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LCQ Deca XP Plus

Improved Ion Optics for Greater Sensitivity and Precision

The LCQ™ Deca XP Plus, the latest addition to the LCQ family, redefines sensitivity and performance in an ion trap mass spectrometer. With enhanced ion optics and Ion Sweep™ gas, the LCQ Deca XP Plus delivers superior sensitivity and non-stop data generation for a variety of advanced LC/MSn applications. Fully automated MSn capabilities and advanced Data Dependent™ experiment design features make analysis of low-abundance compounds in any matrix routine. Powerful Xcalibur® software accelerates data analysis and simplifies the generation of results while providing a single platform to control LC/MSn experiments. With cutting-edge hardware design, outstanding reliability and intelligent software, the LCQ Deca XP Plus is the benchmark instrument for applications such as metabolism and proteomics.

Quadrupole Ion Trap Mass Spectrometer

The LCQ Deca XP Plus couples an orthogonal API source and Ion Sweep gas with industry leading Data Dependent tools, creating the most flexible and sensitive ion trap mass spectrometer ever.

The industry's first APCI/APPI combination ion source allows ionization of compounds not classically accessible to LC/MSn.

Hardware Features

Orthogonal API Source

- Enhanced sensitivity and ruggedness
- Sweep Gas reduces chemical noise
- Removable metal ion capillary tube provides vent-free maintenance

Transfer Ion Optics

- Octapole and “square” quadrupole lenses
- Split voltage quadrupole lens to eliminate noise
- High stability and ion transmission efficiency

New Inter-Multipole Lens

- Lens orifice optimized to increase sensitivity and enhance precision Entrance Lens
- Improves injection of ions into the trap Quadrupole Ion Trap Mass Spectrometer
- Analyzer dimensions optimized for ultimate performance

- Simple, rugged construction for ease of maintenance
- Regulated helium flow for stable operation
- Automatic system calibration and optimization

Vacuum System

- Differentially-pumped vacuum system to 10⁻⁵ Torr
- Split-flow turbomolecular pump controls vacuum in two regions
- Dual rotary vacuum pump configuration
- High-vacuum cast aluminum analyzer chamber

Detection System

- Patented, post-acceleration conversion dynode with ± 15 kV applied voltage
- Off-axis continuous dynode electron multiplier with extended dynamic range
- Unique direct mounting of the multiplier to the electrometer PCB to eliminate electronic noise
- Digital electronic noise discrimination

Integrated Divert Valve

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

Integrated Syringe Pump

- Dual syringes allow automated infusion under data system control

Options

- Orthogonal ESI source compatible with liquid flow rates of <1 μ L/min to 1 mL/min, without splitting
- Orthogonal APCI/APPI source compatible with liquid flow rates of 50 μ L/min to 2 mL/min, without splitting
- Orthogonal APCI source compatible with liquid flow rates of 50 μ L/min to 2 mL/min, without splitting
- Metal needle option for highthroughput, low-flow analyses
- 96-position sample plate AP MALDI for automated and manual data acquisition
- NanoSpray source to support both static and dynamic nanospray experiments, compatible with liquid flow rates of nL/min* to 50 μ L/min

*Lower limit is dependent on gauge of needle used

The fully-integrated Surveyor® LCQ Deca XP Plus system combines the ruggedness of an orthogonal API source with the specificity of MSn, creating the most sensitive quadrupole ion trap mass spectrometer available.

Features and Technical Specifications

- Dynamic Exclusion™ temporarily puts an ion onto an exclusion list after its spectrum has been acquired, allowing acquisition of MS/MS and MS_n spectra on less intense co-eluting compounds
- WideBand Activation™ fragments the water loss ion within an MS/MS spectrum, generating more structurally informative spectra
- Normalized Collision Energy™ compensates for the mass dependent energy deposition characteristics of ion trap mass spectrometers in MS/MS experiments and provides reproducible data from instrument to instrument

Advanced Data Dependent Experiments

- Data Dependent features trigger acquisition of MS_n spectra only when a compound of interest is detected
- Isotopic Data Dependent scanning performs MS/MS only when a userdefined isotopic pattern is detected
- Triple Play determines the charge state and MS/MS spectrum for a multiply charged ion
- 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 production, precursor ion and neutral loss data
- Data Dependent Ion Tree performs MS_n experiments on up to 25 ions

Data Dependent Zoom Map generates sequential MS/MS experiments using a ZoomScan for charge state determination prior to each MS/MS experiment

- Ion Mapping™ Browser software for viewing data generated by Ion Mapping experiments
- MS_n Browser software for viewing data generated by Data Dependent Ion Tree and Ion Mapping experiments
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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
- Discovery™ Browser . . .Open Access™ and combinatorial software
- NIST Library software

System Specifications

MS/MS Sensitivity Electrospray Ionization (ESI) – A loop injection of 2 µL of a 1 pg/µL solution of reserpine (2 picograms [3 femtomoles] total sample) at a flow of 350 µL/min of 50% isopropyl alcohol/50% water will produce a minimum signal-to-noise ratio of 50:1, for the transition of the unit isolated protonated molecular ion at m/z 609 to the largest product ion, 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 femtomoles] 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 50:1, for the transition of the unit isolated protonated molecular ion at m/z 609 to the largest product ion, 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/hr) 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 8000 Btu/h (2300 W) output when considering air conditioning needs
- Operating environment must be 15-27°C (59-80°F) and relative humidity must be 4-80% with no condensation
- Optimum operating temperature is 18-21°C (65-70°F)

Dimensions/Weight

- MS: 56 cm x 79 cm x 76 cm (h x w x d)
- MS: ~120 kg
- Two roughing pumps: 38.6 kg each

Performance Specifications

Mass Ranges

- m/z 15 – 200
 - m/z 50 – 2000
 - m/z 100 – 4000
 - m/z 1000 – 20,000*
- *Available with optional Developer's Kit Software

Scan Power

- MS_n , for $n = 1$ through 10

Contact Closure

- Start In/Out
- Start Out is programmable

Analog Inputs

- Two (2) analog Inputs (0-1 V)



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