



Residual Mass Spectrometry for the new
Millennium

AERO VAC ODYSSEY Mass Spectrometer



“Advances in sensitivity and speed make magnetic sector mass spectrometry the optimum choice for many Residual Gas Analysis applications allowing users to benefit from the many advantages inherent to magnetic sector systems.”

Residual Mass Spectrometry for the new Millennium



ODYSSEY Mass Spectrometer

Applications:

- ▶ Vacuum Coating
- ▶ Leak Checking
- ▶ Semiconductor Manufacturing
- ▶ Refrigeration Manufacturing
- ▶ Automotive Manufacturing
- ▶ Catalytic Studies
- ▶ Nuclear Physics
- ▶ Research and Development
- ▶ Chemical Industry
- ▶ Aeronautics/Aerospace

ODYSSEY – The Magnetic Sector Advantage



The original Mass Spectrometer technology, the Magnetic Sector instrument has always been preferred for both large laboratory systems and for dedicated leak detectors because of its inherent performance advantages. These are now made available to the world of RGA applications by the **ODYSSEY**.

Magnetic Sector Design

The magnetic sector's most distinct and fundamental advantage compared to the quadrupole is its **simplicity**. This is the basis for its **high reliability, high stability, excellent quantitative capability and field maintainability**. Magnetic sector mass spectrometers excel at analyzing extreme low masses such as Hydrogen and Helium in part because of a lack of a "zero blast" effect which plagues quadrupoles and also because of greater resolution than quadrupoles. As the flight tube of a magnetic sector instrument is "field free", it is **much less susceptible to contamination**.

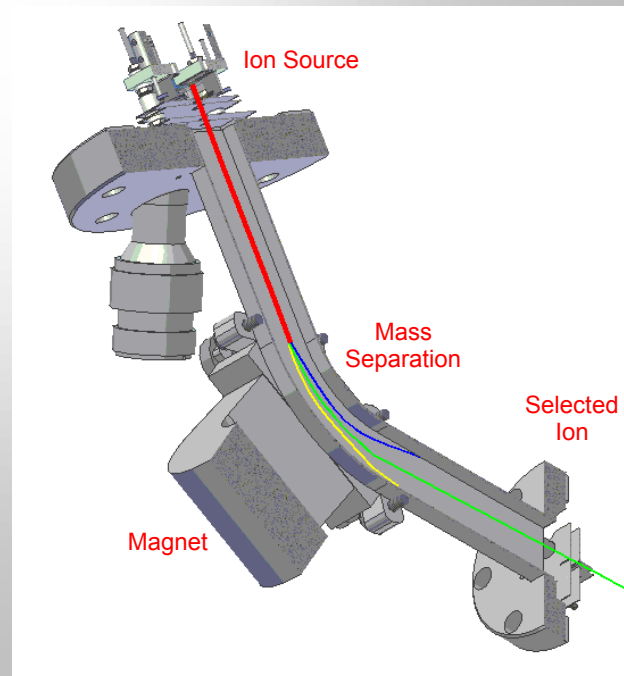
Mass Spectrometer Features

- 1) **High Sensitivity Ion Source** – New design provides greatly improved efficiency/sensitivity.
- 2) **Pre-focused Ion Source** – Factory aligned and never needs adjusting.
- 3) **Dual Filaments** – Insure continuous operation.
- 4) **"Soft-Start" Power Up** – Prolongs filament life.
- 5) **Over-pressure protection** – Guards against filament burnout during operation.
- 6) **High Pressure Sensing** – Prevents start-up at atmospheric pressure.
- 7) **Rugged construction** – Contamination resistant and robust construction for harsh applications and environments.

Principle of Operation

The heart of the magnetic sector mass spectrometer is the spectrometer tube where separation of the gas components occurs.

As shown below, a sample is introduced to the mass spectrometer ion source where positive ions are generated by electron bombardment. A positive potential propels these ions into the field free spectrometer tube and toward the magnetic field region. The degree of deflection of the ion within the magnetic separator depends on the ion's velocity as well as its mass-to-charge ratio. By altering the potential at the ion source, the velocity of a given ion changes, thereby allowing different masses to be focused and detected at the opposite end of the spectrometer tube by the ion collector. Narrow, fixed focusing slits at both ends of the spectrometer tube serve to focus the ion beam and improve the resolution of the system. These ions arrive at the collector and generate a proportional electrical signal that is the basis for measurement.



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ODYSSEY Control Unit

The **ODYSSEY** is a “smart” instrument that can be run stand-alone or connected to a PC. Front panel controls and displays make operation a breeze and Windows based control and data handling software provides for a complete range of analysis capabilities with a PC. Next generation electronics allow a vast **increase in scan speed** over other instruments allowing for true fast trend and transient monitoring.

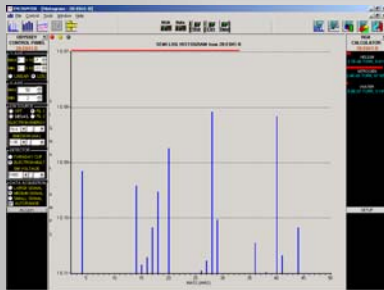


An LCD display allows user input of operating parameters and display of instrument status and gas analysis data. As a stand alone leak detector, the **ODYSSEY** can monitor single mass peaks providing **audio and visual peak indications**. A front panel bar graph signal strength display allows programmable monitoring of peak height with log or linear displays. Leak detection / peak monitoring can be performed while tuned to **any** mass peak within the instrument’s mass range. The unit can operate as a “smart” component of a networked system or in true “stand-alone” mode for “local” needs.

The **ODYSSEY** is equipped for serious control applications with a **24 TTL digital I/O capability** which is compatible with VTI’s standard 24 module opto-isolator board. Additionally there are 8 open collector control outputs, 8 channel single ended **12 bit analog inputs**, 2 channels of **10 bit analog output** and a **remote filament interlock** input.

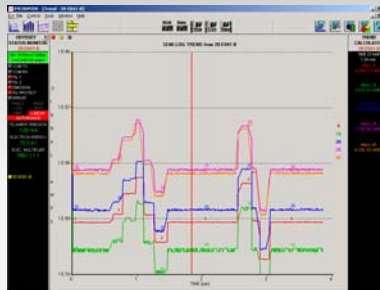
ENCOUNTER RGA Software

The **ODYSSEY** is packaged with Windows compatible RGA data acquisition and control software. This full featured package provides the operating ‘Environment’ including main display modes, Histogram, Trend, Analog and Leak Detect (shown below) and a collection of Status / Control Windows and comprehensive range of Calculators that can be applied to acquired data. The environment is immediately “familiar” to the season RGA user and new operator alike.



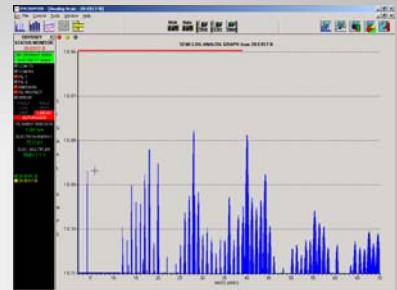
HISTOGRAM MODE

A bar graph display of pressure vs Mass for easy interpretation of spectral “fingerprint” data.



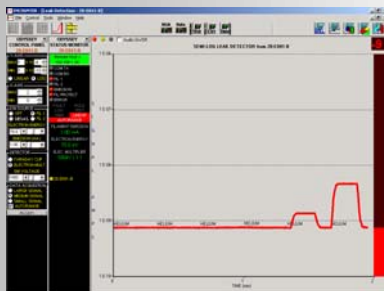
TREND MODE

Graph display provides a chart type output allowing “trend analysis” of critical components.



ANALOG MODE

Graph display provides a chart type output allowing “trend analysis” of critical components.



LEAK DETECT MODE

Constantly monitors any mass (not limited to He) with visual and audible indication of signal.

NAME	MASS	MSD	MSD	MSD	MSD	MSD	MSD	MSD	MSD
ACETIC ACID	43	14	29	43	57	1000	500	500	170
APR	29	32	14	16	40	1000	270	60	30
CARBON DIOXIDE	44	28	16	13	22	1000	110	60	1
CARBON MONOXIDE	28	12	16			1000	50	20	
ETHANE	28	30	27	29	26	1000	300	230	180
ETHYLENE	28	27	26	25	14	1000	600	430	43
FORMALDEHYDE	29	30	28	26	27	1000	500	240	120
METHYL ACETATE	43	14	29	43	57	1000	520	360	110
METHYL ALCOHOL	31	29	32	15	38	1000	740	630	180
METHYLAMINE	30	28	31	29	27	1000	680	560	160
NITROGEN	28	14	28			1000	75	10	
PROPANE	29	28	44	43	27	1000	620	600	320
SPR	166	87	28	33	166	11000	1120	1120	90

SPECTRAL LIBRARY

On-board library displays stored fingerprint spectra for comparison with measured spectra.



MULTIHEAD OPERATION

Display data from multiple heads in multiple formats all while running ‘live’ calculators.

Electronics and Spectrometer Tube

Magnetic Sector Configuration

2" radius, 60° deflection

Resolution

50-75 (with 0.010" slits)
($m/\Delta m$ @ 10% peak height)

Source Sensitivity

1×10^{-4} amps/Torr (1mA emission)
(1×10^{-3} amps/Torr with 3mA emission)

Minimum Detectable Partial Pressure

1×10^{-10} Torr for Faraday Cup
 5×10^{-14} Torr for Electron-multiplier
(with 0.010" slits)

Mass Range

1-150 AMU - Low mass magnet
2-200 AMU - Standard magnet
3-300 AMU - High mass magnet

Dynamic Range

8 decades total
6 decades concurrently

Emission Current

0.1 - 5.0 ma adjustable

Electron Energy

25 - 120 Volts adjustable, standard

Filament Power

20 watts, includes Softstart feature

Peak Location Stability

+/- 0.2% over 8 hours

Peak Height Stability

+/- 1% over 8 hours

Input / Output Capability

24 channel TTL I/O
8 control Outputs
2 Analog outputs – 10 bit
8 single analog inputs – 12 bit
Filament interlock

Bakeout Temperature -(Cable and Magnet Removed)

400°C Faraday Cup
300°C Electron Multiplier

Max Operating Temperature

Head – 150°C Typical
Electronics – 40°C Ambient

Communication Interfaces

RS232 Serial Port
Ethernet Port
(Software support for up to 8 Analyzers)

Probe Weight

9 lbs

Control Unit

120 / 240V, 2.0 amps, 50 / 60 Hz, Weight 15 lbs. Dimensions 19" x 10" x 3.5" (~2" additional for rear panel connections).

Software

"Encounter V2.0" RGA software package PC compatible for Windows™ 9x, NT, 2000, XP

Options

Bar Code Scanner Control
24 channel opto-isolator board
Alternative filament materials
Interchangeable magnets

Ordering Information

(Complete RGA packages)

Odyssey RGA – (1-150amu) - **AV-ODY-RGA-150**
Odyssey RGA – (2-250amu) - **AV-ODY-RGA-250**
Odyssey RGA – (3-350amu) - **AV-ODY-RGA-350**

Interchangeable Magnets:
1-150amu - **AV-MAG-1-150**
1-250amu - **AV-MAG-2-250**
1-350amu - **AV-MAG-3-350**

Thoria Filaments (Std) – (2 pack) - **AV-ODY-FIL-THIR**
Tungsten Filaments – (2 pack) - **AV-ODY-FIL-W**

Bar Code Reader - **AV-BAR-CODE**
24 channel board - **AV-OPT-ISOBRD**



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