

Title : Quadrupole Mass-Spectrometer



The Quadrupole Mass Spectrometer is a very versatile analytical instrument capable of compositional analysis of gases and volatile liquids. It consists of an Electron Impact ion source, quadrupole mass analyzer and a detector. The QMS is a compact, reliable and low cost analytical tool which has numerous applications in the industry. It can analyse a mass range of 1-300 amu with a resolution of 1 amu, which is adjustable.

Its applications include Gas compositional analysis from chemical and physical processes, residual gas analysis in Ultra High Vacuum systems, molecular weight and structural identifications in many organic compounds. It can also be coupled to Gas Chromatograph or a liquid Chromatograph for varied analytical problems.

Features :

- Compact, reliable and low cost analytical tool
- Electron impact ion source
- Turbomolecular pump with Rotary backup for clean vacuum
- Easy sample introduction
- PC based interface & control
- Channel electron multiplier detector

Quadrupole Mass Analyzer

Rod diameter	16 mm
Rod length	200 mm
Pre-filter/post filter	24 mm
RF frequency	1.2 MHz
Resolution	1 amu (adjustable)
Mass range	1-300 amu
Sensitivity	1x10 ⁻⁴ A / torr for N ₂ on Faraday cup 1A / torr on CEM

Ion source

Source	Electron Impact
Filament material	Tungsten wire
Ion Optics	Focus, Lens1, Lens2

Vacuum System

Vacuum system	Rotary pump (5-10 m ³ / h), Turbo molecular pump (250 l / s)
Sample Introduction System	Suitable for gases & volatile liquids. Single port with controlled leak valve.

Electronics:

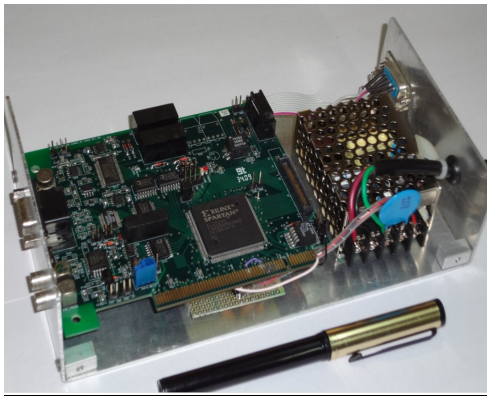
A) Quadrupole D.C. SUPPLY (300V variable)



- This power supply is used along with an 1800V peak RF source as a quadrupole mass analyzer supply. Both RF and DC supplies are simultaneously scanned such that the DC to RF ratio is maintained constant to the second decimal.
- This DC supply along with the RF counterpart are used as quadrupole mass analyzer supply for analyzing ions coming out of the ion source of any type of mass spectrometer. A scan of RF & DC source (@ d c / r f = constant) against detector output will give a mass spectrum upto 300 a.m.u .
 - * Line regulation : 0.001% for 10% change in line voltage.
 - *Load regulation: 0.001% for (90% NL to FLchange in load .)
 - *O/P ripple : <5m V p-p.
 - *O/p stability : Better than 30ppm short term (15minutes).
 - *Tracking : The O/p of 300V supplies track each other by <10mV.
 - *Linearity : 0.01%
 - *Protection : Trip reset type of over current protection.

B) Setpoint and Readback control Unit: This unit controls Ions-source supplies.

C) Multifunction Data Acquisition and Control Module: Controls Analyser supplies and acquires detector signal after conversion by an High Gain I to V amplifier.



- Eight single ended/ four differential ended 16 bit 100ksps analog inputs with programmable ranges of 0-5V, 0-10V, +5V, +10V.
- Two channel of 16 bit +10V analog outputs
- Two channel of 16 bit +5V analog outputs for onboard threshold setting.
- One pulse counting input for pulses from -10mV to -4V and width greater than 10 ns.
- Programmable threshold for the pulse height discrimination.
- LVTTTL compatible digital I/O.
- Digital logic implemented in the FPGA

- Modbus protocol over 4 wire RS422/485 serial link.

Applications of QMS:

- Gas compositional analysis from chemical and physical processes
 - Residual gas analysis in Ultra High Vacuum systems.
 - Molecular weight and structural identifications in many organic compounds
 - It can also be coupled to a Gas Chromatograph or a liquid Chromatograph for varied analytical problems
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- Technology has been transferred to pvt industry.