



thermoscientific

Vanquish

HPLC & UHPLC Systems

Pre-installation Requirements Guide

Revision 3.1

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Revision 3.1, released in June 2023, addition of the Thermo Scientific™ Vanquish™ Refractive Index Detector C and the Thermo Scientific™ Vanquish™ Integral Fraction Collector FT

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Revision 1.0, released in February 2017, initial version for Thermo Scientific™ Vanquish™ Horizon and Thermo Scientific™ Vanquish™ Flex UHPLC Systems

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For ordering information or sales support for HPLC products, contact your local Thermo Fisher Scientific sales organization. For contact information, go to Contact Us on <http://www.thermofisher.com>.

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1 Using this Manual

This chapter provides information about this manual, the conventions used throughout the manual, and the reference documentation that is available in addition to this manual.

1.1 About this Manual

NOTICE This Vanquish (U)HPLC System Pre-installation Requirements Guide document contains information specific to stand-alone Vanquish (U)HPLC Systems. A typical stand-alone system consists of a Vanquish system base with solvent rack, a pump, an autosampler, a column compartment, and a detector.

The Vanquish (U)HPLC Systems are designed to operate reliably under controlled environmental conditions. As the purchaser, you are responsible for providing a suitable location, a suitable operating environment, a source of power of acceptable quality, correct solvent supplies, and proper waste systems.

Operating a Vanquish (U)HPLC System or maintaining it in a condition outside the power and operating environment specifications described in this guide might cause failures of many types. The repair of such failures is specifically excluded from the standard warranty and service contract coverage.

This *Vanquish HPLC & UHPLC Systems Pre-installation Requirements Guide* is designed to provide you with information to plan and prepare your lab site prior to delivery and installation of your system. Please read each chapter carefully to be sure that your laboratory is ready for the installation of your system.

This *Pre-installation Requirements Guide* includes information about the Vanquish System Base with Solvent Rack, Vanquish Pumps, Vanquish Autosamplers, Vanquish Column Compartments, the Vanquish Detectors, including specific information about the Vanquish Charged Aerosol Detector, and the Vanquish Neo UHPLC System.

The Vanquish modules are controlled by a chromatography data system. The data system hardware consists of a desktop computer, a monitor, and an optional printer.

NOTICE If you are integrating your Vanquish (U)HPLC System with a Thermo Scientific mass spectrometer, please also refer to the *Pre-installation Requirements Guide* of the mass spectrometer.

1.2 Conventions

This section describes the conventions that are used throughout this manual.

1.2.1 Safety Messages

The safety messages and precautionary statements in this manual appear as follows:

- Safety messages or precautionary statements that apply to the entire manual and all procedures in this manual are grouped in the Safety chapter.
- Safety messages or precautionary statements that apply to an entire section or to multiple procedures in a section appear at the beginning of the section to which they apply.
- Safety messages that apply to only a particular section or procedure appear in the section or procedure to which they apply. They appear different from the main flow of text.

Safety messages are often preceded by an alert symbol and/or alert word. The alert word appears in uppercase letters and in bold type.

Make sure that you understand and follow all safety messages presented in this manual.

1.2.2 Special Notices and Informational Notes

Special notices and informational notes in this manual appear different from the main flow of text. They appear in boxes and a note label identifies them. The label text appears in uppercase letters and in bold type.

NOTICE Highlights information necessary to prevent damage to the system or invalid test results.

TIP Highlights information of general interest or helpful information that can make a task easier or optimize the performance of the system.

1.2.3 Typographical Conventions

These typographical conventions apply to the descriptions in this manual:

Data Input and Output

- The following appears in **bold** type:
 - ◆ Input that you enter via keyboard or select with the mouse
 - ◆ Buttons that you click on the screen
 - ◆ Commands that you enter by the keyboard
 - ◆ Names of, for example, dialog boxes, properties, and parameters
- For brevity, long expressions and paths appear in the condensed form. For example: Click **Start > All Programs > Thermo Chromeleon 7 > Services Manager > Start Instrument Controller**.

References and Messages

- References to additional documentation appear *italicized*.
- Messages that appear on the screen are identified by quotation marks.

Viewpoint

If not otherwise stated, the expressions *left* and *right* in this manual always refer to the viewpoint of a person that is facing the (U)HPLC system from the front.

Particularly Important Words

Particularly important words in the main flow of text appear *italicized*.

Electronic Manual Version (PDF)

The electronic version (PDF) of the manual contains numerous links that you can click to go to other locations within the manual. These include:

- Table of contents entries
- Index entries
- Cross-references (in blue text), for example, to sections and figures

1.3 Reference Documentation

In addition to this guide, Thermo Fisher Scientific provides the following documents as PDF files or printed booklets for the Vanquish (U)HPLC Systems:

- *Thermo Scientific™ Vanquish™ UHPLC System Operating Manual*
- *Thermo Scientific Vanquish Neo (VN-A10, VN-C10, VN-P10, VN-S10) Operating Manual*
- *Thermo Scientific™ Vanquish™ Pumps C, Pumps F (VC-Pxx, VF-Pxx) Operating Manual*
- *Thermo Scientific™ Vanquish™ Binary Pump H (VH-P10-A[-02]) Operating Manual*
- *Thermo Scientific™ Vanquish™ Split Samplers (VH-A10, VF-A10, VH-A40, VF-A40, VC-A12/13) Operating Manual*
- *Thermo Scientific™ Vanquish™ Integral Fraction Collector FT (VF-F20) Operating Manual*
- *Thermo Scientific™ Vanquish™ Charger (VH-A90) Operating Manual*
- *Thermo Scientific™ Vanquish™ Column Compartments (VH-C10, VC-C10) Operating Manual*
- *Thermo Scientific™ Vanquish™ Diode Array Detector HL (VH-D10) Operating Manual*
- *Thermo Scientific™ Vanquish™ Diode Array Detectors and Multi-Wavelength Detector (VC-D11, VC-D12, VF-D11) Operating Manual*
- *Thermo Scientific™ Vanquish™ Variable Wavelength Detectors (VF-D40, VC-D40) Operating Manual*
- *Thermo Scientific™ Vanquish™ Fluorescence Detectors (VC-D50, VC-D51, VF-D50, VF-D51) Operating Manual*
- *Thermo Scientific™ Vanquish™ Refractive Index Detector (VC-D60) Operating Manual*
- *Thermo Scientific™ Vanquish™ Charged Aerosol Detectors (VH-D20, VF-D20) Operating Manual*

TIP Electronic versions of these manuals are available as PDF (Portable Document Format) files. To open and read the PDF files, Adobe™ Reader™ or Adobe™ Acrobat™ is required.

2 Safety

This chapter provides general and specific safety information and informs on the intended use of the system.

2.1 Safety Symbols and Signal Words

2.1.1 Safety Symbols and Signal Words in This Manual

This manual contains safety messages to prevent injury of the persons using the system. The safety symbols and signal words in this manual include the following:



Always be aware of the safety information. Do not proceed until you have fully understood the information and consider the consequences of what you are doing.



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



IMPORTANT Indique que ne pas tenir compte de l'information jointe peut conduire aux résultats faux ou endommager l'instrument.



CAUTION High voltage, risk of electrical shock.



Attention Haute tension, risque de choc électrique.



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



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

2.1.2 Observing this Manual

Observe the following:









- Before installing or operating the system, read this manual carefully to be familiar with the system and this manual. The manual contains important information regarding user safety as well as use and care of the system.
- Always keep the manual near the system for quick reference.
- Save this manual and pass it on to any subsequent user.










Read, understand, and comply with all safety messages and precautionary statements presented in this manual.

2.1.3 Safety Symbols on the System and in this document

The table shows the symbols used on the Vanquish modules and/or in this *Pre-installation Requirements Guide*:

Symbol	Description
	Indicates a power button that switches the system between on and off states.—Indique un bouton d'alimentation électrique qui permet de mettre sous tension ou hors tension le système.
	Electrical power is on (-)—L'instrument est mis sous tension (-) and Electrical power is off (O)—L'instrument est mis hors tension (O)
	Alternating current—Courant alternatif
	Direct current—Courant continu
	Protective conductor terminal, ground—Conducteur de protection
	Fuse—Fusible
	High voltage, risk of electrical shock—Haute tension, risque de choc électrique
	Component susceptible to electrostatic discharge—Le composant est susceptible de la décharge électrostatique

Symbol	Description
	Surface becomes hot during operation—La surface devient chaude lors du fonctionnement.
	Puncture hazard—To avoid injury during autosampler operation, keep your hands away from the syringe. Risque de pincement—Pour éviter des blessures pendant l'opération du passeur d'échantillon, tenez vos mains à distance de la seringue.
	Pinch point hazard—Risque de pincement
	Refer to the <i>Operating Manual</i> to prevent risk of harm to the operator and to protect the instrument against damage. Référez-vous à ce manuel pour éviter tout risque de blessure à l'opérateur et/ou protéger l'instrument contre tout dommage.
	The deuterium lamp emits UV radiation that is harmful to the eyes and skin. Therefore, avoid looking directly into the light source. Operate the lamp only in the detector with the lamp cover installed and never outside the instrument.
	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".

2.2 Intended Use

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

The Vanquish (U)HPLC systems are designed for laboratory research use only in ultra-high-performance liquid chromatography ((U)HPLC) applications. A PC with multiple USB 2.0 ports (minimum 2) is required.

The Vanquish (U)HPLC systems can be controlled by the Thermo Scientific™ Chromeleon™ Chromatography Data System . The Vanquish (U)HPLC systems can also be operated with other data systems. For more information, contact the Thermo Fisher Scientific sales organization.

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



WARNING If the devices are used in a manner not specified by Thermo Fisher Scientific, the protection provided by the respective device could be impaired.

Thermo Fisher Scientific assumes no responsibility and will not be liable for operator injury and/or instrument damage.

Whenever it is likely that the protection is impaired, the instrument must be disconnected from all power sources and be secured against any intended operation.



Avertissement Si l'instrument est utilisé de façon non spécifiée par Thermo Fisher Scientific, la protection prévue par l'instrument pourrait être altérée.

Thermo Fisher Scientific n'assume aucune responsabilité et ne sera pas responsable des blessures de l'opérateur et/ou des dommages de l'instrument.

Si la protection de l'instrument n'est pas garantie à tout moment, débranchez l'instrument de toutes les sources d'alimentation électrique et assurez-vous que l'instrument n'est pas utilisé involontairement.

2.3 Safety Precautions

2.3.1 General Safety Information

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

TIP Before initial operation of the instruments, make sure that you are familiar with the contents of this *Pre-installation Requirements Guide* and the *Operating Manuals* of the respective module. Observe any warning labels on the device and refer to the related sections in the respective *Operating Manuals*.

For the general safety precautions in French, see [page 22](#).

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

- Install the HPLC system in a well-ventilated laboratory (see [page 39](#)). If the mobile phase includes volatile or flammable solvents, do not allow them to enter the workspace.
- All instruments should be on the same ground.
- The modules/systems are too heavy and/or bulky for one person alone to handle safely. Therefore, a team effort is required to lift or move the modules/systems.
- When connecting the capillaries, make sure that the connectors are free from contaminants. Even minute particles may cause damage to the system (for example, the column).
- If the mobile phase includes volatile or flammable solvents, avoid open flames and sparks.
- Always replace blown fuses with the fuses recommend by Thermo Fisher Scientific.
- Replace faulty power cords and communication cables.
- Many organic solvents and buffers are toxic. Know the toxicological properties of all chemicals that you are using.

- The toxicological properties of many samples may not be well known. If you have any doubt about a sample, treat it as if it contains a potentially harmful substance.
- Wear goggles when handling mobile phases or operating the instrument. An eyewash facility and a sink should be close to the unit. If any mobile phase splashes on the eyes or skin, wash the affected area and seek medical attention.
- Dispose of waste mobile phase in an environmentally safe manner that is consistent with all local regulations. Do not allow flammable or toxic solvents to accumulate. Follow a regulated, approved waste disposal program. Never dispose of flammable or toxic solvents through the municipal sewage system.
- We recommend the use of HPLC- or LC/MS-grade solvents and additives only.
- Use only reagents and buffers that are compatible with all parts that may be exposed to solvents. For information about the materials in the flow path, refer to the *Physical Specifications* section in the respective *Operating Instruction* of the Vanquish system module.
- In the Vanquish (U)HPLC system, capillaries made of PEEK may be used. Swelling or attack by acids can cause PEEK capillaries to start to leak or burst. Certain chemicals, for example, trichloromethane (CHCl₃), dimethyl sulfoxide (DMSO), or tetrahydrofuran (THF) can cause PEEK to swell. Concentrated acids, such as sulfuric acid and nitric acid, or a mixture of hexane, ethyl acetate, and methanol, can attack PEEK. Swelling or attack is not a problem with brief flushing procedures. For more information, refer to the technical literature on the chemical resistance of PEEK. Note also that the Vanquish (U)HPLC Systems are designed for reversed-phase (RP) operation only.
- The fluidics of some Vanquish modules and accessories are designed as Viper-only. Use only the Viper finger-tight fitting system for fluidic connections with them. The use of any non-Viper fitting system in such case will lead to leakages and risk of mechanical damage to receiving ports.
- Use only the spare parts and accessories recommended in the *Operating Manual* of the respective instrument. Substituting parts may impair the performance of the instrument.
- Do not use the instruments in ways other than those described in the respective *Operating Manuals*.

2.3.2 Consignes Générales de Sécurité

Veillez noter Avant de commencer à utiliser l'instrument, assurez-vous que vous vous êtes familiarisés avec le contenu de ce manuel. Observez des étiquettes d'avertissement sur l'appareil et référez-vous aux sections correspondantes dans ce mode d'emploi.

Lors de l'utilisation des instruments analytiques, il faut connaître les dangers potentiels liés aux solvants chimiques.

Veillez observer les consignes générales de sécurité suivantes lorsque vous utilisez l'instrument ou que vous procédez à des opérations de maintenance afin d'éviter tous risques de préjudice corporel et de détérioration de l'instrument:

- Installez le système HPLC dans un laboratoire bien ventilé. Si la phase mobile contient des solvants volatils ou inflammables, empêchez qu'ils ne pénètrent dans l'espace de travail.
- Tous les instruments du système devraient être reliés au même système de mise à la terre.
- Le système est trop lourd et/ou encombrant pour être soulevé ou déplacé par une personne seule. Par conséquent, un effort d'équipe est exigé pour soulever ou déplacer l'instrument.
- Lorsque vous connectez les capillaires, assurez-vous que les raccords sont exempts de tout contaminant. Même d'infimes particules peuvent causer des dommages au système (par exemple, la colonne).
- Si la phase mobile contient des solvants volatils ou inflammables, évitez les flammes nues et les sources d'étincelles à proximité.
- Si une fuite survient, arrêtez l'instrument et résolvez le problème immédiatement.
- Remplacez toujours les fusibles grillés par des fusibles de rechange recommandés par Thermo Fisher Scientific en ce manuel.
- Remplacez les cordons d'alimentation électrique et les câbles de communication défectueux.

- De nombreux solvants organiques et solutions salines sont toxiques. Informez-vous des propriétés toxicologiques de toutes les phases mobiles que vous utilisez.
- Les propriétés toxicologiques de nombreux échantillons peuvent être mal connues. Au moindre doute concernant un échantillon, traitez-le comme s'il contenait une substance potentiellement dangereuse.
- Portez des lunettes de protection lorsque vous manipulez des phases mobiles ou que vous utilisez l'instrument. Une installation permettant de se laver les yeux ainsi qu'un lavabo doivent se trouver à proximité du système. Si une phase mobile, quelle qu'elle soit, entre en contact avec vos yeux ou votre peau, rincez abondamment la zone affectée à l'eau, puis consultez un médecin.
- Débarrassez-vous de tous les déchets de phase mobile de manière écologique, conformément à la réglementation en vigueur au niveau local. Empêchez impérativement l'accumulation de solvants inflammables et/ou toxiques. Suivez un programme d'élimination des déchets réglementé et approuvé. Ne jetez jamais de solvants inflammables et/ou toxiques dans le système municipal d'évacuation des eaux usées.
- Utilisez uniquement des solvants et réactifs qualité HPLC ou LC/MS.
- Assurez-vous que les solutions tampons et réactifs sont compatibles avec les matériaux exposés et les. Pour des informations sur les matériaux exposés, référez-vous à la section technique en ce manuel de l'instrument.
- Dans le système Vanquish (U)HPLC, des capillaires en PEEK peuvent être utilisés. Le gonflement ou l'attaque provoqué par les acides peut entraîner des fuites ou des brisements des capillaires en PEEK. Certaines substances chimiques comme le trichlorométhane (CHCl_3), le diméthyle sulfoxyde, ou le tétrahydrofurane ont pour effet de faire gonfler le PEEK. Des acides concentrés tels que l'acide sulfurique et l'acide nitrique ou un mélange hexane, éthyle acétate et méthanol peuvent attaquer le PEEK. L'exposition brève dans le cadre de procédures de nettoyage n'entraîne pas le gonflement ou l'attaque du matériel en PEEK. Pour obtenir plus d'informations, consultez la littérature technique sur la résistance chimique du PEEK. Veuillez noter également que les systèmes Vanquish UPLC sont conçus uniquement pour la chromatographie en phase inversée.

- La fluidique des quelques instruments et accessoires Vanquish est conçu exclusivement pour le système capillaire Viper™. En ce cas, n'utilisez que des capillaires Viper pour installer les connexions fluidiques. L'utilisation de non-Viper capillaires produira des fuites et des risques de dommages mécaniques aux orifices des valves.
- Utilisez seulement des pièces de rechange ou des accessoires recommandées en ce manuel. L'utilisation d'autres pièces peut affecter les performances de l'instrument.
- N'utilisez pas l'instrument de manière autre que celles décrites dans ce manuel.

2.4 Federal Communications Commission (FCC) Note

The Vanquish (U)HPLC systems have been tested and found to comply with the limits of Class A digital devices, pursuant to part 15 of the U.S. FCC Rules. These limits are designed to provide reasonable protection against harmful interferences 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 or her expense.

2.5 Compliance Information

Thermo Fisher Scientific performs complete testing and evaluation of its products to ensure full compliance with applicable domestic and international regulations. When the system is delivered to you, it meets all pertinent electromagnetic compatibility (EMC) and safety standards as described in the next section or sections by product name.

Changes that you make to your system may void compliance with one or more of these EMC and safety standards. Changes to your system include replacing a part or adding components, options, or peripherals not specifically authorized and qualified by Thermo Fisher Scientific. To ensure continued compliance with EMC and safety standards, replacement parts, additional components, options, and peripherals must be ordered from Thermo Fisher Scientific or one of its authorized representatives.

CE Declaration of Conformity

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

cTUVus Compliance

The cTUVus label on the device indicates that the device has satisfied the requirements for the cTUVus certification. Compliance with the applicable standards has been evaluated by TÜV Rheinland of North America Inc.

WEEE Compliance

This product is required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive 2002/96/EC.

Thermo Fisher Scientific herewith declares conformity of the above products with the respective requirements of the following regulations:

- Low-Voltage Directive 2014/35/EU
- EMC Directive 2014/30/EU

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

- DIN EN 61010-1: 2010

Safety requirements for electrical equipment for measurement, control and laboratory use, Part 1: General Requirements

The EMC of the products was evaluated based on the following standard:

- DIN EN 61326: 2013

Electrical equipment for measurement, control and laboratory use

Safety Requirements have been evaluated by TUV Rheinland of North America, Inc.

- UL61010-1:2004

Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 1: General Requirements

- CAN/CSA-C22.2 No. 61010-1:2004

Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 1: General Requirements

Find more information about the CE conformity in the instruments' *Operating Manuals*.

Responsible for the technical CE documentation is the manufacturer.

For manufacturing location, see the label on the instrument.

3 Site Preparation

This chapter introduces you to the system space and load.

3.1 Shipping Containers

NOTICE It is important that you prepare the site before your field service engineer can install the system. Please review the space and load requirements provided in this chapter and ensure that the laboratory workbenches are large enough and strong enough to support the data system hardware and the LC system. To facilitate communication with a service engineer, install a telephone near the LC system workbench.

TIP If you are integrating the Vanquish (U)HPLC System with a mass spectrometer, please refer to the *Pre-installation Requirements Guide* for your mass spectrometer for its site requirements.

Table 1 lists the dimensions of the shipping containers for the components of the Vanquish (U)HPLC System.

The system is provided with all necessary solvent reservoirs, power cables, and communication cables.

Shipping container for	Height		Width		Depth		Weight	
	cm	in	cm	in	cm	in	kg	lbs
Vanquish System Base (VF-S01-A-02, VF-S02-A-02, VC-S01-A-02)	42	16.5	54	21.3	74	29.1	6	13.2
Vanquish Pumps (VH-P10-A[-02], VF-P10-A-01, VF-P20-A, VF-P32-A-01, VC-P10-A-01, VC-P20-A-01, VC-P21-A-01, VC-P32-A-01, VC-P33-A-01, VC-P40-A-01, VN-P10-A-01)	37	14.6	60	23.6	80	31.5	6	13.2
Vanquish Split Sampler HT/FT/CT/C/NT (VH-A10-A[-02], VH-A40-A-02, VF-A10-A[-02], VF-A40-A-02, VC-A12-A-02, VC-A13-A-02, VN-A10-A-02)	47	18.5	60	23.6	80	31.5	6	13.2

Shipping container for	Height		Width		Depth		Weight	
	cm	in	cm	in	cm	in	kg	lbs
Vanquish Charger Module (VH-A90-A)	100	39	68	27	75	30	14	30.9
Vanquish Column Compartment H/C (VH-C10-A-03, VC-C10-A-03)	37	14.6	60	23.6	80	31.5	6	13.2
Vanquish Column Compartment N (VN-C10-A-01)	37	14.6	60	23.6	80	31.5	6	13.2
Optical Detectors (VWD, DAD, MWD, FLD)	37	14.6	60	23.6	80	31.5	6	13.2
Vanquish Refractive Index Detector C (VC-D60-A-01)	37	14.6	60	23.6	80	31.5	6	13.2
Vanquish Charged Aerosol Detectors (VH-D20-A, VF-D20-A)	37	14.6	60	23.6	80	31.5	6	13.2
Vanquish Integral Fraction Collector FT (VF-F20-A-01)	43	16.9	52	20.5	77	30.3	13	28.7
Vanquish Neo System (VN-S10-A-01)	117	46.1	60	23.6	80	31.5	14	30.9

Table 1: Shipping container dimensions and weight (without modules)

NOTICE The Vanquish System Base contains base, solvent rack, reservoirs, and the Ship Kit. The Ship Kit contains solvent lines, system capillaries, USB cables, System Interlink cables, tools and accessories.

3.2 Space and Load Requirements

Prepare a bench top for the Vanquish (U)HPLC system in a clean, well-ventilated area. Please make sure that the required bench-top space is available to install all system components and the data system properly.

Figure 1 shows the recommended layout for a stand-alone Vanquish (U)HPLC System with a Vanquish detector, column compartment, autosampler, pump, and system base with solvent rack. Allow at least 160 cm (63 in) for the installation of the shown setup, including the data system and printer.

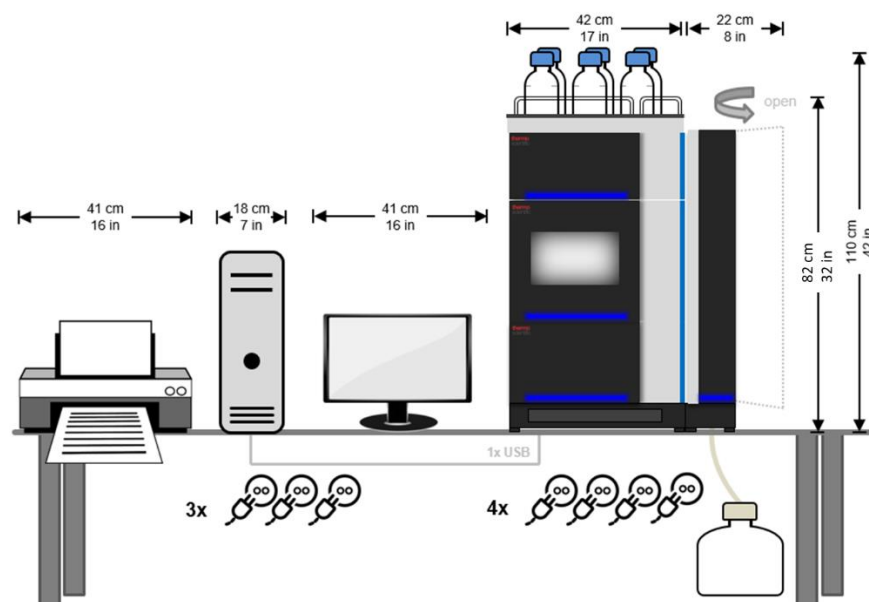


Figure 1: Recommended layout for a stand-alone Vanquish (U)HPLC System with data system

Figure 2 shows the recommended layout for a stand-alone Vanquish (U)HPLC System with a Vanquish detector, column compartment, autosampler, pump, system base with solvent rack, and additionally a Charger module. Allow at least 210 cm (83 in) for the installation of the shown setup, including the data system and printer.

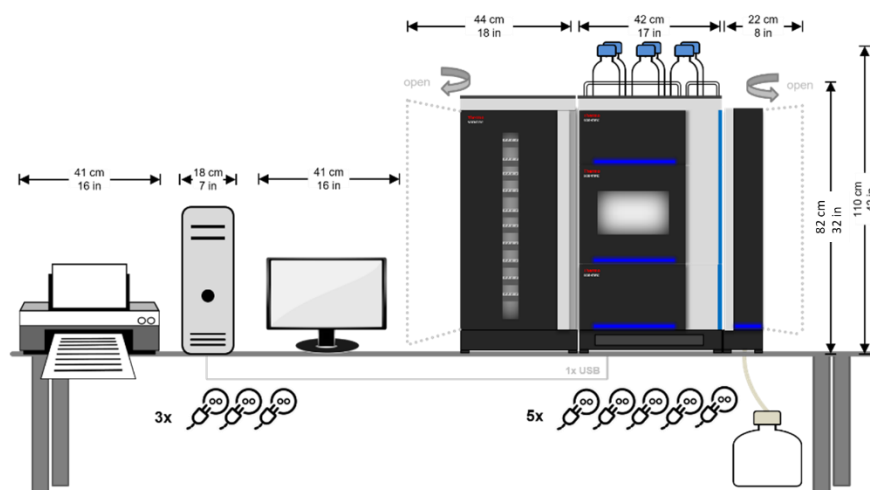


Figure 2: Recommended layout for a stand-alone Vanquish (U)HPLC System with the Charger and data system

Figure 3 shows the recommended layout for a stand-alone Vanquish Duo (U)HPLC System with two Vanquish optical detectors, column compartment, autosampler, pump, and a system base with solvent rack. To add a Charger module, an additional width of 44 cm (18 in) is required. Allow at least 160 cm (63 in) for the installation of the shown setup, including the data system and printer.

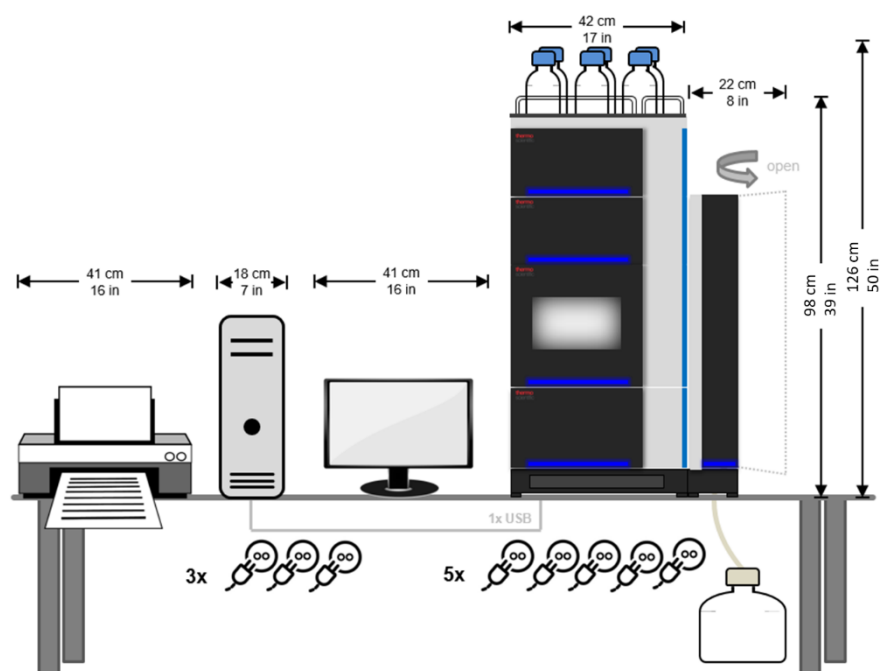


Figure 3: Recommended layout for a stand-alone Vanquish (U)HPLC System with two optical detectors and data system

Figure 4 shows the recommended layout for a stand-alone Vanquish Duo (U)HPLC System with Vanquish charged aerosol detector, optical detector, column compartment, autosampler, pump, and a system base with solvent rack. To add a Charger module, an additional width of 44 cm (18 in.) is required. Allow at least 160 cm (63 in.) for the installation of the shown setup, including the data system and printer.

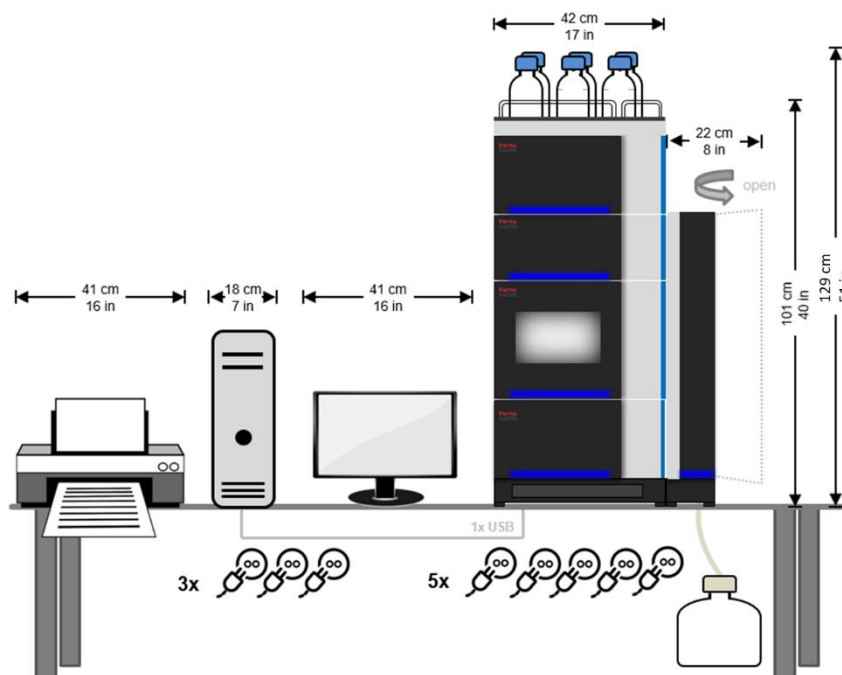


Figure 4: Recommended layout for a stand-alone Vanquish Duo (U)HPLC System with charged aerosol detector, optical detector, and data system

Figure 5 shows the typical layout for a stand-alone Vanquish Duo (U)HPLC System with a Vanquish detector, column compartment, autosampler, pump, and system base with solvent rack using the ionBench Liftable Table for system mobility. For further information, refer to the supplier's Operating Manuals.

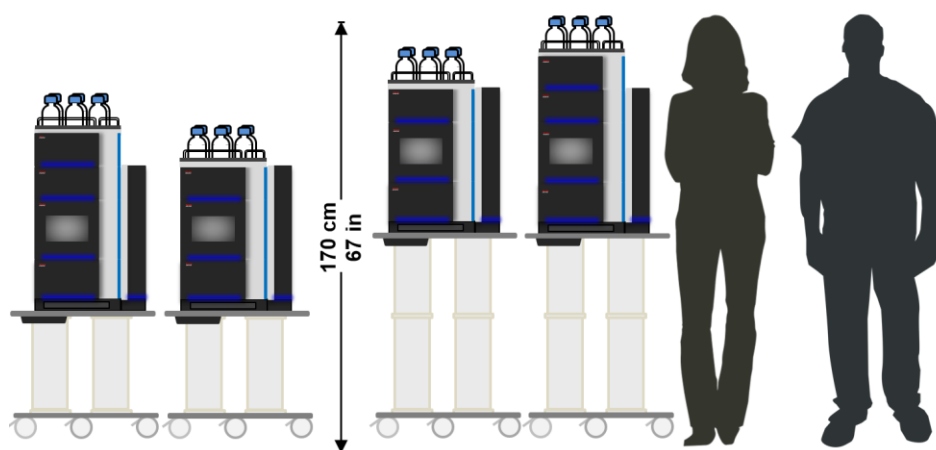


Figure 5: Typical layout for a stand-alone Vanquish (U)HPLC System or Vanquish Duo (U)HPLC System on the LC ionBench liftable table

Table 2 to Table 5 list the minimum bench-top areas, space requirements and the weight of the components of Vanquish (U)HPLC Systems.

LC System	Width		Depth	
	cm	in	cm	in
Vanquish (U)HPLC system with 1 VTCC	64	25.2	62	24.4
Vanquish (U)HPLC system with 1 VTCC and Charger	108	42.5	62	24.4
Vanquish (U)HPLC system with 2 VTCCs	77	30.3	62	24.4
Vanquish (U)HPLC system with 3 VTCCs	90	35.4	62	24.4
Vanquish (U)HPLC system with 3 VTCCs and Charger	134	52.8	62	24.4
Vanquish (U)HPLC Neo system with 1 integrated VTCC	45	17.7	65	25.6

Table 2: Minimum bench-top space requirements for the installation of a Vanquish (U)HPLC system with different numbers of VTCCs (Vanquish Column Compartment H/C) excluding data system and printer)

Extended tower Vanquish (U)HPLC systems with a total height of more than 100 cm (+ 2 cm tolerance) (39.4 in ± 0.8 in) require additional stabilization. This is accomplished via the stack stabilizer kit or by securing the system on the ionBench. The ionBench mounting brackets do not extend the footprint beyond the top surface of the ionBench. The stack stabilizer brace adds to the footprint reflected in [Table 3](#).

Systems which would exceed a total height of 123 cm (+2 cm tolerance) must be configured in two stacks.

The total system height is to be measured/calculated from the table surface to the solvent rack railing. Module heights can be obtained from [Table 5](#).

For example: system base (6 cm), solvent rack (12 cm), one Vanquish pump (19 cm), a Vanquish sampler (29 cm), a charged aerosol detector (19 cm) and a Vanquish UV detector (16 cm), yield a total system height of 101 cm. This is within the acceptable tolerance of maximum 102 cm and therefore additional stabilization is not required.

NOTICE Note that the Column Compartments H/C do not contribute to the height of a system. Additionally, observe your local safety requirements for tilt protection. For further details, please refer to system operation manual.

Extended tower Vanquish LC System with 1 VTCC			
Width with Stabilizer		Depth with Stabilizer	
cm	in	cm	in
73	29	80	31.5

Table 3: Minimum bench-top space requirements for the installation of a Vanquish (U)HPLC system with bench top stabilizer

Description	Part No.
ionBench Lifiable Table	6036.1731
ionBench Lifiable Table with Vanquish Mounting Kit	6036.1720
Vanquish Stack Stabilizer Kit	6036.1710

The main power switch and the main power receptacle are located on the rear right side panel of detector, autosampler, pump, and on the

rear side of the column compartment. The Charger module main power switch and power receptacle is located on the rear left side panel. Provide free and unrestricted access to the main power switch. The power cords of the devices should always be accessible and separable from the power line. Provide at least 15 cm (6 inch) of space between the back of the system and any wall or obstruction to unplug the cables.

Please refer to [Table 4](#) for the recommended vertical height requirements of your Vanquish (U)HPLC system (note that the Column Compartment H/C do not contribute to the height of a system).

System Configuration Examples					
Vanquish Solvent Rack	x	x	x		
Vanquish Pumps	x	x	x		
Split Samplers HT/FT/CT/C Dual Split Samplers HT/FT	x	x	x		
Column Compartment H/C	x	x	x		
Diode Array Detector HL or any other Vanquish optical detector	x	x	x		
2 nd Diode Array Detector HL or any other Vanquish optical detector		x			
Charged Aerosol Detector			x		
Extra head space for eluent bottles and solvent tubing	x	x	x		
Vanquish Neo System without Column Compartment				x	
Vanquish Neo System with Column Compartment					x
Minimum recommended height [cm]*	110	126	129	94	110
Minimum recommended height [in]*	42	50	51	44	50

Table 4: Recommended minimum vertical height requirements of various Vanquish (U)HPLC system setups

NOTICE This height provision will allow sufficient access to the 1-liter solvent bottles in the solvent platform. If you plan to use larger solvent containers, allow more vertical space.

TIP Due to the variety of modules and customized combinations, only the most frequently used system combinations are shown. If your system configuration is not listed, please contact your local Thermo Scientific representative for more information.

The workbench must be capable of supporting the weight of the Vanquish (U)HPLC System including filled eluent bottles, and the data system hardware, plus the weight of any options. If necessary, place the computer equipment on a separate workbench. For the dimensions and weight of the Vanquish modules, please refer to [Table 5](#).



IMPORTANT For your safety and to avoid instrument damage, Thermo Fisher Scientific recommends using a workbench that supports at least twice the load of the equipment to be placed on it.

For your safety and to avoid instrument damage, ask for assistance when you move the pump, the detector, the column compartment or the autosampler.

Component	Height		Width		Depth		Weight	
	cm	in	cm	in	cm	in	kg	lbs
Solvent Rack Vanquish (without bottles)	12	4.0	42	16.6	60	20.1	4	8.8
System Base	6	2.3	42	16.6	42	16.6	5	11.0
Binary Pump H	19	7.6	42	16.6	62	24.4	32	70.5
Binary Pump F/C	19	7.6	42	16.5	62	24.4	20	44.1
Quaternary Pump F/C/CN	19	7.6	42	16.5	62	24.4	17	37.5
Dual Pump F/C/CN	19	7.6	42	16.6	62	24.4	20	44.1
Isocratic Pump C	19	7.6	42	16.6	62	24.4	17	37.5
Binary Pump N	19	7.6	42	16.6	62	24.4	26	57.3
Split Sampler HT/FT	29	11.4	42	16.6	62	24.4	25	55.1
Split Sampler CT	29	11.4	42	16.6	62	24.4	24	52.9

Component	Height		Width		Depth		Weight	
	cm	in	cm	in	cm	in	kg	lbs
Split Sampler C	29	11.4	42	16.6	62	24.4	22	48.5
Dual Split Sampler HT/FT	29	11.4	42	16.6	62	24.4	29	63.9
Split Sampler NT	29	11.4	42	16.6	62	24.4	26	57.3
Charger Module	75	29.5	34	13.4	62	24.2	35	77.2
Column Compartment H/C	70	27.6	11	4.4	42	16.6	14	30.9
Column Compartment N	16	6.3	42	16.6	62	24.4	11	23.6
Diode Array Detector HL	16	6.3	42	16.6	51	20.1	17	37.5
Diode Array Detector FG/CG	16	6.3	42	16.6	62	24.4	17	37.5
Multi-Wavelength Detector CG	16	6.3	42	16.6	62	24.4	17	37.5
Charged Aerosol Detector F/H	19	7.6	42	16.6	62	24.4	18	38.6
Variable Wavelength Detector F/C	16	6.3	42	16.6	51	20.1	16	35
Fluorescence Detector F/C	16	6.3	42	16.6	51	20.1	21	46.3
Refractive Index Detector C	16	6.3	42	16.6	62	24.4	17	36.4
Integral Fraction Collector FT	23	9.1	42	16.5	62	24.4	23	53.7
Vanquish Neo System	82	32.2	45	17.7	65	25.6	66	145.5

Table 5: Dimensions of the modules of the Vanquish HPLC and (U)HPLC systems (excluding the solvent bottles)

TIP If you are integrating your Vanquish (U)HPLC System with a mass spectrometer, please refer to the *Pre-installation Requirements Guide* of the mass spectrometer for information on its space and load requirements.

3.3 Telephone

Install a telephone in your laboratory near the instrument so that, if necessary, you can conveniently operate the system while you speak with Technical Support for Thermo Scientific products by telephone. Place the voice telephone outlet within 2 m (6 ft.) of your system.



IMPORTANT Your instrument is designed to work in a controlled electromagnetic environment. Do not use radio frequency transmitters such as mobile phones, in close proximity to the instrument.

4 Operation Environment

This chapter provides information for operating the system under the prescribed environmental conditions.

4.1 Temperature

NOTICE Attention to the operating environment will ensure continued high performance of your Vanquish (U)HPLC System. Any investment in air conditioning is offset by increased sample throughput and/or reduced repair costs.



IMPORTANT You are responsible for providing the operating environment necessary for proper operation of the Vanquish (U)HPLC System.

The laboratory room temperature must be maintained between 5 °C and 35 °C (41 °F and 95 °F) and temperature fluctuations should be minimized. Temperature fluctuations of more than ± 5 °C can adversely affect the chromatographic performance.

For precision instruments, such as the Vanquish Diode Array Detector HL, the temperature stability of the environment where the instrument is installed can affect performance.



IMPORTANT As the laboratory temperature increases, system reliability decreases. All electronic components generate heat while operating. For the components to continue to operate reliably, ensure that this heat is released into the surrounding air.

Circulation of air around the system must be ensured, the air conditioning system must be capable of maintaining a constant temperature in the immediate vicinity of the system.



IMPORTANT Do not place the Vanquish (U)HPLC System under an air duct, near windows, or near heating or cooling sources.

The air conditioning load for a typical Vanquish (U)HPLC System—pump, thermostatted autosampler, thermostatted column compartment, and detector—with a data system is approximately 410 Watt (1450 BTU/h). [Table 6](#) shows the approximate typical heat output of each module.

TIP The heat output is specified for typical operation mode. The heat output might differ from these values depending on the actual operation (e.g. heating, cooling, etc.). The heat output might deviate from given values if additional features are installed.

Components	Heat output (in Watt)	Heat output (in BTU/h)
Binary Pump H	50	180
Binary Pump F/C	35	130
Quaternary Pump F/C/CN	25	90
Dual Pump F/C/CN	40	150
Binary Pump N	50	180
Split Sampler HT/FT	100	350
Dual Split Sampler HT/FT	105	370
Split Sampler NT	100	350
Charger	275	950
Column Compartment H/C	120	420
Column Compartment N	120	420
Diode Array Detector HL	65	230
Diode Array Detector FG/CG	75	260
Multiple Wavelength Detector CG	75	260
Charged Aerosol Detector H	65	230
Variable Wavelength Detector F/C	55	200
Fluorescence Detector F/C	30	110
Refractive Index Detector C	20	80
Integral Fraction Collector FT	30	110
Vanquish Horizon System Standby ¹	1	10
Vanquish Flex/Core System Standby ¹	1	10
Computer ²	80	280
Monitor ²	30	110
¹ standby: defined as all used modules connected but switched off by system base button		
² approximate. The actual values depend on your equipment.		

Table 6: Typical heat output for the modules of a Vanquish HPLC and (U)HPLC system and the data system with printer

4.2 Humidity

Maintain the relative humidity of the operating environment with no condensation between 5% and 80%.

Operating a Vanquish (U)HPLC System in an environment with very low humidity can cause static electricity to accumulate and discharge, which can shorten the life of the electronic components. Operating the system in an environment with high humidity can cause condensation, oxidation, and short circuits. It can also cause dust to accumulate, which can block filters on cooling fans.

To ensure that your laboratory is always within the required temperature and humidity specifications, Thermo Fisher Scientific recommends that you equip your laboratory with a temperature/humidity monitor.

4.3 Vibration

Keep floors free of vibration caused, for example, by nearby equipment.

4.4 Lighting

For comfort and safety in performing LC system operations, make sure that your laboratory provides excellent lighting.

4.5 Particulate Matter

Ensure that the air in your laboratory is free from excessive dust, smoke, or other particulate matter in excess of 5 micron; that is less than 3,500,000 particles per cubic meter (100,000 particles per cubic foot).

Dust can clog the air filters, which causes reduced airflow around electronic components. Dust on electronic components can act as an insulating blanket, which reduces the transfer of heat from the components to the surrounding air.

4.6 Electrostatic Discharge

Electrostatic discharge (ESD) can damage the electronic components of your Vanquish (U)HPLC System.

The discharge of static electricity is not perceptible to humans until the potential is at least 4000 V. However, a discharge of electrostatic potential as small as 50 V can damage many electronic components. ESD damage can cause your system to cease functioning in the worst case. More commonly, ESD damage may cause latent problems that damage sensitive electrical components causing premature failures.

The modules of your Vanquish (U)HPLC System are designed to withstand electrostatic discharges up to 4,000 V air discharge and 4,000 V contact discharge with incorporated assemblies and all panels in place. However, removing the panels and handling the PCBs without proper precautions might damage the electrical components or cause them to fail prematurely.

Static electricity can develop in a variety of ways. Some examples follow:

- Walking across a carpet in a room that is at 20% relative humidity can generate as much as 35,000 V of electrostatic potential on the surface of your body. A similar walk in a room at 80% relative humidity generates about 1,500 V of electrostatic potential.
- Sitting and working in a chair padded with polyurethane foam in a room at 20 % relative humidity can cause as much as 18,000 V of electrostatic potential to develop on your skin. At 80% relative humidity, the electrostatic potential can be as much as 1,500 V.
- Working in a laboratory coat and clothing made of synthetic fibers can cause static electricity to accumulate on your skin.
- Using Styrofoam™ cups and packing materials results in a considerable electrostatic charge.

Because of ESD, Thermo Fisher Scientific recommends the following precautions, especially when operating your system at the lower end of the relative humidity specification:

- Use a static-dissipating floor covering (such as tile or conductive linoleum) in the room that houses your instrument.
- Use laboratory chairs covered with natural fibers or other static-dissipating material.
- Wear a laboratory coat and clothing made of natural fiber or other static-dissipating material when you are operating the instrument.
- Keep Styrofoam cups or packing materials away from the instrument.

4.7 Gas Supply

For the operation of Vanquish Charged Aerosol Detectors, nitrogen is required that is dry (no water vapor), clean, and free of micro-particles (< 0.1 μm).

Nitrogen gas from a liquid nitrogen source (medical grade) is satisfactory. However, it is highly recommended to filter the gas through a sub-micron particle filter before entering the detector. Not using a well-filtered operating gas supply may affect the performance of the detector.

If you have purchased a nitrogen generator from Thermo Fisher Scientific, a compressed air source is required that supplies at least a pressure of 80 psi in order to operate one detector. We recommend using a Nitrogen Generator for charged aerosol detectors (Part No.: 6295.0200, Corona Nitrogen 1010 generator) if only compressed air is available in the laboratory. The nitrogen generator accepts the same gas supply connections as the Corona charged aerosol detector.

Please contact your local Thermo Fisher Scientific sales representative for more information.



IMPORTANT The Vanquish Charged Aerosol Detector is designed to accept a 0.55 MPa (80 psi) nitrogen gas supply. Supply pressure(s) outside the specification may result in reduced performance and void the warranty.

TIP The gas consumption of the Vanquish Charged Aerosol Detector is approximately 4 L/min.

The Vanquish Charged Aerosol Detector is compatible with gas supply tubing with the following specification: 3/16" ID x 1/4" OD.

Approximately 5 feet of compatible perfluoroalkoxy tubing with a pressure rating of 1.2 MPa (175 psi) ships with each detector.

Please contact your local Thermo Fisher Scientific representative to order custom lengths for installation.

5 Line Power

This chapter specifies the requirements for the line power to achieve optimal instrument performance.

5.1 Quality of Power

The quality of line power delivered to your system can affect its performance and lifetime. To ensure that your instrument performs optimally and is not damaged by power line fluctuations, verify that your laboratory electrical supply complies with all power quality requirements.



IMPORTANT You are responsible for providing a power source of acceptable quality to operate your system.

The quality of power supplied to your Vanquish (U)HPLC System is very important. The line voltage must be stable and within the specifications listed in this guide. The line voltage must be free of fluctuations due to slow changes in the average voltage, surges, sags, or transients.

Table 7 contains definitions for the three most common voltage disturbances.

Voltage disturbance	Definition
Slow average	A gradual, long-term change in average root mean square (RMS) voltage level, with typical durations greater than 2 seconds
Sags and surges	Sudden changes in average RMS voltage level, with typical durations between 50 microseconds and 2 seconds
Transients or impulses	Brief voltage excursions of up to several thousand volts with durations up to 50 microseconds

Table 7: Common voltage disturbances

Constant high line voltage, impulses, or surges in voltage can cause overheating and component failures. Constant low line voltage or sags in voltage can cause the system to function erratically or not at all. Transients, even a few microseconds in duration, can cause electronic devices to fail catastrophically or to degrade and eventually shorten the lifetime of your system. For these reasons, it is important that you establish the quality of the line voltage in your laboratory before installing a Vanquish (U)HPLC System.

5.2 Power Monitoring Devices

Monitor the quality of your line power with a power-line disturbance analyzer. This type of device provides a continuous record of line performance by analyzing and printing out information on three types of voltage disturbances: slow average, sag and surge, and transient. The Dranetz™ power-line disturbance analyzer is a device capable of detecting and recording most types of line power problems. You can rent power-line analyzers from electrical equipment suppliers.

Monitor the powerline 24 hours a day, for seven consecutive days. If inspection of the printout indicates disturbances, take corrective action.

5.3 Power Conditioning Devices

You can correct a line voltage problem using various line voltage conditioning devices. If you have good regulation but the power line disturbance analyzer shows transient voltages, then an isolation/noise-suppression transformer can resolve the problem. If there are both transient and regulation problems, consider power conditioners that can control these problems.

When the line voltage is free from voltage sags, surges, and impulses but is more than 10% outside of the voltage specifications, a buck/boost transformer can lower (buck 10%) or raise (boost 10%) the line voltage.

The buck/boost transformer is encased in a metal housing approximately 13 × 13 × 26 cm (5 × 5 × 10 in.) and is equipped with a 2 m (6 ft.) power cable. To order a buck/boost transformer kit, contact Thermo Fisher Scientific, and have your electrician install the buck/boost transformer before a field service engineer installs your LC system. The installation instructions for the transformer are included in the kit.



CAUTION For compliance and safety, recognized domestic and international organizations (for example, UL, CSA, TUV, and VDE) must certify your uninterruptible power supply (UPS) devices.

Thermo Fisher Scientific does not endorse any power monitoring company, nor does it endorse products other than its own. Companies and products listed in this guide are given as examples only.

5.4 Available Outlets

All Vanquish modules are equipped with auto-ranging power modules and can operate within the range of 100 V to 240 V, 50/60 Hz. The minimum and maximum voltage tolerances are in accordance with EN60950-1:2001, as follows:

“If the equipment is intended for direct connection to the AC main supply, the tolerances on rated voltage shall be taken as +6% and -10% unless the rated voltage is 230 V single phase or 400 V three-phase, in which case the tolerance shall be taken as +10% and -10%.”

For systems installed in regions with 115 V AC service only, the basic power requirements for a Vanquish (U)HPLC System with computer, monitor, and printer consist of the following:

- Nominal voltage of 115 V AC and 230 V AC
- Frequency of 50/60 Hz
- Two fourplex outlets (single-phase power) with a minimum power rating of 10 A (115 V AC)
- Earth ground hard-wired to the main panel

For systems installed in areas with 230 V AC service only, the basic power requirements for a Vanquish (U)HPLC System consist of the following:

- Nominal voltage of 230 V AC
- Frequency of 50/60 Hz
- Two fourplex outlets, with a minimum power rating of 10 A at each fourplex outlet
- Earth ground hard-wired to the main panel



IMPORTANT Any Vanquish (U)HPLC System, including the data system hardware, must have a common ground. The interconnected power outlets for the Vanquish (U)HPLC System must have a common point to one ground connector.

Connecting the modules of the Vanquish (U)HPLC System to external grounds at different potentials can create a ground loop that causes noise and interference.



CAUTION Improper grounding of the Vanquish (U)HPLC Systems creates an electrical safety hazard.

TIP Additional power outlets might be required for test and cleaning equipment, such as an ultrasonic bath. Thermo Fisher Scientific recommends that there be several additional power outlets close to the workbench space within your laboratory.

Table 8 shows the maximum current required by each component of the data system and a typical Vanquish (U)HPLC System. The components are equipped with a switching power supply to support both, 115 V AC and 230 V AC environments.

Module	Module Outlet 115 V AC (in Ampere)	Module Outlet 230 V AC (in Ampere)
	Maximum current drawn	Maximum current drawn
System	8	5
Computer ¹	4	2
Monitor ¹	2	1
Laser printer ¹	3	2
¹ Approximate. The actual value depends on your equipment.		

Table 8: Maximum current (single phase) drawn during typical operation from an LC system at 115 V or 230 V AC, and the data system (with printer) at 115 V or 230 V AC

TIP The values listed in [Table 8](#) are the average currents drawn by each of the listed components. Contact your field service engineer for more information.

Before you install a Vanquish (U)HPLC System, plan your power system. Refer to [Table 9](#) for an example of the number of outlets that your laboratory might require to properly supply power to your Vanquish (U)HPLC System.

Item	Outlets
HPLC System	
System Base / Solvent Rack Vanquish	0
Vanquish Pumps	1
Vanquish Split Samplers	1
Vanquish Column Compartments	1
Vanquish Charger Modules	1
Vanquish Detectors	1
Vanquish Integral Fraction Collector	1
Computer	1
Monitor	1
Laser printer	1
Total outlets required for this configuration	8

Table 9: Required number of outlets for a sample laboratory setup

NOTICE Your setup might vary depending on the line voltages and current supplied. Multiple detectors will require multiple outlets.

5.5 Connecting to Power Sockets



CAUTION Never connect a mass spectrometer and a Vanquish (U)HPLC System to the same electrical power socket circuit.

TIP The power specifications for the modules in your system might vary from those in this guide.

Table 10 shows the maximum current required by each component of a typical Vanquish (U)HPLC System. The components are equipped with a switching power supply to support both, 115 V AC and 230 V AC environments.

Item	Module Outlet 115 V AC (in Ampere)	Module Outlet 230 V AC (in Ampere)
	Maximum current drawn	
Binary Pump H	2	1
Binary Pump F/C	2	1
Quaternary Pump F/C/CN	2	1
Dual Pump F/C/CN	2	1
Binary Pump N	2	1
Split Sampler HT/FT/	3	2
Dual Split Sampler HT/FT	3	2
Split Sampler NT	3	2
Charger	4	2
Column Compartment H/C	4	2
Column Compartment N	4	3
Diode Array Detector HL	2	1
Diode Array Detector FG/CG	2	1
Multiple Wavelength Detector CG	2	1
Charged Aerosol Detector H	2	1
Variable Wavelength Detector F/C	2	1
Fluorescence Detector F/C	2	1

Item	Module Outlet 115 V AC (in Ampere)	Module Outlet 230 V AC (in Ampere)
Refractive Index Detector C	1	1
Integral Fraction Collector FT	3	2
Computer	4	2
Monitor	2	1
Laser printer	3	2

Table 10: Maximum current (single phase) drawn from an LC system at 115 V AC or 230 V AC, and the data system (with printer) at 115 V or 230 V AC

The power-supply cables for the modules of the Vanquish (U)HPLC System are 2 m (6 ft.) and the cables from the personal computer, monitor, and printer are approximately 2 m (6 ft.) long.

TIP Power cords are not included in the shipment of the Vanquish modules and must be ordered separately according to the shipping destination. The power cord is added to the shipment free of charge if it is ordered in combination with a module.

Destination	Plug type	Voltage rating	Current rating	P/N
EU	CEE 7/7	250 V AC	10 A	6000.1000
United States and Canada	NEMA 5-15P	125 V AC	10 A	6000.1001
United Kingdom	BS 1363	250 V AC	5 A	6000.1020
Switzerland	SEV 1011	250 V AC	10 A	6000.1030
Italy	CEI 23-16-VII	250 V AC	10 A	6000.1040
Japan	NEMA-5-15	125 V AC	7 A	6000.1050
Australia	AS-3112	250 V AC	10 A	6000.1060
Denmark	DS 60884-2-D1	250 V AC	6 A	6000.1070
China	C13	250 V AC	10 A	6000.1080
India	YP-80	250 V AC	10 A	6000.1090

Table 11: Summary of available power cords for different geo-regions including the respective part number.



WARNING Never use a power cord other than the power cords provided for the device.

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



AVERTISSEMENT Utilisez uniquement les cordons d'alimentation électrique spécifique à l'instrument.

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

5.6 Uninterruptible Power Supply

If your local area is susceptible to corrupted power or power disruptions, install an Uninterruptible Power Supply (UPS) in your laboratory.



CAUTION For compliance and safety, your uninterruptible power supply (UPS) devices must be certified by recognized domestic and international organizations (for example, UL, CSA, TUV, and VDE).

5.7 Technical Assistance

Occasionally, you might encounter line power sources of unacceptable quality that adversely affect the operation of a Vanquish (U)HPLC System. Correcting line power problems is your responsibility. Contact your local office for Thermo Scientific products for assistance in monitoring the line voltage in your laboratory and in selecting a line conditioner.

Specifying power-conditioning equipment is a complex task that is best handled by a company or consultant specializing in that field. Contact your local Thermo Fisher Scientific office for assistance in locating a power consultant in your area.

6 Waste and Ventilation

This chapter describes the waste and exhaust arrangements for your system.

6.1 General

The waste and exhaust arrangements for your Vanquish (U)HPLC System can affect the proper performance of the system. Solvent wastes must be collected and disposed properly.



IMPORTANT It is in your responsibility to provide the proper waste and ventilation systems that are required to operate your LC system.

To provide drainage and prevent solvent from leaking into the Vanquish (U)HPLC system modules, the accessories kits for the pumps contain the drain tubing to connect the drainage ports on the right side of the Vanquish modules to waste.

To prevent built-up of waste liquid inside the drain tubing it is imperative to route the tubing straight towards the waste container. For further details about this topic please refer to the system operating manual.

The total amount of liquid waste, including the maximum total flow rate and drainage waste for the Vanquish pumps and the Vanquish Split Samplers is listed in [Table 12](#).

Model	
Vanquish Binary Pump C	Flow: up to 10 mL/min, additionally: rear seal wash solution waste
Vanquish Binary Pump F	Flow: up to 8 mL/min, additionally: rear seal wash solution waste
Vanquish Binary Pump H	Flow: up to 5 mL/min, additionally: rear seal wash solution waste
Vanquish Binary Pump N	Flow: up to 100 μ L/min additionally: rear seal wash solution waste
Vanquish Dual Pump C/CN	Flow: up to 20 mL/min combined over both pumps, additionally: rear seal wash solution waste
Vanquish Dual Split Sampler HT/FT	2x Needle wash and 1x condensation waste
Vanquish Dual Pump F	Flow: up to 16 mL/min combined over both pumps, additionally: rear seal wash solution waste
Vanquish Quaternary Pump C/CN	Flow: up to 10 mL/min, additionally: rear seal wash solution waste

Model	
Vanquish Quaternary Pump F	Flow: up to 8 mL/min, additionally: rear seal wash solution waste
Vanquish Split Sampler NT	Needle wash and condensation waste
Vanquish Split Sampler HT/FT/CT/C	Needle wash and condensation waste
Vanquish Integral Fraction Collector FT	Needle wash, condensation waste and flush buffer loop
All modules	Drain liquid in case of leakage or spilling

Table 12: Number of liquid waste lines and possible maximum flow rates for the various Vanquish (U)HPLC modules



IMPORTANT Thermo Fisher Scientific recommends that the waste container is placed in a secondary containment vessel large enough to hold 110% the volume of the waste container itself.

In addition to providing a proper waste collection and disposal system, you must also ensure that your laboratory is vented adequately to prevent the buildup of solvent fumes.

6.2 Vanquish Charged Aerosol Detectors

6.2.1 Ventilation Requirements

Exhaust gases (including carrier gas, vaporized eluent and solute micro particles) exit from the instrument through an external vent. This gas outlet is located on the rear panel of the instrument. It must be connected to a fume hood or a similar venting device with the plastic tubing (20 mm diameter) included in the accessories kit. The exhaust may contain volatile organic compounds in low concentration. For safety reasons, it is essential that the detector is properly vented.



IMPORTANT Ventilation should be at atmospheric pressure with no vacuum applied. A vacuum may cause depressurization inside the detector, creating turbulence and disrupting the instrument's stability.

6.2.2 Drain Connections

The Vanquish Charged Aerosol Detectors use a dual drain / vent tube that is located on the side of the instrument. It is necessary to connect this drain / vent tube to the waste vessel to collect any condensed liquid.



IMPORTANT Extending or combining the waste line can cause a backpressure in the line that can lead to an excess liquid build-up inside the detector. Avoid extending or combining the waste line. Make sure that the waste line drains freely into waste. Please refer to the *Operating manual* of the charged aerosol detector for more information.

TIP Thermo Fisher Scientific recommends placing the waste bottle in a secondary containment vessel large enough to hold 110% the volume of the waste bottle.

7 Solvents

This chapter describes the recommendations for your solvent purity.



IMPORTANT You are responsible for providing the high-purity solvents that are required to operate the Vanquish (U)HPLC System.

We recommend the use of (U)HPLC- or LC/MS-grade solvents and additives only.

The installation of a Vanquish (U)HPLC System requires HPLC-grade methanol and water. If you are using the Vanquish (U)HPLC System as the inlet to a mass spectrometer, always use LC/MS-grade solvents.

The installation of a Vanquish Neo System requires the following solvents:

Solvent	Part number
Water, Optima™ LC–MS grade	P/N W6-212
Acetonitrile, Optima™ LC–MS grade	P/N A955-212
Isopropanol, Optima™ LC–MS grade	P/N A461–212
Water with 0.1% Formic Acid, Optima™ LC–MS grade	P/N LS118–500
80% Acetonitrile with 0.1% Formic Acid, Optima™ LC–MS grade	P/N LS122-500
Formic Acid (FA), Optima™ LC–MS grade	P/N A117-10X1AMP

Table 13: Required solvents for installation of a Vanquish Neo System

TIP Do not filter solvents. Filtering solvents can introduce contamination.

Store and handle all chemicals in accordance with standard safety procedures.

HPLC and LC/MS grade water and methanol are available from Thermo Fisher Scientific www.fishersci.com.

8 Installation

This chapter provides an overview of the installation requirements.

8.1 Installation Kits

NOTICE Prior to installation of the Vanquish (U)HPLC System, make sure to complete all preparations described in the previous chapters.

After you have completed your laboratory site preparation, (e)mailed or faxed the Vanquish (U)HPLC system Installation Request (at the beginning of this guide) to your local office for Thermo Scientific products, and received the system, call your Thermo Fisher Scientific office to set an installation date.

Each Vanquish module is shipped with communication cables and tools specific for the module. A Viper capillary kit for the fluidic connection of the modules is shipped with each Vanquish System Base.



IMPORTANT You are responsible for providing the high purity solvents that are required to operate the Vanquish (U)HPLC System.

8.2 Installation

When your new Vanquish (U)HPLC System is on site and it is ready for installation, a field service engineer will install it.

TIP You are responsible for replacing any consumables used during the installation. Check with your Sales contact that the required column is available at installation.

During the installation, the field service engineer will do the following:

- Install the equipment
- Perform an Installation Qualification (IQ)
- Demonstrate the basic functionality of the purchased system
- Demonstrate the basics of equipment operation and routine maintenance



IMPORTANT This does not include Operational Qualification (OQ) or Performance Qualification (PQ). If an OQ/PQ of the system is required, it must be purchased separately.

Vanquish Neo System installation includes running the IQ in one combination of the available fluidic, workflow and detector options. Customers must decide which combination is to be run for their system IQ.

TIP To receive maximum benefit from this on-site orientation opportunity, plan for the instrument operator to be available during the entire installation process.



IMPORTANT Do not use your new system for sample analysis until the field service engineer has completed the installation and you have signed the Acceptance Form.

8.3 Preventive Maintenance



IMPORTANT You are responsible for the routine and preventive maintenance of the Vanquish (U)HPLC System and the data system computer.

Regular preventive maintenance is essential. It increases the lifetime of the system, maximizes the uptime of your system, and provides you with optimum system performance. Maintenance techniques are covered in the Operating Manuals of the respective module.

Thermo Fisher Scientific provides a variety of service coverage agreements to cover all service activities including preventive maintenance. Contact your local Thermo Fisher Scientific subsidiary or office for details.

9 Instrument Shipments

This chapter provides information of shipments from the factory.

All electrical and mechanical components of the system are carefully tested before the instruments are shipped from the factory.

Forwarding companies specialized in the handling of electronic equipment and delicate machinery ship the Vanquish (U)HPLC System to your site. However, equipment is occasionally damaged in transit.

Take the following precautions when receiving equipment, supplies, or material:

- Check carefully for obvious damage or evidence of rough handling.
- Note any apparent external damage on all copies of the receiving documents and briefly describe the extent of the damage. Have the driver sign (or initial) next to your comments to signify agreement with your observations.

TIP 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.

Freight insurance requires that obvious damage is noted on the receiving documents.

Keep the original shipping container and packing material. They provide excellent protection for the instrument in case of future transit. Shipping the unit in any other packaging automatically voids the product warranty.

Instruments are shipped by one of the following methods:

- Ex Works (EXW) Germering, Germany
- Cost Insurance Freight (CIF) destination
- Cost and Freight (CFR) destination

If the system is damaged in transit, the method of shipment determines who has responsibility for filing a claim against the carrier. If the instrument shipping container, Shock Watch, or other indicators show any evidence of damage or mishandling during shipment, do NOT open the container. Call your Thermo Fisher Scientific representative for further instructions.

Most systems are shipped EXW Germering, and any damage incurred in shipment is the responsibility of the purchaser and the carrier. However, Thermo Fisher Scientific will assist with claims filing and (billable) repairs if necessary.

If the system is shipped CIF or CFR destination and is damaged, Thermo Fisher Scientific files a claim against the carrier. In this case, please contact: orders.dionex.deger@thermofisher.com.

TIP Thermo Fisher Scientific does not accept liability for damage if materials are received with obvious damage AND the damage is not recorded on the receiving documents.

When your system arrives, move it to a protected location indoors. If you have questions about moving your system, contact your local office for Thermo Scientific products.

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