



Isotop^x

Introducing **SIRIX**

isotopx.com

Excellence
in Mass
Spectrometry



ATONA

SIRIX

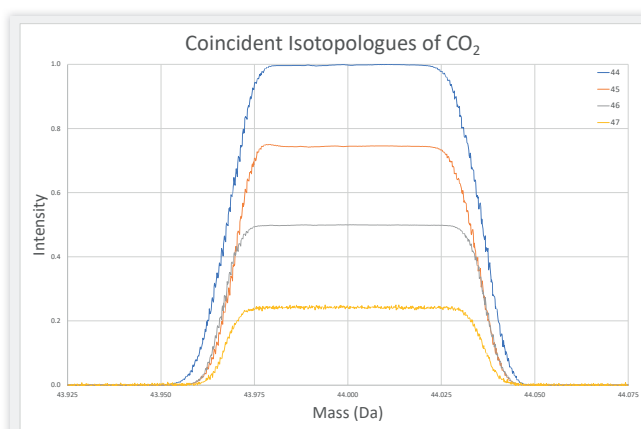
The new standard in high performance IRMS

Imagine if... You could achieve better than 10 ppm precision for 48 CO₂ / 44 CO₂, within 100 minutes

In recent years measurement of isotopologues or “clumped isotopes” has become widespread. Focus is on the analysis of CO₂ where isotopes of mass m/z 44, 45, 46, 47, 48 and 49 are of interest. The new SIRIX mass spectrometer from Isotopx features advanced multicollector technology derived from the Phoenix Thermal Ionisation MS. It also includes the ATONA® amplifier in combination with a high sensitivity, high mass resolution spectrometer design. The result is a powerful, versatile, sensitive, stable isotope mass spectrometer that is intuitive to use, and can also be optimised for the most exacting applications.

SIRIX includes up to 9 individually movable Faraday collectors, allowing complete flexibility in the choice of isotope analysis. The ion optics are based on the same magnet design as the Phoenix TIMS. A large 90° 27 cm radius magnet provides sufficient mass dispersion to allow for simultaneous multicollection of all CO₂ isotopes. The wide flight tube ensures no backgrounds from ion reflections under the minor isotopes. Interferences from hydrocarbons are eliminated from peak centres due to the high mass resolution (>500, 10% valley). A mass resolving power of 5,000 is obtainable.

The large dynamic range and low noise of the ATONA® allows the accurate and precise measurement of ion signals of >1e-7 A down to <1e-17 A on the Faraday array, essential for CO₂ analysis.



CO₂ Measurement, 6,000 1 s Integrations

Function	Mean (Aft)	Std Dev% (Aft)	Std Err ppm (Aft)	Included	Total
45/44	1.18E-02	0.078	1.06	4599	6000
46/44	4.19E-03	0.072	0.97	5618	6000
47/44	4.68E-05	0.170	2.28	5544	6000
48/44	4.46E-06	0.636	8.58	5508	6000

The M20 multi-collector sets the SIRIX apart. Up to 9 individually motorized Faraday collectors are fitted, all on the same focal plane. The mass spectrum above shows multi collection of CO₂ isotopes at mass 44, 45, 46 and 47. The ability to move collectors allows the use of narrow Faraday collectors. Resolution is increased and the problems associated with wide collectors are eliminated.

The data summary above shows indicative precisions obtained on the measurement of CO₂ isotopes. A ~160 nA beam was analysed for 6,000 1 s integrations. This length of time is comparable to sample on-beam time for clumped isotope analyses.

SIRIX

The new standard in high performance IRMS

Imagine if... You didn't need to sample-standard bracket, effectively doubling your sample throughput

Existing instrumentation requires switching between sample and reference gas of the order of every 30 s to continually "calibrate" the instrument. Each switch between sample and reference gas has a corresponding delay/settle period for the beam intensity to stabilise. As a result, the duty cycle of sample gas can be well below 50%, limiting productivity.

With the development of the ATONA® amplifier system and new extended range ATONA®, Isotopx has successfully managed to improve performance and stability of the amplifier system. The exceptionally quiet and stable amplifier allows for extended measurement times of sample gas, without the need for repetitive calibration with a reference gas, or calibration of different gain resistors

BETTER PRECISION

10 ppm

Achieve better than 10 ppm precision for 48 CO₂ / 44 CO₂, within 100 minutes

BETTER STABILITY

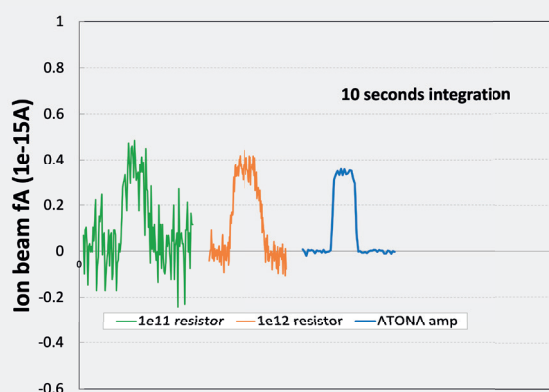
1 ppm

ATONA® shows better than 1 ppm stability over a 40 hour period, with extremely low backgrounds too

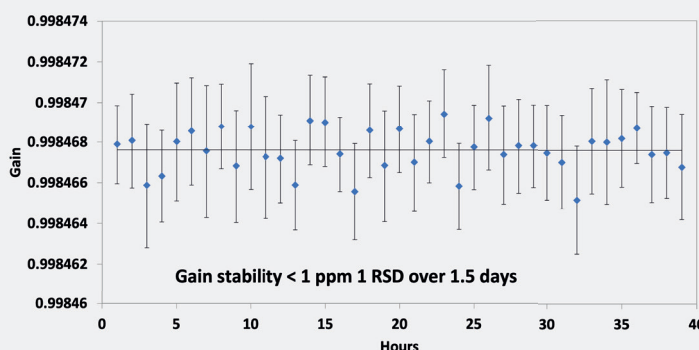
INCREASED PRODUCTIVITY



SIRIX reduces your calibration requirements, increasing your sample throughput



Peak shapes of the same sized ion beam scanned using different detector technologies. It can be seen that the ATONA® amplifier peak exhibits much lower noise characteristics than 10e11 or 10e12 resistor amplifier peaks.



Here you can see the gain stability using the ATONA® amplifier, showing better than 1 ppm stability over a 40 hour period. This is not possible using traditional resistive amplifier techniques.

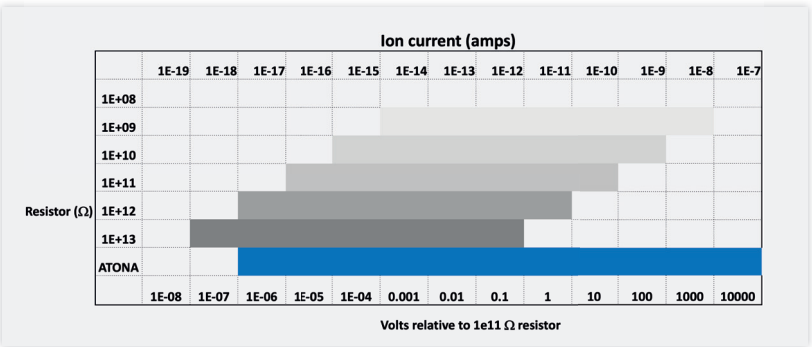
SIRIX

The new standard in high performance IRMS

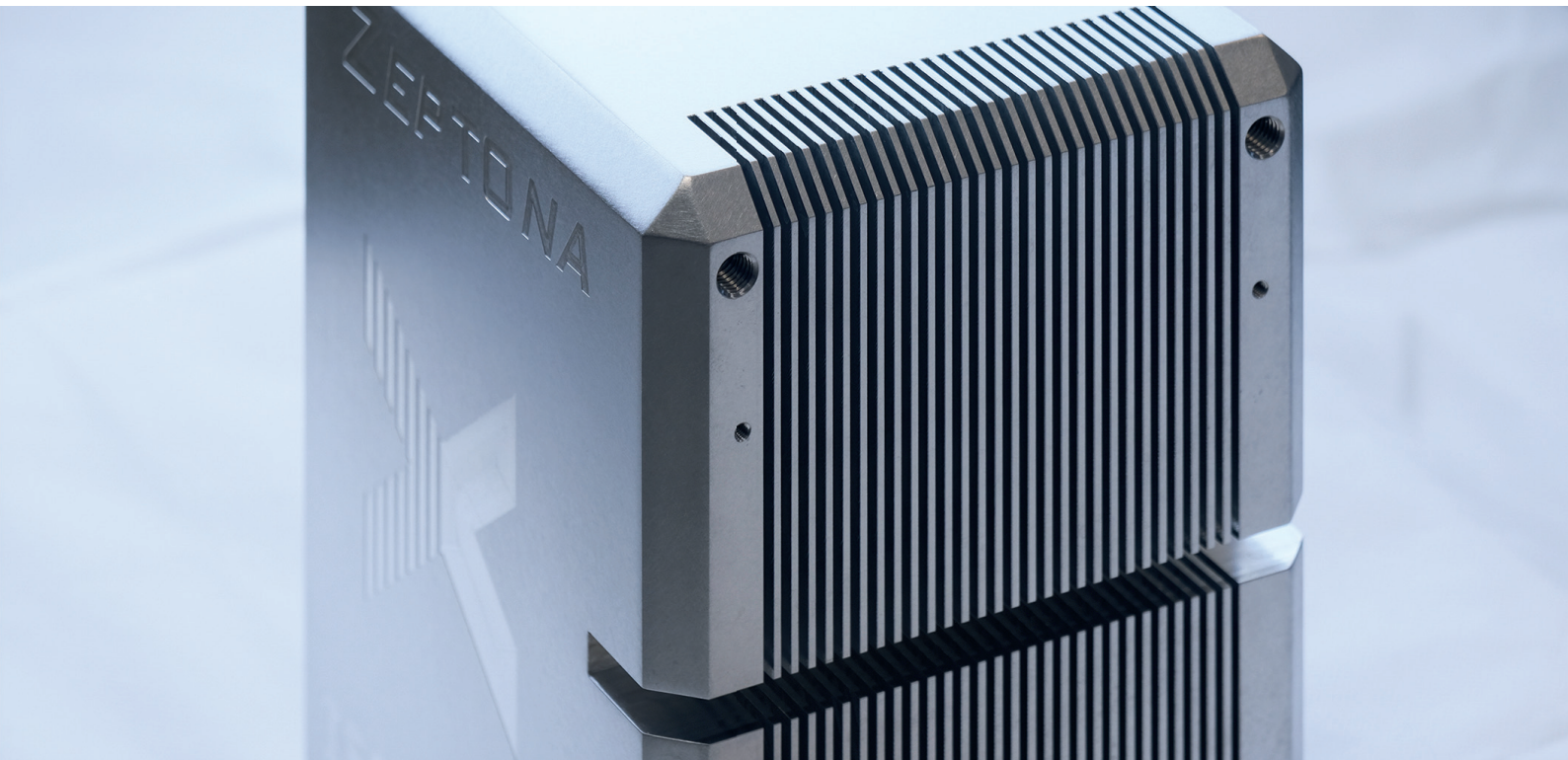
Imagine if... You didn't need to calibrate your detectors, or choose your resistor according to application or beam size

The unique ATONA® amplification technology from Isotopx has eliminated the need for a “feedback resistor”. The outcome is a significant reduction in amplifier noise, a dramatic increase in dynamic range, rapid amplifier decay, and improved baseline and calibration stability. The new extended range ATONA® is fitted as standard and increases maximum signal measurement to 200 nA on channel 1 and 20 nA on channels 2 to 9. This allows the instrument to run with much greater signal intensity. Correspondingly the time taken to achieve the required precision is much shorter, increasing sample throughput. The ATONA® amplifier also exhibits extremely stable baseline measurements over extended periods of time.

The dynamic range of the ATONA® amplifier is far wider than that of traditional resistive amplifiers. The image below shows a dynamic range comparison of resistive amplifiers and ATONA® referenced to a 1e11 Ω amplifier.



SIRIX has additional optional technologies including a high abundance sensitivity filter, ZEPTONA amplification technology, and an adjustable source slit.





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