TIMS

Thermal Ionisation Mass Spectrometry

www.nu-ins.com

TIMS

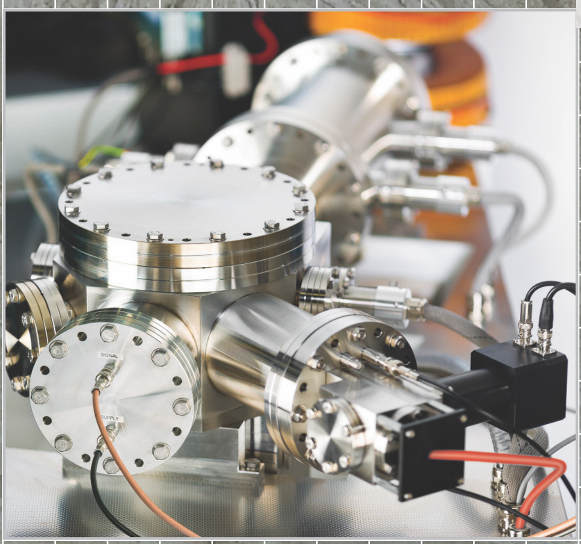
Incorporating our field-proven Zoom lens multi-collector technology, the TIMS improves the versatility and overall performance of this long established analytical technique. Advanced design of filament assembly, ion optics and electronics control combine with flexible detection capability for ultimate performance whilst maintaining ease of use.

Utilised for the first time on a TIMS instrument, our unique patented Zoom lens system ensures perfect peak alignment without the requirement of moving detectors.

Creating ultimate measurement stability, linearity and dynamic range, our Daly ion counting detectors can be used for the precise measurement of small samples and low abundance isotopes.

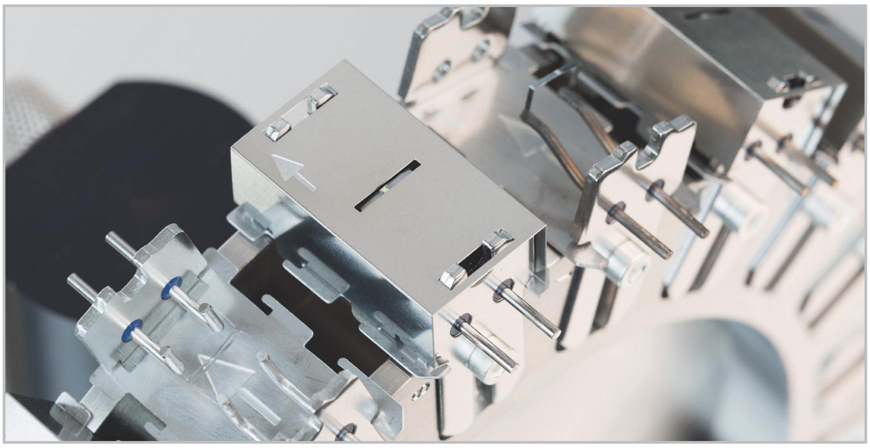
TIMS - key features

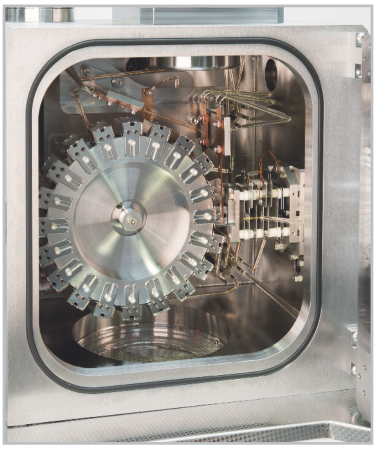
- Patented Zoom Optics for perfect peak alignment and no moving parts in the collector
- Automatic analysis of mixed sample turrets, eliminating the need for supervision
- Enclosed filament assembly designed to eliminate cross contamination
- 20 sample turret constructed from a single piece of stainless steel to minimise trapped volumes
- Daly detectors for ultra-stable measurements of small ion beams
- Robust Daly ion counting system with large dynamic range
- Off axis full size discrete dynode multipliers
- Ion counters automatically protected against large ion beams without switching off the multiplier
- Easily removable ion lens for convenient maintenance
- Easy to replace source slit
- Large dynamic range Faraday detectors, with optional software switchable resistor amplifiers



TIMS

Thermal Ionisation Mass Spectrometer



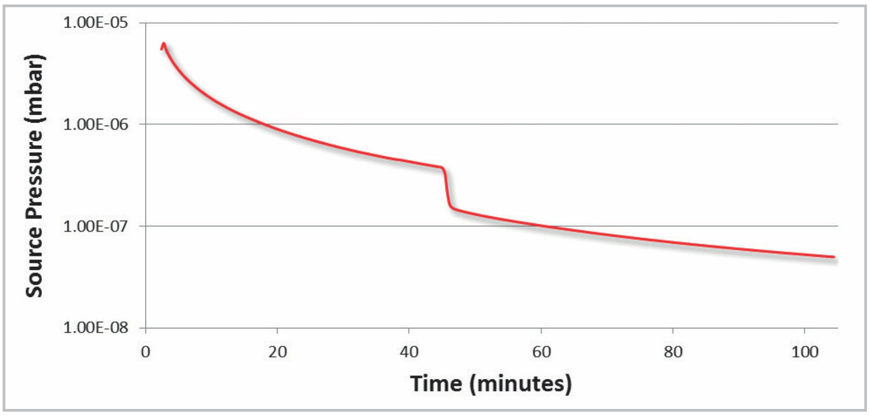


Source

Designed for ease of use and robustness, the source is constructed out of a single piece of stainless steel, the sample turret is designed for minimal trapped volume. It holds 20 single or double filaments. Position of the turret is controlled by visible light sensing technology. Individual filament assemblies are completely enclosed to remove the possibility of cross contamination. An optional degas bench can be supplied to enable rapid outgassing of filaments.

Source Pump Down

The source chamber is pumped by a high-throughput 400 L/sec turbo molecular pump, backed by a dry scroll pump to allow oil free rapid pump down after insertion of the turret. In addition, the TIMS comes as standard with a liquid nitrogen trap which has sufficient capacity for 24 hours of operation with a single fill.



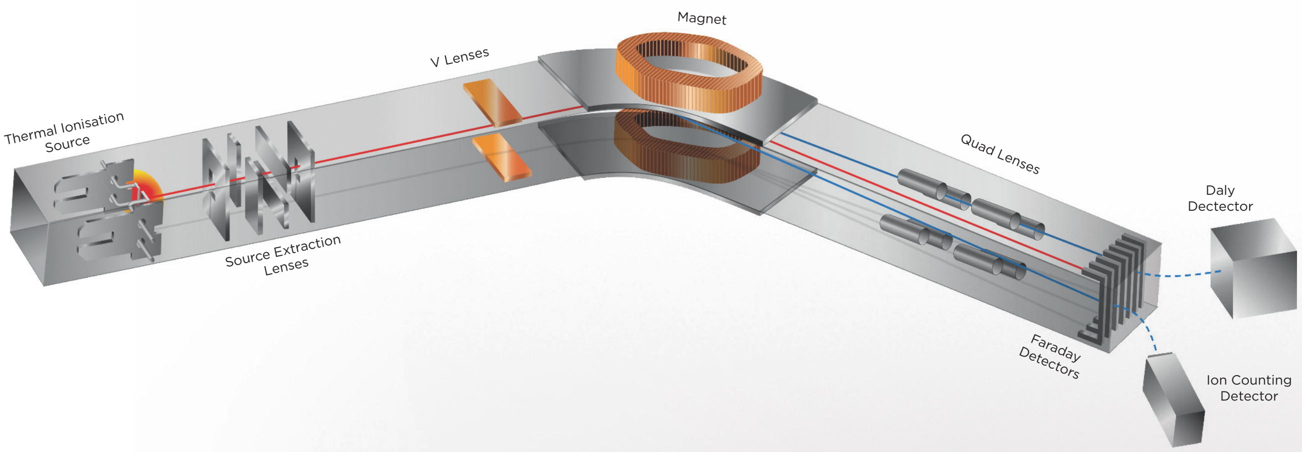
Source pump down time vs source pressure. The cold trap was filled with liquid nitrogen after 45 minutes.

TIMS

High Performance Analyser

Mass Spectrometer

The Nu TIMS utilises a single focusing analyser design with a 70°, 30cm radius laminated magnet. The ion optical system operates at unity magnification to ensure precise ion focussing and large peak flat whilst maximising sensitivity. The variable dispersion Zoom Optics system enables all masses to be located in the centre of the detectors of a fixed static array.



Vacuum system

The vacuum system uses the latest generation of vacuum pumps for ultimate performance, reliability and pumping speed. The pumps comprise of a dry scroll oil free pump, a 400 L/sec turbo pump and 2 x 75 L/sec ion pumps on the analyser. This results in an excellent abundance sensitivity performance as low as 2ppm at one amu spacing relative to 238U. Vacuum gauges are fitted to the instrument and fully monitored in the TIMS instrument software.

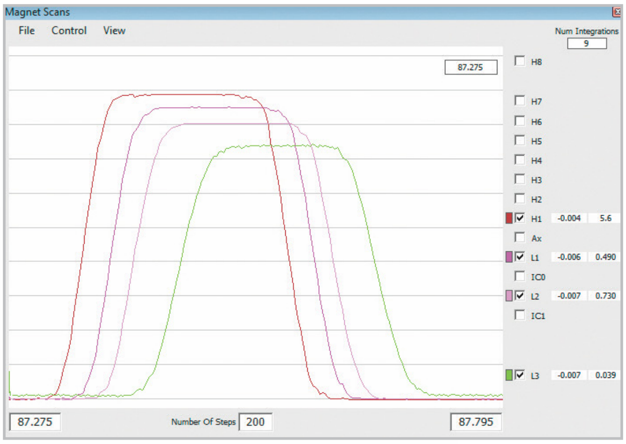
Variable Dispersion Ion Optics

The Nu TIMS utilises a unique Zoom Optics system that removes the necessity for employing movable collectors. This greatly increases the reliability of the collector array and allows instantaneous switching between collector configurations.

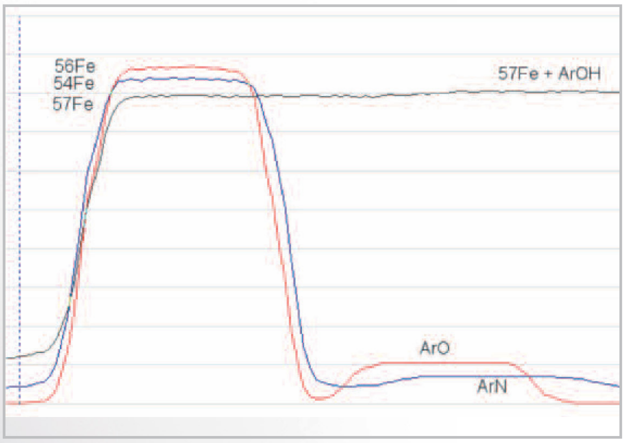
Zoom Optics

During a multi-dynamic acquisition the mass spectrometer steps the magnet through a series of magnet positions on different sets of Faraday cups. With conventional collector systems, compromised positions need to be set up to allow for multiple cycle measurements. The Zoom Optics allows instantaneous mass dispersion switching, providing perfect peak alignment of all peaks in all configurations for multi-dynamic acquisition of five cycles or more.

As an example, the traces displayed show peak coincidence with and without Zoom Optics on cycle five of a five cycle Strontium multi-dynamic routine.



Cycle 5 without Zoom Optics



With Zoom Optics

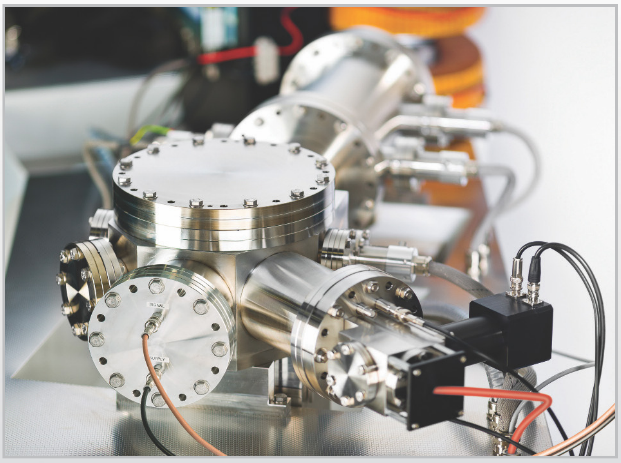
In both cases, the instrument was set up for peak coincidence for the middle (3rd) cycle of the run. With the Zoom Optics employed, perfect coincidence is achieved for every cycle (although only the last one is shown), whilst without it in operation, the peaks gradually lose coincidence.

TIMS

Flexible Detection

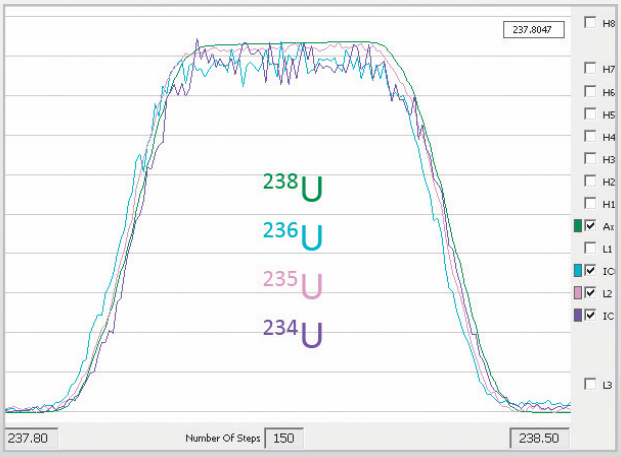
Collector System

Twelve Faraday detectors, one Daly detector and a multiplier are fitted to the instrument as standard providing unparalleled flexibility for simultaneous measurements of many isotope systems in positive or negative ion mode. The unique fixed Faraday collector array incorporates both electrostatic and magnetic suppression devices to prevent the escape of ions and electrons from the Faraday detectors.



Ion Counters

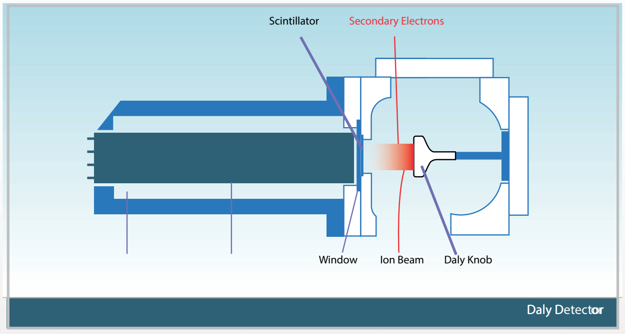
As standard two ion counting positions are populated. These can be fitted either with a Daly detector and a multiplier, two multipliers or two Daly detectors. The Daly provides outstanding performance, lifetime and dynamic range in the positive ion mode with little to no noise, with the added advantage of the photomultiplier being outside the analyser vacuum. Use of the full size, discrete dynode multipliers ensure that the best stability, linearity.



Peak Scan showing the peak shapes and alignment of Uranium on a combination of Faraday, Daly and multiplier detectors.

Daly Detectors

Daly detectors offer the highest performance of any ion counting device over the largest dynamic range.

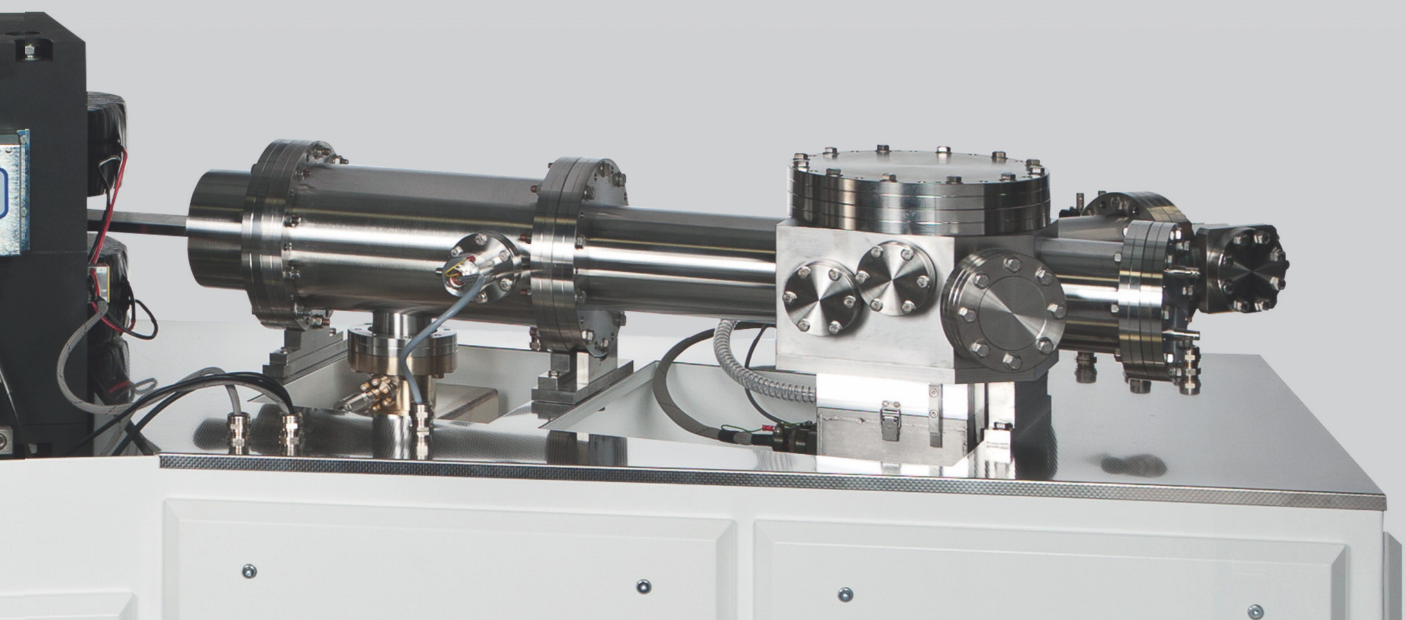


Collector Configuration

Our standard collector configuration consists of twelve Faraday detectors and two ion counting positions, which can be fitted with a choice of Daly detectors or multipliers. The flexibility of this configuration expands the capability of Thermal Ionisation Mass Spectrometry.

For improved abundance sensitivity, energy filters can be placed on the ion counting detectors. These filters can improve the abundance sensitivity by up to 2 orders of magnitude.

To maximise the analytical capability of the instrument, a 16 Faraday, 5 ion counting multiplier/Daly instrument is offered.



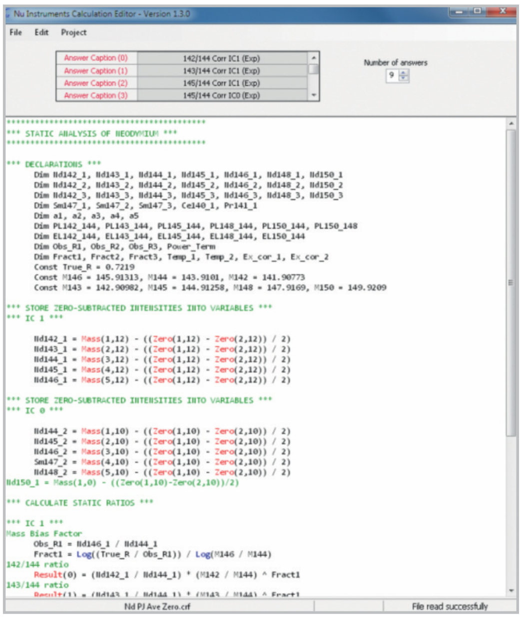
TIMS

Bespoke and Intuitive Software Suite

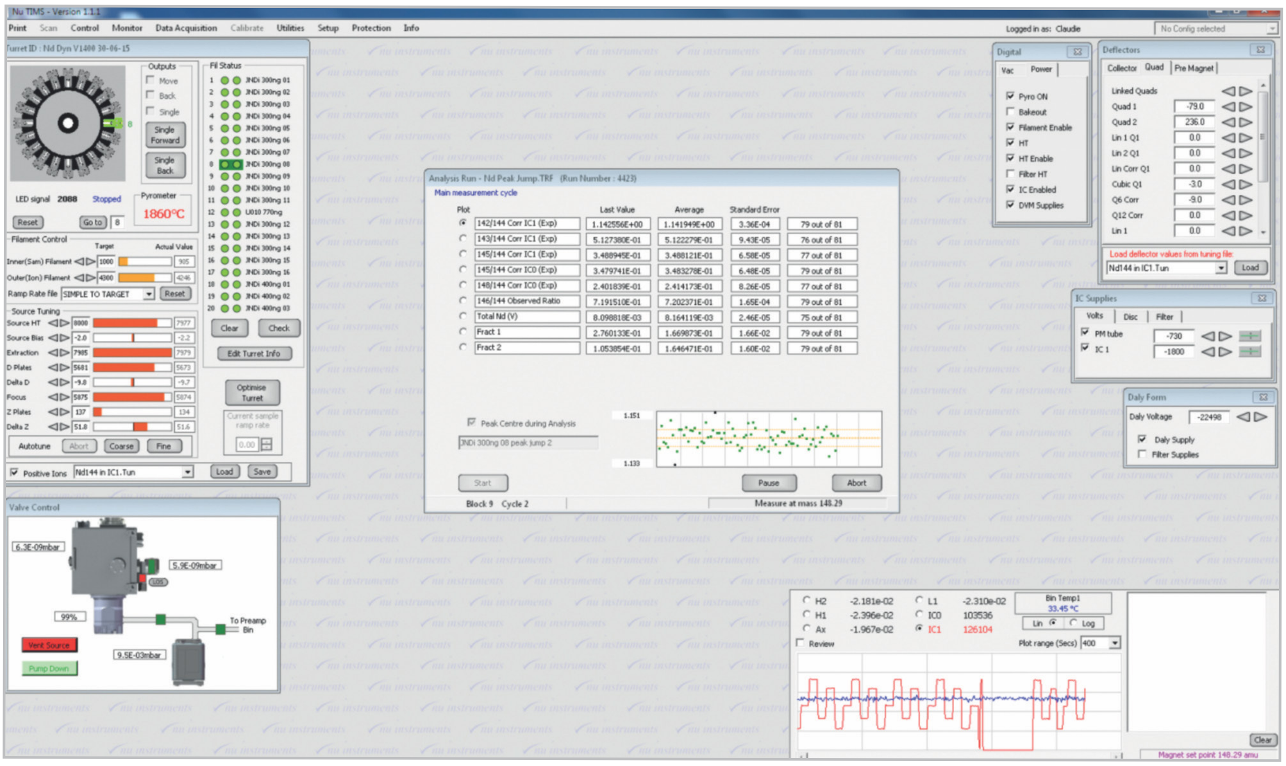
Software

The Nu TIMS comes with a software suite, which gives the user full control of the operation and configuration of various components of the instrument, including venting and pump down after turret exchange. The user friendly interface provides tuning, diagnostics, and instrument protection.

The standard Nu Instruments Calculation Editor (NICE) Software provides user-definable data reduction functions. Both raw and calculated data are available for each sample, alongside full logging of instrument settings and operational parameters. Data can be analysed on or off-line and can be easily exported for further analysis to third party software packages.



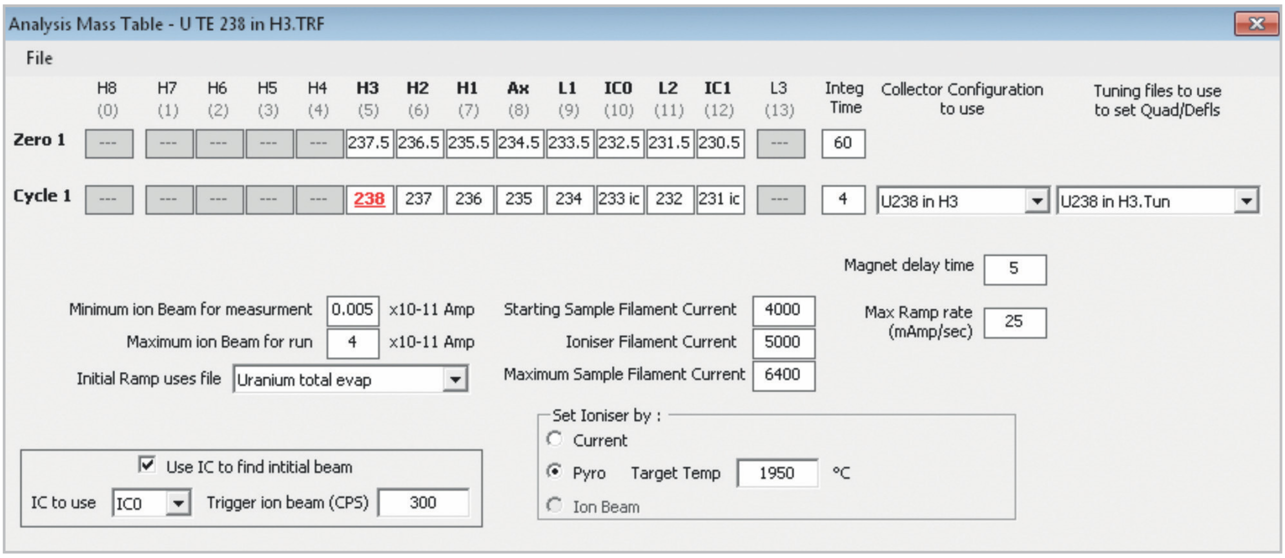
Nu Instruments Calculation Editor (NICE)



Nu TIMS software analysis window - displaying all the necessary information on a single screen.

Total Evaporation Analysis

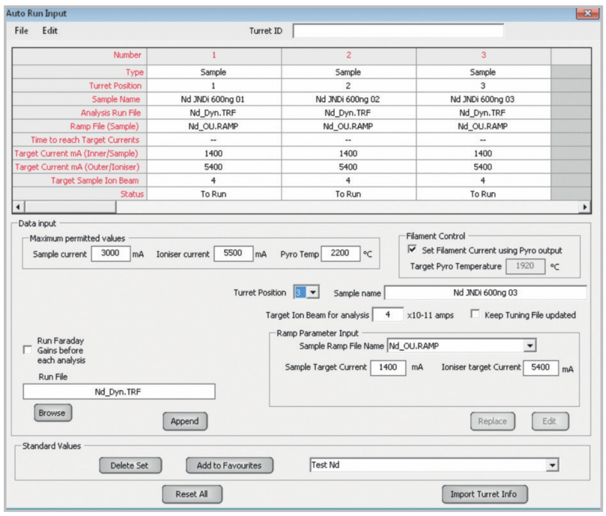
Total evaporation methodology is used to counteract the effects of fractionation in thermal ionisation by measuring all ions of interest from a sample. The Nu TIMS software provides a flexible total evaporation option for automated analysis. Utilising the full flexibility of the instrument, a small beam can be tuned on an ion counter before measuring on Faraday detectors. This ensures minimal pre-analysis sample loss.



Total Evaporation Method

The Nu TIMS software incorporates a comprehensive and flexible integrated automatic sample analysis facility enabling easy creation of batch runs for unattended overnight or weekend measurements.

Futhermore, the automatic shutdown of the instrument on completion option is ideal for overnight runs.



Batch Run setup window

TIMS

Innovators in Mass Spectrometry

Thermal Ionisation Mass Spectrometry

Nu Instruments Limited

Corporate Headquarters
Unit 74, Clywedog Road South,
Wrexham Industrial Estate,
Wrexham,
LL13 9XS - UK.

Tel: +44 (0)1978 661304
nu.info@ametek.com

Innovators in Mass Spectrometry. We deliver cutting-edge science and technology solutions, and offer our customers unparalleled support and maintenance service through the comprehensive AMECARE PERFORMANCE SERVICES program.

Corporate Headquarters
Nu Instruments UK • nu.sales@ametek.com

Regional Contacts
Nu Instruments Europe • nu.europe-sales@ametek.com
Nu Instruments Americas • nu.americas-sales@ametek.com
Nu Instruments Asia • nu.asia-sales@ametek.com

visit us online:
www.nu-ins.com

nu / AMETEK®

TIMS version BRO4.91