



TSQ Fortis triple quadrupole mass spectrometer

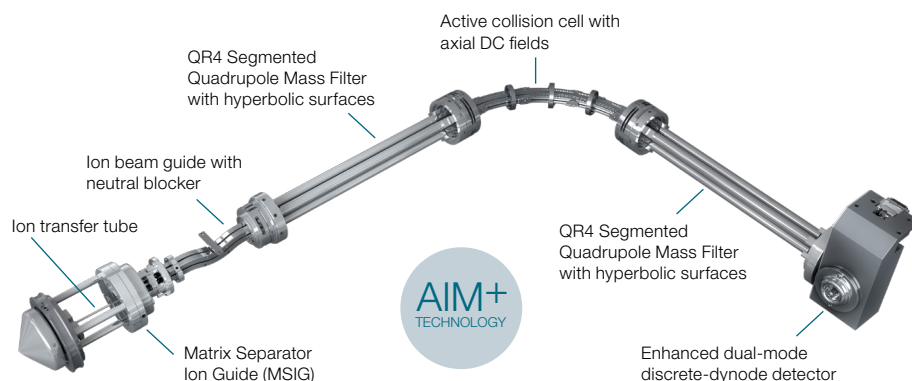
Reach a new level of confidence—unmatched productivity, robustness for everyone

Benefits

- Robust performance through enhanced Active Ion Management (AIM+) technology
- QR4 Segmented Quadrupoles with hyperbolic surfaces deliver sensitivity to meet your needs consistently and reproducibly
- Ultra fast selected-reaction monitoring enables quantitation of more compounds in shorter analysis times
- Seamless integration with application-specific software ensures ease of use and productivity
- User friendly tools for simplified method setup: automated compound optimization, method templates

The new Thermo Scientific™ TSQ Fortis™ triple quadrupole mass spectrometer helps achieve unmatched productivity and robustness for any lab focused on targeted quantitation of complicated analytes or analyte mixtures in complex matrices. This cost-effective system makes it easy for every LC-MS user to obtain high quality, reproducible results faster.

TSQ Fortis MS ion path



Hardware features

Active Ion Management

AIM+ technology maximizes ion transmission, from inception to detection with novel hardware designs to precisely manage electrical fields and remove sources of noise achieve unprecedented levels of quantitative performance.

Thermo Scientific™ OptaMax™ NG API source

- Automatic connection of all gases and voltages on installation simplifies operation and improves reliability
- Automatic source recognition simplifies use and data logging
- Sweep gas reduces chemical noise
- Enhanced exhaust port efficiently removes solvent vapor, improving uptime and reducing chemical noise
- Flexible X, Y, and Z positioning for all ionization probes maximizes performance
- Optimal 60 degree spray angle
- Integrated APCI functionality with interchangeable HESI and APCI ionization probes
- APPI capability

Ion optics

Matrix Separator Ion Guide

The Matrix Separator Ion Guide (MSIG) efficiently transmits the ion beam from atmosphere to vacuum, while eliminating neutrals.

Ion beam guide and neutral blocker

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

QR4 Segmented Quadrupole Mass Filter with hyperbolic surfaces (Q1 and Q3)

Segmented hyperbolic surface quadrupole mass filters with 4.0 mm field radius deliver industry leading ion transmission across the mass range at resolutions up to 0.4 FWHM for the ultimate in sensitivity at all masses and resolutions.

Active collision cell (Q2)

The 90 degree high-pressure argon-filled collision cell produces efficient fragmentation for high sensitivity while guiding ions away from neutral to reduce noise. The axial DC field speeds ion transits through the collision cell yielding up to 600 SRMs/sec with zero cross talk, providing excellent sensitivity and speed.

Detector

- Discrete-dynode detector with increased surface area greatly extends the detector lifetime
- Dual Mode function increases sensitivity by operating in pulse-counting mode when ion flux is low and analog mode when ion flux is high
- 5 orders of dynamic range provide high-confidence quantitation

Vacuum system

- Four-stage differentially pumped vacuum manifold
- Advanced triple-inlet turbomolecular pump integrated with the vacuum manifold
- Dual rotary vacuum pump configuration
- Dry-pump option available

Integrated divert valve and syringe pump

Fully automated data system control of the divert valve and syringe pump with plug and play support. Automated control of divert valve enables switching the solvent front, gradient end point, or any portion of the HPLC run to waste.

Optional ion sources

- Thermo Scientific™ EASY-Spray™ ion source is designed for maximum nanoelectrospray performance with no need for adjustments
- Thermo Scientific™ Nanospray Flex™ ion source is designed for ultimate nanoelectrospray performance with complete flexibility of column selection
- Thermo Scientific™ OptaMax™ Duet NG API ion source enables HESI and APCI functionality without manual changes in the hardware configuration
- Thermo Scientific™ VeriSpray™ PaperSpray ion source enables seamless integration of paper spray technology

Software features

Data system

- High-performance PC with Intel® microprocessor
- High-resolution LCD color monitor
- Microsoft® Windows® 10 operating system (64-bit)

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
- Fully automated loop injection or infusion based compound optimization. All instrument parameters, including source conditions, tube lens, and collision energy are optimized and directly incorporated into the instrument method.
- Direct control of multiple vendors' LC systems and autosampler configurations through Xcalibur software

Scan functions

- Highly sensitive full-scan MS
- Selected-ion monitoring (SIM)
- Selected-reaction monitoring (SRM) with up to 30,000 SRMs definable and up to 600 SRMs/sec and Timed SRMs
- 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
- Automated on-the-fly adjustment of retention time windows to accommodate chromatographic fluctuations

Optional application-specific software

- Thermo Scientific™ TraceFinder™ software simplifies complex quantitative screening data analysis for routine testing 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 in peptide applications
- Thermo Scientific™ Chromeleon™ Chromatography Data System (CDS) software unifies workflows for routine quantitative MS analysis

Performance specifications

Sensitivity

Positive electrospray (HESI)

A 5 µL injection of a 200 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 5 µL loop injection of a 200 fg/µL reserpine solution will produce a minimum signal-to-noise ratio of 20,000:1 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 (nHESI)

A 5 µL loop injection of a 200 fg/µL 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 0.7 Da FWHM.

Mass range

m/z 5–3,000

Resolution

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

Scan rate

- 15,000 amu/second at a resolution of 2 Da FWHM
- Up to 600 SRMs/sec (for resolutions from 0.4 through 2.0 FWHM)
- Polarity Switching: <20 msec electronic switching (25 msec total including signal stabilization time)

Mass stability

Mass assignment will be within ± 0.1 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.

Installation requirements

Power

- Two 230 Vac $\pm 10\%$, 50/60 Hz at 16 A minimum
- Four 120 Vac $\pm 6\text{--}10\%$, 50/60 Hz at 20 A or four 230 Vac $\pm 10\%$, 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 (99.995% Nitrogen also supported)
- Collision gas supply pressure: 135 \pm 70 kPa (20 \pm 10 psig)
- Sheath/aux/sweep gas: 99% pure nitrogen
- Sheath/aux/sweep gas supply pressure: 690 \pm 140 kPa (100 \pm 20 psig)
- Maximum 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: 1,550 W (5,400 Btu/h)
- Total system heat output: 4,420 W (15,380 Btu/h)
- Particulate matter: <3,500,000 particles per cubic meter of air (<100,000 particles of >5 μ m diameter per cubic foot of air)
- Relative humidity: 20–80%, without condensation
- Floors must be free of vibration

Dimensions

Size

- TSQ Fortis MS: 680 \times 760 \times 840 mm (h, w, d – 26.75 \times 30 \times 33 in)
- Oerlikon® SV 65 forepump: 270 \times 320 \times 489 mm (h, w, d – 10.6 \times 12.5 \times 19.25 in)

Weight

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

Find out more at thermofisher.com/Fortis