



Thermo Scientific

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Fraction Collector

VF-F10, VF-F11

Model ASX-280

Operating Instructions

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EG-Konformitätserklärung EC Declaration of Conformity

Der Hersteller: Dionex Softron GmbH, Part of Thermo Fisher Scientific
The manufacturer: Dornierstraße 4, D-82110 Germering

bescheinigt hiermit, dass folgende Produkte:
herewith declares that the following products:

Bezeichnung: Designation	Fraction Collector
Modell: type	ASX-280-FC
Seriennummer: serial number	061501A280 Onwards

den Bestimmungen der folgenden EG-Richtlinien entsprechen:
comply with the respective requirements of the following regulations:

- Maschinenrichtlinie 2006/42/EC
Machinery Directive 2006/42/EC
- EMV Richtlinie 2014/30/EU
EMC Directive 2014/30/EU
- RoHs 2011/65/EU Richtlinie zur Beschränkung der Verwendung bestimmter gefährlicher Stoffe in Elektro- und Elektronikgeräten
RoHs 2011/65/EU Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment

und die Übereinstimmung mit den folgenden Normen gegeben ist:
and meet the following standards:

- DIN EN 61010-1:2010
Sicherheitsbestimmungen für elektrische Mess-, Steuer-, Regel- und Laborgeräte
Teil 1: Allgemeine Anforderungen
Safety requirements for electrical equipment for measurement, control and laboratory use - Part 1: General requirements
- DIN EN 61326-1:2013
Elektrische Mess-, Steuer-, Regel- und Laborgeräte
EMV-Anforderungen – Teil 1: Allgemeine Anforderungen
Electrical equipment for measurement, control and laboratory use - EMC requirements
- Part 1: General requirements
- EN 50581:2012

Diese Erklärung wird verantwortlich für den Hersteller abgegeben durch

This declaration is given for the manufacturer in full responsibility by

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Table of Contents

1	Introduction.....	3
1.1	How to Use This Manual	3
1.2	Safety Information	4
1.2.1	Symbols on the Fraction Collector and in the Manual	4
1.2.2	Safety Precautions.....	5
1.2.3	Consignes de Sécurité	8
1.3	Intended Use	12
1.4	Solvent and Additive Information	12
1.5	Declarations of Conformity	13
1.5.1	CE Declaration of Conformity.....	13
1.5.2	cTUVus Compliance.....	13
1.6	Federal Communications Commission (FCC) Note.....	13
2	Overview.....	14
2.1	Unit Description.....	14
2.2	Operating Principle	15
2.3	Fraction Collector Configurations	16
2.4	Front Panel Elements	18
2.4.1	Fraction Collector FT.....	18
2.4.2	Fraction Collector F	19
2.5	Rear Panel.....	21
2.5.1	Fraction Collector FT.....	21
2.5.2	Fraction Collector F	22
2.5.3	Power Switch	23
2.5.4	USB Port	23
2.5.5	RS-232 (Serial) Port.....	23
2.5.6	Auxiliary I/O Connection	23
2.6	Supported Racks and Sample Containers	24
2.7	Operation	25
3	Installation.....	27
3.1	Facility Requirements	27
3.2	Unpacking	28
3.3	Installing the Fraction Collector	30
3.3.1	Mounting the Diverter Valve Assembly.....	31
3.3.2	Waste Line Connections	32
3.3.3	LC System Connections.....	33
3.3.4	Attaching the Dispense Station.....	34
3.3.5	Connecting the Drain Tubing	35
3.3.6	Installing the Peltier Devices on the Fraction Collector FT (VF-F10-A)	36
3.3.7	Changing the Bezel on a Peltier Device (VF-F10-A).....	37
3.3.8	Placing Fraction Racks on the Fraction Collector FT (VF-F10-A).....	39
3.3.9	Placing Fraction Racks on the Spill Tray Fraction Collector (VF-F11-A).....	41
3.3.10	Adjusting the Drop Former Height.....	44
3.4	Connecting the Fraction Collector	46

3.4.1	Connecting the External Desktop Power Supply	46
3.4.2	Connecting the Interface Cable	48
3.5	Setting Up the Fraction Collector in the Software	50
4	Verifying Installation	52
4.1	Overview of Actions	52
4.2	Inspecting Components Prior to Fluidic Operation	52
4.3	Testing the Drop Former Alignment	52
5	Operation and Maintenance	53
5.1	General Guidelines	53
5.2	Power-Up	53
5.3	Important Operating Parameters	55
5.4	Shutting Down the Fraction Collector	56
5.5	Flushing the Dispense Station and Eluent Flow Path	56
5.6	Routine and Preventive Maintenance	58
6	Troubleshooting	59
6.1	General Notes	59
6.2	Power and Communication Problems	59
6.3	Messages in the Chromeleon Audit Trail	60
7	Service	62
7.1	General Notes and Safety Precautions	62
7.2	Cleaning the Fraction Collector	63
7.2.1	Daily External Cleaning	63
7.2.2	Weekly Cleaning	64
7.3	Checking for Leaks	65
7.4	Installing the Kit for Normal-Phase LC	65
7.5	Installing the Kit with 0.4 mm ID Drop Former	68
7.6	Replacing the Diverter Valve	69
7.7	Replacing the Spill Tray	71
7.8	Updating the Firmware	71
8	Technical Information	73
9	Accessories, Spare Parts, and Consumables	76
9.1	Standard Accessories (included in the shipment)	76
9.2	Optional Accessories	79
9.3	Consumables and Spare Parts	80
10	Index	83

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 Thermo Scientific VF-F10 and VF-F11 Fraction Collector. Therefore, the term "the fraction collector" 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.








1.2 Safety Information

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.
-  **Notice:** Highlights information necessary to prevent damage to the instrument or invalid test results.
-  **Avis:** Signale des renseignements d'intérêt général ou des informations utiles pouvant simplifier une tâche ou optimiser les performances de l'instrument.
-  **Caution:** Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.
-  **Attention:** Signale une situation de danger potentiel qui, si elle n'est pas évitée, pourrait entraîner des blessures mineures à modérées.
-  **Warning:** Indicates a hazardous situation that, if not avoided, could result in serious injury.
-  **Avertissement:** Signale une situation de danger potentiel qui, si elle n'est pas évitée, pourrait entraîner des blessures graves.

1.2.2 Safety Precautions

When working with analytical instrumentation, you must know the potential hazards presented by the device and the used substances. Before initial operation of the fraction collector, make yourself familiar with the contents of this manual.

For the safety precautions in French, see page 8.

-  **Warning:** **Injury hazard**
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*.

- **Operator qualifications**

To use this product, you should have a basic knowledge of chemistry, a basic knowledge of electronic sampling equipment, at least a beginning level of computer experience, and working knowledge of the analytical instrument used with the fraction collector.

- **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**

The fraction collector is intended for use only by qualified operators who have been trained in safe laboratory practices. Make sure you know the hazards associated with all of the chemicals you are using, and take the appropriate precautions. Exposure to laboratory chemicals may result in serious injury.

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.

- **Emergency shutdown**

In case of emergency, turn off the fraction collector power switch, disconnect the power cord at the wall outlet, and shut down the HPLC system. If Peltier devices are installed, disconnect their power cords at the wall outlet.

The power switch on the rear panel is not the mains disconnect. Power mains disconnect is accomplished by unplugging the power cord at the power supply or at the wall outlet.

- **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 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.
- ◆ 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.

- 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.
- Keep fingers, hair, and loose clothing away from the moving parts of the fraction collector.
- 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 56).
- 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. Avant de commencer à utiliser l'instrument, assurez-vous que vous vous êtes familiarisés avec le contenu de ce manuel. **⚠ Avertissement: Risque des blessure**

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.

- **Qualifications de l'opérateur** Pour utiliser ce produit, vous devez avoir une connaissance de base de la chimie, une connaissance de base de l'équipement d'échantillonnage électronique, au moins un niveau débutant d'expérience en informatique et une connaissance pratique de l'instrument d'analyse utilisé avec le collecteur de fraction.

- **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 risques 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** Le collecteur de fraction est destiné à être utilisé uniquement par des opérateurs qualifiés qui ont été formés à des pratiques de laboratoire sûres. Assurez-vous de connaître les risques associés à tous les produits chimiques que vous utilisez et prenez les précautions appropriées. L'exposition à des produits chimiques de laboratoire peut entraîner des blessures graves.

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 de sécurité 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.

En cas d'urgence, éteignez l'interrupteur d'alimentation du collecteur de fraction, débranchez le cordon d'alimentation à la prise murale et éteignez le système CLHP. Si des dispositifs Peltier sont installés, débranchez leurs cordons d'alimentation à la prise murale.

L'interrupteur d'alimentation sur le panneau arrière n'est pas la déconnexion du secteur. La déconnexion du secteur s'effectue en débranchant le cordon d'alimentation au niveau de l'alimentation ou de la prise murale.

- **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'acétonitrile 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 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.
 - ◆ 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.).
- Débranchez l'instrument de toute source d'alimentation électrique avant de retirer les capots. Quand les capots de protection de l'appareil sont démontés, vous êtes exposés à des connexions électriques sous haute tension deviennent accessibles. 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.
- 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.
- Garder les doigts, les cheveux et les vêtements amples loin des parties mobiles du collecteur de fraction.
- Avant d'interrompre le fonctionnement pendant plusieurs jours ou plus, observez les précautions figurant en page 56.
- 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

The fraction collector is intended to be part of the Thermo Scientific Vanquish™ or UltiMate™ 3000 (U)HPLC system.

The intended use of the (U)HPLC system is to analyze mixtures of compounds in sample solutions. The fraction collector is used to collect the separated compounds in defined sample containers for further analysis. The fraction collector is for use by qualified personnel and in laboratory environment only.

The fraction collector and (U)HPLC system are intended for laboratory research use only. They are not intended for use in diagnostic procedures.

1.4 Solvent and Additive Information

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 7. For the safety instructions in French, see page 10.
- The fraction collector may be operated only using the components originally supplied with the unit and within the technical specifications and environmental conditions (→ page 73) that are outlined in this manual.
- Allowed ranges and concentrations (standard system configuration):
 - ◆ pH range: 2-12
 - ◆ Chloride concentration: 1 mol/L or less
- 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).

Also refer to the general guidelines and recommendations on the use of solvents and additives in the *Vanquish System Operating Manual* (if applicable) and the operating manuals for all modules in your chromatography system. If there is any question regarding appropriate usage, contact Thermo Fisher Scientific before proceeding.

⚠ Warning:**Injury hazard**

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: Risque de blessure**

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.

1.5 Declarations of Conformity

1.5.1 CE Declaration of Conformity

The device has satisfied the requirements for the CE mark and is compliant with the applicable requirements.

1.5.2 cTUVus Compliance

The cTUVus label on the device indicates that the device has satisfied the requirements for the cTUVus of North America Inc. of North America Inc.

1.6 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 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 spill 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 24).
- The spill 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 sample container 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™ 7 Chromatography Data System.
- Connection of the fraction collector to the computer on which the chromatography software is installed is achieved by using either a USB or RS232 serial cable.

2.2 Operating Principle

The fraction collector collects fractions from the (U)HPLC system. A solenoid diverter valve directs the flow either to the waste or to the fraction collection sample containers. When the software sends a trigger signal to the fraction collector calling for fractions to be collected, the diverter valve moves over the assigned collection sample container and is then switched to route eluent flow into the sample container.

During any movements, all sample containers remain stationary while the moving diverter valve assembly positions the drop former over the appropriate sample container or above the dispense 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 sample container.
Drop former	This component is attached to the diverter valve and forms droplets or a jet of eluent for collection into sample containers.
Waste tubing	This tubing connects the waste outlet port of the diverter valve to a waste container or to a drainage system.
Dispense 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 sample container	The sample container 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.
Fraction collector F, including: - 1.6 mm ID diverter valve and 1 mm ID PEEK drop former	VF-F11-A-01
Fraction collector FT (cooled version), including: - 1.6 mm ID diverter valve and 1 mm ID PEEK drop former - 1.0 mm ID diverter valve and 0.4 mm ID PEEK drop former - two Peltier devices incl. power supplies ready for use with vial racks or well plates	VF-F10-A-01

Kit with 0.4 mm ID drop former

A kit for flow rates up to 5 mL/min is available. It includes a different diverter valve, which replaces the standard valve.

Description	Part No.
Kit with an 0.4 mm ID drop former, 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:

Explosion hazard

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

 Avertissement: Risque d'explosion

Les solvants de la phase normale, non-conducteurs et non-polaires, par exemple hexane, peuvent entraîner une accumulation de charges électrostatiques sur le faisceau des gouttes en l'absence de mise à la terre. *N'effectuez pas* d'applications en phase normale sans vous être assuré que votre faisceau des gouttes est proprement isolée et mise à la terre.

For information about the optional accessories that are available for the fraction collector, see section 9.2 (→ page 79).

2.4 Front Panel Elements

2.4.1 Fraction Collector FT

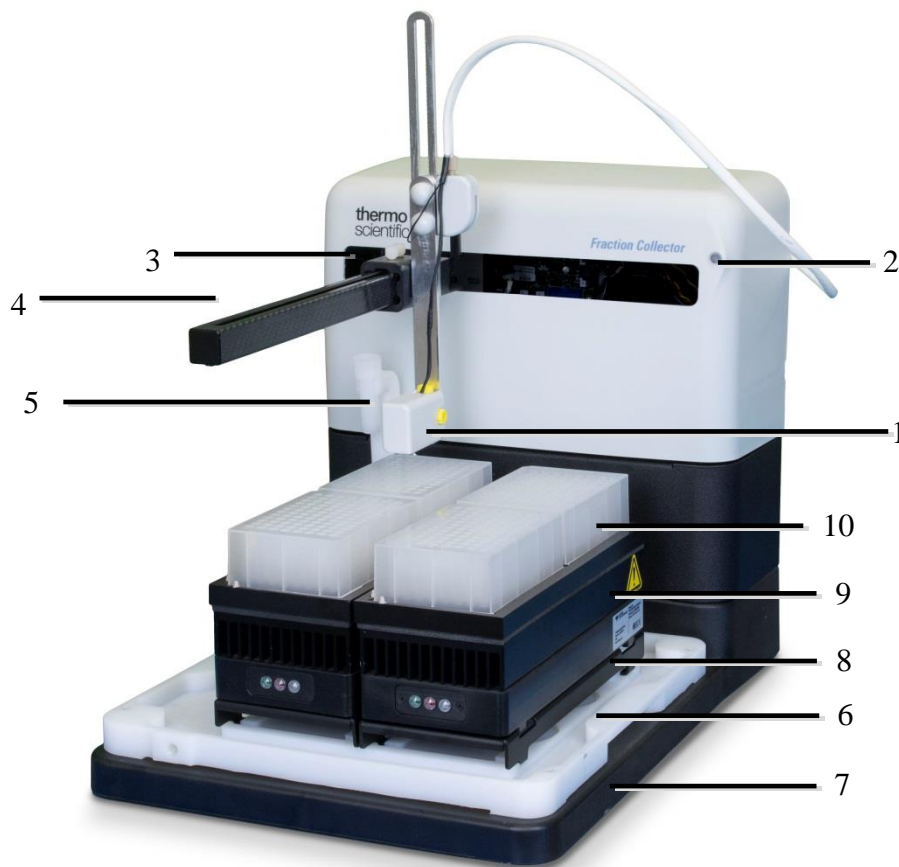


Fig. 1: Front panel view

No.	Front Panel Element	Description
1	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 sample containers and dispense station.
2	Power indicator LED	The LED is illuminated blue when the fraction collector is turned on.
3	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 15).
4	Fraction collector arm	Transports the diverter valve assembly fore-and-aft (→ see also section 2.2, page 15).
5	Dispense 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 dispense station is connected to a waste container or drainage system.

6	Spill tray with drain	Spill tray which allows mounting of supported rack types. The tray guides spilled solvents into a waste container.
7	Fraction collector base	Platform which supports the spill tray.
8	Peltier riser	Positions the sample containers or wells close to the drop former. The insulated racks are taller and do not require a riser.
9	Peltier device	Cools the samples.
10	Rack or well plate	Holds the collection vials.

2.4.2 Fraction Collector F

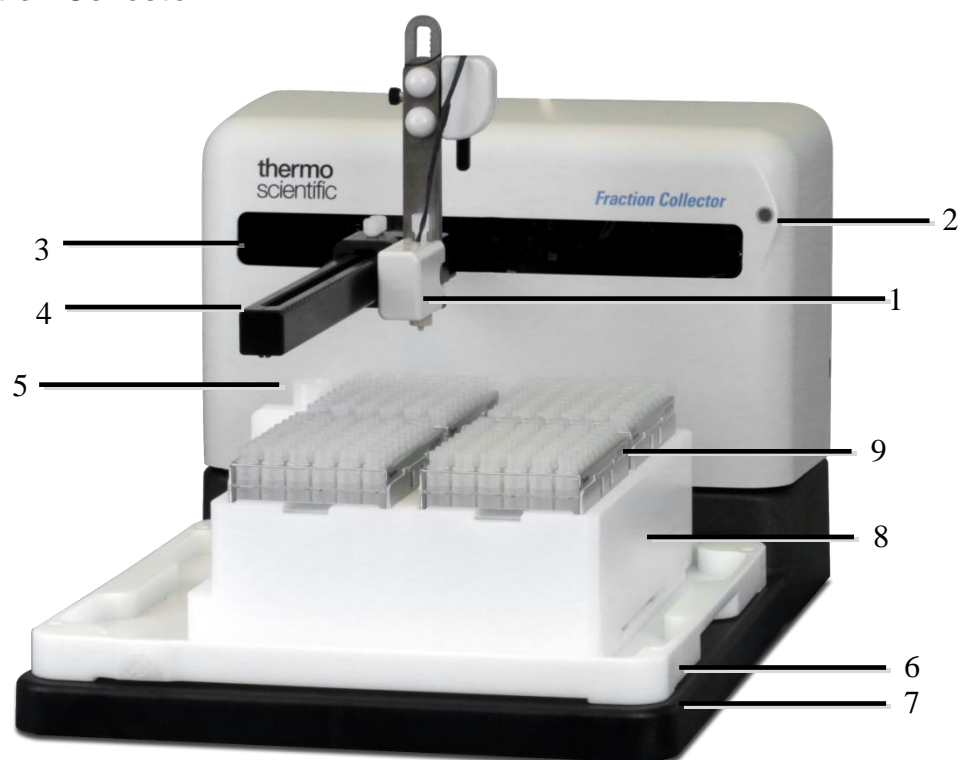


Fig. 2: Front panel view

No.	Front Panel Element	Description
1	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 sample containers and dispense station.
2	Power indicator LED	The LED is illuminated blue when the fraction collector is turned on.
3	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 15).

4	Fraction collector arm	Transports the diverter valve assembly fore-and-aft (→ see also section 2.2, page 15).
5	Dispense 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 dispense station is connected to a waste container or drainage system.
6	Spill tray with drain	Spill tray which allows mounting of supported rack types. The tray guides spilled solvents into a waste container.
7	Fraction collector base	Platform which supports the spill tray.
8	Rack adapter	Positions the sample containers or wells close to the drop former. Some taller racks do not require an adapter.
9	Rack or well plate	Holds the collection vials.

2.5 Rear Panel

2.5.1 Fraction Collector FT

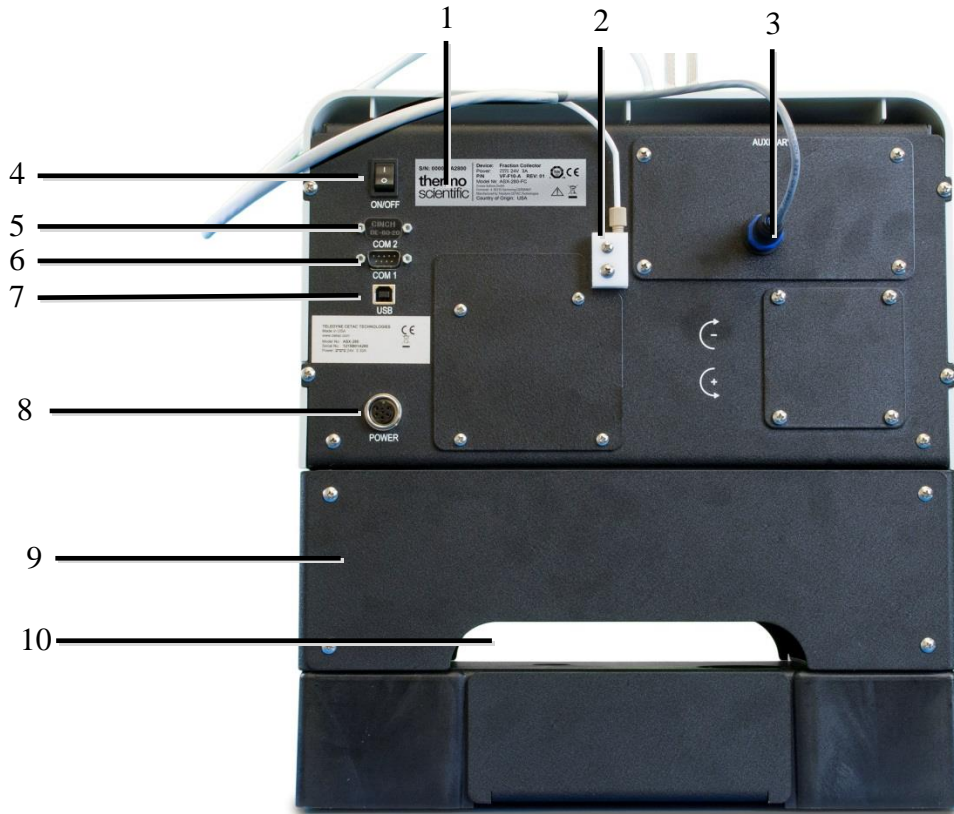


Fig. 3: Rear panel view (here:VF-F10-A)

No.	Description
1	Type label
2	Mounting block of diverter valve assembly
3	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).
4	Power switch
5	COM2 Serial communication port (unused)
6	COM1 RS-232 port (serial) for connection to the data system computer
7	USB port (Universal Serial Bus) for connection to the data system computer
8	Main power receptacle
9	The fraction collector riser accommodates the height of the Peltier devices
10	Peltier cable pass-through

2.5.2 Fraction Collector F

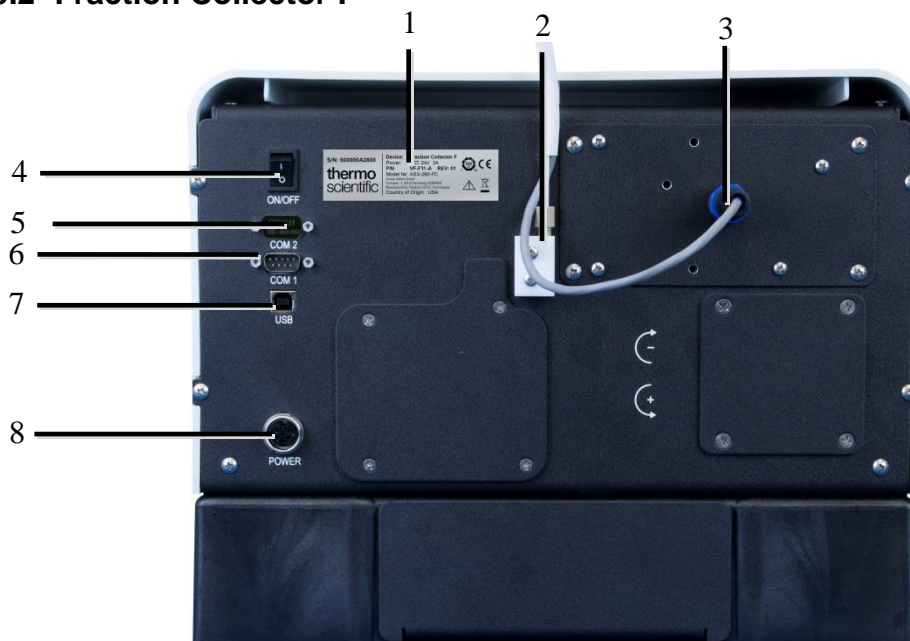


Fig. 4: Rear panel view (here:VF-F11-A)

No.	Description
1	Type label
2	Mounting block of diverter valve assembly
3	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).
4	Power switch
5	COM2 Serial communication port (unused)
6	COM1 RS-232 port (serial) for connection to the data system computer
7	USB port (Universal Serial Bus) for connection to the data system computer
8	Main power receptacle

2.5.3 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.

For the VF-F10-A, note that the two Peltier cooling devices are not controlled by the fraction collector's power switch. They are turned on and off by connecting and disconnecting their power cords.

2.5.4 USB Port

Use a USB connection to connect the fraction collector to the computer on which the chromatography software is installed. The communication data is transferred digitally via the appropriate USB cable. USB driver software on the computer treats the USB port as a virtual serial port. To ensure trouble-free operation, all USB cables must be ordered from the Thermo Fisher Scientific sales organization.

For information about how to connect the fraction collector to the computer, see section 3.4 (→ page 46).

2.5.5 RS-232 (Serial) Port

You can use a serial connection (RS-232) to control the fraction collector if, for example, no USB port is available. 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.

2.5.6 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 Supported Racks and Sample Containers

The fraction collector supports a large variety of sample containers like well plates, vials and tubes. For information about how to install a rack, see page 36.

The following racks for sample containers are supported:

Rack for	Sample Container Size	Part No.
14 tubes, cooled	50 mL; 30 mm x 100 mm	6706.0014
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
30 tubes, cooled	14 mL; 16 mm x 100 mm	6706.0030
40 tubes	20 mL; 20 mm x 100 mm	6702.0040
60 tubes	14 mL; 15 mm x 100 mm	6702.0060
90 tubes	8 mL; 13 mm x 100 mm	6702.0090
54 vials (Vanquish Split Sampler)	12 mm OD In addition, a rack adapter (part no. 6702.0200) is required for the non-cooled fraction collector.	6850.1023
40 vials (WPS-3000)	2 mL, 12 mm OD, cylindrical In addition, a rack adapter (part no. 6702.0100) is required for the non-cooled fraction collector. The vials should have an opening as large as possible for unerring fractionation.	6820.4070
60 vials, cooled	12 mm OD	6706.0060
22 vials (WPS-3000)	4 mL, 15 mm OD In addition, a rack adapter (part no. 6702.0100) is required for the non-cooled fraction collector.	6820.4084
10 vials (WPS-3000)	10 mL, 22 mm OD In addition, a rack adapter (part no. 6702.0100) is required for the non-cooled fraction collector.	6820.4086
-	250 mL Schott bottles Up to six bottles (part no. 2270.0026) can be placed directly on the spill tray.	-

The following adapters are available:

Adapter for	Tube Size	Part No.
Vanquish 54 pos sample racks and well plates, non-cooled	Four Vanquish 54 pos sample racks and 96 well plates, shallow and deep well	6702.0200
WPS-3000 sample racks, non-cooled	Four WPS-3000 sample racks	6702.0100
Cooled racks, Vanquish 54 pos sample racks and well plates		6706.9006

For details on rack installation and allowed combinations of fraction formats, see section 3.3.6, page 36.

2.7 Operation

The fraction collector is designed to be operated from a computer configured with the Chromeleon Chromatography Data System (CDS).

3 Installation

3.1 Facility Requirements

The operating environment is important to ensure optimal performance of the fraction collector. 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.

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

⚠ Avis: 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 73).
- Install the instrument in the laboratory on a stable surface that is free of vibrations.
- Avoid rough handling of the fraction collector. 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 longterm 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.

- The fraction collector must be placed on a sturdy countertop or table. Do not place the fraction collector on a wheeled cart or folding table.
- 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.

⚠ Notice: 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).

⚠ Avis: 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).

- Avoid using the fraction collector 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.

⚠ Notice: 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.

⚠ Avis: 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 est nulle. Pour plus d'informations, consultez la déclaration de garantie dans les conditions de vente.

Unpacking the fraction collector

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.
3. Remove the form-fitting foam spacers, which allow for secure placement and positioning inside the shipping box.
4. Remove the protective wrap from the fraction collector.
5. 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 fraction collector 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 fraction collector 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):

1. Mount the diverter valve assembly (→ page 31)
2. Connect a waste line to the diverter valve (→ page 32)
3. Connect the fraction collector to the HPLC system (→ page 33)
4. Attach the dispense station (→ page 34)
5. Connect the drain tubing (→ page 35)
6. Install the Peltier devices, if applicable (→ page 36)
7. Change the bezel on a Peltier device, if applicable (→ page 37)
8. Place the fraction racks on the fraction collector (→ page 39) or spill tray (→ page 41)
9. Adjust the drop former height (→ page 44)

**Caution:****Pinch hazard**

Ensure the power switch is off and the power cord is unplugged before proceeding with installation. If the power is left on, motors may move unexpectedly and cause injury.

**Attention:****Risque de pincement**

Assurez-vous que l'interrupteur d'alimentation est éteint et que le cordon d'alimentation est débranché avant de procéder à l'installation. Si l'alimentation est laissée allumée, les moteurs peuvent se déplacer de manière inattendue et causer des blessures.

3.3.1 Mounting the Diverter Valve Assembly

For mounting the diverter valve assembly on the fraction collector arm, select the appropriate diverter valve for your application conditions.

Intended Flow-rate Range (mL/min.)	Recommended Diverter Valve
0.5 – 5.0	1.0 mm ID with 0.4 mm ID drop former
5.0 – 150	1.6 mm ID with 1.0 mm ID drop former

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. 5 shows the assembly attached.

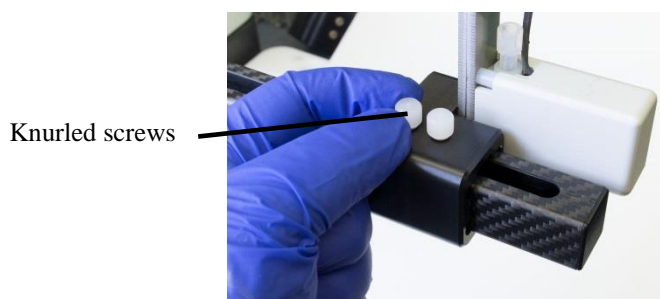


Fig. 5: Diverter valve assembly

2. Attach the cable to the mounting block to the fraction collector rear panel with the knurled finger-tight nut (→Fig. 6).

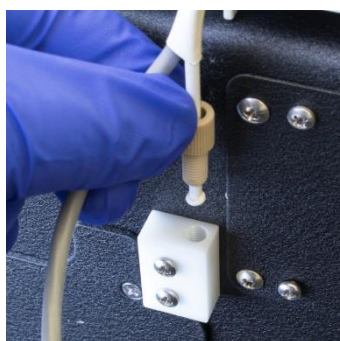


Fig. 6: Attaching the cable to the mounting block

3. Connect the diverter valve cable to the connector on the fraction collector rear panel (→ Fig. 7). Tighten the knurled nut finger-tight.



Fig. 7: Attaching the diverter valve cable to the mounting block

4. Screw the PEEK drop former finger-tight into the diverter valve (→ Fig. 8).



Fig. 8:: Attaching the drop former

3.3.2 Waste Line 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 5).
- 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 spare capillaries.

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

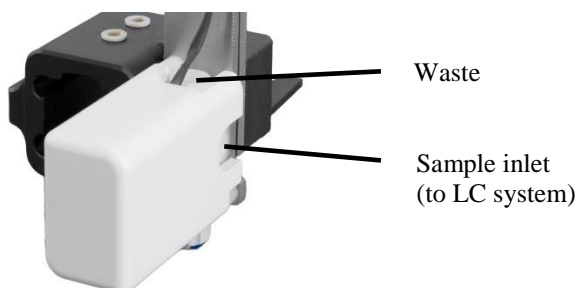


Fig. 9: Connections on the diverter valve

Note the following when connecting the sample inlet:

In order to ensure an adequate capillary connection between source capillary and sample inlet, place first the PTFE screw and then slide the ferrule onto the capillary end as shown (→ Fig. 7). Then carefully install the capillary.

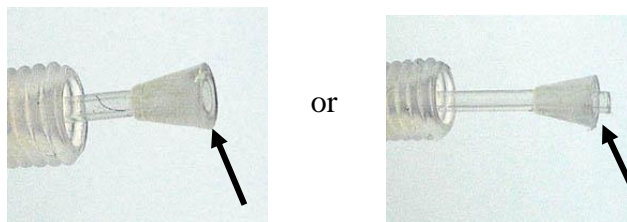


Fig. 10: Connecting the waste or sample inlet tubing to the diverter valve

3.3.3 LC System Connections

For optimized performance from your fraction collector, please refer to the HPLC Capillary Connection kit for the necessary components. Select the appropriate capillary to the corresponding flow rate range of the target application. Depending on the flow cell outlet, there can be a non-Viper connection or a Viper-only connection.

Non-Viper connections

For non-Viper connections from the detector, refer to the table below. One can derive the appropriate setup correlating the application's flow rate with the corresponding colored PEEK capillary, Derivative Step, and Delay Volume. The Derivative Step and Delay Volume can be programmed in the **Advanced Options** of the Chromeleon Instrument Method Wizard.

To physically connect the capillary:

1. Slide the one-piece finger-tight fitting on one end of the capillary and couple with the outlet of the detector.
2. Use the PTFE screw and ferrule connection to couple the other end to the sample inlet of the diverter valve (→ Fig. 10).

Capillary Color	Capillary Ordered Length	Actual Length (+/- 0.5cm)	Compatible Flow-rate Range (mL/min.)	Derivative Step Value (sec)	Chromeleon 7.2 Delay Volume (µL)
Red (125 µm I.D.)	152.4cm (5ft)	157.5cm (5.17ft)	0.5 – 0.8	0.02	55
Blue (250 µm I.D.)	152.4cm (5ft)	157.5cm (5.17ft)	0.5 – 1.2	0.02	86
Orange (500 µm I.D.)	152.4cm (5ft)	157.5cm (5.17ft)	1.2 – 5.0	0.02	334

Clear (1.0 mm I.D.)	2m (6.6ft) included	110cm (3.6ft)	5.0 – 150	0.02	890
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Viper-only connections

For Viper-only connections, refer to the table below. One can derive the appropriate setup correlating the application's flow rate with the corresponding colored PEEK capillary, Derivative Step, and Delay Volume. The Derivative Step and Delay Volume can be programmed in the **Advanced Options** of the Chromeleon Instrument Method Wizard.

To physically connect the capillary:

1. On the outlet to the detector, couple the Viper capillary provided in the HPLC Connection Kit.
2. Attach the capillary union to the open end of the Viper capillary.
3. Using the one-piece finger-tight fitting, connect the PEEK capillary to the union.
4. To the other end of the PEEK capillary, slide on the PTFE nut and then the PTFE ferrule (→ Fig. 10).
5. Couple PEEK capillary to the Sample Inlet of the diverter valve on the fraction collector.

Capillary Color	Capillary Ordered Length	Actual Length (+/- 0.5cm)	Suggested Flow Rate Range (mL/min.)	Suggested Derivative Step Value (sec)	Corresponding Chromeleon 7.2 Delay Volume (µL)
Red (125 µm I.D.)	152.4cm (5ft)	157.5 cm (5.17ft)	0.5 – 0.8	0.02	56
Blue (250 µm I.D.)	152.4cm (5ft)	157.5 cm (5.17ft)	0.5 – 1.2	0.02	87
Orange (500 µm I.D.)	152.4cm (5ft)	157.5 cm (5.17ft)	1.2 – 5.0	0.02	335
Clear (1.0 mm I.D.)	2m (6.6ft) included	110cm (3.6ft)	5.0 – 150	0.02	891

3.3.4 Attaching the Dispense Station

The dispense station is located at the extreme left position of the fraction collector head (→ Fig. 2, page 19). 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 dispense station is installed in its holding bracket at shipment, but can be removed easily by pulling the station out of the bracket. The dispense station easily “snaps” back into place.

i **Tip:** Ensure that the height of the drop former and dispense station is properly adjusted to avoid crashes (→ section 3.3.10, page 44 and section 4, page 44).

3.3.5 Connecting the Drain Tubing

Connect a drain tubing to the dispense station and another to the tray drain of the spill tray as described below.

Connecting the dispense station drain tubing

The dispense station drain tubing attaches to the dispense station. Use an elbow piece (shipped with the fraction collector) to connect the drain tubing to the dispense station.

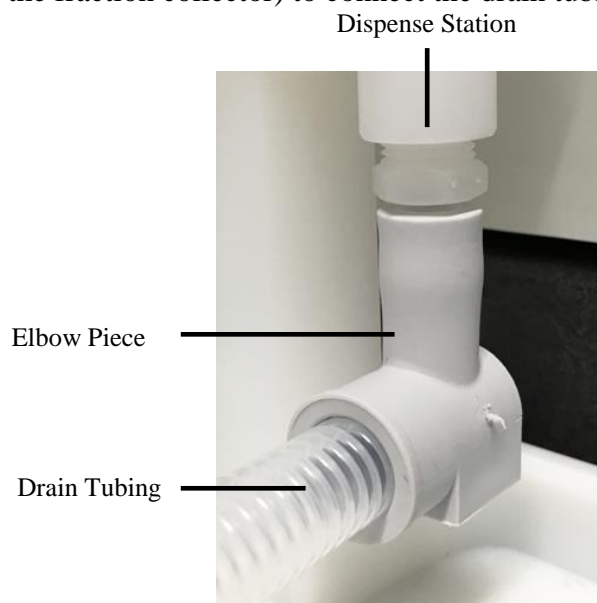


Fig. 11: Connecting the dispense station drain tubing

Connecting the spill tray drain tubing

Connect another drain tubing in the same way to the integrated drain at the front left corner of the spill tray. You can use the T piece shipped with the fraction collector to connect the two drain tubes to a single drain (→ Fig. 12). You can also connect them to the HPLC drain system, if applicable, as shown in the figure.

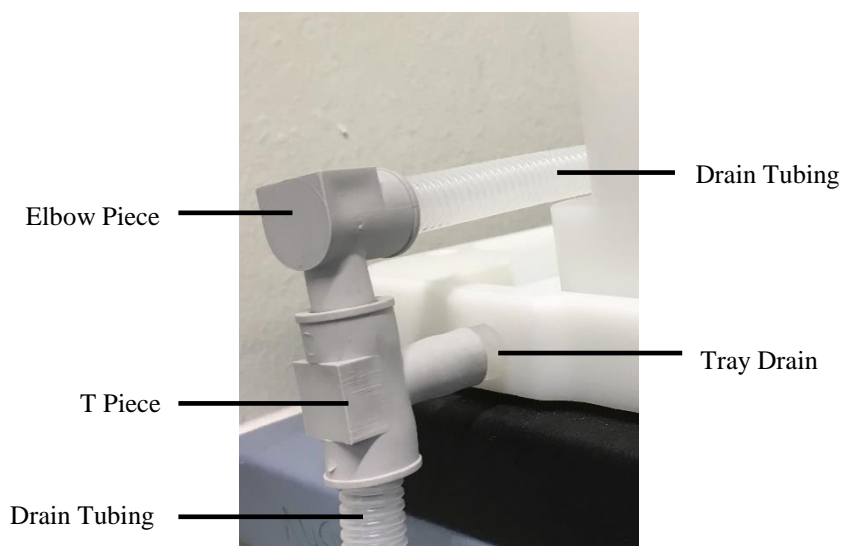


Fig. 12: Connecting the spill tray drain tubing

Placing the waste container

All drain tubing should be routed to an appropriate waste container or drainage system. 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 (→ Fig. 13). If necessary, shorten the tubing.

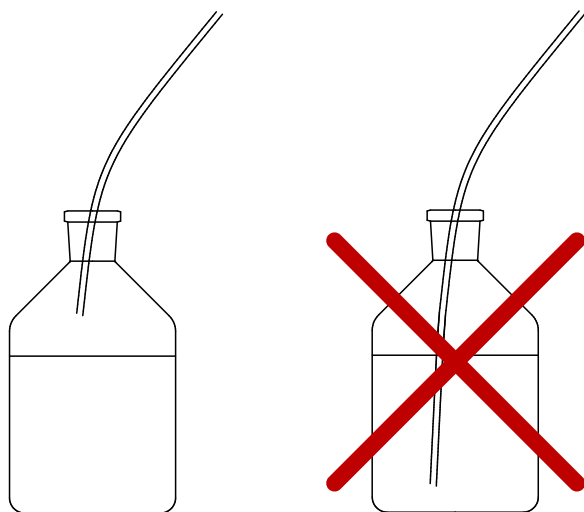


Fig. 13: Dispense station tubing in waste container

3.3.6 Installing the Peltier Devices on the Fraction Collector FT (VF-F10-A)

Two Peltier cooling devices may be placed on the spill tray of the fraction collector.

1. For each Peltier device, thread the cable of the power supply through the opening in the fraction collector. Each Peltier device has its own power supply.

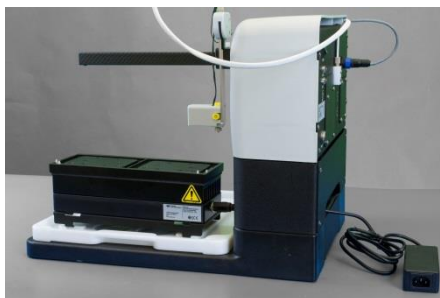


Fig. 14: Peltier device with power supply

2. Connect the power supply to the Peltier device, then plug the power supply into the wall outlet.
3. Place the Peltier devices on the spill tray with the LED facing forward and the power connector facing the back of the autosampler.

3.3.7 Changing the Bezel on a Peltier Device (VF-F10-A)

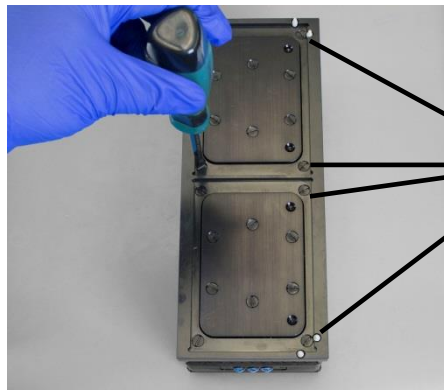
When you change between insulated racks and uninsulated well plates or racks, you may need to change the bezel on top of the Peltier devices.

1. Unplug the power cable from the Peltier device and place the Peltier device on a flat surface.
2. Select a flat blade screwdriver which exactly fits the screws on top of the Peltier device. The nylon screws can be damaged if the screwdriver is too large or too small.



Fig. 15: Correct size screwdriver

3. Remove the 8 screws which hold the bezel in place.



Remove the 8 screws closest to the outside of the Peltier device

Fig. 16: Removing the bezel screws

- Carefully lift the bezel. The bezel fits quite tightly, but you should be able to remove it using only your hands (no pry tools should be used).



Fig. 17: Removing the bezel

- Press the new bezel firmly in place.



Fig. 18: Pressing the new bezel into place

- Tighten the screws using just your fingertips on the screwdriver.

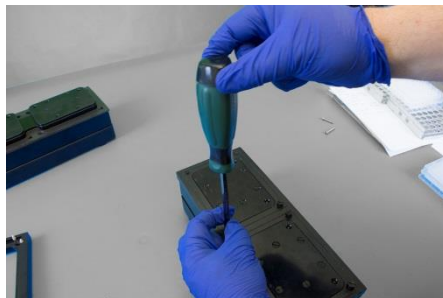


Fig. 19: Gently securing the screws

3.3.8 Placing Fraction Racks on the Fraction Collector FT (VF-F10-A)

⚠ Caution: Pinch hazard

Before loading or unloading any fraction racks on the spill 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.

⚠ Attention: Risque de pincement

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.

A riser must be placed under each Peltier device. For each of the two Peltier devices:

1. Place the riser on the spill tray. The feet of the riser should snap into place on the tray.

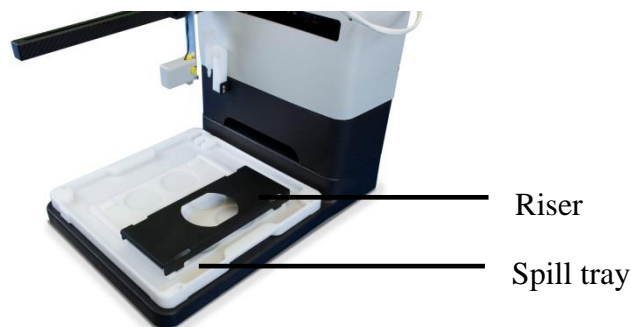


Fig. 20: Riser installed on the spill tray

2. Place the Peltier device on the riser.

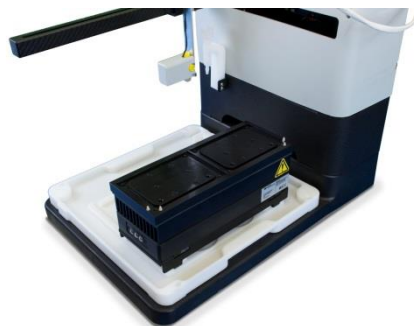


Fig. 21: Peltier device placed on the riser

3. Place the racks or well plates on the Peltier device.

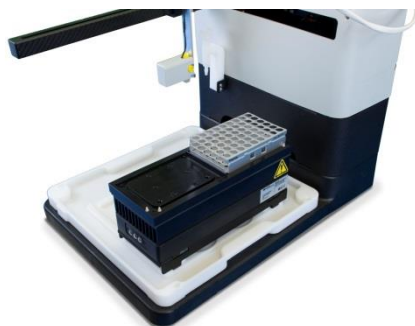




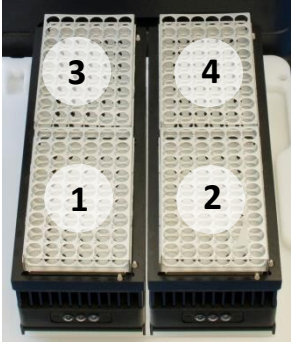
Fig. 22: One rack shown on the Peltier device

Layout of Cooled Racks

Depending on the rack type, you can install a certain number of racks or, deep well plates, or bottles. The maximum number of racks and the order in which the racks must be placed and configured in the software can be taken from the following table. 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 rack type in Chromeleon, refer to *Chromeleon Help*.

Fraction rack	Maximum number of racks/bottles	Rack layout
14PosCooled, 30PosCooled, 60PosCooled	Two racks can be installed on each of the two cooling devices, holding the specified number of tubes. Any two racks may be used together at one time. These rack types must not be mixed with racks or well plates of different heights in order to guarantee proper operation. These rack types must not be mixed with non-cooled racks for tubes or bottles. No riser is used under the Peltier device.	
96Pos on cooling device	Two well plates (96 positions) can be installed on each of the two cooling devices. Well plates and racks with different heights must not be mixed in order to guarantee proper operation. Well Plates must not be mixed with non-cooled rack types for tubes or bottles. A riser must be placed under the Peltier device.	

Fraction rack	Maximum number of racks/bottles	Rack layout
54pos on cooling device	Two 54 pos sample racks can be installed on each of the two cooling devices. 54pos racks and well plates with different heights must not be mixed in order to guarantee proper operation. 54pos racks must not be mixed with non-cooled rack types for tubes or bottles. A riser must be placed under the Peltier device.	

3.3.9 Placing Fraction Racks on the Spill Tray Fraction Collector (VF-F11-A)

⚠ Caution: Pinch hazard

Before loading or unloading any fraction racks on the spill 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 sample containers while the fraction collector is operating.

⚠ Attention: Risque de pincement

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.

The 90 position, 8 mL tube racks in the Fraction Collector F accessories kit are shipped unassembled. First, assemble the racks using the supplied instructions. Then, position them on the spill tray, using care to line up the rack locating pins with the associated recesses in the tray (Fig.23).

Other rack types such as Thermo Scientific Vanquish Split Sampler, UltiMate 3000 WPS-3000 vial racks and the 96 well plates require special adapters which can be ordered separately. The adapter block is correctly installed on the spill tray in one position only, when the recess on the bottom of the adapter block is properly aligned with the elevated parts of the spill tray.

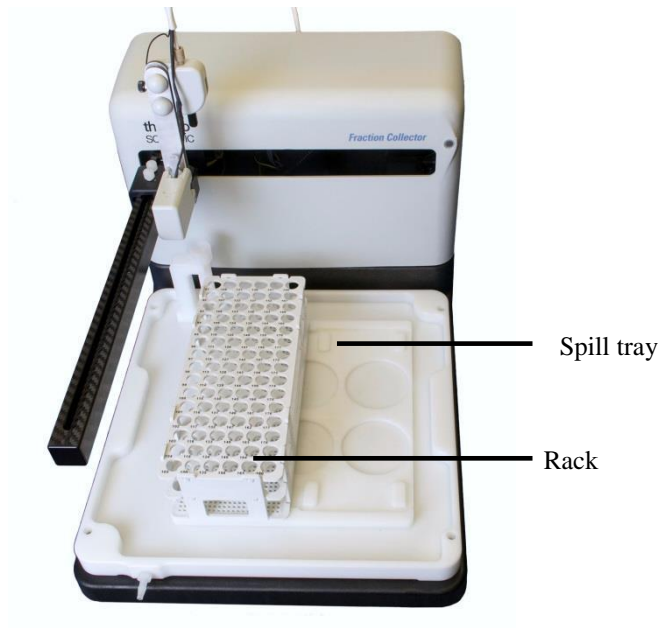


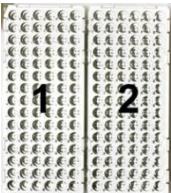
Fig.23: One rack placed in spill tray

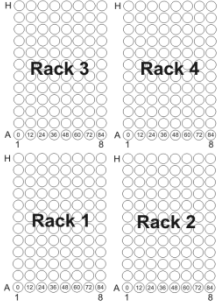
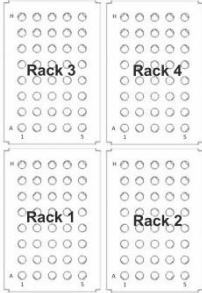

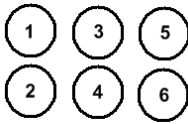
When installing funnel racks on the 21-position rack, connect tubing (shipped with the rack) to each funnel and route the tubing to an appropriate container or bottle. Observe the instructions for drain tubing (→ page 35).

Layout of Non-Cooled Racks

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 the software can be taken from the table on page 42. 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 rack type in Chromeleon, refer to *Chromeleon Help*.

Fraction rack	Maximum number of racks/bottles	Rack layout
21Pos, 24Pos, 40Pos, 60Pos, 90Pos	Two racks can be installed on the spill tray, holding the specified number of tubes. Any two racks may be used together at one time.	

Fraction rack	Maximum number of racks/bottles	Rack layout
96Pos, non-cooled	Four well plates (96 positions) can be installed on the well plate adapter. Well plates and racks with different heights must not be mixed in order to guarantee proper operation . Well Plates must not be mixed with rack types for tubes or bottles.	
54pos, non-cooled	Four 54 position sample racks for 12 mm OD vials can be installed on the well plate adapter. 54 pos sample racks and well plates with different heights must not be mixed in order to guarantee proper operation . 54 pos sample racks must not be mixed with rack types for tubes or bottles.	
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 spill tray. You must always install all six bottles. It is not possible to mix bottles with other rack types.	

Removing the Rack Adapter

To prevent the spill tray from accidentally being lifted out of its proper position, always remove the rack adapter toward the side as shown here:

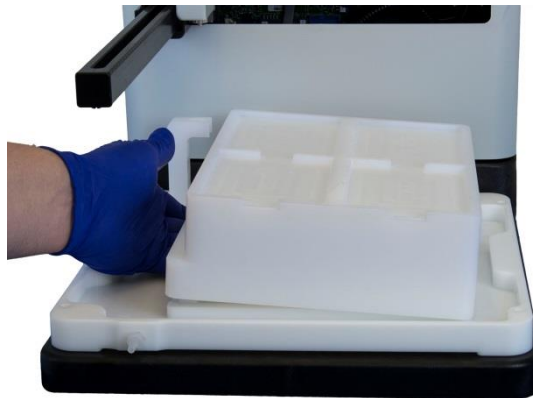


Fig. 24: Removing the rack adapter

3.3.10 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. 25).
2. Slide the assembly so that the drop former is several millimeters above the highest point of the fraction sample container. 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.

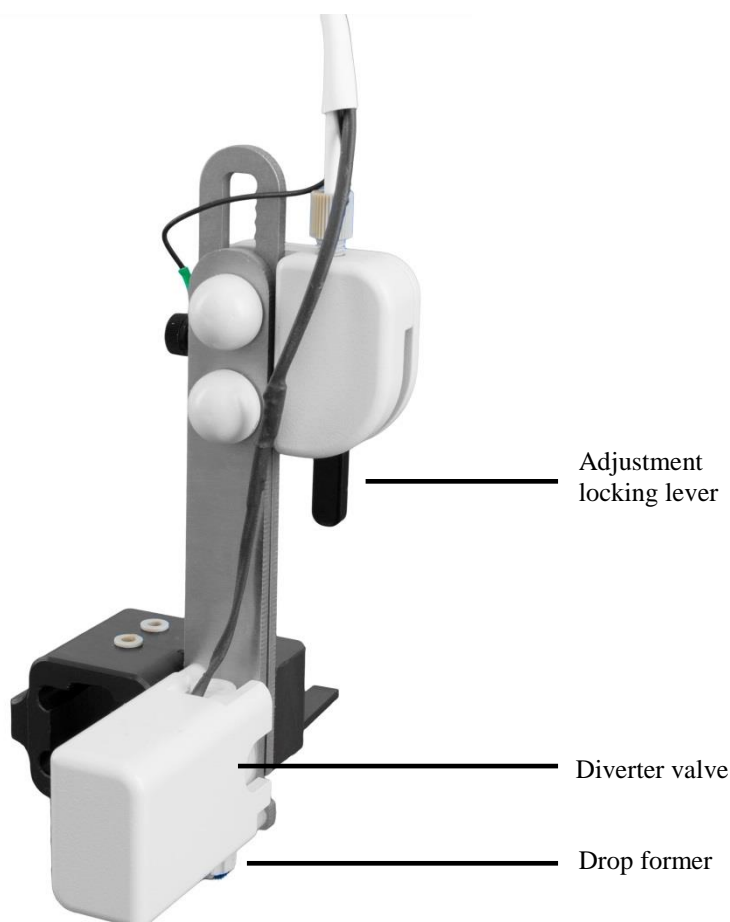


Fig. 25: Diverter valve assembly with drop former

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

i Tip: This setting ensures that the diverter valve assembly will not impinge on the dispense station during movement, while allowing for the minimum distance between those two components to minimize the risk of eluent being dispensed outside of the dispense 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.

5. 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 fraction collector to the power source and to the computer on which the chromatography data system is installed. The following sections explain how to establish these connections.

3.4.1 Connecting the External Desktop Power Supply

An external desktop power supply is delivered with each fraction collector.

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

1. Place the fraction collector 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 21).
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 1.07 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:****Fire and shock hazard**

Never use a power cord other than the power cords provided for the device. Use only the provided power supply.

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

The device 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.

**Avertissement:****Risque d'incendie et de choc**

Utilisez uniquement les cordons d'alimentation électrique spécifique à l'instrument. N'utilisez que l'alimentation fournie.

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

L'instrument 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 Connecting the Interface Cable

To connect the fraction collector to the computer on which the chromatography data system is installed, select *one* of the following alternatives:

- Use a USB cable (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 computer (→ section 3.4.2.1).
- Use an RS-232 cable (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 3.4.2.2).

i **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.

3.4.2.1 Communication via USB

Before you can operate the fraction collector with the chromatography software via USB, an additional virtual COM port must be created on the computer on which the chromatography data system is installed. Select this new COM port when configuring the fraction collector in the software.

Connecting a USB Cable

i **Tip:** Verify that the chromatography software is installed on the computer *before* you connect the fraction collector to the computer.

To establish a connection via a USB cable:

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

i **Tips:** As an alternative, you can connect the fraction collector to the internal USB port on another module in the Vanquish or UltiMate 3000 system that is connected to the computer, or connect the fraction collector to the computer via an external USB hub.

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. Windows™ 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).

- i** **Tip:** The required Virtual COM Port drivers are usually found and installed automatically when the fraction collector is plugged in. If this is *not* the case, complete the steps below.

Installing the Virtual COM Port on the Data System Computer

1. Locate the **Drivers\USB Virtual COM Port** folder on the Chromeleon Service Release DVD.
2. 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.

3.4.2.2 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. 26).

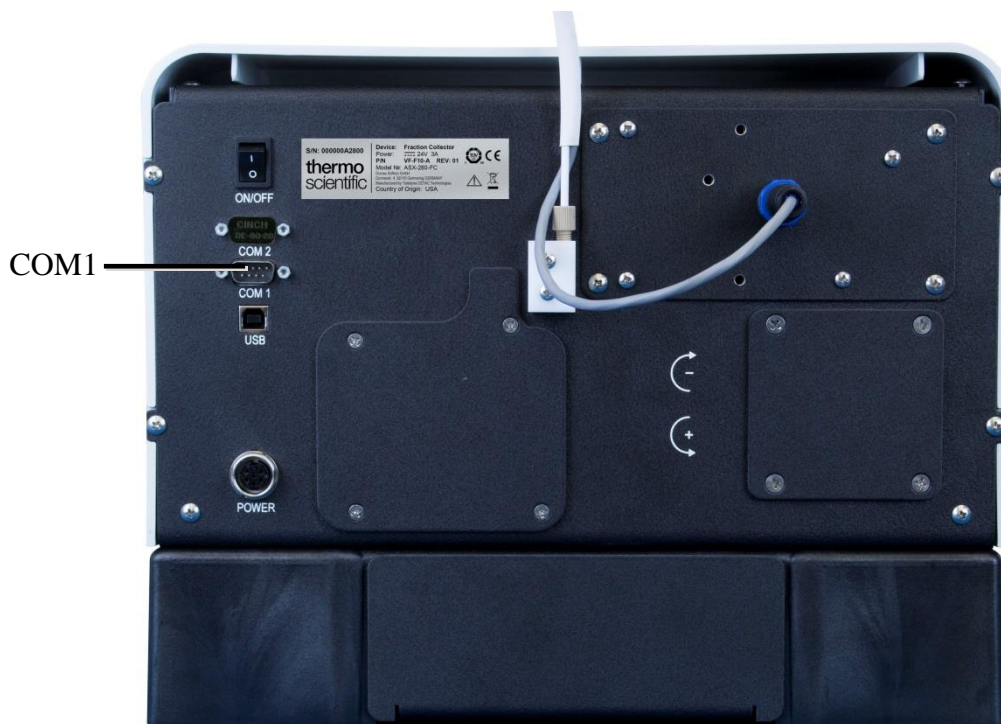


Fig. 26: COM1 Port

2. Connect the cable to a serial (RS232) port on the computer

3.5 Setting Up the Fraction Collector in the Software

This manual assumes that the Chromeleon 7 Chromatography Data System is already installed on the Chromeleon data system computer and a valid license is available.

For general information how to set up a system in Chromeleon, refer to the *Chromeleon 7 Installation Guide*.

For information about setting up the Vanquish system in Chromeleon, refer to the *Vanquish System Operating Manual*.

The *Chromeleon Help* provides detailed information about the required settings.

4 Verifying Installation

4.1 Overview of Actions

Once the installation 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 computer on which the chromatography data system is installed 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, dispense 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 62).

4.3 Testing the Drop Former Alignment

The drop former must align to the center of each fraction sample container 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 sample container 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.

 **Tip:** If the fraction collector alignment is not correct, contact your local Thermo Fisher Scientific support organization.







5 Operation and Maintenance

The fraction collector 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 fraction collector. When you finish using the fraction collector, you may need to flush the dispense station and flow path before shutting the fraction collector down.

The fraction collector can be operated with the Chromeleon 7 Chromatography Data System. Stand-alone operation is not supported.

5.1 General Guidelines

When operating the fraction collector, pay attention to the following guidelines:

-  **Notice:** The rack configuration *must not* be changed during fraction collection, or during the course of an instrument method or sequence.
-  **Avis:** Ne changez pas la configuration du rack au cours de la collection de fraction, ou au cours d'une méthode d'instrument ou séquence.
-  **Notice:** The CollectMode *must not* be changed during fraction collection, or during the course of an instrument method or sequence.
-  **Avis:** Ne changez pas le CollectMode au cours de la collection de fraction, ou au cours d'une méthode d'instrument ou séquence.
-  **Notice:** To avoid accidental contamination of empty tubes, never use **SawVertical** collect mode in combination with **Continue** movement mode.
-  **Avis:** Afin d'éviter contamination des tubes, n'utilisez pas le mode de collection **SawVertical** avec le mode de mouvement **Continue**.

5.2 Power-Up

Once you arrange the 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 dispense station is properly connected (→ section 3.3.5, page 35).
2. Turn the fraction collector power switch on. The blue LED indicator along the fraction collector x-axis lights up when the power is on.
3. For the VF-F10-A, connect the power cords of the two Peltier devices to a wall outlet.

4. Ensure the waste tubing is in the correct waste container and proper drain flow is achieved.



Caution:

Pinch hazard

Keep fingers, hair, and loose clothing away from the moving parts of the fraction collector.



Attention:

Risque de pincement

Garder les doigts, les cheveux et les vêtements amples loin des parties mobiles du collecteur de fraction

5.3 Important Operating Parameters

The commands and parameters described in the table should be considered for simple routine operation of the fraction collector. You can access these parameters from the Chromeleon user interface.

For more information, refer to *Chromeleon Help and documents*.

Parameter	Description
Collect mode	<p>Defines how the drop former travels across the racks. Note that Schott bottles will always be processed in SawVertical collect mode. The collect mode setting is not supported with Schott bottles.</p> <p>Vertical: The drop former follows a meander-shaped path. Be aware that this mode minimizes position change times, but negates imprinted position numberings.</p> <p>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.</p> <div style="text-align: center;"> <p style="display: flex; justify-content: space-around; margin-top: 10px;"> Vertical SawVertical </p> </div> <p>Note: To avoid accidental contamination of empty sample containers, SawVertical collect mode is not allowed in combination with Continue movement mode. The CollectMode must not be changed during a fraction collection, or during the course of an instrument method or sequence.</p>
Move to rinse position on sequence end	<p>If set to Yes, the drop former automatically moves to the rinse position when the sequence ends.</p>
Movement mode	<p>Defines whether the diverter valve switches (closes) or remains open when the drop former moves.</p> <p>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 position, the delivered sample will be directed to the waste.</p>

	<p>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.</p> <p>Note: To avoid accidental contamination of empty sample containers, Continue movement mode is not allowed in combination with SawVertical collect mode.</p>
Rack 1 to Rack 6	<p>Defines the rack types installed on the tray. You may define up to six racks. If you have less than six racks installed, select NotUsed for all unused rack positions. The following rules should be observed:</p> <ul style="list-style-type: none"> • All racks have to be defined following the order from Rack1 to Rack6. • Racks for 96 well plates and Schot bottles (Bottle) must not be mixed with any other rack types. • Unused rack positions must always be at the end of the list. For example, it is not allowed to set NotUsed for Rack1 and then select a rack type for Rack2. <p>For the assignment of numbers for each rack type, refer to page 36.</p> <p>Note: The rack configuration must not be changed during a fraction collection, or during the course of an instrument method or sequence.</p>
Tube position	Moves the drop former to a tube position as defined by the installed rack type. At least one valid rack type must be defined.
Rinse position	Centers the drop former over the dispense station. Perform this command before replacing a rack, for example.
Valve	Switches the diverter valve to the Drain or Collect position. Manual switching of the valve may sometimes be required during maintenance procedures.

5.4 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 5.5.
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 fraction collector power switch.

5.5 Flushing the Dispense Station and Eluent Flow Path

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

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

Flushing the dispense station during initial startup of the fraction collector removes any contaminants. Flushing the dispense 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 fraction collector down. This will prevent buildup of precipitates inside the flow path.

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

5.6 Routine and Preventive Maintenance

Routine maintenance of the fraction collector consists of regular cleaning of specific fraction collector components. Routine maintenance also includes checking fraction collector components for leaks or other damage. Additional periodic maintenance tasks may be required, including replacement of the following fraction collector components: sample inlet tubing, dispense 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 ...
Daily	Check the fluid lines for any signs of leakage (→ page 65).
	Check the fluid connections for any signs of salt deposits.
	Clean the fraction collector (general) (→ page 63).
	When using buffer solutions, flush the fraction collector flow path thoroughly after use with a suitable solvent.
Weekly	Clean the fraction collector (thorough) (→ page 64).
Periodically	Inspect the tubing for possible damage, such as cracks, nicks, cuts, or blockages.
	Replace dispense station tubing and sample inlet/waste tubing (connected to the diverter valve) as needed.
	Check the dispense station tubing connected to the dispense 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"> • Drop former • Diverter valve • General tubing If you fail to replace these components when they deteriorate, the fraction collector will not function properly.
Annually	Have Thermo Fisher Scientific service personnel check the fraction collector once a year to prevent, for example, contamination and excessive wear.

6 Troubleshooting

6.1 General Notes

The fraction collector 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 data system 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 fraction collector.

If you determine the problem is in the fraction collector, 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, contact Thermo Fisher Scientific Technical Support for assistance.

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 on the fraction collector 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 46).</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 Technical Support.</p>
The LEDs on the Peltier device are off.	The Peltier device is not plugged in. (The Peltier devices are powered separately from the fraction collector.)	Connect the Power cord.
The fraction collector 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 fraction collector rear panel, or to the appropriate module USB hub if connecting in that manner (→ section 3.4; page 46).</p>

Problem	Probable Cause	Remedial Action
The fraction collector 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 in the Instrument Configuration Manager. 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 Technical Support for assistance if you are unable to eliminate the problem.

Message	Remedial action
Error:001 Illegal or missing parameter Error:002 X-axis out of range Error:003 Y-axis out of range Error:005 Illegal command Error:006 Internal Error= Error:010 Serial time-out Error:013 Maximum Y position exceeded Error:014 Maximum X position exceeded Error:016 Home movement required. Error:017 Error moving home Error:018 Passthrough command pending Error:019 No passthrough command pending Error:023 Checksum verify failed Error:025 Internal communication error Error:029 Critical Error Reset Required Error:030 Unexpected passthrough data Error:036 Axes range error Error:042 Home movement timed out	If you see any of these errors: 1. Inspect the fraction collector to verify that all motion is unobstructed. Look especially for: <ul style="list-style-type: none"> • Tubing which is too short. • Vials which are too tall. • Dirt in the lead screws. 2. Try the operation again. 3. If the error persists, contact Thermo Fisher Scientific Technical Support for assistance.
Error:007 Movement Error	1. Verify that all motion is unobstructed. 2. Cycle power. 3. Try the operation again. 4. If the error persists, contact Thermo Fisher Scientific Technical Support for assistance.

Message	Remedial action
Error:035 Tray Not Selected Error:038 Available Tubes Exhausted	<ol style="list-style-type: none">1. Reconfigure the tray.2. Try the operation again.3. If the error persists, contact Thermo Fisher Scientific Technical Support for assistance.
Error:039 Motor driver overcurrent error. Reset required Error:040 Motor driver thermal shutdown. Reset required	<ol style="list-style-type: none">1. Verify that all motion is unobstructed2. Turn power off for 5 minutes.3. Try the operation again.4. If the error persists, contact Thermo Fisher Scientific Technical Support for assistance.
Error:041 Motor driver undervoltage required	<ol style="list-style-type: none">1. Check power connections.2. Try the operation again.3. If the error persists, contact Thermo Fisher Scientific Technical Support for assistance.

7 Service

This chapter explains how to clean the fraction collector, inspect it for leaks, and replace damaged components.

⚠ Notice: 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).

⚠ Avis: 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-circuitez 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.

⚠ Caution: **Chemical hazard**

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).

⚠ Attention: **Danger chimique**

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 for repair, contact your local Thermo Fisher Scientific support organization. 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. 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 5.4 (→ page 56).

7.2 Cleaning the Fraction Collector

Cleaning the fraction collector 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 fraction collector 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 fraction collector 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 5.4 (→ page 56).


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

 **Warning:** **Shock hazard**


Do not allow any liquid to enter the instrument cabinet other than as intended through the specified tubing, or come into contact with any electrical components. The instrument must be thoroughly dry before you reconnect power, or turn the instrument on.


 **Avertissement:** **Risque de choc**

Ne laissez pas de liquide pénétrer dans l'armoire à instruments autrement que par les tubes spécifiés ou entrer en contact avec des composants électriques. L'instrument doit être complètement sec avant de le remettre sous tension ou de l'allumer.

 **Notice:** Do not clean with carbon tetrachloride.

 **Avis:** Ne pas rincez avec du tétrachlorure de carbone.

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

 **Avis:** 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 fraction collector 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 fraction collector 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 labgrade cleaning agent, followed by a towel dampened with clear water. Pay special attention to the Y-axis slider block and the autosampler arm.
4. Wipe loose particles off the Y-axis lead screw with a dry, lint-free cloth. The Y-axis lead screw is the large metal screw located inside the autosampler arm.



Fig. 27: Y-axis lead screw

5. Wash the spill tray in a warm detergent solution. Rinse with water then dry.
6. Replace the rack on the fraction collector tray.

⚠ Notice: Never lubricate the lead screws. The lead screw nuts are compounded with a dry film lubricant. Oiling the lead screws will cause gumming, galling, and binding of the moving parts.

⚠ Avis: Ne jamais lubrifier les vis-mères. Les écrous de vis-mère sont composés d'un lubrifiant à film sec. L'huilage des vis-mères provoquera le gommage, l'abrasion et la fixation des pièces mobiles.

7.3 Checking for Leaks

The drop former, eluent tubing and the dispense station tubing have a limited life and will wear out under normal use. 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 dispense 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: **Explosion hazard**
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. Do *not* perform normal-phase applications without a proper grounding protection of the drop former.



Avertissement: Risque d'explosion

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. *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.

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.
4. Screw the SST drop former finger-tight into the diverter valve.
5. Push the open clip end of the grounding cable from the normal-phase kit between the diverter valve and the drop former (→ Fig. 28).

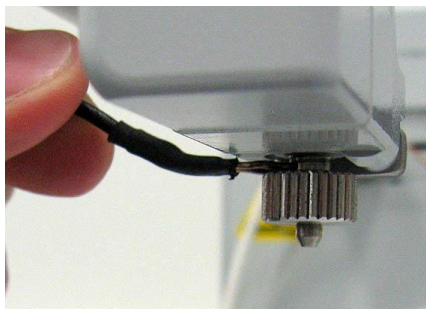


Fig. 28: Installing the normal-phase ground strip

6. Remove the ground cable screw and reinstall with the normal-phase grounding cable attached. Make sure to lead the cable along the front side of the diverter valve assembly (→ Fig. 29).

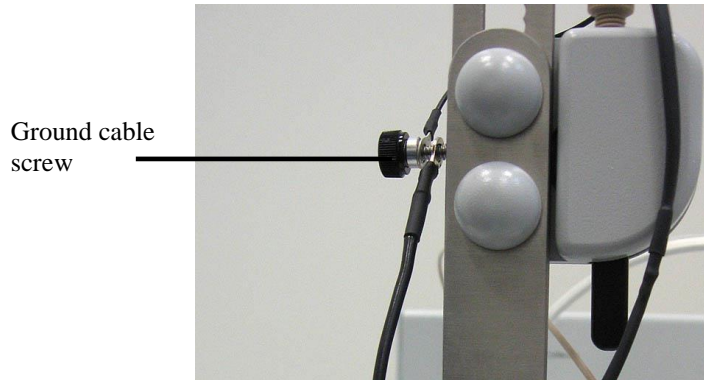


Fig. 29: Normal-phase ground strip

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

7.5 Installing the Kit with 0.4 mm ID Drop Former

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

The kit 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 69).
3. Connect the diverter valve cable to the auxiliary I/O connection on the fraction collector rear panel (→ Fig. 3, page 21). 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. 30). 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.

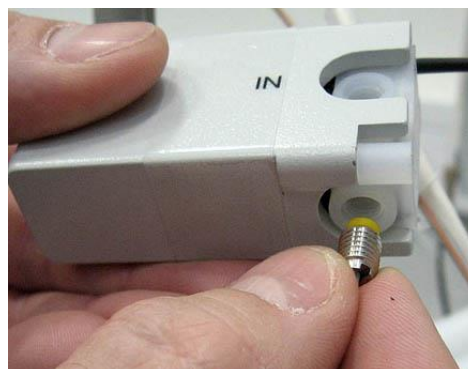
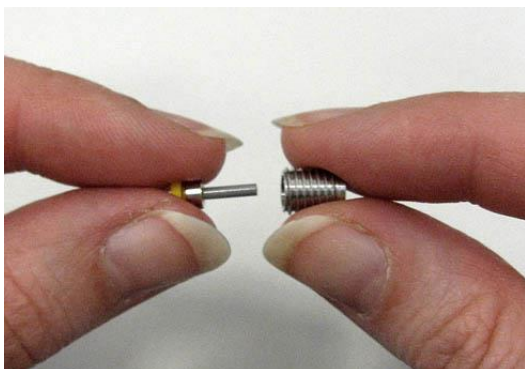


Fig. 30: Installing the 0.4 mm drop former

6. Mount the diverter valve to the diverter valve assembly by using the hexagon wrench shipped with the kit (→ Fig. 31, page 69). 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. 33, page 70).
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. 32, page 70).
9. Install the diverter valve connections (→ section 3.3.3, page 33).
10. Verify that the alignment is still correct (→ page 52).

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 with 0.4 mm ID drop former 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 5 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. 31).

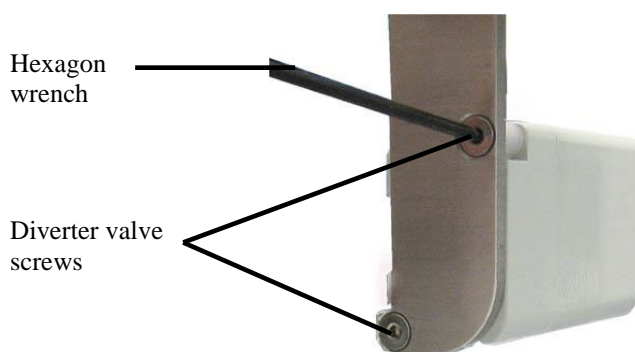


Fig. 31: Dismounting the diverter valve

5. Loosen the two finger-tight knurled screws that attach the rear cable and grounding cable to the diverter valve assembly (→ Fig. 32).

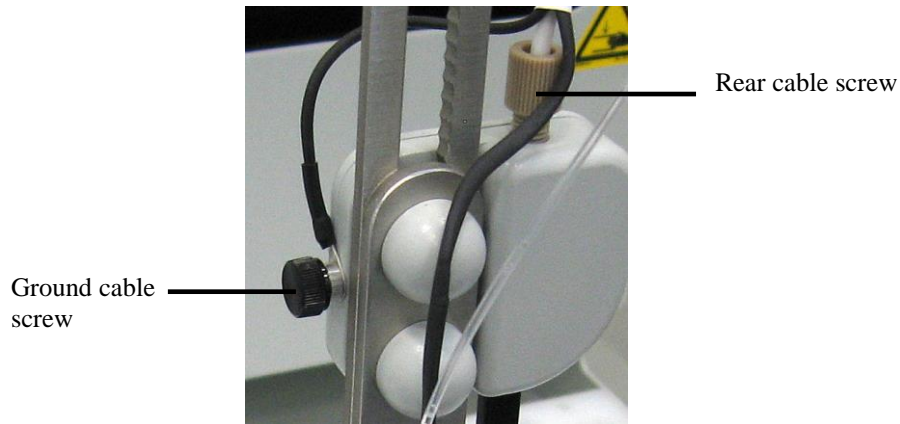


Fig. 32: Cable screws on the diverter valve assembly

6. Disconnect the diverter valve cable from the auxiliary I/O connection on the fraction collector rear panel (→ Fig. 3, page 21).
7. Loosen the finger-tight knurled screw that attaches the rear cable to the mounting block on the fraction collector rear panel (→ Fig. 33).

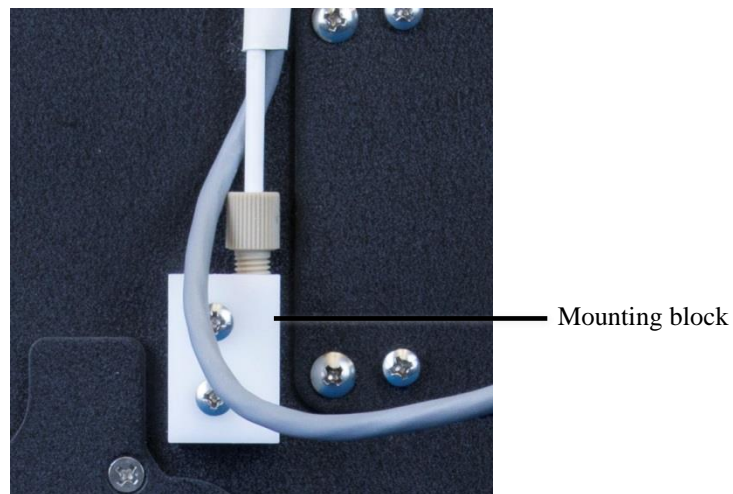


Fig. 33: Removing the rear cable screw

8. Reinstall the new diverter valve in reverse order. If you are replacing a low-flow diverter valve, also see section 7.5 (→ page 68).

7.7 Replacing the Spill Tray

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

1. Remove the rack adapter or the fraction racks from the spill tray as shown in Fig. 24 on page 43.
2. Lift the spill tray from the base plate such that the holes in the two screws in the base plate disengage from the two holes in the spill tray.
3. Place the new spill tray on the fraction collector such that the two bumps on the base plate are placed inside the holes in the tray.



Fig. 34: Installing the spill 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 your local Thermo Fisher Scientific support organization.

8 Technical Information

Sample capacity:	<p>For VF-F10-A-01 Fraction Collector FT and VF-F11-A-01 Fraction Collector F</p> <ul style="list-style-type: none"> • 6 x 250 mL bottles <p>Any four of the following:</p> <ul style="list-style-type: none"> • Well plates (96, deep and shallow) • 54 x 12 mm OD vials (≤ 1.5 mL) – Vanquish Split Sampler sample rack • 40 x 12 mm OD vials, cylindrical (2 mL) – UltiMate 3000 Well Plate Sampler sample rack • 22 x 15 mm OD vials (4 mL) – UltiMate 3000 Well Plate Sampler sample rack • 10 x 22.5 mm OD vials (10 mL) – UltiMate 3000 Well Plate Sampler sample rack <p>Any two of the following:</p> <ul style="list-style-type: none"> • 21 x funnel for fractionation of unlimited volumes into appropriate vessels • 21 x 30 mm (OD) x 100 mm (H) tubes (50 mL) • 24 x 24 mm (OD) x 100 mm (H) tubes (30 mL) • 40 x 20 mm (OD) x 100 mm (H) tubes (20 mL) • 60 x 15 mm (OD) x 100 mm (H) tubes (14 mL) • 90 x 13 mm (OD) x 100 mm (H) tubes (8 mL) (default configuration for VF-F11-A-01) <p>For VF-F10-A-01 Fraction Collector FT in cooling configuration</p> <p>Any two of the following:</p> <ul style="list-style-type: none"> • 14 x 30 mm (OD) x 100 mm (H) tubes (50mL) • 30 x 16 mm (OD) x 100 mm (H) tubes (15 mL) • 60 x 12 mm (OD) vials, cylindrical (2 mL) <p>Any four of the following (default configuration for VF-F10-A-01):</p> <ul style="list-style-type: none"> • 54 x 12 mm (OD) vials (≤ 1.5 mL) • 96 well plates
Tube change time:	Typically 0.2 to 0.4 s, depending on collect mode and rack type
Maximum tube height:	150 mm
Flow Rate Range:	0.4 mm ID drop former: 0.5 – 5 mL/min 1 mm ID drop former: 5 - 150 mL/min
Carry-over volume:	5 μ L (standard), 1.3 μ L (with optional 0.4 mm ID kit)
Cooling Temperature	VF-F10-A-01: 4 °C VF-F11-A-01: can be upgraded to cooling
Sample Temperature Accuracy	- 2 °C / + 4 °C
Sample Temperature Stability	± 1 °C

Wetted parts:	ETFE, FFKM (SimRiz®), PFA, PEEK (with 1mm and 0.4 mm drop former), PTFE, stainless steel (with grounded drop former for normal-phase LC)
Biocompatible	Yes, pH range 2–12, chloride concentration up to 1 mol/L
Control:	All functions software-controlled via RS-232 or USB; requires Chromeleon Chromatography Data System
GLP features:	In Chromeleon: All system parameters are recorded in the Chromeleon audit trail.
Communication	COM1: DB-9 RS-232 serial connection to a controller PC. (max ±12 VDC, 8 mA) USB: USB connection to a controller PC. (max 5 VDC)
Range of use	Indoor use only
Ambient operating temperature	5 °C – 40 °C (41 °F – 104 °F), recommended: 10 °C – 35 °C (50 °F – 95 °F)
Ambient storage temperature	0 °C – 55 °C (32 °F – 131 °F)
Ambient operating humidity	0% – 80% non-condensing for temperatures up to 31 °C, decreasing linearly to 50% at 40 °C, recommended: 20 – 70% relative humidity, non-condensing
Ambient storage humidity	0% – 95% non-condensing
Operating altitude	Up to 2,000 m (6,562 ft)
Pollution degree	2 Normally no pollution or only dry, non-conductive pollution occurs. The pollution has no influence. Occasionally, however, a temporary conductivity caused by condensation may be expected.
Power requirements:	100–240 V, 47-63 Hz AC 1.07 A with an output of DC 24V, maximum 3.33 A Automatic voltage selection Power Supply Installation Category: CAT II (Line voltage in appliance and to wall outlet) Instrument Installation Category: CAT I (Mains isolated). Use only with the provided power supply. There is one power supply for the fraction collector. For the VF-F10-A, there is an additional power supply for each of two Peltier devices (total of three power supplies, requiring three wall outlets).
Overvoltage category	II
Emission sound pressure level:	< 70 dB(A), typically 62 dB(A)
Dimensions (h × w × d):	VF-F10 -A-01 (With cooling option): Without cables and tubing: 41 x 36 x 50 cm (16 x 14 x 19.5 in.) With cables and tubing: 66 x 36 x 63 cm (26 x 14 x 24.5 in.) VF-F11-A-01 (Without cooling option): Without cables and tubing: 30 x 36 x 50 cm (12 x 14 x 19.5 in.) With cables and tubing: 56 x 36 x 63 cm (22 x 14 x 24.5 in.)

Weight:	11 kg (24.25 lbs) Without cooling option 17 kg (37.48 lbs) With cooling option
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Technical information: July 2018

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

- The diameter of the fraction sample container 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.

⚠ Notice: Do not use mismatching fraction sample container. Be sure your sample containers meet the given requirements.

⚠ Avis: 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 ship kit includes the items listed in the table. The kit content is subject to change and may vary from the information in this manual.

Fraction Collector FT

For reordering information of the ship kit components, see section 9.3.

Description	Quantity in the accessories kit
Fraction collector FT accessories kit, including:	
T pieces for drain connections	2
HPLC connection kit including <ul style="list-style-type: none"> • Union • 0.13 x 1.5 m PEEK capillary • 0.25 x 1.5 m PEEK capillary • 0.5 x 1.5 m PEEK capillary • Two one-piece fingertight fittings 	1
Viper capillary, I.D. 0.13 mm, PEEK for connection to Viper only flow cells in Vanquish Detectors	1
L pieces for drain connections	2
Vanquish sample container kit	1

USB cable, type A to type B, USB 2.0, 5 m	1
RS-232 serial cable, 9pin–9pin, fem–fem, 5m	1
External power supply	3
Peltier device	2
Fluid kit, including PTFE tubing, nuts and ferrules	1
Diverter valve assembly for flow rates > 5 mL/min, including:	1
• Set of knurled PTFE screws for mounting of diverter valve assembly on the fraction collector arm	2
• Set of knurled metal screws for diverter valve mounting block at rear panel (black)	2
• 1 mm ID PEEK drop former	1
Diverter valve assembly for flow rates < 5 mL/min, including:	1
• Set of knurled PTFE screws for mounting of diverter valve assembly on the fraction collector arm	2
• Set of knurled metal screws for diverter valve mounting block at rear panel (black)	2
• 0.4 mm ID PEEK drop former	1

Fraction Collector F

For reordering information of the ship kit components, see section 9.3.

Description	Quantity in the accessories kit
Fraction collector F accessories kit, including:	
T pieces for drain connections	2
HPLC connection kit including	1
• Union	
• 0.13 x 1.5 m PEEK capillary	
• 0.25 x 1.5 m PEEK capillary	
• 0.5 x 1.5 m PEEK capillary	
• Two one-piece fingertight fittings	
Viper capillary, I.D. 0.13 mm, PEEK for connection to Viper only flow cells in Vanquish Detectors	1
L pieces for drain connections	2
Vanquish sample container kit	1
USB cable, type A to type B, USB 2.0, 5 m	1
RS-232 serial cable, 9pin–9pin, fem–fem, 5m	1
External power supply	1
Fluid kit, including PTFE tubing, nuts and ferrules	1
90 position rack for 8 mL tubes; 13 mm x 100 mm	2

Polypropylene tubes (8 mL, OD 13 mm)	180
Diverter valve assembly for flow rates > 5 mL/min, including:	1
• Set of knurled PTFE screws for mounting of diverter valve assembly on the fraction collector arm	2
• Set of knurled metal screws for diverter valve mounting block at rear panel (black)	2
• 1 mm ID PEEK drop former	1

9.2 Optional Accessories

For a list of supported racks and collection vessels, refer to section 2.6 (→ page 24).

Optional Accessory	Part No.	Remarks
Kit with 0.4 mm ID drop former	6702.0300	Kit for flow rates up to 5 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.
Fraction Collector enclosure with exhaust	6706.9004	To prevent dust contamination of the fractions.
Cooling Upgrade Kit	Contact sales.	Upgrade to cooled version for Fraction Collector F

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.

Description	Part No.	VF-F10-A-01	VF-F11-A-01
10 position rack for 10 mL vials; 22 mm OD, WPS-3000	6820.4086	x	x
14 position cooling rack for 50 mL tubes; 30 mm x 100 mm	6706.0014	x	With 6706.9007A
21 position rack for 50 mL tubes; 30 mm x 100 mm	6702.0021	x	x
22 position rack for 4 mL vials; 15 mm OD, WPS-3000	6820.4084	x	x
24 position rack for 30 mL tubes; 24 mm x 100 mm	6702.0024	x	x
30 position cooling rack for 14 mL tubes; 16 mm x 100 mm	6706.0030	x	With 6706.9007A
40 position rack for 20 mL tubes; 20 mm x 100 mm	6702.0040	x	x
40 position rack for 2 mL vials; 12 mm OD, WPS-3000	6820.4070	x	x
54 position sample rack for 12 mm OD vials, Vanquish Split Samplers	6850.1023	x	x
60 position rack for 14 mL tubes; 15 mm x 100 mm	6702.0060	x	x
60 position cooling rack for 12 mm OD vials	6706.0060	x	With 6706.9007A
90 position rack for 8 mL tubes; 13 mm x 100 mm	6702.0090	x	x
Adapter for 4 x Vanquish sample rack and 96 well plates	6702.0200	x	x
Adapter for 4 x WPS-3000 racks	6702.0100	x	x
Bottle 0.25 L	2270.0026	x	x
Cooling adapter 96 well plates	6706.9006	x	With 6706.9007A
Cooling device (1 piece), Revision A	6706.9005A	x	With 6706.9007A
Cooling upgrade kit for Fraction Collector F (VF-F11-A-01), incl. raiser, 2x cooling device, Revision A	6706.9007A	-	x
Dispense station	6706.9002	x	x
Diverter valve (replacement for standard diverter valve), ID = 1.0 mm	6702.0500	x	x
Drainage kit, Vanquish System	6036.1120	x	x
Drop former, 0.4 mm ID, PEEK, including drop former replacement tool	6702.0305	x	x
Drop former, 1.0 mm ID, PEEK (replacement for standard drop former)	6702.0505	x	x
Enclosure wit exhaust	6706.9004	x	x

Description	Part No.	VF-F10-A-01	VF-F11-A-01
Funnel rack, 21 positions	6702.1021	x	x
HPLC connection kit Includes all required capillaries and fittings to connect the fraction collector to the HPLC system.	6706.9008	x	x
Kit for 0.4 mm ID drop former, incl. diverter valve and tubing	6702.0300	x	x
Kit for normal phase (NP) operation, ID = 1.0, SST, including grounding cable	6702.0400	x	x
Power supply; external, 24-Volt	6702.9010	x	x
Spill tray	6706.9025	x	x
USB cable, type A to type B, USB 2.0, 1 m	6911.0002	x	x

10 Index

A		F	
Accessories		Facility Requirements.....	26
Optional	78	Firmware Update	70
Standard	75	Flush Dispense Station	55
Alignment	51	Fraction Tube Racks.....	23, 38, 40
Auxiliary I/O Connector	22	Fraction Tubes	23
C		Front Panel	17, 18
CE mark	12	I	
Chloride Concentration.....	11	Inspect Components	51
Chromleon.....	24	Installation	29
Parameters.....	54	Peltier Devices.....	35
Setup	49	Power Connection.....	45
Cleaning	62	Verification.....	51
Daily.....	62	Intended Use.....	11
Weekly	63	K	
Collection Vessels	23	Kit for Normal-Phase LC	15
Configurations	15	Kit with 0.4 mm ID Drop Former.....	15, 67
Connection.....	45	L	
Computer.....	47, 48	LC System Connection.....	32
Diverter Valve.....	31, 32	Leaks	64
Interface to PC	47	M	
Non-Viper	32	Maintenance	52, 57
Power	45	Maintenance Intervals	57
RS-232 Cable	48	Messages	59
USB Cable	47	N	
Viper-only	33	Normal-Phase LC	15, 64
cTUVus mark.....	12	O	
D		Operating Instructions	2
Daily Cleaning	62	Operation	24, 52
Dispense Station	33, 55	Important Parameters.....	54
Dispense Station Tubing.....	34	Safety Precautions	4
Diverter Valve	31, 32, 68	Safety Symbols	3
Connect LC System	32	Operation Principle.....	14
Replace.....	68	P	
Waste Line Connections	31	Peltier Device	36
Diverter Valve Assembly.....	30	Peltier Devices.....	35
Adjust Height	43	pH Range.....	11
Alignment	51	Power Connection	45
Mount Assembly	30	Power Switch.....	22
Diverter Valve Connector	22	Power-Up	52
Drain Tubing	34		
Drop Former	15, 43, 51		
E			
Error Messages	59		

R

Rack Adapter 42
 Racks 23, 38, 40
 Rear Panel 20
 Rear Panel Connector 22, 47, 48
 Repair 61
 General Notes 61
 Replace Diverter Valve 68
 RS-232 Port 22

S

Safety Information 3
 Safety Precautions 4
 Safety Symbols 3
 Serial Port 22
 Service 61
 Check for Leaks 64
 Clean Fraction Collector 62
 Firmware Update 70
 General Notes 61
 Install 0.4 mm Kit 67
 Install Normal-Phase Kit 64
 Replace Diverter Valve 68
 Safety Measurements 61
 Settings 54
 Setup
 Software 49
 Shutdown 55
 Software Control 24
 Solvent
 Chloride Concentration 11
 pH Range 11

Solvents 11
 Spare Parts 79
 Specification 72
 Spill Tray 23, 38, 40, 70
 Spill Tray Tubing 34
 Stainless Steel Drop Former 15, 64
 Startup 52

T

Technical Information 72
 Tray 23, 38, 40, 70
 Troubleshooting 58
 Communication Problems 58
 Messages 59
 No Power 58
 Tubes 23

U

Unit Description 13
 Configurations 15
 Overview 13
 Principle of Operation 14
 Unpacking 27
 USB 22, 47, 48
 User Information 12

V

Verify Installation 51

W

Waste Line 31
 Weekly Cleaning 63