



Vanquish Horizon UHPLC System

# Uncompromised UHPLC performance

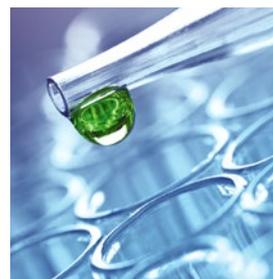
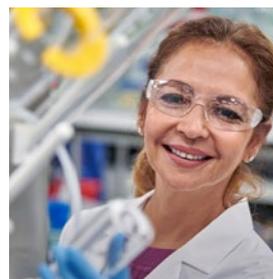
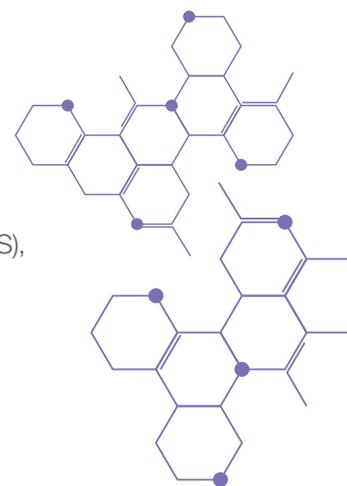


# Experience uncompromised UHPLC performance

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:

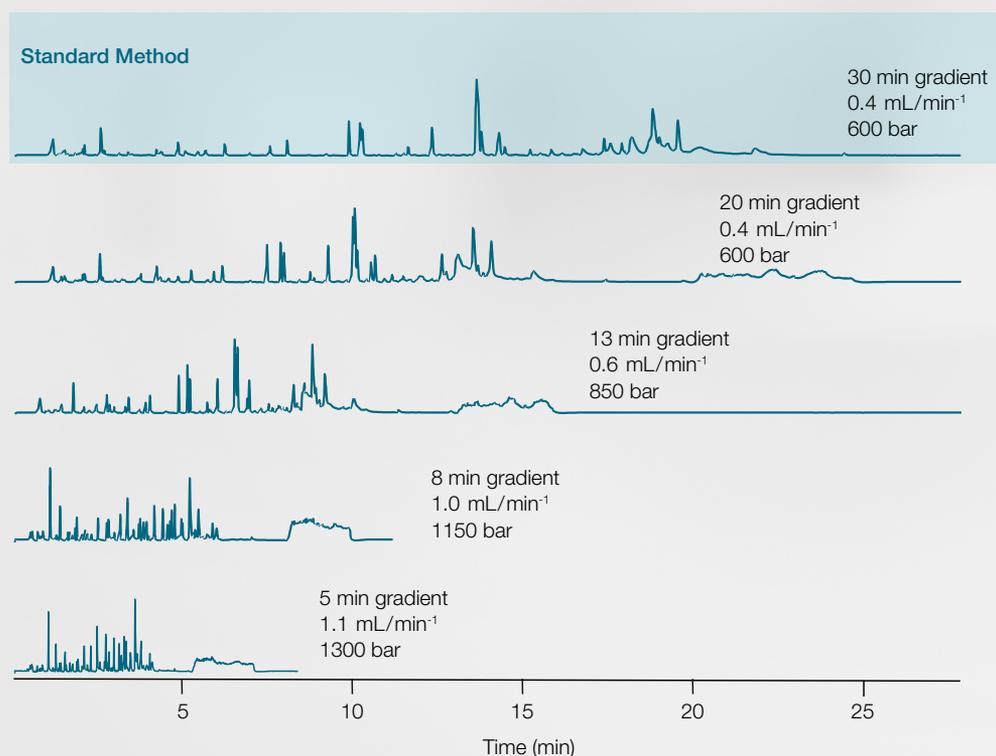
- Unparalleled performance for challenging UHPLC separations requiring the best pumping precision and widest application range
- Full biocompatibility to address the most challenging biotherapeutic applications with unsurpassed retention time and peak area precision
- Highest throughput capabilities 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™ Chromeleon™ Chromatography Data System (CDS), Waters™ Empower™ 3 CDS and Agilent™ OpenLab™ CDS software



# Uncompromised performance

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  $\mu\text{m}$  particle columns
- Dedicated 1.5  $\mu\text{m}$  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 thermostating options to refine and take full advantage of your sub 2  $\mu\text{m}$  particle column separations
- Outstanding peak area and retention time precision



**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  $\mu\text{m}$  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 Chromeleon CDS method setup wizards and Smart Startup, Standby and Shutdown for safe operation



**Vanquish Solvent Monitor manages your eluent and waste levels for highest confidence during analysis.**

## 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 Chromeleon CDS and directly on the module itself.

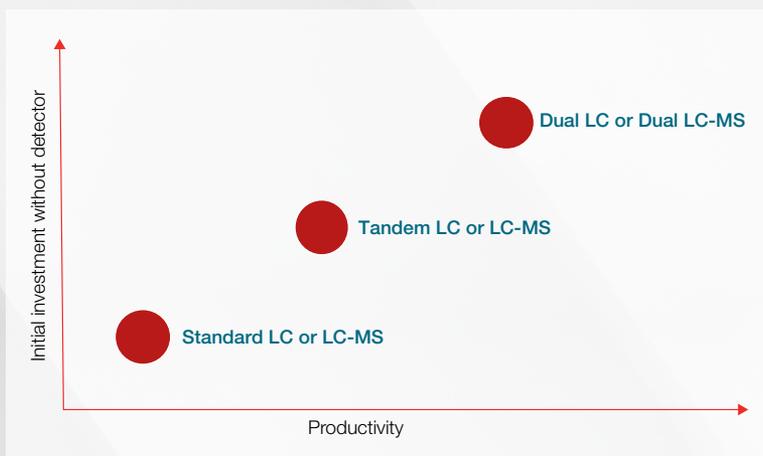
Run large sample sets with confidence, avoid lost time, and eliminate procedural deviations by monitoring mobile phase levels; prevent hazardous spills by monitoring waste levels.

# 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

- Increased 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
- Maximize throughput with application-specific Thermo Scientific Vanquish Horizon Duo UHPLC systems



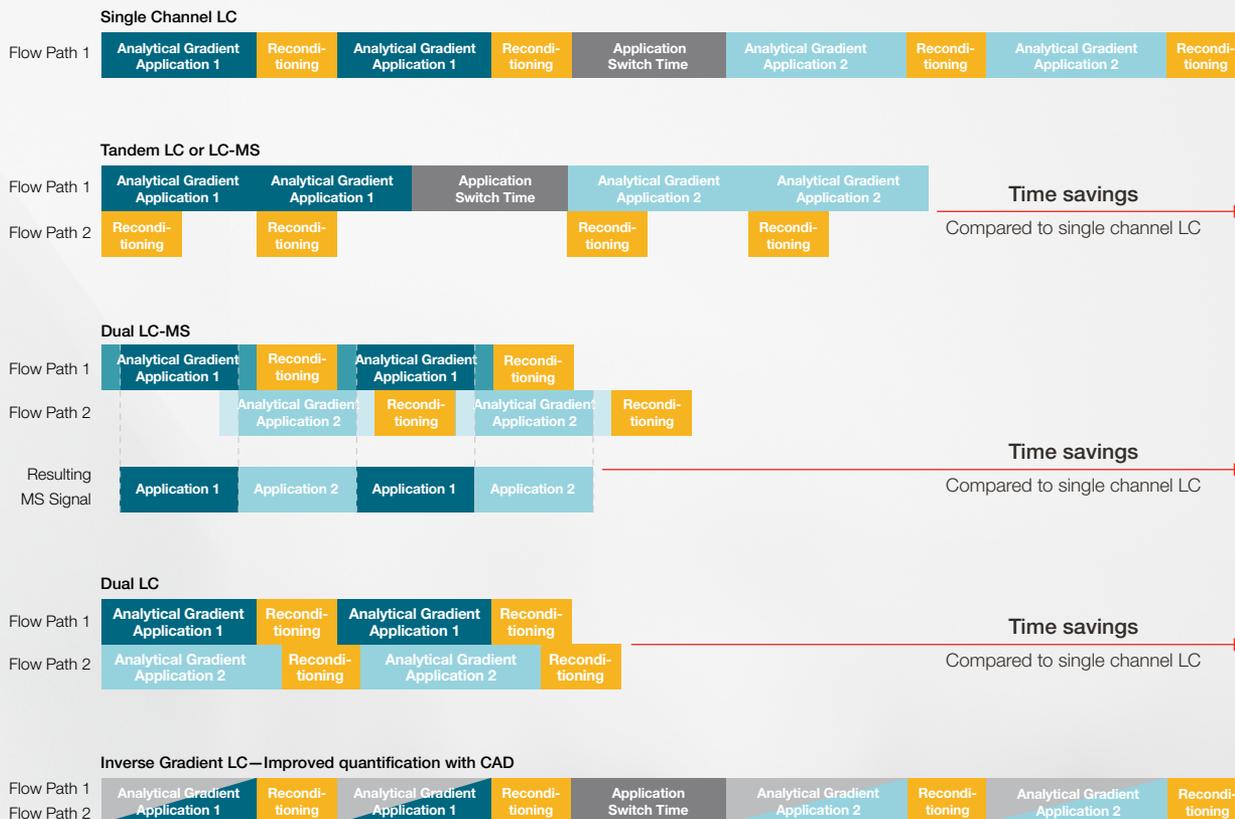
**Vanquish Horizon Duo UHPLC system can double the productivity while requiring only small additional investments.**



**A Vanquish Duo for Dual LC-MS is a multichannel LC with no extra bench space required, while offering doubled throughput with Vanquish system inherent values of robustness and ease of use. Here the instrument is shown with the optional Charger module.**



# Maximize productivity



## Thermo Scientific Vanquish Duo for Dual LC

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

## Vanquish Duo for Dual LC-MS

Double the throughput of your LC-MS application with the Vanquish Duo for Dual LC-MS. Run up to two applications simultaneously with a multi-channel LC while benefiting from the robustness, performance, and ease-of-use inherent of the Vanquish LC platform.

## Vanquish Duo for Tandem LC or LC-MS

Increase your lab throughput by 30% with the Vanquish Duo for Tandem LC or LC-MS workflow.<sup>1</sup> Maximize the utilization of your optical detector or mass spectrometer.\*

\* TN72203: Tandem UHPLC operation for high-throughput LC-MS peptide mapping analyses.

## Vanquish Duo for Inverse Gradient LC

Improve your lab quantification capabilities with the Vanquish Duo for Inverse Gradient, employing the unique and near-universal charged aerosol detection, to quantify non-volatile and semi-volatile compounds even when no individual reference standard is available.

# Increased confidence

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:

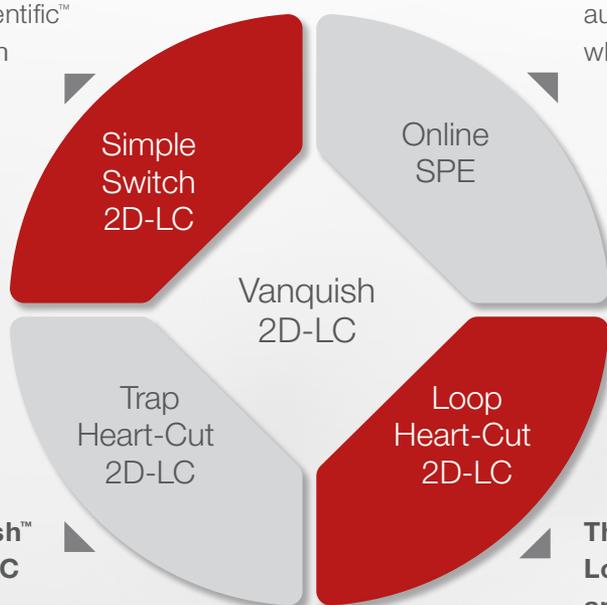
## Vanquish Online 2D-LC systems

### 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 for Dual LC.

### 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.

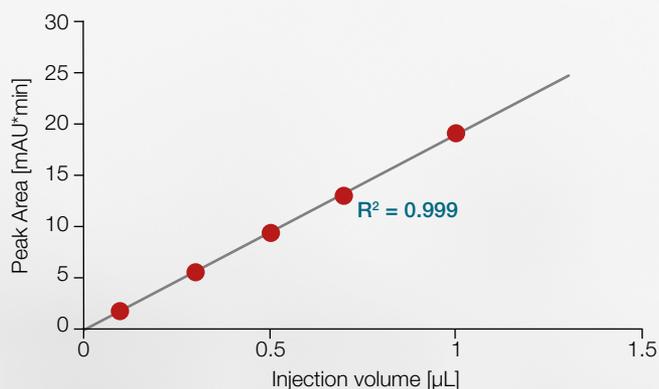
### Thermo Scientific™ Vanquish™ Loop Heart-Cut 2D-LC HPLC and UHPLC system

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.



# Precision on new levels

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.



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

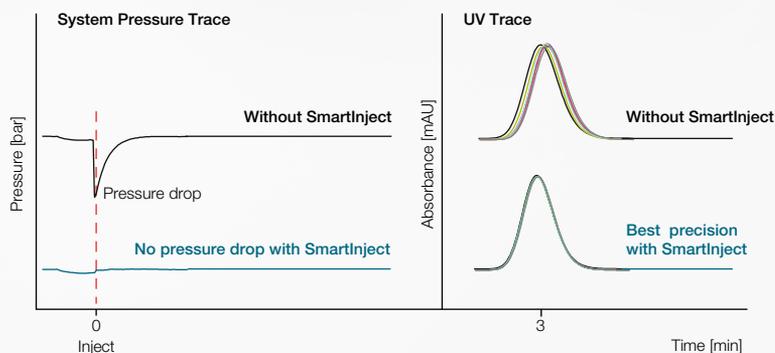
- SmartInject technology for increased retention time precision and prolonged column lifetime
- SmartFlow™ pumping algorithm for improved flow accuracy for superior system-to-system reproducibility
- SmartStroke™ technology for a variable stroke volume resulting in improved signal-to-noise performance 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.



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.



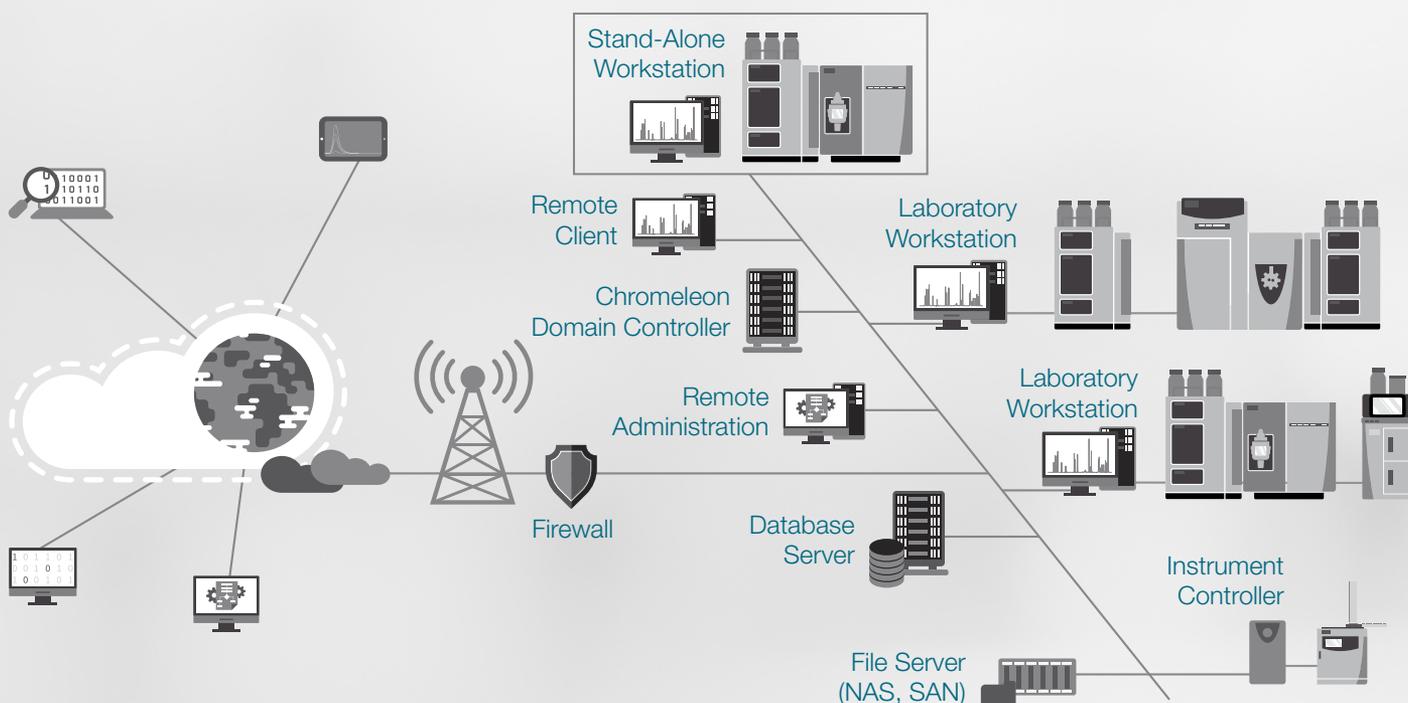
## Chromeleon CDS

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.

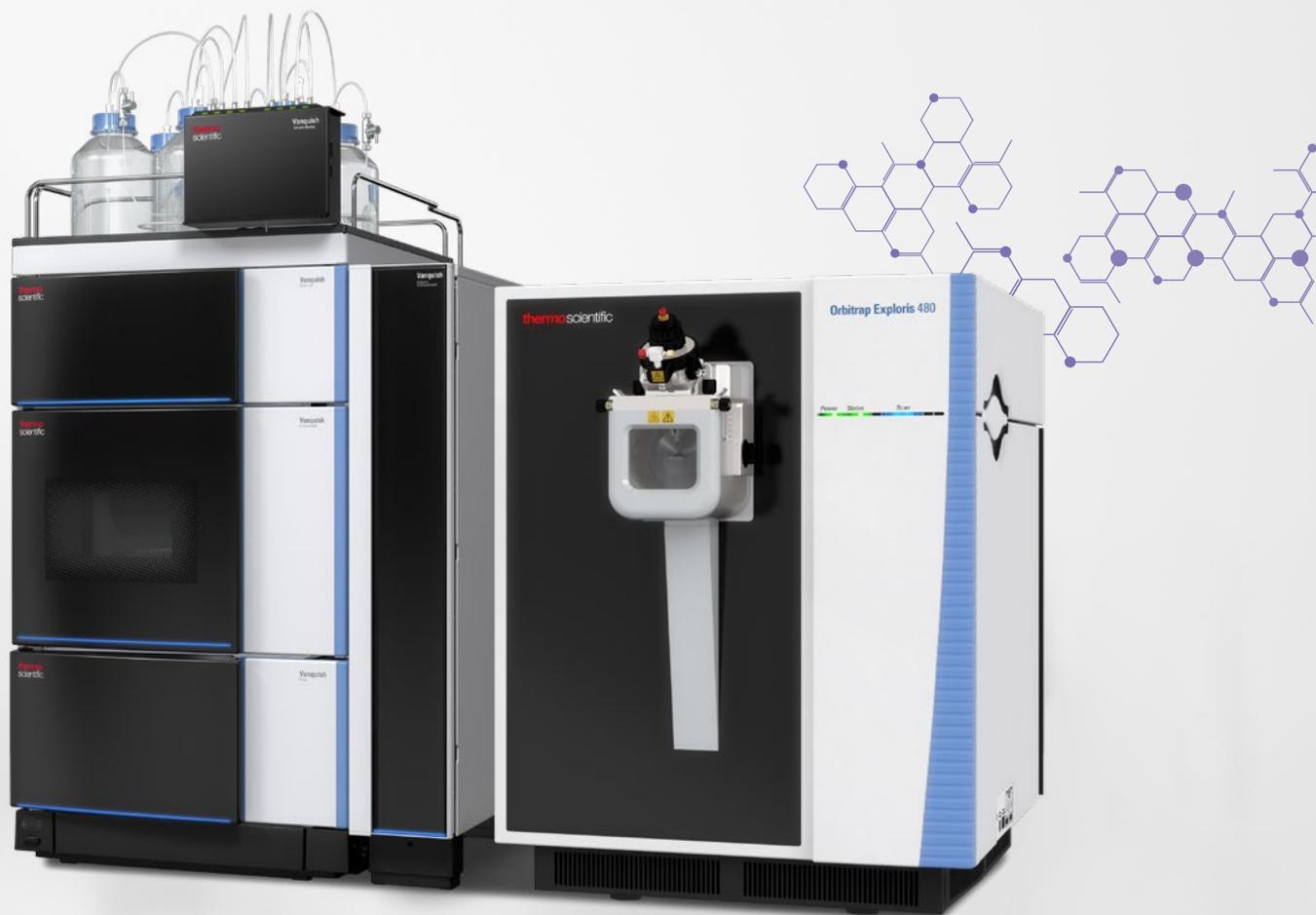


Network scalability—stand-alone to a global network with secure central data storage.

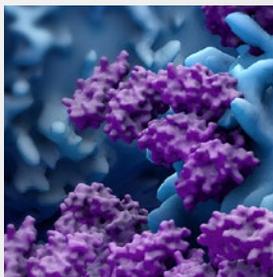
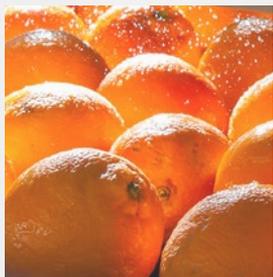
# Benefit from highly-sensitive and selective mass spectrometry

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



The Vanquish Horizon UHPLC system with the Thermo Scientific™ Orbitrap Exploris™ 480 mass spectrometer.



# Detect your analyte

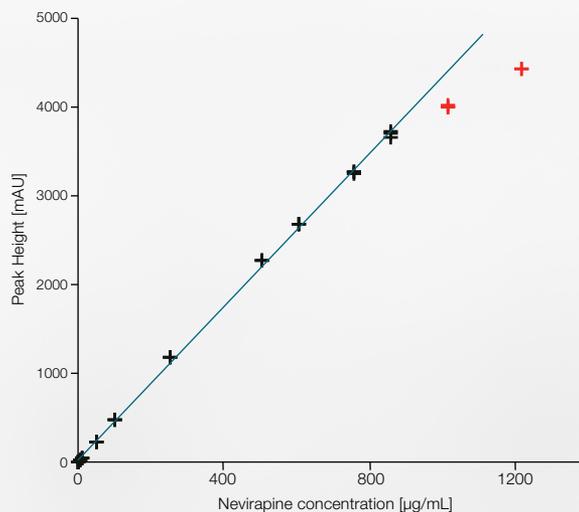


Choosing the right detection technology is key to revealing all the components of interest in your sample. The Vanquish Horizon UHPLC system offers a wide range of detection capabilities that can be easily integrated and combined to fit your methods.



## Industry-leading diode array detection

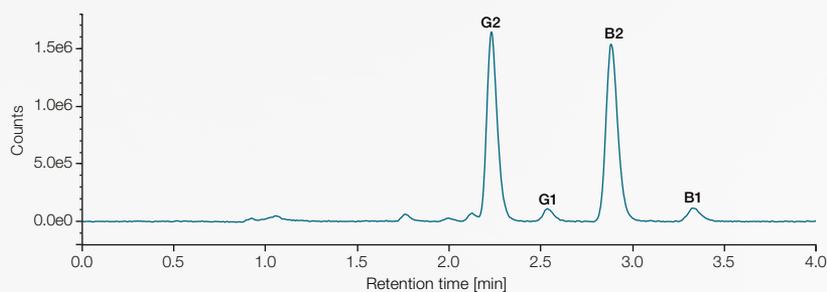
Thermo Scientific Vanquish Diode Array Detector HL with the Thermo Scientific™ LightPipe™ detection technology delivers supreme analyte sensitivity through low baseline noise and longer effective light path by total internal reflection. The Thermo Scientific Vanquish Diode Array Detector FG offers cutting 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.



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.

## Powerful fluorescence detection

Fluorescence detection enables high sensitivity and selectivity.

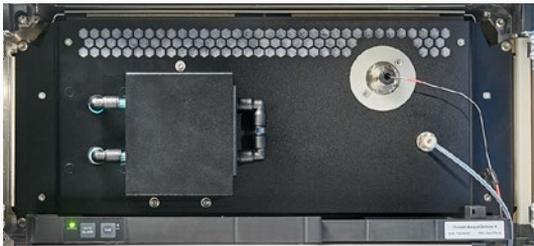


FLD chromatogram of the four aflatoxins: G2, G1, B2 and B1 at a concentration of 0.9 µg/kg for G2 and B2 and 2.9 µg/kg for G1 and B1.

## Variable wavelength detection

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

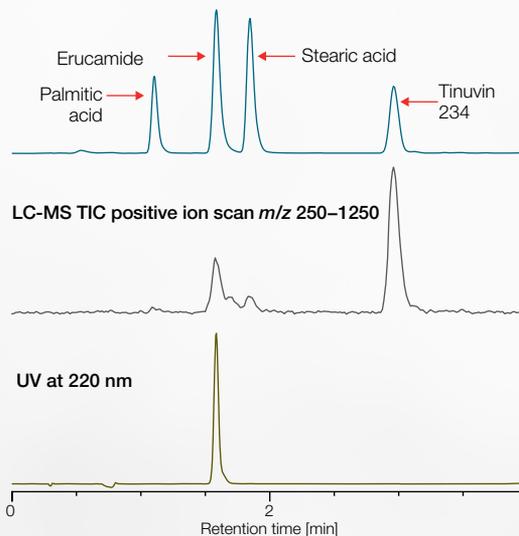




### Unique, universal charged aerosol detection

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.

### Charged Aerosol Detection



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.



### 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.



# Explore the system



### 1 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.

### 2 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).

### 3 SmartInject Technology

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

### 4 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.

### 5 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.

### 6 Easier operation

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



### 7 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.

### 8 Keep your lab tidy

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

### 9 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.

### 10 Higher data confidence

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

### 11 Biocompatibility

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

### 12 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



### Thermo Scientific™ Vanquish™ Core™ HPLC system

- Workhorse instrument to dependably deliver results
- System intelligence for improved productivity
- Seamless method transfer
- Low pressure, high pressure, and isocratic solvent blending



700 bar

### Thermo Scientific™ Vanquish™ Flex™ UHPLC system

- Unparalleled flexibility and control
- High throughput, high sensitivity
- Low pressure and high pressure solvent blending



1000 bar

### Thermo Scientific Vanquish Horizon UHPLC system

- Industry-leading precision and accuracy in delivering sample information
- Unmatched detection, sensitivity and speed
- Truly future-proof with specifications far in excess of all others
- Optimizes the benefits of LC-MS analysis



1500 bar

## The collective power of chromatography

LC that takes your productivity to new heights



Find out more at [thermofisher.com/vanquishhorizon](http://thermofisher.com/vanquishhorizon)