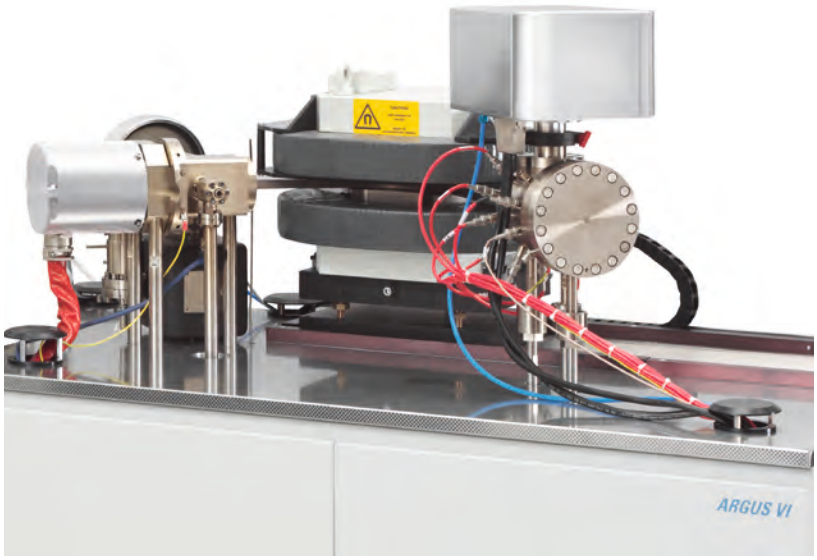
Thermo Scientific ARGUS VI

Noble Gas Mass Spectrometer

A compact noble gas mass pectrometer for the highest precision analysis of argon



The Thermo Scientific™ ARGUS VI™ is a revolutionary static vacuum mass spectrometer using state-of-the-art technology for the isotopic analysis of small samples of the noble gases, in particular, Argon. It has an extremely robust design and excellent ion optics combined with industry-leading instrument control software to create the total argon analysis package.

The ARGUS VI instrument is a totally new approach to noble gas mass spectrometry. It comprises a magnetic sector analyzer with 13 cm, 90° extended geometry ion optics giving an effective dispersion of 26 cm. The geometry combines superb ion optic performance with two-direction focusing and high dispersion. The analyzer incorporates novel design elements that have hitherto been unavailable in static vacuum systems.



Electromagnet

The electromagnet is fabricated using soft iron. It is mounted on roller bearings and has translational and rotational adjustment in all three planes to optimize peak shape and flatness.

- Supplied as standard for maximum sensitivity in all applications
- Excellent results for peak jumping acquisitions
- Delivers extended mass range
- Electromagnet can scan over the entire analyzer operating range
- High stability achieved with a temperature controlled field probe
- Fully controlled by IonVantage software allowing rapid peak jumping between masses whilst maintaining maximum sensitivity

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Ion Source

Flange mounted "Nier" type ion source designed for easy de-mount, filament change and cleaning.

- Maximized ion production for high sensitivity
- Simple design, easy to clean and maintain

Vacuum System

The vacuum system is designed for true UHV performance. The system (excluding flight tube) is manufactured using 316LN stainless steel. The UHV pumping is achieved by utilizing a 20 L/s ion pump designed specifically for pumping the noble gases and an optional
80 L/s turbo molecular pump backed by a two-stage diaphragm pump. The pumping system isolation valve is a CF40 all metal valve that can be pneumatically controlled. The CF16 inlet valve to the mass spectrometer is manually controlled. The mass spectrometer also includes one SAES NP10 non-evaporable getter pump located in its own water cooled jacket. The getter can be isolated from the system via a CF16 all metal valve.

- 20 L/s Ion pump with controller
- Vacuum ~ 10^{-10} mbar
- 80 L/s turbo-molecular pump mounted beneath the bench
- Dry-pumped backing line
- Ion gauge for vacuum monitoring
- NP10 SAES getter with controller
- Pneumatic valves have helium leak rates for valve and body < 1 x 10^{-10} cc STP/sec
- Heaters and controls to bake mass spectrometer to 350 °C are included

Electronic Control Systems

Source electronics – All tuning parameters are computer controlled, interfacing to a suite of electronics that operate the HV, Focus, Electron Volts, Ion Repeller, Trap and X Steering.

- Intelligent Interface - Controls communication between the PC and the source, the magnet and all valve controls
- Output lines for implementation of full valve control
- High stability head amplifier
- Additional data collection channels for prep system inputs

Collector Array

The collector array utilizes five Faraday detectors fitted to the argon mass 36, 37, 38, 39 and 40 positions. The Faradays incorporate amplifier circuits that allow resistors with gains of 10^{10} – 10^{12} Ohm character to be used. The resolving slits and detectors are positioned to allow true simultaneous collection of masses 36 through to 40. There is also an optional ion counting electron multiplier that can be fitted to the Low 3 position. This detector can be automatically selected from the software system. The CuBe electron multiplier has ion counting efficiency ~ 80% or better with inherent noise less than
10 CPM.

The ARGUS VI collector array also includes a proprietary beam deflection capability which allows for individual beam manipulation. Each of the six electrostatic deflectors, positioned in front of the collectors, allows the end user to alter the ion beam dispersion by up to 0.1 amu. As an example this would allow the user not only to measure all 5 argon isotopes on the Faraday array but also in the offset position with 40 to 37 in the Faraday's and the 36 in the ion counting multiplier.

- Faraday collectors with optional ICM Abundance sensitivity ~ 5 ppm for adjacent masses

Data System and Software

Thermo Scientific Qtegra™ Intelligent Scientific Data Solution™ is the dedicated data acquisition and control software utilized to control the ARGUS VI system. Operating under Windows 7 and in conjunction with the embedded computer system this provides comprehensive system control, acquisition and reporting.

- Full computer control and storage of all source parameters including trap current and ion repeller voltage
- Full colour display, including a numeric and graphical display of ion beams and pressure gauges and a graphical valve status display
- Full access to valve control when automatic sequences not in operation
- Ion beams and isotope ratio display during data acquisition to allow operator assessment of data quality during analysis
- All raw data stored
- Operating parameters for the mass spectrometer and preparation systems are stored in parameter files for recall and control of automated sample runs
- Manual control routines for scan control, source tuning, and valve operation
- True multi-tasking enabling concurrent operation of multiple programmes including access to Microsoft Excel for offline data handling whilst analysis is still taking place

Standard Specifications

The ARGUS VI system is an extended geometry 13 cm radius 90° magnetic sector analyzer with ultra low internal volume.

Mass range	He, Ne, Ar: 4.5 kV acceleration voltage Kr, Xe: lower acceleration voltage
Background	≥ 5 × 10^{-14} cc STP (@ m/z ^{36}Ar)
Sensitivity argon	≤ 1 × 10^{-3} Amp/Torr @ ≤ 1 mA 4.5 kV
Resolution Faraday cup	≥ 200 @ Ax
System stability m/z ^{40}Ar	≤ ± 50 ppm / 30 min.
Peaktop flatness Faradays	≤ ± 0.001 for ± 150 ppm (mass deviation) @ Ax

www.thermoscientific.com/ARGUS

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PS30167_E 05/13S

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