

The Finnigan TSQ Quantum Ultra triple quadrupole mass spectrometer defines a new standard of excellence for your quantitative analysis needs.

## Finnigan™ TSQ® Quantum Ultra™/Ultra AM

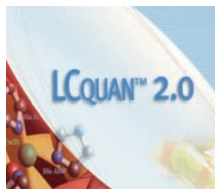


- Premier model of the Finnigan triple quadrupole mass spectrometer line
- Universal Ion Max™ source
- Redefining sensitivity
- Supports 21 CFR Part 11 compliance through LCQUAN 2.0

APCI probe, with ceramic heater, virtually eliminates carryover. The Ultra's innovative technology provides the widest linear dynamic range and lowest sensitivity limits of any triple quadrupole MS.

The Finnigan TSQ Quantum Ultra AM has routine accurate mass measurement capability—on the chromatographic timescale. Its electronic analyzer control circuitry allows full advantage to be taken of the high-resolution HyperQuad™ mass analyzers at the heart of every Finnigan TSQ Quantum. This additional innovation results in accurate mass measurement capabilities that are easier to use and have a greater dynamic range than those of instruments based on Q-ToF technology. With these industry leading features, the Finnigan TSQ Quantum Ultra defines a new standard of excellence in bioanalytical and environmental analysis.

The Finnigan TSQ Quantum Ultra defines the standard for quantitative performance. It features the revolutionary Ion Max source with interchangeable ESI and APCI probes, a titanium skimmer for increased robustness and sensitivity, and a redesigned ion transfer tube lens for enhanced ion focusing and ion transmission. The Ion Max source also allows full probe adjustment in the x, y, and z directions so that probe position can be optimized for maximum robustness and sensitivity. Its new, ultra high temperature, self-cleaning



## Hardware Features

### Ion Max API Source

- Enhanced sensitivity and ruggedness
- Sweep gas reduces chemical noise
- Optimal 60-degree spray angle for best sensitivity and ruggedness
- Interchangeable ESI and APCI ionization probes
- APPI/APCI combination probe
- Removable ion transfer tube provides vent-free maintenance
- High temperature, self-cleaning APCI heater employing state-of-the-art ceramic heater technology
- X, Y, and Z probe positioning adjustments for all ionization probes
- Automatic source recognition for ease of use and simplified data logging
- Dual square profile quadrupole ion guides for the highest ion transmission

### Triple Stage Quadrupole

- Dual HyperQuad, precision hyperbolic quadrupole mass analyzers for ultra performance
- Large 6-mm field radius provides high transmission and superior peak shape
- 90-degree square profile quadrupole ion guide with noise-reducing geometry
- Software control and automated optimization of collision energy and gas pressure
- Fully automated system calibration, tuning, and compound optimization

### Vacuum System

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

### Detection System

- Off-axis continuous dynode electron multiplier with extended dynamic range
- $\pm 15$  kV post-acceleration conversion dynode
- Integrated electron multiplier eliminates field emission and microphonic noise
- Digital electronic noise reduction

### Integrated Divert Valve

- Fully-automated data system control enables switching the solvent front, gradient end point, or any portion of the HPLC run to waste
- Automatic system optimization by loop injections
- User-definable default state of the valve, either "to waste - load" or "to source - inject"

### Integrated Syringe Pump

- Automated infusion and loop injections under full data system control

### Source Options

- ESI probe compatible with liquid flow rates of 1  $\mu\text{L}/\text{min}$  to 1  $\text{mL}/\text{min}$ , without splitting
- APPI/APCI combination probe compatible with liquid flow rates of 50  $\mu\text{L}/\text{min}$  to 2  $\text{mL}/\text{min}$ , without splitting
- APCI probe compatible with liquid flow rates of 50  $\mu\text{L}/\text{min}$  to 2  $\text{mL}/\text{min}$ , without splitting
- Metal needle option for ESI with configurations for low-flow or high-flow analysis
- NanoSpray source supports both static and dynamic nanospray experiments, compatible with liquid flow rates of 50  $\text{nL}/\text{min}^*$  to 50  $\mu\text{L}/\text{min}$

*\*Lower limit depends on gauge of needle used.*

### System Control

- Powerful embedded computer system with Motorola PowerPC<sup>®</sup> processor
- Integrated Serial Peripheral Interconnect (SPI) bus for reliable electronic communications between system modules
- Dedicated SHARC<sup>™</sup> digital signal processor (DSP) for dedicated instrument control
- Fast 100 base-T Ethernet port for PC-to-Instrument communications

### Data Acquisition

- Real-time, high-speed, digital signal processing with dedicated SHARC digital signal processor (DSP)
- High-speed analog-to-digital converter (ADC) with 195 kHz sampling rate
- Adjustable scan speeds to 2000 Da/sec
- High-resolution centroiding

### Software Features

#### Scan Functions

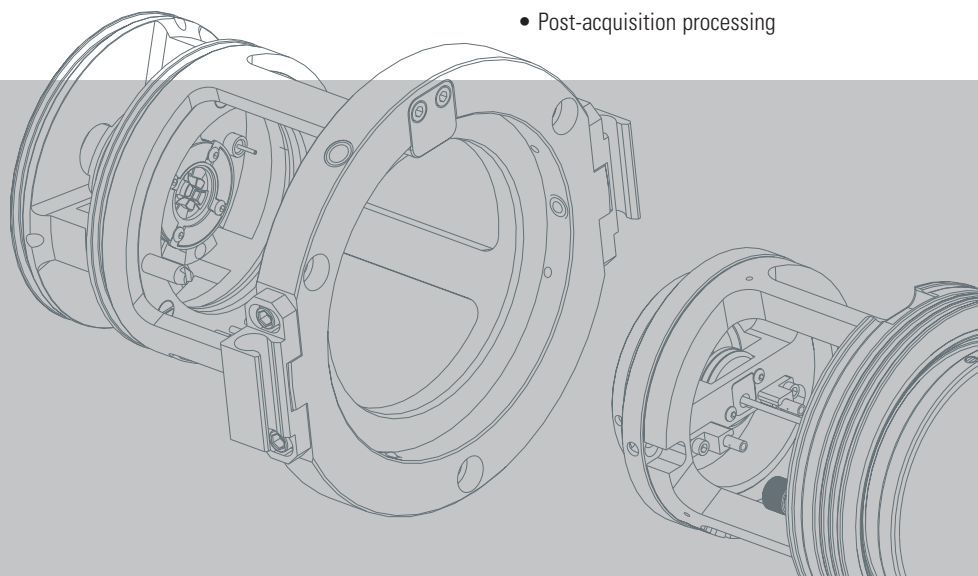
- Highly sensitive full-scan MS in Q1 or Q3
- Selected Ion Monitoring (SIM) in Q1 or Q3
- Selected Reaction Monitoring (SRM) for the most demanding bioanalytical assays
- Product Ion Scanning
- Precursor Ion Scanning
- Neutral Loss Scanning

#### Advanced Data-Dependent Experiments

- Available from all scan types
- Dynamic Exclusion<sup>™</sup>
- Polarity switching between source scan and Data Dependent<sup>™</sup> scan
- AutoSIM
- AutoLock feature for accurate mass systems

#### Accurate Mass Calibration

- Internal lock mass for best performance
- External lock mass for interference-free measurement
- Post-acquisition processing



## Data System

- Xcalibur processing and instrument control software
- LCQUAN™ quantitation software supports 21 CFR Part 11 compliance
- Data system control of all instrument parameters
- Superior comprehensive instrument diagnostics
- Automated optimization of all instrument parameters including gas pressures and collision energy within an experiment
- Direct control of multiple vendor LC systems and autosampler configurations through Xcalibur data system software
- High performance PC with Intel® Pentium® microprocessor and Microsoft® Windows® operating system
- 19-inch viewable ultra-sharp, flat screen display monitor

## Optional Application-Specific Software

- BioWorks™/SEQUEST®/TurboSEQUEST™ – protein identification tools
- Mass Frontier™ – spectral interpretation and classification software to identify unknowns
- Metabolite ID – rapid review and reporting of drug metabolism data
- DeNovoX™ – automatically sequences unknown peptides

## System Specifications

### Sensitivity

#### Electrospray (ESI) at Unit Resolution

A 5  $\mu\text{L}$  loop injection of a 200 fg/ $\mu\text{L}$  (0.329 fmol/ $\mu\text{L}$ ) reserpine solution at a flow rate of 400  $\mu\text{L}/\text{min}$  50/50 IPA/water will produce a minimum signal-to-noise ratio of 50:1 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 mode (SRM) with Q1 and Q3 resolution set to 0.7 Da FWHM.

#### ESI at High Resolution

A 5  $\mu\text{L}$  loop injection of a 200 fg/ $\mu\text{L}$  (0.329 fmol/ $\mu\text{L}$ ) reserpine solution at a flow rate of 400  $\mu\text{L}/\text{min}$  50/50 IPA/water will produce a minimum signal-to-noise ratio of 50:1 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 mode (SRM) with Q1 resolution set to 0.2 Da and Q3 resolution set to 0.7 Da FWHM.

#### Atmospheric Pressure Chemical Ionization (APCI) and Atmospheric Pressure Photoionization (APPI) at Unit Resolution

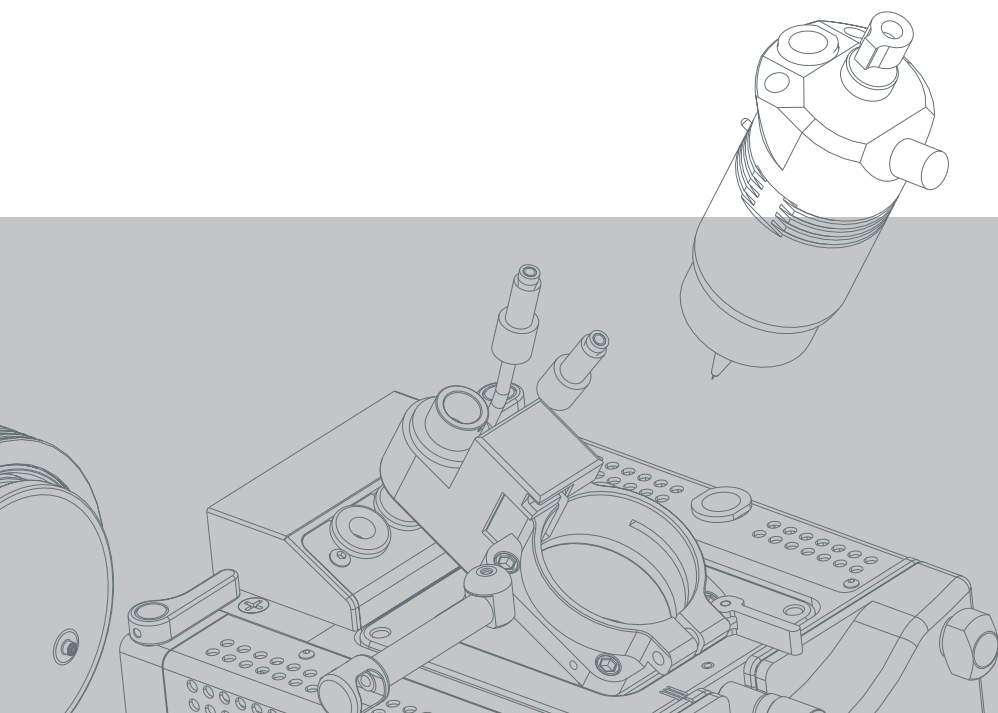
A 5  $\mu\text{L}$  loop injection of a 200 fg/ $\mu\text{L}$  (0.329 fmol/ $\mu\text{L}$ ) reserpine solution at a flow rate of 1 mL/min 50/50 IPA/water will produce a minimum signal-to-noise ratio of 50:1 for the transition of the protonated molecular ion at  $m/z$  609.3 to the fragment ion at  $m/z$  195.1 when operated in selected reaction monitoring mode (SRM) with Q1 and Q3 resolution set to 0.7 Da FWHM.

### APCI and APPI at High Resolution

A 5  $\mu\text{L}$  loop injection of a 200 fg/ $\mu\text{L}$  (0.329 fmol/ $\mu\text{L}$ ) reserpine solution at a flow rate of 1 mL/min 50/50 IPA/water will produce a minimum signal-to-noise ratio of 50:1 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 mode (SRM) with Q1 resolution set to 0.2 Da and Q3 resolution set to 0.7 Da FWHM.

### Mass Accuracy– TSQ Quantum Ultra AM

Infusion of a mixture of polyethylene glycols (PEG's) of average molecular weights 200, 400, 600, and 1000 at 50 pmoles/ $\mu\text{L}$  produces 27 ammoniated PEG ions from 124 to 1268 Da. Accurate mass data is generated on each of the 25 ions from 168 to 1224 Da using the neighboring peaks as internal lock masses. The mass of each ion is determined from the average of up to 100 scans and the error between the expected mass and the measured mass is expressed in mmu and ppm. The root mean square (RMS) average is computed from the errors of the 25 individual ions. The RMS error will be less than or equal to 5 ppm.



## Performance Specifications

### Mass Range

- 30–1500 Dalton

### Resolution

- 7500 (FWHM) at m/z 508 of polytyrosine
- Resolution is continuously adjustable to better than 0.1 Da peak width (FWHM) across the entire mass range.

### Mass Stability

#### TSQ Quantum Ultra

- Mass assignment will be within  $\pm 0.050$  Da over a 24 hour period. The laboratory room temperature must be maintained between 15-27 °C (59-81 °F). The optimum temperature of operation is between 18-21 °C (65-70 °F). The room temperature may not change by more than 5 °C (9 °F) during this period.

#### TSQ Quantum Ultra AM

- Mass assignment will be within  $\pm 0.025$  Da over a 24 hour period. The laboratory room temperature must be maintained between 15-27 °C (59-81 °F). The optimum temperature of operation is between 18-21 °C (65-70 °F). The rate of change in temperature may not exceed 2 °C per hour (3.6 °F/hr) and not by more than 5 °C (9 °F) during this period.

## Installation Requirements

### Power

- One 230 Vac  $\pm 10\%$ , 50/60 Hz at 16 A minimum
- Four 120 Vac  $+6-10\%$ , 50/60 Hz at 20 A or four 230 V  $\pm 10\%$  AC, 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  $\pm$  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 sheath gas consumption: ~ 20 L/min.

## Environment

- Functional temperature range: 15 °C to 27 °C (59 °F to 81 °F)
- Optimal temperature range: 18 °C to 21 °C (65 °F to 70 °F)
- TSQ Quantum Ultra heat output: 2,300 W (8,000 Btu/h)
- Particulate matter: < 3,500,000 particles per cubic meter of air (< 100,000 particles of > 5  $\mu$ m diameter per cubic foot of air)
- Relative humidity: 20% to 80%, without condensation
- Floors must be free of vibration.

## Dimensions

- TSQ Quantum Ultra and Ultra AM: 61 cm  $\times$  56 cm  $\times$  79 cm (h  $\times$  w  $\times$  d)
- Liquid chromatograph\*: 61 cm  $\times$  76 cm  $\times$  61 cm (h  $\times$  w  $\times$  d)
- Minitower computer: 48 cm  $\times$  18 cm  $\times$  43 cm (h  $\times$  w  $\times$  d)
- Monitor: 41 cm  $\times$  41 cm  $\times$  43 cm (h  $\times$  w  $\times$  d)
- Forepumps (each): 30 cm  $\times$  20 cm  $\times$  64 cm (h  $\times$  w  $\times$  d)
- Laser printer: 20 cm  $\times$  41 cm  $\times$  46 cm (h  $\times$  w  $\times$  d)

## Weight

- TSQ Quantum Ultra: 118 kg
- Liquid chromatograph\*: 45 kg
- Minitower computer: 14 kg
- Monitor: 5 kg
- Forepumps (each): 34 kg
- Laser printer: 7 kg

\*Values are for the Surveyor LC system. Other LC systems will vary.

## International Offices

### Australia

Tel. (61) 2 9898 9000

### Austria

Tel. (43) 1 333 50340

### Belgium

Tel. (32) 2 482 30 30

### Canada

Tel. (905) 712 2258

Canada only

Tel. (800) 721 4260

### Central and South America

Tel. (01) 512 251 1530

### France

Tel. (33) 1 60 92 48 00

### Germany

Tel. (49) 6103 4080

### Italy

Tel. (39) 02 950 591

### Japan

Tel. (81) 45 453 9100

### The Netherlands

Tel. (31) 76 5878 722

### People's Republic of China

Tel. (86) 10 6621 0839

### Spain

Tel. (34) 91 657 4930

### Sweden

Tel. (46) 8 556 468 00

### Switzerland

Tel. (41) 61487 8400

### United Kingdom

Tel. (44) 1 442 233555

### United States

Tel. (01) 800 532 4752

