

# Vanquish Neo UHPLC system PepMap Neo columns Beyond Brilliant



 The world leader in serving science

# We listened to your feedback

## Performance



- Load samples into the MS, in an unobtrusive, pain free manner
- High performance, separation power are required for -omics & targeted LC-MS bio-analysis

## Robustness



- Reliability and long-term robustness are the main bottlenecks
- Column to column consistency and longevity is insufficient for large sample sets

## Ease of Use



- Novice LC-MS users are often operating low-flow LC-MS systems
- Easy fluidics connections, simple to use columns & LC-MS setups are crucial for wide adoption of low-flow LC-MS

# Vanquish Neo UHPLC system

The new standard in nano-, capillary-, and micro-flow LC



## Beyond discovery

all-in-one nano-, capillary-, and micro-flow LC systems for high sensitivity LCMS workflows



## Beyond innovation

accelerating productivity with long-term, trouble-free operation at maximum performance



## Beyond possibilities

enabling LCMS experts and novice users to get high quality results, every time



# Thermo Scientific LC system portfolio

## Analytical LC

## Low-flow LC

### Dependability



Thermo Scientific™ Vanquish™  
Core HPLC Systems

### Flexibility



Thermo Scientific™ Vanquish™  
Flex UHPLC Systems

### Performance



Thermo Scientific™ Vanquish™  
Horizon UHPLC System

### Sensitivity



Thermo Scientific™ Vanquish™  
Neo UHPLC System

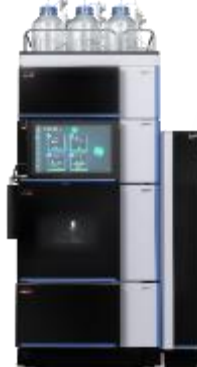
## Application-specific LC

### Development



Thermo Scientific™ Vanquish™  
Method Development Systems

### Confidence



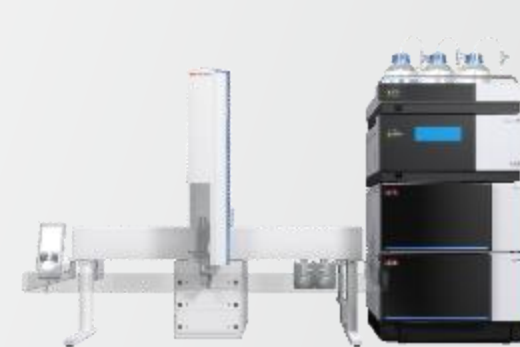
Thermo Scientific™ Vanquish™  
Online 2D-LC Systems

### Productivity



Thermo Scientific™ Vanquish™  
Duo UHPLC Systems

### Throughput



Thermo Scientific™ Transcend™ LX  
and TLX Systems

# Design • Vanquish Neo UHPLC system

## Integrated System

- Factory pre-assembled & pre-tested
- Simple configuration incl. hardware and fluidics for nano/cap/micro-flow LC
- Slide-in autosampler and pump modules

## Standardized Configurations

- Optimized fluidics for direct and trap-and-elute injections
- All labeled solvent lines
- Integrated capillary, solvent and waste lines guides
- Bottle tray with pre-defined positions for recommended solvents



## Ease-of-use

- Touch user interface for at-system control and monitoring
- Remote direct system access
- Standalone troubleshooting and diagnostics

## Convenient operation

- Unlock-to-slide system base
- Drawer for tools & consumables
- System power button
- Integrated system controller

# Technical features • Vanquish Neo UHPLC system

## System

- Single system driver and smart modules interlink
- Standardized fluidics for nano/cap and micro-flow applications
- 1500 bar complete Thermo Scientific™ nanoViper™ Fingertight Fittings flow path
- Guided method creation with integration of consumable/fluidics parameters

## Pump

- Active flow control from 1 nL/min to 100  $\mu$ L/min w/o pump hardware changes
- Multi-point flow calibration algorithm
- Fast sample loading and column equilibration at up to 1500 bar
- Increased tolerance to solvents outgassing



## Column compartment \*

- Temperature control for capillary and micro-flow LCMS
- Up to two low-dispersion valves
- Heated trap-and-elute injection configuration

\* Optional module

## Autosampler

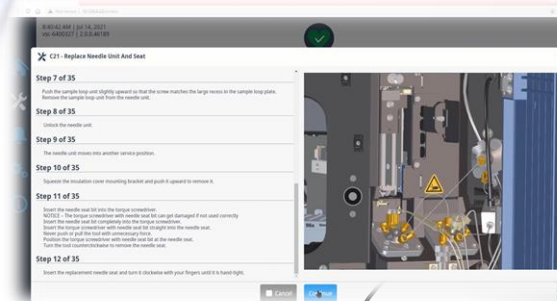
- Low-flow split-loop injection path design (GDV < 0.5  $\mu$ L)
- 1500 bar, maintenance-free valves
- Vial bottom detection technology
- SmartInject technology for direct and trap-and-elute injections
- Multi-wash options
- Wide injection volume range
- High injection volume precision & accuracy
- Forward-flush and back-flush trap-and-elute injections w/o fluidics change

# Superior usability • Vanquish Neo UHPLC system



Easy system status monitoring through direct visualization of key system parameters

Direct instrument control without PC during system preparation, maintenance, and diagnostics



Automated system procedures, triggered remotely: start-up, self-checks, & leak tests for daily operational convenience

Streamlined troubleshooting: built-in diagnostic procedures & guided tutorials for increased uptime and reduced costs per injection

**Intuitive user interface, system monitoring and control**

# Intelligent operation and method setup

System interlink and single system driver provide intelligent, direct communication between modules



General Settings

Solvents

Solvent Type A: H2O Solvent Name A: %A

Solvent Type B: ACN80 Solvent Name B: %B

Flow Gradient

No	Time	Duration [min]	Flow [µl/min]	%B	Volume [µl]	No. of Column Volumes
1	0.000					
2	0.000	0.000	50.000	1.0	0.00	0.00
3	0.100	0.100	50.000	4.0	5.00	0.06
4	14.000	13.900	50.000	35.0	695.00	8.80
5	14.000					
6	14.100	0.100	50.000	99.0	5.00	0.06
7	20.000	5.900	50.000	99.0	295.00	3.74
8	20.000					
9	20.000					

Workflow Information

**Heated Trap-and-Elute Injection Micro (50 µm ID, > 5 µl/min)**

Separation Column(s) Specifications

Property	Value
Inner Diameter:	1000 [µm]
Length:	15.0 [cm]
Void Volume:	78.933 [µl]
Maximum Pressure:	800 [bar]
Maximum Flow:	100.0 [µl/min]
Maximum Temperature:	60.0 [°C]
Maximum Pressure Change Up:	1000 [bar/min]
Maximum Pressure Change Down:	1000 [bar/min]

Factory pre-calibrated for common LC-MS mobile phases, plus guided calibration procedures for additional solvents

Simplified gradient programming guide

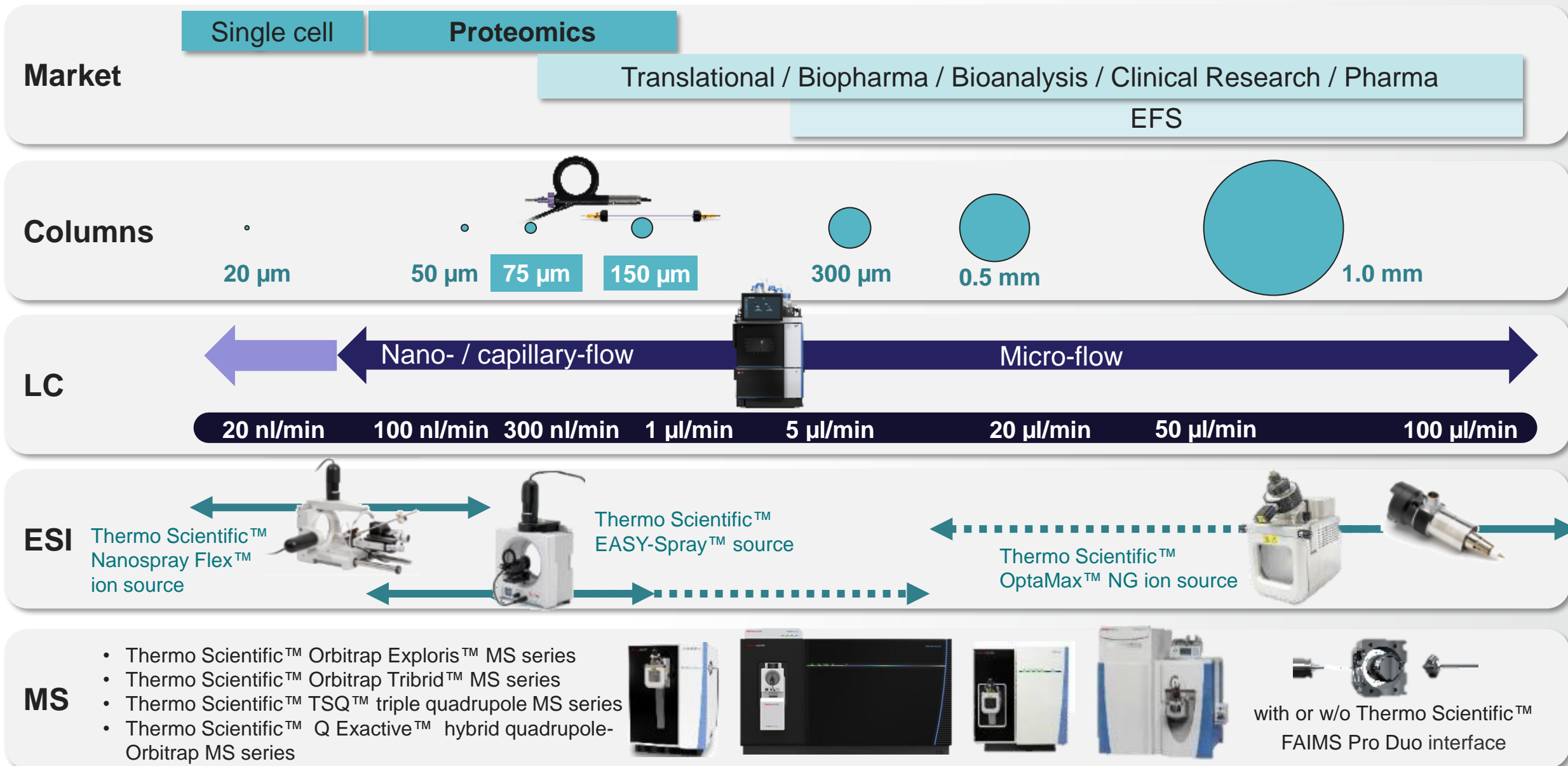
Active notifications when operating out of recommended parameter range

Active integration of consumable information

Featuring a new level of system intelligence



# Solution to high-sensitivity workflows



# Column portfolio from nano- to micro-flow applications

## Column

50  $\mu\text{m}$

75  $\mu\text{m}$

150  $\mu\text{m}$

300  $\mu\text{m}$

0.5 mm

1.0 mm

## EASY-Spray columns

Thermo Scientific™ EASY-Spray™ PepMap™ Neo columns ensure robust nano- and capillary-flow LC-MS analysis. The EASY-Spray integrated column and emitter design virtually eliminates dead volume and is temperature-controlled for maximum reliability and performance.

## Linear nano- and capillary-flow columns

Standalone columns for nano- and capillary-flow are designed with single nanoViper and double nanoViper trouble free connectors for robust separation. Compatible with any MS system source design, they deliver excellent resolution, long column lifetime, and low carry-over.

## Micro-flow columns

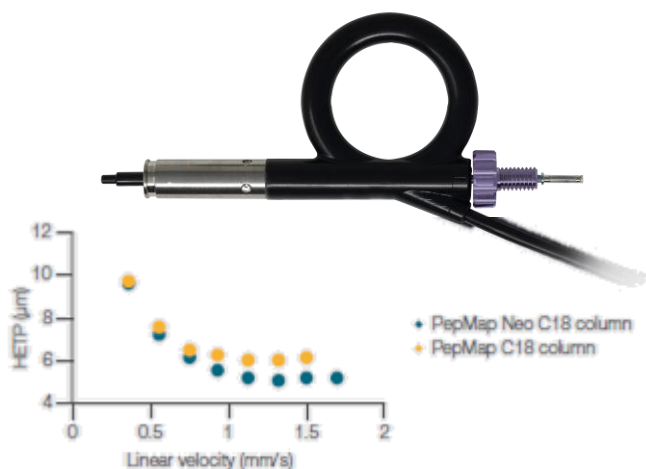
For outstanding peak shapes in micro-flow chromatography, 1 mm I.D. columns are available in a range of chemistries

## Emitters

Nano and capillary emitters act as a column-independent sprayer, allowing the introduction of flow from nano and capillary columns without the troublesome handling of traditional emitters and connectors.

## Trap columns

Trap columns help accelerate sample loading and permit on-line sample concentration and desalting as well as ensuring protection of our entire low-flow column portfolio. The Thermo Scientific™ PepMap™ Neo trap is 1500 bar pressure compatible.



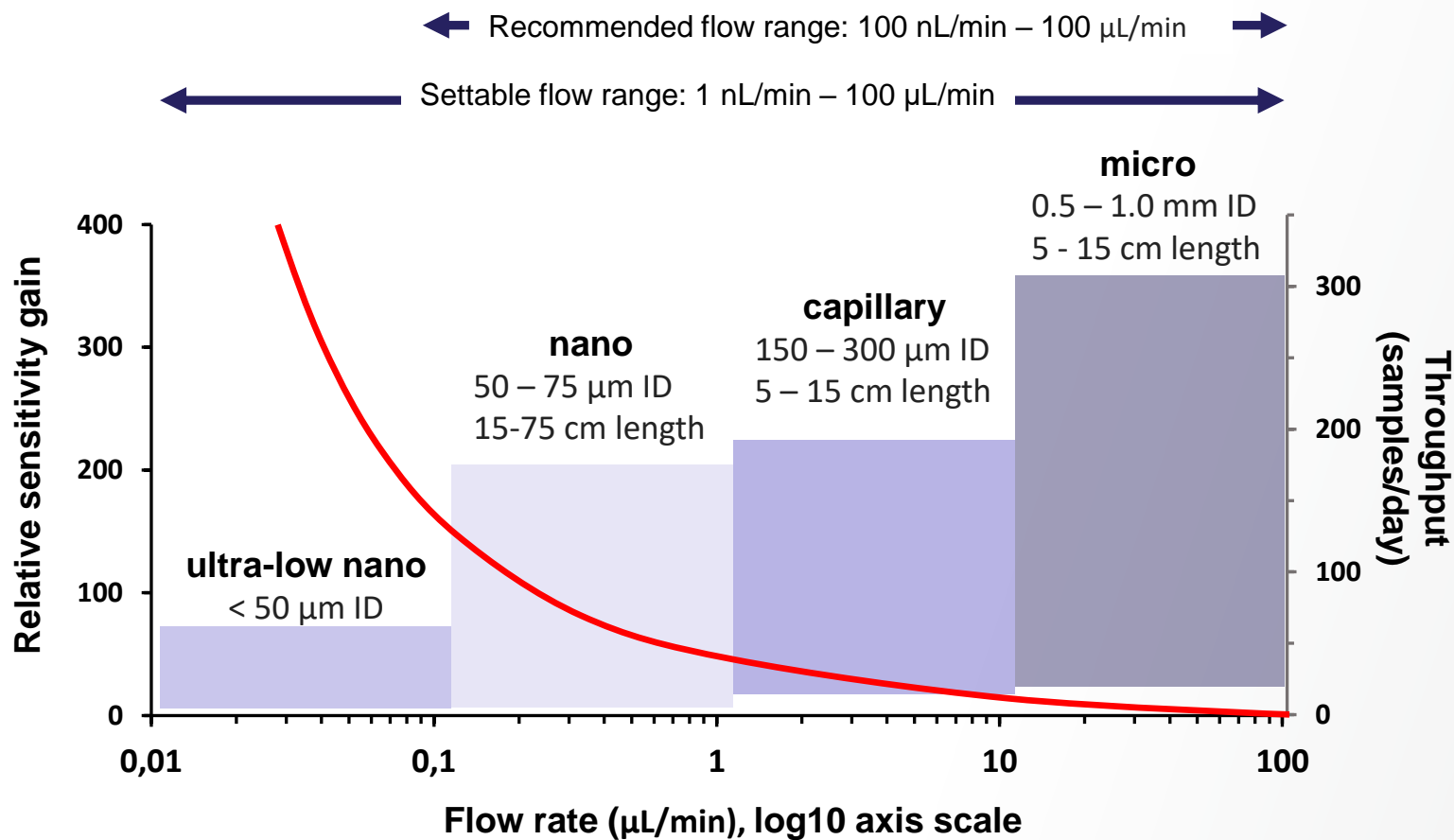
PepMap Neo C18 columns (teal) outperform Thermo Scientific™ PepMap™ C18 (orange) columns of the same format—50 cm x 75  $\mu\text{m}$  I.D., 2  $\mu\text{m}$  particle diameter



The range of nano/cap/micro columns, emitters and traps for virtually any application

# All-in-one UHPLC system

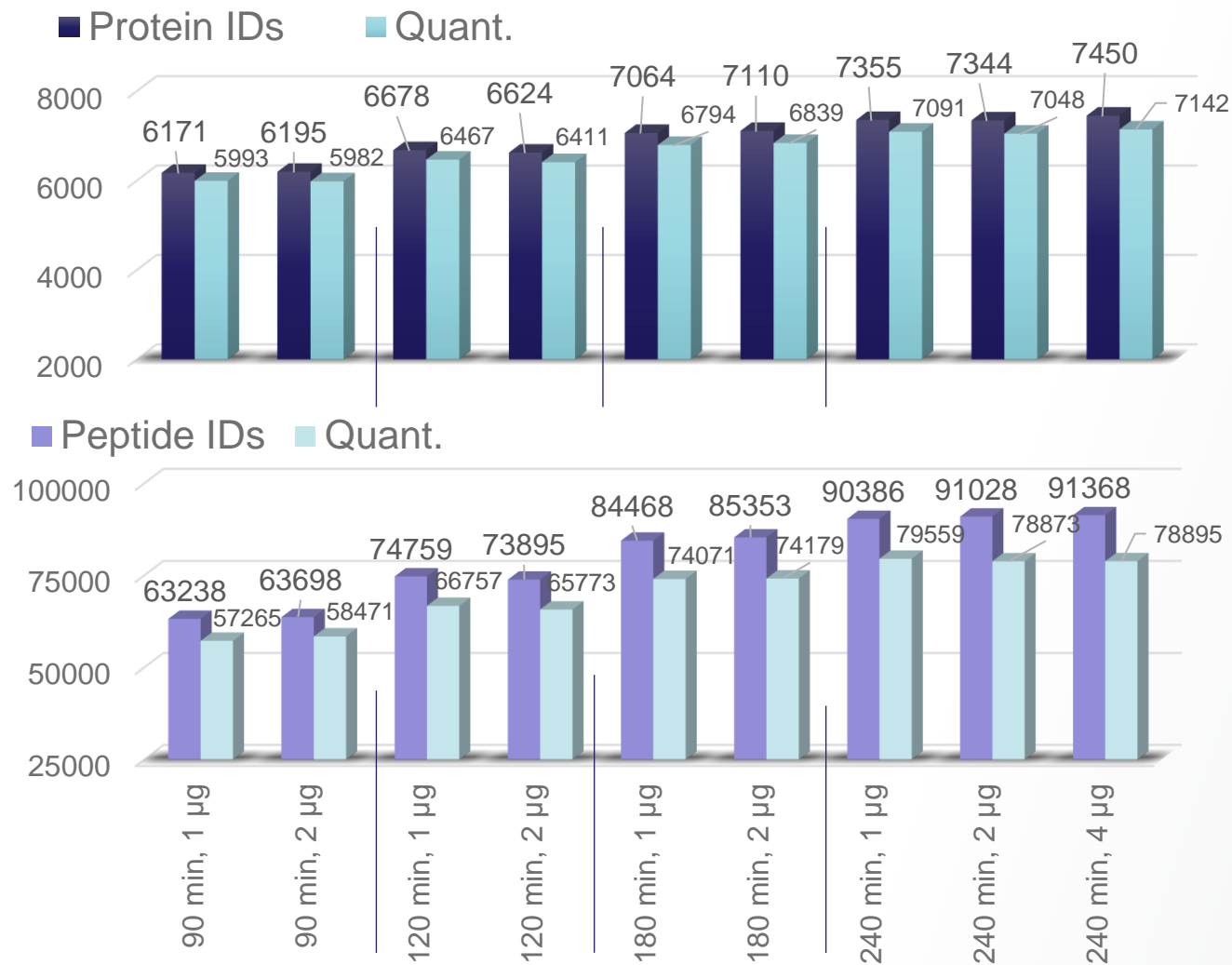
Discover more in every sample



- Thermo Scientific™ ProFlow™ XR **active flow control across the full flow range w/o hardware changes**
- Factory multi-point flow calibration for **precise and reproducible flow delivery**
- Low-flow **columns 50 µm - 1 mm ID support full flow rate range**
- Typical application areas
  - **Nano:** deep quantitative proteome profiling
  - **Capillary:** high throughput and sensitivity
  - **Micro:** robust profiling of thousands samples

**Performance and versatility for nano-, capillary-, and micro-flow LC-MS applications**

# Deepest quantitative proteome profiling



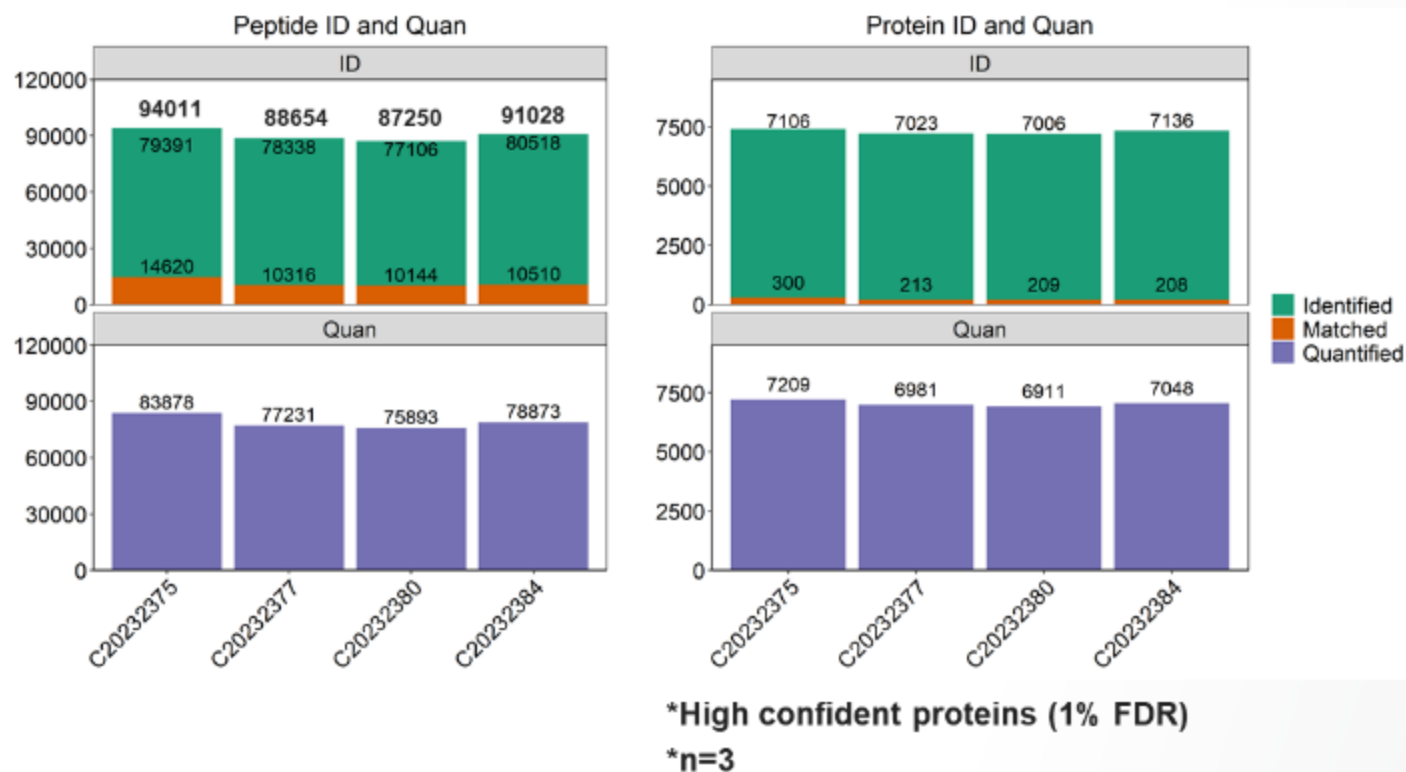
- **Wide flow-pressure footprint**, constant pressure loading & equilibration, gradient and flow optimization **versatility**
- Achieve maximum performance for long and ultra-long columns (75 cm and 1.5 m)
- Improved **peak width** with 75 cm long Thermo Scientific™ PepMap™ Neo columns **boosts** protein and peptide identifications
- Technical Note: Nano LC-MS proteomics, [TN74152](#)

\*75 µm x 75 cm, 2 µm, 3 replicates; including match between runs; 2-step Sequest™ HT and INFERYS, < 1% FDR

Next level of bottom-up proteomics research with long and efficient columns

# Excellent nanoLC-MS reproducibility

EASY-Spray PepMap Neo columns delivery high performance, every time



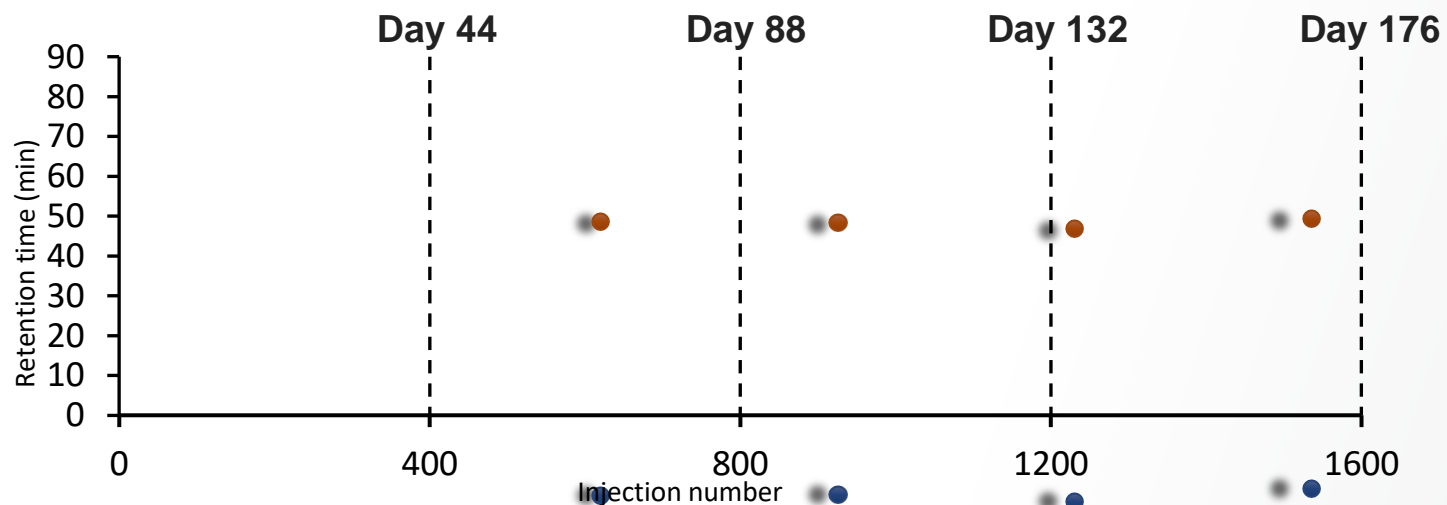
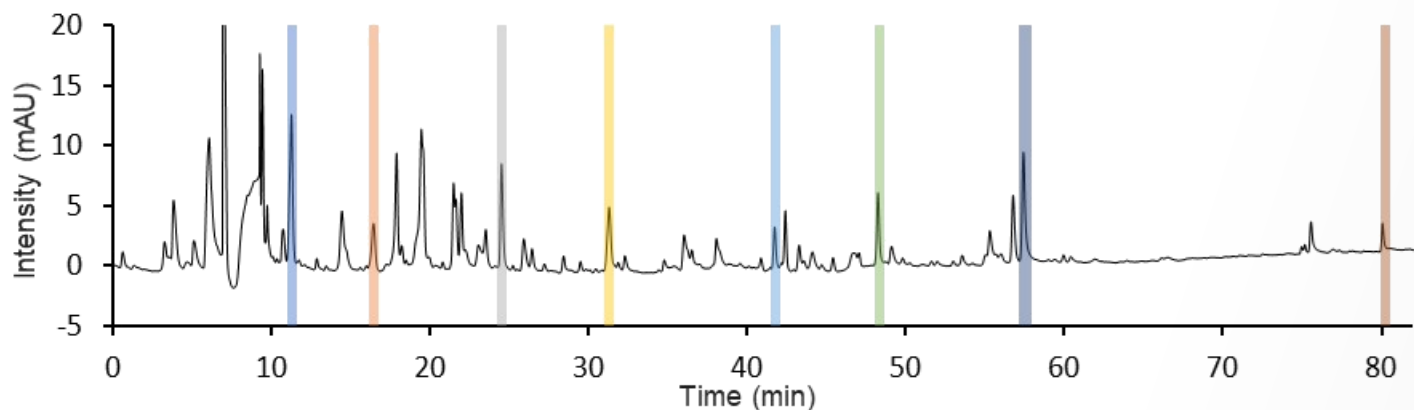
- Reproducible identification and quantification of HeLa peptides and proteins **over 4 EASY-Spray PepMap Neo columns**
- **Maximum performance** with long columns and long reproducible gradients
- Technical Note: Nano LC-MS proteomics, TN74152

240 min gradient, direct injection, 75 µm x 75 cm, 2 µm, 2-step Sequest HT and INFERYS, < 1% FDR, Orbitrap Exploris 480, DDA acquisition

**Vanquish Neo coupled with PepMap Neo columns provide maximum consistency**

# Long-term robustness

Delivering efficient separations 24/7

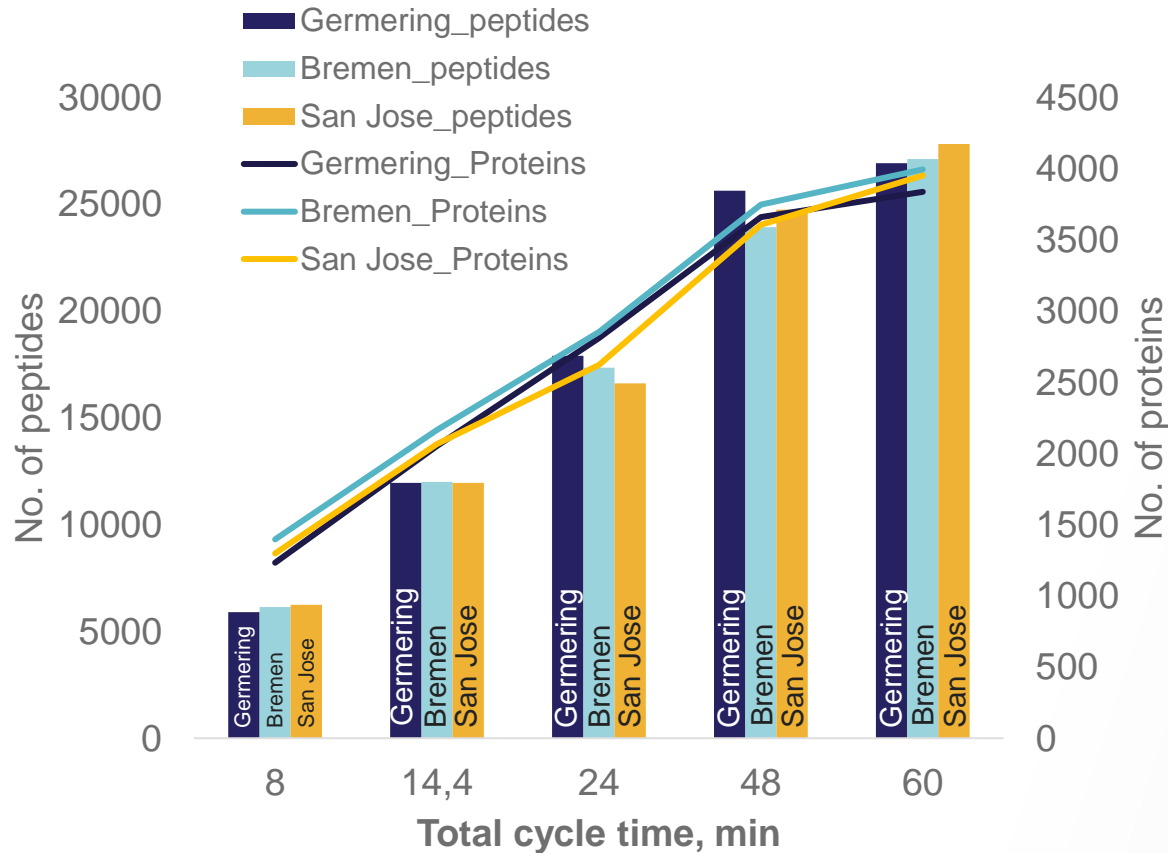


- **Robust** Vanquish Neo **hardware** and PepMap Neo **columns** with SmartInject technology result in **uninterrupted long-term analysis**
- Viper and nanoViper fittings ensure near-zero-dead volume and virtually **leak-free connections**
- **Lower cost/sample** through reduced downtime, maintenance, solvent consumption, and waste generation
- Technical Note: Robustness [TN000172](#)

Confidence in your results

# Reproducibility

Across systems, columns, operators and continents



\*75 µm x 15 cm, 2 µm, DDA acquisition, 2-step Sequest HT and INFERYS, < 1% FDR, Orbitrap Exploris 480

Flow Rate (µL/min)	Sample Throughput/Day	Cycle Time (min)	Method Duration (min)	Elution Window (min)	MS utilization (%)
1.3	180	8	6.6	5.4	67.5
1	100	14.4	13	11.8	81.9
0.8	60	24	22.6	21	87.5
0.4	30	48	46.6	45.1	94.0
0.3	24	60	58.6	57	95.0

\*MS utilization (%) = Peptide elution window/Cycle time\*100%

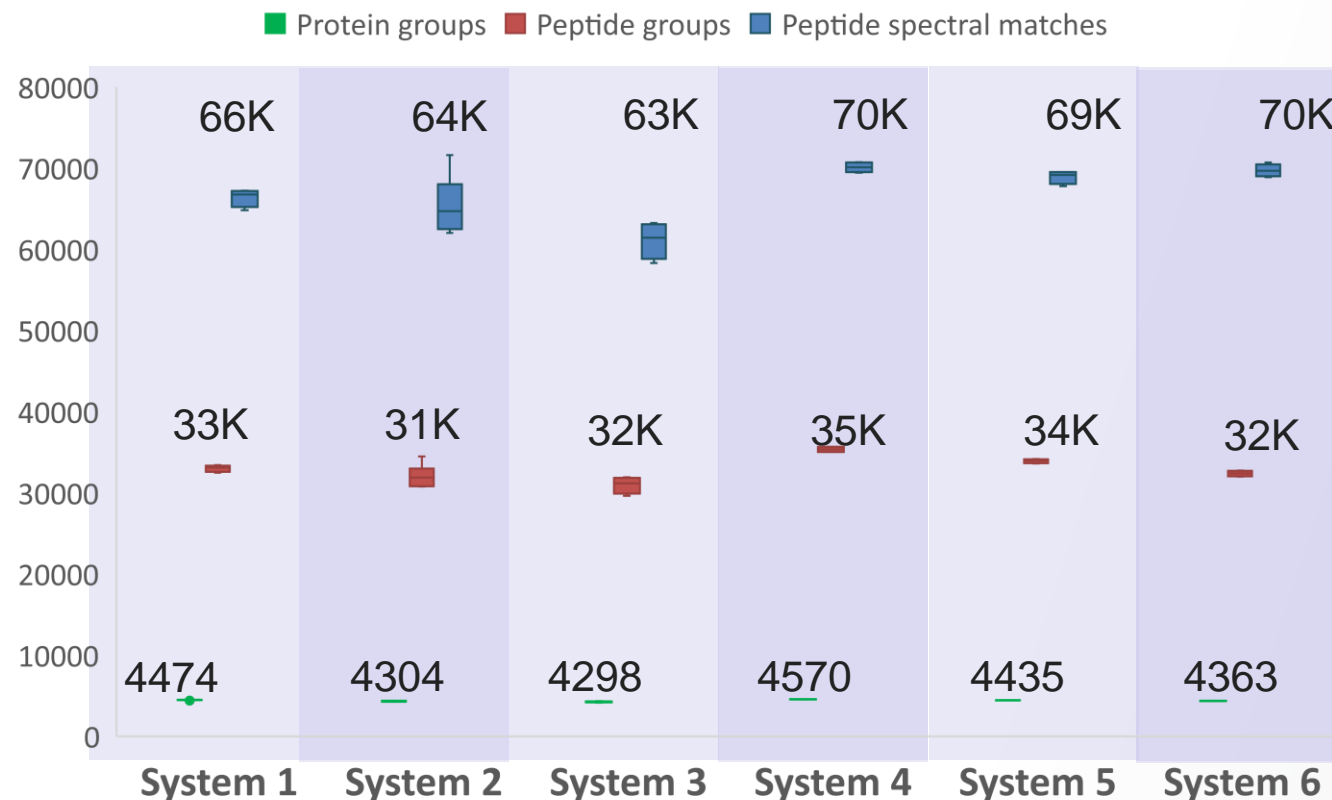
- **Standardized** high throughput methods are ready for deployment
- **Multi-site reproducibility** ensure consistency for large cohort analysis
- Technical Note: capLCMS [TN000138](#)



Uncompromised performance and system-to-system reproducibility

# Confidence in your results

Guarantee the highest quality separations, system-to-system and column-to-column reproducibility



- Vanquish Neo UHPLC systems are **factory** pre-assembled, configured, calibrated, and fully tested
- All EASY-Spray PepMap Neo columns are tested with **LC-UV** and **LC-MS** analysis before shipment
- Technical Note: Reproducibility, TN000199

\*75 µm x 50 cm, 2 µm, DDA acquisition, 2-step Sequest HT and INFERNYS, < 1% FDR, Orbitrap Exploris 240

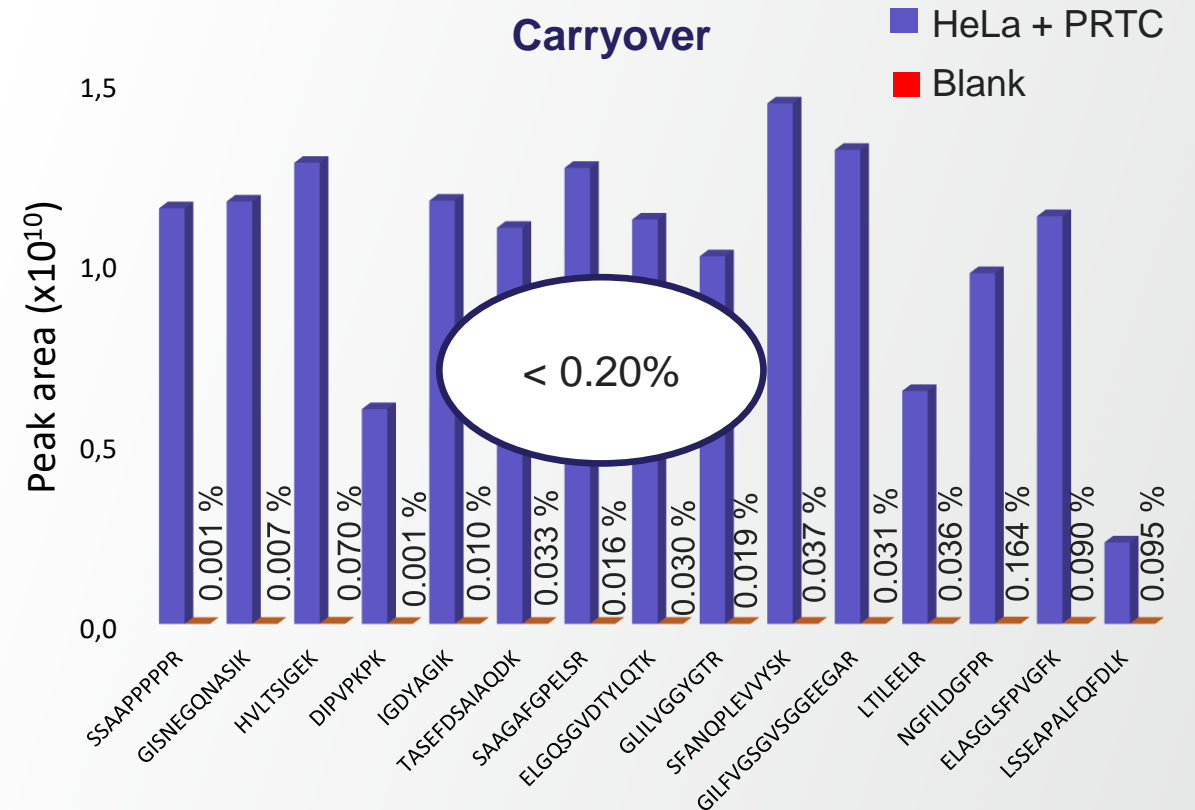
**High consistency of nanoLC-MS results under factory operation qualification conditions**



# Productivity

Negligible carryover and low- to high-volume sample handling

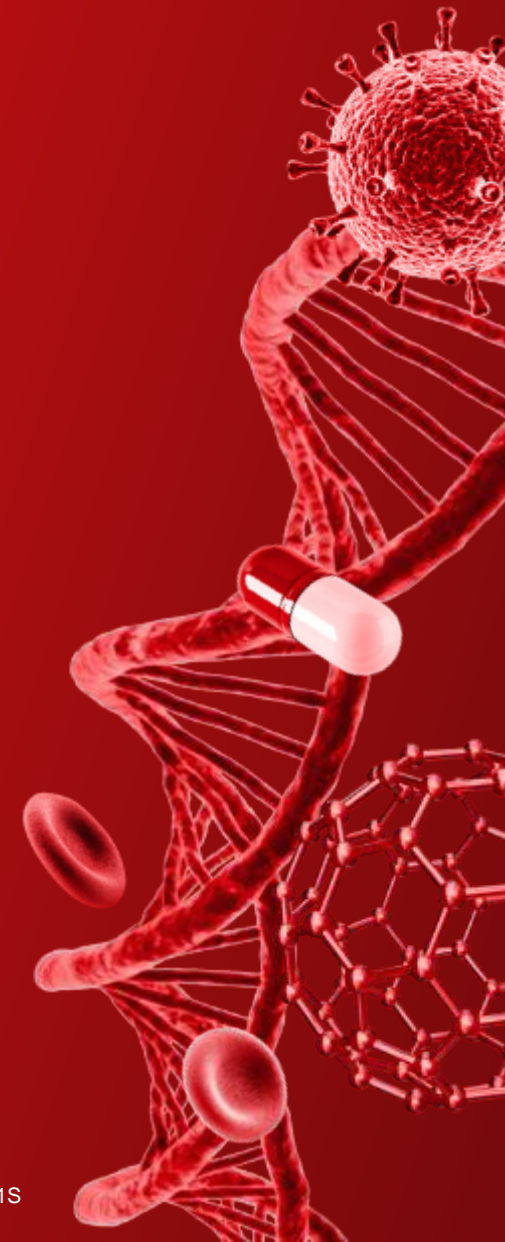
- **Split-loop design**
  - Superior injection volume linearity, precision & accuracy
  - Reduces sample loading time
  - Limits sample dispersion & sample usage
- **Multi-wash** injection routines for minimum carryover
- **ZebraWash** for efficient trap column washing
- **Multi-draw** for large volume trap-and-elute injections
- **Vial bottom detection**
  - Small volume injections of precious samples
  - Minimizing sample losses



[Autosampler spotlight SP-74151](#)

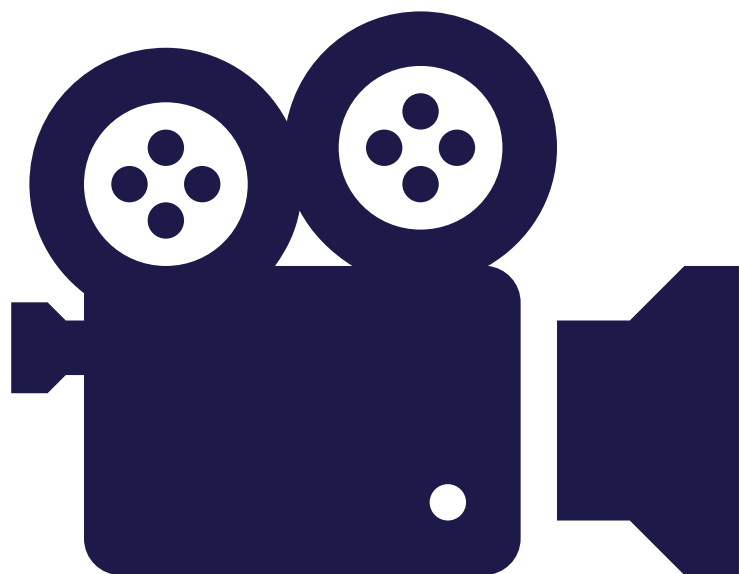
Superior sample injection performance

# Thank you



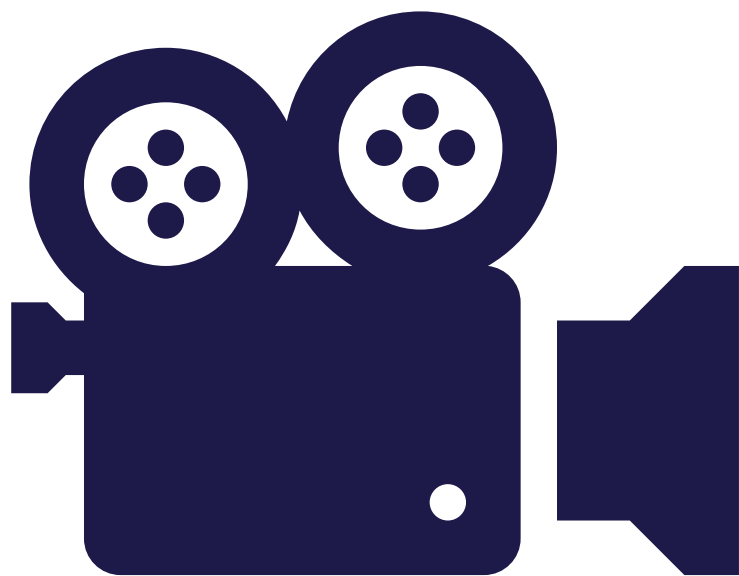
# Key technical collaterals

Reference	Title
BR-74142	<a href="#">Brochure Vanquish Neo UHPLC system</a>
PS-74081	<a href="#">Product specification Vanquish Neo UHPLC system</a>
<b>Product Spotlights</b>	
SP-74066	<a href="#">Beyond discovery: All-in-one nano-, capillary- and micro-flow Vanquish Neo UHPLC system binary pump</a>
SP-74151	<a href="#">Beyond innovation: Redefining low-flow sample injection with the Vanquish Neo UHPLC system autosampler</a>
SP-74153	<a href="#">Beyond possibilities: Intelligent system operation with the Vanquish Neo UHPLC system User Interface</a>
<b>Technical notes</b>	
TN74152	<a href="#">Vanquish Neo UHPLC system sets new performance standards for single-shot nanoLCMS bottom-up proteomics</a>
TN74161	<a href="#">Ultra-robust micro-flow LC-MS/MS for targeted high-throughput peptide quantification using the Vanquish Neo UHPLC system</a>
TN000138	<a href="#">Fast, sensitive, and reproducible nano- and capillary-flow LCMS methods for high-throughput proteome profiling using the Vanquish Neo UHPLC system hyphenated with the Orbitrap Exploris 480 MS</a>
TN000137	<a href="#">Quantitative targeted nano- and capillary-flow LC-MS peptide analysis using the Vanquish Neo UHPLC System coupled to a triple quadrupole mass spectrometer</a>
TN000172	<a href="#">Robust long-term Vanquish Neo UHPLC system operation enabling high-performance high-pressure nanoLC separations</a>



## The Evolutionary Journey of LCMS for Proteomics





## Thermo Scientific Vanquish Neo UHPLC System: The New Standard in Nano-, Capillary- and Micro-Flow LC



- [1 - FULL VIDEO](#)
- [2 - SHORT VIDEO 1](#)
- [3 - SHORT VIDEO 2](#)

## Whiteboard Video: Accelerating Proteomics Research With the Thermo Scientific Vanquish Neo UHPLC System

