MAX-LT

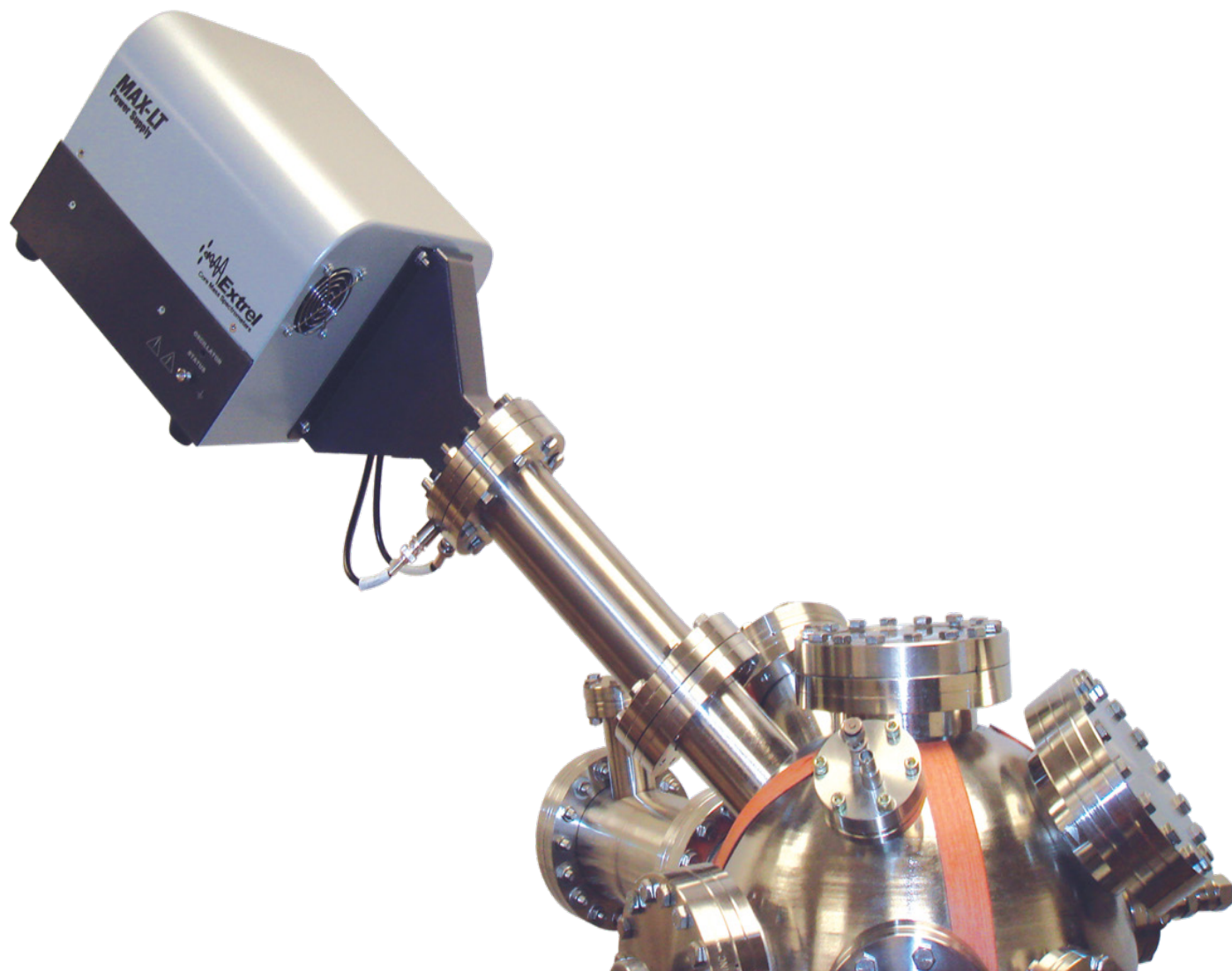**Flange Mounted Quadrupole Mass Spectrometers**

PRODUCT NOTE

# MAX-LT Flange Mounted Quadrupole Mass Spectrometers

The Extrel MAX-LT systems are high sensitivity and high resolution quadrupole mass spectrometers.
Mounted on a UHV compatible flange, they are complete with an ionizer, quadrupole mass filter, ion detector, power supplies, controller and software. The systems use Extrel's high performance 9.5 mm rod Tri-Filter™ quadrupole mass filter and can be used as the basis for a new MS system or added to existing systems for expanded capabilities.
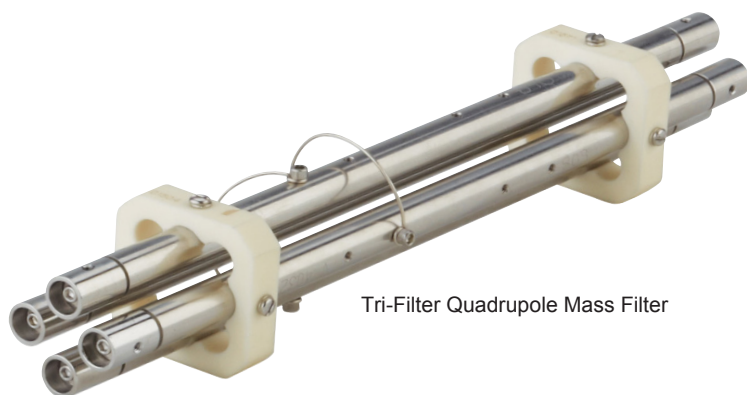
Tri-Filter Quadrupole Mass Filter

- 9.5 mm quadrupole with pre- and post-filter

- High sensitivity: 1.0 mA/Torr

- High abundance sensitivity: 1×10^6

- All components in vacuum probe UHV compatible

- Pulse counting mode for better S/N and for multi-channel Scalar data acquisition

- Negative ions option available for pulse counting data acquisition

- Ionizer with cross beam set-up available for photo ionization experiments

- Merlin Automation Data System with fast data acquisition speed of 12,500 data pts/s

- Flexibility with imbedded macros for system control and data acquisition

MAX-LT
Power Supply

14.0"
(36 cm)

2.0"
(5 cm)

4.5"
(11 cm)

28.5"
(72 cm)

MAX-LT Dimensions
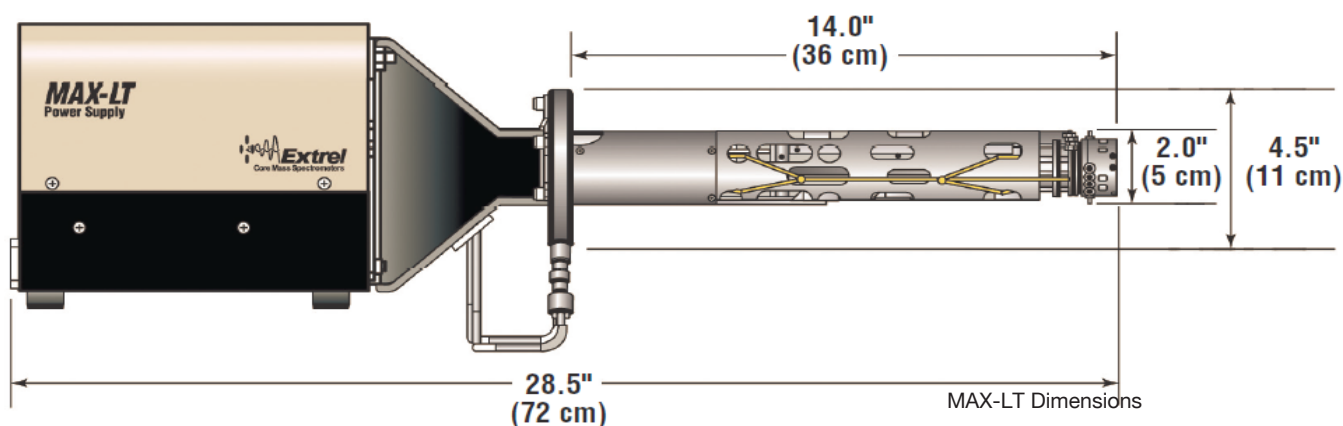
Applications:

- Temperature Programmed Desorption (TPD)
- Dynamic SIMS
- Scattering
- Laser Ablation Studies
- Residual Gas Analysis (RGA)
- Outgassing Studies
- Bakeout/Vacuum Pumpdown
- Combustion Analysis

- Emissions Monitoring
- Plasma Monitoring
- CVD Process Monitoring
- End Point Detection
- Flow Tube Detection
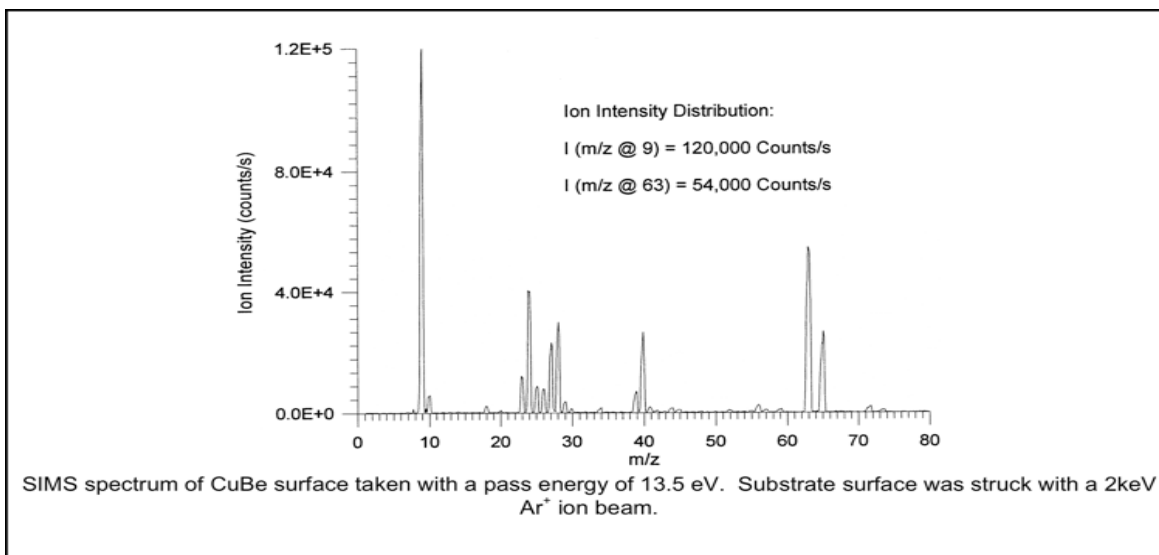- Molecular Beam Studies
- Catalysis

Temperature Programmed Desorption (TPD)

As gases desorb from a surface, they are ionized, analyzed and compared with the temperatures at which they were desorbed. Small molecules, such as CO and H_2O, are tyically the main interest. The MAX-LT's ionizer can be located close to the substrate to ionize even the low concentration desorbed compounds. The system is able to handle a wide temperature range from many TPD sources with target temperatures ranging from 4K to 1,000K have been demonstrated. A shielded ion source helps to minimize neutrals in the chamber, lowering the observed background during analysis. The MAX-LT in a TPD application has fine control of the ionizer to perform "soft" ionization to retain the molecular ion with fragmentation. The instrument maintains high sensitivity and exceptional confidence for the resulting data and mass spectrum.
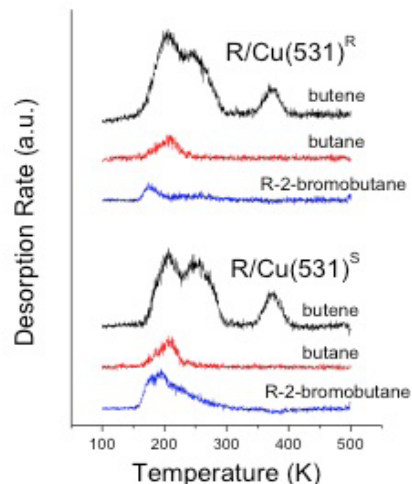

Secondary Ion Mass Spectrometry (SIMS)

Secondary ion mass spectrometry (SIMS) studies are used to gather information about a surface being analyzed and can fall into two categories, Dynamic or Static. Dynamic SIMS is used for bulk analysis utilizing an ion beam and quadrupole mass spectroscopy (QMS), such as the MAX-LT configured for SIMS applications. The instrument has a conical aperture on the ionizer that can be located close to the substrate to collect and transmit the secondary ions or ionize the desorbed neutral compounds efficiently. The optional Extrel Energy Filter Ionizer allows the researcher to differentiate between secondary ions and ionized neutrals in the chamber, assuring the resulting data is representative of the experiment. The MAX-CS control system allows the researcher to have fine control of the ionizer to perform "soft" ionization to retain the molecular ion without fragmentation.

Ion Intensity Distribution:
I (m/z @ 9) = 120,000 Counts/s
I (m/z @ 63) = 54,000 Counts/s

SIMS spectrum of CuBe surface taken with a pass energy of 13.5 eV. Substrate surface was struck with a 2keV Ar^+ ion beam.

What sets the LT-SIMS apart from the rest is the optional Extrel Energy Filter Ionizer. The Energy Filter Ionizer allows for the reduction in background and experimental noise in the mass spectrometer. It handles several sources of noise such as high energy ions (1keV - 100 keV), which are not easily analyzed by a QMS, and should be blocked from entering the analyzer. The center stop of the energy filter keeps neutrals from entering the analyzer by blocking the line-of-sight. The cone aperture allows close placement to the target surface, which allows for greater sensitivity to the sputtered plume of ions. The on-axis energy filter demonstrates a fine energy scan of < 0.6 eV FWHM (full width at half maximum) resolution.


Extrel Energy Filter Ionizer
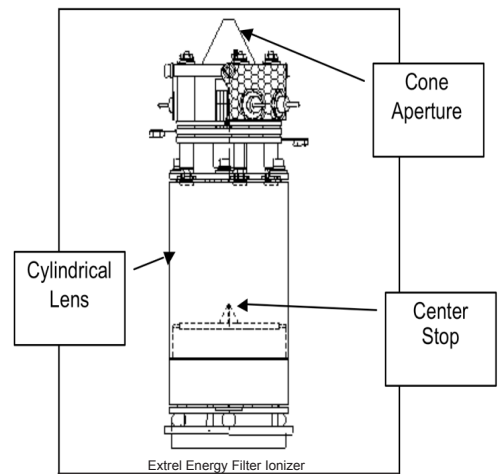
Software

Every MAX-LT is equipped standard with the *Merlin Automation Data System™* software. One of the most powerful and flexible research software packages on the market, Merlin Automation allows total user control over their system. Users can collect, analyze and perform library searches on all data.
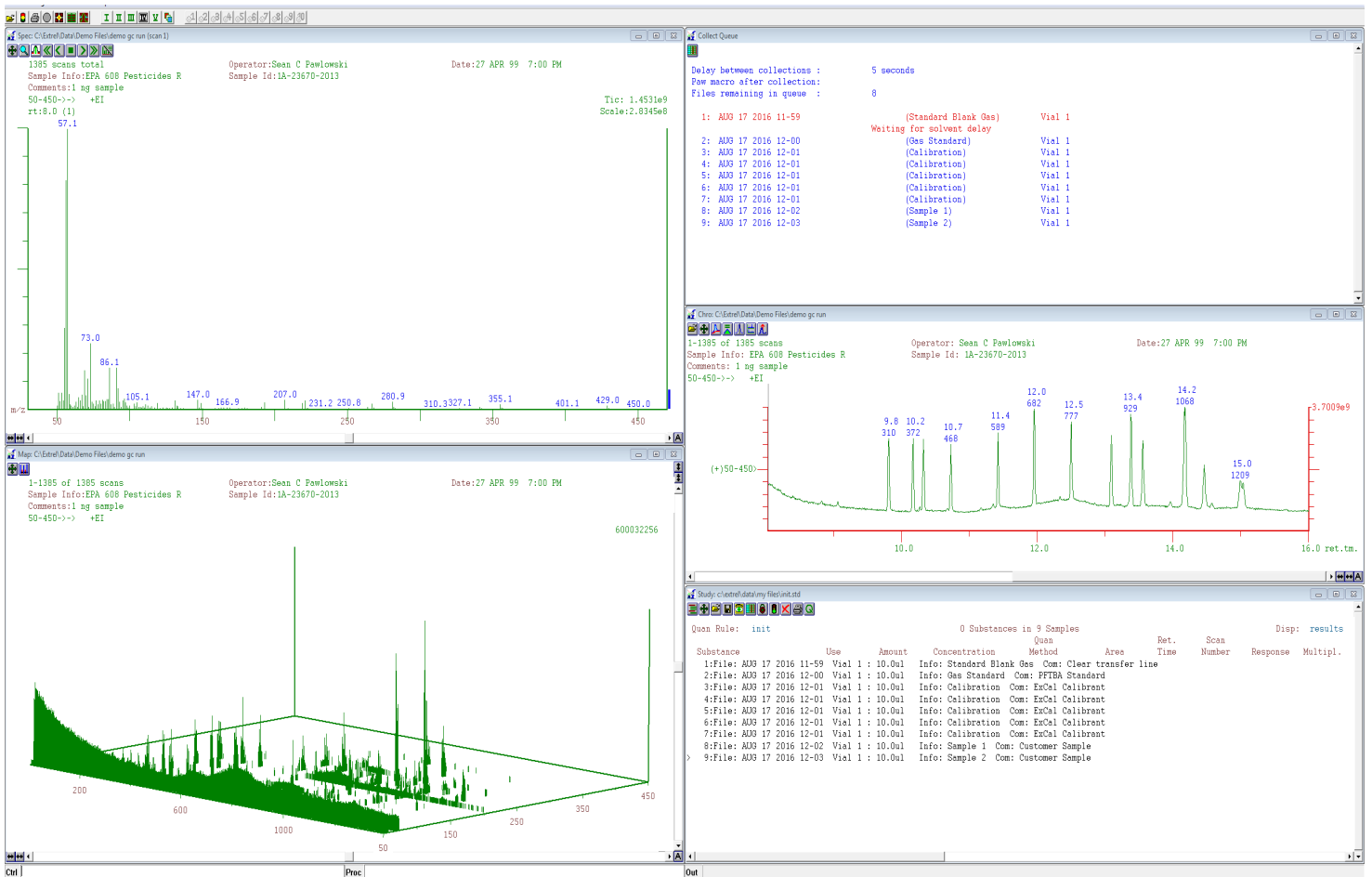
Merlin Automation gives you the power to monitor your entire workflow. From analyte monitoring in the chromatogram window, live Profile or Centroid spectra, to spectral comparison in the Mass Map window, it provides the researcher ultimate flexibility for their application.
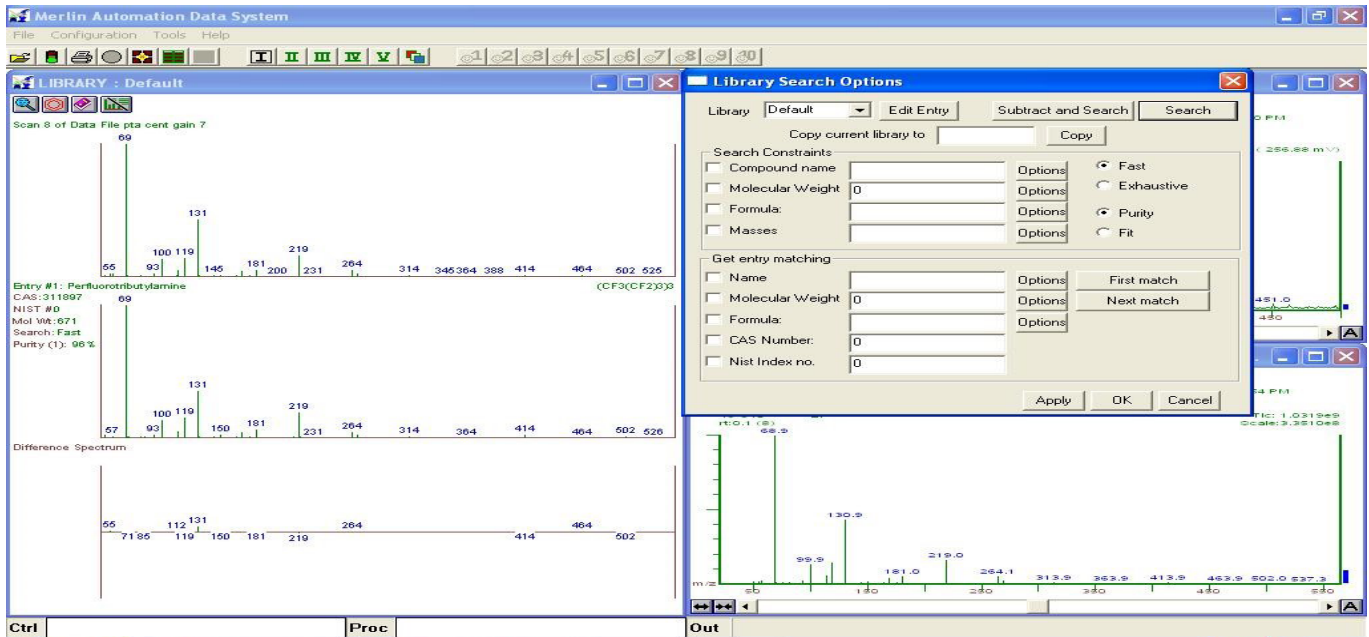
When researchers are looking for a software package that allows for the ability to perform quantitative measurements, security tracking and data trending, they turn to Extrel's **Questor5™** Software. It is Extrel's true quantitative software platform, providing unlimited flexibility in analysis design and automation, all packaged with a user-friendly interface. Questor5, partnered with the stability and performance of Extrel's MAX probe products, allows for effortless quantitative data trending, with each component quantified and reported in less than 400 msec. Many labs are concerned with security issues, such as user tracking for validation or downtime due to unknown operator failure. Not sure if your information has been breached? The data logger will report every user and every event, providing full traceability. The system also includes 21 CFR 11 compliance, for the pharmaceutical industry.
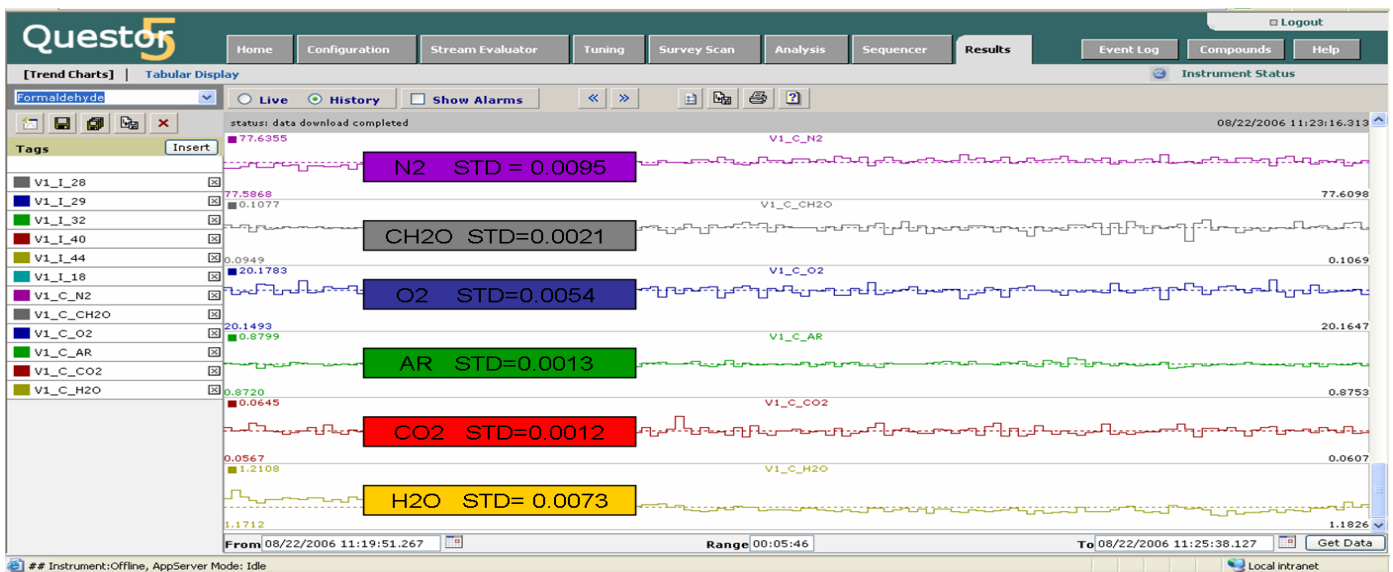
MAX-LT Specifications and Features

Mass Range:

- 1 to 500 amu
- 2 to 1,000 amu

Mass Filter Type: 9.5 mm quadrupole with pre- and post-filters

Sensitivity: 1 mA/Torr

Abundance Sensitivity: 1×10^6

Minimum Detectable Partial Pressure: 1×10^{-15} Torr

Maximum Operation Pressure: 10^{-5} Torr

Detector: Faraday only or dual Faraday/multiplier

Maximum Ambient Temperature: 40°C

Bakeout Temperature: 150°C

Ionizer Design: Electron ionization

Ionizer Type: Solid shield axial ionizer, optional cone aperture

Probe Materials: SS304, Tungsten, Alumina, Iridium, Copper, Nickel, Kapton

Filament:

- Thoria-coated iridium or tungsten
- Switchable dual filaments option available

Electron Emission: 0.01-7 mA

Flange Size: 4.5 inch, 62 CF

System Weight:

       Probe Weight: 19 lbs

       Control Electronics Weight: 30 lbs

Extrel

www.extrel.com
412-963-7530