Thermo Finnigan LTQ-FT Ultra

Unprecedented Analytical Power

Performance Specifications

• Concentration independent ppb mass accuracy
• Widest dynamic range
• Parallel detection
• MSn
• ECD and IRMPD
• Ultra High resolution
• Intelligent Data Dependant acquisition Unprecedented Analytical Power The LTQ FT Ultra delivers unprecedented analytical power for the most demanding applications.

The unmatched mass accuracy eliminates false positive identifications in bottom-up and middle-down proteomics and enables the unambiguous identification of unknown analytes with on-line LC-MSn at any concentration.

Ultra high resolution is essential for the analysis of complex samples such as crude oil, Dissolved Organic Matter (DOM) or intact proteins. This is available with a single mouse click.

The LTQ FT Ultra system is a fully integrated hydrid mass spectrometer consisting of a Linear Ion Trap Mass Spectrometer, LTQ XL, combined with a Fourier Transform Ion Cyclotron Resonance Mass Spectrometer.

LTQ XL
Ion Max™
API Source
• Enhanced sensitivity and ruggedness
• Sweep Gas™ reduces chemical noise
• 60° interchangeable ion probe orientation
• Removable metal ion capillary tube provides vent-free maintenance

Transfer Ion Optics
• Advanced ion guides
• High stability and ion transmission efficiency

2D Linear Quadrupole Ion Trap Mass Spectrometer
• Optimized analyzer dimensions
• Regulated helium flow for stable performance

• 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
• Patented dual conversion dynode detector
• Two off-axis continuous dynode electron multipliers with extended dynamic range
• Digital electronic noise discrimination

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Fourier Transform ICR MS

• Multipole ion transfer optics with differential pumping
• New open cylindrical ICR Ultra cell
• Actively shielded 7 Tesla super conducting magnet with liquid helium and liquid nitrogen level sensors and meter
• Ultra low noise detect amplifiers (Preamp Ultra)
• 14 bit signal digitization
• Ultra fast real-time data acquisition and instrument control system
• Differentially pumped vacuum system with
• One split-flow turbo-molecular pump (at LT) and two 260L turbo molecular pumps
• Pressure in the FT cell, under operating conditions, better than 5 x 10-9mtorr
• Rotary vane pumps as fore vacuum pumps
• Penning Ion gauge and electronic monitoring of pressure
• Automatic tuning of all FT ICR parameters

Performance Characteristics

Mass range

• 50 to 4,000 Da Resolution
• 100,000 at m/z 400 at 1 s per scan (broadband mode)
• > 750,000 at m/z 400 at slower scan repetition rates (broadband mode)

Mass accuracy

• < 1.2 ppm RMS error with external calibration (using the calibration range and settings only)
• < 1 ppm RMS error with internal calibration Sensitivity
• Attomole range for peptides
• Intrascan dynamic range: > 4,000

Sensitivity

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Linear Ion Trap MS

• MS, MS/MS and MSn Analysis
• AGC Control

• Secondary Electron Multiplier Detector FTICR MS
• Ion Image Current Detector
• Accurate Mass, High Resolution
• ECD, IRMPD

Options
• ESI probe compatible with liquid flow rates of < 1 µL/min to 1 mL/min, without splitting
• H-ESI probe compatible with liquid flow rates of < 1 µL/min to 1 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 µL/min
• 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
• Electron capture dissocation (ECD)
• Infrared multi photon dissociation (IRMPD)
*Lower limit is dependent on gauge of needle used Data System
• Xcalibur™ processing and instrument control software • LCQUAN™ 2.5 quantification package
• Microsoft® Office XP software package
• Microsoft Windows® XP operating system
• High-performance PC with Intel® Pentium® microprocessor
• High-resolution LCD color monitor Operation modes
• High resolution accurate mass scans with high repetition rate
• Precursor ion isolation and fragmentation in the linear ion trap with high resolution accurate mass MS/MS and MSn data acquisition in the FT ICR
• Data Dependent scans using both the linear trap and the FT ICR MS
• Data dependent MS/MS with parallel acquisition of multiple MSn scans in the linear ion trap while acquiring a high resolution full scan MS spectrum in the FT ICR
• Ion Mapping, Neutral Loss Ion Mapping. Parent Ion Mapping, user selectable Dynamic Exclusion, Nth Order Triple Play experiment, Data Dependent Zoom Map, Data Dependent Ion Tree experiment, and Total Ion Map experiment

Exclusive Technologies
• Pulsed Q Collision Induced Dissociation (PQD) enables trapping of low mass fragment ions
• High Resolution Isolation (HRI) allows for the separation of an isobaric interfering species down to 0.3 Da or for isolation of a thermally labile compound
• Unique, patented 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 spectra
• Normalized Collision Energy™ compensates for the massdependent energy deposition characteristics of ion trap mass spectrometers in MS/MS experiments, providing reproducible data from instrument to instrument
• Stepped Normalized Collision Energy allows for the variation of the collision energies in an experiment
• Multistage Activation generates combination MS/MS spectra and MS3 spectra based on a user defined neutral loss

Advanced Data Dependent Experiments
• Data Dependent features trigger acquisition of MSn spectra only when a compound of interest is detected
• Isotopic Data Dependent scanning software triggers MS/MS scanning only when a specified isotopic pattern is detected

• Accurate Mass Neutral loss triggered ECD
• ESI probe compatible with liquid flow rates of < 1 µL/min to 1 mL/min, without splitting
• Nth Order Triple Play allows the number of ions undergoing a Triple Play to be defined
• Ion Mapping™ automatically generates a 3-dimensional MS/MS map, yielding product ion, precursor ion, and neutral loss information
• Ion Mapping Browser Software displays data generated by Ion Mapping experiments
• Data Dependent Ion Tree performs MSn experiments on up to 25 species
• Data Dependent Zoom Map generates sequential MS/MS experiments using a ZoomScan for charge state determination prior to each MS/MS experiment
• MSn Browser software displays data generated by Data Dependent Ion Tree and Ion Mapping experiments
Optional Application-Specific Software
• MetWorks™ – automated metabolite identification using spectral trees
• Mass Frontier™ – spectral interpretation and classification software to identify unknowns
• BioWorks™ – protein identification and quantitation featuring SEQUEST®
• PEAKS – powerful, easy de novo sequencing
• ProMass™ Deconvolution – intact protein analysis
• SIEVE™ – automated label-free differential expression of proteins and peptides
• ProSight PC™ – top-down protein identification

Installation requirements*

Power
• 3 Phase 16 A, 230 V ± 10 %, 50/60 Hz
Gas
• Helium Ultra-high purity (99.999 %) with less than 1.0 ppm each of water, oxygen, and total hydrocarbons.
• The required gas pressure is 275 ± 70 kPa (40 ± 10 psi).
Nitrogen
• The nitrogen for the API sheath gas and auxiliary/sweep gas should be high purity (99%).
• The required gas pressure is 760 ± 70 kPa (110 ± 10 psi).
* Detailed installation requirements are provided in the LTQ FT Ultra Preinstallation Requirements Guide P/N 1153751. Liquid cryogens for the superconducting magnet
Helium
• The liquid helium capacity of the magnet is 150 L.
• The refill interval is approximately 100 days.
Nitrogen
• The liquid nitrogen capacity of the magnet is 100 L. The refill interval is approximately seven days.

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Space requirements
Floor Space
• L x W 3,786 mm x 2,505 mm (149” x 98.6”)
Weight Distribution
• 800 Kg/m2 (163 lbs/sq. foot)

Total Weight
• 1,200 Kg (2650 pounds)
Ceiling Height
• 2,900 mm (114”)
Minimum Door Height
• 2,100 mm (82.7”)
Minimum Door Width
• 890 mm (35”)

Environment
Room temperature
• The laboratory room temperature must be maintained between 15 and 27 °C (59 and 81 °F).
• The optimum temperature of operation is between 18 and 21 °C (65 and 70 °F).
Air conditioning load
• The air conditioning load for a basic LTQ FT Ultra system (with a typical LC) is approximately 7.4 kW.
Humidity
• The relative humidity of the operating environment must be between 40 and 80 %, with no condensation.
• It is recommended that the room is equipped with an automated ventilation system and oxygen depletion detectors.