Thermo Scientific Q Exactive Focus Orbitrap LC-MS/MS System

Affordable. Durable. Proven.

- Scan speed up to 12 Hz with Orbitrap Analyzer Technology for best screening and quantitative results
- Resolving power of up to 70,000 (FWHM) at *m/z* 200
- Routine sub ppm mass accuracy
- Linear Dynamic Range up to 6 orders of magnitude
- Multiple approaches to quantitation including Selected Ion Monitoring (SIM), Parallel Reaction Monitoring (PRM), and Data-Independent Acquisition (DIA)
- Polarity switching for maximum compound coverage
- Higher-Energy Collisional Dissociation (HCD)

The Thermo Scientific™ Q Exactive™ Focus benchtop LC-MS/MS combines quadrupole precursor ion selection and a high-resolution accurate-mass (HR/AM) Orbitrap mass analyzer to deliver mass accuracy, sensitivity and fast polarity switching while maintaining sensitivity compared to a triple quadrupole mass spectrometer.

The Q Exactive Focus mass spectrometer delivers qualitative and quantitative results every day. Perform routine identification, quantitation and confirmation in a single analysis with easy to use Thermo Scientific™ TraceFinder™ acquisition and processing software.

Based on the proven Q Exactive platform, the Q Exactive Focus provides durable and reliable performance for routine laboratories doing automated screening, profiling and quantification analysis of small molecule compounds. Full scan confirmation mode and parallel reaction monitoring (PRM) provide reproducible quantitation results and targeted screening capabilities. Variable data-independent analysis (vDIA) provides complete qualitative coverage for unknown screening without compromising proven quantitative attributes.

The Q Exactive Focus system provides best in class data quality at a value price. It is ideal for routine labs performing food safety residue analysis, environmental analysis, forensic toxicology, sports doping, clinical research, metabolomics, and pharmaceutical analyses.

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Hardware Specification

Thermo Scientific Ion Max API Source

- H-ESI II probe with dual desolvation zone technology
- Sweep gas to reduce chemical noise
- 60° interchangeable ion probe orientation
- Removable metal ion transfer capillary provides vent-free maintenance

Ion Optics

- RF lens stacked-ring radio frequency ion guide captures and efficiently focuses the ions into a tight beam. Large variable spacing between electrodes allows for better pumping efficiency and improved ruggedness.
- Bent flatapole ion guide reduces noise by preventing neutrals and high-velocity clusters from entering the quadrupole

Quadrupole Mass Filter

- Thermo Scientific™ HyperQuad™ mass filter provides increased ion transmission
- Variable precursor ion isolation width selection from 0.4 Da to full mass range

Vacuum System

- Differentially pumped vacuum system with final vacuum $<1 \times 10^{-9}$ mbar
- Two split-flow turbomolecular pumps and one rotary vane pump
- Seven vacuum regions

Orbitrap Mass Analyzer

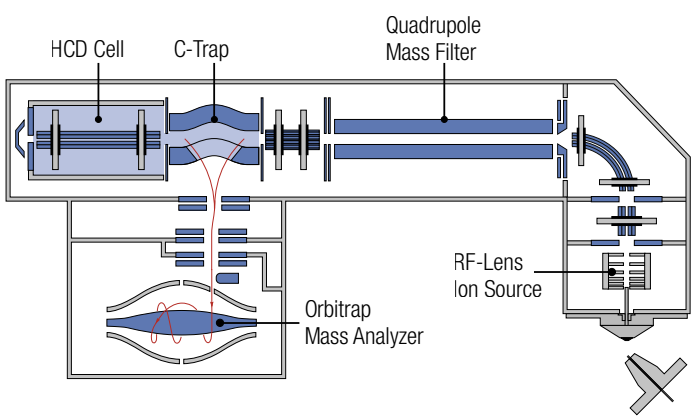
- Nitrogen-filled C-Trap
- Highly efficient ion transfer to Thermo Scientific™ Orbitrap™ mass analyzer
- Straight multipole collision cell for HCD
- High field Orbitrap mass analyzer with 5 kV central electrode voltage
- Low-noise image current preamplifier
- 16-bit signal digitalization

Data Acquisition

- Ultrafast real-time data acquisition and instrument control system
- Fully automated calibration via instrument control software
- Automatic Gain Control

Performance Characteristics	
Resolving power	70,000 @ *m/z* 200
Mass range	50 to 2000 *m/z*
Scan rate*	Up to 12 Hz at resolution setting of 17,500 @ *m/z* 200
Mass accuracy *	Internal: <1 ppm RMS External: <3 ppm RMS
Sensitivity	Full MS: 500 fg buspirone on column S/N 100:1 SIM: 50 fg buspirone on column S/N 100:1
Dynamic range	>5000:1
Linear Dynamic range	>1,000,000
Polarity switching	One full cycle in <1 sec (one full positive mode scan and one full negative mode scan at a resolution setting of 35,000)
Analog inputs	One (1) analog input (0–1 V) One (1) analog (0–10 V)

*Under defined conditions



Q Exactive Focus schematics diagram

Options

- ESI probe compatible with liquid flow rates of <1 µL/min to 1 mL/min without splitting
- APCI source compatible with liquid flow rates of 50 µL/min to 2 mL/min without splitting
- APCI/APPI source compatible with liquid flow rates of 50 µL/min to 2 mL/min without splitting
- Metal needle kits for high- and low-flow analyses

Software Features

Data System

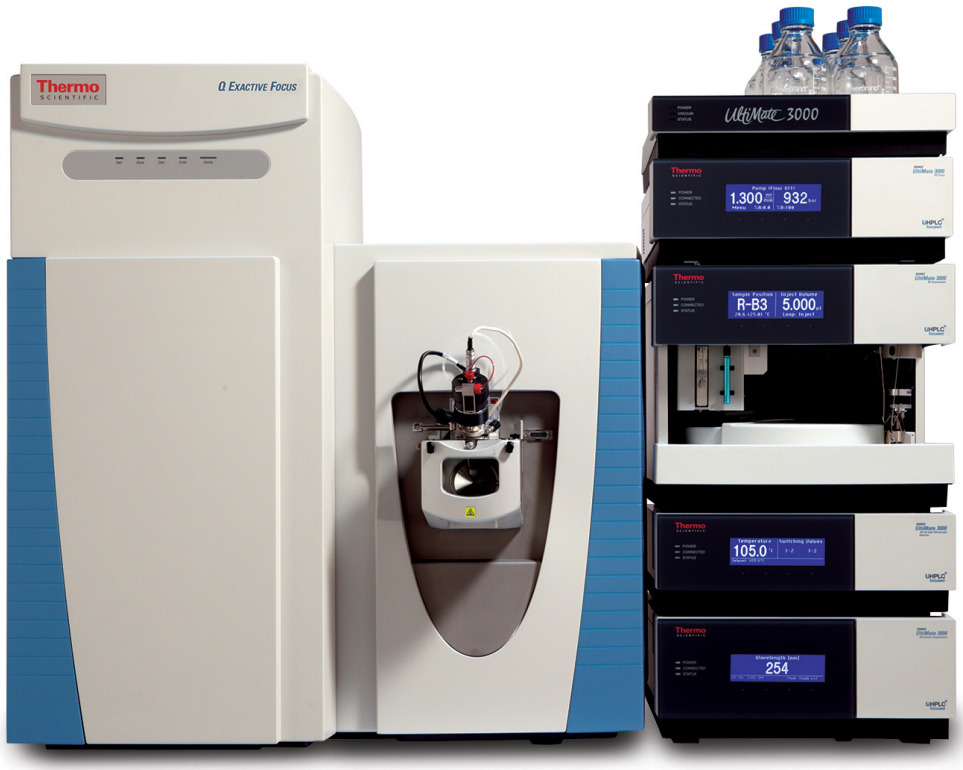
- High-performance PC with Intel® microprocessor
- High-resolution LCD color monitor
- Microsoft® Windows® 7 operating system
- Microsoft Office software package
- Thermo Scientific™ Xcalibur™ instrument control and data processing software
- Workflow-based method editor

Operation Modes

- Full MS with high-resolution accurate-mass detection
- Selected Ion Monitoring (SIM) with high-resolution accurate-mass detection
- Parallel Reaction Monitoring (PRM) for improved screening and quantitative confidence
- Data-Independent Acquisition (DIA) for unbiased identification and quantitative analysis
- All-Ion Fragmentation (AIF) in the HCD collision cell with high-resolution accurate-mass detection
- In-source fragmentation of all ions
- Positive/negative ion switching on chromatographic timescale
- On-the-fly data-dependent decision making
- Timed SIM for scheduled data acquisition of the targets of interest

Exclusive Technologies

- Automatic Gain Control (AGC) ensures that the Orbitrap mass analyzer is always filled with the optimum number of ions for all scans
- High-performance HCD collision cell for highest performance MS/MS fragmentation
- Collision energy profiling using different collision energies for HCD fragmentation
- Advanced signal processing
- Interleaved operation



Q Exactive Focus mass spectrometer with Thermo Scientific™ Dionex™ Ultimate™ RSLC 3000

Installation Requirements

Power

- 2 × 230 VAC ± 10% single phase, 15 A, 50/60 Hz, with earth ground for the instrument
- 120 or 230 VAC single phase with earth ground for the data system

Gas

Nitrogen

- High-purity nitrogen gas supply (99% pure at 800 ± 30 kPa (8.0 ± 0.3 bar, 116 ± 4 psi))

Environment

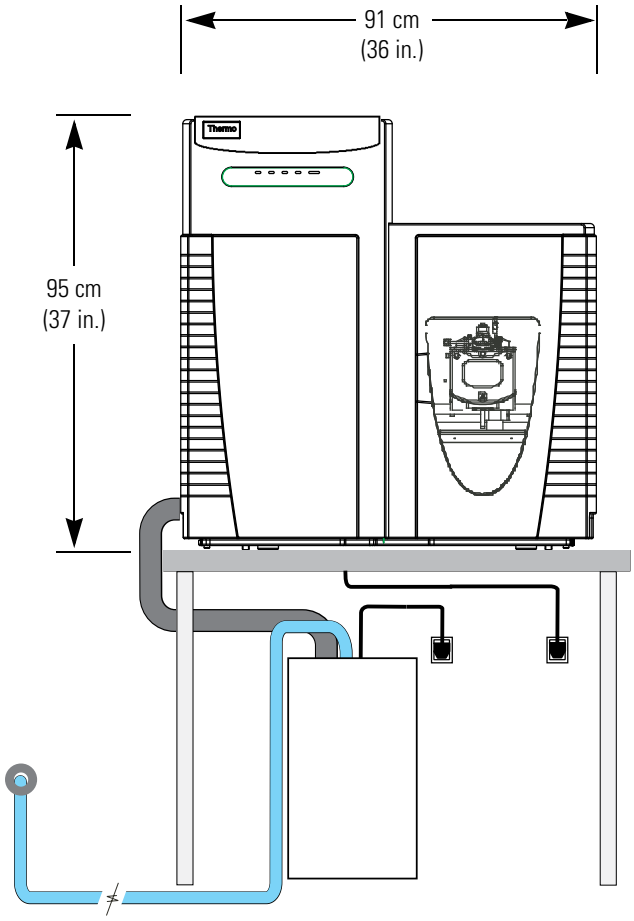
- System averages 2500 W (~9000 Btu/h) output when considering air conditioning needs
- Operating environment must be 15–26 °C (59–78 °F) and relative humidity must be 40–70% with no condensation

Weight

- Q Exactive Focus mass spectrometer: 182 kg (400 lbs) without forevacuum pump
- Forevacuum pump: 62 kg (136 lbs)

Dimensions

- Q Exactive Focus mass spectrometer: (h × d × w) 95 × 83 × 91 cm (37 × 33 × 36 in.)



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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
Korea +82 2 3420 8600
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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