



The leak detector and vacuum diagnostic tool for the new Millennium

AERO VAC

POLARIS

Leak Detection System



“With the combination of traditional high performance Leak Detection features and Residual Gas Analysis in one system, the Polaris is the world’s first total capability vacuum diagnostic and management tool.”

Leak Detector and Vacuum Diagnostic tool for the new Millennium



POLARIS *Leak Detector*

Leak Test Applications in:

- ▶ Vacuum Coating
- ▶ Blanket filled Component Test
- ▶ Semiconductor Manufacturing
- ▶ Refrigeration Manufacturing
- ▶ Nuclear Physics
- ▶ Aeronautics/Aerospace
- ▶ Research and Development
- ▶ Automotive Manufacturing

POLARIS - Philosophy:

VTI has long been established as one of the worlds leading suppliers of Calibrated Leaks and Custom Leak Test Systems, a reputation founded significantly on the "Real World Approach" VTI adopts to system design, manufacture and support thereafter. Nowhere does this philosophy make itself more apparent than in the Polaris Leak Detector and Vacuum Diagnostic system.

The 'Real World' concerns itself not with the best possible specification that can be achieved with meticulous care and attention, but with how the system performs on a day-in-day-out basis. Factors such as **recovery time** (how soon a small leak can be detected following 'hitting' the system with a large leak), **response time**, **simple operation**, **reliability of result**, **"Up-Time"** and **field maintainability** are all as critical as the ultimate level of detection.

VTI addresses these needs in three simple steps:

- 1) **We use the AERO VAC Odyssey as the gas sensor.**
- 2) **We build the system to UHV standards, period.**
- 3) **We use standard components – no proprietary vacuum hardware to hold up operation.**

1) AERO VAC Odyssey

The **Odyssey** uses the Magnetic Sector principle for mass separation. This principle is generally used in all dedicated Leak Detection Systems but is limited to mass four to monitor Helium. Uniquely, in the **POLARIS** the **Odyssey** is employed, a larger instrument which provides exceptional performance with Helium **AND** allows RGA or Leak Detection to be performed over a mass range of 2 to 250 amu.

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**.

The **Odyssey** is also designed to fulfill the Leak Detector control role with dedicated front panel controls, control circuitry and firmware to facilitate automatic system cycling and the ability to integrate options such as a Bar Code Scanner to provide quick scan system control or product registration.

Additionally, the **POLARIS** can communicate with plant production computers allowing product registration and test result data to be available via the standard **RS232** or **Ethernet** communication ports. All this, and full RGA capability too, when used in conjunction with the **"Encounter"** RGA software package.

2) UHV Standards

The **POLARIS** is built to UHV standards, period, no compromises. Depending upon application, pumps, chambers and connections may vary but you will always find metal seals, metal valve seats and construction commensurate with UHV standards and practices. This is the only way to insure the "day-in-day-out" operation to the 10^{-11} standards of the **POLARIS** without the He poisoning associated with O-ring seals.

3) Standard Components

The **POLARIS** uses standard vacuum components, the kind most 'vacuum oriented' facilities will have on-hand so that system maintenance can be effected on-site and with the minimum of delay.

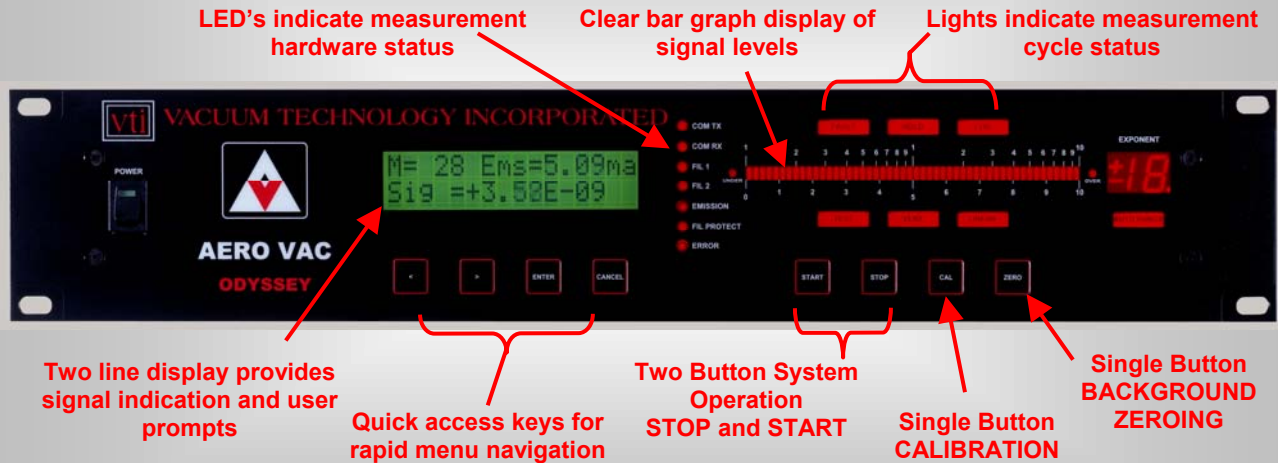
It is also possible to tailor the **POLARIS** to the task at hand addressing specific gas load and cycle time requirements with space to install a wide range of pumping options. If you have large volumes to be evacuated, have specific wet or dry pump requirements or maybe you have trained maintenance staff and spares on hand and wish to use a type of pump for compatibility, then VTI can accommodate these requirements with ease.

The Real World approach from VTI ...

Call Toll Free 1-800-704-4774 – www.vacuumtechnology.com

Leak Detector Operation:

System start up is a single switch operation with automatic pump down and system preparation. With the **Odyssey** as the measurement heart of the system, the **POLARIS** benefits from the system capabilities of the Odyssey controller. Measurement cycle control and clear display of system status are provided through the front panel as highlighted below.



Operation can be further simplified with the option of the Bar Code Scanner allowing a single 'scan' to represent a 'macro' style operation. This can also be used for product registration, the information (together with the test results for that component) being made available for communication to plant computer via the RS232 or Ethernet interfaces.

Performance:

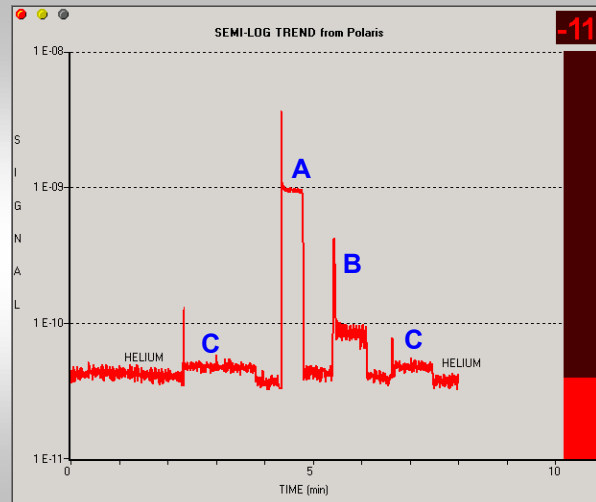
Detection limit is only one measure of system performance. There are other key issues affecting the use of the system on a daily basis.

Recovery time is paramount if you are working in a situation where frequent cycling to atmosphere is required or where the instrument is subjected to relatively large leaks (introducing high Helium levels).

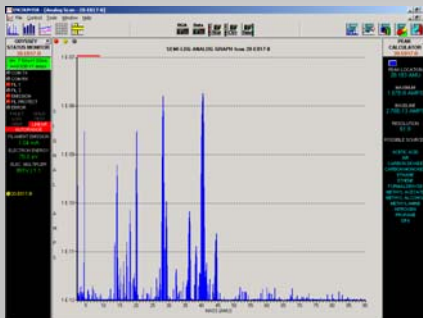
Signal to noise ratios govern system response times.

The trace illustrated right shows system responses to (A) 10^{-9} , (B) 10^{-10} and (C) 10^{-11} std cc/sec Helium leaks. The spikes are gas bursts on opening each of the calibrated leaks.

The **POLARIS** addresses these challenges with two sensitivity modes, purge facility and by automatically controlling system timings over the measurement range.



Why Residual Gas Analysis?



While Helium is an excellent choice of 'search gas' for leak checking (it's low molecular weight and size render it capable of permeating just about anything!) it is not always available. Often, during manufacturing, a component may be charged with or subjected to another gas making that a preferential 'search gas' to use. Additionally, there are many reasons for checking the 'quality' of vacuum, looking for water, oil and contaminant levels especially when looking for very small leaks where 'real' and 'virtual' leaks can easily be confused. RGA is the **ONLY** way to determine a virtual leak.

Conventional Leak Detectors are of no use in these situations.

This is where the **POLARIS** is unequalled. The ability to carry out full RGA analysis of the vacuum provides invaluable information for vacuum diagnostic purposes. Available right there and then at the time of test failure or result questioning. A full set of displays, Analog, Histogram and Trend are provided together with Peak, Trend and RGA Calculators. Ask for the "Encounter" brochure for details on RGA software performance and capability.

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Leak Detector

Direct/Counter-flow Mode

Sensitivity

4×10^{-11} Std cc/sec He

Measurement Range

1×10^{-4} to 2×10^{-11} Std cc/sec

Maximum Inlet Test Pressure

>7.5 Torr

He Pumping Speed at Inlet Port

Direct - >20 l/s

Counter-flow - >3 l/s

Response Time

To leak at inlet port - <0.5 s

Sniffer Mode – (Optional)

Sensitivity

1×10^{-7} Std cc/sec He

Response Time

<0.5 seconds (Standard)

General

Auto Calibration

With built in calibrated leak

Full Test Cycling

Audible signal

Start up time

<5 min

Dimensions

24" wide x 35" deep x 36" high

Options

Full RGA capability

Wet or Dry pump versions

Bar Code Scanner

Residual Gas Analyzer – (optional)

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)

(1mA/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

2-250 AMU - Standard 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

Materials in Vacuum

Stainless Steel (304), nickel, glass (EM),

Rhenium, alumina, ceramics, ThO₂/Ir,

copper gasket

RGA Software Features – (optional)

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

Ordering Information

(Complete **POLARIS** packages):

Polaris Leak Detector (Dry pumps) - **AV-POLARIS-D**

Polaris Leak Detector (Wet pumps) - **AV-POLARIS-W**

Thoria Filaments – pack of two - **AV-ODY-FIL-THIR**

(Options):

RGA Capability - **AV-LD-RGA**

Bar Code Reader - **AV-BAR-CODE**

Calibrated Leaks - **See Leak brochure**



VACUUM TECHNOLOGY
I N C O R P O R A T E D

1003 Alvin Weinberg Drive
Oak Ridge, TN 37830 U.S.A.

Tel +1 865 481 3342

Fax +1 865 481 3788

E-mail sales@vacuumtechnology.com

www.vacuumtechnology.com

Contact: