



thermoscientific

Vanquish Access HPLC System

Operating Manual

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ThermoFisher
SCIENTIFIC

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Original Operating Manual

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<https://www.thermofisher.com/us/en/home/technical-resources/contact-us.html>

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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

This manual provides instructions for installation, set up, start up, shut down, operation, maintenance and troubleshooting of your Vanquish Access system.

This manual also contains safety messages, precautionary statements, and special notices. Follow these properly to prevent personal injury, damage to the system, or loss of data.

Note the following:

- Illustrations in this manual are provided for basic understanding. No claims can be derived from the illustrations in this manual.

1.2 Conventions

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

1.2.1 Conventions for 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

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 by the keyboard or that you 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 **File > Save as**.

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 refer to the viewpoint of a person that is facing the 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)

1.3 Reference Documentation

In addition to this operating manual, other documentation is available for reference.

Hardware Documentation

Additional hardware documentation includes the following:

- *Operating manuals* for the modules of the Vanquish Access system
- *Instrument Installation Qualification Operating Instructions*

Thermo Fisher Scientific provides up-to-date operating manuals as PDF (Portable Document Format) files that you can access from our customer manuals website. To open and read the PDF files, Adobe™ Reader™ or Adobe™ Acrobat™ is required.

Go to the following website: www.thermofisher.com/HPLCmanuals

Software Documentation

Software documentation for the Thermo Scientific™ Dionex™ Chromeleon™ 7 Chromatography Data System includes the following:

- *Chromeleon™ Help and documents*
The *Chromeleon Help* provides extensive information and comprehensive reference material for all aspects of the software.
- *Installation Guide*
For basic information about device installation and configuration, refer to the *Installation Guide*.
- *Instrument Configuration Manager Help*
For specific information about a certain device, refer to the *Instrument Configuration Manager Help*.
- *Quick Start Guide*
For information about the main elements of the user interface and step-by-step guidance through the most important workflows, refer to the *Quick Start Guide*.
- *Reference Guide*
For a concise overview of the most important workflows, refer to the *Reference Guide*.

TIP The *Chromeleon Help* and documents are included in the software shipment.

Third-Party Documentation

Refer also to the user documentation provided by the manufacturers of third-party components and materials, for example, Safety Data Sheets (SDSs).

2 Safety

This chapter provides general and specific safety information and informs about 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.



CAUTION

Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.



WARNING

Indicates a hazardous situation that, if not avoided, could result in serious injury.

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 with regard to 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

For a list of the safety symbols that appear on a Vanquish Access system module or on labels affixed to a module, refer to the *Operating Manual* of the module. Follow the safety notices in these manuals to prevent the risk of operator injury or damage to the system.

Safety Symbols on the System Base

Symbol	Description
	Indicates a potential hazard. Refer to this manual to avoid the risk of personal injury and/or to prevent damage to the device.
	Indicates a power button that switches the system between on and off states.
	Indicates a potential pinch point hazard. Keep your hands clear to avoid harming your hands.

2.2 Intended Use

The intended use of the Vanquish Access system is to analyze mixtures of compounds in sample solutions.

The system is for use by qualified personnel and in laboratory environment only.

The Vanquish Access system and its modules are intended to be used as General Laboratory Equipment (GLE).

They are not intended for use in diagnostic procedures.

Laboratory Practice

Thermo Fisher Scientific recommends that the laboratory in which the Vanquish Access system is used follow best practices for LC analyses. This includes among others:

- Using appropriate standards
- Regularly running calibration
- Establishing shelf life limits and following them for all consumables used with the system
- Running the system according to the laboratory's verified and validated 'lab developed test' protocol

2.3 Safety Precautions

2.3.1 General Safety Information

All users must observe the general safety information presented in this section and all specific safety messages and precautionary statements elsewhere in this manual during all phases of installation, operation, troubleshooting, maintenance, shutdown, and transport of the system.



If the system is used in a manner not specified by Thermo Fisher Scientific, the protection provided by the system could be impaired. Observe the following:

- Operate the system only within its technical specifications.
- Use only the replacement parts and additional components, options, and peripherals specifically authorized and qualified for the system by Thermo Fisher Scientific.
- Perform only the procedures that are described in this operating manual and in supporting documents for the system. Follow all instructions step by step and use the tools recommended for the procedure.
- Open the enclosure of the system and other components only if specifically instructed to do so in this manual.
- Thermo Fisher Scientific cannot be held liable for any damage, material or otherwise, resulting from inappropriate or improper use of the system. If there is any question regarding appropriate usage, contact Thermo Fisher Scientific before proceeding.

2.3.2 Qualification of the Personnel

Observe the information below on the proper qualification of the personnel installing and/or operating the system.

Installation



Only skilled personnel are permitted to install the system and to establish the electrical connections according to the appropriate regulations.

- Thermo Fisher Scientific recommends always having service personnel certified by Thermo Fisher Scientific perform the installation (for brevity, referred to as Thermo Fisher Scientific service engineer).
- If a person other than a Thermo Fisher Scientific service engineer installs and sets up the system, the installer is responsible for ensuring the safety of the system.

Operation



General Operation

The system is designed to be operated only by trained and qualified personnel in a laboratory environment.

All users must know the hazards presented by the system and the substances they are using. All users should observe the related Safety Data Sheets (SDSs).

2.3.3 Personal Protective Equipment

Wear personal protective equipment and follow good laboratory practice to protect you from hazardous substances. The appropriate equipment depends on the hazard. For advice on the hazards and the equipment required for the substances you are using, refer to the material handling and safety data sheet provided by the vendor.



An eyewash facility and a sink should be available nearby. If any substance contacts your skin or eyes, wash the affected area and seek medical attention.

Protective Clothing

To protect you from chemical splashes, harmful liquids, or other contamination, put on appropriate protective clothing, such as a lab coat.

Protective Eyewear

To prevent liquids from striking your eyes, put on appropriate protective eyewear, such as safety glasses with side shields. If there is a risk of splashing liquids, put on goggles.

Gloves

To protect you from harmful liquids and avoid personal injury during maintenance or service, put on appropriate protective gloves.

2.3.4 General Residual Hazards

Pay attention to the following general residual hazards when working with the system:



WARNING—Hazardous Substances

Solvents, mobile phases, samples, and reagents might contain toxic, carcinogenic, mutagenic, infectious, or otherwise harmful substances. The handling of these substances can pose health and safety risks.

- Be sure that you know the properties of all substances that you are using. Avoid exposure to harmful substances. If you have any doubt about a substance, handle the substance as if it is potentially harmful.
- Wear personal protective equipment as required by the hazard and follow good laboratory practice.
- Reduce the volume of substances to the minimum volume required for sample analysis.
- Avoid handling of solvent reservoirs above head height.
- Do not operate the system in a potentially flammable environment.
- Avoid accumulation of harmful substances. Make sure that the installation site is well ventilated.
- Dispose of hazardous waste in an environmentally safe manner that is consistent with local regulations. Follow a regulated, approved waste disposal program.

**WARNING—Biohazard**

Biohazardous material, for example microorganisms, cell cultures, tissues, body fluids, and other biological agents can transmit infectious diseases. To avoid infections with these agents:

- Assume that all biological substances are at least potentially infectious.
- Wear personal protective equipment as required by the hazard and follow good laboratory practice.
- Dispose of biohazardous waste in an environmentally safe manner that is consistent with local regulations. Follow a regulated, approved waste disposal program.

**WARNING—Self-Ignition of Solvents**

Solvents with a self-ignition temperature below 150 °C might ignite when in contact with a hot surface (for example, due to leakage in the chromatography system).

Avoid the use of these solvents.

**WARNING—Hazardous Vapors**

Mobile phases and samples might contain volatile or flammable solvents. The handling of these substances can pose health and safety risks.

- Avoid accumulation of these substances. Make sure that the installation site is well ventilated.
- Avoid open flames and sparks.
- Do not operate the system in the presence of flammable gases or fumes.

**CAUTION—Escape of Hazardous Substances from PEEK Capillaries**

Some capillaries in the system are made of PEEK. Swelling or attack by acids can cause PEEK capillaries to start leaking or to 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.

**CAUTION—Sparking due to Electrostatic Discharge**

Liquid flowing through capillaries can generate static electricity. This effect is particularly present with insulating capillaries and non-conductive solvents (for example, pure acetonitrile). Discharge of electrostatic energy might lead to sparking, which could constitute a fire hazard.

Prevent the generation of static electricity near the chromatography system.

2.3.5 In Case of Emergency

**WARNING—Safety Hazard**

In case of emergency, disconnect the system modules from the power line.

2.4 Solvent and Additive Information

2.4.1 General Compatibility

To protect optimal functionality of the Vanquish Access system, observe these recommendations on the use of solvents and additives:

- The system can be used with reversed-phase (RP) and normal-phase (NP) compatible solvents and additives.
- Use only solvents and additives that are compatible with all parts in the flow path.
- Anhydrous methanol may lead to stress failures in titanium surfaces, especially when formic acid or TFA is added to the mixture. Thermo Fisher Scientific recommends adding 3% of water to prevent this.

Piston Seal Compatibility

The pump is shipped with carbon-fiber filled PTFE piston seals. Slightly increased abrasion may be observed with these seals, depending on the application. Consider testing the permeability of the static mixer regularly at short intervals.

2.4.2 Allowed pH Ranges

Allowed pH range	Remark
1-13	<ul style="list-style-type: none"> • <i>pH value of 1-2</i> : The application time should be as short as possible. Flush the system thoroughly after these applications. • <i>pH values higher than 9.5 with optical detectors</i>: Avoid using mobile phases with a pH value higher than 9.5 together with optical detectors. This can impair the functionality and optical performance of the detector flow cell.

2.4.3 Allowed Concentrations

Concentration	Value
Buffer concentration	Less than or equal to 1 mol/L
Chloride concentration	Less than or equal to 0.1 mol/L <i>High chloride concentration</i> : The application time should be as short as possible. Flush the pump thoroughly after these applications.

2.4.4 Further Information

- For information about the materials that are used in the flow path of the Vanquish Access system, refer to the *Specifications* chapter in the *Operating Manual* for each module.
- Observe the general guidelines and recommendations on the use of solvents and additives in the chromatography system. See [Use of Solvents and Additives](#) (▶ page 81).

3 System Overview

This chapter introduces you to the system and the main components.

3.1 System Description

The Vanquish Access system is designed for use in high performance liquid chromatography (HPLC) applications. It comprises the following modules:

- System base
- Pump
- Autosampler
- Variable wavelength detector
- Column compartment
- Solvent rack

For a description of the solvent rack and system base, see [System Base](#) (▶ page 29) and [Solvent Rack](#) (▶ page 28). For a description of the other modules, refer to the *Operating Manuals* for these modules.

3.1.1 Solvent Rack

The solvent rack provides a secure location for placing solvent reservoirs. Use the solvent reservoirs that are shipped with the system. If you use other solvent reservoirs, ensure that the system stack is stable and does not tilt.

On the front right, the solvent rack has a clamp that can easily be removed by sliding it upward to access solvent and wash lines.

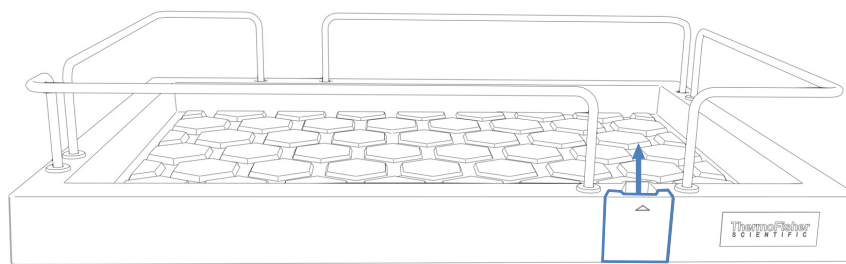


Figure 1: Solvent rack (front view)

3.1.2 System Base

The system base is a mandatory part of the Vanquish Access system. It is the bottom part of the system stack and carries the pump, autosampler, detector, and column compartment.

The system base provides:

- Power button for power on/off control of all modules
- Drain port for connecting a system waste line
- Drain port for the detector waste line
- Locks to toggle between moveable and stationary mode

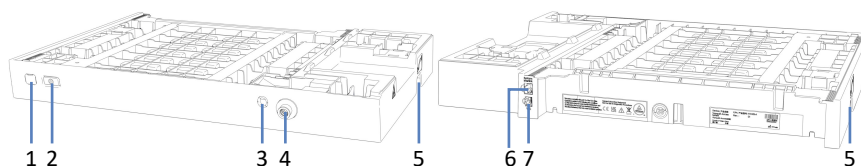


Figure 2: System base (front and rear view)

No.	Description
1	Reserved for future use
2	System power button Allows power on/off control for all modules of the system that are connected to the system base via the System Interlink port.
3	Detector waste outlet For guiding the waste line from the detector to waste.
4	System drain port For connecting the system waste line.
5	Locks - on the left and right side of the system base Allows toggling between movable and stationary mode.
6	System Interlink port Allows connecting the other modules for power on/off control from the system base.
7	Reserved for future use

3.2 Operation

The system is designed to be operated from a computer configured with the Chromeleon Chromatography Data System (CDS). The Chromeleon software provides complete instrument control, data acquisition, and data management.

For a basic description of instrument control and automated sample analysis with the Chromeleon software, see [Operating the System from the Software](#) (▶ page 84).

Keypads are available inside the system modules, allowing you to perform certain basic functions directly from each module.

4 Unpacking

This chapter provides information for unpacking the system and informs you about the scope of delivery.

4.1 Unpacking the System

Damaged Packaging, Defective on Arrival

Inspect the shipping container for signs of external damage and, after unpacking, inspect the system for any signs of mechanical damage that might have occurred during shipment.

If you suspect that the system may have been damaged during shipment, immediately notify the incoming carrier and Thermo Fisher Scientific about the damage. Shipping insurance will compensate for the damage only if reported immediately.

Unpacking the Solvent Rack and System Base

To unpack the solvent rack and system base, follow these steps:

1. Open the shipping container.
2. Remove the ship kit.
3. Carefully remove the solvent rack, liquid reservoirs, and the flow cell from the shipping container.
4. Place the solvent rack on a stable surface.
5. Carefully remove the system base from the shipping container.
6. *If applicable*
Remove any additional packing material.
7. Place the system base on a stable surface.

TIP Keep the shipping container and all packing material. These items will be needed if the system is transported to a new location or shipped.

Unpacking the System Modules

For details on unpacking and moving the system modules, refer to the *Operating Manual* of each module.

4.2 Scope of Delivery

The following items are included in the delivery:

- System base
- Solvent rack
- Ship kit
- Liquid reservoirs
- Flow cell
- System operating manual (downloadable from customer manual website)

5 Installation

This chapter specifies the requirements for the installation site and describes how to set up, install, and configure the system.

5.1 Safety Guidelines for Installation

Pay attention to the following safety guidelines:



Observe all warning messages and precautionary statements presented in [Safety Precautions](#) (▶ page 19).



Observe all warning messages and precautionary statements presented in the *Safety Guidelines for Installation* section in the *Operating Manual* for the individual modules of the Vanquish Access system.



CAUTION—System Stack Stability

The Vanquish Access system configuration follows a defined stack arrangement. Modifying the system stack arrangement may impair the system stability or damage the system.

Do not change the system configuration or the height of the system stack.

NOTICE—Damage to Doors

The doors of the pump, autosampler and detector are fixed with screws and cannot be removed by the customer. To prevent the doors from being damaged, be careful when opening and closing the doors. Keep the required system clearance.

5.2 Installing the System

A Thermo Fisher Scientific service engineer installs and sets up the Vanquish Access system, including all modules and options or parts shipped with them. The service engineer checks that the installation is correct and that the Vanquish Access system and modules operate as specified. The engineer also demonstrates the basic operation and main features.

If personnel other than a Thermo Fisher Scientific service engineer installs the system, follow the steps below.

1. Pay attention to the safety guidelines and observe all site requirements.
For the safety guidelines when installing the system, see [Safety Guidelines for Installation](#) (▶ page 36). For the site requirements, see [Site Requirements](#) (▶ page 38).
2. Set up the system hardware. See [Setting Up the Hardware](#) (▶ page 42).
3. Set up the flow connections for the initial flushing procedures. See [Setting up the System Flow Connections for Initial Flushing Procedures](#) (▶ page 56).
4. Set up the system in the software. See [Setting Up the System in the Software](#) (▶ page 66).
5. Perform initial flushing procedures. See [Flushing the System after Installation](#) (▶ page 69).

NOTICE

Thermo Fisher Scientific recommends performing Instrument Installation Qualification and Operational Qualification after installation. Some Chromeleon versions support automated qualification for Vanquish Access. Refer to the documentation for the software version that you are using and/or perform the qualification manually.

5.3 Site Requirements

An appropriate operating environment is important to ensure optimal performance of the system.

This section provides important requirements for the installation site. Note the following:

- Make sure that the installation site has enough power outlets for all devices in the system.
- Operate the system only under appropriate laboratory conditions
- For specifications, see [Specifications](#) (▶ page 119).

5.3.1 Workbench

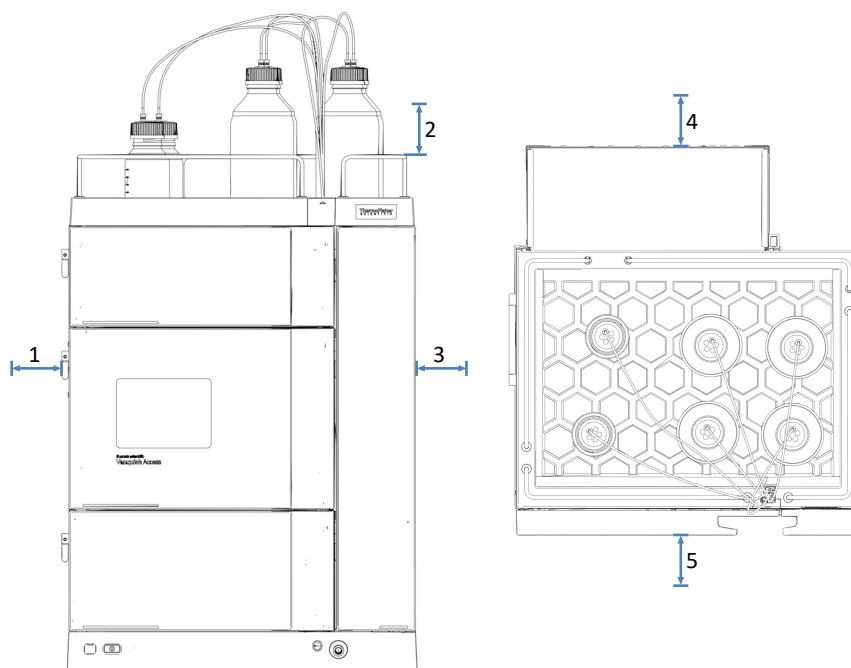


Figure 3: System stack clearances

No.	Description
1	Minimum 30 cm
2	Minimum 30 cm
3	Minimum 10 cm
4	Minimum 15 cm
5	Minimum 45 cm

5.3.2 Power Considerations

**CAUTION—Electric Shock or Damage to the Device**

Connecting the device to a line voltage higher or lower than specified could result in personal injury or damage to the device.

Connect the device to the specified line voltage only.

The device can be affected by short voltage interruptions in case the power supply of the equipment is turned off to protect the device against an undetermined behavior. When the supply voltage returns, the power supply automatically restarts the device and reconnection to the chromatography data system is required.

5.3.3 Power Cord

The power cords are designed to match the wall socket requirements of the country in which they are used. The end of the power cords that plugs into the power socket on the device is identical for all power cords. The end of the power cords that plugs into the wall socket is different.

**WARNING—Electric Shock or Damage to the Device**

- Never use a power cord other than the power cords provided by Thermo Fisher Scientific for the device.
- Only use a power cord that is designed for the country in which you use the device.
- Do not use extension cords.
- Never plug the power cord to a power socket that is shared with other equipment (for example, multiple sockets).
- Operate the device only from a power outlet that has a protective ground connection.
- In case of emergency, it must be possible to reach the power cord easily at any time to disconnect the device from the power line.

**WARNING—Electric Shock or Damage to a Product**

Misuse of the power cords could cause personal injury or damage the instrument. Use the power cords provided by Thermo Fisher Scientific only for the purpose for which they are intended. Do not use them for any other purpose, for example, for connecting other instruments.

5.3.4 Condensation

NOTICE—Condensation in the device can damage the electronics.

- When using, shipping, or storing the device, avoid or minimize conditions that can lead to a build-up of condensation in the device. For example, avoid significant or fast changes in environmental conditions.
- If you suspect that condensation is present, allow the device to warm up to room temperature. This may take several hours. Wait until the condensation is gone completely before connecting the device to the power line.

5.3.5 Operating Conditions

When operating the system, make sure that the installation site meets these general environmental and operating conditions. For specified ambient temperature and humidity, see [Specifications](#) (► [page 119](#)).

Temperature

Temperature fluctuations can affect the performance of the system. Avoid locations with significant changes in temperature and strong air drafts. For example, do not place the system in the direct sunlight, near heating or cooling sources, or under an air duct.

Humidity

The relative humidity of the operating environment is important for the performance of the system. Operate the system in the specified humidity range, with no condensation.

When the humidity is too high, condensation may occur, causing damage to the electronic components in the system. When the humidity is too low, static electricity may accumulate and discharge, shortening the life of the electronic components.

Ventilation

Make sure that the installation site is well ventilated at any time to avoid potential health hazards and safety risks, which may be caused by handling hazardous substances, volatiles or gases.

Vibration and mechanical shocks

Vibrations and mechanical shocks may affect the performance of the system. Therefore, the installation site should be free of vibrations. Avoid mechanical shocks and avoid placing the system in locations where vibrations are caused by other instruments.

Electromagnetic interference

- The system has been tested and found to comply with the immunity requirements for both basic and industrial electromagnetic environments, pursuant to EN IEC 61326-1.
Electromagnetic sources of strong interference may affect the performance of the system. In close proximity to the system, avoid operating equipment generating strong electric or magnetic fields and only operate certified laboratory equipment. Do not connect equipment that may cause power disturbances to the same power network used to supply the system.
- The system has been tested and found to comply with the emission limits for a Class A equipment, pursuant to EN IEC 61326-1.



CAUTION

This equipment is not intended for use in residential environments and may not provide adequate protection to radio reception in such environments.

5.4 Setting Up the Hardware

This section describes how to set up the hardware and provides information about the system connectors and cables.

5.4.1 Installing the System Stack

**CAUTION—Heavy Load, Bulky Device**

The system modules are too heavy or bulky for one person alone to handle safely. To avoid personal injury or damage to the system modules, observe the following guidelines:

- Physical handling of the modules, including lifting or moving, requires a team effort of two persons.
- A team effort is in particular required when lifting the modules into the system stack or when removing them.
- Use the carrying handles that are pre-installed on the modules to move or transport the modules. Never move or lift the modules by the front door. This will damage the doors or the modules.

The system modules are arranged in a system stack.

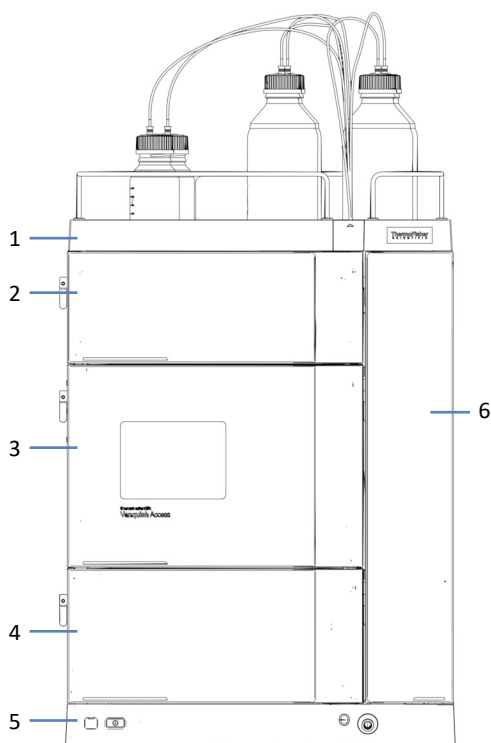


Figure 4: System arrangement

No.	Description
1	Solvent Rack
2	Detector
3	Autosampler
4	Pump
5	System Base
6	Column Compartment

NOTICE

Moving the Vanquish Access system stack after installation even over short distances on the workbench can damage and impair the functionality of the system base.

- Therefore, install the system stack at the final location.
- If you have to move the system after installation, see [Moving the System Stack \(Unlocking/Locking\)](#) (► page 44).

1. Place the system base on the workbench.
2. Unlock the system base (see [Unlocking the System Base](#) (▶ page 45)) to be able to shift the system base slightly for better access to all system parts.
3. Lift the pump by its carrying handles. Place the pump on the system base approximately 5 cm before the end of the rails. Push the pump towards the rear until the pump clicks into place.
4. Repeat the previous step for the autosampler and detector by placing the autosampler on the pump, and the detector on the autosampler.
5. Remove the protective caps from each system module. They are located at the rear of the housings.
6. Attach the column compartment to the system stack (see [Attaching the Column Compartment to the System](#) (▶ page 47)).
7. Place the solvent rack on the detector approximately 5 cm before the end of the rails. Push the solvent rack towards the rear until it clicks into place.
8. Connect the signal cables to the system modules. For connecting USB and system interlink cables in the system, see [Signal Cable Connections](#) (▶ page 48).
9. Connect the system modules to a power source (see [Connecting Power Cords](#) (▶ page 54)).
10. Guide the cables through the cable clips (see [Guiding Cables through the Cable Clips](#) (▶ page 55)).

5.4.2 Moving the System Stack (Unlocking/Locking)

The system base has a locking mechanism. Before you move the system base, for example, for installation and maintenance, you need to unlock the system base. To prevent it from being moved during operation on the workbench, lock it.

You can switch between the moveable and stationary mode using the system base locking tools shipped with the system base.

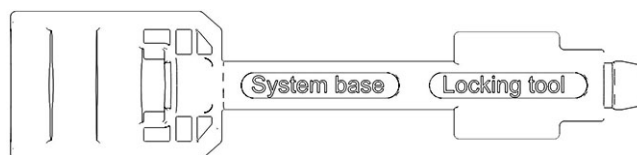


Figure 5: System base locking tool

5.4.2.1 Unlocking the System Base

1. Insert a locking tool into the lock port on one side of the system base.
2. Insert one locking tool into the lock port on the other side of the system base.
3. Unlock the system base by turning the locking tools as shown below. In the unlocked position, the locking tools cannot be removed from the system base.

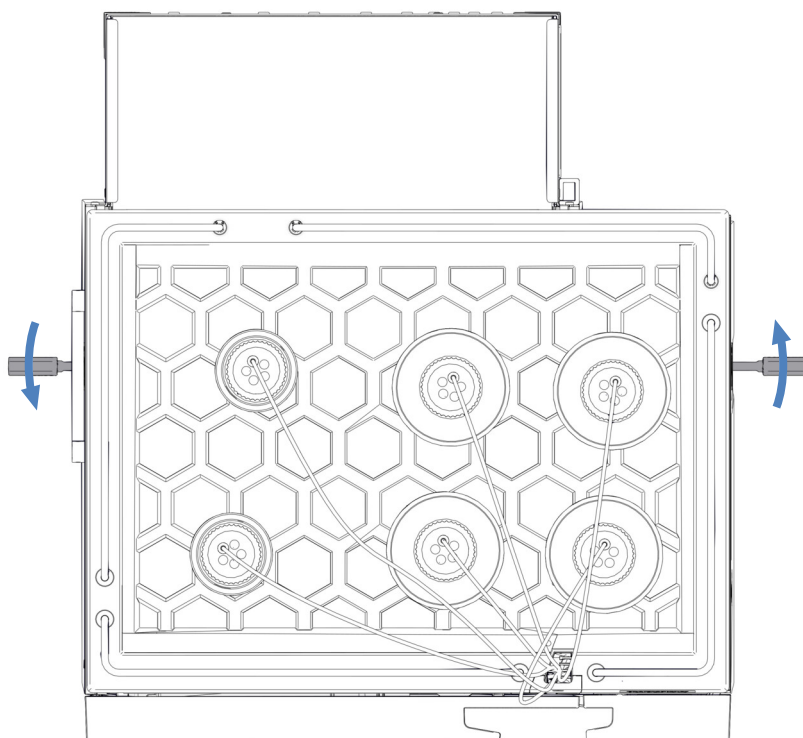


Figure 6: Unlocking the system base

4. Move the system.
5. Lock the system base (see [Locking the System Base](#) (► page 46)).

5.4.2.2 Locking the System Base

The system base has been set to movable mode before setting up the stack. Therefore, the locking tools are already inserted into the system base.

1. Move the system to the operating position.
2. Lock the system base by turning the locking tools as shown below.

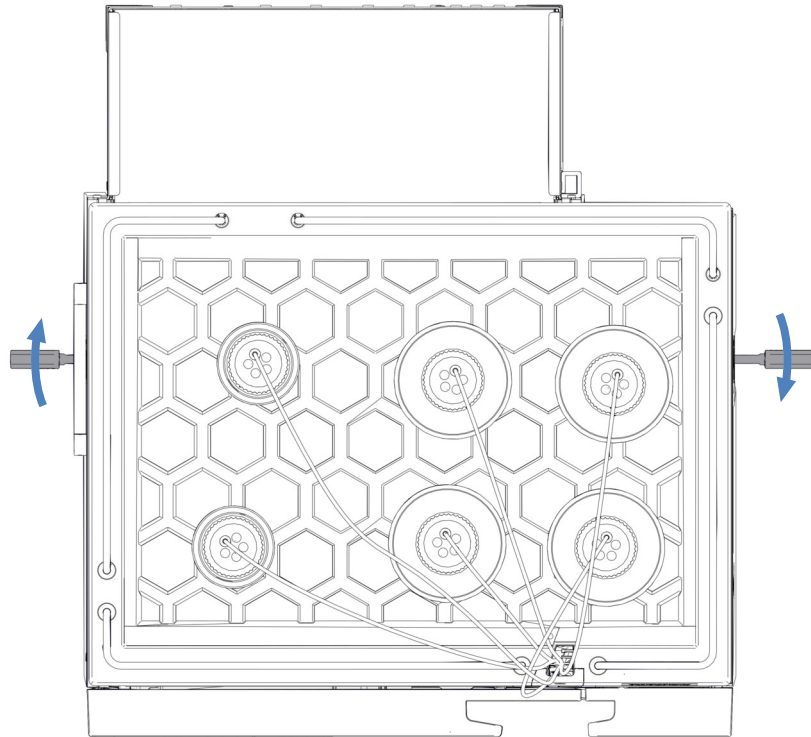


Figure 7: Locking the system base (top view)

3. Remove the locking tools and store them in a safe place.

5.4.3 Attaching the Column Compartment to the System

CAUTION—Risk of Tilting Solvent Rack

To prevent the solvent rack from tilting, remove the solvent rack before removing or installing the column compartment.

Preparations

1. Remove the solvent rack.

*Follow these steps***NOTICE—Pinch Point Hazard**

When placing the column compartment on the system base, be careful not to pinch your hands or fingers between the column compartment and the system base.

1. Grasp the column compartment by its sides.
2. Slightly lift the column compartment up.
3. Insert the holding knobs on the column compartment in the grooves on the mounting bars that are pre-installed on the autosampler and pump.
4. Place the column compartment on the system base.

5.4.4 Signal Cable Connections

This section provides details on the cables and interfaces used to connect the system to a computer or other devices, and details on how to interlink the system modules with each other.

5.4.4.1 Connector Overview

System base

The following connectors are provided on the system base for signal connections:

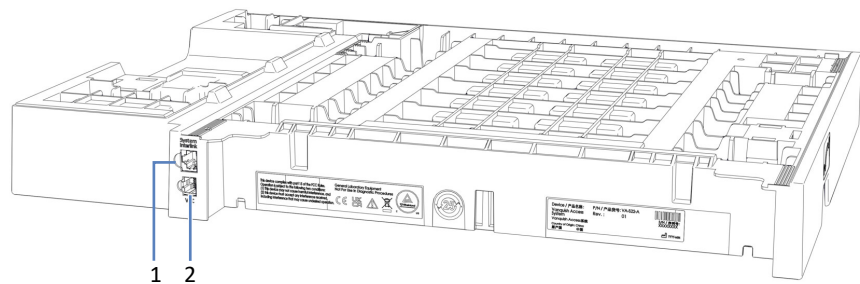


Figure 8: System base connectors

No.	Description
1	System Interlink port Allows connecting the other modules for power on/off control from the Vanquish Access system base.
2	Reserved for future use.

System modules

The following connectors may be provided on the system modules for power line connection and for signal connections:

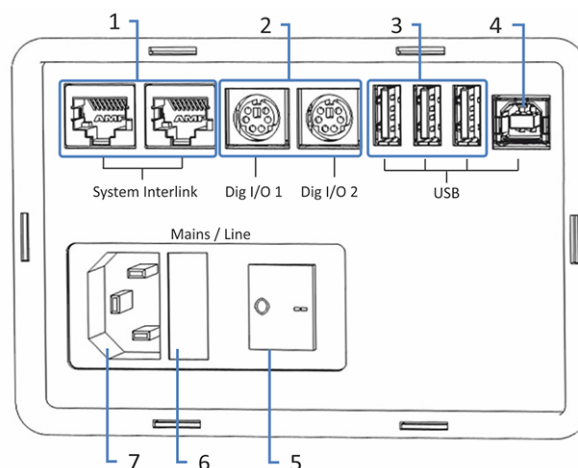


Figure 9: Connectors

No.	Description
1	<p>System Interlink port</p> <p>Allows power on/off control for the system from the Vanquish Access system base and device communication</p> <p>Note: Do not connect cables other than the provided system interlink cables to these ports, as this may damage the electronics.</p> <p>For details on system interlink connections, see System Interlink Connections (▶ page 52).</p>
2	<p>Digital I/O ports (not available for all modules)</p> <p>Allow exchange of digital signals with external instruments</p> <p>For information on connection and pin assignment, refer to the <i>Operating Manual</i> for the related module.</p>
3	<p>USB (Universal Serial Bus) hub ("A"-type connector) (not available in all modules)</p> <p>Allows connection to other modules in the Vanquish Access system</p>
4	<p>USB port ("B" type connector)</p> <p>Allows connection to other modules in the Vanquish Access system or the computer on which the chromatography data system is installed.</p> <p>For details on USB connections, see USB Connections (▶ page 50).</p>
5	Main power switch (on/off control)
6	Fuse holder
7	Power inlet connector

TIP Thermo Fisher Scientific recommends using the USB ports only as described above. If the USB ports are used for any other purpose, Thermo Fisher Scientific cannot ensure proper functionality.

5.4.4.2 USB Connections

All USB connections require standard USB A-to-B type cable.



Figure 10: USB cable

The flat, rectangular end of the cable is the "A" connector. The smaller, hexagonal end is the "B" connector.

TIP

- The USB standard limits the USB cable length to 5 meters. Each USB device can be separated from the computer or next USB hub by no more than 5 meters.
- After connecting the USB cables and before turning on the power to a device for the first time, verify that the chromatography software is installed on the computer. When the power is turned on, the required USB drivers are automatically found and the Windows™ operating system can detect the device.

USB Cable Overview

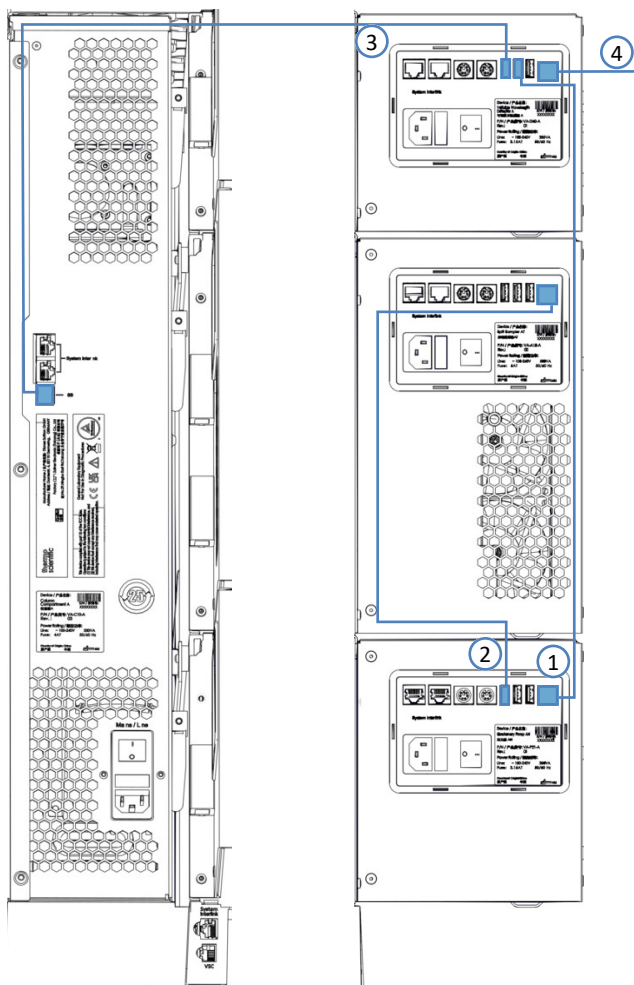


Figure 11: USB cable connections (example)

No.	Description
-	USB connection:
1	From pump to detector
2	From autosampler to pump
3	From column compartment to detector
4	From detector to computer

Follow these steps

1. Connect the pump and the **USB** hub on the UV/VIS detector with a USB cable.
2. Connect the pump and the autosampler with a USB cable.
3. Connect the column compartment and the **USB** hub on the UV/VIS detector with a USB cable.
4. Connect the **USB** port on the UV/VIS detector to a USB port (2.0 or higher) on the computer.

In order to control the modules that use a USB hub on another module, the module that provides the hub must be turned on.

NOTICE

- Never use defective communication cables. If you suspect that a cable is defective, replace the cable.
- To ensure trouble-free operation, use only the cables provided by Thermo Fisher Scientific for connecting the system.

5.4.4.3 System Interlink Connections

The system interlink connections require a special system interlink cable (Cat. 6 cable).

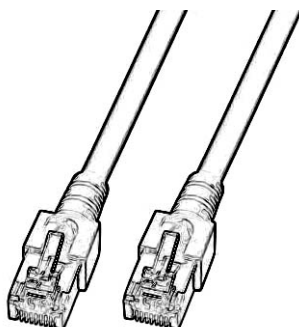


Figure 12: System interlink cable

System Interlink Cable Overview

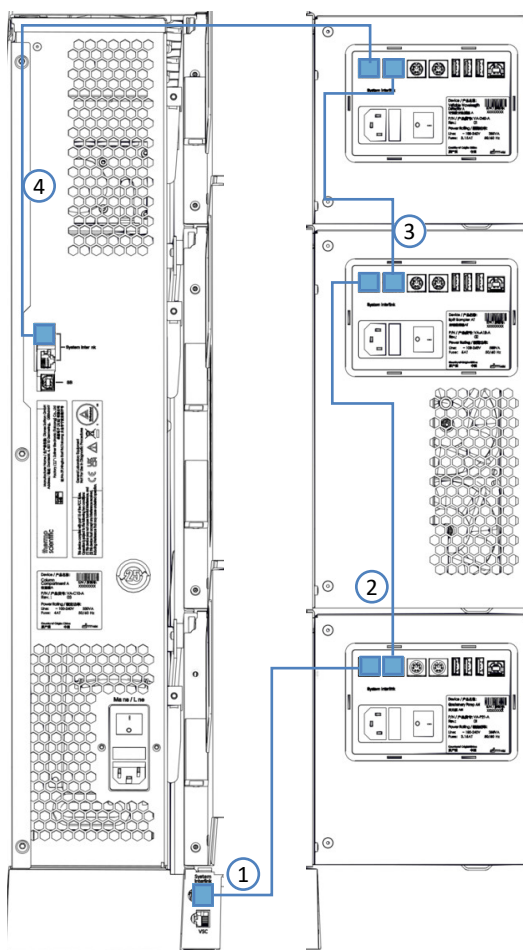


Figure 13: System interlink cable connections (example)

No.	Description
-	System interlink connection:
1	From system base to pump
2	From pump to autosampler
3	From autosampler to detector
4	From detector to column compartment

Follow these steps

1. Connect the **System Interlink** ports on the system base and the pump with a system interlink cable.
2. Connect the **System Interlink** ports on the pump and the autosampler with a system interlink cable.
3. Connect the **System Interlink** ports on the autosampler and the UV/VIS detector with a system interlink cable.
4. Connect the **System Interlink** ports on the UV/VIS detector and the column compartment with a system interlink cable.

5.4.5 Connecting Power Cords

This section provides details on how to connect the modules to the power source. Do not turn on the system or modules yet.

NOTICE

Condensation in a device can damage the electronics.

- Before connecting the devices to the power line, be sure that no condensation is present in the devices.
- If you suspect that condensation is present, allow the device to warm up to room temperature slowly. Wait until the condensation is completely gone before proceeding.

Follow these steps

1. Verify that the power switch on each device is set to OFF.
2. Connect the power cord to the power-inlet connector on each device.
3. Connect the free end of the power cords to an appropriate power source.
4. Insert the signal and power cables into the cable clips (see [Guiding Cables through the Cable Clips](#) (▶ page 55)).
5. If necessary, move the system to its final position.
6. Lock the system base against moving (see [Locking the System Base](#) (▶ page 46)).

5.4.6 Guiding Cables through the Cable Clips

The cable clips can be used to guide signal and power cables in an orderly fashion.

The pump and the detector each have one cable clip cutout on the right side and the autosampler has two cable clip cutouts on the right side.

The location of the cable clips is shown below.

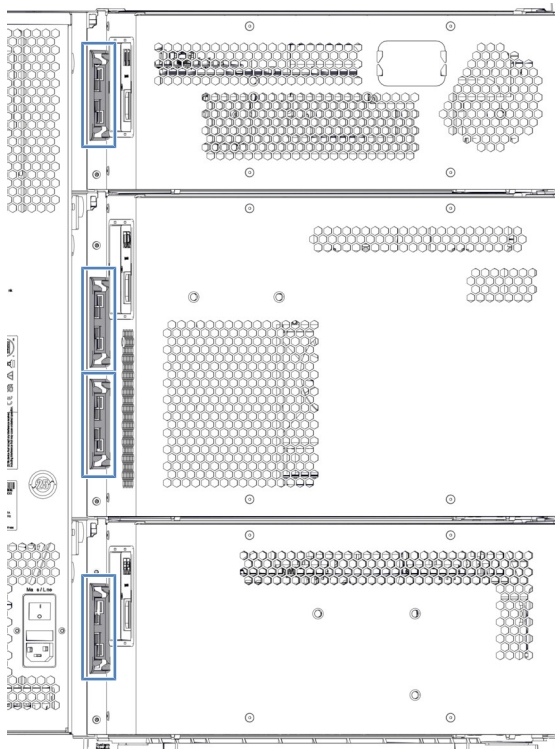


Figure 14: Location of cable clips

5.5 Setting up the System Flow Connections for Initial Flushing Procedures

1. Observe the guidelines for connecting flow connections:
 - a) See [General Information and Guidelines](#) (▶ page 57).
 - b) See [Guiding Capillaries and Tubing Through the System](#) (▶ page 58).
 - c) See [Connecting Fittings, Capillaries, and Tubing](#) (▶ page 60).
2. Set up the flow connections for the pump. For details, refer to the *Operating Manual* of the pump.
3. Set up the flow connections for the autosampler. For details, refer to the *Operating Manual* of the autosampler.
4. Set up the remaining flow connections:
 - a) Connect the capillary from the autosampler to a Viper union.
 - b) Connect the column outlet capillary (detector inlet capillary) to the Viper union and route it to waste.

NOTICE

Do not connect the column and the flow cell to the flow path yet!

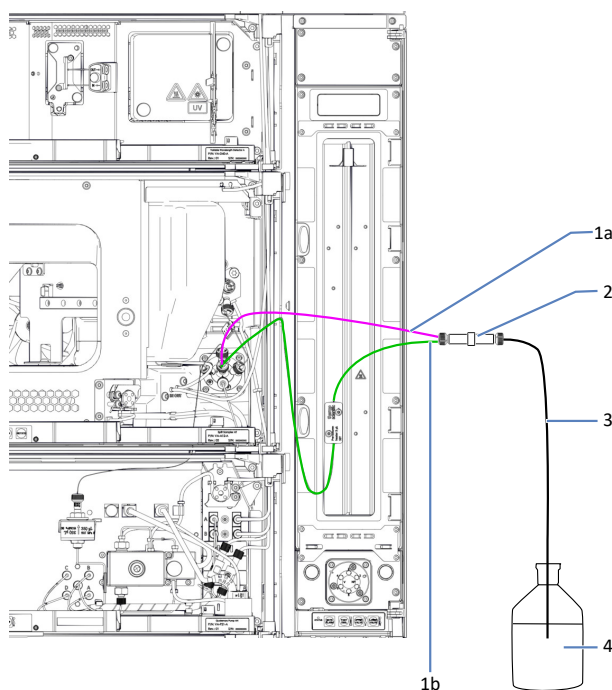


Figure 15: Flow connections for initial flushing without column and without flow cell

No.	Description
1	Capillary depending on the configuration
1a	Autosampler outlet capillary (no pre-heater installed)
1b	Pre-heater outlet capillary (pre-heater installed)
2	Viper union
3	Column outlet capillary (detector inlet capillary)
4	Waste container

5. Connect the waste line to the system drain port. See [Connecting the Drain Tubing to the System Drain Port](#) (▶ page 62).
6. Test the drain system. See [Testing the Drain System](#) (▶ page 64).
7. Turn on the system (see [Turning On the System](#) (▶ page 65)).
8. Set up the system in the chromatography data system (see [Setting Up the System in the Software](#) (▶ page 66)).
9. Perform initial flushing procedures (see [Flushing the System after Installation](#) (▶ page 69)).

5.5.1 General Information and Guidelines

This section gives an overview of the flow connections to and from the system. For details on tubing and capillary connections within and between the modules, refer to the *Operating Manual* of each module.



Flow connections can be filled with hazardous substances. Observe the warning messages and precautionary statements presented in [Safety Precautions](#) (▶ page 19).

- Dirty components can contaminate the chromatography system. Contamination leads to poor performance of the modules and entire system or can even cause damage to the modules and system. Therefore:
 - ◆ Always wear appropriate gloves.
 - ◆ Place the components only on a clean, lint-free surface.
 - ◆ Keep your tools clean.
 - ◆ Use only lint-free cloth for cleaning.
- Use the solvent reservoirs that are shipped with the system. If you use other solvent reservoirs, ensure that the system stack is stable and does not tilt.
- The system uses the Viper™ fitting system. For installation instructions and guidelines and for handling recommendations, see [Connecting Fittings, Capillaries, and Tubing](#) (▶ page 60).

5.5.2 Guiding Capillaries and Tubing Through the System

Flow connections between the modules of the Vanquish Access system are guided through either the tubing chase in the devices or the guide holes or capillary clips of the devices.

Tubing Chase with Tubing Guides

To guide certain tubes and lines from the top module to the bottom module in the Vanquish Access system stack, the stackable modules have a tubing chase on the inside right. The tubing chase provides four tubing guides.

Each guide can hold up to three tubes or lines. In each module, push the tube (or line) into the appropriate guide.

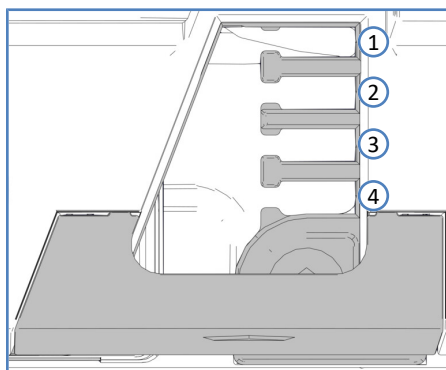


Figure 16: Tubing chase with tubing guides (view from top)

No.	Use for
1	Solvent tubing (up to three solvent lines)
2	Solvent tubing (up to three solvent lines)
3	Wash liquid tubing (seal wash, autosampler needle wash)
4	Detector waste line

Tubing Brackets

Tubing brackets are available for holding the tubing in place. Slip the bracket side onto the drain pipe.

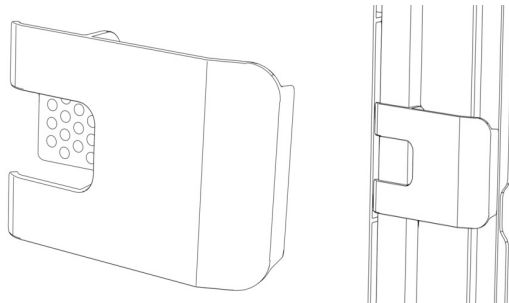


Figure 17: Tubing bracket (left), tubing bracket installed (right)

Guide Holes and Capillary Clips

Guide holes and capillary clips are provided at specific positions on the system modules. Route flow connections from one module to the next module in the Vanquish Access system through the appropriate guide hole or capillary clip when instructed to do so in the manual.

5.5.3 Connecting Fittings, Capillaries, and Tubing

This section provides information about how to connect and handle capillaries, fittings, and tubing.

5.5.3.1 General Guidelines

When connecting capillaries and tubing, follow these general recommendations:

- Use only the capillaries and tubing (for example, solvent lines or waste tubing) that are shipped with the product or additional or spare capillaries and tubing as recommended by Thermo Fisher Scientific.
- The connectors must be free from contaminants. Even minute particles may cause damage to the system or lead to invalid test results.
- Do not install capillaries or tubes that are stressed, nicked, kinked, or otherwise damaged.
- Install capillaries and fittings only at the positions for which they are intended.

5.5.3.2 Connecting Viper Capillaries

This section describes how to connect Viper™ capillaries. All Viper flow connections in the Vanquish Access system are designed to be finger-tight.

To connect Viper capillaries with knurls, follow these steps:

NOTICE

- Tighten or loosen Viper capillaries *only* with your fingers. Do not use tools other than the knurl that comes with the capillary.
 - To avoid damage to the capillary or connection, tighten and loosen the Viper capillaries *only* when the system pressure is down to zero.
-

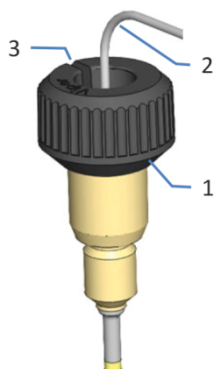


Figure 18: Viper fitting with knurl

No.	Description
1	Knurl
2	Capillary
3	Slot

1. Insert the Viper capillary into the connection port.
2. Tighten the connection by the knurl.

TIP Note the slot in the knurl. You can easily remove the knurl from the capillary through this slot if space is limited.

3. Check whether the connection leaks. If leakage exists, follow the steps further down.

Resolving Leakage of Viper Fittings with Knurls

1. Tighten the connection a little more.
2. If leakage continues, remove the capillary.
3. Clean the capillary ends carefully by using a lint-free tissue wetted with isopropanol.
4. Reinstall the capillary.
5. If the connection continues to leak, install a new Viper capillary.

5.5.4 Connecting the Drain Tubing to the System Drain Port



WARNING—Escape of Hazardous Substances

Hazardous substances can escape from waste lines and waste containers if connections and waste containers are not properly installed. Exposure to these substances can pose health and safety risks.

Verify the correct installation of connections and containers by testing the drain system (see [Testing the Drain System](#) (▶ page 64)).

The Vanquish Access system has been designed for optimized and simple leak liquid and waste handling:

- Leak liquid from the solvent rack, detector, autosampler, pump, and column compartment flows through pipes from the modules to the system base drain port.
- Seal wash and needle wash liquids from the pump and autosampler, as well as condensate from the autosampler, are also guided to the system base drain port.
- Waste from the detector can also be routed through the system base. Do not connect the detector waste line yet!

Parts required

- Drain tubing from ship kit
- Suitable waste container

Follow these steps

1. Push the drain tubing into the system drain port as far as it goes in to establish a self-sealing connection.

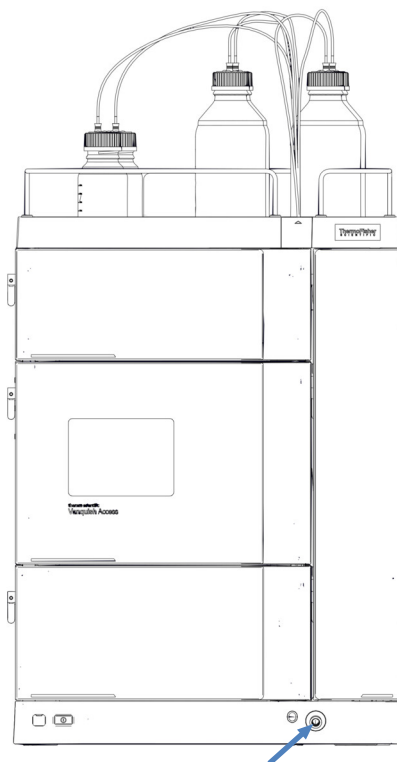


Figure 19: System drain port

2. Route the free end of the drain tubing into a waste container.
3. Ensure proper drainage of waste (see next section).

Ensuring Proper Drainage of Waste

1. Position the waste container below the level of the system stack. To prevent solvent vapors from evaporating back into the system, make sure that the distance is sufficient.
2. Make sure the drain tubing is neither bent nor pinched.
3. To prevent liquid from flowing back into the system, the entire drain tubing must remain below the drain port. Avoid the formation of siphons.

4. To allow the waste liquid flowing off properly and avoid liquid accumulation in the system base, the end of the drain tubing must not be submerged in waste liquid (see figure below):
 - a) Shorten the drain tubing if required.
 - b) Observe the liquid level in the waste container and empty the waste container as necessary.

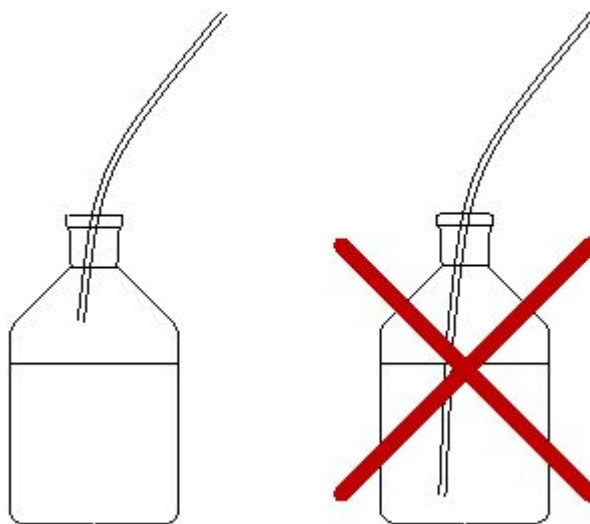


Figure 20: Free end of drain tubing in waste container

5.5.5 Testing the Drain System

Check the drain system for proper drainage of waste:

1. Pour water or isopropanol into the drain in the solvent rack.
2. Verify that the liquid leaves the system at the system drain port and into the waste container.
3. If a leak is visible, find and eliminate the problem.

5.6 Turning On the System

Preparations

1. Verify that any shipping locks have been properly loosened or removed.

NOTICE—System damage

Shipping locks must be properly loosened or removed before operation to avoid damage to the system.

2. Lock the system base (see [Locking the System Base](#) (▶ page 46)).
3. Verify that the chromatography software is installed on the data system computer. When the power is turned on, the required USB drivers are automatically found and the Windows™ operating system can detect the system modules.

Follow these steps

1. Turn on each system module with its main power switch. Verify that the autosampler is turned on before the pump flow is on and pressure builds up.
2. Turn on the system power by pressing the lower push button on the front left of the system base (system power button).

TIP Turn a module off with the main power switch, when instructed to do so, for example, during maintenance. Pressing the system power button will not be sufficient to turn off the power to the module completely.

See also

 [Power On/Off Control](#) (▶ page 78)

5.7 Setting Up the System in the Software

This section describes the basic steps for setting up the Vanquish Access system with the Chromeleon 7 software.

Preparations

1. Verify that the Chromeleon software is installed on the data system computer and a valid license is available.
2. Verify that all modules of the Vanquish Access system are connected to the data system computer via USB. See [USB Connections](#) (▶ page 50).
3. Verify that all modules of the Vanquish Access system are connected to each other via system interlink. See [System Interlink Connections](#) (▶ page 52).
4. The Vanquish Access driver package is required to control the system. For details on the supported Chromeleon versions and download, refer to the *Release Notes* for the driver package.

Installing the Driver Package

1. Run the following program from the distributed installer package: Thermo.Chromeleon.Vanquish.Access.Driver.01.00.00.msi.
2. Perform a Chromeleon Station IQ to verify correct installation.

For details, refer to the *Release Notes* for the Vanquish Access driver package.

Loading USB Drivers

1. Turn on the data system computer if it is not yet already on.
2. Turn on all system modules.
Windows will automatically detect the new devices and perform the USB installation. If Windows fails to detect the devices and launches a wizard instead, this indicates that you connected the devices to the computer and turned on the power for the first time *before* you installed the Chromeleon software. In this case, cancel the wizard, install the software, and then repeat the steps.
3. Proceed to next section.

Starting the Instrument Controller and Instrument Configuration Manager

TIP In order to start the Chromeleon Instrument Controller, you must log on under Windows with local administrator privileges, or as a member of the **Windows Chromeleon Operators** user group.

1. Start the Chromeleon Instrument Controller.
Right-click the Chromeleon tray icon on the Windows taskbar (the icon is crossed out in red) and click **Start Chromeleon Instrument Controller**. The icon changes to gold, indicating that the Instrument Controller Service is starting. The icon changes to gray when the Instrument Controller Service is running (idle).

If the Chromeleon tray icon is not available on the Windows taskbar, click **Start > All Programs** (or **Programs**, depending on the operating system) > **Thermo Chromeleon 7 > Services Manager > Start Instrument Controller**.
2. Start the Chromeleon 7 Instrument Configuration Manager.
Click **Start > All Programs** (or **Programs**, depending on the operating system) > **Thermo Chromeleon 7 > Instrument Configuration Manager**.
3. Proceed to next section.

Adding the Vanquish Access System

1. On the **Edit** menu, click **Add Instrument** to add a new instrument (system).
2. Select the new instrument and click **Add Module** on the **Edit** menu to add the first module.
3. In the **Add module to instrument** dialog box, on the **Manufacturers** list, select **Thermo Scientific > HPLC: Vanquish Access** and on the **Modules** list, select the module you want to add, for example, **Vanquish Access Quaternary Pump**. Repeat this step for each module of the system. Note that the system can be operated only if all four modules have been configured.

TIP With Chromeleon 7.2.10 MUg and lower and Chromeleon 7.3.1, select **Thermo Scientific** and then select the modules on the **Modules** list.

4. On the **General** configuration page for each module, make sure that simulation mode is deactivated and click **Browse** to select the module address.

The Chromeleon software connects to the module and transfers the settings from the device firmware to the software. Check and change the settings on the other configuration pages if necessary. For information about the settings, click **Help** or press the **F1** key.

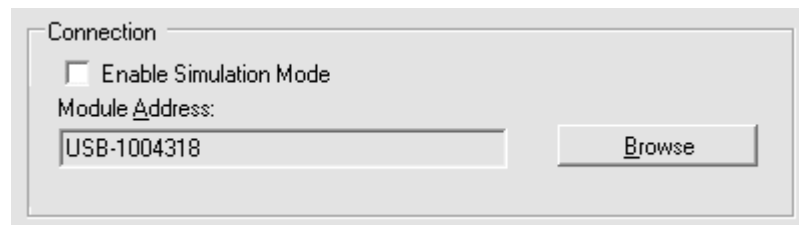


Figure 21: Software configuration: select module address (here: pump)

5. On the **File** menu, click **Save Installation** and then close the Instrument Configuration Manager.

5.8 Flushing the System after Installation

This section describes how to flush the Vanquish Access system after installation. As certain system components are filled with isopropanol during shipment, flushing is required before the system can be operated. Use solvents that are miscible with isopropanol.

5.8.1 Flushing the System without Column or Flow Cell

NOTICE

To avoid damage to other modules in the Vanquish Access system, verify the following before you begin:

- No flow cell is connected to the flow path.
- No column is connected to the flow path.

1. Purge the pump.
2. Have the pump deliver the solvent used for purging for a short time.
3. Proceed to next flushing step. See [Flushing the System with Column Installed](#) (▶ page 69).

5.8.2 Flushing the System with Column Installed

Flush the system again for a short time after connecting the column with a solvent suitable for your application.

Follow these steps

1. Change the flow connections of the column compartment for normal operation and replace the Viper union with the column.
Note The free end of the column outlet/detector inlet capillary remains guided to waste.

NOTICE

To avoid damage to other modules in the Vanquish Access system, verify the following before you begin:

The flow cell is not connected to the flow path.

2. Have the pump deliver the solvent for a short time. Observe the pressure limit and other properties of the column.
3. Proceed to next flushing step. See [Flushing the System with Column and Flow Cell Installed](#) (▶ page 70).

5.8.3 Flushing the System with Column and Flow Cell Installed

NOTICE

When operating the detector with a flow cell that was stored, the flow cell may be filled with solvent. Use solvents that are miscible with this solvent, or use an appropriate intermediate solvent. New flow cells are dry or filled with isopropanol when shipped.

1. Observe the guidelines for flow cells in the *Operating Manual* of your detector.
2. Install the flow cell, if not already done, connect the column outlet/detector inlet capillary and the detector waste line to the flow cell. For details, refer to the *Operating Manual* of your detector.
3. Guide the detector waste line to the detector waste outlet in the system base. See [Installing the Detector Waste Line](#) (▶ page 70). The flow and waste connections are now set up for normal operation (see [Flow Connections Overview](#) (▶ page 73)).
4. Flush the detector with flow from the pump.

5.8.3.1 Installing the Detector Waste Line

Parts required

- Detector waste line

TIP The detector waste line connects the flow cell outlet through the detector waste outlet to the waste.

- For instructions on how to connect the waste line through the detector waste outlet to the waste, follow the steps below.
- For instructions on how to connect the waste line from the flow cell outlet, refer to the operating manual of the detector.

- Suitable waste container

Follow these steps

1. Locate the outlet for the detector waste line in the system base (see figure below).
2. Route the waste line through the detector waste outlet.

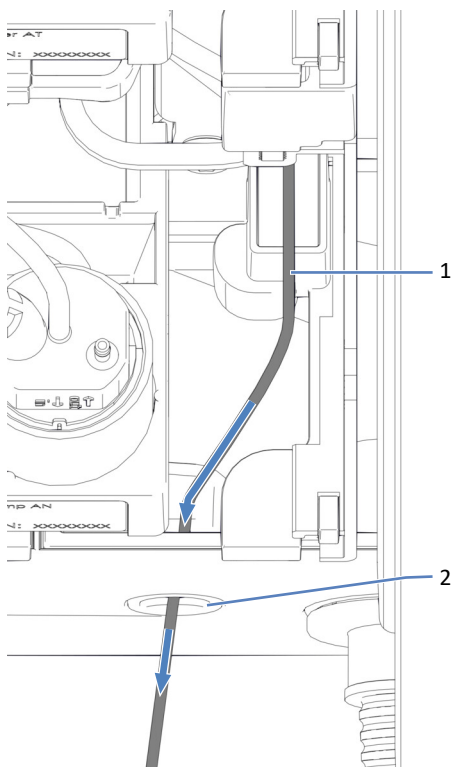


Figure 22: Routing the detector waste line through the detector waste outlet

No.	Description
1	Detector waste line
2	Detector waste outlet

3. Route the free end of the waste line into a waste container.
4. Ensure proper drainage of the waste from the detector. You may need to cut the waste line to length.
5. Ensure proper drainage of waste (see next section).

Ensuring Proper Drainage of Waste

1. Position the waste container below the level of the system stack. To prevent solvent vapors from evaporating back into the system, make sure that the distance is sufficient.
2. Make sure the detector waste line is neither bent nor pinched.

3. To prevent liquid from flowing back into the system, the entire detector waste line must remain below the drain port. Avoid the formation of siphons.
4. To allow the waste liquid flowing off properly and avoid liquid accumulation in the system base, the end of the waste line must not be submerged in waste liquid (see figure below):
 - a) Shorten the waste line if required.
 - b) Observe the liquid level in the waste container and empty the waste container as necessary.

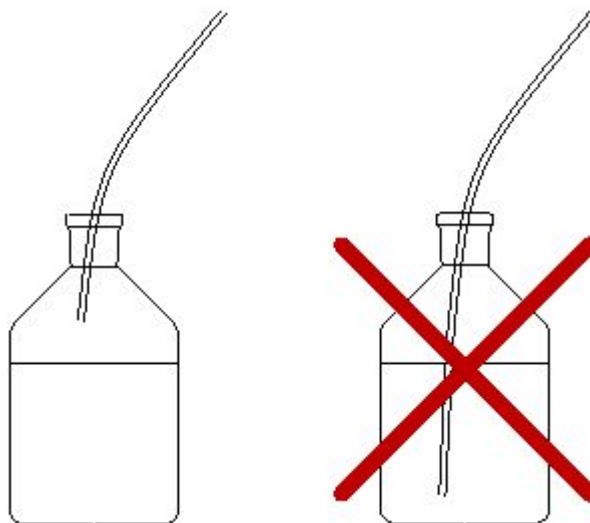


Figure 23: Free end of drain tubing in waste container

5.8.3.2 Flow Connections Overview

The pictures illustrate the flow paths through the system for normal operation.

Solvent and wash flow paths



Figure 24: Solvent and wash flow connections in the Vanquish Access system

No.	Description
1	Seal wash line
2	Needle wash line
3	Solvent lines
4	Column outlet/detector inlet capillary
5	Column inlet capillary
6	Capillary connecting the pump and the autosampler

Waste flow path

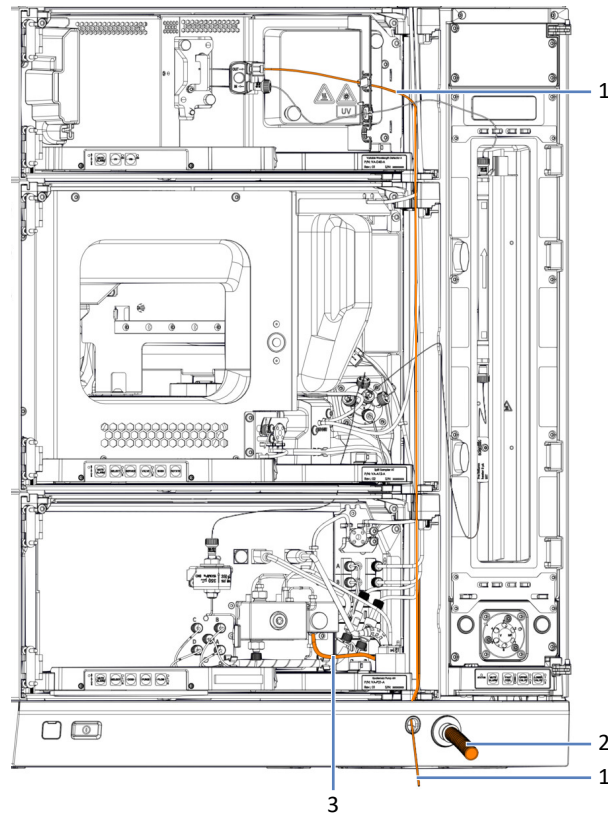


Figure 25: Waste flow connections in the Vanquish Access system

No.	Description
1	Detector waste line
2	System drain tubing
3	Waste line from purge unit

6 Operation

This chapter provides information for routine operation and for shutdown.

6.1 Introduction to this Chapter

The information in this chapter assumes that the initial setup of the system has already been completed. If this is not the case, refer to the instructions in [Installation](#) (▶ page 35).

6.2 Safety Guidelines for Operation

When operating the system, pay attention to the following safety guidelines:



Observe all warning messages and precautionary statements presented in [Safety Precautions](#) (► page 19).



Observe all warning messages and precautionary statements presented in the *Safety Guidelines for Operation* section in the *Operating Manual* for the individual modules of the Vanquish Access system.

NOTICE

Pay attention also to the following guidelines:

- To prevent damage resulting from leakage or from running the pump dry, always set the lower pressure limit for the pump.
- If there is evidence of leakage in the device, turn off the pump flow and remedy the situation immediately.
- If the pump flow is interrupted, act appropriately to protect the components in the detector. For details, refer to the *Operating Manual* for the detector.
- Always verify that the autosampler is turned on before the pump flow is on and pressure builds up. If the autosampler is turned off, for example, after a power failure, stop the pump flow and wait until the pressure is down to zero before turning on the autosampler or other modules again.

6.3 Power On/Off Control

For easier handling, you can use the power button on the front left of the Vanquish Access system base (system power button) for power on/off.

Observe the following:

- All modules in the Vanquish Access system that are connected to the system base via system interlink cables are turned on or off simultaneously when the system power button is pressed.
- When the power is on, the system power button is pressed in. When the power is off, the system power button stands out.
- If the main power switch on a device is off, you cannot turn on the device with the system power button.
- To turn off a device completely, you *have to* turn it off with the main power switch on the device. Pressing the system power button will not be sufficient to turn off the power to the device completely.

6.4 Preparing the System for Operation

This section gives information on any additional steps that are required to prepare the Vanquish Access system for operation and sample analysis.

Before Operating the System for the First Time

NOTICE

Flush the system flow path thoroughly before operating the system for the first time. For details, see [Flushing the System after Installation](#) (▶ page 69).

- Perform a wavelength validation. For details, refer to the *Vanquish Access Variable Wavelength Detector Operating Manual*.

Before Starting Sample Analysis

- Check the liquid level in the solvent reservoirs. Verify that the amount of solvent is sufficient for the analysis.
- Check the liquid level in the needle wash and seal wash reservoirs. Make sure that the amount of wash liquid is sufficient for the analysis.
- Load the autosampler carousel with sample racks, sample containers and vials as required. For details, refer to the *Vanquish Access Autosampler Operating Manual*.
- Set the rack types in the chromatography data system. For details, refer to the *Vanquish Access Autosampler Operating Manual*.

TIP Before starting a sample or sequence, verify that the rack types set in the chromatography data system match the rack types in the sample compartment.

- Verify that the insulation loop cover of the autosampler is installed.
- Close the doors of all modules in the Vanquish Access system, if not already done.
- Purge the needle wash system to fill the wash port with fresh needle wash liquid by selecting the **Purge Needle Wash** button the ePanel for the autosampler.
- Make sure that the chromatography system is properly equilibrated (see further down).

System Equilibration

System equilibration should include the following operations:

- Purging the pump (*all* channels, including those not used for the application)
- Flushing the entire chromatography system with the starting solvent to rinse out any solvent from a previous analysis run
- Warming up (or cooling down) all temperature-controlled devices in the system to the starting temperature. Temperature-controlled devices can be, for example
 - ◆ Column compartment
 - ◆ Sample compartment thermostating in the autosampler
- Turning on the lamp (or lamps) in the UV/VIS detector
- Monitoring the pump pressure and pressure ripple and checking that the pressure is stable and the ripple within reasonable limits for the application
- Monitoring the detector signal and checking whether the detector signal is stable so that the drift and signal noise are within reasonable limits for the application
- Performing an autozero of the detector baseline

TIP The Chromeleon software supports procedures for automatically starting a chromatography system in the software (**Smart Startup**). The startup procedure includes the operations for system equilibration. For details, refer to the *Chromeleon Help*.

6.5 Use of Solvents and Additives

Particles entering the chromatography system can block capillaries and valves, increase wear, and damage the column or system. Especially with aqueous solvents, algae and other microorganisms can grow and deposit in the system and block the solvent line filters. Blocked capillaries or filters can cause increased or unstable system pressure.

For optimum performance of the chromatography system, observe the following guidelines:

Solvent Quality and Filtration

- Use high-quality high-purity solvents (filtered) and additives as required by the application, for example, UHPLC-grade or LC/MS-grade. Filtered high-purity solvents are usually labeled accordingly by the vendor.
- Use high-quality water for example, UHPLC-grade or LC/MS-grade (0.2 µm filtered).
- When you use water from water purification systems, polymeric contamination may occur if the purification system is not maintained properly.
- When preparing salt solutions or buffers and preparation is complete, use membrane filtration (0.2 µm) to remove any particulate matter and to reduce microbial growth.
- Use fresh solvents at regular intervals. Avoid adding up (refreshing) solvents. With premixed solvents, be especially sure that they are properly prepared and fresh.
- Always use the appropriate solvent line filters as recommended by Thermo Fisher Scientific. Check the filters for permeability at regular intervals and replace them as necessary.
- For best seal performance, do not recycle or recirculate solvents.
- Note the special properties of the solvents, such as viscosity, boiling point, or UV absorption.

Solvent Reservoirs

- Before filling a solvent reservoir, rinse the reservoir thoroughly with a high-purity solvent.
- To reduce the growth of algae, consider using amber glassware or using appropriate additives, for example, formic acid.
- Avoid using methanol from aluminum reservoirs.

Flushing for switching between reversed-phase and normal-phase modes

The system can be used for reversed-phase (RP) and normal-phase (NP) applications. Before switching modes, flush the system. See [Switching between Reversed-Phase and Normal-Phase Modes](#) (▶ page 83).

Flushing after Operation

- Flush out buffers and solutions that form peroxides.
- Never leave buffers, salt solutions, or aggressive solvents in the system for a longer period without flow.
- Before you change from a buffer or salt solution to organic solution, flush the system thoroughly with de-ionized water.
- Before you change solvents, make sure that the new solvent is miscible with the previous solvent. If the solvents are not miscible, flocculation may occur.
Mix immiscible solvents with an intermediate solvent to replace them step by step. For example, use isopropanol.

6.6 Switching between Reversed-Phase and Normal-Phase Modes

The system can be used for reversed-phase (RP) applications and normal-phase (NP) applications. Before switching modes, flush the system.

Switching from RP to NP mode

1. Flush the system with water.
2. Flush the system with isopropanol.

Switching from NP to RP mode

Flush the system with isopropanol.

6.7 Operating the System from the Software

This section describes the basic steps for operating the Vanquish Access system with the Chromeleon software. For additional information, refer to the Help and documents provided with the software that you are using.

6.7.1 Starting the Instrument Controller and Client

1. Start the Chromeleon Instrument Controller.
Right-click the Chromeleon tray icon on the Windows taskbar (the icon is crossed out in red) and click **Start Chromeleon Instrument Controller**. The icon changes to gold, indicating that the Instrument Controller Service is starting. The icon changes to gray when the Instrument Controller Service is running (idle).

If the Chromeleon tray icon is not available on the Windows taskbar, click the **Start** button, then select **Thermo Chromeleon 7 > Services Manager > Start Instrument Controller**.
2. Start the Chromeleon 7 client.
Click the **Start** button, then select **Chromeleon 7**.

6.7.2 Controlling the System from the ePanel Set

When the chromatography system is not running an automated analysis, you can control the system modules from the ePanel Set. Use the ePanel Set to view status information and perform commands.

To access the ePanel Set:

1. On the **Console**, click the **Instruments** Category Bar.
2. In the Navigation Pane, click the instrument that you want to control.
The Chromeleon software connects to the instrument and displays the ePanel Set.

The ePanel Set opens to the **Home** panel, which shows basic status information about each module in the system and provides access to the instrument Audit Trail.

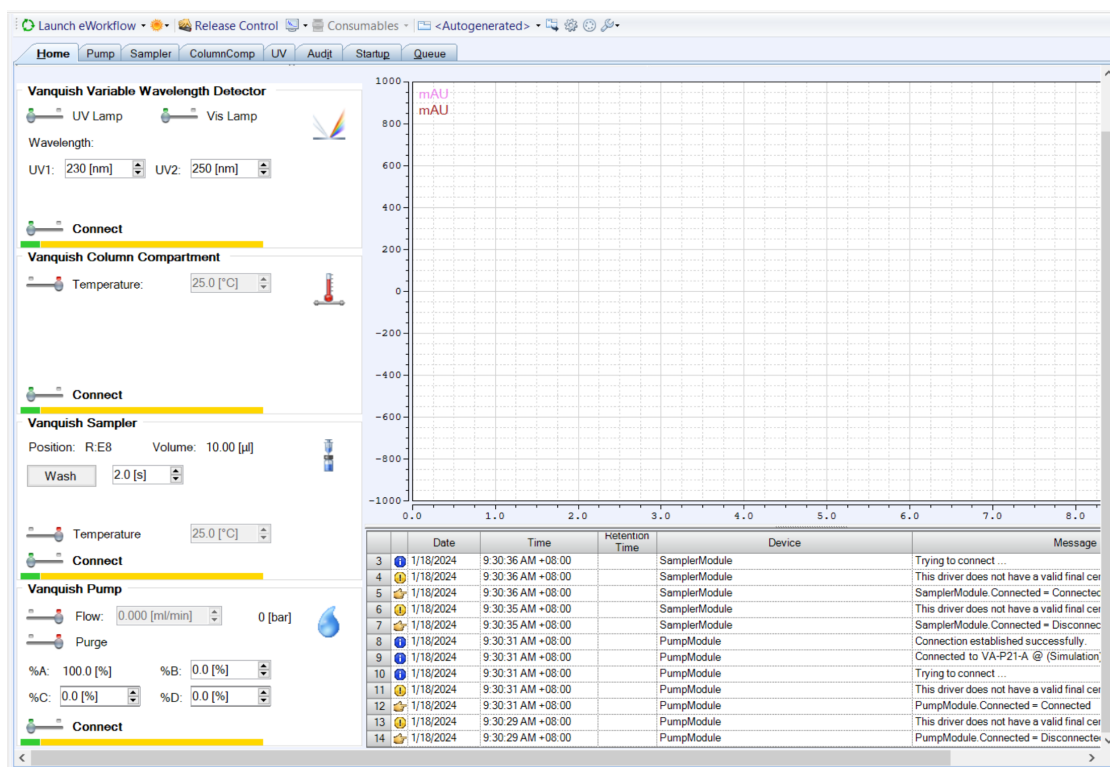


Figure 26: Chromeleon 7 ePanel for a Vanquish Access system (example)

3. On the ePanel Set, click the tab for a module.
4. Use the controls (for example, buttons, sliders) to perform commands.
5. If a function that you want to perform is not available on a panel, press the **F8** key to open the **Command** window. From this window, you can access all commands that are available for the system.

TIP

The commands and parameters that are available in the **Command** window may vary, depending on the user level in the **Command** window (**Normal**, **Advanced**, or **Expert**). To change the user level, right-click in the commands list and select a different user level.

6.7.3 Monitoring the Baseline

When an instrument is idle, you can monitor the baseline signals without starting a sequence. During baseline monitoring, the monitored signals are displayed on the real-time signal plot on the ePanel for the module. You may have to add the signal to the plot in the Plot Properties (for details, refer to the *Help*).

To monitor the baseline signals:

1. Open the ePanel Set.
2. On the toolbar above the ePanel Set, click **Monitor Baseline**:



Figure 27: Monitor Baseline icon

3. In the **Select Channels to Monitor** dialog box, select the signals that you want to monitor.
4. To stop monitoring the baseline, click **Stop** on the toolbar.

TIP

Monitor baseline data is overwritten each time baseline monitoring is started. If you want to save the data permanently, define the location in the **Monitor Baseline Save Preferences** dialog box. For details, refer to the *Help*.

6.7.4 Running Automated Sample Analysis

Automated sample analysis with the chromatography system involves creating and running a sequence. In a sequence, you determine how the injections of a sample are analyzed and in which order they are processed. Each injection of a sequence is processed by using an instrument method, which defines the property values and timed control commands for each module. For details how to create an instrument method using the Instrument Method Wizard, refer to the *Help*.

Chromeleon 7 supports several methods for creating a new sequence. The most important are:

TIP

If no eWorkflows are available, you can create a new eWorkflow as described in the *Help*. As an alternative, use the Sequence Wizard to create the sequence.

- eWorkflows (preferred method)
eWorkflows provide a set of predefined templates and rules for creating a new sequence.
- Sequence Wizard

Creating a Sequence via eWorkflows

1. On the **Console**, click the **eWorkflows** Category Bar.
2. In the **Navigation Pane**, click the eWorkflow name.
3. In the Work Area, click the instrument name, and then click **Launch**.
4. The eWorkflow Wizard guides you through the process. Complete the steps in the wizard. For detailed information about a wizard page, click the Help icon.
After you finish the wizard, the sequence is displayed in the Data view of the **Console**.

Creating a Sequence via Sequence Wizard

1. On the **Console** menu bar, click **Create > Sequence**.
2. The Sequence Wizard guides you through the process. Complete the steps in the wizard. Specify the number of samples and/or standards, the instrument method, processing method, and report template that you want to use. For detailed information about a wizard page, click the Help icon.
After you finish the wizard, the sequence is displayed in the Data view of the **Console**.

Starting the new sequence

For details how to control sequences, assign them to instruments, start the sequence run, and manage queues, refer to the *Chromeleon Help*.

6.8 Shutting Down the System

If the system will not be operated for some time, observe the general guidelines outlined below.

6.8.1 Interrupting Operation of the System for a Short Period

To interrupt operation of the system for a short period (short-term shutdown), for example, overnight, observe these guidelines for the Vanquish Access system modules, as required by your system arrangement:

- For your UV/VIS detector, note the following:
 - ◆ The lamp(s) in the detector can remain turned on.
 - ◆ The shutter can be moved to a closed position for protection of the flow cell.
- Apply a flow of 0.05 mL/min and have the pump deliver an appropriate solvent.
Check the lower pressure limit for the pump and adapt the value if necessary. If the pressure falls below the lower limit, the pump stops the flow.
- Set the injection valve in the autosampler to the Inject position.
- Make sure that the temperature of the column does not exceed 40 °C.
- When resuming operation, let the flow equilibrate and verify that the operating parameters for the other system modules are set as required before proceeding.

TIP The Chromeleon software provides procedures for automatically preparing the chromatography system for shutdown. The procedures include, for example, operations for reducing the flow rate, reducing the temperature in temperature-controlled devices, and turning off the detector lamps. For information about **Smart Shutdown** and **Smart Standby**, refer to the *Chromeleon Help*.

6.8.2 Interrupting Operation of the System for a Longer Period

To interrupt operation of the system for a longer period, follow the instructions below.

Preparations for flushing the system

1. Set the injection valve to **Inject** position if the valve is not yet in this position.
2. Turn off all lamps.
3. Stop the pump flow.
4. Remove the column from the flow path and replace it by a union connector (for example, the Viper union from the system ship kit)

Flushing the system

1. Restart the pump flow and flush the system with an appropriate solvent (minimum HPLC-grade). Observe the following:

Situation after Shutdown	If no additive is used	If an additive is used
If using reversed-phase (RP) compatible solvents and additives:		
System remains in the laboratory after shutdown	Flush the system, for example with methanol. 100% acetonitrile should not be used.	Flush the system with several volumes of methanol and water (50:50) (for example, 1.0 mL/min for 10 minutes with the standard system) to prevent salt buildup in the fluidics. If the solvents in the device are not miscible with water, use an appropriate intermediate solvent.
System shall be transported or shipped after shutdown	Flush the system with isopropanol.	Flush the system first with several volumes of methanol and water (50:50) (for example, 1.0 mL/min for 10 minutes with the standard system) to prevent salt buildup in the fluidics. If the solvents in the device are not miscible with water, use an appropriate intermediate solvent. Afterward, flush the system with isopropanol.

Situation after Shutdown	If no additive is used	If an additive is used
If using normal-phase (NP) compatible solvents and additives:		
System remains in the laboratory or shall be transported or shipped	Flush the system, for example with isopropanol. 100% acetonitrile should not be used.	Flushing liquids should be minimum HPLC-grade. 1. Flush the system with several volumes of an appropriate pure solvent with a flow rate of 1.0 mL/min for 10 minutes. 2. Flush the system with isopropanol.

NOTICE

Residual samples, impurities from the column or buffers with high salt concentrations can deposit in the flow cell. This can lead to damage of the flow cell. In addition, solvents containing acid can damage the flow cell.

- Always flush the flow cell with an appropriate solvent before interrupting operation.
- Fill the flow cell with pure isopropanol using the flushing and injection kit.
- The flow cell should *not* be filled with pure water to avoid the growth of algae. If you want to fill the flow cell with water, you need to add 10% HPLC-grade isopropanol.

2. Set the injection valve to **Bypass** position.
3. Turn off the pump flow and wait until the system pressure is down to zero.
4. *If the system shall be transported or shipped after shutdown:* Flush the needle wash system with an organic needle wash liquid, such as isopropanol, to avoid organic growth in the needle wash system.
5. Remove any sample racks and sample containers from the sample compartment.
Verify that the autosampler has been cleaned and/or decontaminated from condensation or spilled samples.
6. *If the system shall be transported or shipped after shutdown:* Secure the needle unit (refer to the *Securing the Needle Unit* section in the *Vanquish Access Autosampler Operating Manual*).
7. Install the insulation loop cover (refer to the *Installing the Insulation Loop Cover* section in the *Vanquish Access Autosampler Operating Manual*).

Disconnecting the detector flow connections

1. Disconnect the capillaries from the flow cell inlet and outlet.
2. On the flow cell, protect the inlet and outlet ports with the plugs supplied with the flow cell.
3. Protect the inlet capillary with caps.

Disconnecting the Solvent Lines

1. Unscrew the caps of the solvent reservoirs.
2. Together with the caps, remove the solvent lines from the reservoirs.
3. Protect the solvent line filters from contamination as appropriate.
4. Empty the solvent lines. Refer to the *Emptying the Solvent Lines* section in the *operating manual* of the pump.
5. Disconnect the solvent lines on the pump inlets.
6. Close the pump inlets with appropriate plugs.

Emptying the Seal Wash System

1. Unscrew the cap of the seal wash reservoir.
2. Together with the cap, remove the seal wash line from the seal wash reservoir.
3. Remove the peristaltic tubing from the seal wash pump. When the tubing is removed, any liquid that may be present in the seal wash line, flows off to waste.

Turning off the system

1. The step depends on the situation:

Situation	Steps
All system modules remain in the system stack and are to be turned off	Turn off the system with the system power button on the system base.
One of the modules shall be removed from the system stack	Turn off <i>all</i> system modules with their main power switch. Pressing the system power button will not be sufficient to turn off the power to a device completely.
If the system shall be transported or shipped after shutdown	<ol style="list-style-type: none"> 1. Turn off the system with the system power button on the system base. 2. Turn off all system modules with their main power switch. 3. Follow the instructions in Transporting or Shipping the System (► page 102).

6.8.3 Restart after Long-Term Shutdown

To restart the device after a long-term shutdown, follow these steps:

1. Prepare and restart all modules in the system, following the instructions in the *Operating Manuals* for the modules. Pay special attention to the *Preparing the Module for Operation* section.
2. Turn on the system as follows:

Situation	Steps
All system modules remained in the system stack and were turned off	Turn on the system with the system power button on the system base.
One of the modules was removed from the system stack	Turn on all system modules with their main power switch.
The system was transported or shipped	<ol style="list-style-type: none">1. Turn on all system modules with their main power switch.2. Turn on the system with the system power button on the system base.

3. If not already done, turn on the system power button on the system base.
4. Before starting an analysis, let the system equilibrate and be sure that it is ready for operation. See [Preparing the System for Operation](#) (▶ page 79).

7 Maintenance and Service

This chapter gives general guidelines on maintenance and transport of the system.

7.1 Introduction to Maintenance and Service

This chapter describes the routine maintenance that the user may perform for the system.



Additional maintenance or service procedures must be performed only by service personnel certified by Thermo Fisher Scientific (for brevity, referred to as Thermo Fisher Scientific service personnel).

7.2 Safety Guidelines for Maintenance and Service

When performing maintenance or service procedures, pay attention to the following safety guidelines:



Observe all warning messages and precautionary statements presented in [Safety Precautions](#) (▶ page 19).



WARNING—High Voltage

High voltages are present inside the device that could cause an electric shock.

Do not open the housing or remove protective panels unless specifically instructed to do so in this manual.



WARNING—Escape of Hazardous Substances from Flow Connections

Flow and capillary connections can be filled with substances that can pose health risks. Solvent can spray when capillaries burst, slip out of their fittings, or are not properly tightened or when capillary connections are otherwise open.

Wear appropriate protective equipment and follow good laboratory practice.



WARNING—Tilting Liquid Reservoirs

Liquids in the reservoirs on the solvent rack might contain harmful substances. Spilling of these substances can pose health and safety risks.

To prevent the reservoirs from tilting, be careful not to pull on the liquid lines when performing maintenance.



CAUTION—Spraying Solvent

Solvents can spray when under high pressure.

- Stop the pump flow prior to opening the flow path.
- Wait until the system pressure is down to zero.
- When opening the flow path, wear appropriate protective equipment.

**CAUTION—Hot Surfaces**

Surfaces inside the system may become hot during operation. Touching hot parts might cause burns.

Allow hot surfaces to cool down before starting replacement or maintenance procedures.

**CAUTION—Hydrostatic Pressure**

Solvent may spill when you open the flow path. This is due to hydrostatic pressure in the system when the solvent reservoirs are located above the pump outlet. Before you loosen a connection in the flow path:

- Turn off the pump flow and wait until the system pressure is down to zero.
- Unscrew the caps of the solvent reservoirs and remove the solvent lines together with the caps from the reservoirs.
- Empty the solvent lines. Refer to the *Operating Manual* for the pump.
- Retighten the reservoir caps.

**CAUTION—Electric Shock or Damage to the Device**

After the power to the device is turned off, the device is still energized as long as the power cord is connected. Repair work on the device while the device is connected to power could lead to personal injury.

- Always unplug the power cord before starting repair work inside the device.
- If you were instructed to remove any housing covers or panels, do not connect the power cord to the device while the cover or panels are removed.

**CAUTION—System Stack Stability**

The Vanquish Access system configuration follows a defined stack arrangement. Modifying the system stack arrangement may impair the system stability or damage the system.

Do not change the system configuration or the height of the system stack.

NOTICE—Damage to Doors

The doors of the pump, autosampler and detector are fixed with screws and cannot be removed by the customer. To prevent the doors from being damaged, be careful when opening and closing the doors. Keep the required system clearance.

TIP When the power is turned off to the autosampler, the front door of the autosampler is opened automatically for proper ventilation of the sample compartment and cannot be closed while the power is turned off.

7.3 General Rules for Maintenance and Service

For successful maintenance and service procedures, follow the rules and recommendations below.

General Rules

- Use only the replacement parts specifically authorized and qualified for the device by Thermo Fisher Scientific.

Opening Flow Path Connections

- Before opening the flow path to replace capillaries in the system, turn off the pump flow and wait until the system pressure is down to zero.
- Dirty components can contaminate the chromatography system. Contamination leads to poor performance of the modules and entire system or can even cause damage to the modules and system. Therefore:
 - ◆ Always wear appropriate gloves.
 - ◆ Place the components only on a clean, lint-free surface.
 - ◆ Keep your tools clean.
 - ◆ Use only lint-free cloth for cleaning.

Depot Repair

- If you need to return a system module for depot repair, follow the instructions in [Transporting or Shipping the System](#) (▶ page 102).

See also

- 📄 [Consumables and Replacement Parts](#) (▶ page 129)

7.4 Routine and Preventive Maintenance

Optimum system performance, maximum uptime of the system, and accurate results can be obtained only if the system is in good condition and properly maintained.

7.4.1 Maintenance Plan

Perform the maintenance procedures in the table on a regular basis. The frequency given in the table is a suggestion. The optimum frequency for maintenance depends on several factors, such as the types and amounts of samples and solvents used with the system.

Frequency	What you should do...
Daily	<ul style="list-style-type: none"> • Inspect the flow connections for signs of leakage or blockage. • When you use buffers or salt solutions, flush the system thoroughly after use with an appropriate solvent that does not contain buffers or salts.
Regularly	<ul style="list-style-type: none"> • Solvent line filters: The following tasks are especially important when using aqueous solvents. Aqueous solvents may contaminate the filters with algae and other microorganisms that deposit on the filters. <ul style="list-style-type: none"> ◆ Check the filters for permeability. ◆ Replace the filters at regular intervals. ◆ Replace the solvents at regular intervals. ◆ Rinse the reservoirs thoroughly before refilling them. • Empty the waste container or containers. • Inspect the flow connections for damage, such as cracks, nicks, cuts, or blockage. • Check the drain system for blockage (see Testing the Drain System (▶ page 64)). If a leak alarm is triggered or if a leak is visible, find and eliminate the blockage. • Clean the system (see Cleaning or Decontaminating the System (▶ page 100)). • Check that all warning labels are still present on the system and clearly legible. If they are not, contact Thermo Fisher Scientific for replacement.
Annually	Have Thermo Fisher Scientific service personnel perform preventive maintenance once a year.

7.4.2 Cleaning or Decontaminating the System

Cleaning and decontamination must be performed by qualified personnel wearing suitable personal protective equipment. Always observe national and local regulations.

NOTICE

Wipe up all liquids spilled onto the system immediately. If surfaces are exposed for longer periods, these liquids can cause damage.

Decontamination

Decontamination is required, for example, when leakage or spillage has occurred, or before service or transport of the system. Use a suitable cleaning detergent or disinfectant to ensure that the treatment renders the system safe to handle.

Parts required

- Suitable cleaning detergent (or disinfectant)
- Purified water
- Lint-free cloths or wipes



CAUTION—Explosive Gas Mixtures from Alcoholic Cleaning Detergents

Alcohol-containing cleaning detergents may form flammable and explosive gas mixtures with air.

- Use such cleaning detergents only when required and only in adequately ventilated rooms.
- Avoid open flames or exposure to excessive heat during the cleaning process.
- Wipe the cleaned components thoroughly dry after cleaning. Do not operate the device before it is completely dry.

NOTICE

Observe the following:

- Only use cleaning detergents that will not damage the surfaces of the system.
- Never use sharp tools or brushes for cleaning any surfaces.
- Do not use sprays for cleaning.
- Prevent cleaning detergent from entering the flow path.
- Do not use excessively wetted cloth or wipes for cleaning. Prevent any liquids from entering the functional components of the device. Liquids can cause a short circuit when getting in contact with the electronic components.

Preparations

1. Turn off the power to the system and disconnect the power cord from the power source.

Follow these steps

1. Wipe the surfaces clean with a clean, dry, soft, lint-free cloth or wipe. If necessary, slightly dampen the cloth or wipe with a solution of lukewarm water and a suitable cleaning detergent.
2. Allow the cleaning detergent to react as recommended by the manufacturer.
3. Wipe the cleaned surfaces with purified water to ensure that all cleaning detergent residues have been removed.
4. Wipe the surfaces dry using a soft, lint-free cloth or wipe.

7.5 Transporting or Shipping the System

If you want to transport the system to a new location or if you need to ship the system, first prepare the system for transport, dismantle the system stack, and then move or ship the system as required. Follow the instructions in this section.

NOTICE

Moving the system stack even over short distances on the workbench can damage and impair the functionality of the system base. Observe the following:

Before moving the system stack, unlock the system base using the locking tools.

7.5.1 Dismounting the System Stack

Preparations

1. Perform a long-term shut down of the device (see [Shutting Down the System](#) (▶ page 88)).
2. Turn off all modules with their main power switch.
3. Remove the solvent reservoirs and solvent lines from the solvent rack.
4. Remove all flow connections between the modules within the Vanquish Access system and all waste lines.
5. Remove all signal cables and power cords.
6. Lift the front part of the solvent rack and remove the solvent rack by pulling it towards the front.

Removing the System Modules

1. Grasp the column compartment by its sides and slightly lift it up and out of the grooves on the mounting bars.
2. Remove the detector, autosampler, and pump as described in the next step.
3. Lift the front part of the module by using the carrying handles. Remove the module from the stack towards the front and carefully place it on a stable surface.

7.5.2 Transporting or Shipping System Components and System Modules



CAUTION—Possible Contamination

Hazardous substances may have contaminated the device during operation and may cause personal injury to service personnel.

- Decontaminate all parts of the device that you want to return for repair.
- Fill in and sign the Health and Safety Form. Thermo Fisher Scientific refuses to accept devices for repair if the Health and Safety Form is missing, incompletely filled in, or unsigned.

Shipping solvent rack and system base

To ship the solvent rack and/or system base, follow these steps:

1. Follow the unpacking instructions in this manual in the reverse order.
Use only the original packing material and shipping container. If the original shipping container is not available, appropriate containers and packing material can be ordered from the Thermo Fisher Scientific sales organization.
2. If you need to return the solvent rack or system base to Thermo Fisher Scientific, contact your local Thermo Fisher Scientific support organization for the appropriate procedure.

Transporting or shipping system modules

For details on transporting or shipping the system modules, refer to the *Transporting or Shipping* section in the *Operating Manual* of each module.

8 Troubleshooting

This chapter is a guide to troubleshooting issues that may arise during operation of the system.

8.1 General Information about Troubleshooting

This section gives information about operating issues that might occur during the operation of a Vanquish Access system.

If you are unable to resolve a problem following the instructions given here or if you experience problems that are not covered in this section, contact Thermo Fisher Scientific Technical Support for assistance. See the contact information at the beginning of this manual.

To facilitate device identification, have the serial number and technical name available when communicating with Thermo Fisher Scientific.

Status Indicators

The status indicator LED bar (Light Emitting Diodes) on the front side of each module and the **STATUS** LED on the keypad inside each module provide quick visual feedback on the operational status of the module. If the firmware detects a problem, the status indicators are red.

Instrument Audit Trail Messages

If the device firmware detects a problem, the problem is reported to the chromatography data system.

The chromatography data system logs information about all events related to instrument operation for the current day in an Instrument Audit Trail. The Instrument Audit Trail is named with the current date, using the format `yyyymmdd`. For example, the Instrument Audit Trail for May 15, 2023, is named `20230515`.

The Instrument Audit Trails can be found on the ePanel Set (Audit ePanel). In addition, Audit Trails for each instrument are available in the Chromeleon 7 Console Data view, in the folder of the instrument.

Messages in the Instrument Audit Trail may be preceded by an icon. The icon identifies the seriousness of the problem. For possible causes and recommended remedial actions, see the *Messages* section in the operating manual of the module that is in error state.

8.2 System Troubleshooting

This section is a guide to troubleshooting issues that may arise during operation of the Vanquish Access system.

Locate the tables in the following sections for the type of symptom you have, find the possible cause, and use the description of the solution to help you solve your problem quickly.

This section provides information on symptoms and causes directly related to the Vanquish Access system modules and connections between the modules. For information on general chromatography and application troubleshooting, refer to the technical literature.

8.2.1 Peak Shape

Peak tailing

Possible Cause	Remedial Action
Extra column volume too large	Use short capillary connections with a suitable inner diameter. Use appropriate Viper capillaries.
Improper capillary connections	Check fittings for correct placement. Loosen and retighten Viper fittings (refer to the <i>Viper Installation and Operation Guide</i>). Use only the appropriate fittings (see Connecting Fittings, Capillaries, and Tubing (▶ page 60)).

Peak broadening

Possible Cause	Remedial Action
Detector response time too long and/or data collection rate too low	Select a suitable response time and/or data collection rate.
Capillaries clogged	Replace the capillaries.
Sample loop clogged	Replace the sample loop (refer to <i>Split Sampler Operating Manual</i>).
Solvent selector/ proportioning valve defective	Contact Technical Support.
Extra-column volume too large	<ul style="list-style-type: none"> • If early peaks are broader than later eluting ones, check the capillary I.D. and length, sample loop size, for example. • Use a capillary with a smaller volume for the connection between column compartment and detector.
Temperature gradient in column	Use a pre-heater.

8.2.2 Ghost Peaks, Negative Peaks and Spikes

Ghost peaks

Possible Cause	Remedial Action
Contamination (typically injection unit or column)	Flush the system using an appropriate solvent.
Improper reference wavelength	The sample must not absorb in the range of the reference wavelength. Consider using a method without reference wavelength.
Selected bandwidth too high	Select a lower bandwidth.
Degassing channels contaminated	Purge the pump (all channels) to rinse the degassing channels (refer to <i>Pump Operating Manual</i>).

Negative peaks

Possible Cause	Remedial Action
Improper reference wavelength	The sample must not absorb in the range of the reference wavelength. Consider using a method without reference wavelength.
Wrong polarization of analog output	If you are using analog output, check the analog output polarization.

Spikes

Possible Cause	Remedial Action
Air trapped in flow cell	<ul style="list-style-type: none"> • Check all fluid connections for tightness, in particular in the intake path. • Degas the mobile phase. • Install a restrictor at the flow cell outlet, observing the pressure specification of the respective flow cell and the general guidelines for the flow cell. <p>Note: Excessive backpressure will destroy flow cells!</p>
Particles in flow cell	<ul style="list-style-type: none"> • Flush the system (see Flushing the System with Column and Flow Cell Installed (► page 70)). If you suspect that a capillary is contaminated with particles, in particular between the column and the flow cell, replace the capillary. • Flush the flow cell with different flows if particles are trapped in flow cell. • Check if the column is defective.
UV/VIS lamp old, defective, or not properly installed	Check if the lamp is properly seated. Replace the lamp (refer to <i>Detector Operating Manual</i>).
Electrical interferences from other instruments	Avoid operation of equipment generating strong electric or magnetic fields in close proximity. Do not connect equipment that may cause power disturbances to the same power network used to supply the system.
Column temperature significantly above boiling point of mobile phase	Install a restrictor at the flow cell outlet, observing the pressure specification of the respective flow cell and the general guidelines for the flow cell. Note: Excessive backpressure will destroy flow cells!

8.2.3 Peak Area Precision

Contamination or carry-over

Possible Cause	Remedial Action
Contamination in the system	Flush the system using an appropriate solvent.
Autosampler carry-over	The needle may be contaminated. Wash the needle in the wash port. If carry-over persists, replace the needle seat (refer to <i>Split Sampler Operating Manual</i>).

Environmental conditions

Possible Cause	Remedial Action
Unstable environmental conditions	Make sure that the temperature and air humidity are constant. Use column thermostating. Avoid draft. Use insulation on the capillary from the column compartment to the detector.

Capillary problems

Possible Cause	Remedial Action
Capillary connections not installed properly or not tight, dead volumes in capillary connections	Properly install the capillary connections. Tighten the capillary connections. Replace capillary.

Pump problems

Possible Cause	Remedial Action
Piston seals in pump leaking	Replace the seals (refer to <i>Pump Operating Manual</i>).
Air trapped in pump head	Purge the pump (refer to <i>Pump Operating Manual</i>).
Baseline fluctuations	See subsection "Periodic baseline fluctuations" in Baseline (▶ page 113).
Pump pulsation or flow fluctuations	See subsection "Pressure pulsation or inconstant pressure" in Pressure (▶ page 111).
Irreproducible gradient	Change the gradient. Check the solvent line filters for permeability. Replace the filters if necessary (refer to <i>Pump Operating Manual</i>).

Inappropriate detector settings

Possible Cause	Remedial Action
Improper wavelength, e.g., in a UV spectrum flank	Choose a detection wavelength that is located near the apex of the spectrum.
Detector response time too short	Select a longer response time.
Detector response time too long	Peaks are eventually not separated any more. Select a shorter response time.

Injection volume variation

Possible Cause	Remedial Action
Autosampler draws air from vial	There is not enough amount of sample in the vial, the needle height setting is incorrect, or there are too many replicates.
Air trapped in autosampler flow path	Perform a wash cycle. Check that the injection valve is in Inject position and the flow components of the autosampler are flushed with solvent.
Draw speed too high	Select a lower draw speed.
Gas content of sample too high or saturated	Reduce the draw speed. Degas the sample if possible.
Needle clogged or needle tip deformed	Replace the needle (refer to <i>Split Sampler Operating Manual</i>).
Piston seals in autosampler metering device leaking	Replace the metering device head (refer to <i>Split Sampler Operating Manual</i>).
Injection valve or other autosampler components leaking	Inspect the autosampler and the connections on the injection valve. Tighten leaking connections. Replace leaking parts (refer to <i>Split Sampler Operating Manual</i>).
Needle seat worn out	Replace the needle seat (refer to <i>Split Sampler Operating Manual</i>).

8.2.4 Flow*No flow*

Possible Cause	Remedial Action
Leak in system	Find and eliminate the leak.
Inlet and/or outlet check valve contaminated or defective	Clean the inlet check valve or outlet check valve, and replace the check valve if necessary (refer to <i>Pump Operating Manual</i>).
Air trapped in pump heads	Purge the pump (refer to <i>Pump Operating Manual</i>) and check in the chromatography data system whether the degasser has reached the operating vacuum (Degasser Vacuum = OK).

Possible Cause	Remedial Action
Air trapped in autosampler flow path	Perform a wash cycle (refer to <i>Split Sampler Operating Manual</i>).
Column temperature too high – eluent evaporating	Select a lower column temperature (refer to <i>Column Compartment Operating Manual</i>).

Flow fluctuations

Possible Cause	Remedial Action
Pump inlet path clogged	Check the solvent inlet lines, solvent line filters, and solvent selectors/proportioning valve, for example, for signs of clogging.
Air trapped in pump inlet path	<ul style="list-style-type: none"> • Purge the pump. • Inspect the degasser for indications for leakage. Check in the chromatography data system whether the degasser has reached the operating vacuum (Degasser Vacuum = OK). Degassing may not work properly if the flow rate is too high. • Inspect the capillary and solvent line connections for leakage; tighten loose fitting connections.
Inlet and/or outlet check valve contaminated or defective	Clean the inlet check valve or outlet check valve, and replace the check valve if necessary (refer to <i>Pump Operating Manual</i>).
Piston seals not sealing tightly	Replace the piston seals (refer to <i>Pump Operating Manual</i>).

8.2.5 Pressure

Pressure pulsation or inconstant pressure

Possible Cause	Remedial Action
Air trapped in the system	Purge the pump (refer to <i>Pump Operating Manual</i>).
Inlet and/or outlet check valve contaminated or defective	Clean the inlet check valve or outlet check valve, and replace the check valve if necessary (refer to <i>Pump Operating Manual</i>).
Pump inline filter (or static mixer) clogged	Check the permeability of the inline filter (or static mixer). Replace the inline filter (or static mixer) if necessary (refer to <i>Pump Operating Manual</i>).
Pump head compression values not reached	Check the compression values and take remedial action (refer to <i>Pump Operating Manual</i>).
System clogged with particles	Samples and insufficient solvent purity are frequently the source for particles clogging the system. Follow the instructions for resolving clogging in the autosampler (refer to <i>Split Sampler Operating Manual</i>).
Solvent line filter clogged	Check the solvent line filters for permeability. Replace the filters if necessary (refer to <i>Pump Operating Manual</i>).

High backpressure

Possible Cause	Remedial Action
One or more capillaries in the system clogged or damaged by bending	Check the capillaries in the system systematically from the detector to the pump. Replace the capillaries as needed.
Pump inline filter (or static mixer) clogged	Check the permeability of the inline filter (or static mixer). Replace the inline filter (or static mixer) if necessary (refer to <i>Pump Operating Manual</i>).
Pre-heater clogged	Rinse the pre-heater capillary in reverse direction, using an appropriate solvent. If necessary, replace the pre-heater (refer to <i>Column Compartment Operating Manual</i>).
Column switching valve clogged	Check the valve for indications of blockage. Replace the valve if necessary (refer to <i>Column Compartment Operating Manual</i>).
Flow cell clogged	Clean the flow cell. Replace the flow cell if necessary (refer to <i>Detector Operating Manual</i>).
Contamination in the system	Flush the system with an appropriate solvent.

Low backpressure

Possible Cause	Remedial Action
Leak in system	Find and eliminate the leak.

8.2.6 Retention Time Variation*Decreasing retention times*

Possible Cause	Remedial Action
Increasing flow rate	Check flow rate settings. Perform OQ flow precision test.
Improper mobile phase composition	Check premixed mobile phase. Perform an OQ gradient accuracy test. A proportioning valve may be defective. Contact Technical Support.

Increasing retention times

Possible Cause	Remedial Action
Decreasing flow rate	Check capillary connections for leaks. Check flow rate settings.
Piston seal leakage	Check the pump for piston seal leakage (refer to <i>Pump Operating Manual</i>).
Improper mobile phase composition	Check premixed mobile phase. Perform an OQ proportioning test. A proportioning valve may be defective. Contact Technical Support.

Scattering retention times

Possible Cause	Remedial Action
Pressure fluctuations from pump	<ul style="list-style-type: none"> • Purge the pump. • Check the compression values and take remedial action (refer to <i>Pump Operating Manual</i>). • Check the pump for piston seal leakage (refer to <i>Pump Operating Manual</i>). • Check the solvent line filters for permeability. Replace the filters if necessary (refer to <i>Pump Operating Manual</i>).
Imprecise solvent proportioning	<ul style="list-style-type: none"> • Perform an OQ eluent proportioning test. • Clean the inlet check valve or outlet check valve, and replace the check valve if necessary (refer to <i>Pump Operating Manual</i>). • A proportioning valve may be defective. Contact Technical Support.

8.2.7 Baseline*High baseline drift*

Possible Cause	Remedial Action
System not sufficiently equilibrated	Flush the system until equilibration. Usually, a volume of 5–10 times the column volume will be sufficient.
Unstable environmental conditions	<ol style="list-style-type: none"> 1. Make sure that the temperature and the humidity are constant. You can determine temperature fluctuations by recording the temperature channels. 2. Verify on the detector that the lamp house cover is properly installed and that the front doors are closed. Avoid draft.
Flow cell contaminated	Clean the flow cell. Replace the flow cell if necessary (refer to the <i>Detector Operating Manual</i>).
UV/VIS lamp not stable	Allow the lamp and optics to warm up for at least 60 minutes. If the lamp is old, you may need to replace the detector lamp (refer to the <i>Detector Operating Manual</i>). A new lamp may need burn-in time before the first analysis. For details, refer to the <i>Detector Operating Manual</i> .
Absorption of eluent changes when gradient is run	Absorbing additives may change the absorption spectrum, depending on the solvent. Consider varying additive concentrations to level the drift.

Non-periodic baseline fluctuation, high noise

Possible Cause	Remedial Action
Pressure fluctuations from pump	<ul style="list-style-type: none"> • Purge the pump (refer to the <i>Pump Operating Manual</i>). • Perform a basic tightness test (see Basic Tightness Test (▶ page 117)), or test the pump for leakage as described in the <i>Pump Operating Manual</i>. • Clean the check valves (refer to the <i>Pump Operating Manual</i>).
Air trapped in the system	Purge the system as necessary (refer to the <i>Pump Operating Manual</i>).
UV/VIS lamp old or not properly installed	Check that the lamp is correctly installed. Replace the lamp (refer to the <i>Detector Operating Manual</i>).

Possible Cause	Remedial Action
Improper reference wavelength	The sample must not absorb in the range of the reference wavelength. Consider using a method without reference wavelength.
Detector response time too short	Select a suitable response time.
Improper wavelength or optical bandwidth	Select an appropriate wavelength. Select a higher bandwidth in particular with critical conditions (low absorption, few light).
Flow cell not properly installed	Check that the flow cell is installed properly (refer to the <i>Detector Operating Manual</i>).
Detector defective	Contact Technical Support.

Periodic baseline fluctuation, pulsation

Possible Cause	Remedial Action
Pressure fluctuations from pump	<ul style="list-style-type: none"> • Purge the pump (refer to the <i>Pump Operating Manual</i>). • Perform a basic tightness test (see Basic Tightness Test (▶ page 117)), or test the pump for leakage as described in the <i>Pump Operating Manual</i>. • Clean the check valves (refer to the <i>Pump Operating Manual</i>).
Air trapped in the system	Purge the system (refer to the <i>Pump Operating Manual</i>).
Improper reference wavelength	The sample must not absorb in the range of the reference wavelength. Consider using a method without reference wavelength.
UV/VIS lamp defective or not properly installed	Check that the lamp is correctly installed. Replace the lamp (refer to the <i>Detector Operating Manual</i>).
Piston calibration value mismatch	Verify that the calibration value of the piston (imprinted on the rear of the piston) corresponds to the related piston calibration value in the chromatography data system. Adapt the value in the data system if necessary.

8.2.8 Temperature Control

Column compartment temperature does not change although the set point has not been reached

Possible Cause	Remedial Action
Ambient temperature too high or setpoint lower than the specified difference to the ambient temperature	Reduce the ambient temperature (for example, by ventilating the room).
Temperature control turned off	Check the setting for TempCtrl in the chromatography data system (TempCtrl=On turns temperature control on).
Ventilation grid obstructed	Make sure that the ventilation grids of the column compartment are not obstructed in any way.

Possible Cause	Remedial Action
Ambient air enters column chamber	<ul style="list-style-type: none"> • Improper sealing of the column chamber may impair the heating and cooling performance of the column compartment and lead to a considerable amount of condensed water. • When guiding capillaries through the column chamber cover seal, make sure that the cover seals properly. If the chamber cover seal is damaged, replace the chamber cover (refer to <i>Column Compartment Operating Manual</i>). • Also, make sure that the front door is properly closed.
Column compartment defective	Contact Technical Support.

Autosampler does not reach set temperature

Possible Cause	Remedial Action
Ambient temperature or humidity too high	Reduce the ambient temperature (for example, by ventilating the room), and/or ambient humidity.

8.2.9 Power and Communication

Entire system has no power (all LED bars off (dark))

Possible Cause	Remedial Action
System power button turned off	Turn on the system with the power button on the front left of the system base.

Single module has no power (LED bar off (dark))

Possible Cause	Remedial Action
Module power turned off	Turn on the module with its main power switch.
Module not connected to the mains	Connect the power cord.
Fuse has blown	Replace the fuses (refer to <i>Operating Manual</i> of the module).
Error in electronic system	Contact Technical Support.

One or more modules cannot be turned off from the power button on the system base

Possible Cause	Remedial Action
System power connection interrupted	Check the system interlink connections between the system base and the system modules, see Signal Cable Connections (▶ page 48).

Module cannot be operated from the chromatography data system

Possible Cause	Remedial Action
No connection between module and computer	<ul style="list-style-type: none"> Check the USB connections from the system to the computer, see Signal Cable Connections (▶ page 48). If the module uses a USB hub on another module, check that the module that provides the hub is turned on. Check the USB port on the computer. USB standard 2.0 is required.
Repeated unexpected disconnects in the chromatography data system	Install a USB Isolator. For ordering information, see Optional Accessories (▶ page 128).

8.2.10 System Diagnostics

For the Vanquish Access system modules, diagnostics features are supported in the Chromeleon software. With these features, the user can check and monitor the performance and reliability of certain components.

Manual Testing

You can run the following tests from Chromeleon:

Test	Available for	Remarks
Basic Tightness Test	Pump and autosampler	Depending on the Vanquish Access system configuration, the available tests may vary. If a test is grayed out in the Chromeleon software, the test is currently not available.
Grating Motor Test	Variable wavelength detector	
Intensity Test	Variable wavelength detector	
Shutter Motor Test	Variable wavelength detector	When a test is running, the LED bar on the module shows a blue running light.

Automatic Testing

You can set up a schedule in Chromeleon for automatic testing. Automatic testing is possible only for tests and functions that can run unattended, without further user interaction, for example the *Basic Tightness Test*.

Test Failed

To ensure that you run sequences only on fully operational modules, the Chromeleon software prevents you from starting a sequence if a diagnostic test has failed. If a test failed, take remedial action and repeat the test. A user with special control privileges in the Chromeleon software can override the failed test result. Refer to the *Chromeleon Help*.

See also

 [Basic Tightness Test](#) (▶ page 117)

 [Grating Motor Test](#) (▶ page 117)

 [Intensity Test](#) (▶ page 118)

 [Shutter Motor Test](#) (▶ page 118)

8.2.10.1 Basic Tightness Test

The **Basic Tightness Test** checks the tightness of the pump and autosampler.

Follow these steps

1. Run the test from the Chromeleon software. Refer to the *Chromeleon Help*.
The test runs automatically without further user interaction.
2. If the test fails, check the Instrument Audit Trail for a message. For remedial actions refer to the *Troubleshooting* section in the *Operating Manual* for the module for which the test failed.

8.2.10.2 Grating Motor Test

The **Grating Motor Test** checks the mechanical stability of the grating drive.

Follow these steps

1. Install the diagnostic cell in the detector.
2. Run the test from the Chromeleon software. Refer to the *Chromeleon Help*.
3. Depends on the test result:

Test result	Action
Passed	Reinstall the flow cell of your application.
Failed	Contact Thermo Fisher Scientific Technical Support.

8.2.10.3 Intensity Test

The **Intensity Test** is a test to measure the intensity of the lamps and the transmission performance ("intensity") of the optics.

Follow these steps

1. Install the diagnostic cell in the detector.
2. Turn on the detector lamps (one or both) that you want to test.
3. Run the test from the Chromeleon software. Refer to the *Chromeleon Help*.
4. Depends on the test result:

Test result	Action
Passed	Reinstall the flow cell of your application.
Failed	For the remedial actions, refer to the <i>operating manual</i> of your detector.

8.2.10.4 Shutter Motor Test

The **Shutting Motor Test** checks the mechanical stability of the shutter motor and filter paddle.

Follow these steps

1. Install the diagnostic cell in the detector.
2. Turn on the detector lamps (one or both).
3. Run the test from the Chromeleon software. Refer to the *Chromeleon Help*.
4. Depends on the test result:

Test result	Action
Passed	Reinstall the flow cell of your application.
Failed	Contact Thermo Fisher Scientific Technical Support.

9 Specifications

This chapter provides important system specifications.

9.1 System Specifications

The physical conditions of a standard system are specified as follows:

Type	Specification
Materials in the flow path	For materials in the flow path, refer to the <i>Operating Manuals</i> for the modules in your system. For solvent and additive information, see Solvent and Additive Information (► page 24).
Biocompatibility	No
Control	System base power button Chromeleon 7
Good Laboratory Practice (GLP) features	Predictive Performance functions for scheduling maintenance procedures based on the actual operating and usage conditions of the system. All system parameters logged in the Chromeleon Audit Trail.
Safety features	Leak detection and safe leak handling
Range of use	Indoor use only
Ambient operating temperature	5 °C - 35 °C
Ambient storage temperature	-20 °C - 45 °C
Ambient operating humidity	20% - 80% relative humidity, non-condensing
Ambient storage humidity	Maximum 60% relative humidity, non-condensing
Operating altitude	Maximum 2000 m above sea level
Pollution degree	2
Emission sound pressure level	Typically approx. 55 dB(A), max. approx. 75 dB(A)
System dimensions (height x width x depth)	82 cm x 55 cm x 62 cm
System weight	Approx. 75 kg

9.2 Solvent Rack and System Base Specifications

The physical conditions of the solvent rack and system base are specified as follows. For specifications of the other modules in the Vanquish Access system, refer to the *Specifications* section in the *Operating Manual* for each module.

Type	Specification
System Interlink	1 System Interlink port (RJ45-8 connector)
Max. volume of an individual solvent reservoir	Use the solvent reservoirs that are shipped with the system. If you use other solvent reservoirs, ensure that the system stack is stable and does not tilt.
Solvent rack dimensions (height x width x depth)	12 cm x 55 cm x 41 cm
Solvent rack weight	2 kg
System base dimensions (height x width x depth)	6 cm x 55 cm x 42 cm
System base weight	4 kg
System base user input	System base power button

10 Accessories, Consumables and Replacement Parts

This chapter describes the standard accessories that are shipped with the system and the accessories that are available as an option. This chapter also provides information for reordering consumables and replacement parts.

10.1 General Information

The system must be operated only with the replacement parts and additional components, options, and peripherals specifically authorized and qualified by Thermo Fisher Scientific.

Accessories, consumables, and replacement parts are always maintained at the latest technical standard. Therefore, part numbers are subject to change. If not otherwise stated, updated parts will be compatible with the parts they replace.

10.2 Ship Kit

This section lists the content of the system ship kit also including parts for the system modules. The kit content is subject to change and may vary from the information in this manual. Refer to the content list included in the kit for the most recent information about the kit content at the time when the system is shipped.

For reordering information, see [Consumables and Replacement Parts](#) (▶ page 129).

Liquid Reservoirs and Accessories

Item	Quantity in shipment
Reservoir, 0.25 L, with reservoir cap	2
Reservoir, 1 L, including cap	2
Plugs and retaining guides for reservoir caps, kit, including <ul style="list-style-type: none"> • Cap plug to close open holes in the reservoir cap (pack of 5) • Retaining guide to keep the liquid line in place in the reservoir cap (pack of 2) 	4
Cap for reservoirs, screw-cap	4

Tubing and Accessories

Item	Quantity in shipment
Solvent lines to connect the solvent reservoirs to the degasser inlet ports or line connection unions	1
Solvent line filter	4
Silicone tubing, 3 m	1
Seal wash line, Viton™, 1.80 m length, for connecting: <ul style="list-style-type: none"> • Seal wash reservoir and seal wash pump • Seal wash pump - pump head • Pump head - seal wash detector 	1
Tubing connector, straight (pack of 5)	1
Tubing connector, 90°-angled	2
Tubing connector, ID 1/16"	5
Needle wash line, Flexelene™, for connecting: <ul style="list-style-type: none"> • Needle wash reservoir and needle wash pump • Needle wash pump and wash port 	1
Detector waste line	1

Item	Quantity in shipment
Fitting plug for detector waste line	1
Tubing bracket	4
Drainage kit, including: <ul style="list-style-type: none"> • Drainage, straight tubing connector • Drain tubing, 6.25 m length • Cable tie (pack of 2) 	1

Capillaries and Accessories

Item	Quantity in shipment
Viper capillary kit, including: <ul style="list-style-type: none"> • Capillary pump-autosampler, stainless steel, I.D. x length 0.18 x 350 mm • Capillary column-flow cell, stainless steel, I.D. x length 0.13 x 350 mm • Passive pre-heater, stainless steel, I.D. x length 0.25 x 580 mm 	1
Partition panel plug for guiding insulated detector capillaries	1
Viper union	1
Adapter, Viper	2

Cables

Item	Quantity in shipment
System interlink cable (RJ45), 0.5 m	5
USB cable type A to B High Speed USB 2.0, 1 m	3
USB cable type A to B High Speed USB 2.0, 5 m	1

Tools

Item	Quantity in shipment
System base locking tool	2
Syringe, plastic, 12 mL	1

Miscellaneous

Item	Quantity in shipment
Flow scheme	1
Sample rack, for 54 x 12 mm O.D. vials	4
Vial, glass screw top, 2 mL (pack of 100)	1
Caps for vials (pack of 100)	1
Column holder kit (pack of 6 column holders) including: <ul style="list-style-type: none"> • Column holder left for left-side positioning of the column (pack of 2) • Column holder right for right-side positioning of the column (pack of 2) Column holder double for positioning two columns at the same height (pack of 2)	2
Passive pre-heater, part of Viper capillary kit (details, see <i>Capillaries and Accessories</i>)	1
Standard flow cell, SST, 11 µL	1
Fuses kit, Vanquish Access system (pack of 10) The kit includes the appropriate fuses for the Vanquish Access system modules. Use them as follows: <ul style="list-style-type: none"> • 5 AT, 230 V AC, slow-blow: Autosampler • 4 AT, 250 V AC, slow-blow: Column compartment • 3.15 AT, 250 V AC, slow-blow: Detector and pump 	1

10.3 Optional Accessories

Method Development and Transfer Kits

Item	Part No.
Method Transfer Kit Contains a loop capillary kit and a switching valve to adjust the system gradient delay volume to the desired HPLC method.	6190.2110
Strong solvent loop Vanquish Loop to increase the volume between autosampler and column for successful transfer of applications using strong-eluting sample solvents.	6036.2200

Miscellaneous

Item	Part No.
Pre-heater, passive, stainless steel, I.D. x length 0.18 x 530 mm	6732.0170
USB isolator The USB Isolator improves the reliability of the USB connection between the USB port of an HPLC system module and the data system computer.	6287.0540

10.4 Consumables and Replacement Parts

10.4.1 Capillaries and Tubing

Description	Part No.
Drainage kit, Vanquish Access system, including: <ul style="list-style-type: none"> • Straight tubing connector (also available as separate part) • Drain tubing, 6.25 m length • Cable tie (pack of 2) 	6190.1120
Straight tubing connector	6190.0003
Viper capillary kit, including (parts are available separately, see rows above): <ul style="list-style-type: none"> • Capillary, pump-autosampler, stainless steel, I.D. x length 0.18 x 350 mm¹ • Capillary, column-flow cell, stainless steel, I.D. x length 0.13 x 350 mm • Passive pre-heater, stainless steel, I.D. x length 0.25 x 580 mm¹ ¹ : also available as separate part (see rows below)	6190.2310
Viper capillary, pump-autosampler, stainless steel, I.D. x length 0.18 x 350 mm	6040.2375
Passive pre-heater, stainless steel, I.D. x length 0.25 x 580 mm	6732.0180
Viper inline filter Installed between a column and a Viper capillary to filter particles bigger than 0.5 µm	6036.1045
Viper union	6040.2304
Normal-Phase (NP) tubing kit The kit includes the replacement tubing and tubing connectors, for replacing the following: <ul style="list-style-type: none"> • All seal wash lines from the seal wash reservoir to the seal wash pump and from the seal wash pump to the pump heads and on to the seal wash detector (Viton tubing, opaque white tubing) • The peristaltic tubing in the seal wash pump (PharMed tubing, light yellow tubing) • The needle wash line from the needle wash reservoir to the needle wash pump and from the needle wash pump to the wash port (Flexelene tubing, clear tubing) • The detector waste line (capillary and fitting) 	6036.3973

10.4.2 Solvents and Wash Systems

Reservoirs for solvents and wash liquids

Description	Part No.
Reservoir, 1 L, including cap	2270.0012
Reservoir, 0.25 L, including cap	2270.0026
Cap for reservoirs, screw-cap (pack of 4)	6270.0013
Cap plug to close open holes in the reservoir cap (pack of 20)	6000.0047
Retaining guide to keep the liquid line in place in the reservoir cap (pack of 5)	6000.0042
Plugs and retaining guides for reservoir caps, kit including <ul style="list-style-type: none"> • Cap plug to close open holes in the reservoir cap (pack of 10) • Retaining guide to keep the liquid line in place in the reservoir cap (pack of 5) 	6030.9101

Solvent Lines and Solvent Line Filters

Description	Part No.
Solvent lines to connect the solvent reservoirs to the degasser inlet ports or line connection unions	6036.1701

For information about additional solvent lines and solvent line filters, refer to the *Consumables and Replacement Parts* section in the *Operating Manual* for the pump.

10.4.3 Fuses and Cables

Description	Part No.
Fuses kit, Vanquish Access system The kit includes the appropriate fuses for the Vanquish Access system modules.	6036.0002
System interlink cable (RJ45), 0.5 m	6036.0004
USB cable, type A to type B, high-speed, USB 2.0 Cable length: 1 m	6035.9035A
USB cable, type A to type B, high-speed, USB 2.0 Cable length: 5 m	6911.0002A

10.4.4 Maintenance Kit and Tool Kit

Description	Part No.
Maintenance kit, including: <ul style="list-style-type: none"> • Injection valve rotor, for normal-phase solvents • Pump head seal (2 PTFE seals, different sizes) • Piston seal (pack of 4) (also to be used as seal wash seal) • Peristaltic tubing (PharMed, light yellow tubing) • Viton™ tubing (opaque tubing) • Tubing connector (straight, pack of 2) • Tubing connector (90°-angled) • Tubing connector (straight for I.D 1.0 -2.0 mm (pack of 4) • Solvent line filter (pack of 10) • Tubing clip (self-adhesive) (pack of 3) 	6190.5000
Tool kit, including <ul style="list-style-type: none"> • Torx screwdriver, size T10 • Torx screwdriver, size T15 • Torx screwdriver, size T20 • Torx screwdriver, size T30 • Open-end wrench, size 11 x 13 mm • Open-end wrench, size 1/4" x 5/16" • Hexagon wrench, size 6 • Double-ended ring wrench, size 11 x 13 mm • Seal-handling tool • Spacing tools, pump head and pistons • Fitting, Viper 	6190.2150

10.4.5 Solvent Rack, System Base and Accessories

Description	Part No.
System base	6190.1100
Packing material for system base	6190.1000
Solvent rack	6190.1300
System base locking tool	6036.1160

11 Appendix

This chapter provides additional information about compliance.

11.1 Compliance Information

Thermo Fisher Scientific performs complete testing and evaluation of its products to ensure full compliance with applicable domestic and international regulations.

For details on compliance, also see the Compliance Information section in the *Operating Manual* for each module in the Vanquish Access system.

11.1.1 Declarations of Conformity



CE Declaration of Conformity

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

RoHS Compliance

This product complies with the RoHS (Restrictions of Hazardous Substances) directives:

- *European RoHS Directive*
Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment
The CE mark on the device indicates that the product is compliant with the directive.
- *China RoHS regulations*
Measures for Administration of the Pollution Control of Electronic Information Products
One of the following logos may be present on the device if applicable:

Logo	Description
	The green logo marks items that do not contain the hazardous substances identified by the regulations.
	The orange logo including a one-digit or two-digit number marks items that contain hazardous substances identified by the regulations. The number indicates the environment-friendly use period (EFUP) of the item. During this period, the item (when used as intended) will not cause serious damage to human health or environment. For more information, go to http://www.thermofisher.com/us/en/home/technical-resources/rohs-certificates.html

UKCA Declaration of Conformity

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

UL/CSA 61010-1 Compliance

The label of the NRTL Lab on the device (for example, cTUVus or CSA mark) indicates that the device has satisfied the requirements of the applicable standards.

11.1.2 WEEE Compliance

This product is required to comply with the European Union's Waste Electrical & Electronic Equipment (WEEE) Directive. It is marked with the following symbol:



Figure 28: WEEE symbol

Thermo Fisher Scientific has contracted with one or more recycling or disposal companies in each European Union (EU) Member State, and these companies should dispose of or recycle this product. For further information, contact Thermo Fisher Scientific.

11.1.3 FCC Compliance

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 instructions, 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.

11.1.4 Manual Release History

Revision	Covering
1.0	Vanquish Access System

The instructions were prepared in English (original instructions). Other language versions are translations based on the English original instructions.

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