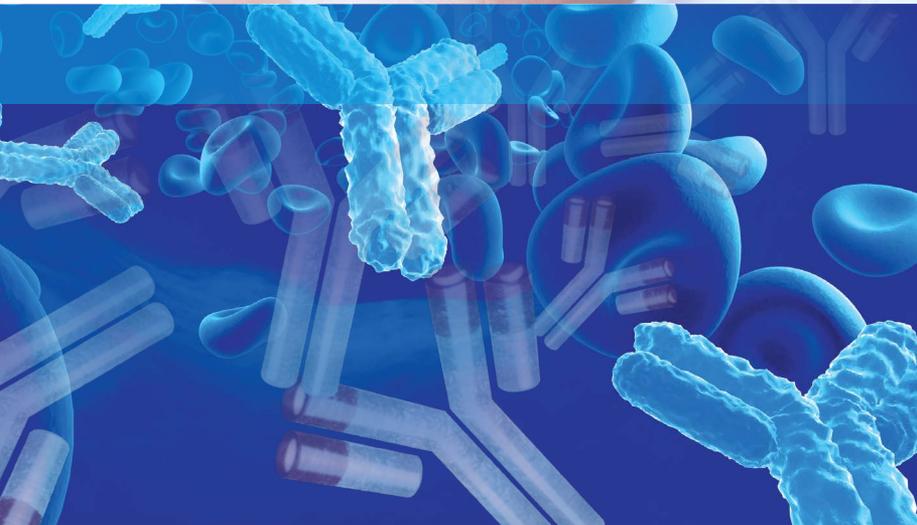


Thermo Scientific Dionex  
UltiMate 3000 BioRS Systems



## Genuine Bio UHPLC for biomolecule analysis

Resolution • Throughput • Connectivity

**Thermo**  
SCIENTIFIC

# Powering Bio UHPLC beyond reversed phase

The Thermo Scientific™ Dionex™ UltiMate™ 3000 Biocompatible Rapid Separation (BioRS) system perfectly matches the demands for biomolecule separations to run various modes of chromatography in UHPLC. This goes beyond reversed-phase UHPLC: it is genuine Bio UHPLC.

## High Resolution Bio UHPLC

The UltiMate 3000 BioRS system is powered by UltiMate 3000 Rapid Separation technology to support the high pressures required for the separation of bioanalytes on high resolution bio UHPLC columns.

This state-of-the-art technology combined with a biocompatible, low-dispersion flow path, provides the highest peak capacity and sensitivity for complex samples, whether proteins, peptides, or biotherapeutics.

The Thermo Scientific Dionex Viper™ Fingertight fitting technology ensures robust system connections with virtually zero-dead volume for maximum performance.

Peptide mapping, monoclonal antibody charge variant analysis, glycan analysis, or nucleic acid analysis, the UltiMate 3000 BioRS system is ready to meet the high chromatographic demands of any of these biomolecule analyses.



▶ UltiMate 3000 BioRS system



## Rely on your results in biochromatography every time, everywhere.

The system was developed for reliability and robustness under the harsh solvent conditions applied in biochromatographic analyses.

The corrosion-resistant materials in the complete system flow path (pump, autosampler, column compartment and detector) reduce the risk of analyte interaction with internal surfaces and extends the lifetime of particular biocolumns, even under high salt or extreme pH conditions.

◀ Biocompatible injection valve and needle of the UltiMate 3000 WPS-300TBRS autosampler.

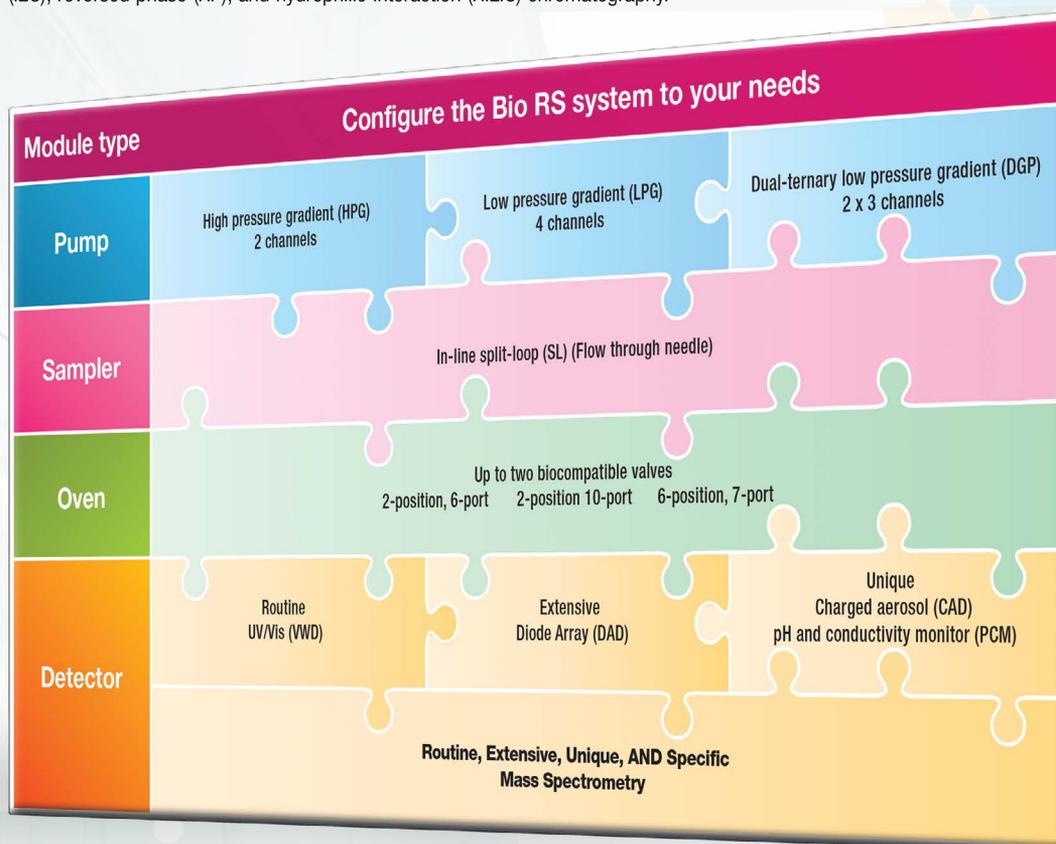
## Ultimate Productivity and Flexibility

The UltiMate 3000 BioRS system delivers optimal separations at ultrahigh speed while maintaining resolution by combining:

- **Pressure of up to 1000 Bar (15,000 psi)**
- **Flow rates of up to 8 mL/min**
- **Short sampler cycle times (< 20 seconds)**
- **Wide column thermostating range (5 °C to 110 °C)**
- **Ultrafast data collection and processing (up to 200 Hz)**

**UHPLC<sup>+</sup>**  
focused

Bio UHPLC enables faster gradients and shorter run times compared to conventional Bio LC analysis. This results in increased sample throughput in typical modes of biochromatography, e.g. ion exchange (IEC), reversed phase (RP), and hydrophilic interaction (HILIC) chromatography.



## Seamless Integration with MS

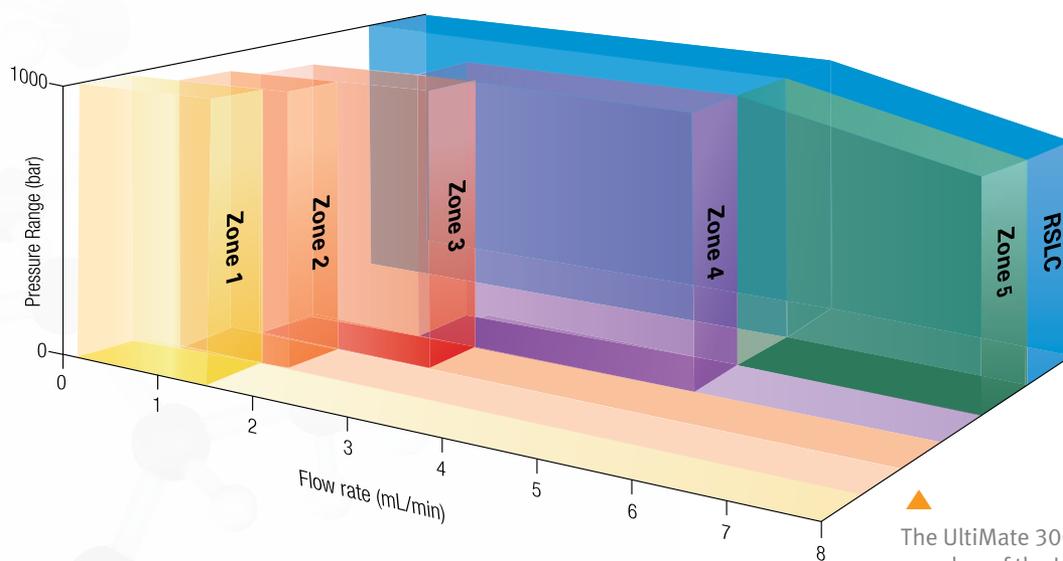
From routine quantitation and confirmation using ion traps, triple quadrupoles, or high resolution Thermo Scientific™ Q Exactive™ and Exactive Plus mass spectrometers, to complex discovery using Thermo Scientific™ Orbitrap™ hybrid mass spectrometers, all systems seamlessly integrate with the UHPLC<sup>+</sup> solutions offered by the UltiMate 3000 BioRS system.



# Versatile components for scalable separations

## One System for all Your Analytical Applications

Utilizing the full power of RSLC technology, the UltiMate 3000 BioRS system, with its extensive flow-pressure footprint, excels at supporting a wide variety of applications, in any state of the molecule's characterization whether it is development, identification, or quality control (QC).



▲ The UltiMate 3000 BioRS, as a member of the UltiMate 3000 RS system family, provides the extensive flow-pressure footprint to fully meet your chromatographic goals.

## Biocompatible Solvent Delivery

The UltiMate 3000 BioRS centers around the biocompatible RS pump family which is the first choice for advanced biochromatographic separations with:

- Pressures up to 1000 Bar (15,000 psi)
- Binary, quaternary, and dual-ternary gradient solvent delivery
- Productivity solutions such as parallel and tandem LC

The BioRS pumps provide state-of-the-art performance for high-speed and ultrahigh-resolution (bio)applications - even under harsh salt and pH conditions.



**RS**  
Bio

## Reliable Sample Handling of Biomolecules

The biocompatible Thermo Scientific Dionex UltiMate 3000 Well Plate Autosampler is engineered to meet the high demands of bio UHPLC. In-line split-loop (flow-through needle) fluidics and virtually zero-dead-volume Viper connections provide lowest carry over and lowest possible peak dispersion. Low gradient delay volume provides fast gradient response. Corrosion-resistant materials ensure robustness and highest system uptime.



▲ WPS-3000TBRS Autosampler

## Precise Thermostatting for any Bio Column

The Thermo Scientific Dionex Thermostatted Column Compartment (TCC) uses large-area Peltier elements and a fan-based, forced-air design to provide efficient cooling and heating.

- **Wide temperature range: 5 °C to up to 110 °C for reliable separations**
- **Holds up to 12 columns and columns with a maximum length of 30 cm to facilitate automated method development**
- **Freely configurable biocompatible switching valves for advanced chromatographic techniques**



▲ TCC-3000RS Column Compartment

## pH and Conductivity Monitoring

The Thermo Scientific Dionex UltiMate 3000 pH and conductivity monitor is a valuable tool for HPLC method development, particularly for protein and nucleic acid separations. It is an indispensable tool for the Thermo Scientific™ pH gradient platform for monoclonal antibody

analysis by linking the mobile phase pH with the elution time of the components. The pH and conductivity monitor allows for the monitoring of gradient formation, column equilibration, and understanding column buffering effects in pH gradient ion-exchange chromatography.



▲ PCM-3000 pH and Conductivity Monitor

# Resolution, speed, and sensitivity

## Low Dispersion for Maximum Resolution

One of the main challenges in bio LC analyses is to generate peak capacity. This requires low-extra column volumes and long columns with small particles.

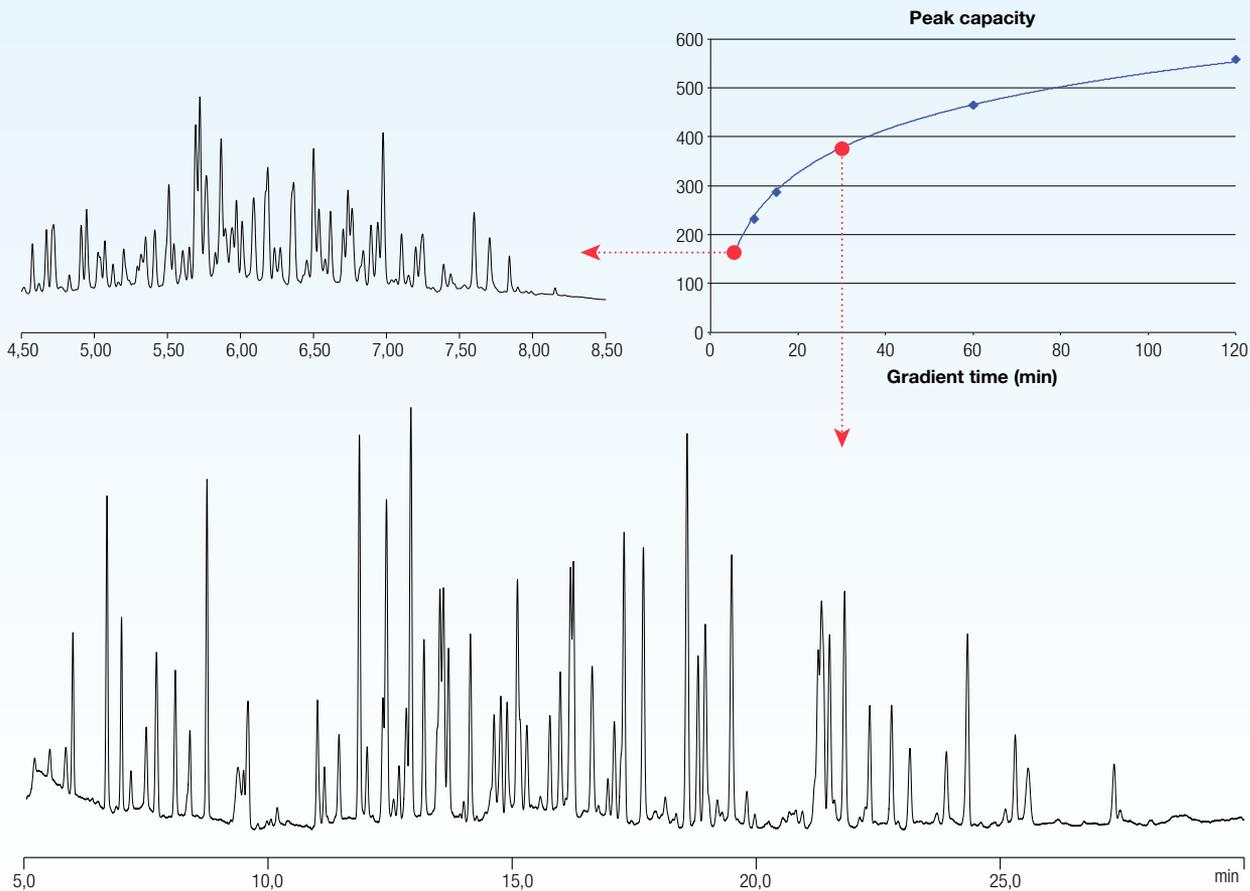
The UltiMate 3000 BioRS system supports long UHPLC columns and is equipped with the tool-free biocompatible Viper fingertight fitting system in 100  $\mu\text{m}$  i.d. throughout the sample flow path.

Fluidic connections for HPLC and UHPLC are handled easily with the Viper fingertight fitting system, because it provides a perfect fit every time. The Viper system ensures superior chromatographic performance by eliminating peak broadening effects caused by imperfect connections, a cause commonly found with conventional connectors.



## Combining Resolution, Speed, and Sensitivity

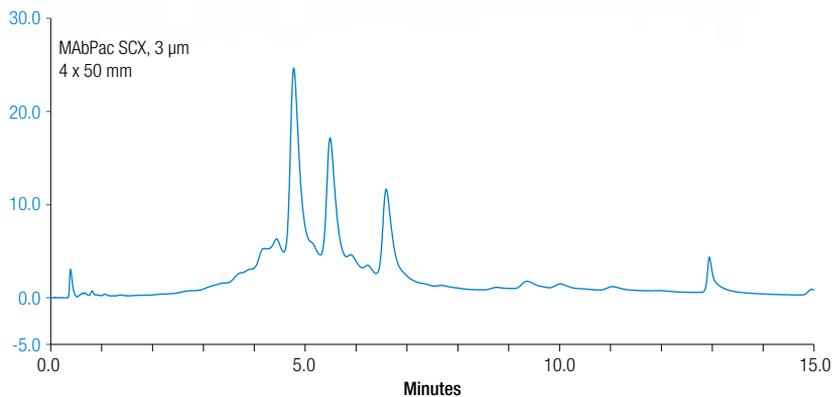
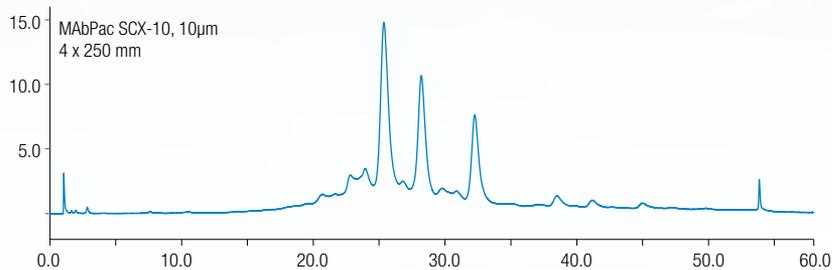
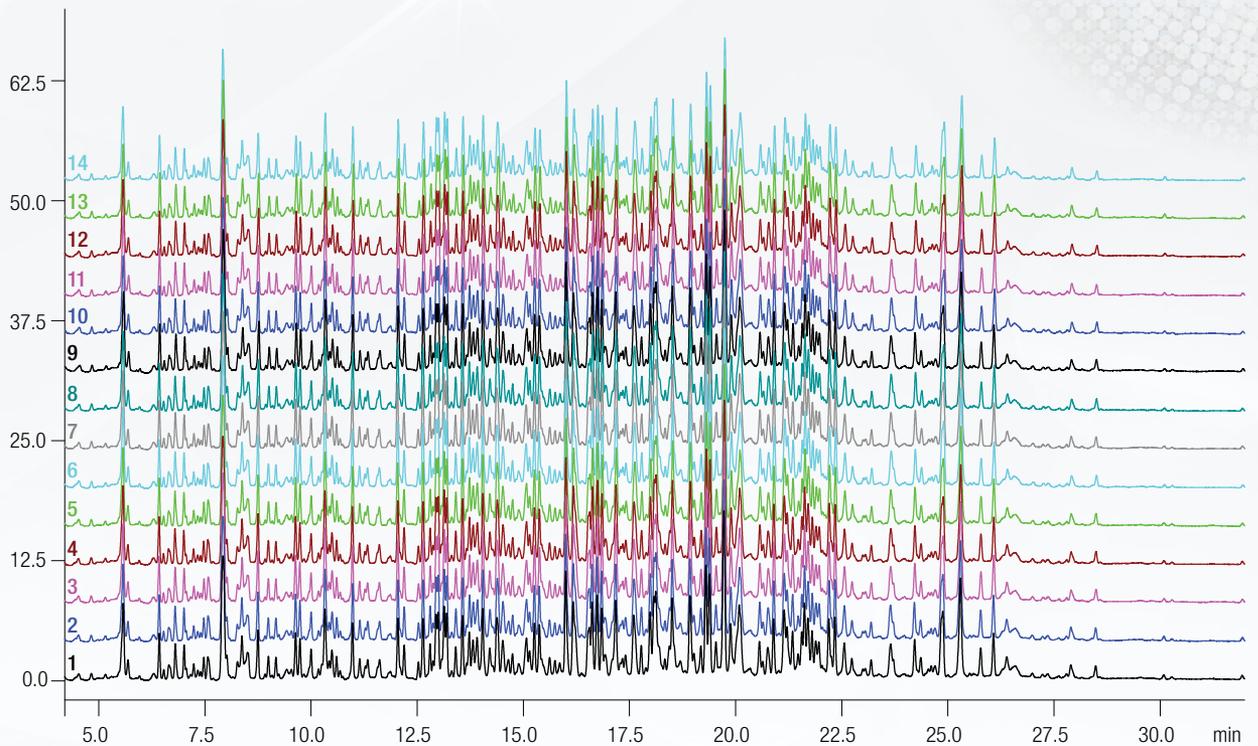
Long UHPLC columns can be used for fast, as well as high resolution separations. A 25 cm long column packed with Thermo Scientific Acclaim™ RSLC 2.2  $\mu\text{m}$  C18 particles provides very high resolution peptide mapping: five-minute gradients deliver significant resolving power.



Top Right: Average peak capacity based on a set of single component peaks of a protein digest at different gradient lengths on 2.1  $\times$  250 mm Acclaim RSLC 2.2  $\mu\text{m}$  C18 column. Top Left: Five minute gradient run of a BSA digest yielding a peak capacity of ~ 160. Bottom: 30 minute gradient run of a BSA digest yielding a peak capacity of ~ 370.

## Excellent Repeatability

The UltiMate 3000 BioRS system delivers resolution, speed, and sensitivity for fast high throughput applications, as well as high resolution and high peak capacity measurements. In combination with high reproducibility and low carryover, you get valuable data from your biomolecule samples – instantly and reliably.



## Speed – Extend your Sample Throughput

Achieve fast, high throughput bio analysis by combining the flow and pressure capabilities of the UltiMate 3000 BioRS system with dedicated Thermo Scientific columns.

Accelerate and optimize your LC separations on conventional bio columns. The UltiMate 3000 BioRS system delivers the lowest extra-column-volumes and highest efficiency with small particle size columns. This allows for faster run times and higher sensitivity.



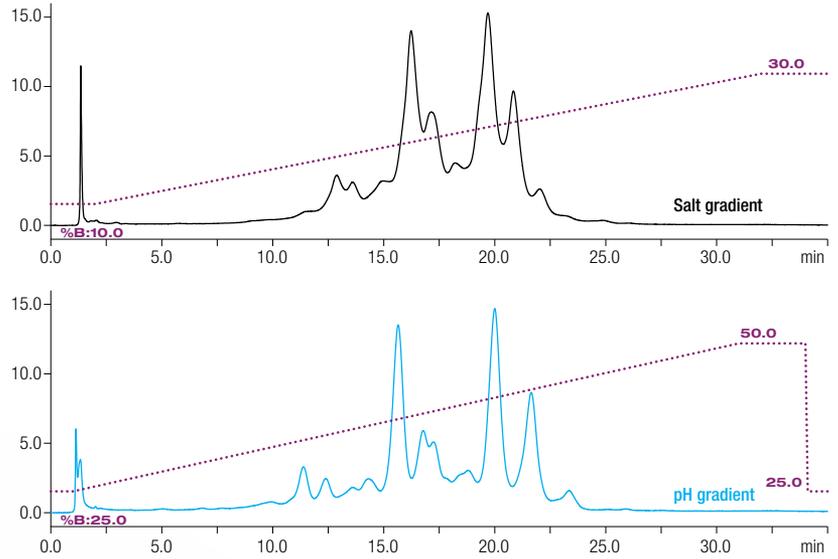
Monoclonal antibody (MAb) charge variant analysis on IEX columns with a salt gradient in 20 mM MES pH 5.6 buffer. The change in column length, as well as optimization of flow and reduction in gradient time produced a 75% reduction in run-time, an improvement in sensitivity, and reduction of eluent consumption without loss of separation efficiency.

# Learn more about your sample

## Innovative Method Development Platform

The gold standard Thermo Scientific ProPac™ WCX and MAbPac™ columns, when combined with the PCM-3000 pH and conductivity monitor and the pH buffer concentrates, pave the way to game-changing high resolution pH-based IEC of intact proteins, separating charge variants better than ever before.

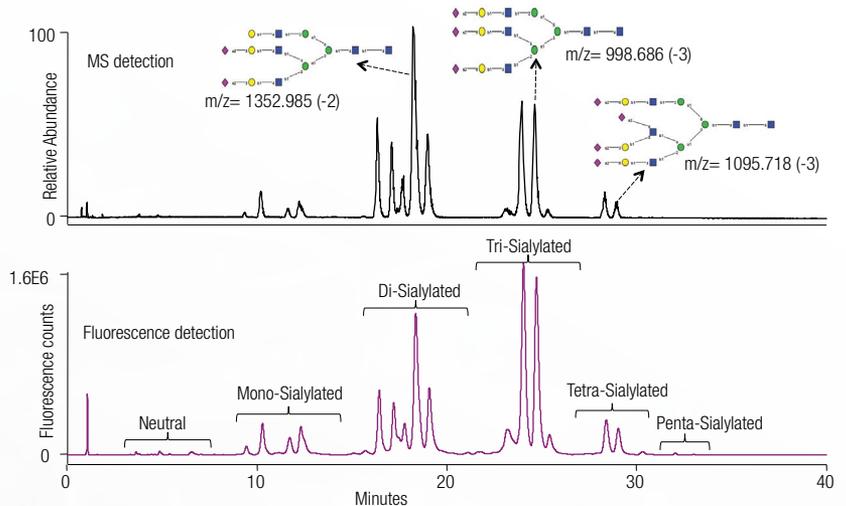
Top: optimized salt-based IEC gradient of a MAb. Bottom: same MAb sample on a wide pH gradient. The total peak area in both plots is identical, illustrating high sensitivity with superior resolution for the pH gradient.



## Unique Selectivity and Separation Power

The Thermo Scientific GlycanPac™ AXH-1 column separates both labeled and unlabeled N- and O-glycans by charge, size, and isomer. This results in superior and unique selectivity based on the number of sialic acid content, as well as ultra high resolution of individual glycans within each sialic class (classes harboring 0 to 5 sialic acids).

The GlycanPac AXH-1 column is highly compatible with mass spectrometry for the identification and characterization of glycans, as well as quantifying each charge state. The columns can be valuable for the separation of heparin fragments with four to eight saccharides with, or without defined sulfation, as well as for glycolipid characterization.



LC-MS analysis of 2AB-linked N-glycans from Bovine fetuin on the BioRS system using the GlycanPac AXH-1 column. Top: MS data, bottom: Fluorescence detection



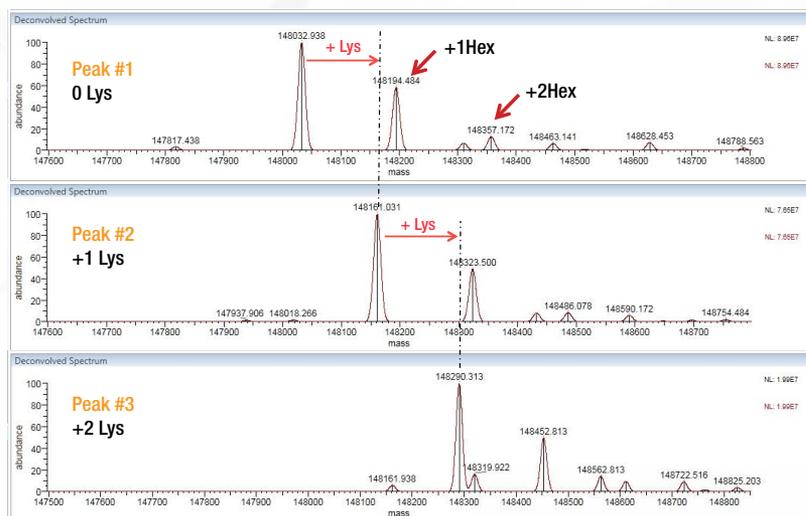
# Perfect integration with mass spectrometry

Orbitrap technology has achieved gold-standard status in the world of mass spectrometry. The Exactive family of mass spectrometers consists of benchtop Orbitrap MS systems.

The Q Exactive mass spectrometer combines high-performance quadrupole precursor selection with high-resolution accurate mass (HR/AM) orbitrap detection. This combination offers comparable sensitivity to the most sensitive triple quadrupole mass spectrometers on the market today. In addition to this exceptional sensitivity, the ability to identify, quantify, and confirm compounds in a single run is enabled using full-scan, selected-ion monitoring (SIM) or MS/MS parallel-reaction monitoring (PRM) at high resolution and accurate mass. The Exactive Plus mass spectrometer with the same high-resolution accurate mass (HR/AM) orbitrap detection, but without the quadrupole, is well-suited for high-throughput screening applications. With its 6000  $m/z$  upper mass range, it is extremely capable for routine biologics screening and QC.



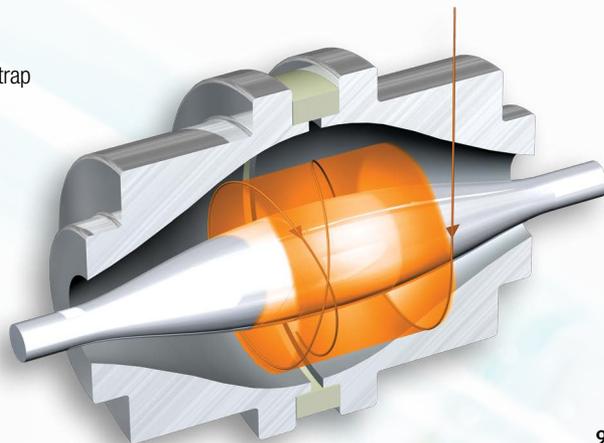
Q Exactive mass spectrometer



Deconvoluted MS spectra of intact MAb fractions, fractionated from ion-exchange chromatography (IEC), desalted and analyzed using Thermo Scientific Protein Deconvolution software version 2.0.

By coupling IEC with MS via desalting, lysine variants, glycoforms, and other charge variants can easily be differentiated and greatly resolved.

When detailed information is required about an analyte, the high-field Orbitrap in the Thermo Scientific Orbitrap Elite™ hybrid mass spectrometer, with a dual-pressure linear ion trap, offers robustness and a larger dynamic range for the ultimate analytical instrument. Multiple fragmentation modes (CID, HCD, and ETD) can be applied for the elucidation of even the most complex analyte structures.

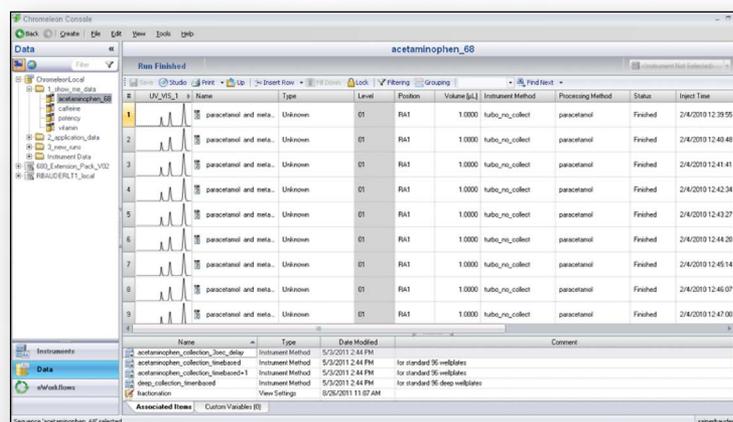
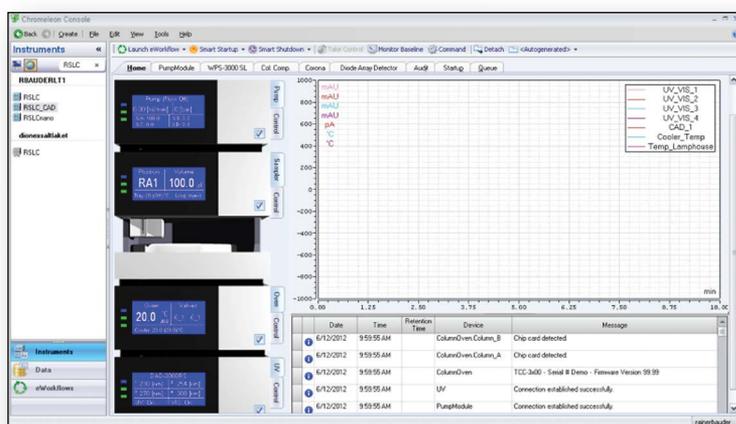


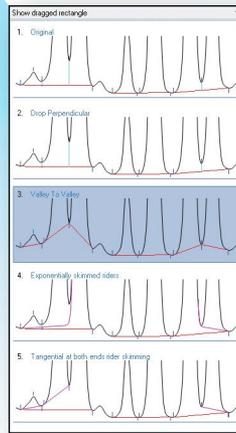
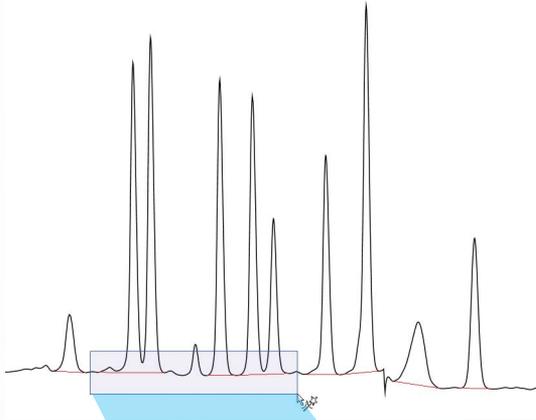
# Streamlining all workflows and delivering instant results

## Intelligent Chromatography Software

Thermo Scientific Dionex Chromeleon™ 7 is the next-generation chromatography data system that uses Operational Simplicity™ as its guiding design principle. Chromeleon 7 takes you from samples to results in the shortest time possible.

Innovative eWorkflows™ enable anyone to start chromatographic analyses and generate results with just a few selections. eWorkflows automatically create sequences containing the correct instrument conditions, data processing parameters, and reporting templates. Samples are run automatically, processed immediately, and reported instantly—ensuring the shortest possible time from samples to results.





Chromleon's automatic integration and dynamic data processing reduce the analyst's effort and display the results immediately.

The unique and innovative integration tools, Cobra™ peak detection wizard, and SmartPeaks™ integration assistant, enhance the user experience and make detection and integration easy and straightforward.

## Software for Mass Spectrometry

Thermo Scientific Dionex DCMSLink™ software is a free, control-only package, providing fully integrated single-point control of any Thermo Scientific LC system through Thermo Scientific Xcalibur™ software and mass spectrometry control software from other leading manufacturers.

Learning new software is held to a minimum with the MS software as the single user interface. Using DCMSLink software to connect your instrument to various MS software packages, the full benefits of the UltiMate 3000 systems are ready to support your MS applications.

# XCALIBUR™

A New Era in Mass Spectrometry

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