

Thermo Scientific Velos Pro

Dual-Pressure Linear Ion Trap
Accelerating Innovation

- **Novel detection system provides up to 6 orders of linear quantitation**
- **Unique dual-pressure linear ion trap and proprietary S-lens gives superior scan speed, resolution, and sensitivity**
- **Generation II ion optics improve robustness and reduces downtime**
- **Dissociation by CID, PQD, ETD, and now novel HCD functionality provide the ultimate in structural information**
- **Upgradable to accurate mass and ultra-high resolution Orbitrap™ technology**

The Thermo Scientific Velos Pro LC-MSⁿ delivers ultimate performance on the world's fastest, most sensitive ion trap. A novel wide dynamic range discrete dynode detection system produces low RSDs and unprecedented quantitation from an ion trap. The Velos Pro™ broadens the MSⁿ capabilities of the ion trap with a powerful new fragmentation technique, HCD (Higher-Energy Collisional Dissociation), with access to low mass fragments for complete structure characterization by tandem mass tag labeling.

A new rapid scan mode that reads ions at 66.7 kDa/s increases the duty cycle of the ion trap and allows data dependent acquisition of search quality spectra at >10Hz. Generation II ion optics feature a neutral blocking technology that elevates the robustness to a new level.

The Velos Pro enables the identification and robust quantitation of even very low abundance compounds and provides absolute confidence in every result.

Hardware Feature

Ion Max API Source

- Enhanced sensitivity and ruggedness
- Sweep Gas reduces chemical noise
- 60° interchangeable ion probe orientation
- Removable metal ion transfer tube provides vent-free maintenance

Transfer Ion Optics

- S-lens technology
- Generation II ion optics with novel neutral blocking technology for improved robustness
- High stability and ion transmission efficiency

Dual-Pressure Linear Ion Trap Mass Spectrometer

- Dual-pressure for optimized performance
- Isolation waveforms during injection
- Balanced rf field
- Automatic system calibration
- High-efficiency radial ion ejection

Vacuum System

- Differentially-pumped vacuum system to 10⁻⁵ Torr
- Split-flow turbomolecular pump controlling vacuum in three regions
- Dual rotary vacuum pump configuration
- High-vacuum aluminum analyzer chamber

Detection System

- Dual conversion dynode detector
- Two off-axis discrete dynode electron multipliers with extended dynamic range
- 24-bit electrometer for high level linearity
- Digital electronic noise discrimination



Integrated Liquid Delivery

- Fully-automated data system with valve control enables user to divert the solvent front, gradient end point and any other portion of the HPLC run to waste
- Syringe Pump allows automated infusion under data system control

Options

- HCD: Higher-Energy Collisional Dissociation
- ETD: Electron Transfer Dissociation
- HESI II probe compatible with liquid flow rates of <math><1\mu\text{L}/\text{min}</math> to 1 mL/min, without splitting
- APCI/APPI source compatible with liquid flow rates of 50 $\mu\text{L}/\text{min}$ to 2 mL/min, without splitting
- Nanospray source supports static packed tip and dynamic nanospray experiments, compatible with liquid flow rates of 50 nL/min* to 2 $\mu\text{L}/\text{min}$
- Metal needle options for high- and low-flow analyses

*Lower limit is dependent on gauge of needle used

Software Features

Data System

- Thermo Scientific Xcalibur processing and instrument control software
- Thermo Scientific LCQUAN quantitation package
- Microsoft® Office software package
- Microsoft Windows® operating system
- High-performance PC
- High-resolution LCD color monitor

Scan Functions

- Predictive Automatic Gain Control (AGC) delivers up to 10 Hz data dependent MS/MS acquisition.
- Full-scan mass spectra for sensitive analyses and rapid screening of unknown compounds
- Full-scan product ion spectra at sensitivities higher than any ion trap mass spectrometer
- Selected Reaction Monitoring (SRM) for a traditional LC/MS/MS quantitative analytical experiment

- MSⁿ for multi-stage MS experiments to probe the structure of ions
- ZoomScan a high-resolution, full-range scan to resolve isotopic envelopes often used for charge state determination
- Ultra ZoomScan for ultimate resolution
- Rapid Scan, the fastest scan mode for UPLC analytical data collection
- TurboScan an ultra-fast scan to improve signal-to-noise and sampling rate
- Unique, Automatic Gain Control (AGC) ensures that the ion trap is always filled with the optimum number of ions for any scan type
- Dynamic Exclusion allows acquisition of MS/MS and MSⁿ spectra from lower intensity ion species
- WideBand Activation generates more structurally informative spectras
- Normalized Collision Energy provide reproducible data from instrument to instrument

System Specifications

MS/MS Sensitivity

Heated Electrospray Ionisation (HESI)

2 μL of a 50 fg/ μL solution of reserpine (100 femtograms total) injected at a flow of 500 $\mu\text{L}/\text{min}$ will produce a minimum signal-to-noise ratio of 100:1, for the transition of the isolated protonated molecular ion at m/z 609 to the largest two product ions, m/z 397 and m/z 448, when the mass spectrometer is operated at unit resolution in the full-scan MS/MS mode, scanning the product ion spectrum from m/z 165 – 615.

Atmospheric Pressure Chemical Ionisation (APCI) –

2 μL of a 50 fg/ μL solution of reserpine (100 femtograms total) injected at a flow of 500 $\mu\text{L}/\text{min}$ will produce a minimum signal-to noise ratio of 100:1, for the transition of the isolated protonated molecular ion at m/z 609 to the largest two product ions, 397 and 448, when the mass spectrometer is operated at unit resolution in the full-scan MS/MS mode, scanning the product ion spectrum from m/z 165 – 615.

Installation Requirements

Power

- One 230 Vac $\pm 10.0\%$, 15 Amps, 50/60 Hz, single phase, with earth ground dedicated to the instrument
- 120 or 230 Vac single phase, with earth ground for the data system

Gas

- One high-purity (99% pure, flow rate 15 L/min) nitrogen gas supply for the API source
- One ultra-high-purity helium gas supply (99.998% pure) with less than 1 ppm each of water, oxygen, and total hydrocarbons for the mass analyzer

Environment

- System averages 2300 W (8000 BTU/h) output when considering air conditioning needs
- Operating environment must be 15-27 °C (59-80 °F) and relative humidity must be 40-80% with no condensation
- Optimum operating temperature is 18-21 °C (65-70 °F)

Dimensions/Weight

- MS: 56 cm x 79 cm x 59 cm (h x w x d)
- MS: ~120 kg
- Roughing pumps: 38.6 kg

Performance Specifications

Mass Range

- m/z 15 – 200
- m/z 50 – 2000
- m/z 200 – 4000

Resolution

- 0.05 FWHM (full width half maximum) with Ultra ZoomScan between m/z 50-2000

Scan Power

- MSⁿ for n = 1 through 10

Analog Inputs

- One (1) analog Input (0-1 V)
- One (1) analog Input (0-10 V)

www.thermoscientific.com/velospro

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