Vanquish Horizon UHPLC System

Uncompromised UHPLC performance
Experience uncompromised UHPLC performance

When you need the best analytical tools for the toughest analytical challenges, like producing life-saving medicines or ensuring the quality and safety of our food and environment, the Thermo Scientific™ Vanquish™ Horizon UHPLC system lets you push the boundaries of separation science.

Designed with innovative technology and attention to fine detail, the Vanquish Horizon UHPLC system brings exceptional analytical precision, detector sensitivity, and operational simplicity to enable unmatched robustness and performance. Designed for research labs who need the highest performing UHPLC and LC-MS, the Vanquish Horizon UHPLC system delivers:

- Unparalleled performance for challenging UHPLC separations requiring the best pumping precision and widest application range
- Full biocompatibility to address the most challenging biotherapeutic applications with unsurpassed retention time and peak area precision
- Highest throughput capabilities for UHPLC and LC-MS with extra-long unattended operation
- Dedicated solutions for exceptional and seamless LC-MS integration
- Maximum detector sensitivity with minimized baseline noise
- Simple integration with your Thermo Scientific™ Chromeloon™ Chromatography Data System (CDS), Waters™ Empower™ 3 CDS and Agilent™ OpenLab™ CDS software
In your laboratory, UHPLC is an essential tool to advance your research and prevail against the toughest analytical challenges. The Vanquish Horizon UHPLC system is built with innovative technologies to improve your UHPLC analysis with:

- Highest pressure capabilities allowing use of extra-long sub 2 µm particle columns
- Dedicated 1.5 µm columns with solid core particle column technology and fully porous Validated for Vanquish columns for optimized separations
- Minimized system dispersion by employing low dispersion Thermo Scientific™ Viper™ Fingertight Fitting systems
- Multiple thermostatting options to refine and take full advantage of your sub 2 µm particle column separations
- Outstanding peak area and retention time precision

Uncompromised performance

Accelerated peptide mapping utilizing the full power range of the Vanquish Horizon UHPLC system while maintaining 100% sequence coverage using a Thermo Scientific™ Acclaim™ RSLC 120, C18, 2.2 µm column.
Enable your operators

In today’s analytical laboratory environment, your scientific personnel have limited time for in-depth familiarization with new instrumentation. An LC system should seamlessly fit into your existing workflows and processes without requiring extra training or expertise.

The Vanquish Horizon UHPLC system brings ease of use to a new level, enabling every user to deliver exceptional results, independent of user experience.

- Viper Fingertight Fittings for nearly zero dead-volume fluidic connections
- Automatic and remote instrument purging
- Thermo Scientific™ Vanquish™ Solvent Monitor to ensure enough eluent and waste capacity for every sequence
- Easy to use Thermo Scientific Chomeleon CDS method setup wizards and Smart Startup, Standby and Shutdown for safe operation

Vanquish Solvent Monitor

The Vanquish Solvent Monitor enables Vanquish HPLC and UHPLC systems to accurately and automatically measure the liquid levels in each individual solvent channel and waste container.

Deep integration of the Vanquish Solvent Monitor into the Vanquish Horizon UHPLC system provides direct viewing of solvent and waste volumes within Chomeleon CDS and directly on the module itself.

Run large sample sets with confidence, avoid lost time, and eliminate procedural deviations by monitoring mobile phase levels; prevent hazardous spills by monitoring waste levels.

Vanquish Solvent Monitor manages your eluent and waste levels for highest confidence during analysis.
High-throughput capabilities

Keep up with the ever-increasing sample processing demand by improving productivity and throughput. The Vanquish Horizon UHPLC system can cope with ultra-high throughput analysis with:

- Extra-low overall system gradient delay volume
- Highest pumping precision for even the most challenging gradients
- Incredibly short injection cycle which can be nearly eliminated by additional smart Chromeleon CDS control features
- Maximize sample throughput with Thermo Scientific™ Vanquish™ Horizon High-throughput LC systems

Vanquish Horizon High-throughput LC systems
Vanquish Duo UHPLC systems

Double your throughput, deepen your sample knowledge, and better utilize your bench space with the Thermo Scientific™ Vanquish™ Duo UHPLC systems. Two completely independent flow paths in one system for maximum productivity.

Vanquish Tandem LC systems

Increase your lab throughput by 30% with the Vanquish Tandem LC systems. Maximize the utilization of your optical detector or mass spectrometer.

Traditional Single Channel LC
Flow Path 1
Analytical Gradient Application 1
Reconditioning
Application
Switch Time
Analytical Gradient Application 2
Reconditioning
Analytical Gradient Application 1
Flow Path 2
Analytical Gradient Application 2
Reconditioning
Analytical Gradient Application 2
Reconditioning

Time savings
Compared to single channel LC

Vanquish Duo UHPLC Systems
Double your productivity with two independent UHPLC channels in one stack
Flow Path 1
Analytical Gradient Application 1
Reconditioning
Analytical Gradient Application 1
Reconditioning
Application
Switch Time
Analytical Gradient Application 2
Reconditioning
Flow Path 2
Analytical Gradient Application 2
Reconditioning
Analytical Gradient Application 2
Reconditioning

Time savings
Compared to single channel LC

Vanquish Tandem LC Systems
Gain an average of 40% in productivity by maximizing mass spectrometer utilization with offline column reconditioning
Flow Path 1
Analytical Gradient Application 1
Application Switch Time
Analytical Gradient Application 2
Reconditioning
Analytical Gradient Application 2
Reconditioning
Flow Path 2
Reconditioning
Reconditioning
Reconditioning
Reconditioning

Time savings
Compared to single channel LC

Built for productivity and throughput
Increase sample capacity with the Thermo Scientific™ Vanquish™ Charger module for a total capacity of up to nearly 9000 samples while the barcode reader simultaneously manages the complete inventory.
Improve your quantification

Improve your lab’s quantification capabilities with Thermo Scientific Vanquish Inverse Gradient LC systems, employing the unique and universal Charged Aerosol Detection, to consistently quantify all non-volatile and semi-volatile compounds even when no reference standard is available.

By utilizing a second pump to deliver an inverse gradient, the detector offers:

• Uniform response with CAD under gradient elution conditions
• Reliable standard-free quantification of knowns and unknowns

Analytical gradient

By simplifying method setup with automatic Inverse Gradient calculation considering all system volumes.

In this image, the text is presented in a readable manner with appropriate spacing and alignment. The page includes a diagram illustrating the analytical gradient and inverse gradient compensation, along with text explaining the capabilities of Thermo Scientific Vanquish Inverse Gradient LC systems.

Purify your samples

The isolation of a single compound from a complex mixture can be a major challenge for scientists tasked with in-depth sample characterization. The demands for isolation followed by further investigation can be multifaceted, based on the key area of focus of the drug development process.

The Vanquish Analytical Purification LC Systems support a broad range of applications for both upstream and downstream processes. They match the separation power of the LC systems with compelling fractionation for high-purity and high-yield compound collection. Built with Thermo Scientific Vanquish HPLC and UHPLC system components, they deliver unrivaled performance, robustness, and user-friendliness.

Purify by fractionation to:

• Identify and characterize new target analytes
• Improve production process by impurity profiling
• Isolate reference material
• Enrich compound of interest by pooling

The text is clear and concise, with a logical flow that guides the reader through the capabilities and applications of the Vanquish Analytical Purification LC Systems.
The analysis of complex samples with difficult-to-resolve analytes or interfering matrixes could be challenging with conventional UHPLC utilizing a single column chemistry. In these cases, the analysis may be improved by employing two-dimensional liquid chromatography to resolve co-eluting peaks and gain confidence in your separation.

Four different Vanquish 2D-LC systems can be configured from Vanquish Horizon modules/components targeting different two-dimensional LC workflows:

**Vanquish Online 2D-LC systems**

**Thermo Scientific™ Vanquish™ Simple Switch™ 2D-LC UHPLC system**

Achieve utmost application flexibility through seamless switching between a Vanquish Trap Heart-Cut 2D-LC instrument and a Thermo Scientific™ Vanquish™ Duo UHPLC system.

**Thermo Scientific™ Vanquish™ Online SPE HPLC and UHPLC system**

Ensure analyte pre-concentration and sample clean-up in an automated repeatable workflow while saving solvent and time.

**Thermo Scientific™ Vanquish™ Trap Heart-Cut 2D-LC HPLC and UHPLC system**

Transfer one or multiple fractions of the first dimension analytical column to a trap column before submitting to the second dimension for improved detection flexibility such as, making non-MS compatible separation MS compatible.

**Thermo Scientific™ Vanquish™ Loop Heart-Cut 2D-LC HPLC and UHPLC system**

Collect one or multiple fractions of the first dimension separation in a sample loop and transfer the cut-out fraction(s) to a complementary column chemistry for a second dimension separation for peak purity confirmation.
Analytical precision, for both retention times and peak areas, are critical to obtain reliable qualitative and quantitative analytical results for every application and specifically in 2D-LC applications. The Vanquish Horizon UHPLC system brings this precision to new levels of confidence in your results.

- SmartInject technology for increased retention time precision and prolonged column lifetime
- SmartFlow™ pumping algorithm for improved flow accuracy for superior system-to-system reproducibility
- SmartStroke™ technology for a variable stroke volume resulting in improved signal-to-noise performance for applications utilizing trifluoroacetic acid
- Outstanding precision for improved compound identification and quantification, automated data processing, efficient selected reaction monitoring scheduling and precise 2D-LC chromatography

**Why SmartInject Technology?**

During injections, the sample loop at atmospheric pressure is placed in line with the high-pressure flow path, typically resulting in a pressure drop. With regular UHPLC systems, this adversely affects retention time precision and column lifetime. SmartInject Technology automatically eliminates the pressure drop improving data confidence and reducing cost of ownership.

Autosampler linearity for even low injection volumes, here from 100 nL to 1 µL.

![System Pressure Trace](Image1)

![UV Trace](Image2)

Significant reduction of pressure drop after injection using SmartInject Technology resulting in improved retention time reproducibility (6 replicates) and enhanced column lifetime.
Use your existing software infrastructure for implementation

Regardless of your current software infrastructure, you can take advantage of the latest innovation of the Vanquish Horizon UHPLC system. The Vanquish Horizon system combines perfectly with Chromeleon CDS to take advantage of the unrivaled flexibility, precision and ease-of-use.

**Chromeleon CDS**
Scalable from workstation to global enterprise, Chromeleon CDS provides complete instrument control, data acquisition, data processing and data security regardless of whether you work with the most recent feature release, the extended support or the long-term support software version.

**Standard Instrument Integration (SII) for Empower 3 and OpenLab software**
Enabling seamless instrument control and method creation for all laboratories currently employing Waters Empower CDS and Agilent OpenLab CDS software.

Network scalability—stand-alone to a global network with secure central data storage.
Mass spectrometry is a prevalent tool in many laboratories. The Vanquish Horizon UHPLC system can be seamlessly coupled to best in class Thermo Scientific triple quadrupole or Thermo Scientific high-resolution accurate mass Orbitrap mass spectrometers. For single point control, your LC-MS system can be controlled completely by Chromeleon CDS.

- Best in class retention time precision for optimal selected reaction monitoring
- Superior separation for minimal ion suppression
- Minimum carry-over for reliable trace level LC-MS quantification

Workflow automation is important for many industries in order to increase consistency of results and lab efficiency—particularly during the pandemic where labs must ensure high productivity with the minimum number of onsite personnel. Vanquish HPLC and UHPLC systems can be easily equipped with a Thermo Scientific™ Vanquish™ Loader to fully automate your LC or LC-MS analysis when used in combination with a robotic mover.
Detect your analyte

Choosing the right detection technology is key to revealing all the components of interest in your sample. The Vanquish Horizon UHPLC system offers a wide range of detection capabilities that can be easily integrated and combined to fit your methods.

Industry-leading diode array detection
Thermo Scientific Vanquish Diode Array Detector HL with the Thermo Scientific™ LightPipe™ detection technology delivers supreme analyte sensitivity through low baseline noise and longer effective light path by total internal reflection. The Thermo Scientific Vanquish Diode Array Detector FG offers cutting edge detector linearity as well as a smooth and robust LC-MS integration. Based on diode array detection technology, the Multiple Wavelength Detector offers a cost-effective solution for simultaneously acquiring up to eight UV-Vis wavelength channels.

Powerful fluorescence detection
Fluorescence detection enables high sensitivity and selectivity.

Variable wavelength detection
UV-Vis detection with excellent sensitivity and linearity is a cost-effective and powerful solution for quantitative compound analysis.

Concentration vs. peak height plot of nevirapine with data points that were considered for calibration (black) and data points that were eliminated from calibration due to curve decline (red). Linear calibration with permitted offset and no weighting.

FLD chromatogram of the four aflatoxins: G2, G1, B2 and B1 at a concentration of 0.9 µg/kg for G2 and B2 and 2.9 µg/kg for G1 and B1.
Unique, universal charged aerosol detection
The Thermo Scientific™ Vanquish™ Charged Aerosol Detectors are powerful and near-universal. They are able to detect all non-volatile and many semi-volatile analytes with uniform response and with sub-nanogram-level, even those that lack a chromophore or that poorly ionize. The flexibility and performance of charged aerosol detection is ideal for analytical R&D, while its simplicity and reproducibility benefit manufacturing QA/QC applications.

Simple mass detection
Mass spectrometry gives access to valuable data no other technology can deliver. The easy-to-use Thermo Scientific™ ISQ™ EM single quadrupole mass spectrometer or the Thermo Scientific™ ISQ™ EC single quadrupole mass spectrometer integrates with LC systems for reliable, robust, and easy LC-MS routine analysis with an extended mass range for more flexibility using the ISQ EM. Integrated software allows both novices and experts to quickly master MS to gain more insights from every sample.

Pairing smoothly with your LC-MS
LC-MS is widely used for quantification purposes in many application fields, including food safety and environmental monitoring. In conjunction with the Thermo Scientific mass spectrometer portfolio, Vanquish Horizon delivers a great solution for ultra-sensitive detection. For control of your LC-MS setup you can choose between the feature-rich Thermo Scientific™ Xcalibur™ software, the powerful Thermo Scientific™ TraceFinder™ software or the compliance-ready Chromeleon CDS control.

Unlike mass spectrometry and UV, the CAD is able to measure all analytes in the sample. Mass spectrometry (MS) requires the analyte to form gas phase ions while response by a UV detector depends upon the nature of the chromophore.
Explore the system
Vanquish Solvent Monitor
Use the Vanquish Solvent Monitor to increase your regulatory compliance, productivity, and safety of your laboratory. That device guarantees that your HPLC systems will never run dry and the waste will not spill over, reducing loss of valuable measurement time and sample material.

Vanquish User Interface
With the Vanquish User Interface, you are the master of your LC instrument. The display always shows you the key parameters of your instrument such as flow and pressure and guides you in a visual step-by-step video tutorial through key maintenance tasks.

Detection capabilities
Differing molecular characteristics of your analyte, from small molecules to complex biomolecules, necessitates multiple detector technologies. The Vanquish Horizon UHPLC systems have been built to utilize a wide range of analytical detectors, including mass spectrometry (MS), diode array detection (DAD), multi wavelength detection (MWD), charged aerosol detection (CAD), variable wavelength detection (VWD), and fluorescence detection (FLD).

Ultra-high sample capacity
The Vanquish autosampler has a default sample capacity of 216 1.5 mL glass vials or 4 well plates. This capacity can be further increased with the Thermo Scientific Vanquish Charger module to a capacity of up to 23 well plates.

Built for automation
The Vanquish autosampler has the option to add the Vanquish Loader to connect the LC or LC-MS system to the sample preparation robotics, allowing the complete analysis of the sample from preparation to reporting without human intervention.

Proprietary injection and switching valves
The valves used in the Vanquish Horizon UHPLC system are designed to meet the reliability needs to make UHPLC run robustly and routinely. The valves are long-life and follow a no-maintenance philosophy reducing your overall cost of ownership.

SmartInject Technology
Superior retention time precision and accuracy, as well as enhanced column protection.

Easier operation
Utilizes tool-free Viper Fingertight Fittings with near-zero dead volume operation and ergonomic design.

Simple maintenance
Modules can be repaired without de-stacking; each unit has handles for ease of maneuvers; light bars on the front of the system indicate system status; and the entire system supports tool-free maintenance.

Keep your lab tidy
The built-in drawer stores accessories, related documents, or any other useful material for the system.

Absolute precision
The Vanquish Horizon pumping delivers the best retention time precision of the complete portfolio even for the most shallow gradients. Smart algorithms improve flow accuracy and minimize baseline pulsation.

Higher data confidence
Highest injection precision for even the lowest injection volumes and retention time precision for reliable qualitative and quantitative sample characterization.

Biocompatibility
Vanquish Horizon UHPLC Systems are, by design, biocompatible to deal with all challenging eluents for biopharmaceutical characterization, increasing data confidence and instrument uptime.

Compatible with your software infrastructure
The Vanquish Horizon UHPLC System can scan be operated in various software environments including the latest Chromeleon software feature release, Chromeleon CDS long-term and extended support version, Waters Empower and Agilent OpenLab CDS.
# Thermo Scientific LC portfolio overview

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## Dependability

### Thermo Scientific™ Vanquish™ Core HPLC Systems
- High-pressure binary, low-pressure quaternary solvent blending or isocratic flow delivery
- Workhorse instrument
- Seamless method transfer
- System intelligence for improved productivity

### Thermo Scientific™ Vanquish™ Flex UHPLC Systems
- High-pressure binary and low-pressure quaternary solvent blending
- Biocompatible
- Unparalleled flexibility and control

### Thermo Scientific™ Vanquish™ Horizon UHPLC System
- High-pressure binary solvent blending
- Biocompatible
- Industry-leading specifications
- Unmatched detection sensitivity

### Thermo Scientific™ Vanquish™ Neo UHPLC System
- All-in-one nano-, capillary-, and micro-flow LC systems
- Accelerating productivity with long-term, trouble-free operation
- Intelligent at-system or remote control, method setup, diagnostics, and troubleshooting

## Flexibility

### Thermo Scientific™ Vanquish™ Core HPLC Systems

### Thermo Scientific™ Vanquish™ Flex UHPLC Systems

## Performance

### Thermo Scientific™ Vanquish™ Horizon UHPLC System

### Thermo Scientific™ Vanquish™ Neo UHPLC System

## Sensitivity

### Thermo Scientific™ Vanquish™ Core HPLC Systems

### Thermo Scientific™ Vanquish™ Flex UHPLC Systems

### Thermo Scientific™ Vanquish™ Horizon UHPLC System

### Thermo Scientific™ Vanquish™ Neo UHPLC System

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