

# Thermo Scientific Dionex UltiMate 3000 Series

## Automated Fraction Collector AFC-3000

### Operating Instructions (Original Operating Instructions)



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## Declaration of Conformity

(Original Declaration)

**Product:** Thermo Scientific Dionex UltiMate 3000 - Fraction Collector

**Type:** AFC-3000

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

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

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

- DIN EN 61010-1:2001  
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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August 30th, 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 the fraction collector, Thermo Fisher Scientific recommends that you review the manual thoroughly before operating the fraction collector.

All descriptions in the manual apply to the AFC-3000 Automated Fraction Collector. Therefore, the term "the fraction collector" or "the AFC-3000" is used throughout the manual.

**Notes:** The device configuration may vary, for example, the fraction collector may be equipped with differing rack configurations; therefore, not all descriptions necessarily apply to your particular instrument. If some detail applies to only one fraction collector model or version, that model (version) is identified by name.

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

The descriptions in this manual refer to firmware version 1.03 and Chromeleon™ 6.80 Service Release 13.

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 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. The information contained in this document is subject to change without notice.

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




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## 1.2 Safety Information

The CE Mark label on the instrument indicates that the instrument is compliant with the related standards (→ page I).






### 1.2.1 Symbols on the Fraction Collector and in the Manual

The table below shows the symbols used on the fraction collector:

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





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

-  **Tip:** Indicates general information, as well as 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.

-  **Tip:** Before initial operation of the fraction collector, make yourself familiar with the contents of this manual.
- For the safety precautions in French, see page **Fehler! Textmarke nicht definiert.**
-  **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 device and refer to 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. 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.

**Operation with Normal-Phase Eluents:**

Do *not* perform normal-phase applications without a proper grounding protection for the drop former. Non-conductive, non-polar normal-phase eluents, for example hexane, can lead to a build-up of electrostatic charges on an ungrounded drop former. **The electrostatic discharge can create a fire and/or explosion hazard.**

Note that a grounded drop former (part no 6702.0400) is available for normal-phase (NP) applications. Use normal-phase eluents with the AFC-3000 Automated Fraction Collector *only* after it has been modified with this grounded drop former. **Operating the device without the grounded drop former can result in a fire and/or explosion hazard!**

- **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.
  - ◆ Always wear safety glasses when handling fused silica tubing, for example, during installation or when cutting capillaries to the length.
- Disconnect the fraction collector 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.
- Use only the original spare parts and accessories authorized for the device by Thermo Fisher Scientific.
- When operating the HPLC system, always set a lower pressure limit for the pump. This prevents damage resulting from leakage or from running the pump dry.
- The fraction collector weighs more than 8 kg (17.7 lbs). Therefore, you should use caution when lifting or moving the fraction collector.
- When lifting or moving the autosampler, always lift by the bottom or sides of the unit. This is to avoid damage to the instrument.
- After operation, rinse out buffers and solutions that form peroxides.
- Before switching from buffer to organic solution, rinse the analytical system thoroughly with deionized or HPLC grade water.
- When switching to another solvent, ensure that the new solvent is miscible with the one contained in the HPLC system. If the solvents are not miscible, the system can be damaged, for example, by flocculation.

- If a leak occurs, turn off the fraction collector immediately, stop the pump flow, and remedy the situation.
- Use only standard solvents (HPLC grade) and buffers that are compatible with all parts that may be exposed to solvents.
- To avoid personal injury, do not reach inside the sample area during a running analysis.
- Before interrupting operation for several days or more or when preparing the fraction collector for transport, observe the precautions for shutting down the instrument (→ page **Fehler! Textmarke nicht definiert.**).
- Do not use the fraction collector in ways other than those described in these *Operating Instructions*.
- 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 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 réglementé 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.

**Applications en phase normale:**

*N'effectuez pas* d'applications en phase normale sans vous être assuré que votre faiseur des gouttes est proprement isolée et mise à la terre. Les solvants de la phase normale, non-conducteurs et non-polaires, par exemple hexane, peuvent entraîner une accumulation de charges électrostatiques sur le faiseur des gouttes en l'absence de mise à la terre. **Le décharge électrostatique peut représenter un risque d'incendie et/ou d'explosion.**

Notez que un faiseur des gouttes isolée et mise à la terre est disponible pour applications en phase normale (référence 6702.0400). Utilisez les solvants de type phase normale *uniquement* avec le collecteur de fraction AFC-3000 modifié à l'aide du cette faiseur des gouttes isolée et mise à la terre. **L'utilisation du collecteur de fraction sans le faiseur des gouttes isolée et mise à la terre peut présenter un risque d'incendie et/ou d'explosion.**

- **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 tétrahydrofuran (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.
  - ◆ Portez des lunettes de protection lorsque vous manipulez des capillaires en silice fondue (pendant l'installation, découpe, etc.).
- Quand les capots de protection de l'appareil sont démontés, vous êtes exposés à des connexions électriques sous haute tension deviennent accessibles. Débranchez l'instrument 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.
  - Utilisez seulement des pièces de rechange originales et des accessoires autorisés par Thermo Fisher Scientific.

- Réglez toujours une limite de pression minimum pour la pompe HPLC. Ceci prévient les dommages résultant de fuites ou de long-terme fonctionnement à sec de la pompe.
- Le collecteur de fraction pèse plus de 8 kg (17.7 livres). Par conséquent, soulevez le collecteur de fraction avec précaution.
- Lorsque vous soulevez ou déplacez le collecteur de fraction, soulevez toujours par le bas ou les côtés, afin de ne pas endommager l'instrument.
- Après utilisation, purgez le système des tampons et des susceptibles de former des peroxydes.
- Lorsque vous passez d'une solution saline à un solvant organique, effectuez un rinçage intermédiaire du système HPLC à l'eau dé-ionisée ou qualité HPLC.
- Lorsque vous passez à un autre solvant, assurez-vous que le nouveau solvant soit miscible avec celui qui se trouve dans la pompe. Dans le cas contraire, la pompe peut être endommagée; par exemple, par des floculations!
- Si une fuite se produit, arrêtez immédiatement l'instrument, stoppez le débit de la pompe et remédiez au problème.
- Utilisez uniquement des solvants (qualité HPLC) et des solutions salines compatibles avec les matériaux exposés phase mobiles.
- Afin d'éviter des blessures corporelles, ne mettez pas la main à l'intérieur du compartiment à échantillons lorsqu'une analyse est en cours.
- Avant d'interrompre le fonctionnement pendant plusieurs jours ou plus, observez les précautions figurant en page **Fehler! Textmarke nicht definiert.**
- N'utilisez pas l'instrument 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 fraction collector is designed for laboratory research use in high-performance liquid chromatography (HPLC) and ultra-high performance liquid chromatography (UHPLC) applications. The fraction collector is part of the UltiMate 3000 system, but can also be used with other systems. A control computer with RS-232 *or* USB port is required.

The fraction collector is controlled by the Chromeleon Chromatography Management System.

Observe the following for using the fraction collector:

- The fraction collector has been designed for the multidimensional separation of biomolecules with aqueous and polar organic mobile phases, for example methanol, that are commonly used in reversed-phase (RP) liquid chromatography. For normal-phase (NP) applications, observe the safety instructions for the fraction collector on page 4. For the safety instructions in French, see page 7.
- The fraction collector may be operated only using the components originally supplied with the unit and within the technical specifications and environmental conditions (→ page 71) that are outlined in this manual.
- Use only standard solvents (HPLC grade, preferably LC-MS grade (0.2 µm filtered)) and buffers, compatible with the flow path materials. Note any special properties of the solvents such as viscosity, boiling point, UV absorption (UV/VIS detector), refractive index (refractive index detector), and dissolved gas (degasser).

If there is any question regarding appropriate usage, contact Thermo Fisher Scientific before proceeding.



**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

The fraction collector can be operated with the UltiMate 3000 or any other (U)HPLC system. The design has been optimized for robust and easy use as well as for minimized carry-over volume. A wide range of fraction collection formats and a flow range up to 150 mL/min guarantees a maximum of flexibility.

- A universal drip tray accommodates a large variety of fraction collection racks and collects spilled solvent. For detailed information about the supported rack types see section 2.6 (→ page 20).
- The universal drip tray includes an integrated drain at its front left corner to guide spilled solvents into a waste container.
- The diverter valve is mounted to a height-adjustable plate to allow closest possible positioning over a fraction collection tube and to cut down the carry-over volume to a minimum.
- A field-upgradable grounded drop former is available for normal-phase (NP) applications.
- The fraction collector is designed for easy access to the fluidic components, allowing fast and reliable maintenance.
- 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.
- The fraction collector is controlled by the Chromeleon Chromatography Management System.
- Connection of the fraction collector to the Chromeleon computer is achieved by using either a RS-232 serial *or* USB cable.

## 2.2 Operating Principle

The AFC-3000 Automated Fraction Collector collects fractions from the UltiMate 3000 or any other HPLC system. A solenoid diverter valve directs the flow either to the waste or to the fraction collection tubes. When Chromeleon sends a trigger signal to the AFC-3000 calling for fractions to be collected, the diverter valve moves over the assigned collection tube and is then switched to route eluent flow into the tube.

During any movements, all tubes remain stationary while the moving diverter valve assembly positions the drop former over the appropriate tube or above the rinse station.

The fraction collector includes the following fluidic components:

Component	Description
Sample inlet capillary	Eluent is supplied from the detector outlet to the common (inlet) port of the diverter valve through this tubing.
Diverter valve	This valve directs the eluent from the detector to either waste or to a collection tube.
Drop former	This component is attached to the diverter valve and forms droplets or a jet of eluent for collection into tubes.
Waste tubing	This tubing connects the waste outlet port of the diverter valve to a waste container or to a drainage system.
Rinse station	A tube-like shaped port, which is mounted to the head of the fraction collector. The outlet of this station is connected to a waste container or a drainage system through a tubing.
Collection tube	The tube into which eluent/sample is collected.

The fraction collector includes the following axis components:

Axis Component	Description
X	When facing the front of the unit, the left to right movement axis of the fraction collector arm.
Y	When facing the front of the unit, the fore and aft movement axis of the diverter valve assembly on the fraction collector arm.
Z	The manually adjustable height axis of the diverter valve assembly.

## 2.3 Fraction Collector Configurations

The fraction collector is available in the following standard configuration for flow rates up to 150 mL/min:

Description	Part No.
AFC-3000 Automated Fraction Collector, including: - two 90 position racks - 180 x 8 mL tubes, 13 mm OD - 1.6 mm ID diverter valve and 1 mm ID PEEK drop former	5702.1000

### Kit for low flow rates

A kit for flow rates up to 10 mL/min is available. It includes a different diverter valve, which replaces the standard valve.

Description	Part No.
Kit for low flow rates, including: 1.0 mm ID diverter valve with 0.4 mm ID PEEK drop former	6702.0300

### Kit for normal-phase LC

In addition to the standard and low-flow PEEK drop formers, Thermo Fisher Scientific offers a stainless steel drop former with 1.0 mm ID for use with normal-phase solvents. The stainless steel drop former provides grounding via the diverter valve cable and is suitable for flow rates up to 150 mL/min.

Description	Part No.
Kit for normal-phase LC, including: 1.0 mm ID stainless steel drop former with grounding cable	6702.0400



#### Warning:

Do *not* perform normal-phase applications without a proper grounding protection of the drop former. Non-conductive, non-polar normal-phase eluents, for example hexane, can lead to a build-up of electrostatic charges on an ungrounded drop former. **The electrostatic discharge can create a fire and/or explosion hazard.**



**Avertissement:** *N'effectuez pas* d'applications en phase normale sans vous être assuré que votre faiseur des gouttes est proprement isolée et mise à la terre. Les solvants de la phase normale, non-conducteurs et non-polaires, par exemple hexane, peuvent entraîner une accumulation de charges électrostatiques sur le faiseur des gouttes en l'absence de mise à la terre. **Le décharge électrostatique peut représenter un risque d'incendie et/ou d'explosion.**

For information about the optional accessories that are available for the fraction collector, see section 9.2 (→ page 74).

## 2.4 Front Panel Elements

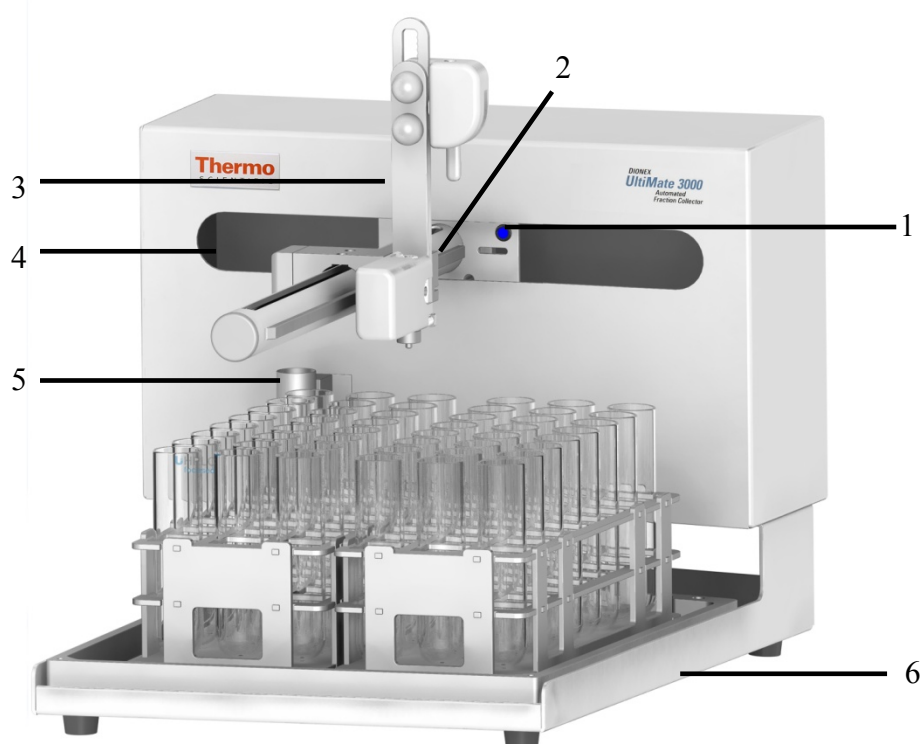
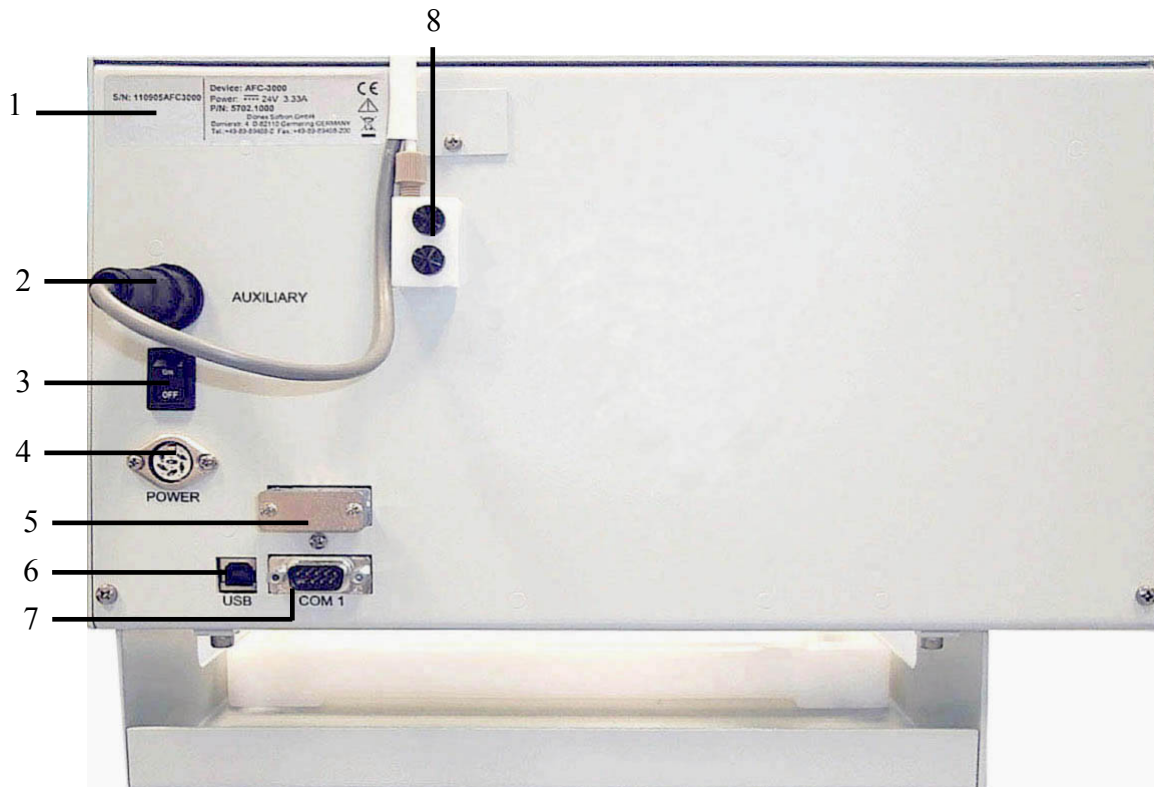


Fig. 1: Front panel view

No.	Front Panel Element	Description
1	Power indicator LED	The LED is illuminated blue when the fraction collector is turned on.
2	Fraction collector arm	Transports the diverter valve assembly fore-and-aft (→ see also section 2.2, page 14).
3	Diverter valve assembly	Assembly to which the diverter valve is attached. The mounting height of the diverter valve assembly is manually adjustable to attain the proper clearance above the collection tubes and rinse station.
4	X travel slot	Front cover opening which facilitates travel of the fraction collector arm in the right-to-left, or 'X' direction (→ see also section 2.2, page 14).
5	Rinse station	The tube shaped port, mounted to the cabinet of the fraction collector, where eluent may be dispensed and delivered to the waste. The outlet of the rinse station is connected to a waste container or drainage system.
6	Universal drip tray with drain	Drip tray which allows mounting of supported rack types. The tray guides spilled solvents into a waste container.

## 2.5 Rear Panel



*Fig. 2: Rear panel view*

No.	Description
1	Type label
2	Auxiliary I/O connection Connects to diverter valve assembly to provide power to the diverter valve and grounding to the stainless steel drop former (if equipped).
3	Power switch
4	Main power receptacle
5	Serial communication port (unused)
6	USB port (Universal Serial Bus) for connection to the Chromeleon computer
7	COM 1 RS-232 port (serial) for connection to the Chromeleon computer
8	Mounting block of diverter valve assembly



### **2.5.1 Power Switch**

The power switch on the rear panel is the main power switch for the fraction collector. Turn on the power switch before initial operation of the fraction collector. Turn off the main power switch when instructed to do so, for example, before performing a service procedure or when interrupting operation for longer time periods. In this case, also observe the safety precautions outlined in this manual.

### **2.5.2 USB Port**

You can use a USB connection to connect the fraction collector to the Chromeleon computer, for example, if no RS-232 COM port is available. The communication data is transferred digitally via the appropriate USB cable. However, a USB converter software must be installed so that Chromeleon can communicate with the fraction collector. To ensure trouble-free operation, all USB cables must be ordered from the Thermo Fisher Scientific sales organization for Dionex HPLC Products.

For information about how to connect the fraction collector to the Chromeleon computer, see section 3.4 (→ page 35).

### **2.5.3 RS-232 (Serial) Port**

The Chromeleon Chromatography Management System uses a serial connection (RS-232) to control the fraction collector. The communication data is transferred digitally via the appropriate RS-232 cable. To ensure trouble-free operation, all RS-232 cables must be ordered from the Thermo Fisher Scientific sales organization for Dionex HPLC Products.

### **2.5.4 Auxiliary I/O Connection**

The auxiliary I/O connection is used to provide power to the diverter valve and grounding to the stainless steel drop former. The appropriate cable is pre-installed on the diverter valve.

## 2.6 Universal Fraction Tray, Racks and Tubes

The fraction collector supports a large variety of fraction collection racks, including most of the Isco Foxy Jr./R1 and wellplate sampler racks. For information about how to install a rack, see page 30.

The following rack types are supported:

Rack/Adapter for	Tube Size	Part No.
21 tubes	50 mL; 30 mm x 100 mm A funnel rack (part no. 6702.1021) in conjunction with this rack allows collecting fractions of unlimited volumes into appropriate vessels.	6702.0021
24 tubes	30 mL; 24 mm x 100 mm	6702.0024
40 tubes	20 mL; 20 mm x 100 mm	6702.0040
60 tubes	14 mL; 16 mm x 100 mm	6702.0060
90 tubes	8 mL; 13 mm x 100 mm	6702.0090
60 tubes (Foxy Jr./R1)	1.5 mL	5701.2023
72 tubes (Foxy Jr./R1)	Mini tubes, 18 mm OD	5701.2024
36 vials (Foxy Jr./R1)	Scintillation vials, 28 mm OD	5701.2025
2 well plates (Foxy Jr./R1)	Two 96 well plates	5701.2021
40 vials (WPS-3000)	2 mL, 12 mm OD In addition, a rack adapter (part no. 6702.0100) is required. The vials should have an opening as large as possible for unerring fractionation.	6820.4070
22 vials (WPS-3000)	4 mL, 15 mm OD In addition, a rack adapter (part no. 6702.0100) is required.	6820.4084
10 vials (WPS-3000)	10 mL, 22 mm OD In addition, a rack adapter (part no. 6702.0100) is required.	6820.4086
4 well plates	Four 96 well plates	6702.0200

In addition, up to six 250 mL Schott bottles (part no. 2270.0026) can be placed directly on the universal drip tray.

To ensure correct installation of the Foxy racks, a set of positioning pins is available from Thermo Fisher Scientific (part no. 6702.9006).

For details on rack installation and allowed combinations of fraction formats, see section 3.3.5, page 30.

## 2.7 Chromeleon Software

The fraction collector can exclusively be controlled by the Chromeleon Chromatography Management System. For operating the fraction collector with Chromeleon, the following licenses are required:

- Timebase Class 1
- **Fraction Collection** (part no. 5960.0038)  
for *basic* fraction collection, with wizard-based program setup and fraction reporting.  
—or—
- **Extended Fraction Collection** (part no. 5960.0039)  
for *advanced* fraction collection. The **Extended Fraction Collection** license includes the **Fraction Collection** license. In addition, it supports functions for advanced fraction collection, such as automatic sample purification via the associated post-acquisition steps, color-coded sample and fraction tracking, and sophisticated fractionation algorithms with peak shoulder detection.

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

Two modes of software control are available:


- **Direct Control**  
With direct control, you select operating parameters and commands in the Chromeleon **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 46.
- **Automated Control**  
With automated control, you use a program file. This is a list of control commands, executed in chronological order for automated operation of the fraction collector. For more information about automated control, see page 52.




## 3 Installation

### 3.1 Facility Requirements

The AFC-3000 operates reliably even under less than ideal conditions. It is not, however, indestructible. Malfunction or damage can occur if specific operating conditions are not met. Meeting these conditions requires that you create a proper lab environment, replace fraction collector components that wear out under normal use, and purchase the appropriate supplies for use with the fraction collector.


 **Important:** Damage or malfunction that results from unsatisfactory operating conditions may constitute misuse or abuse and may therefore be excluded from warranty coverage.


 **Important:** Dommage ou de dysfonctionnement qui résulte de conditions d'exploitation insatisfaisantes peut constituer une utilisation abusive ou l'abus et être exclu de garantie.

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 71).
- Install the instrument in the laboratory on a stable surface that is free of vibrations.
- Avoid rough handling of the AFC-3000. Do not expose the fraction collector to vibration or shock.
- Make sure that the surface is resistant to solvents.
- Avoid locations with extreme changes in temperature (for example, caused by direct sunlight or drafts) and high humidity.
- Allow sufficient clearance behind and on the sides of the fraction collector for power connections and ventilation.
- Make sure the unit is not exposed to excessive flammable or corrosive materials.
- Protect the fraction collector from long-term exposure to condensation, corrosive materials, solvent vapor, continual standing liquids, or large spills into the fraction collector cabinet or fraction collector arm. Exposures of this type can damage the drive mechanisms as well as the electronics.

- Observe the same general electrostatic discharge precautions as with any other integrated circuit electronic devices. Low-humidity environments, especially when combined with static-generating materials, require maximum care.


 **Important:** Discharge static buildup and ground to the fraction collector base or cabinet before performing any maintenance. Do not touch or short-circuit bare contacts (for example, COM1 or auxiliary ports).

 **Important:** Déchargez accumulation d'électricité statique et mettez à la terre la base et le cabinet du collecteur de fractions avant de procéder à tous travaux d'entretien. Ne touchez ou court-circuitiez pas des contacts nus (par exemple, COM1 ou ports auxiliaires).


- Avoid using the AFC-3000 if strong electromagnetic interference, radio frequency interference, or radioactivity is present. Interference fields can cause erratic operation of the fraction collector. The fraction collector will not function properly if the level of radioactivity is above background.


## 3.2 Unpacking

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


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


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

 **Important:** Ship the unit only in the original shipping container and observe the packing instructions. Shipping the unit in any other packaging automatically voids the warranty. For more information, see the warranty statement in the terms of sale.

 **Important:** Expédier l'unité uniquement dans le conteneur d'expédition original et d'observer les instructions d'emballage. L'unité dans toute autre emballage automatiquement d'expédition, la garantie en vides. Pour plus d'informations, consultez la déclaration de garantie dans les conditions de vente.

1. Place the shipping container on the floor and remove any accessories.
2. Grasp the fraction collector by the sides. Slowly and carefully, pull the instrument out of the shipping container and place it on a stable surface.

 **Important:** The fraction collector weighs more than 8 kg (17.7 lbs). Therefore, you should use caution when lifting the fraction collector. To prevent the unit from falling, always lift by the bottom or the sides of the unit. Do not lift the fraction collector by the packing material.

 **Important:** Le collecteur de fraction pèse plus de 8 kg (17.7 livres). Par conséquent, soulevez le collecteur de fraction avec précaution. Afin d'empêcher l'instrument de tomber, saisissez-la par le bas ou les côtés de l'unité. Ne soulevez l'instrument à l'aide du matériau d'emballage.

3. The fraction collector is encased in protective wrap and is fitted with form-fitting foam spacers, which allow for secure placement and positioning inside the shipping box. Remove the foam spacers, and then remove the protective wrap.
4. Before connecting the fraction collector to the power source, wait 4-8 hours to allow the instrument to adapt to room temperature and to allow any condensation that might have occurred during shipping to evaporate. After 4-8 hours, check the fraction collector; if condensation still exists, allow the fraction collector to continue to warm up (without connecting it to the power source) until any condensation is completely gone.


### 3.3 Installing the Fraction Collector


The AFC-3000 is designed for easy installation consisting of two parts; assembling the fraction collector and connecting it to the analytical instrument.

For the most part, you can install the AFC-3000 without using tools. In fact, using tools such as screwdrivers or pliers to perform most installation tasks may result in a damaged or unusable instrument. You can remove the knurled screws with tools if necessary, but do not tighten them with anything other than your fingers.

To install the fraction collector, you must complete the following tasks (each of these tasks will be discussed in detail later in this section):

- Mount the diverter valve assembly (→ page 27)
- Establish connections on the diverter valve (→ page 28)
- Attach the rinse station (→ page 29)
- Connect the rinse station tubing (→ page 29)
- Check the proper alignment of the universal drip tray
- Place the fraction tube racks on the tray (→ page 30)
- Set the drop former height adjustment (→ page 33)
- Establish external connections (→ page 35)
- Set up the fraction collector in Chromeleon (→ page 39)

 **Important:** Ensure that the power is off before proceeding with installation.

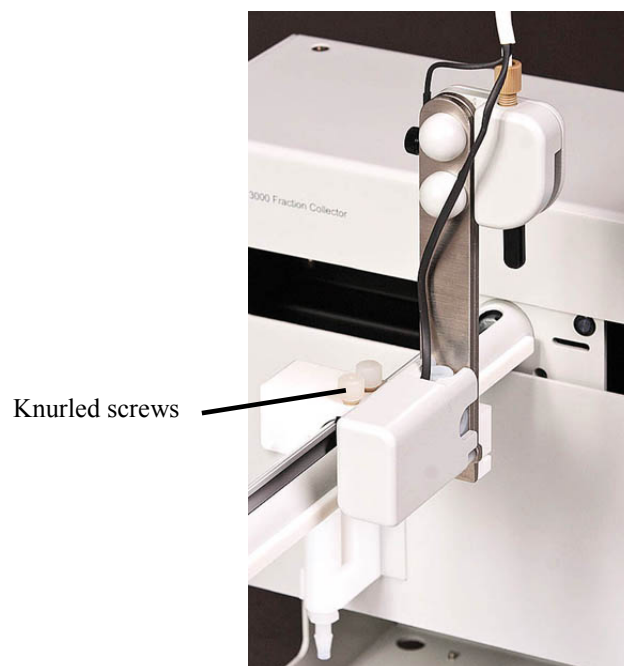
 **Important:** Assurez-vous que l'alimentation secteur est éteint avant de procéder à l'installation.



### 3.3.1 Mounting the Diverter Valve Assembly

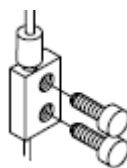
Mounting the diverter valve assembly on the fraction collector arm is the first major task. The diverter valve assembly attaches to the fraction collector arm using two knurled finger-tight screws.

1. Place the diverter valve assembly on the fraction collector arm and mount it with two knurled finger-tight screws. No tools are required to fasten the screws. Fig. 3 shows the assembly attached.



*Fig. 3: Diverter valve assembly*

2. Attach the mounting block to the AFC-3000 rear panel with the finger-tight mounting block screws provided (→ Fig. 4).



*Fig. 4: Attaching the mounting block*

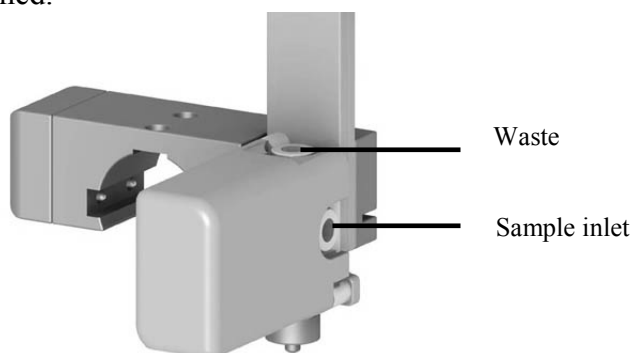
3. Connect the diverter valve cable to the auxiliary I/O connection on the AFC-3000 rear panel (→ Fig. 2, page 18). Tighten the knurled nut finger-tight.
4. Screw the PEEK drop former finger-tight into the diverter valve.

### 3.3.2 Diverter Valve Connections

When connecting capillaries to the fraction collector, observe the following general precautions:

- Observe the precautionary statements for capillaries and capillary connections in section 1.2.2 (→ page 3).
- When you connect capillaries, make sure that the connectors are free from contaminants. Even minute particles may cause damage to the system.
- Use only the capillaries shipped with the fraction collector and original Dionex spare capillaries.

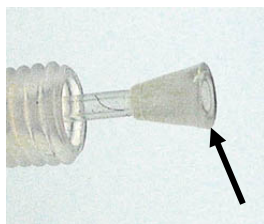
Connect the waste and sample inlet tubing to the diverter valve. Verify that the tubings are properly connected and tightened.



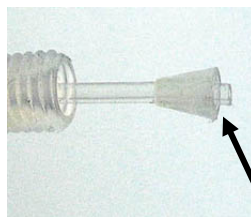
*Fig. 5: Connections on the diverter valve*

Note the following when connecting the sample inlet:

In order to make sure that the capillary end is not pushed into the valve bore, place the ferrule at the capillary end so that the capillary does not protrude from the ferrule (→ Fig. 6). Then carefully install the capillary.



*right*



*wrong*

*Fig. 6: Connecting the sample inlet tubing to the diverter valve*

### 3.3.3 Attaching the Rinse Station

The rinse station is located at the extreme left position of the fraction collector head (→ Fig. 1, page 17). This station is used to dispense liquid to waste through normal operation of the HPLC system operation. The dispensed liquid is evacuated by gravity drain via a gravity drain arrangement into a waste reservoir.

The rinse station is installed in its holding bracket at shipment, but can be removed easily by pulling the station out of the bracket. The rinse station easily “snaps” back into place.

**i Tip:** Ensure that the height of the drop former and rinse station is properly adjusted to avoid crashes (→ section 3.3.6, page 33 and section 4, page 34).

### 3.3.4 Connecting the Drain Tubing

The rinse station drain tubing attaches to the rinse station. Use an elbow piece (shipped with the fraction collector) to connect the drain tubing to the rinse station (→ Fig. 7). Connect another drain tubing in the same way to the integrated drain at the front left corner of the drip tray. You can use the Y piece shipped with the fraction collector to connect the two drain tubes to a single drain. You can also connect them to an UltiMate 3000 drain system, if applicable. The tubing should be routed to an appropriate waste container or drainage system.

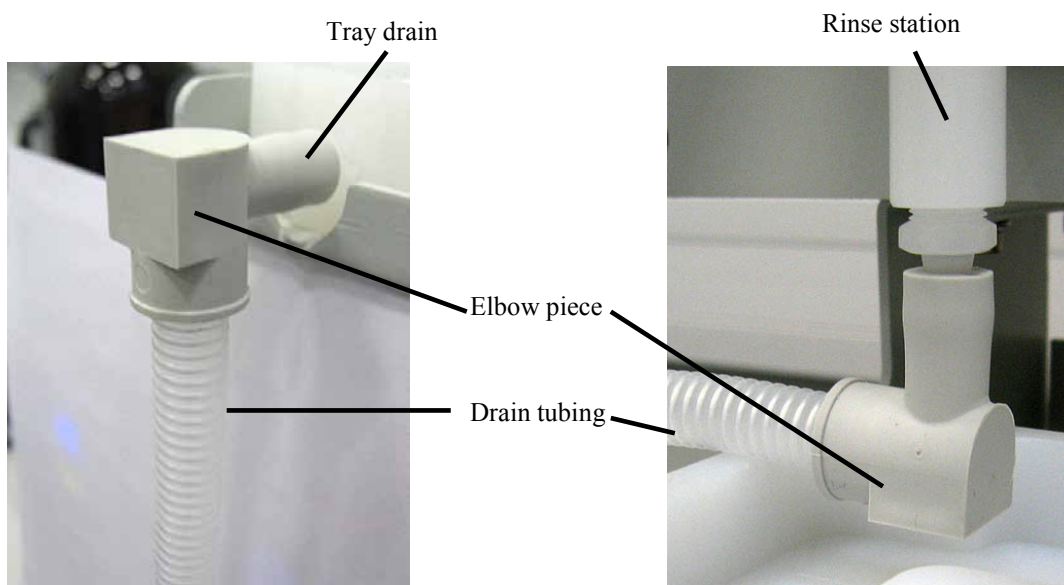
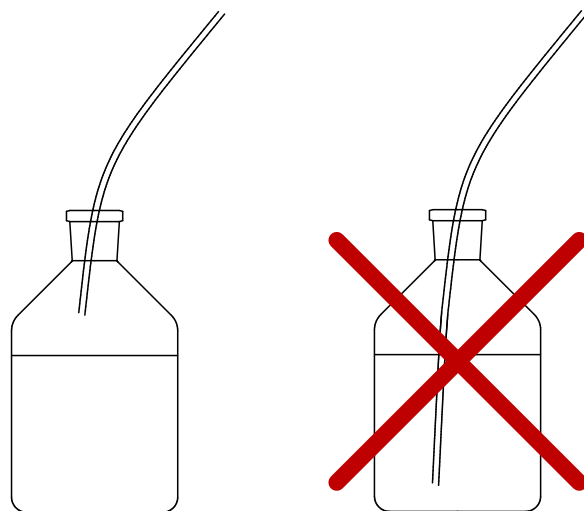


Fig. 7: Connection of the drain tubing

Place the waste container below the fraction collector to allow any liquids to flow off. Ensure that the free end of the tubing inside the waste container is *always above* the liquid level. If necessary, shorten the tubing.

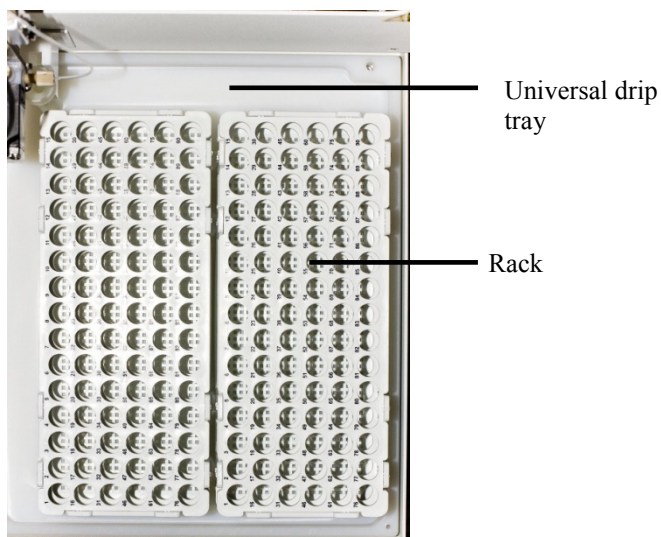


*Fig. 8: Rinse station tubing in waste container*

### 3.3.5 Placing Fraction Racks on the Universal Drip Tray

The fraction tube racks in the AFC-3000 accessories kit are shipped unassembled. First, assemble the racks using the supplied instructions. Then, position them on the universal drip tray, using care to line up the rack locating pins with the associated recesses in the tray (Fig.9).

Other rack types such as Thermo Scientific Dionex well-plate sampler racks and the 4 x 96 well plates require special adapters which can be ordered separately. The adapter block is correctly installed on the drip tray in one position only, when the recess on the bottom of the adapter block is properly aligned with the elevated parts of the drip tray.



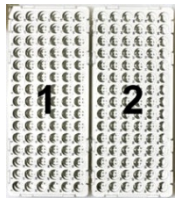
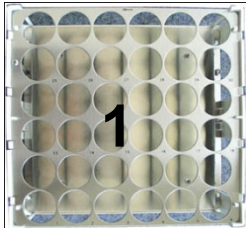

*Fig.9: Racks placed in universal drip tray*

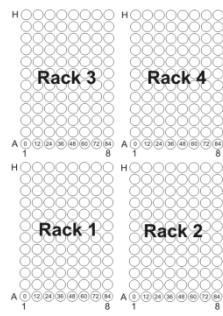

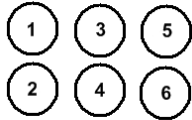
**⚠ Important:** Before loading or unloading any fraction racks on the universal drip tray, move the arm with the drop former to the home position by cycling the power off and on (or by sending the **RinsePosition** command). Never attempt to load, unload, or reposition a fraction rack or fraction tube while the fraction collector is operating.

**⚠ Important:** Avant de charger ou décharger aucun des racks de tubes de fraction du plateau de fractions, parquez le bras avec le générateur des gouttes en position d'origine par éteindre et allumer consécutivement l'instrument (ou donner la **RinsePosition** commande). Jamais tentez charger, décharger ou repositionner un des racks de tubes de fraction ou un tube de fraction tandis que le collecteur de fraction est en operation.

When installing funnel racks on the 21-position rack, connect tubing (shipped with the rack) to each funnel and route the tubing to an appropriate container or bottle. Observe the instructions for drain tubing (→ page 29).

Depending on the rack type, you can install a certain number of racks, deep well plates, or bottles. The maximum number of racks and the order in which the racks must be placed and configured in Chromeleon can be taken from table on page 31. The rack layout is shown facing the front of the unit. Note that it is not allowed to install a rack, for example, in position 2 if no rack is installed in position 1. For details on setting the racks in Chromeleon, refer to section 5.2.3 (→ page 49).

Fraction rack	Maximum number of racks/bottles	Rack layout
21Pos, 24Pos, 40Pos, 60Pos, 90Pos	Two racks can be installed on the universal drip tray, holding the specified number of tubes. Any two racks may be used together at one time.	
36Pos_Foxy, 60Pos_Foxy, 72Pos_Foxy	One Foxy rack can be installed on the universal drip tray, holding the specified number of tubes.	
96Pos_Foxy	Two well plates (96 positions) can be installed on the Foxy well plate holder.	

Fraction rack	Maximum number of racks/bottles	Rack layout
96Pos	Four well plates (96 positions) can be installed on the well plate adapter. Well plates must not be mixed with other rack types.	
10Pos_WPS, 22Pos_WPS, 40Pos_WPS	Four WPS-3000 well-plate sampler racks can be installed on the rack adapter. Any four racks may be used together at one time.	
Bottle	Six 250 mL Schott bottles can be placed directly on the universal drip tray. You must always install all six bottles. It is not possible to mix bottles with other rack types.	

### Foxy rack positioning pins

When Foxy Jr./R1 racks are used, Thermo Fisher Scientific recommends installing two positioning pins (part no. 6702.9006) to prevent incorrect installation and orientation of a Foxy rack. Place the pins in the holes provided in the universal drip tray. With the pins installed, a Foxy rack cannot be installed incorrectly on the universal drip tray.

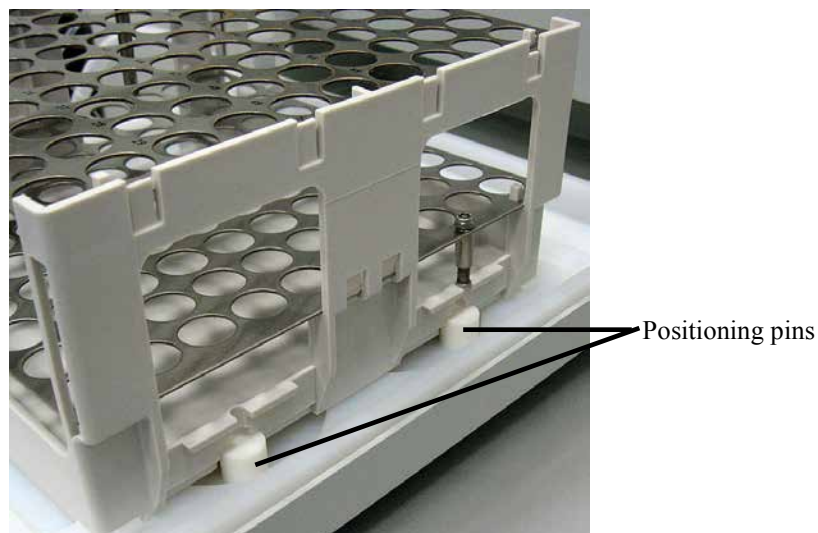


Fig. 10: Positioning pins for Foxy racks



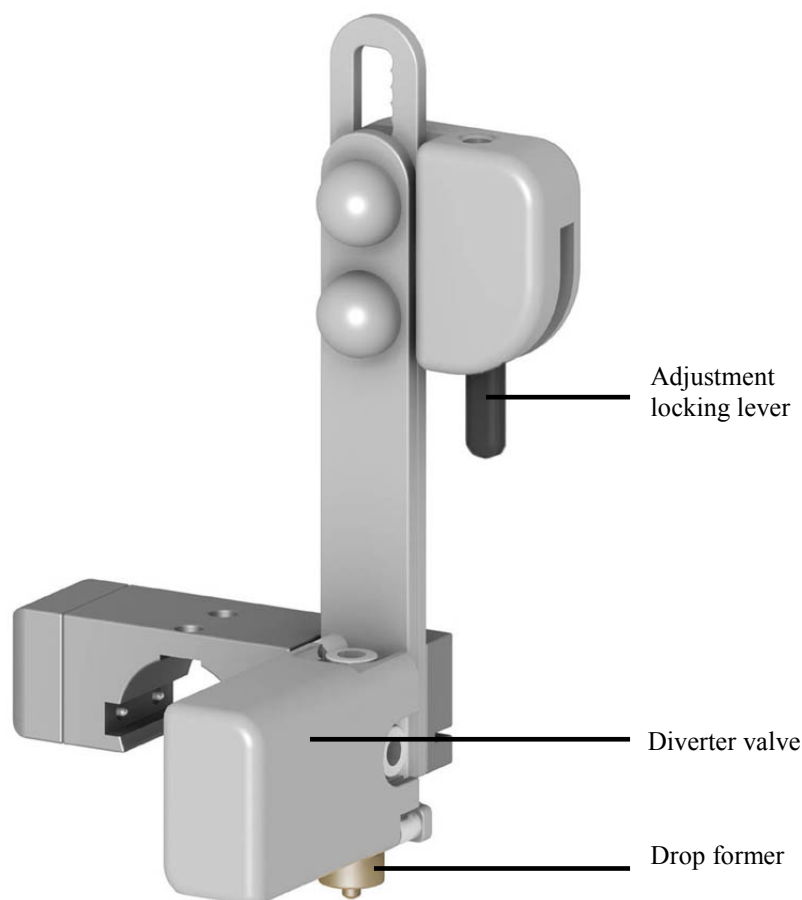
- i** **Tip:** To prevent the universal drip tray from accidentally being lifted out of its proper position, always remove the rack adapter toward the side as shown here:



*Fig. 11: Removing the rack adapter*

### 3.3.6 Adjusting the Drop Former Height

1. Grasp the diverter valve assembly firmly by the vertical stainless steel element while rotating the adjustment locking lever upward. This will unlock the slider assembly, allowing you to move it up and down freely (→ Fig. 12).
2. Slide the assembly so that the drop former is several millimeters above the highest point of the fraction tubes or vials. Adjust as needed.
3. Grasp the diverter valve assembly firmly by the vertical stainless steel element while rotating the adjustment locking lever downward. This will lock the diverter valve assembly so that its height is fixed. If the lever cannot be moved downward easily, the diverter valve assembly may not be positioned properly in one of the grooves.



*Fig. 12: Diverter valve assembly with drop former*

- Slide the rinse station up or down in its holder so that the lowest part of the drop former is slightly above the top of the rinse station when it is in the rinse position.

**i Tip:** This setting ensures that the diverter valve assembly will not impinge on the rinse station during movement, while allowing for the minimum distance between those two components to minimize the risk of eluent being dispensed outside of the rinse station barrel. In case of an obstruction during the movement of the drop former, the device will turn off after ca. 20 seconds to avoid damage.

- Turn the fraction collector off and manually move the diverter valve assembly to the four corner positions of the installed fraction racks. This is to verify that the adjusted height is suitable for all positions despite any tolerances that may exist.



## 3.4 Connecting the Fraction Collector

The next steps in the installation process involve connecting the AFC-3000 to the power source and to the Chromeleon computer. The following sections explain how to establish these connections.

### 3.4.1 Connecting the External Desktop Power Supply

A voltage-specific external desktop power supply is delivered with each AFC-3000.

Use the external desktop power supply shipped with the fraction collector to connect the instrument to the main power source:

1. Place the AFC-3000 within 1.2 meters of a power outlet.
2. Connect the external desktop power supply to the DC power input connector on the rear panel of the fraction collector (→ Fig. 3, page 19).
3. Connect the supply side of the power supply to the power source that is connected to a true ground.

The input rating is AC 100V-240V 1.9 A with an output of DC 24V, maximum 3.33 A. No manual adjustment is required to 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.



**Important:**

The AFC-3000 is intended to operate from an AC power source that will not apply more than 240V AC between the supply conductors and ground. A protective ground connection by way of the grounding connector in the power cord is required for safe operation.




**Important:**

L'AFC-3000 est destiné à fonctionner d'une source d'alimentation courant alternatif qui s'appliquera pas plus que 240V courant alternatif entre le conducteur et la terre. Une connexion de protection à la terre par le fil neutre dans le fil d'alimentation est nécessaire pour la sécurité d'exploitation.

### 3.4.2 General Communications Information

To connect the fraction collector to the Chromeleon computer, select *one* of the following alternatives:

- Use an RS-232 cable (part no. 8914.0153, shipped with the instrument) to connect the **COM 1** port on the rear panel of the fraction collector to a serial COM port on the computer (→ section 3.4.3, page 36).
- Use a USB cable (part no. 6911.0002, shipped with the instrument) to connect the USB port on the rear panel of the fraction collector to a USB port on the computer.  
To use USB, a virtual COM port has to be installed to the Chromeleon computer (→ section 3.4.4, page 36).

 **Tip:** When interconnecting any computing devices, keep the communications cables away from sources of electromagnetic or radio frequency (RF) interference, such as electric motors, transformers, fluorescent light ballasts, or RF energy sources.

### 3.4.3 Communication via RS-232

To establish connection via a serial (RS-232) cable:

1. Connect the cable to **COM 1** serial (RS-232) port on the rear panel of the fraction collector (→ Fig. 2).
2. Connect the cable to a serial (RS-232) port on the Chromeleon computer

### 3.4.4 Communication via USB

Before you can operate the fraction collector with Chromeleon via USB, an additional virtual COM port must be created on the Chromeleon computer. Select this new COM port when configuring the fraction collector in Chromeleon (→ page 41).


The required drivers are usually *found and installed automatically* when the fraction collector is plugged in. If this is *not* the case, complete the following steps:

#### Installing the Virtual COM Port on the Chromeleon Computer

1. Locate the **Drivers\USB Virtual COM Port** folder on the Chromeleon Service Release DVD.
2. Check which files are contained in the folder (the shipped driver version depends on the Chromeleon version):
  - *The folder contains the **CDM 2.06.00.exe** file (or a later version):* Double-click the file. This will install the drivers.


- The folder contains the **2.08.24** folder (or a higher number) and further sub folders and PDF files: The installation instructions (PDF file) for the drivers can be found in this folder. Install the drivers as described in the instructions for your operating system.

### Connecting a USB Cable

 **Tip:** Verify that Chromeleon is installed on the computer and that the license code is entered *before* you connect the fraction collector to the Chromeleon computer.

To establish a connection via a USB cable:

1. Turn on both the Chromeleon computer and the fraction collector.
2. Plug one end of the USB cable into the USB port on the Chromeleon computer and the other end to the USB port on the fraction collector.

 **Tips:** As an alternative, you can connect the fraction collector to the internal USB port on another module in the UltiMate 3000 system that is connected to the Chromeleon computer, or connect the fraction collector to the Chromeleon computer via an external USB hub (→ Fig. 13, page 38).

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. The required drivers (USB Serial Converter and USB Serial Port) are usually found and installed automatically (see below). If this is not the case, install the drivers manually as described above under *Installing the Virtual COM Port on the Chromeleon Computer*.

*Windows Vista, Windows 7 and Windows Server 2008*

will automatically detect the fraction collector and perform the USB installation. The message "Your device is ready to use" appears. When you open the message, you can see the number of the new virtual COM port (e.g., COM3).

*Windows XP*

will automatically detect the fraction collector and launch the **Found New Hardware Wizard**, which guides you through the installation of the USB Serial Converter:

- ◆ If asked whether Windows can connect to Windows Update to search for software, select **Yes, this time only**. If no internet connection is available, you must manually install the drivers as described in section 2.2.
- ◆ Click **Finish** when the wizard reports that the software has been installed.
- ◆ The **Found New Hardware Wizard** is launched again. Repeat the same steps for installation of the USB Serial Port.

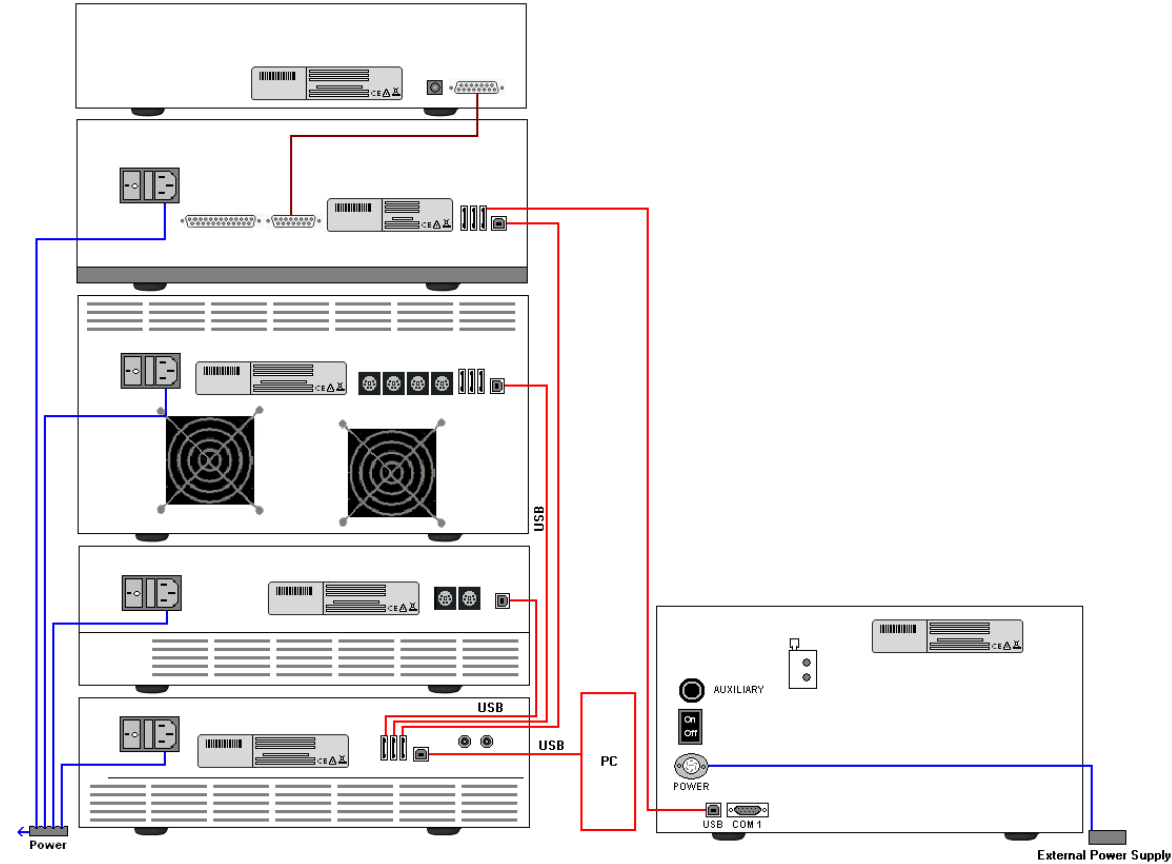




Fig. 13: Rear panel connections on an UltiMate 3000 system with AFC-3000 (Example)

## 3.5 Setting Up the Fraction Collector in Chromeleon


This section provides brief instructions for installing and configuring the fraction collector in Chromeleon.


 **Tip:** The minimum requirement for control of the AFC-3000 is Chromeleon 6.80 SR7e (Driver Update).


### 3.5.1 Installing the Fraction Collector

1. Start 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**.

2. Click **Start** to start the server.
3. Click **Close** to close the Chromeleon Server Monitor window. The Server Monitor icon  appears on the taskbar.

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

4. 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**.
5. If necessary, click the plus sign beside the server icon  to display the items underneath.
6. Select the timebase to which the fraction collector will be assigned, or create a new timebase (on the **Edit** menu, click **Add Timebase**).
7. 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.
8. On the **Manufacturers** list, click **Dionex** and on the **Devices** list, click **AFC-3000 Fraction Collector**.
9. There are three configuration tab pages. Make the required settings on the first two tab pages. For more details, see section 3.5.2.
10. Click **OK** to complete the installation of the fraction collector.

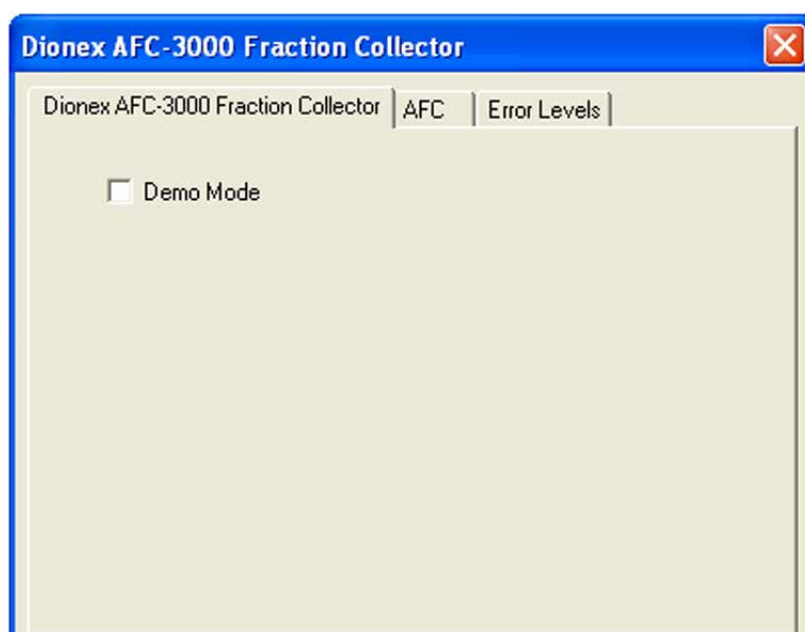
11. Open the **Add device to timebase** dialog box again. On the **Manufacturers** list, click **Generic** and on the **Devices** list, click **Fraction Collection**. Accept the settings on the two configuration pages, then click **OK**.
12. On the **File** menu, click **Save Installation** and then close the Server Configuration program.

### 3.5.2 Configuring the Fraction Collector

This section describes the settings that must be made on the first two configuration pages.

#### Dionex AFC-3000 Fraction Collector Page

On this page, you can activate or deactivate the Demo Mode.



*Fig. 14: Dionex AFC-3000 Fraction Collector page*

- **Demo Mode**

Verify that the check box is cleared. In the Demo Mode, Chromeleon simulates the functions of the fraction collector. If the Demo Mode is enabled, the **Port** list will be unavailable on the **AFC** page.

## AFC Page

This page is used to configure the connection between Chromeleon and the fraction collector.

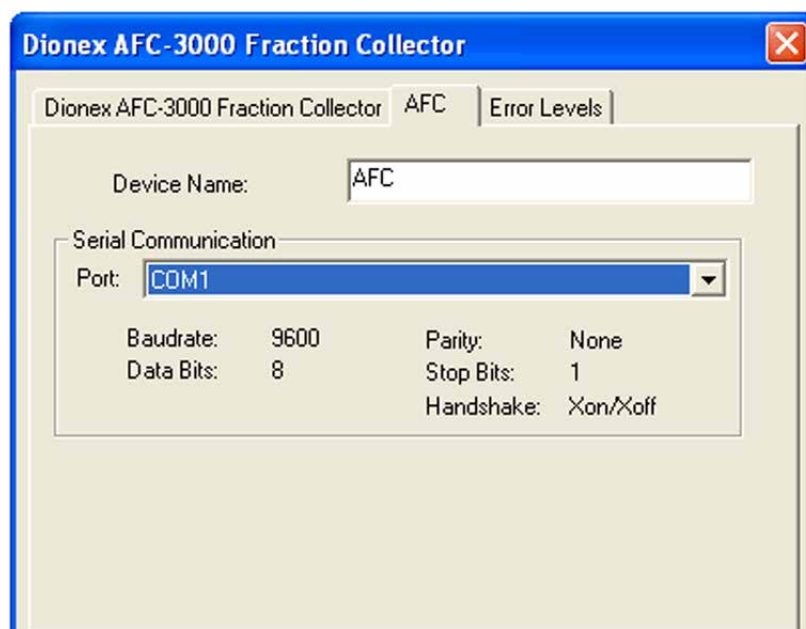


Fig. 15: AFC page

- **Device Name**

The name used to identify the fraction collector in the installation environment and in the Chromeleon client program. To control the fraction collector with the existing control panels, accept the default name. If you enter a different name, you may have to re-link the controls on the control panels and edit the device name in the program files.

- **Serial Communication**

In the **Port** list, select the serial interface port to which the fraction collector is connected. This is either the COM port on the Chromeleon computer to which the RS-232 serial cable is connected, or, if a USB cable is used for the connection, the virtual COM port (USB Serial Port) that was created during installation of the USB drivers (Windows automatically allocates a number for the virtual COM port, for example, COM5; usually, this is the COM port with the highest number). In addition, the current interface parameters are displayed. The port selection list is unavailable when Chromeleon is in demo mode.





## 4 Verifying Installation

### 4.1 Overview of Actions

Once the installation of the AFC-3000 has been completed, it is important to verify the correct installation to ensure proper functionality of the fraction collector.

Installation verification of the fraction collector consists of three parts:

- Visual inspection of all components
- Ensuring that the communications interface between the fraction collector and the Chromeleon computer is working
- Ensuring that the diverter valve assembly functions properly

This chapter explains how to test the above items before you use the fraction collector.

### 4.2 Inspecting Components Prior to Fluidic Operation


Complete the following steps:

1. Shut down and unplug the fraction collector.
2. Visually inspect the drop former, rinse station and all attached tubing for leaks or signs of damage.

If you detect a leak or other damage to a fraction collector component, you must replace the component. For more information, see the Service section (→ page 61).

### 4.3 Testing the Interface

Test the communications interface between the fraction collector and the Chromeleon computer.

1. Start the Chromeleon **Server** if it is not already running (→ page 39).
2. Verify that the cable is properly connected.
3. Start the Chromeleon client by clicking the Chromeleon icon .

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**.


4. Open the Chromeleon Browser and double-click the UltiMate\_3000\_AFC-3000.pan control panel in the **Dionex Templates/Panels/Dionex\_LC** folder.

5. Connect the control panel to the timebase in which the fraction collector 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**.
6. Verify that the fraction collector is connected to Chromeleon. If it is not, click **Connect**.

The fraction collector resets its position, with the diverter valve assembly moving in defined in X- and Y-direction and back over the rinse position. If the fraction collector does not reset, see the Troubleshooting section (→ page 59).

## 4.4 Testing the Drop Former Alignment

The drop former must align to the center of each fraction tube to ensure satisfactory sample dispensing. Shipping or rough handling can disturb the fraction collector's cabinet-to-base alignment. If it is incorrectly aligned, the fraction collection into the tubes might be disturbed. It is therefore important to test it before you actually run samples with the fraction collector.

 **Tip:** Before testing the alignment of the drop former, ensure that you have installed all fraction collector components correctly. Also, ensure that you have securely tightened all finger-tight screws.

Testing the drop former involves observing its operation. To do so, complete the following steps:

1. Load the universal drip tray with the rack type and tubes intended to be used (→ section 3.3.5).
2. Turn the fraction collector power switch on and verify that the LED power indicator is on (blue).
3. Set the correct rack configuration in Chromeleon (→ section 5.2.3, page 49).
4. In Chromeleon, open the **Commands** dialog box (→ page 46). Click the plus sign beside **AFC**, and then click **TubePosition**.
5. In the **TubePosition** box, select a suitable position, for example, position 1, and click **Execute** to move the drop former to the designated dispense position. Check that the drop former tip correctly accesses each position at the center of the tube. Repeat for further suitable positions as needed.

 **Tip:** If the fraction collector alignment is not correct, contact Thermo Fisher Scientific Service for Dionex HPLC Products.

## 5 Operation and Maintenance

The AFC-3000 is both reliable and easy to use. Before using it, however, ensure that your lab environment provides operating conditions that will prolong the life of the AFC-3000. When you finish using the fraction collector, you may need to flush the rinse station and flow path before shutting the fraction collector down.

The AFC-3000 can be operated with the Chromeleon Chromatography Management System. Stand-alone operation is not supported.

### 5.1 Power-Up

Once you arrange the tube racks and ensure that the arrangement is correctly defined in the software, you can start the fraction collector and let it run until the sampling sequence is finished. To do so, complete the following steps:

1. Ensure that the rinse station is properly connected (→ section 3.3.4, page 29).
2. Turn the AFC-3000 power switch on. The blue LED indicator along the fraction collector x-axis lights up when the power is on.
3. Ensure the waste tubing is in the correct waste container and proper drain flow is achieved.
4. Connect the AFC-3000 to Chromeleon (→ section 5.2.1).

### 5.2 Operation with Chromeleon

Before you begin, verify that


1. The Chromeleon software is installed on the computer and the license code is entered. The minimum requirement for control of the AFC-3000 is Chromeleon 6.80 SR7e, (Driver Update). If a USB cable is used for communication, a USB converter software must be installed in addition (→ page 37).
2. The fraction collector is connected to the Chromeleon computer.
3. The fraction collector is set up in Chromeleon, as described in section 3.5 (→ page 39).

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

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 46)
- Automated control with a control program (PGM) (→ page 52)

### 5.2.1 Connecting to Chromeleon

1. Start the Chromeleon **Server Monitor** if it is not already running (→ page 39).
2. Click **Start** to start the server.
3. 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**.

4. Connect the Chromeleon client to the timebase in which the fraction collector is installed. For details about how to do this from the **Commands** dialog box, see page 46. For details about how to do this on a control panel, see page 47.

Before turning off the fraction collector by the main power switch, always disconnect the module in Chromeleon (**Disconnect** command).

### 5.2.2 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 also available on a control panel.

#### To open the Commands dialog box

1. Open a control panel (any panel is possible). To open a control panel, open the Chromeleon Browser and double-click a control panel in the **Dionex Templates/Panels** folder.
2. Connect the control panel to the timebase in which the fraction collector 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 F8 or click **Command** on the **Control** menu.
4. To view the available parameters and commands for the fraction collector, click the plus sign beside **AFC**.

The commands and parameters available in the dialog box may vary, depending on the Chromeleon version and the 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.

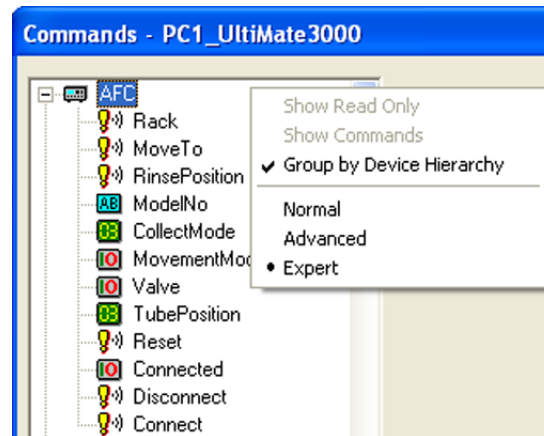



Fig. 16: Commands dialog box

6. Verify that the fraction collector is connected to Chromeleon. If it is not connected, execute the **Connect** command.

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

#### To open the AFC-3000 control panel

1. Open the **Commands** dialog box and connect the AFC-3000 to Chromeleon (→ page 46).
2. On the **View** menu, click **Default Panel Tabset** or click the corresponding icon on the toolbar , and then connect to the Chromeleon server.

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

3. On the **Panel Tabset** for your timebase, click the **AFC-3000** tab page (→ Fig. 17).

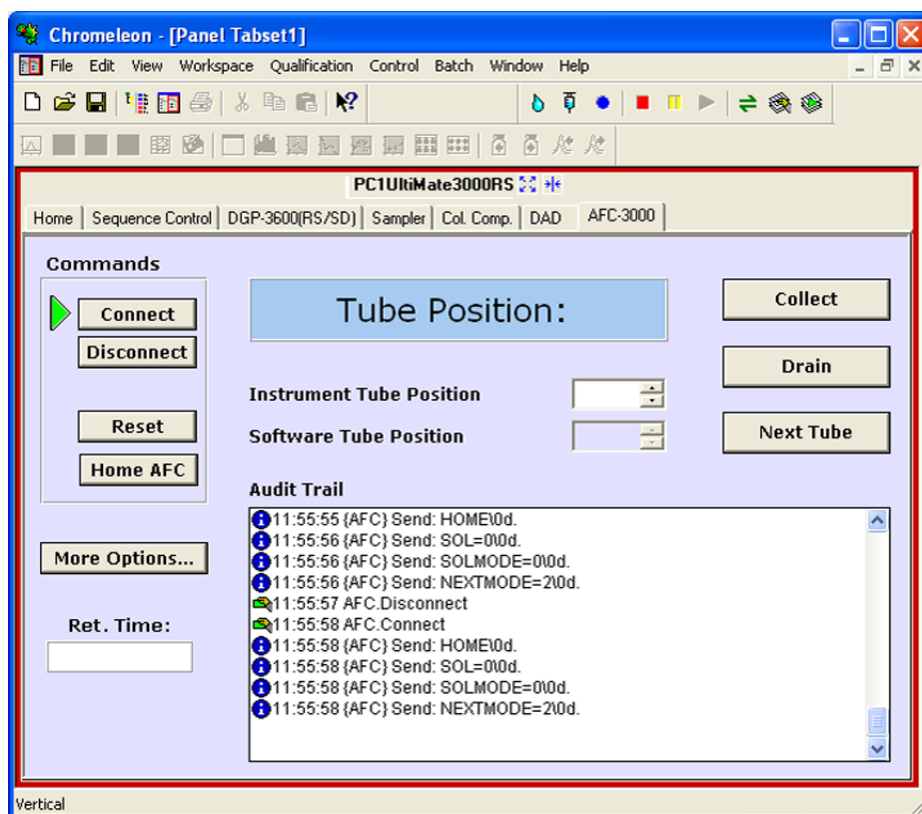


Fig. 17: AFC-3000 Control Panel

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

### 5.2.3 Setting the Rack Configuration

Define the installed rack types in Chromeleon. It is *not recommended* to define a rack type in a program file.

**⚠ Important:** The rack configuration *must not* be changed during fraction collection, or during the course of a program file or sequence.

**⚠ Important:** Ne changez pas la configuration du rack au cours de la collection de fraction, ou au cours d'un programme ou sequence.

1. Open the **Commands** dialog box (→ page 46).
2. Click the plus sign beside **AFC**.
3. Click **Rack**. In the **Rack1** to **Rack6** boxes, select the installed racks. If you have less than six racks installed, select **NotUsed** for all unused rack positions. Note the following restrictions:
  - All racks have to be installed and defined following the order from **Rack1** to **Rack6**.
  - Unused rack positions (= **NotUsed**) must always be the last positions. For example, it is not allowed to set **NotUsed** for **Rack1** and then select a rack type for **Rack2**. Observe the rack layout scheme (example for four 96 well plates see Fig. 18; details for all rack types see page 31).
  - Racks for 96 well plates must not be mixed with any other rack types.
4. Click **Execute**.

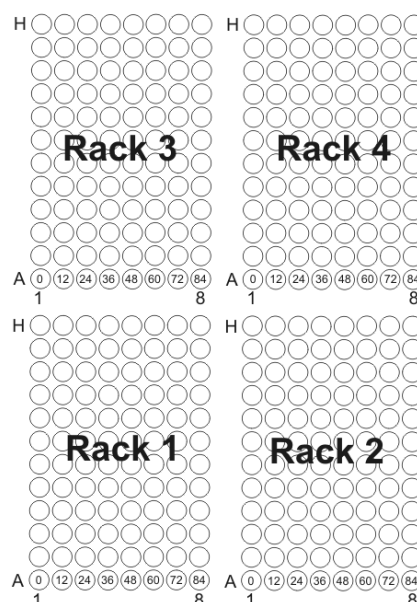


Fig. 18: Rack layout scheme (here: four 96 well plates)  
(Tube numbering assumes SawVertical collect mode)

## 5.2.4 Defining the Collect Mode

Define how the drop former travels across the racks.

**⚠ Important:** The CollectMode *must not* be changed during fraction collection, or during the course of a program file or sequence.

**⚠ Important:** Ne changez pas le CollectMode au cours de la collection de fraction, ou au cours d'un programme ou séquence.

1. Open the **Commands** dialog box (→ page 46).
2. Click the plus sign beside **AFC**.
3. Click **CollectMode**. In the **CollectMode** box, select the collect mode:

**Vertical:** The drop former follows a meander-shaped path. Be aware that this mode minimizes tube change times, but negates imprinted tube numberings.

**SawVertical** (default): The drop former follows a saw-shaped path. The movement matches the imprinted numbering on all rack types that are available from Thermo Fisher Scientific.

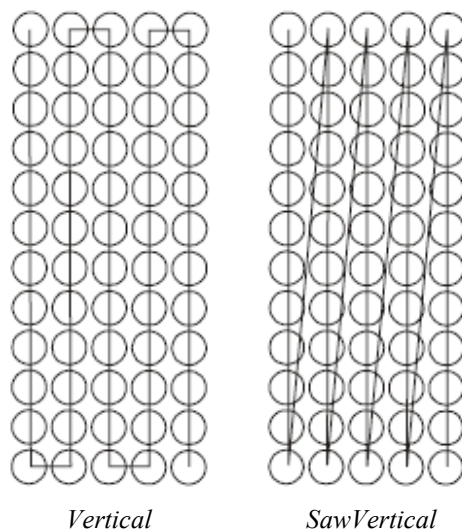


Fig. 19: Vertical and SawVertical collect modes

**⚠ Important:** To avoid accidental contamination of empty tubes, never use **SawVertical** collect mode in combination with **Continue** movement mode.

**⚠ Important:** Afin d'éviter contamination des tubes, n'utilisez pas le mode de collection **SawVertical** avec le mode de mouvement **Continue**.

4. Click **Execute**.

**i Tip:** Schott bottles will always be processed in **SawVertical** collect mode. The collect mode setting is not supported with Schott bottles.




### 5.2.5 Defining the Movement Mode


Define the diverter valve behavior during any drop former movements:

1. Open the **Commands** dialog box (→ page 46).
2. Click the plus sign beside **AFC**.
3. Click **MovementMode**. In the **MovementMode** box, select the movement mode:

**Interrupt** (default): If the diverter valve is open ("Collect") prior to any movement of the drop former, the diverter valve will always close ("Drain") prior to a movement and will open again ("Collect") after the target position has been reached. While the valve is switched to drain and the drop former moves to the next tube, the delivered sample will be directed to the waste.

**Continue**: The diverter valve maintains the previously defined valve state during and after any diverter valve movement. In this mode, either all sample goes to the waste or all sample goes through the drop former. This mode is designed to be used with the funnel rack.

 **Important:** To avoid accidental contamination of empty tubes, never use **Continue** movement mode in combination with **SawVertical** collect mode.

 **Important:** Afin d'éviter contamination des tubes, n'utilisez pas le mode de mouvement **Continue** avec le mode de collection **SawVertical**.

4. Click **Execute**.

## 5.2.6 Automated Fraction Collection with Chromeleon

The Fraction Collection driver in Chromeleon facilitates the process of collecting fractions. Before you start, verify that this driver is installed in the same timebase as the AFC-3000 (→ page 40).

With automated control, you create a program file (PGM) for automated operation of the fraction collector. The Program Wizard assists you in creating a program for fraction collection control.

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

### Fraction Collection - General Options

Determine whether fractions are collected *by peak* or *by time*.

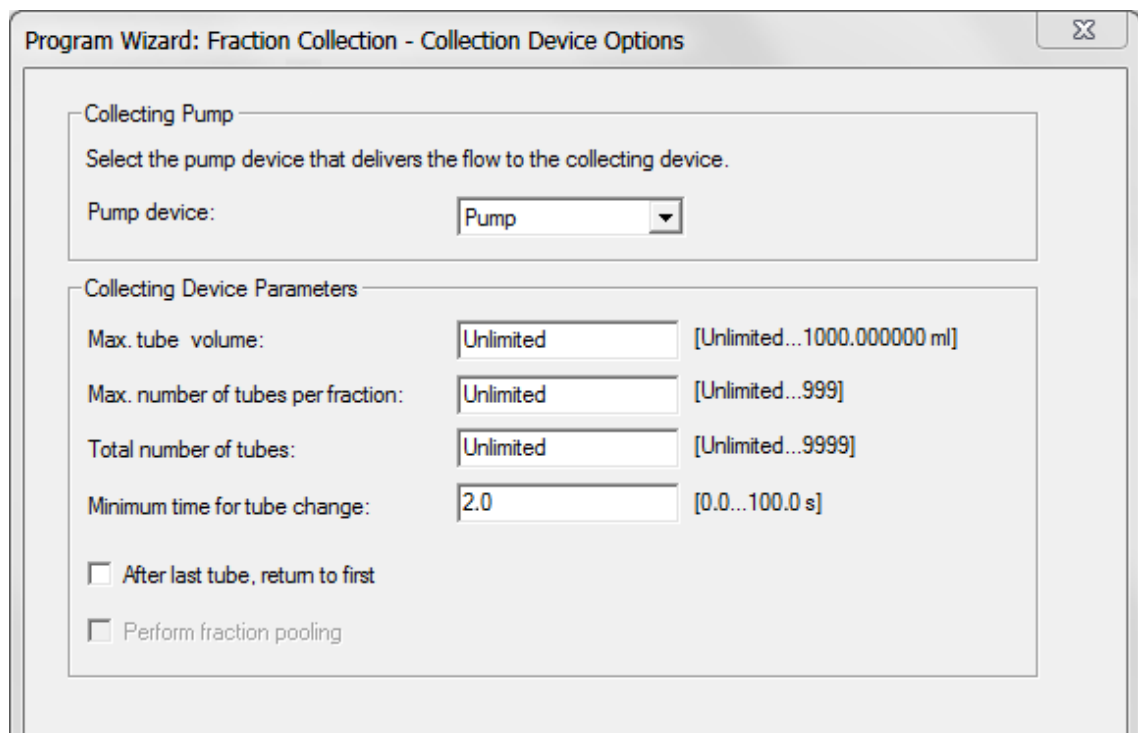
- If you select **Collect by peak using channel**, choose the detection channel from the list. Select the **Collect outside peaks, too** check box to collect sample in-between peaks.
- If you select **Collect by time**, type a time period in the **Collection period** box.
- Under **Collect Time Frame**, you can restrict the time for collecting fractions. Click **Collect only from** and type or select the start and end times in the boxes.

Fig. 20: Fraction Collection Wizard: General Options page

## Fraction Collection - Collection Device Options

Enter collection parameters, such as the maximum tube volume, maximum number of tubes per fraction, or total number of tubes.

- Type the volume of the installed tubes in the **Max. tube volume** box.
- Type the maximum of number of tubes to be used for collecting a single fraction in the **Max. number of tubes per fraction** box.
- Type the total number of installed tubes in the **Total number of tubes** box.



Program Wizard: Fraction Collection - Collection Device Options

Collecting Pump

Select the pump device that delivers the flow to the collecting device.

Pump device: Pump

Collecting Device Parameters

Max. tube volume: Unlimited [Unlimited...1000.000000 ml]

Max. number of tubes per fraction: Unlimited [Unlimited...999]

Total number of tubes: Unlimited [Unlimited...9999]

Minimum time for tube change: 2.0 [0.0...100.0 s]

☐ After last tube, return to first

☐ Perform fraction pooling

Fig. 21: Fraction Collection Wizard: Collection Device Options page

## Fraction Collection - Peak Detection Options

Modify the peak detection algorithm for fraction collection if required (→ Fig. 22). For more information, see the Chromeleon *Help*.

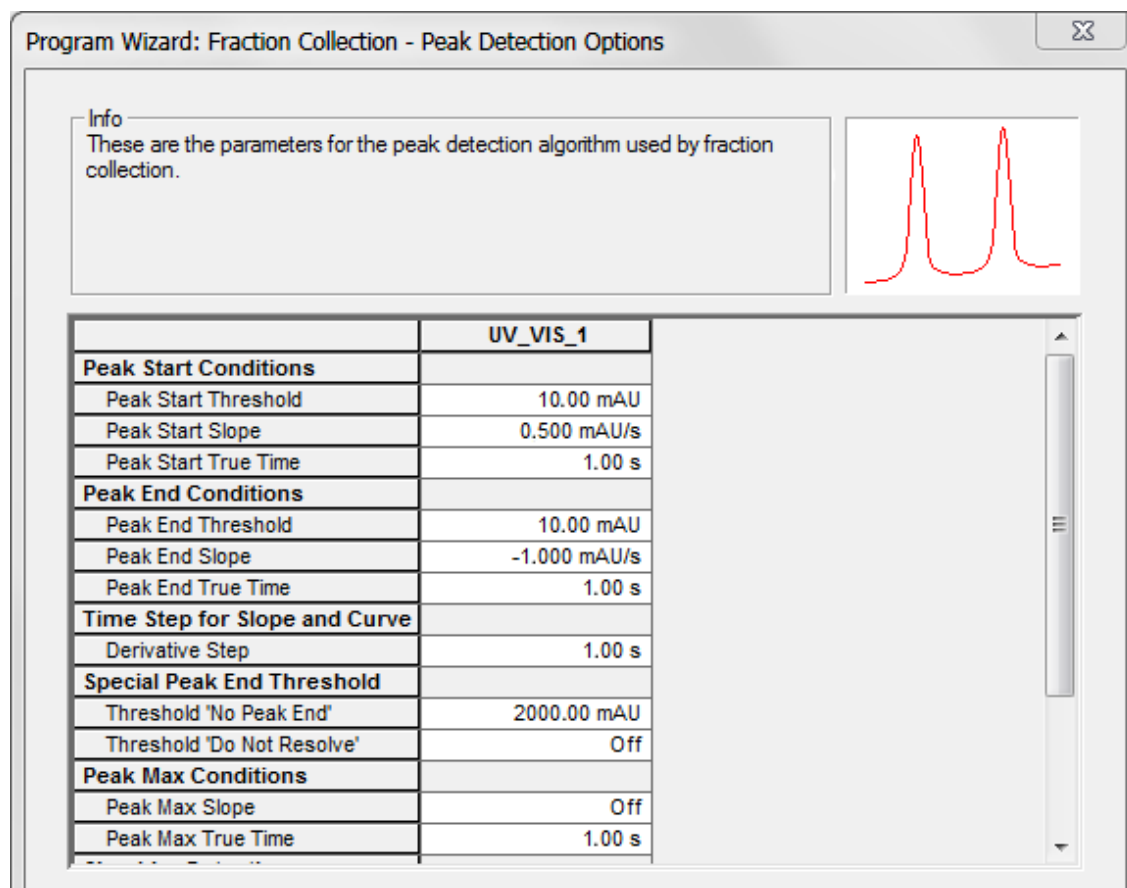


Fig. 22: Fraction Collection Wizard: Peak Detection Options page

## Fraction Collection - Delay and Detector Offset Options

Set the delay time or delay volume between the first detector in the system and the fraction collector.

- Delay Time:** This is a constant value which should only be applied with a constant pump flow rate of your method. Note that changing the flow rate requires an according adaption of the delay time to allow for proper fraction collection.  
**Delay Volume:** This is the fluidic volume travelled by a peak after triggering the set start threshold conditions between a detector and the separation point of the diverter valve. Using the delay volume offers more flexibility, as Chromeleon automatically calculates the delay time from the pump flow rate and the defined delay volume.

Both the delay volume and the delay time should be determined experimentally with a suitable method. As a first approximation, the delay volume can be determined as a result of the volume calculation of all tubing between the detector cell and the diverter valve. Note that the volume of the drop former itself does not contribute to the delay volume but to the carry over volume. It is recommended to perform a suitable test with some collected fractions to assure proper functionality and fraction collection quality.

- If more than one detector is used, enter the delay time offset between the first detector after the separation column and the subsequent detector or detectors under **Detector Delay Offsets**.

Program Wizard: Fraction Collection - Delay and Detector Offset Options

**Delay**

☒ Delay time: 5.0 [0.0...9999.0 s]

☐ Delay volume: 0 [0...100000 µl]

The delay - measured in s or µl - is defined between the first detector and the collection device.

**Detector Delay Offsets**

Detector Name	Delay Time Offset [s]
UV	0.0

Fig. 23: Fraction Collection Wizard: Delay and Detector Offset Options page

After completion of the wizard, Chromeleon creates a program file (method). Use this program as a basis and add the required AFC-3000 commands and properties, for example, by copying them from the example program provided in the appendix.

## To modify a program

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.

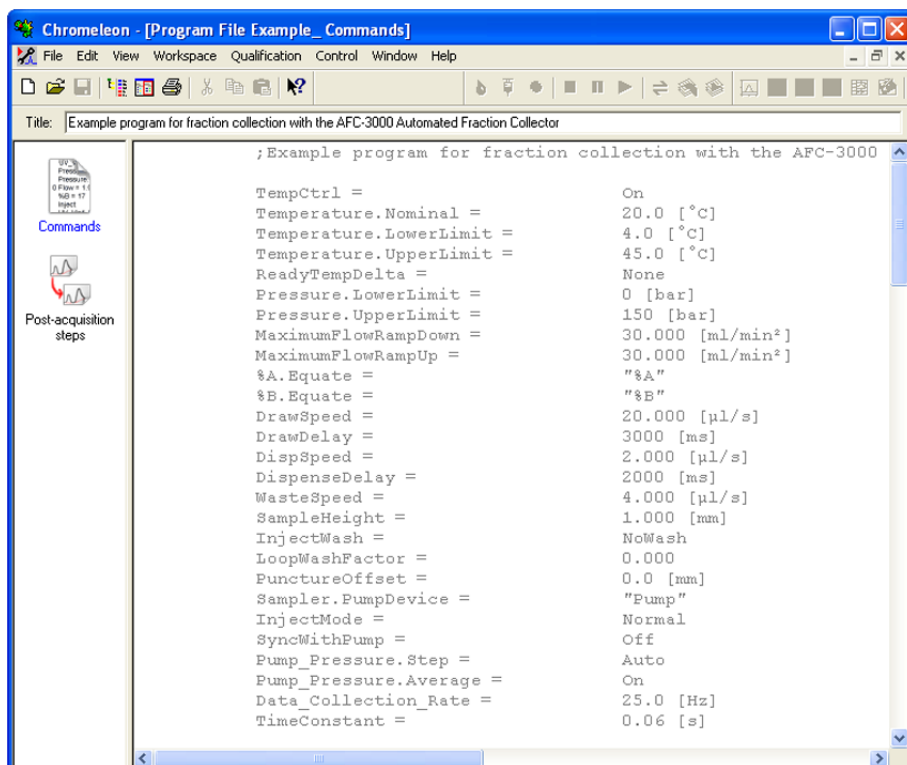


Fig. 24: Chromeleon program file (shown in the Commands view, here not connected to a timebase)

2. Change the settings in the program as desired and add the required AFC-3000 commands. A program example can be found in the appendix.

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.

**⚠ Important:** The rack configuration (**Rack**) and the collect mode (**CollectMode**) *must not* be changed during the course of a program file.

**⚠ Important:** Ne changez pas la configuration du rack (**Rack**) et le mode de collection (**CollectMode**) au cours d'un programme.

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

For more information on fraction collection, see the *Chromeleon Help*.

## 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*.

## 5.3 Shutting Down the Fraction Collector

To shut down the fraction collector, complete the following steps:

1. Flush flow paths as required and as outlined in section 5.4.
2. Shut down the HPLC system to which the fraction collector is connected as is required and as instructed via the associated documentation and outlined procedures therein.
3. Turn off the AFC-3000 power switch.

## 5.4 Flushing the Rinse Station and Eluent Flow Path

Generally, you can operate the AFC-3000 without flushing the rinse station. Under normal circumstances, you can simply drain the rinse station prior to shutting down the fraction collector. However, you should flush the rinse station and flow path under two circumstances:

- during initial startup of the AFC-3000, after installation
- following the use of strong bases, acids, or organic solvents as may be present in the eluent

Flushing the rinse station during initial startup of the AFC-3000 removes any contaminants. Flushing the rinse station after using strong rinse/eluent agents/solvents prevents degradation and failure of the flow path components. If additives such as buffers are used as a part of the mobile phase, flush the system with several volumes of a suitable solvent before shutting the AFC-3000 down. This will prevent buildup of precipitates inside the flow path.

To flush the rinse station and flow path, flush the entire HPLC system as outlined in the system's operating instructions.

## 5.5 Routine and Preventive Maintenance

Routine maintenance of the AFC-3000 consists of regular cleaning of specific fraction collector components. Routine maintenance also includes checking AFC-3000 components for leaks or other damage. Additional periodic maintenance tasks may be required, including replacement of the following fraction collector components: sample inlet tubing, rinse station tubing, and fraction tray.

Perform the maintenance procedures listed in the following table at regular intervals to ensure optimum performance and maximum uptime of the fraction collector. The exact maintenance schedule for the fraction collector will depend on numerous factors, and will vary by application.

Frequency	What you should do ...
<b>Daily</b>	Check the fluid lines for any signs of leakage (→ page 63).
	Check the fluid connections for any signs of salt deposits.
	Clean the fraction collector (general) (→ page 62).
	When using buffer solutions, flush the fraction collector flow path thoroughly after use with a suitable solvent.
<b>Weekly</b>	Clean the fraction collector (thorough) (→ page 63).
<b>Periodically</b>	Inspect the tubing for possible damage, such as cracks, nicks, cuts, or blockages.
	Replace rinse station tubing and sample inlet/waste tubing (connected to the diverter valve) as needed.
	Check the rinse station tubing connected to the rinse station. Verify that the tubings are not clogged and are routed to the appropriate drain system or waste container without trapping liquid in the tubing, which could cause an overflow condition. Check the volume of the liquid in the waste container and empty as needed.
	Check the following components for wear and replace if necessary: <ul style="list-style-type: none"> <li>• Drop former</li> <li>• Diverter valve</li> <li>• General tubing</li> </ul> If you fail to replace these components when they deteriorate, the fraction collector will not function properly.
<b>Annually</b>	Have Thermo Fisher Scientific Service check the fraction collector once a year to prevent, for example, contamination and excessive wear.



## 6 Troubleshooting

### 6.1 General Notes

The AFC-3000 is both easy to operate and reliable. When the fraction collector does not function properly, isolate the problem to determine if it originates in the Chromeleon computer, the analytical instrument, the communications cable, or the fraction collector itself. The following sections help you to identify and eliminate the source of problems that may occur during the operation of the AFC-3000.

If you determine the problem is in the AFC-3000, check the power system, the communications interface, or the diverter valve assembly to locate the cause of the problem and resolve it.

If a problem occurs, always check the Chromeleon audit trail for messages (→ section 6.3).

If you cannot solve a problem using the steps given in this chapter, please contact Thermo Fisher Scientific Service for Dionex HPLC Products.

### 6.2 Power and Communication Problems

The following table provides information about operating problems and lists probable causes, as well as remedial actions.

Problem	Probable Cause	Remedial Action
The blue LED power indicator is off.	<p>The instrument is not connected to the mains.</p> <p>The power is turned off.</p> <p>The power switch of the external power supply is turned off.</p> <p>An error occurred in the electronic system.</p>	<p>Connect the power cord (→ section 3.4.1; page 35).</p> <p>Turn on the fraction collector power.</p> <p>Turn on the power switch of the external power supply (if equipped).</p> <p>Contact Service.</p>
The AFC-3000 does not work correctly when controlled by Chromeleon.	There is no connection between the fraction collector and the Chromeleon computer.	<p>Check the USB or RS-232 cable and connection to the computer. If the cable is connected, ensure that it is tightened properly.</p> <p>Verify that the cable is connected to COM 1 port on the AFC-3000 rear panel, or to the appropriate module USB hub if connecting in that manner (→ section 3.4; page 35).</p> <p>Test the interface (→ section 4.3; page 43).</p>

Problem	Probable Cause	Remedial Action
The AFC-3000 does not work correctly when controlled by Chromeleon.  (Cont'd)	The fraction collector is not correctly configured in Chromeleon.  The USB port on the computer is not ready for operation.	Check the configuration for the correct COM port selection (→ section 3.5.2; page 40).  Check the USB port on the computer.

## 6.3 Messages in the Chromeleon Audit Trail


When the fraction collector is operated with Chromeleon, messages are displayed in the Chromeleon Audit Trail.


The following table lists fraction collector-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
Can't open communication channel Serial Device Driver\COM2.	Check the configuration for the correct COM port selection (→ section 3.5.2; page 40).
Command for function Connect failed.	The AFC-3000 cannot connect to Chromeleon. See Communication Problems (→ page 59).
Command for function Rack failed.	Verify that you have configured the racks in the appropriate order, and that you have not configured more racks than can be installed (→ page 49).
Command to change property TubePosition failed.	You have entered a tube position that exceeds the number of positions on the installed racks. Verify that you have defined a valid rack type. Enter a valid tube position.
Device is not remote.	The AFC-3000 is not connected to Chromeleon. Execute the Connect command.
Error P0040: Value out of range.	Verify that you have entered values that are within the allowed range.
Internal error: A required parameter was missing.	Verify that you have defined a legal rack type for all used rack positions, and <b>NotUsed</b> for unused rack positions (→ page 49).
Invalid enumerated value 3.	Verify that you have entered valid rack types only (→ page 49).
Parameter TubePosition value exceeded its allowed range. Set to closest valid value 384.	You have entered a tube position that exceeds the number of 384. Enter a valid tube position. This error appears only with the use of the <b>96Pos</b> rack type.

## 7 Service


This chapter explains how to clean the AFC-3000, inspect it for leaks, and replace damaged components.

 **Important:** Discharge static buildup and ground to the fraction collector base or cabinet before performing any maintenance. Do not touch or short-circuit bare contacts (for example, COM1 or auxiliary ports).


 **Important:** Déchargez l'accumulation d'électricité statique et mettez à la terre la base et le cabinet du collecteur de fractions avant de procéder à tous travaux d'entretien. Ne touchez ou court-circuitiez pas des contacts nus (par exemple, COM1 ou ports auxiliaires).

### 7.1 General Notes and Safety Precautions

The following sections describe all procedures for the fraction collector 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 fluidic components, always move the diverter valve assembly into the appropriate position to facilitate safe working conditions and to allow access to all components without obstructions. The power should be turned off for almost all service procedures to ensure the safety of the operator/technician. (Follow the instructions in the sections for the individual components.)
- Use only the original spare parts authorized for the device by Thermo Fisher Scientific.
- Before returning any instrument to 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 and observe the packing instructions when shipping the fraction collector. Shipping the instrument in anything other than the original packaging voids the warranty. If the appropriate shipping container is not available, appropriate shipping containers and packing material can be ordered from the Thermo Fisher Scientific sales organization for for Dionex HPLC Products. The packing instructions are included in the “Installation and Qualification Documents for Chromatography Instruments” binder and are available on request. For more information, see the warranty statement in the terms of sale.

For instructions on shutting down the fraction collector, see section 5.3 (→ page 57).

## 7.2 Cleaning the Fraction Collector


Cleaning the AFC-3000 is the primary maintenance task you perform. Failure to do so regularly causes increased wear and reduces the fraction collector’s life.

You must clean the AFC-3000 both daily and weekly to prevent damage and extend its life. It is especially important to clean up spills and remove contaminants, such as abrasives, from the fraction collector’s moving parts. It may also be necessary to chemically neutralize spills. The following sections explain daily and weekly cleaning procedures.


### 7.2.1 Daily External Cleaning


Use of the AFC-3000 often results in spills on fraction collector components such as the fraction tray. Good maintenance requires that you clean the fraction collector daily. To do so, complete the following steps:

1. Shut down and unplug the fraction collector.

 **Tip:** For information about shutting down the fraction collector, see section 5.3 (→ page 57).

2. Wipe the fraction tray, fraction collector cabinet, and fraction collector arm using a towel dampened with a lab-grade cleaning agent.

 **Important:** Do not allow the cleaning agent to come into contact with the lead screws. Never lubricate either of the two lead screws.

 **Important:** Assurez-vous que les broches filetées ne soient jamais en contact avec les agents de nettoyage. Ne jamais lubrifiez les deux broches filetées.

3. Repeat step 2, using a towel dampened with clear water. This process removes any remaining contaminants.
4. Dry the fraction tray, fraction collector cabinet, and fraction collector arm using a dry towel. The AFC-3000 must be thoroughly dry before you turn the fraction collector power on.

### 7.2.2 Weekly Cleaning

Although cleaning the fraction collector daily removes spills and contaminants from most of the fraction collector components, it is necessary to clean the AFC-3000 more thoroughly once a week. To do so, complete the following steps:

1. Shut down and unplug the fraction collector.
2. Remove the rack.
3. Wipe the fraction collector exterior, base and tray until they are clean, using a towel dampened with a lab-grade cleaning agent, followed by a towel dampened with clear water.
4. Replace the rack on the fraction collector tray.

### 7.3 Checking for Leaks

Several of the fraction collector components have a limited life and will wear out under normal use; the drop former, eluent tubing and the rinse station tubing. Standard maintenance procedures require that you periodically check these components for leaks. To do so, complete the following steps:

1. Shut down and unplug the fraction collector.
2. Visually inspect the drop former, eluent tubing and rinse station and tubing for leaks or signs of deterioration or salt loading.

If you detect a leak or other damage to a fraction collector component, you must replace it.

## 7.4 Installing the Kit for Normal-Phase LC

Description	Part No.
Kit for normal-phase LC, including: 1.0 mm ID stainless steel drop former and grounding cable	6702.0400



### Warning:

Do *not* perform normal-phase applications without a proper grounding protection of the drop former. Non-conductive, non-polar normal-phase eluents, for example hexane, can lead to a build-up of electrostatic charges on an ungrounded drop former. **The electrostatic discharge can create a fire and/or explosion hazard.**



**Avertissement:** *N'effectuez pas* d'applications en phase normale sans vous être assuré que votre faiseur des gouttes est proprement isolée et mise à la terre. Les solvants de la phase normale, non-conducteurs et non-polaires, par exemple hexane, peuvent entraîner une accumulation de charges électrostatiques sur le faiseur des gouttes en l'absence de mise à la terre. **Le décharge électrostatique peut représenter un risque d'incendie et/ou d'explosion.**

1. Switch the valve to **Drain** position, then shut down and unplug the fraction collector. Set the pump flow to 0.
2. Carefully move the diverter valve assembly along the Y arm to the front.
3. Remove the current drop former. Then screw the SST drop former finger-tight into the diverter valve.
4. Push the open clip end of the grounding cable from the normal-phase kit between the diverter valve and the drop former (→ Fig. 25).

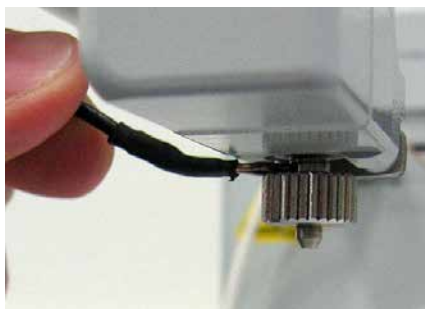
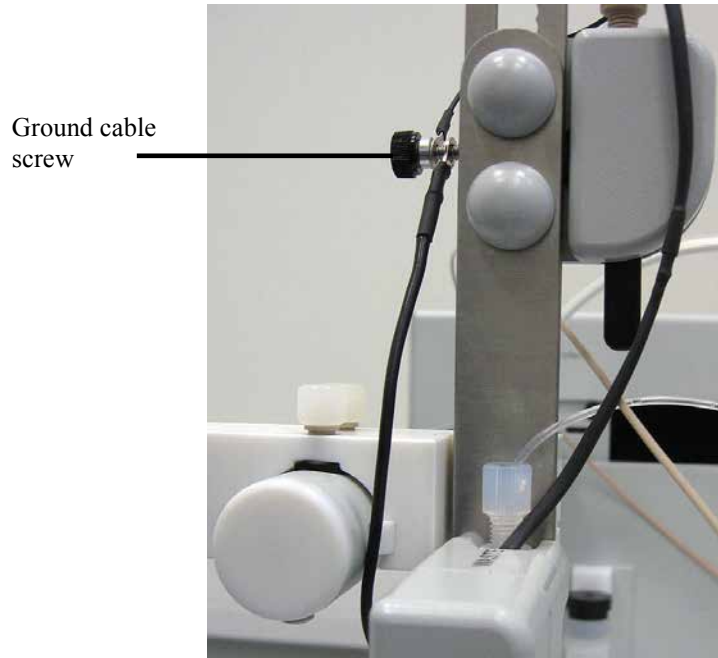


Fig. 25: Installing the normal-phase ground strip

5. Remove the ground cable screw and reinstall with the normal-phase grounding cable attached. Make sure to lead cable along the front side of the diverter valve assembly (→ Fig. 26).



*Fig. 26: Normal-phase ground strip*

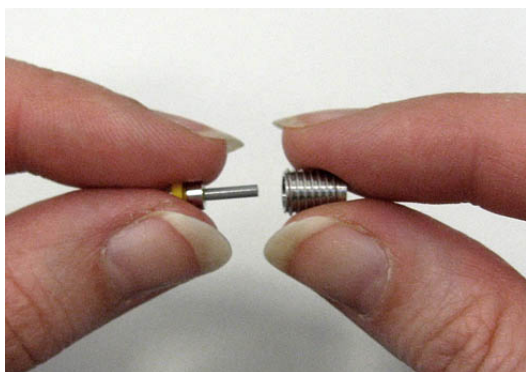
**i** **Tip:** The carry-over volume of the normal-phase kit is the same as for the standard configuration.

## 7.5 Installing the Kit for Low Flow Rates

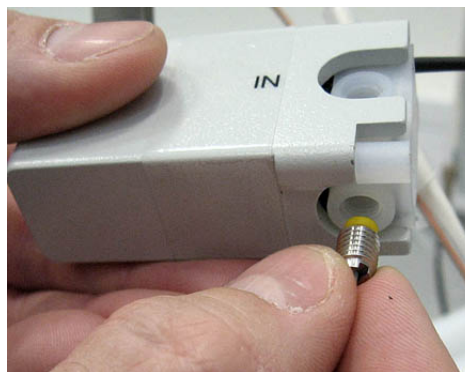
Description	Part No.
Kit for low flow rates, including: 1.0 mm ID diverter valve with 0.4 mm ID PEEK drop former	6702.0300

The kit for low flow rates includes a tool for installation and a piece of 0.3 mm ID PTFE tubing. Before you start, make sure that you have all parts of the kit at hand.

1. Shut down and unplug the fraction collector. Set the pump flow to 0.
2. Dismount the current diverter valve from the assembly (→ page 67).
3. Connect the diverter valve cable to the auxiliary I/O connection on the AFC-3000 rear panel (→ Fig. 2, page 18). Tighten the knurled nut finger-tight.
4. Remove the two valve screws that are attached to the new diverter valve.
5. Remove the drop former and drop former screw from their packaging and insert the drop former into the screw (→ Fig. 27). Then place the screw in the diverter valve (bottom side). Use the screwdriver tool shipped with the kit to carefully tighten the screw. You may have to retighten the screw if you observe leakage during operation.



*Fig. 27: Installing the low-flow drop former*



6. Mount the diverter valve to the diverter valve assembly by using the hexagon wrench shipped with the kit (→ Fig. 28, page 67). The diverter valve must be mounted with the waste connection facing upward.
7. Tighten the finger-tight knurled screw that attaches the rear cable to the mounting block (→ Fig. 30, page 68).
8. Tighten the finger-tight knurled screw that attaches the rear cable to the diverter valve and connect the grounding cable from the rear cable to the ground cable screw and tighten the screw (→ Fig. 29, page 68).



9. Install the diverter valve connections (→ section 3.3.2, page 28). A low-flow inlet capillary is shipped with the kit.
10. Verify that the alignment is still correct (→ page 44).

**i Tips:** After installing the low-flow inlet capillary, always determine the delay time or volume. Note that the carry-over volume of the kit for low flow rates is smaller than with the standard configuration.

Exclusively use the low-flow drop former within the specified flow rates (up to 10 mL/min). At higher flow rates, the jet from the drop former may cause sprays or spillages.

## 7.6 Replacing the Diverter Valve

Description	Part No.
Diverter valve with 1.0 mm ID PEEK drop former (up to 150 mL/min)	6702.0500
Diverter valve with 0.4 mm ID drop former (up to 10 mL/min), including tools and tubing	6702.0300

The rear cable is pre-installed on the diverter valve.

1. Shut down and unplug the fraction collector. Set the pump flow to 0.
2. Carefully move the diverter valve assembly along the Y arm to the front.
3. Remove the sample inlet and waste tubing and unscrew the current drop former from the diverter valve.
4. Loosen the two diverter valve screws by using the hexagon wrench shipped with the kit (→ Fig. 28).

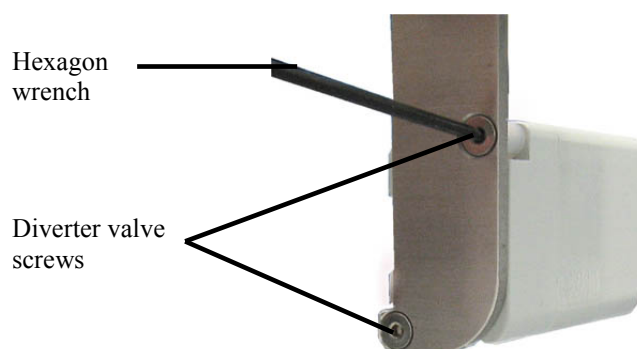
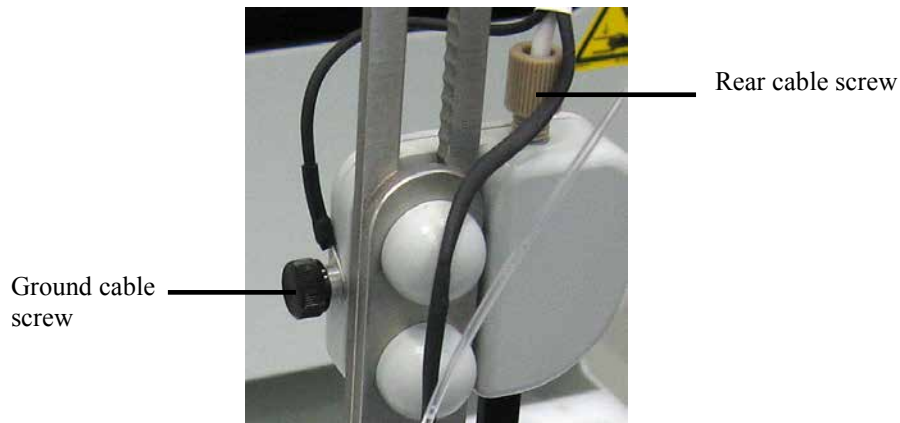


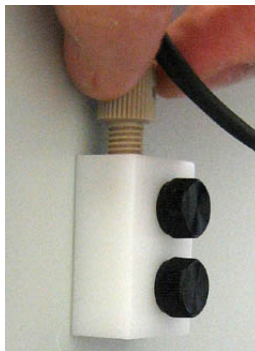
Fig. 28: Dismounting the diverter valve

5. Loosen the two finger-tight knurled screws that attach the rear cable and grounding cable to the diverter valve assembly (→ Fig. 29).



*Fig. 29: Cable screws on the diverter valve assembly*

6. Disconnect the diverter valve cable from the auxiliary I/O connection on the AFC-3000 rear panel (→ Fig. 2).
7. Loosen the finger-tight knurled screw that attaches the rear cable to the mounting block on the AFC-3000 rear panel (→ Fig. 30).



*Fig. 30: Removing the rear cable screw*

8. Reinstall the new diverter valve in reverse order. If you are replacing a low-flow diverter valve, also see section 7.5 (→ page 66).

## 7.7 Replacing the Universal Drip Tray

For proper operation, the universal drip tray must be properly seated on the base plate of the fraction collector. An improperly installed universal drip tray may lead to the impression that the fraction collector is misaligned.

1. Remove the rack adapter or the fraction racks from the universal drip tray as shown in Fig. 11 on page 33.
2. Lift the drip tray from the base plate such that the holes in the two screws in the base plate disengage from the two holes in the drip tray.
3. Place the new universal drip tray on the fraction collector such that the two screws on the base plate are placed inside the holes in the tray.



*Fig. 31: Installing the universal drip tray*

4. Verify that the universal drip tray is not misaligned. This means that the drip tray and the base plate have to be arranged in parallel (compare figures below).



*Fig. 32: Misaligned universal drip tray*



*Fig. 33: Properly aligned universal drip tray*

## 7.8 Updating the Firmware

The fraction collector is shipped with the most recent firmware version. However, in some cases, a firmware update may be required.

Only qualified service personnel should perform firmware updates. For more information, please contact Thermo Fisher Scientific Service for Dionex HPLC Products.



## 8 Technical Information

<b>Tube capacity:</b>	Depends on rack configuration; standard configuration: 180 x 8 mL tubes (13 mm x 100 mm)
<b>Tube change time:</b>	Typically 0.2 to 0.4 s, depending on collect mode and rack type
<b>Maximum tube height:</b>	150 mm
<b>Maximum flow rate:</b>	150 mL/min
<b>Carry-over volume:</b>	15 µL (standard), 1.3 µL (with optional low-flow kit)
<b>Wetted parts:</b>	ETFE, FFKM (Simriz®), PFA, PEEK (with standard and low-flow drop former), stainless steel (with grounded drop former for normal-phase LC)
<b>Control:</b>	All functions software-controlled via RS-232 or USB; requires Chromeleon Chromatography Management System
<b>GLP features:</b>	In Chromeleon: All system parameters are recorded in the Chromeleon audit trail.
<b>Power requirements:</b>	100–240 V, 47-63 Hz AC 1.9 A with an output of DC 24V, maximum 3.33 A Automatic voltage selection
<b>Emission sound pressure level:</b>	< 70 dB(A), typically 62 dB(A)
<b>Environmental conditions:</b>	<div> <div>Range of use:</div> <div>Indoor use</div> <div>Temperature:</div> <div>10 to 35 °C (50 to 95 °F)</div> <div>Air humidity:</div> <div>20-70% relative humidity, non-condensing</div> <div>Overvoltage category:</div> <div>II</div> <div>Pollution degree:</div> <div>2</div> </div>
<b>Dimensions (h × w × d):</b>	43 x 34 x 46 cm (16.5 x 13.4 x 18.1 in.)
<b>Weight:</b>	8 kg (17.7 lbs)

Technical information: August 2013

All technical specifications are subject to change without notice.





## 9 Accessories, Spare Parts, and Consumables

Accessories, spare parts, and consumables for the fraction collector 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.

Because the life-span of the fraction tubes varies, you should maintain an adequate supply of spare tubes. When you need to purchase additional supplies, it is extremely important that you choose the appropriate sizes and materials. When you purchase fraction tubes, make sure they meet the following requirements:

- The diameter of the fraction tube matches the rack size you are using.
- The height does not exceed 150 mm.
- The material is compatible with the samples and solvents you are using.

 **Important:** Do not use mismatching fraction tubes. Be sure your tubes meet the given requirements.

 **Important:** N'utilisez pas de tubes de fraction incompatible. Assurez-vous que vos tubes répondent aux exigences données.

### 9.1 Standard Accessories (included in the shipment)

The following accessories are shipped with the fraction collector. (The list is subject to change without notice). 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>AFC-3000 accessories kit, including:</b>		
24 V external power supply	6702.9010	1
Diverter valve assembly, including screws for installation and 1 mm ID PEEK drop former	-	1
Fluidics kit, incl. sample inlet tubing (1.0 mm x 4 m) and waste tubing (1.0 mm x 1.8 m) with nuts and ferrules	-	1
Drain tubing (2 x 1.8 m)	Included in 6040.0005	2
Elbow, Y and T pieces for drain connections	Included in 6040.0005	7
Rack (90 position, 8 mL; 13 mm x 100 mm)	6702.0090	2
Polypropylene tubes (8 mL, OD 13 mm)	-	180
USB cable, type A to type B, USB 2.0, 5 m	6911.0002	1
RS-232 serial cable, 9pin–9pin, fem–fem, 5m	8914.0153	1
Capillary marker	Included in 6040.2399	5
Spiral tube	-	1

## 9.2 Optional Accessories

Optional Accessory	Part No.	Remarks
Kit for low flow rates	6702.0300	Kit for flow rates up to 10 mL/min. Includes different diverter valve assembly, drop former, and tubing.
Kit for normal-phase LC	6702.0400	SST drop former for use with normal-phase solvents. Provides grounding via a cable.
Drain kit for UltiMate 3000 systems	6040.0005	The kit includes all required components for system drainage.
Fraction Collection License	5960.0038	Additional Chromeleon license required for basic fraction collection (→ page 21).
Extended Fraction Collection License	5960.0039	Additional Chromeleon license required for <i>advanced</i> fraction collection (→ page 21). This license includes the Fraction Collection license.
Rack (21 position, 50 mL; 30 mm x 100 mm )	6702.0021	
Rack (24 position, 30 mL; 24 mm x 100 mm)	6702.0024	
Rack (40 position, 20 mL; 20 mm x 100 mm)	6702.0040	
Rack (60 position, 14 mL; 16 mm x 100 mm)	6702.0060	
Rack (10 position, WPS, 10 mL; 22 mm OD)	6820.4086	Racks can be used for WPS-3000 and ACC-3000 autosamplers.
Rack (22 position WPS, 4 mL; 15 mm OD)	6820.4084	
Rack (40 position, WPS, 2 mL; 12 mm OD)	6820.4070	
Adapter for WPS racks	6702.0100	Required for use of all WPS racks with the AFC-3000.
Rack (36 position, Foxy; scintillation vials, 28 mm OD)	5701.2025	Racks can be used for Foxy Jr./R1 fraction collectors.
Rack (60 position, Foxy; 1.5 mL)	5701.2023	
Rack (72 position, Foxy; mini tubes, 18 mm OD)	5701.2024	
Positioning pins for Foxy racks	6702.9006	Pins facilitate installation of Foxy racks on the AFC-3000.
Adapter for 4 well plates	6702.0200	An adapter is required for using well plates with the AFC-3000.
Adapter for 2 well plates (Foxy Jr./R1)	5701.2021	
Bottle (0.25 L)	2270.0026	
Funnel rack	6702.1021	To be used in conjunction with the 21 position rack (6702.0021). Tubing included.



### 9.3 Consumables and Spare Parts

The part number always refers to the packing unit. Unless otherwise stated, the packing unit is 1 unit. For more information, contact the Thermo Fisher Scientific sales organization for Dionex HPLC Products.

Description	Part No.
24 V external power supply	6702.9010
Bottle (0.25 L)	2270.0026
Capillary markers (10 pcs)	6040.2399
Diverter valve, 0.4 mm ID drop former, and tubing ("Kit for low flow rates")	6702.0300
Diverter valve (replacement for standard diverter valve)	6702.0500
Drop former, 0.4 mm ID, PEEK, including drop former replacement tool	6702.0305
Drop former, 1 mm ID, PEEK (replacement for standard drop former)	6702.0505
Drop former, 1 mm ID SST, including grounding cable ("Kit for normal-phase LC")	6702.0400
Funnel rack	6702.1021
Rack (10 position, WPS, 10 mL; 22 mm OD)	6820.4086
Rack (21 position, 50 mL; 30 mm x 100 mm )	6702.0021
Rack (22 position WPS, 4 mL; 15 mm OD)	6820.4084
Rack (24 position, 30 mL; 24 mm x 100 mm)	6702.0024
Rack (36 position, Foxy; scintillation vials, 28 mm OD)	5701.2025
Rack (40 position, 20 mL; 20 mm x 100 mm)	6702.0040
Rack (40 position, WPS, 2 mL; 12 mm OD)	6820.4070
Rack (60 position, 14 mL; 16 mm x 100 mm)	6702.0060
Rack (60 position, Foxy; 1.5 mL)	5701.2023
Rack (72 position, Foxy; mini tubes, 18 mm OD)	5701.2024
Rack (90 position, 8 mL; 13 mm x 100 mm)	6702.0090
Adapter for 4 WPS racks	6702.0100
Adapter for 4 well plates	6702.0200
Adapter for 2 well plates (Foxy Jr./R1)	5701.2021
RS-232 serial cable, 9pin–9pin, fem–fem, 5m	8914.0153
Universal drip tray	6702.9025
USB cable, type A to type B, USB 2.0, 1 m	6911.0002



## 10 Appendix - Chromeleon Example Program

;Example program for fraction collection with the AFC-3000  
Automated Fraction Collector and the following instruments:  
HPG-3x00, WPS-3000SL, VWD-3x00

```
TempCtrl = On
Temperature.Nominal = 20.0 [°C]
Temperature.LowerLimit = 4.0 [°C]
Temperature.UpperLimit = 45.0 [°C]
ReadyTempDelta = None
Pressure.LowerLimit = 0 [bar]
Pressure.UpperLimit = 150 [bar]
MaximumFlowRampDown = 30.000 [ml/min²]
MaximumFlowRampUp = 30.000 [ml/min²]
%A.Equate = "%A"
%B.Equate = "%B"
DrawSpeed = 20.000 [µl/s]
DrawDelay = 3000 [ms]
DispSpeed = 2.000 [µl/s]
DispenseDelay = 2000 [ms]
WasteSpeed = 4.000 [µl/s]
SampleHeight = 1.000 [mm]
InjectWash = NoWash
LoopWashFactor = 0.000
PunctureOffset = 0.0 [mm]
Sampler.PumpDevice = "Pump"
InjectMode = Normal
SyncWithPump = Off
Pump_Pressure.Step = Auto
Pump_Pressure.Average = On
Data_Collection_Rate = 25.0 [Hz]
TimeConstant = 0.06 [s]

AFC.Valve = Drain
;Close the diverter valve prior to a run to avoid
accidental spillages

AFC.CollectMode = SawVertical
;Define how the drop former travels over the collection
vessels.
;Do only define once and do not change during a run or
a sequence

AFC.MovementMode = Interrupt
;Define how the diverter valve behaves between tube
changes.

AFC.TubePosition =
FractionCollection.TubePosition
;Synchronize the fraction collector position with
```

```
        ;the current position of the fraction collection driver
        prior to a run

;*****
;* Definition of triggers for fraction collection starts here.
;*****
        Trigger                                FracStart
        FracStartDetected
        AFC.Valve =                            Collect
        Log                                    AFC.TubePosition
        Log
        FractionCollection.TubePosition
        EndTrigger

        Trigger                                TubeChange
        FracTubeChange
        AFC.Valve =                            Drain
        AFC.TubePosition =
        FractionCollection.TubePosition
        AFC.Valve =                            Collect
        Log                                    AFC.TubePosition
        Log
        FractionCollection.TubePosition
        EndTrigger

        Trigger                                FracEnd
        FracEndDetected
        AFC.Valve =                            Drain
        AFC.TubePosition =
        FractionCollection.TubePosition
        Log                                    AFC.TubePosition
        Log
        FractionCollection.TubePosition
        EndTrigger

;*****
;* Definition of triggers for fraction collection ends here.
;*****

;*****
;* Definition of fraction collection driver settings starts here.
;*****
        FractionCollection.PumpDevice =        "Pump"
        TubeMaxVolume =                        40.000000 [ml]
        TotalNumberInstalled =                 42
        MaxTubesPerFraction =                  10
        TubeWrapping =                         No
        TubeChangeDuration =                   0.5 [s]

        DetectionChannel1.Name =               "UV_VIS_1"
```

```

PeakStartThreshold =          10.00 [signal]
PeakStartSlope =             0.500 [signal/s]
PeakStartTrueTime =          1.00 [s]
PeakEndThreshold =           9.00 [signal]
PeakEndSlope =               -1.000 [signal/s]
PeakEndTrueTime =            1.00 [s]
DerivStep =                  1.00 [s]
ThresholdNoPeakEnd =         2000.00 [signal]
ThresholdDoNotResolve =      Off
PeakMaxSlope =               Off
PeakMaxTrueTime =            1.00 [s]
PeakStartCurve =             1.000 [signal/s2]
PeakEndCurve =               1.000 [signal/s2]
BaselineDrift =               0.000 [signal/s]
BaselineOffset =             0.000 [signal]

DelayTime =                   5.5 [s] ;To be
determined by suitable experiment on site.
OffsetTime =                  0.0 [s]

;*****
;* Definition of fraction collection driver settings ends here.
;*****
UV_VIS_1.Wavelength =        190 [nm]
Flow =                       25.000 [ml/min]
%B =                          0.0 [%];isocratic
Pump.Curve =                  5

;*****
;* Sample run starts here.
;*****
0.000    Autozero
          Wait                      UV.Ready and
                                   Sampler.Ready

          Inject
          Pump_Pressure.AcqOn
          CollectFractions =      By_Peak
          CollectOutsidePeaks =   No
          UV_VIS_1.AcqOn

10.000   Pump_Pressure.AcqOff
          CollectFractions =      No
          UV_VIS_1.AcqOff

10.142   AFC.Valve =              Drain
          ;Close the diverter valve after a run to avoid
          accidental spillages

          End ;End time is crooked because of internal processing
          times required by triggers

```

```
;*****  
;* Sample run ends here.  
;*****
```

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