



PLASMA DIAGNOSTICS
HPR-60 PRODUCT SPECIFICATION

HPR-60 Molecular Beam Sampling System for

- **Reaction Kinetics**
- **Gas Analysis**
- **Clusters**

A. General Features

- High performance gas sampling system designed specifically for the analysis of high pressure reaction processes up to 100 mbar. An optional third stage extends the sampling pressure range to atmosphere. The system is applicable for the study of gas kinetics of atmospheric reactions, clusters and high pressure plasmas.
- The standard HPR-60 vacuum system comprises a 2 stage inlet system, complete with turbo molecular pumping, providing for high pressure molecular beam sampling. Axially aligned orifices offer minimum disturbance of ion and radical species making the system particularly suitable for large clusters, neutral, radical and ion analysis.
- At the heart of the HPR-60 is the Hiden high performance triple filter quadrupole mass spectrometer with mass range options up to 2500 amu, providing sub ppm detection capability and enhanced abundance sensitivity. The HPR-60 is additionally available with Hiden's EQP mass/energy analyser for measurement of mass and energy distributions of ions and neutrals.
- The HPR-60 operates under the control of Hiden's WindowsTM MASsoft PC operating software. This powerful multi-tasking package provides for easy control of the mass spectrometer. The on-board 'scan gallery' allows fast access set up of view styles for ease of data display, storage, transfer and interpretation.

B. Differentially pumped Molecular Beam Sampling System

with UHV pumping and pressure gauging comprises :

- (1) First Stage :**
 - Quadrupole housing and sampling orifice.
 - Adjustable bellows section to enable fine positioning of the first stage orifice across the molecular beam axis.
- (2) Second Stage :**
 - Sampling orifice and mounting flange configured for the users process chamber
- (3) Third stage (optional)**
 - Sampling orifice and mounting flange configured for the users process chamber to be placed before the 2 standard

stages. This is typically pumped by a rotary pump, and can be used for sample pressures up to atmosphere.

Selective pumping depending on sampling pressures up to atmosphere:

	OPTION A (20 mbar)	OPTION B (100 mbar)	OPTION C (Atmosphere)
Turbo pumping speed	60 l/sec	240 l/sec	240 l/sec + 3rd Stage
Mounting flange	DN-63-CF	DN-100-CF	DN-100-CF

- Optional custom built cryo and water feedthroughs can be built into the probe to aid pressure reduction and inhibit the memory effect. These can be seen in figure 1.

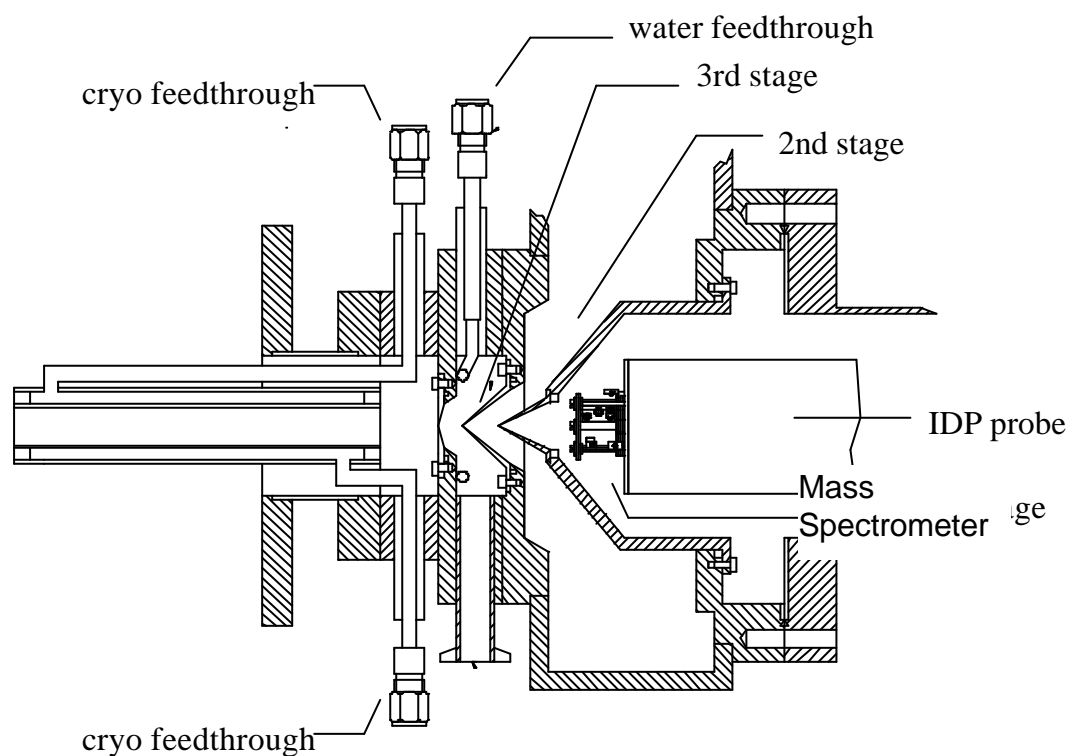


Figure 1. The 3 stage HPR-60 with optional cryo and water feedthroughs.

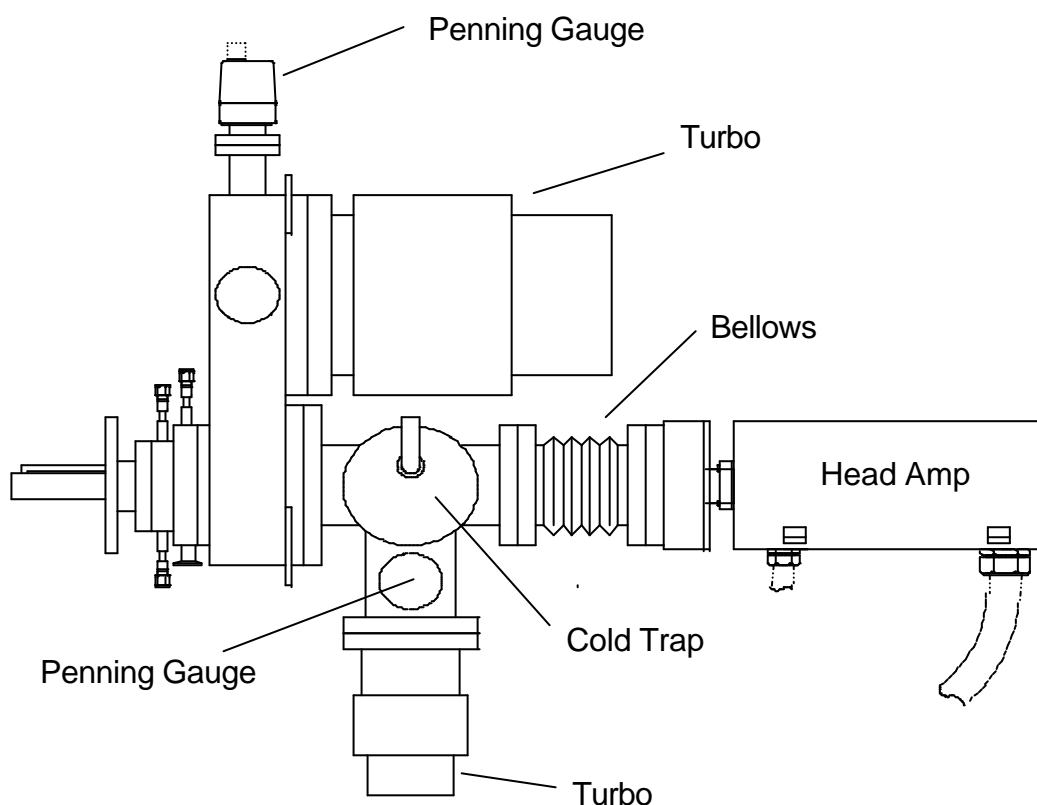


Figure 2. Side view of the 3 stage HPR-60 showing the bellows section providing for axial alignment of the orifices.

C. The Mass Spectrometer

The quadrupole analyser is a precision assembly with triple-stage mass filter, electron impact ioniser with twin filaments and the option of analogue or Pulse Ion Counting detection. Mass range options are 300, 510, 1000 and 2500 amu. Complete specifications are available on request, a brief summary is given below.

Mass Spectrometer options:

	HAL/3F RC	HAL/3F PIC	EPIC	EQP
Detection Scheme	Analogue	Pulse Ion Counting	Pulse Ion Counting	Pulse Ion Counting
Products Sampled	Neutrals Radicals	Neutrals Radicals	Neutrals Radicals Positive Ions Negative Ions	Neutrals Radicals Positive Ions Negative Ions

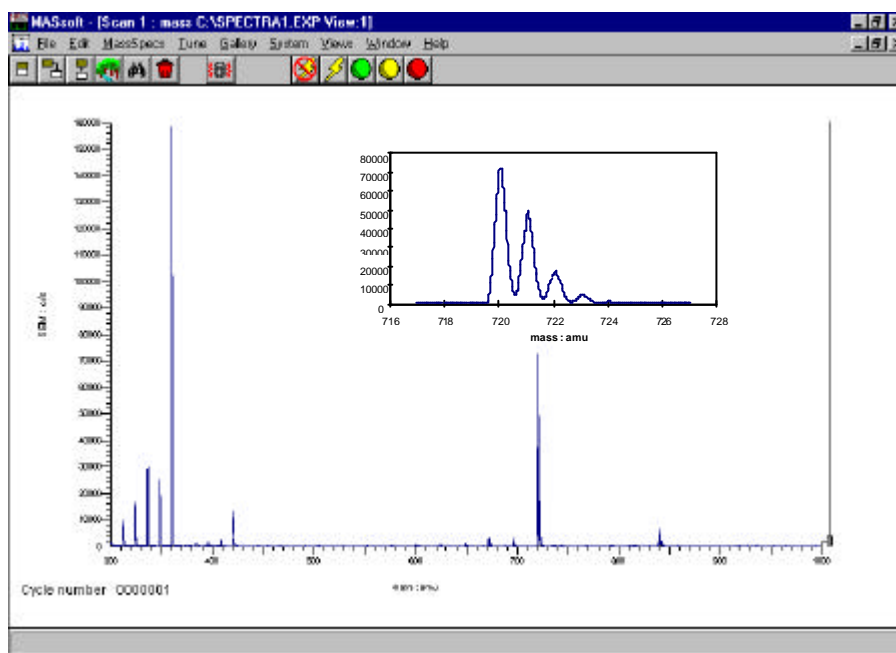
				Ion Energies
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D. PC Computer Hardware and Software

- Windows™-MASsoft PC software provides for fast data acquisition through either user-configured acquisition files or pre-set modes selected by icon. A recommended PC system is offered with the option of acquiring NIST98 Mass Spectral Database - the world's most widely used mass spectral library, with access to the mass spectra of over 100,000 compounds.
- All systems are directly controlled from a PC compatible computer via RS232 or Ethernet link, enabling simultaneous data acquisition from multiple systems where appropriate.
- Comprehensive I/O facilities as standard, including 2 Analogue Inputs, 3 Relay Outputs and 5 Digital I/O lines. (16 Channel Analogue Inputs and Outputs available as options)

E. Example Data

The following data, obtained with the Hiden HPR-60, shows a mass spectrum from 300 - 1000 amu of Fullerene C₆₀ produced from high pressure arc evaporation. The zoomed series of C₆₀ peaks are identified as incorporating upto n=9 of the ¹³C isotope.



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