fuses) 4 A fuse, slow-blow, 5 x 20 mm (10 fuses) 10 A fuse, slow-blow, 250V, 6.3 x 32 mm (5 fuses)	6820.0026
Menu pen	6300.0100
Needle	6820.2403
Needle capillary	6820.2446

Description	Part No.
Online degas wash kit (The kit includes all tubes and fittings required to connect the wash liquid for online degassing.)	6820.2450
Open-end wrench (size 3/16")	6146.1231
Open-end wrench (size 5.5 mm)	6146.1225
(Double) open-end wrench (size 1/4" x 5/16")	6000.0051
Pod (including rotor seal for pH values 0-14) for injection valve The pod is suitable for pressures < 62 MPa (9000 psi).	6822.0051
Power cord, Australia, China	6000.1060
Power cord, Denmark	6000.1070
Power cord, EU	6000.1000
Power cord, India/SA	6000.1090
Power cord, Italy	6000.1040
Power cord, Japan	6000.1050
Power cord, Switzerland	6000.1030
Power cord, UK	6000.1020
Power cord, US	6000.1001
Rotor Seal (RheBuild) kit (suitable for pH values 0 - 14) for injection valve The kit includes 1 rotor seal, hexagonal wrench, and installation instructions.	6840.0012
Sample loop, 20 µL, Viper	6830.2414
Sample loop, 50 µL, Viper	6830.2416
Sample loop, 200 µL, Viper	6830.2418
Signal cable (6-pin Mini-DIN)	6000.1004
Stator for injection valve	6840.0011
Syringe (250 µL)	6822.0003
Syringe (1000 µL)	6822.0005
Syringe gasket (for installation in the syringe valve, pack of 5 gaskets)	6822.0009
Tray for 10 of 10 mL vials	6820.4086
Tray for 22 of 4 mL vials	6820.4084
Tray for 40 vials (O.D. < 12 mm)	6820.4070
Tray for 40 x 1.5 mL vials ( <i>Eppendorf</i> ) The Eppendorf vials must be uncapped.	6820.4094
Tray for 40 x 0.5 mL vials ( <i>Eppendorf</i> ) The Eppendorf vials must be uncapped.	6820.4096
Tray for 40 x 1.1 vials ( <i>conical vials</i> )	6820.4087
Tray for 72 x 1.2 mL vials ( <i>cylindrical vials</i> )	6820.4090

Description	Part No.
Tray for 72 x 0.3 mL vials ( <i>cylindrical vials</i> )	6820.4091
Tray for 72 x 0.3 mL micro dialysis vials	6820.4097
Tubing from wash liquid reservoir to syringe valve	6820.0011
USB cable, type A to type B, high Speed USB 2.0 (cable length: 5m)	6911.0002
USB cable, type A to type B, high Speed USB 2.0 (cable length: 1m)	6035.9035
Vial (250 µL, cylindrical, polypropylene with glass insert; 100 vials)	6820.0027
Vial (250 µL, cylindrical, polypropylene; 1000 vials)	6820.0029
Vial (1.1 mL, conical, crimp top; 500 vials)	6000.0077
Vial (1.2 mL, cylindrical, crimp top; 500 vials)	6000.0062
Vial (1.8 mL, amber; 100 vials)	6000.0072
Vial (2 mL, amber, for screw cap; 500 vials)	6000.0060
Vial (4 mL, amber, for screw cap; 100 vials)	6000.0074
Vial (10 mL vial, cylindrical), including crimp cap and seal (pack of 5)	6820.0023
Vial caps for 250 µL polypropylene vials (1000 caps)	6820.0028
Vial caps for 250 µL polypropylene vials (100 caps)	6820.0046
Vial caps for 1.1 mL vials (crimp cap with slotted silicone/PTFE septum; 100 caps)	6000.0076
Vial caps for 1.2 mL vials (crimp cap; 1000 caps)	6000.0064
Vial caps for 1.8 mL vials (crimp cap with septum, 100 caps)	6000.0071
Vial caps (screw caps, white) for 2 mL vials (500 caps)	6000.0057
Vial caps (crimp caps) for 5 mL vials (100 caps)	6000.0073
Vial holder (5-positions) for 10 mL vials	6820.4073
Vial septum for 2 mL vials (silicone, red, 500 septa)	6000.0058
Vials septum for 4 mL vials (silicone/PTFE, 500 septa)	6000.0075
Vial septum for 1.2 mL vials (silicone/PTFE, 8 mm, slotted; 500 septa)	6000.0061
Wash liquid reservoir (2 reservoirs), including: reservoir holder and tubing	6820.4075

## 10 Injection Modes

### 10.1 Full-Loop Injection

The switching sequence for a standard full-loop injection is as follows:

- When the sequence starts, the valve is in the **Inject** position. The needle has pierced the septum of the vial and is in the vial.
- The syringe draws the programmed flush volume from the vial; thus, removing any residual wash liquid by filling the needle with sample.
- When the injection valve is switched into the **Load** position, a "sharp" sample front is placed at the inlet of the sample loop.
- The sample loop is quantitatively filled by transporting two times the loop volume through the loop.
- The injection valve is switched into the **Inject** position. The sample loop becomes part of the mobile phase flow path; the sample is transported to the column and the analysis time starts.

The required amount of sample is:

$$\text{FlushVolume} + \text{Volume} \times \text{LoopOverfill}$$

Example:

$$80 \mu\text{L} + 20 \mu\text{L} \times 2 = 120 \mu\text{L}$$

The following picture illustrates the distribution of the liquids for a full-loop injection shortly before the injection is performed (and when a Wash was performed before):

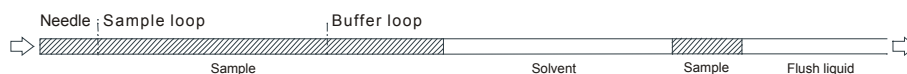


Fig. 60: Full-loop injection

## 10.2 Partial-Loop Injection

The switching sequence for a standard partial-loop injection is as follows:

- When the sequence starts, the valve is in the **Inject** position. The needle has pierced the septum of the vial and is in the vial.
- The syringe draws the programmed flush volume from the vial, thus, removing any residual wash liquid by filling the needle with sample.
- When the injection valve is switched into the **Load** position, a "sharp" sample front is placed at the inlet of the sample loop.
- The sample loop is filled by transporting the programmed injection volume into the sample loop.

You are free to choose the sample volume. However, if the injection volume exceeds 50% of the sample loop volume, the linearity will decrease considerably. In this case, Chromeleon issues a Warning. Chromeleon issues an Error if the injection volume is 100% of the sample loop volume.

- The injection valve is switched into the **Inject** position. The sample loop becomes part of the mobile phase flow path; the sample is now transported to the column and the analysis time starts.

The required amount of sample is:

$$\text{FlushVolume} + \text{Volume}$$

Example:

$$80 \mu\text{L} + 10 \mu\text{L} = 90 \mu\text{L}$$

The following picture illustrates the distribution of the liquids for a partial-loop injection:

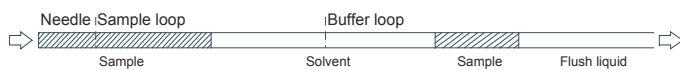


Fig. 61: Partial-loop injection



## 11 Appendix - Digital I/O (Pin Assignment)

The digital I/O ports provide four digital inputs and four relay outputs that can be used to exchange digital signals with external devices. The port numbering on the rear panel corresponds to the numbering of the relays and digital inputs in Chromeleon. The port numbering on the rear panel corresponds to the numbering of the relays and digital inputs in Chromeleon.

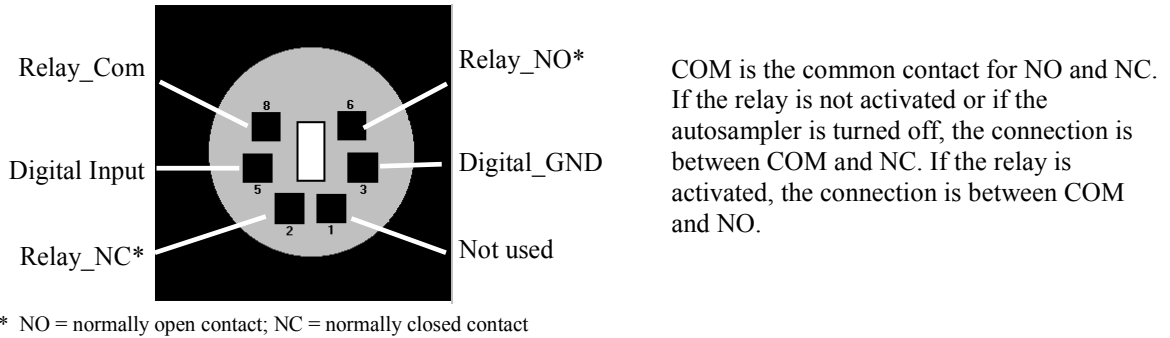


Fig. 62: Digital I/O (view from the rear)

	Description
Digital Input ↔ Digital GND	0 to +5V
Relay_Com ↔ Relay_NO (or Relay_NC)	Switching voltage: 100V DC; switching current: 0.25 A Carry current: 0.5 A; Switching capacity: 3W Contact resistance: max. 200 mΩ

Fig. 63: Digital I/O

To connect an external device to a digital I/O port, use the appropriate mini-DIN cable (part no. 6000.1004). The table lists the functions assigned to the connector pins. It also provides information about the core colors and core labels for each pin:

Pin	Signal Name	Signal Level	Core Color	Core Label
1	Not used		Pink	Analog High
2	Relay_NC	Max. 100V <sub>DC</sub> /0.25A/3W	Gray	Analog Low
3	Digital_GND	0V	Green	Digital GND
5	Digital Input	0 to +5V	Yellow	Digital Input
6	Relay_NO	Max. 100V <sub>DC</sub> /0.25A/3W	Brown	Digital Output
8	Relay_COM	Max. 100V <sub>DC</sub> /0.25A/3W	White	Dig./Out (GND)
			Black	Shield

Fig. 64: Pin assignment (6-pin Mini-DIN port and cable)



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