

thermo scientific



Vanquish Duo HPLC and UHPLC Systems

Maximize productivity

**ThermoFisher**  
SCIENTIFIC

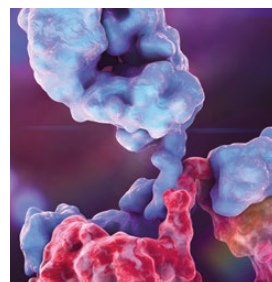
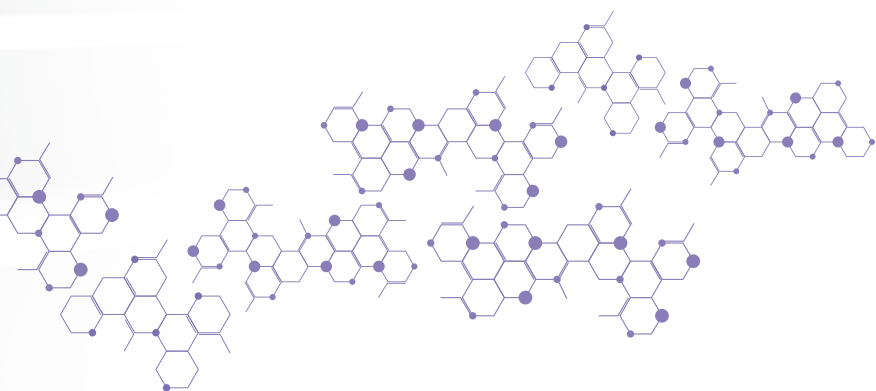
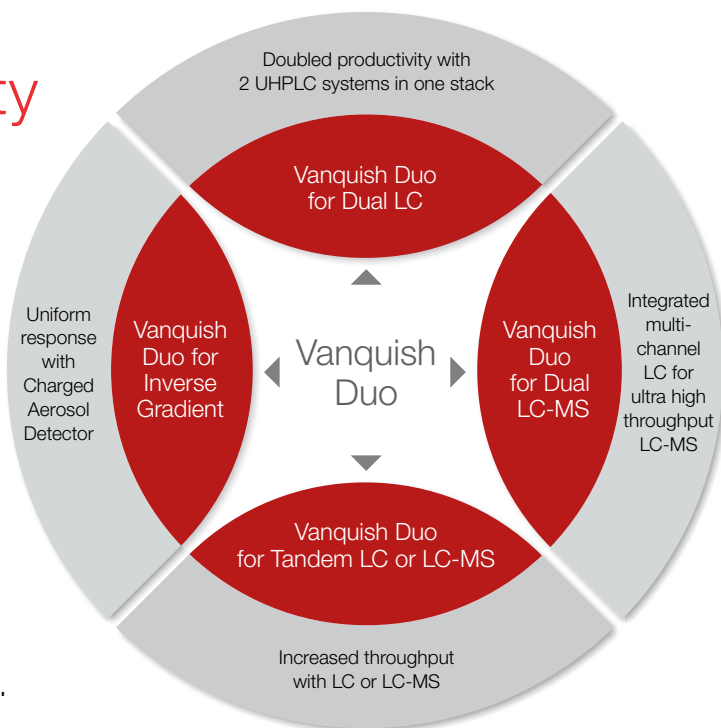


# Optimize your productivity

In today's challenging research and production environments, you are being asked to be more productive without increasing spending or compromising quality.

At the same time, advancements and innovations are needed to improve operational efficiency and performance.

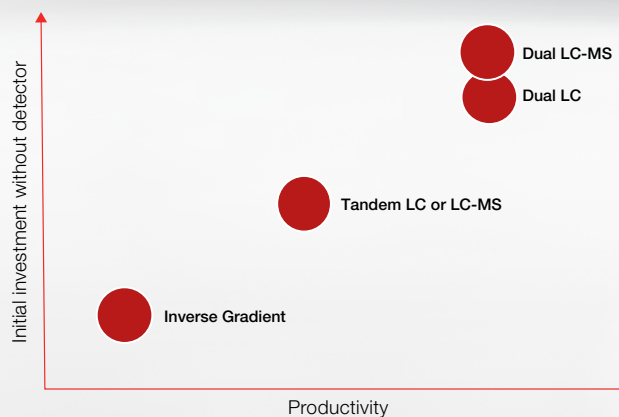
How do you accomplish this? It's easy with the Thermo Scientific™ Vanquish™ Duo HPLC and UHPLC systems built for enhanced productivity. By combining individual Vanquish components, four workflows consisting of distinguished system configurations and software wizards can be created.



# Two flow paths for maximized productivity

Your laboratory may be facing increased pressure to improve working efficiency and deal with limiting resources, such as budget, space, or manpower. Vanquish Duo HPLC and UHPLC systems are designed to overcome these limitations.

Vanquish Duo HPLC and UHPLC systems consist of four individual workflows, each separately configured, to address specific analytical challenges.



## Unique dual technology

The Vanquish platform contains two unique dual modules. The Vanquish dual pumps merge two individual, low pressure mixing pumps in one housing enabling separate eluents and gradients for each pump.

The Vanquish dual split samplers possess two independently controlled injection units including separate injection valves and injection needles. Used in Dual LC and LC-MS workflows only, this enables high throughput and extensive sample characterization workflows.



# Individual configurations to best serve your needs

Vanquish Duo workflows are configured with Thermo Scientific™ Vanquish™ Core system, Thermo Scientific™ Vanquish™ Flex system or Thermo Scientific™ Vanquish™ Horizon system modules. All four of these workflows make use of two pumps to increase the analytical productivity.

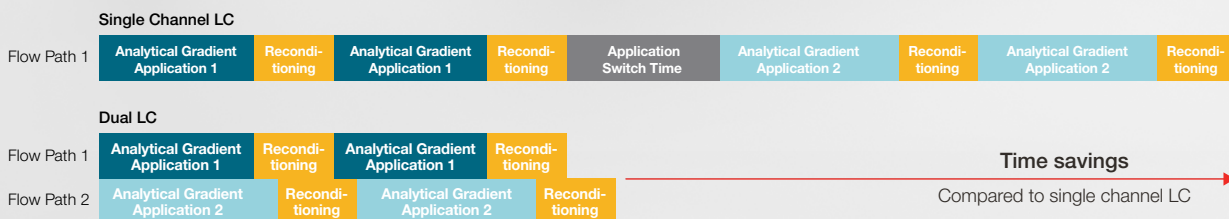
	Vanquish Duo system for Dual LC	Vanquish Duo system for Dual LC-MS	Vanquish Duo system for Tandem LC or LC-MS	Vanquish Duo system for Inverse Gradient
<b>Supported systems</b>	<ul style="list-style-type: none"> <li>• Vanquish Horizon</li> <li>• Vanquish Flex</li> </ul>	<ul style="list-style-type: none"> <li>• Vanquish Horizon</li> <li>• Vanquish Flex</li> </ul>	<ul style="list-style-type: none"> <li>• Vanquish Horizon</li> <li>• Vanquish Flex</li> <li>• Vanquish Core</li> </ul>	<ul style="list-style-type: none"> <li>• Vanquish Horizon</li> <li>• Vanquish Flex</li> <li>• Vanquish Core</li> </ul>
<b>Sampler</b>	Dual split sampler	Dual split sampler	Split sampler	Split sampler
<b>Detector</b>	Two out of the complete detector portfolio	One mass spectrometer	One out of the complete detector portfolio and/or one mass spectrometer	Thermo Scientific™ Vanquish™ Charged Aerosol Detector
<b>Software control</b>	<ul style="list-style-type: none"> <li>• Thermo Scientific™ Chromeleon™ Chromatography Data System (CDS)</li> <li>• Thermo Scientific™ Standard Instrument Integration (SII) for Waters™ Empower™ 3 CDS</li> </ul>	Thermo Scientific™ Aria™ MX software	<ul style="list-style-type: none"> <li>• Chromeleon CDS</li> <li>• Standard System Integration for Thermo Scientific™ Xcalibur™ software</li> </ul>	<ul style="list-style-type: none"> <li>• Chromeleon CDS</li> <li>• Thermo Scientific™ Standard Instrument Integration (SII) for Waters Empower 3 CDS and Agilent™ OpenLab™ CDS</li> </ul>



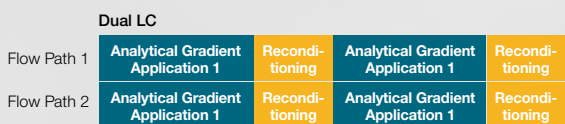
# Vanquish Duo System for Dual LC

A Vanquish Duo system for Dual LC enables you to run two methods simultaneously on one instrument, doubling your throughput or deepening your sample knowledge while maximizing your productivity and performance. The unique Vanquish Duo system for Dual LC will:

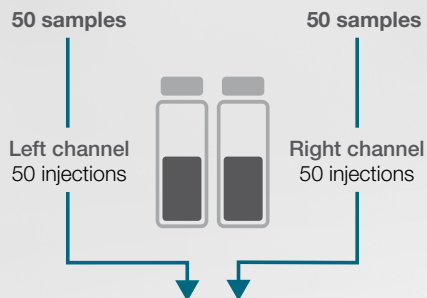
- Improve return on investment by reducing cost per sample
- Increase sample throughput without changing validated methods
- Increase capacity without sacrificing bench space
- Accelerate your method development process
- Analyze the same set of samples with multiple methods reducing sample preparation time and maximizing sample knowledge



## What can you do with a Vanquish Duo system for Dual LC?



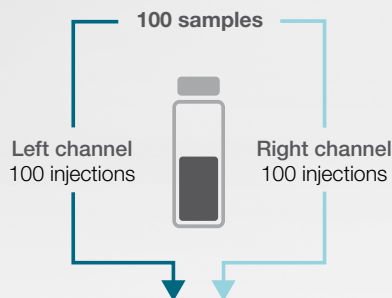
### Run two identical columns in parallel



**Be finished in half the time**



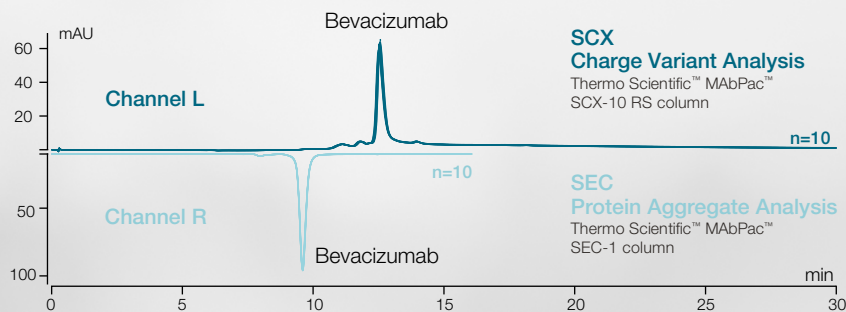
### Run your complementary columns in parallel



**Get more information out of every sample**



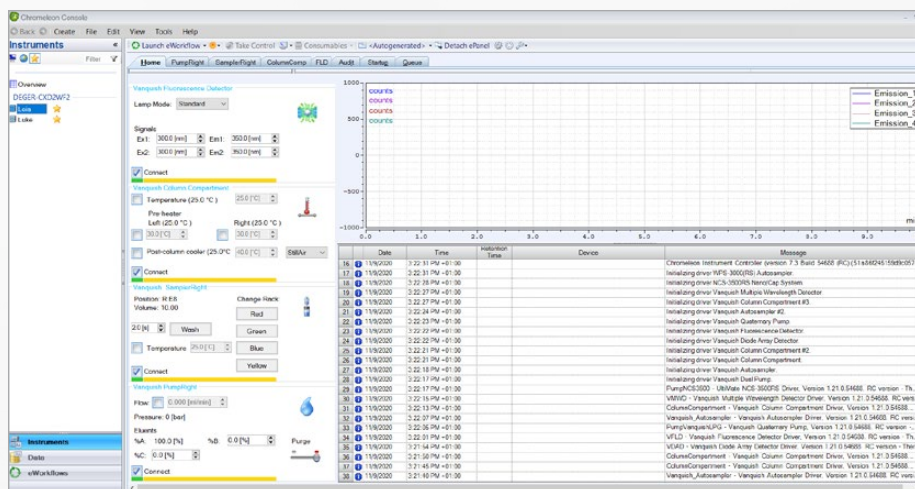
Sample injected on two complementary columns



Two independent assays run simultaneously from a single sample on one LC instrument to deepen your sample knowledge.

“The instrument offers a fantastic increase in throughput, either while running the same separation chemistry or most excitingly when running two different separation chemistries, enabling us to generate large amounts of characterization data from the same sample quickly.”

—Dr. Jonathan Bones, Principal Investigator, National Institute for Bioprocessing Research and Training



Complete control with just a few clicks

Chromleon CDS delivers industry-leading ease-of-use for the Vanquish Duo system for Dual LC. Independently control the two channels of the Vanquish Duo system for Dual LC from a single interface with full traceability of all actions that is 21 CFR Part 11 compliant.

Easy-to-use and intuitive system control of the Dual LC workflow within Chromleon CDS.



# See the Vanquish Duo System for Dual LC

The Vanquish Duo UHPLC system for Dual LC has been built to utilize a wide range of analytical detectors, including mass spectrometry (MS), diode array detection (DAD), charged aerosol detection (CAD), variable wavelength detection (VWD), and fluorescence detection (FLD).

## 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 during your analysis, reducing loss of valuable measurement time and sample material.

## 2 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.

## 3 Versatile detection capabilities

Differing molecular characteristics of your analyte, from small molecules to complex biomolecules, necessitate multiple detector methodologies. Vanquish Duo system for Dual LC can be used with any two detectors out of the broad detector portfolio including MS, DAD, VWD, FLD and CAD.

## 4 Compatible with your software infrastructure

A Vanquish Duo UHPLC system for Dual LC can be operated in various software environments including the latest Chromeleon software feature release, Chromeleon CDS long-term, and extended support version and Waters Empower.

## 5 Versatile column management

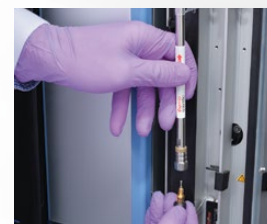
Greater column capacity (two 30 cm columns or a greater number of shorter columns per compartment), plus class-leading temperature range and temperature stability.

## 6 Delivering powerful separations

Run samples with two similar or different columns to increase throughput or maximize output. Setup with optional second compartment for independent column temperatures.

## 7 Easier operation

Patented tool-free Thermo Scientific™ Viper™ Fingertight Fittings with near-zero dead volume operation and ergonomic design.



## 8 Unique Thermo Scientific™ SmartInject technology

Superior retention time precision and enhanced column protection with intelligent SmartInject technology on both flow paths.

## 9 Two proprietary injection valves

Two separate injection valves with no shared fluidics allowing full application flexibility, including individual eluents, wash liquids and loop sizes.

## 10 Easier sample handling

Automated barcode reader to eliminate tedious rack configuration.

## 11 Higher sample capacity

High sample capacity is standard (four plates versus two plates on industry average). Increase capacity further with the optional Thermo Scientific™ Vanquish™ Charger module.

## 12 Accurate flow for more data confidence

The flow is delivered by a dual pump offering two truly individual devices in a single housing with ternary gradient proportioning.

## 13 Simple maintenance

Module maintenance is reduced to a minimum and can be worked on without instrument de-stacking, plus smart light bars on the front of the system provide instant system status update.

## 14 Keep the lab tidy

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

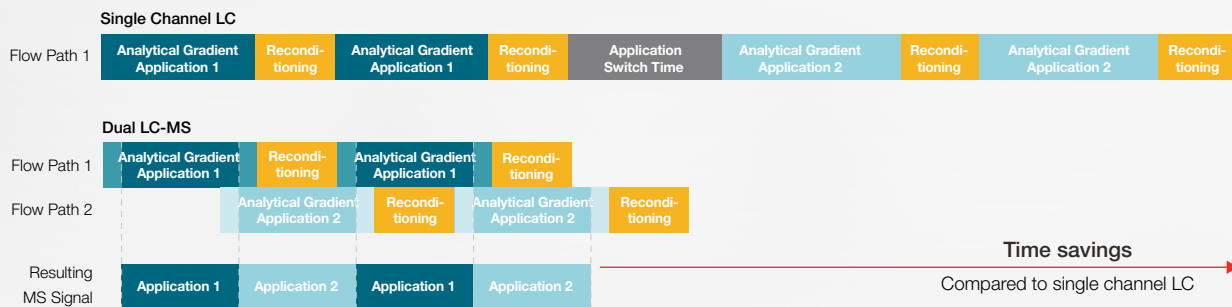




# Vanquish Duo System for Dual LC-MS

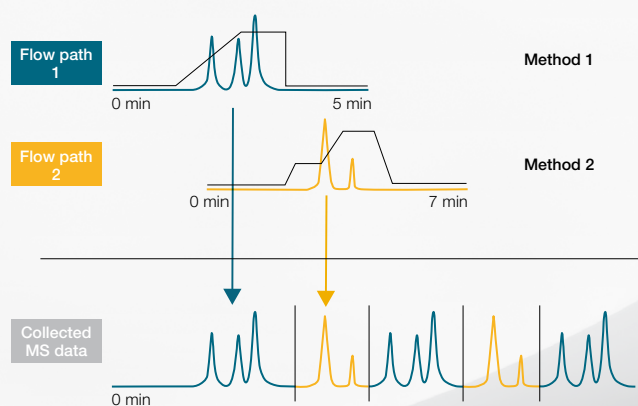
During gradient elution of LC-MS analysis, the elution window of the compounds of interest is often only a fraction of the total run time limiting the final sample throughput. The Vanquish Duo system for Dual LC-MS can double LC-MS throughput with a multi-channel LC approach that eliminates wasted time from the application.

- Double the throughput without compromising data quality
- Small footprint for optimal bench space utilization
- Improves flexibility by running two different methods simultaneously
- Accelerates return on investment with greater MS utilization



A Vanquish Duo system 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.

The Dual LC-MS workflow consists of two independent LC channels which can independently operate to run the separation. This combination, along with the smart scheduling capability of Thermo Scientific Aria MX software, results in doubled throughput without any sacrifice in data quality, sensitivity or additional bench space.

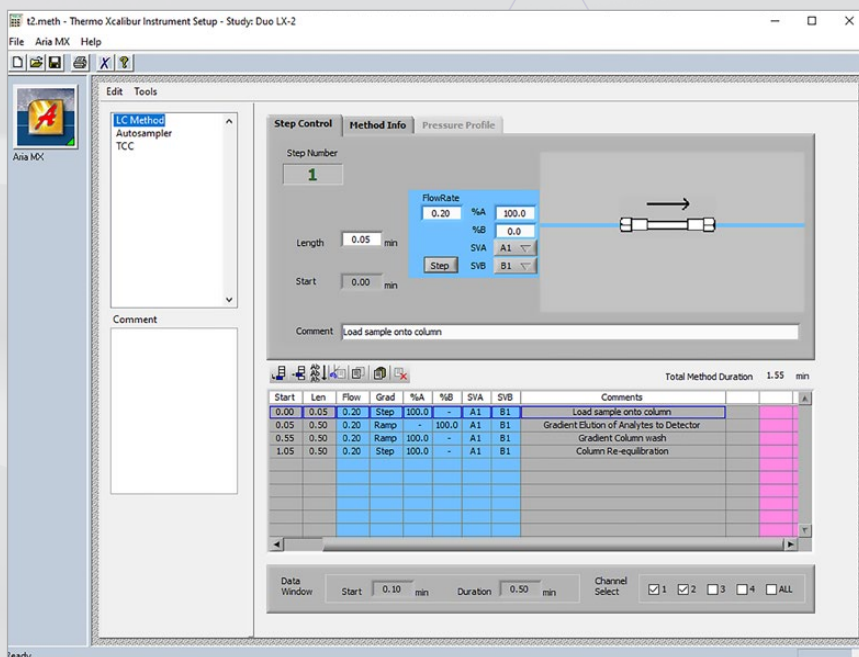


Interlacing of two LC flow paths into one single mass spectrometer for doubled throughput even with two different types of analysis.



## Intelligent scheduling

Aria MX software manages and controls all aspects of the Vanquish system. It is powerful enough to schedule and manage multiple methods on multiple channels simultaneously. At the same time, it features an intuitive graphical method editing, allowing anyone to quickly develop methods and run batches of samples. Aria software can be either used with Thermo Scientific mass spectrometer software such as Thermo Scientific™ TraceFinder™ and Xcalibur software and additionally integrates into Analyst® software.

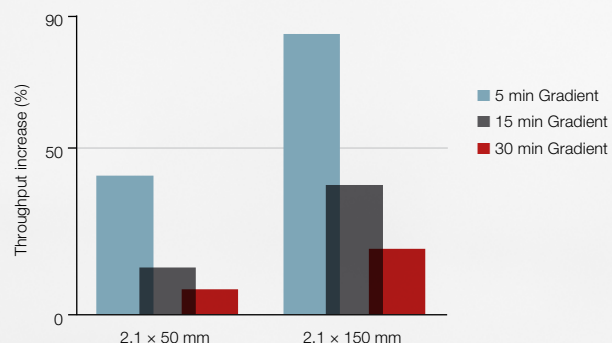


# Vanquish Duo System for Tandem LC or LC-MS

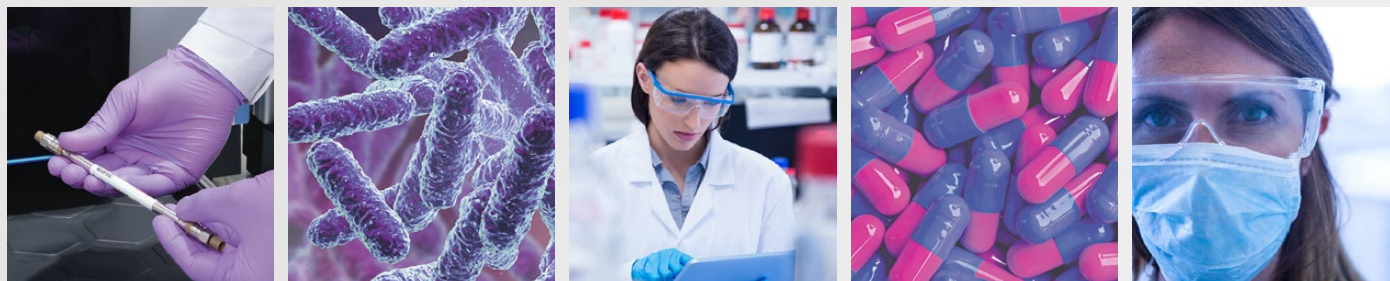
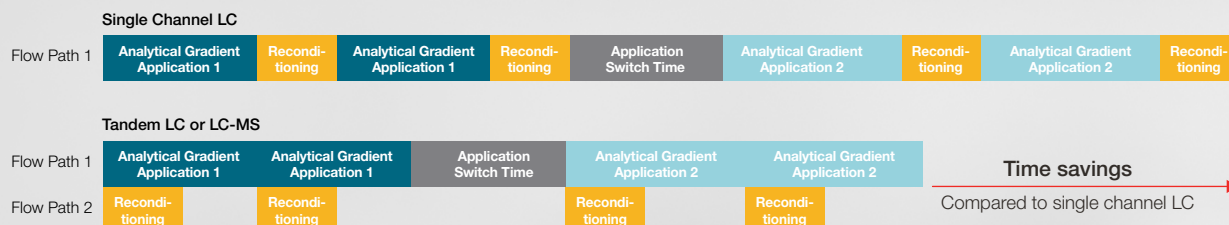
Gradient separations are commonly used in LC or LC-MS. Column reconditioning, such as washing and re-equilibration, takes time and reduces your overall sample throughput. The Vanquish Duo system for Tandem LC or LC-MS eliminates these limitations and improves productivity by:

- Increasing sample throughput without modifying a validated method
- Improving return on investment by maximizing the instrument utilization
- Reducing column carry over through extended column washing without sacrificing throughput
- Simplifying method setup with automatic method conversion from your original gradient method

## Throughput increase by Tandem LC or LC-MS



Throughput increase by Tandem LC or LC-MS is between 10–80% for most common conditions.

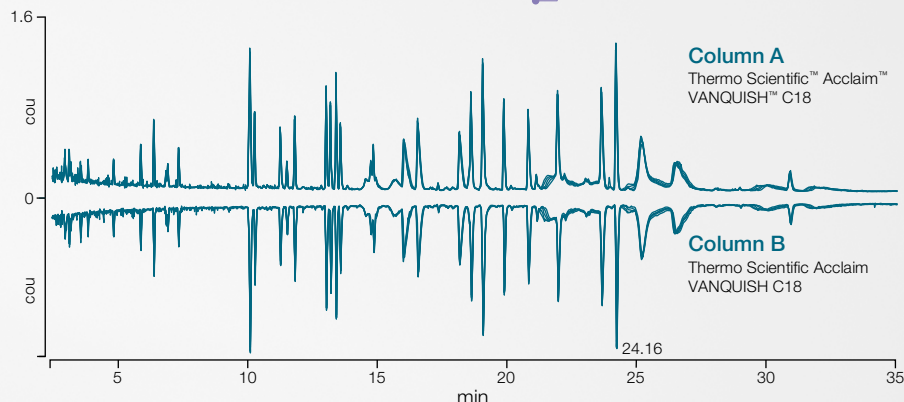


“Since installing the Tandem LC-MS system we have doubled our throughput and increased the precision of our data!”

—Dr. Richard Rogers, Just Biotherapeutics, Inc.



The Vanquish Duo system for Tandem LC or LC-MS splits the analysis between two pumps and two columns. One pump delivers the analytical gradient while the second pump runs the reconditioning gradient. This configuration allows you to use two identical columns to run your sequence faster without compromising data quality.



Reproducible results for the Thermo Scientific™ Vanquish™ Horizon Duo UHPLC system for Tandem LC or LC-MS—Thermo Scientific™ Q Exactive™ HF hybrid quadrupole-Orbitrap™ mass spectrometer showing an overlay of five total ion current chromatograms. The sample shown is digested Infliximab using the Thermo Scientific™ SMART™ Digest Kit.

“With the Vanquish Duo for Tandem LC-MS, we have two instruments in one in terms of analysis time but it’s only occupying the footprint of a single LC system. Of course it saves space, but furthermore it gives us a more efficient utilization of our MS system.”

—Dr. Dan Bach Kristensen, Principal Scientist, Symphogen

## Simply upgrade your method

Implementing Tandem LC or LC-MS into your workflow is easy with compliance-ready Chromeleon software for LC or LC-MS users and Thermo Scientific Standard Instrument Integration (SII) for Thermo Scientific Xcalibur software for LC-MS users.

A simple dedicated instrument method wizard enables you to create new methods without the need for additional training.

No	Time	Flow [ml/min]	%B	Curve
1	0.000			Run
2	0.000	0.500	20.0	S
3	5.000	0.500	60.0	S
4	5.100	0.500	90.0	S
5	7.100	0.500	90.0	S
6	7.200	0.500	20.0	S
7	New Row			
8	10.000			Stop Run

Chromeleon CDS and SII for Xcalibur guides users through the implementation of a Tandem LC or LC-MS method with automatic system volume considerations and gradient formation of the reconditioning pump.

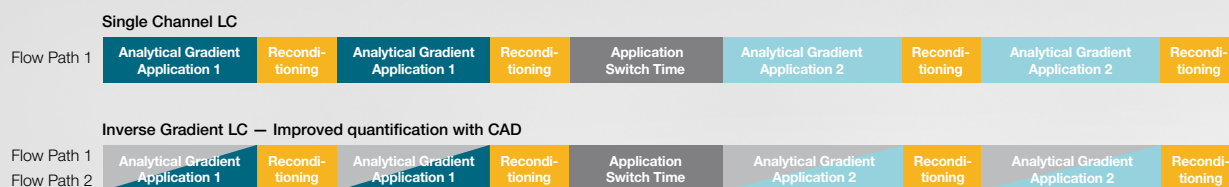
# Vanquish Duo System for Inverse Gradient

Vanquish Duo system for Inverse Gradient provides you a uniform response for all detectable analytes with the superior charged aerosol detection (CAD). While isocratic separations can yield a uniform CAD response, some separations require gradient elution.

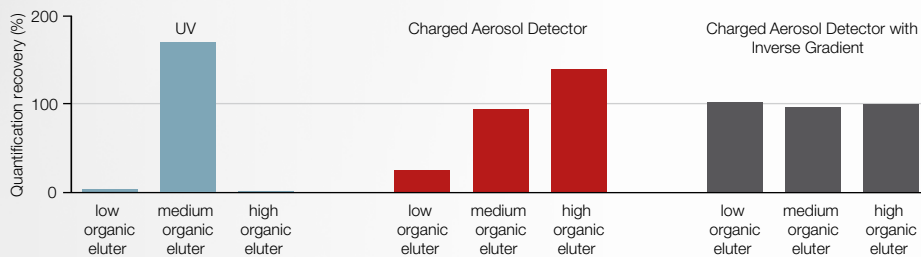
By utilizing a second pump to deliver an inverse gradient, the detector offers:

- Uniform response with CAD under gradient elution conditions
- Reliable standard-free quantification of knowns and unknowns
- Simplifying method setup with automatic Inverse Gradient calculation considering all system volumes

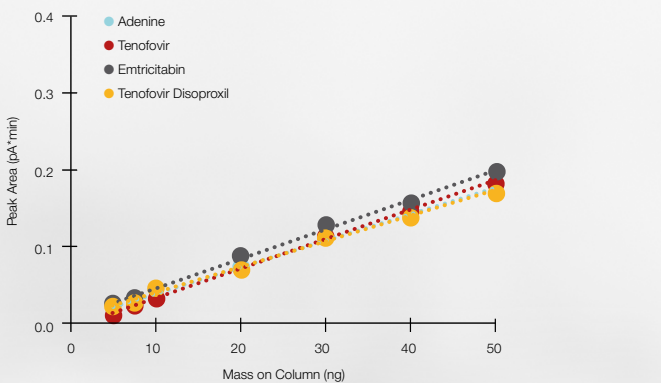
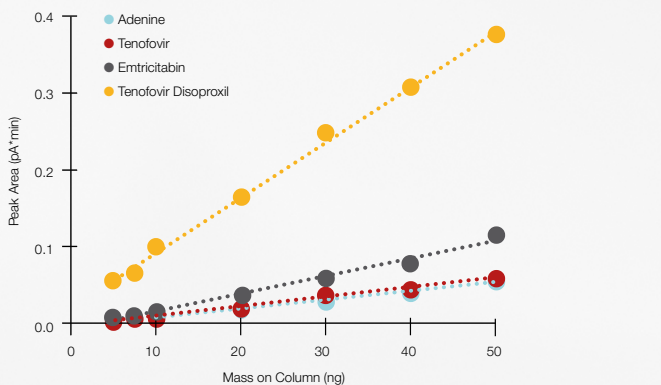
By using an Inverse Gradient for compensation, the eluent entering the detector always has the same solvent composition, no matter where the compound elutes during the gradient. This gives you consistent response for quantitative information with high confidence even if you lack an individual standard.



## Quantification recovery of unknown compounds



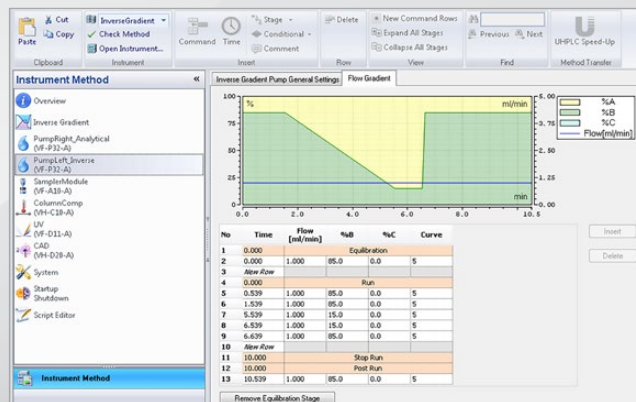
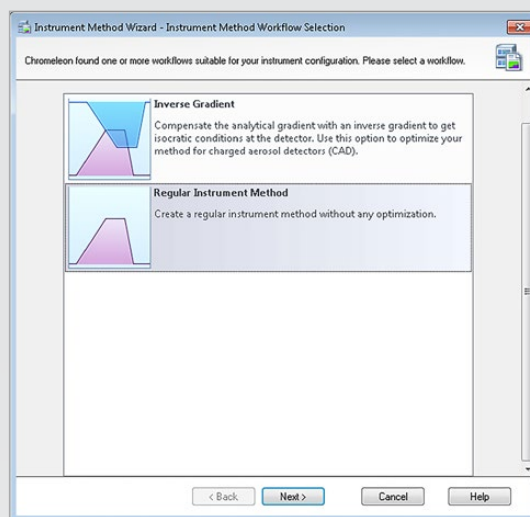
For a gradient separation, the quantification recovery of unknown compounds with CAD is best with the eluting conditions from the Inverse Gradient approach. For a standard CAD, the quantification recovery will depend on the organic content. UV detection recovery depends on chromophore extinction coefficient.



Calibration curves for four pharmaceuticals without (top) and with Inverse Gradient compensation (bottom) showing similar response factors for all compounds.

## No extra work needed— automatic gradient conversion

Chromeleon CDS automatically identifies the Inverse Gradient instrument configuration and starts the dedicated method wizard. The wizard calculates and applies the Inverse Gradient to the second pump in the Vanquish Duo system for Inverse Gradient taking into account all internal volumes giving highest quantification accuracy and maximized ease-of-use.



Chromeleon CDS guides users through the implementation of an Inverse Gradient method with automatic system volume considerations and gradient formation.

## See what you've been missing

Most detection options in liquid chromatography require certain physico-chemical properties to detect a substance, such as a chromophore for UV light absorption or ionizability for mass spectrometry. Charged aerosol detection quantifies any non-volatile analyte independent of chemical structure while simultaneously providing uniform response, excellent sensitivity and a wide linear range.

## Thermo Scientific LC Portfolio Overview

### HPLC systems

Routine analysis

### UHPLC systems

Method development

Research and high throughput

Thermo Scientific Vanquish Duo HPLC and UHPLC system workflows

#### 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/vanquishduo](http://thermofisher.com/vanquishduo)