

Thermo Scientific LCQ Fleet ion trap LC/MSⁿ

Exceptional analytical value

The LCQ Fleet ion trap mass spectrometer enables the confident analysis of complex samples in a rugged, reliable, and cost-effective platform.

Product highlights

- Fast Positive/Negative Polarity Switching for higher throughput
- Normalized Collision Energy eliminates the need for tuning
- Data-Dependent Acquisition enables automated analysis of unknowns
- Dynamic Exclusion allows the detection of low intensity ions

The LCQ Fleet™ ion trap mass spectrometer delivers high quality structural information for routine analysis of complex samples, on a high-throughput basis. It integrates seamlessly with fast HPLC systems under a convenient single point of control. Equipped with many advanced features, including MSⁿ, a powerful tool for confident structural characterization, the LCQ Fleet enables all users, from novice to expert, to easily analyze and interpret sample data.

**Hardware features****Ion Max-S 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

Options

- HESI-II source compatible with liquid flow rates of < 1 $\mu\text{L}/\text{min}$ to 1 mL/min, without splitting
- HESI-II probe offers metal needle options for high- and low-flow analyses
- APCI/APPI source compatible with liquid flow rates of 50 $\mu\text{L}/\text{min}$ to 2 mL/min, without splitting
- Nanospray II source supports static, packed tip and dynamic nanospray experiments, compatible with liquid flow rates of 50 nL/min* to 5 $\mu\text{L}/\text{min}$

* Lower limit is dependent on gauge of needle used

Transfer ion optics

- Advanced multipole ion guides
- High stability and ion transmission efficiency

Vacuum system

- Differentially-pumped vacuum system to 10–5 Torr
- Split-flow turbomolecular pump controls vacuum in three regions
- High-vacuum machined aluminum analyzer chamber

Detection system

- Proprietary conversion dynode detector
- Off-axis continuous dynode electron multiplier with extended dynamic range
- Digital electronic noise discrimination
- High-efficiency axial ion ejection

Integrated Divert Valve

- Fully-automated data system control enables user to divert to waste the solvent front, gradient end point and any other portion of the HPLC run
- User-definable default state of the valve, either “to waste” or “to source”

Integrated syringe pump

- Syringe Pump allows automated infusion under data system control

Software features

Data system

- Thermo Scientific™ Xcalibur™ processing and instrument control software
- Microsoft® Office software package
- Microsoft Windows® operating system
- High-performance PC with Intel® Pentium® microprocessor
- High-resolution LCD color monitor

Scan functions

- Full-scan feature provides full-scan mass spectra for sensitive analyses and produces spectra for rapid screening of unknown compounds
- Selected Ion Monitoring (SIM) monitors selected ions for target compound analysis
- Full-scan MS/MS produces fast, full scan, information rich, product ion spectra
- Selected Reaction Monitoring (SRM) for a traditional LC/MS/MS quantitative analytical experiment
- MSⁿ for multi-stage MS experiments to probe the structure of ions
- ZoomScan a high-resolution, full-range scan to resolve isotopic envelopes which is often used for charge state determination of peptides and oxidation state determination of organometallics
- TurboScan an ultra-fast scan to improve signal-to-noise and sampling rate

Exclusive technologies

- Unique, proprietary 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 mass-dependent energy deposition characteristics, providing reproducible data from instrument to instrument
- Pulsed-Q Dissociation (PQD) – enables trapping of low mass fragment ions

System specifications

MS/MS sensitivity

Electrospray ionization (ESI) – A loop injection of 2 μL of a 1 $\text{pg}/\mu\text{L}$ solution of reserpine (2 picograms, 3.28 picomoles total sample) at a flow of 400 $\mu\text{L}/\text{min}$ of 50% isopropyl alcohol/50% water will produce a minimum signal-to-noise ratio of 100:1, for the transition of the isolated protonated molecular ion at m/z 609 to the largest two product ions, 397 and 448, when the mass spectrometer is operated at unit resolution in the full-scan MS/MS mode, scanning the product ion spectrum from m/z 165–615.

Atmospheric pressure chemical ionization (APCI) – A loop injection of 2 μL of a 1 $\text{pg}/\mu\text{L}$ solution of reserpine (2 picograms, 3.28 picomoles total sample) at a flow of 400 $\mu\text{L}/\text{min}$ of 50% isopropyl alcohol/50% water will produce a minimum signal-to-noise ratio of 100:1, for the transition of the isolated protonated molecular ion at m/z 609 to the largest two product ions, 397 and 448, when the mass spectrometer is operated at unit resolution in the full-scan MS/MS mode, scanning the product ion spectrum from m/z 165–615.

Installation requirements

Power

- One 230 Vac $\pm 10.0\%$, 15 Amps, 50/60 Hz, single phase, with earth ground dedicated to the instrument
- 120 or 230 Vac single phase, with earth ground for the data system

Gas

- One high-purity (99% pure, flow rate 15 L/min) nitrogen gas supply for the API source
- One ultra high-purity helium gas supply (99.998% pure) with less than 1 ppm each of water, oxygen, and total hydrocarbons for the mass analyzer

Environment

- System averages 2300 W (8000 Btu/h) output when considering air conditioning needs
- Operating environment must be 15–27 $^{\circ}\text{C}$ (59–80 $^{\circ}\text{F}$) and relative humidity must be 40–80% with no condensation
- Optimum operating temperature is 18–21 $^{\circ}\text{C}$ (65–70 $^{\circ}\text{F}$)

Dimensions /weight

- MS: 56 cm x 79 cm x 59 cm (h x w x d)
- MS: ~120 kg
- Roughing pumps: 38.6 kg

Performance specifications

Mass range

- m/z 15–200
- m/z 50–2000
- m/z 100–4000

Linear dynamic range

- Under typical experimental conditions, at least four (4) orders of magnitude

Resolution, scan speed, and mass accuracy

See Table 1

Polarity switching

- <100 msec between positive and negative MS Scan Power

Scan power

- MSⁿ, for n = 1 through 10
- Contact Closure
- Start In/Out
- Start Out is programmable

Analog inputs

- One (1) analog Input (0–1 V)
- One (1) analog Input (0–10 V)

Table 1. Resolution, scan speed, and mass accuracy specifications at m/z 50–2,000.

LCQ Fleet	Mass Accuracy (Da)	Peak Width (FWHM)	Scan Rate (Da/Sec)
Turbo	1.5	3	80,000
Normal	0.15	0.7	12,500
Enhanced	0.15	0.45	5,000
Zoom	0.15	0.3	1,111
Ultrazoom	0.15	0.15	28

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