QMS Probe Dimensions

MAX System 2000, 4000
Insertion Length: 406.1 mm (15.99 inches)
Axial Ionizer: 48.6 mm (1.91 inches)
Mass Filter: 219.1 mm (8.63 inches)
Detector: 138.4 mm (5.45 inches)
Minimum Tube I.D.: 97.5 mm (3.84 inches)

QMS Probe Dimensions

MAX System 50, 120, 500HT, 1000
Insertion Length: 415.5 mm (16.36 inches)
Axial Ionizer: 48.6 mm (1.91 inches)
Mass Filter: 228.6 mm (9.00 inches)
Detector: 138.4 mm (5.45 inches)
Minimum Tube I.D.: 97.5 mm (3.84 inches)

Quadrupole Probe Assembly Hardware

Item	Configurations
Ionizer	**Axial Molecular Beam Ionizers** Options: ■ Flat Aperture or Sampling Cone ■ Solid or Mesh Shield ■ Tungsten or Thoriated Iridium Filaments **Cross Beam Deflector Ionizers** Options: ■ Flat Aperture or Sampling Cone ■ Solid or Mesh Shield ■ Tungsten or Thoriated Iridium Filaments **RGA Ionizer** ■ Flat Aperture, Mesh Shield, Tungsten Filaments **Cross Beam Ionizers for Photo Ionization** ■ Solid Shield with Tungsten or Thoriated Iridium Filaments **Tandem Ionizer, Energy Analyzer** Options: ■ Flat Aperture or Sampling Cone ■ Solid or Mesh Shield ■ Tungsten or Thoriated Iridium Filaments
Quadrupole Mass Filter	**9.5 mm (3/8 inches) or 19 mm (3/4 inches) Tri-Filter Mass Filter** ■ Solid or Vented Housing ■ Entrance and Exit Lenses
Detector	**Counting Electron Multiplier with Conversion Dynode** ≤ 90 cps Noise at 2800 VDC in (-)Ion Mode **Low Noise CEM with Conversion Dynode** ≤ 3 cps Noise at 2800 VDC in (-)Ion Mode
Mounting Flange	**100 CF (6 inches) or 150 CF (8 inches) Mounting Flange** ■ 35 mm Axial Glass Viewport ■ RF Feedthroughs for Single Quad ■ Single 10-Pin Feedthrough (Other Configurations Available)

Extrel MAX-QMS System

MAX System Mass Range and Performance

System	Quadrupole Mass Filter	Operating Frequency	Mass Range	Relative Transmission	Resolution (M/△M FWHM)	General Sensitivity (mA/Torr)
MAX-4000	9.5 mm (3/8 inch) Tri	880 kHz	10-4000	20%	1200	0.1
MAX-2000	9.5 mm (3/8 inch) Tri	1.2 MHz	2-2000	25%	1500	0.3
MAX-1000	19 mm (3/4 inch) Tri	880 kHz	1-1000	50%	1800	1
MAX-500HT	19 mm (3/4 inch) Tri	1.2 MHz	1-500	60%	2000	2
MAX-120	19 mm (3/4 inch) Tri	2.1 MHz	1-120	65%	2500	3
MAX-50	19 mm (3/4 inch) Tri	2.9 MHz	1-50	75%	3000	4

Note: Performance specifications shown here are minimum production test requirements. Actual performance may be better.

Merlin CS & QPS

Module	Function/Connections
Baseboard	■ I/O Connections - 16 Digital I/O, 6 Analog Inputs, 20 Analog Outputs (optional) ■ 3 Relay Connections ■ 1 Ion Gauge Connection
Pole DC Supply	**DC Voltage and Mass Command for Mass Filter** ■ RF Oscillator Connection
Filament Supply	**Electron Impact Filament Power Supply** ■ Filament Connection ■ Ionizer Heater
Computer Interface	**Data System and Raw Signal Data** ■ Preamp ■ Vacuum Interlock ■ Data System
Optics Raw Supply	■ Optics Source Voltages
Optics Module	**Optics Supply Outputs** ■ 2 +/- 100 VDC Lens Boards ■ 4 +/- 400 VDC Lens Boards
Bipolar Dynode Module	**Dynode Power Supply**
Bipolar Multiplier Module	**Electron Multiplier Power Supply**

MAX System Preamplifier Options

Item	Standard	Options
Preamplifier	Analog or Positive Ion Pulse Counting	■ None ■ Analog and Positive Ion Pulse Counting ■ Positive and Negative Ion Pulse Counting

Extrel Core Mass Spectrometers
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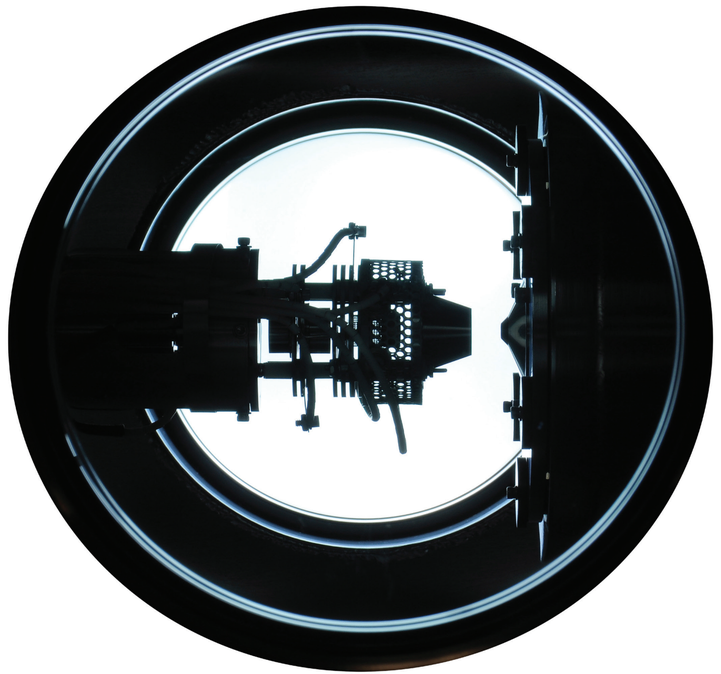
RPF103B

MAX-QMS
Quadrupole Mass Spectrometer

Extrel
www.extrel.com

PRODUCT NOTE



Extrel MAX-QMS System

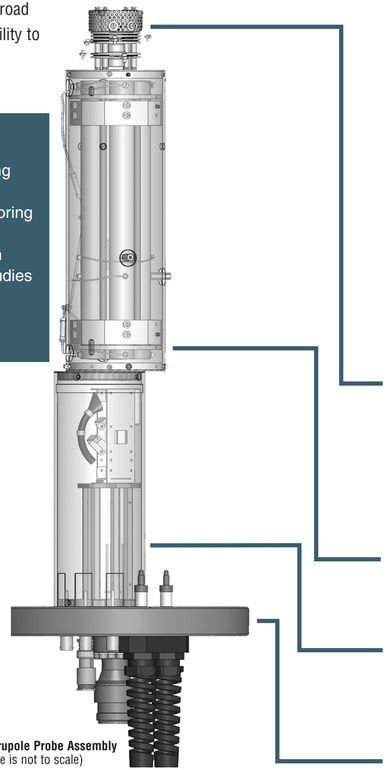
The Extrel® MAX-QMS Systems are UHV-compatible flange mounted Quadrupole Mass Spectrometers. The Ionizer, Quadrupole Mass Filter and Detector on a mounting flange are designed for inclusion in your experimental vacuum chamber. The MAX-QMS mass spectrometer consists of the rack mountable QPS (Quadrupole Power Supply), MAX-CS command system, and the Merlin Automation Data System Software.

The MAX-QMS Systems are based on Extrel's industry-leading mass spectrometer technology centered around our range of RF power supplies with 9.5 mm and 19 mm tri-filter mass filters. With a broad range of capabilities and available options, as well as Extrel's ability to provide custom designs, the MAX Systems can be configured for an extensive variety of applications.

Applications

- Dynamic SIMS
- Scattering
- Laser Ablation Studies
- Residual Gas Analysis (RGA)
- Combustion Analysis
- Outgassing Studies
- Bakeout/Vacuum Pumpdown
- Atmospheric & Marine Research
- Temperature Programmed Desorption
- Emissions Monitoring
- Plasma Monitoring
- CVD Process Monitoring
- End Point Detection
- Flow Tube Detection
- Molecular Beam Studies
- Catalysis
- Pyrolysis Research

MAX-QMS System Assembly



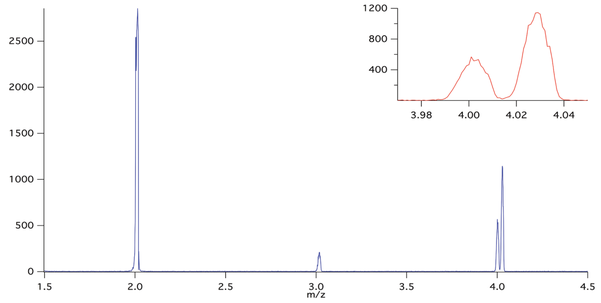
Quadrupole Probe Assembly
(Image is not to scale)

Merlin Automation Data System Software Features

Feature	Description
Spectra Scan	■ 20 Separate Non-Overlapping Mass Ranges, More Available using Customer-Written Macros ■ Real-Time Profile, Histogram and Chromatograph (TIC) Display ■ Single Scan, Continuous and External Trigger
Single Ion Monitoring	■ 20 SIM Masses, More Available using Customer-Written Macros ■ Real-Time Profile, Histogram and Chromatograph (TIC) Display ■ Single Scan, Continuous and External Trigger
MS/MS	■ Monitor and Control Combinations of up to 4 Separate Quadrupoles, Hexapoles, or Octupoles using Optional TQMS Module
System Control Data Manipulation	■ Averaging and Data Smoothing ■ Background Subtraction ■ Trend Plotting ■ Post Acquisition Centroid ■ Chromatographic Quantitation ■ Calibration Curves

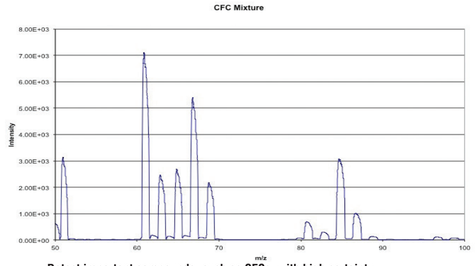
A Breadth of Applications

The MAX-QMS is the featured instrument for cutting edge research in gas analysis. The applications range from the small atomic analysis of gases, such as the high resolution analysis separations of Helium and Deuterium at mass 4, to the real-time atmospheric monitoring of environmentally important compounds, such as CFCs. This instrument can be used for residual gas analysis or for highly sensitive analysis of photocatalytically driven Temperature Programmed Desorption. The MAX-QMS is a highly sensitive, incredibly accurate and precise, and unbelievably flexible system for any researcher in need of mass spectral information.

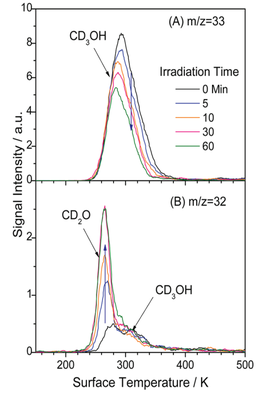


Typical mass scan of masses 1 - 4 on a MAX50 system. Inset shows full baseline separation between Helium and Deuterium at mass 4.

Extrel MAX-QMS System



Detect important compounds, such as CFCs, with high certainty.



TPD A: Typical TPD spectra collected at m/z = 33 (CD_2OH+)

TPD B: Typical TPD spectra collected at m/z = 32 (CD_2O+)

(Guo, Q. et al. *J. Am. Chem. Soc.* 2012, 134, 13366-13373)

Merlin Automation™ Data System Software

The Merlin Automation Data System is a powerful tool that helps you get the most from your Extrel Quadrupole Mass Spectrometer. Operating in a Windows® 7, or Windows® 10 environment, the Merlin Automation Data System Software allows you to simultaneously perform high-speed data acquisition and sophisticated data processing. It is extremely flexible and can be customized for individual applications using simple, easy to write macros. The MAX system comes with everything needed to connect to your PC.

Systems Electronics