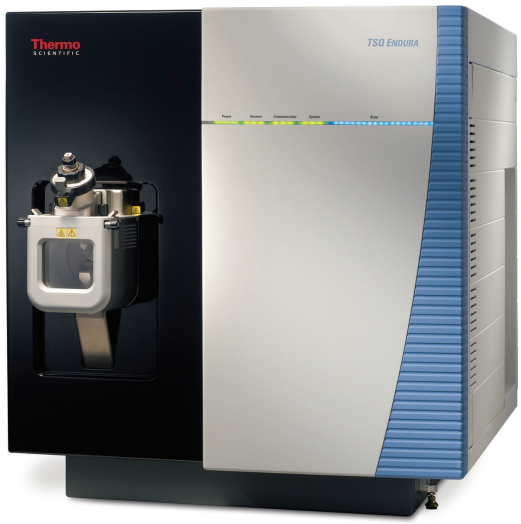
Thermo Scientific TSQ Endura Triple-Stage Quadrupole Mass Spectrometer

Extreme quantitative value with unprecedented ease

- Extreme quantitative value in a triple quadrupole mass spectrometer
- Best-in-class sensitivity
- Ultrafast selected-reaction monitoring enables quantification of more compounds in less time
- Superb robustness and reliability
- Close integration with application-specific software ensures maximum productivity
- Simple method development and easy operation



The Thermo Scientific™ TSQ Endura™ triple-stage quadrupole mass spectrometer provides unparalleled value, with LODs and LOQs unrivaled in its class. It delivers this best-in-class quantitation run after run and day after day, even for complex and difficult-to-run samples. Close integration with application-specific software ensures maximum productivity. The instrument's excellent analytical performance doesn't come at the price of complexity or lack of durability; breakthrough software and hardware developments make operation far easier and more reliable than in previous-generation triple quadrupoles. The TSQ Endura MS helps users spend more time thinking about their analyses and less time worrying about instrument setup and operation.

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Hardware Features

Thermo Scientific™ EASY-Max NG™ API Source

- Automatic connection of all gases and voltages on installation for simpler operation and greater reliability
- Automatic source recognition for ease of use and simplified data logging
- Sweep gas reduces chemical noise
- Enhanced exhaust port efficiently removes solvent vapor, improving uptime and reducing chemical noise
- Optimal 60 degree spray angle
- Minimal adjustment
- Interchangeable HESI and APCI ionization probes
- Dual-mode HESI and APCI capability

Ion Optics

RF-Lens

The progressively spaced stacked-ring ion guide (RF-Lens) captures and efficiently focuses ions in a tight beam. Large variable spacing between electrodes provides better pumping efficiency and improved ruggedness. Automatic tuning program optimizes ion transmission.

Ion Beam Guide

The ion beam guide, with its neutral blocker, stops neutrals and high-velocity clusters, keeping the ion optics cleaner, reducing noise, and increasing sensitivity.

Hyperbolic Quadrupole Mass Filter (Q1 and Q3)

Hyperbolic quadrupoles with high ion transmission at isolation widths down to 0.4 amu provide excellent sensitivity and selectivity.

Active Collision Cell (Q2)

The high-pressure argon-filled collision cell produces efficient fragmentation for high sensitivity. An axial DC field speeds ion transits, yielding up to 500 SRM/s with zero cross talk.

Vacuum System

- Four-stage differentially pumped vacuum manifold
- Advanced triple-inlet turbomolecular pump integrated with the vacuum manifold
- Single rotary vacuum pump configuration

Detector

- Dual-mode discrete-dynode detector increases sensitivity by operating in pulse-counting mode when ion flux is low and analog mode when ion flux is high
- Six orders of dynamic range provide high-confidence quantitation

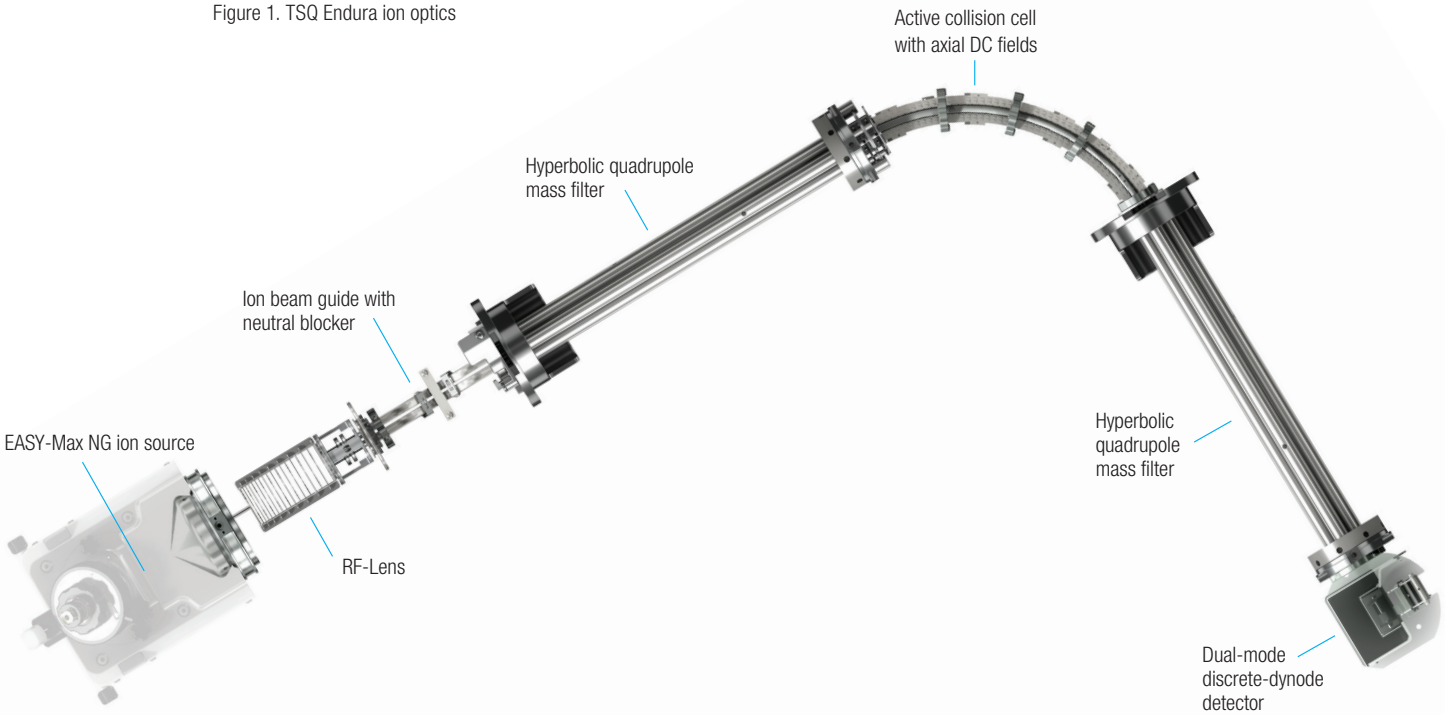
Integrated Divert Valve and Syringe Pump

Fully automated data system control of the divert valve enables switching the solvent front, gradient end point, or any portion of the HPLC run to waste.

Optional Ion Sources

- Thermo Scientific™ Ion Max NG™ ion source provides ultimate performance with full adjustments for optimization
- Thermo Scientific™ EASY-Spray NG™ ion source is designed for maximum nanoelectrospray performance with no need for adjustments
- Thermo Scientific™ Nanospray Flex NG™ ion source is designed for ultimate nanoelectrospray performance with complete flexibility of column selection

Figure 1. TSQ Endura ion optics



Software Features

Data System

- High-performance PC with Intel® microprocessor
- High-resolution LCD color monitor
- Microsoft® Windows® 7 operating system (64 bit)
- Microsoft Office 2010 software

Standard MS Software

- Thermo Scientific™ Xcalibur™ processing and instrument control software
- Tune editor for system calibration, diagnostics, and manual data acquisition
- Method editor with comprehensive application-specific template library and drag-and-drop user interface to facilitate method development
- Automated optimization of all instrument parameters, including gas pressures and collision energy, within an experiment
- Direct control of multiple vendors' LC systems and autosampler configurations through Xcalibur software
- Foundation of shared, state-of-the-art software makes it easier to transfer methods between next-generation instruments

Scan Functions

- Highly sensitive full-scan MS in Q1 or Q3
- Selected-ion monitoring (SIM) in Q1 or Q3
- Selected-reaction monitoring (SRM) with up to 30,000 SRMs definable and up to 500 SRMs/s
- High-resolution (0.4 Da) selected-reaction monitoring
- Product ion scanning
- Precursor ion scanning
- Neutral-loss scanning
- Reverse energy ramp (RER) MS/MS spectra gives information-rich MS/MS spectra for solid compound identification
- Polarity switching capabilities
- Quantitation-enhanced data-dependent (QED) MS/MS
- Mixed Mode Scan Function

Optional Application-Specific Software

- Thermo Scientific™ LCQUAN™ quantitation software supports 21 CFR Part 11 compliance
- Thermo Scientific™ TraceFinder™ software simplifies method development and routine analysis in food safety, environmental, clinical research, and forensic toxicology laboratories
- Thermo Scientific™ Mass Frontier™ spectral interpretation and classification software for the identification of unknowns
- Supports the use of Skyline software (MacCoss Lab, University of Washington) for method development and data analysis for peptide applications

Performance Specifications

Sensitivity

Positive Electrospray (HESI)

A 2 µL injection of a 500 fg/µL reserpine solution will produce a minimum signal-to-noise ratio of 80,000:1 for the transition of the protonated molecule at *m/z* 609.3 to the fragment ion at *m/z* 195.1 when operated in selected-reaction monitoring (SRM) mode with Q1 and Q3 resolution set to 0.4 and 0.7 Da FWHM respectively.

Atmospheric Pressure Chemical Ionization (APCI)

A 2 µL loop injection of a 500 fg/µL reserpine solution will produce a minimum signal-to-noise ratio of 25,000:1 for the transition of the protonated molecular ion at *m/z* 609.3 to the fragment ion at *m/z* 195.1 when operated in selected reaction monitoring (SRM) mode with Q1 and Q3 resolution both set to 0.7 Da FWHM.

Negative Electrospray (nESI)

A 2 µL loop injection of a 500 fg/uL chloramphenicol solution will produce a minimum signal-to-noise ratio of 80,000:1 for the transition of the deprotonated molecular ion at *m/z* 321.0 to the fragment ion at *m/z* 152.0 when operated in selected reaction monitoring mode (SRM) with Q1 and Q3 resolution set to 0.4 and 0.7 Da FWHM, respectively.

Mass Range

m/z 10–3400

Resolution

Q1 and Q3 adjustable to 0.4 Da peak width (FWHM) across the entire mass range

Scan Rate

15,000 amu/second at a resolution of 2 FWHM

500 SRM/second (for any resolution from 0.4 through 2.0 FWHM)

25msec polarity switching

Mass Stability

Mass assignment will be within ±0.05 Da over a 24 hour period. The laboratory room temperature must be maintained between 18–27 °C (65–81 °F). The room temperature may not change by more than 5 °C (9 °F) during this period.

1. Includes the divert/inject valve and syringe

Installation Requirements

Power

- Three 230 Vac ±10%, 50/60 Hz at 16 A minimum
- Four 120 Vac +6–10%, 50/60 Hz at 20 A or four 230 Vac ±10%, 50/60 Hz at 13 A
- Earth ground hardwired to main panel
- Free from voltage variations above or below the recommended operating range

Gas

- Collision gas: 99.995% pure argon
- Collision gas supply pressure: 135 ± 70 kPa (20 ± 10 psig)
- Sheath/aux/sweep gas: 99% pure nitrogen
- Sheath/aux/sweep gas supply pressure: 690 ± 140 kPa (100 ± 20 psig)
- Maximum sheath gas consumption: ≈20 L/min

Environment

- Functional temperature range: 15–27 °C (59–81 °F)
- Optimal temperature range: 18–21 °C (65–70 °F)
- Heat output: 1550 W (5400 Btu/h)
- Total system heat output: 4420 W (15,380 Btu/h)
- Particulate matter: <3,500,000 particles per cubic meter of air (<100,000 particles of >5 µm diameter per cubic foot of air)
- Relative humidity: 20% to 80%, without condensation
- Floors must be free of vibration

Dimensions

Size

- TSQ Endura MS[1]: 680 × 760 × 840 mm (h, w, d – 27 × 30 × 33 in)
- Oerlikon® SV 65 forepump: 270 × 320 × 489 mm (h, w, d – 10 × 13 × 19 in)

Weight

- TSQ Endura MS: 125 kg (275 lb)
- Oerlikon® SV 65 forepump: 52 kg (115 lb)

For Research Use Only. Not for use in diagnostic procedures.

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Africa +43 1 333 50 34 0
Australia +61 3 9757 4300
Austria +43 810 282 206
Belgium +32 53 73 42 41
Canada +1 800 530 8447
China 800 810 5118 (free call domestic)
400 650 5118
Denmark +45 70 23 62 60
Europe-Other +43 1 333 50 34 0
Finland +358 9 3291 0200
France +33 1 60 92 48 00
Germany +49 6103 408 1014
India +91 22 6742 9494
Italy +39 02 950 591
Japan +81 45 453 9100
Latin America +1 561 688 8700
Middle East +43 1 333 50 34 0
Netherlands +31 76 579 55 55
New Zealand +64 9 980 6700
Norway +46 8 556 468 00
Russia/CIS +43 1 333 50 34 0
Singapore +65 6289 1190
Spain +34 914 845 965
Sweden +46 8 556 468 00
Switzerland +41 61 716 77 00
UK +44 1442 233555
USA +1 800 532 4752

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