



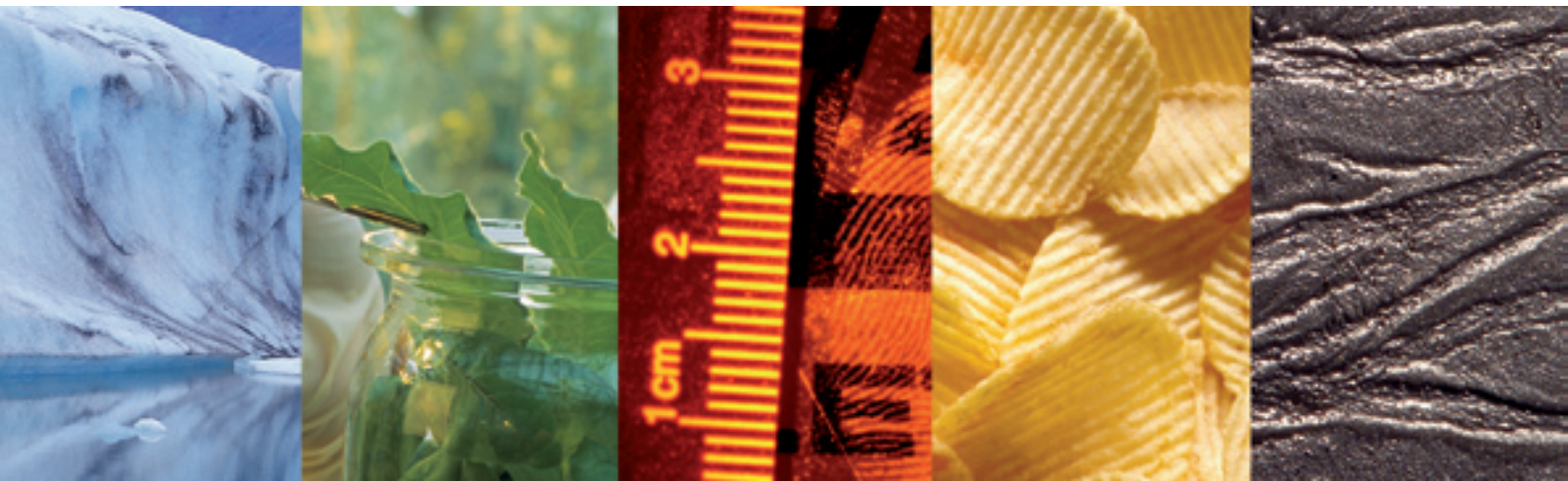
more advanced IRMS performance

100 years, more experience

IsoPrime's beginnings date back to the early 1970's. The product line constantly developed through the 80's and 90's as it changed from VG Isotopes and finally formed as the stable isotope specialist IsoPrime Ltd. Throughout these 35 years there has been consistent research & development which produced a series of famous products such as the VG Sira, Prism and Optima IRMS. From this lineage, the IsoPrime IRMS represents the world's most advanced IRMS mass spectrometer/inlet product combination.

IsoPrime is a daughter company of Elementar, a business with over 111-years expertise in elemental analysis. The company roots back to Heraeus in Germany and earned its worldwide reputation for manufacturing the most technically advanced systems. Already in 1923, when using its equipment, Fritz Pregl received a Nobel Prize for Chemistry for his innovations in elemental micro analysis.

IsoPrime has been developed to meet the needs of the world's best scientists and technologists, who demand the most advanced, efficient and practical solutions, for IRMS applications. IsoPrime is the IRMS of choice for experts in the fields of geological sciences, environmental studies, medical sciences and food authentication.



More possibilities

In addition to its more advanced technical specifications, the world's leading IRMS inlet combination represents the intelligent choice for the stable isotope user. With significant advantages in Elemental Analysis, Gas Chromatography and Head Space Gas Analysis, Isoprime provides best-in-class performance, whatever the application.

Ultra High Precision Analysis

For the highest precision requirements, Isoprime has Dual Inlet (DI) and Continuous Flow (CF). These include DI based peripherals for high precision analysis of $\delta^{18}\text{O}$ and δD of waters and $\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ of small sample size carbonates. ChromeHD allows for ultra high precision δD analysis of waters. For many challenging applications that require this level of precision, in particular geological, water and environmental, these are the methods of choice for effective analyses.

Elemental Analysis:

Isoprime's parent company Elementar, is the world market leader in elemental analysis, using the most sophisticated micro electronics and mechanical design, providing major advantages in the areas of food technology, environmental analysis and for contract laboratories. The unique separation technology employed in Elementar EAs allows Isoprime to be the first manufacturer which can provide complete systems for simultaneous CNS/CHNS-IRMS analysis. A wide sample concentration range from micro to macro means that we have an EA that caters to every application requirement

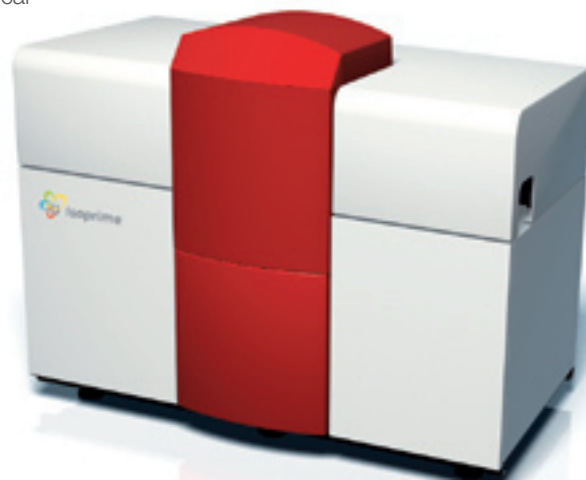
Compound Specific Isotope Analysis:

Working with leading manufacturers in gas and ion chromatographic separation like Agilent Technologies, Inc., Isoprime provides unique solutions for compound specific isotopic analysis (CSIA) for food, geological, environmental and medical research.

Head Space Gas Analysis:

Isoprime provides a solution for flexible headspace gas sampling for analysis including heart-cut technology to eliminate interferences and cryotrap for trace gas analysis.

“Isoprime is the leading IRMS mass spectrometer-inlet combination system”



More performance

With IsoPrime, unparalleled IRMS performance is delivered without compromise. Its unique benchtop design ensures maximum space efficiency, whilst it is built to the most exacting specifications available on the market.

A superior construction made from stainless steel polished to UHV design, high-throughput capabilities and an extended-life collector array are just a few of the benefits of IsoPrime. Add to this, matchless linear dynamic range for continuous flow H_2 and high precision, then you'll realise why IsoPrime provides the optimum price-to-performance IRMS available today.

IsoPrime's precision and extra sensitivity is gained through a very low memory ion source, an ultra stable head amplifier and exceptional ion production.

Very Low Memory Ion Source
Matchless dynamic range - $CF H_2$
Exceptional ion production
Extended-life collector array
Benchtop design



More options

Continuous Flow

Whenever you need a Continuous Flow (CF) sample preparation and management system, IsoPrime is the ideal choice, with its extensive range of CF inlets, with class-leading measuring features, e.g. for CHNS-IRMS analysis in less than 20 minutes. CF inlets are available for water, carbonate, trace gas, compound specific isotope and elemental analysis.

IsoPrime has a CF H₂ energy filter fitted as standard with a dynamic range of 30:1, giving ultimate flexibility.

Rapid analysis of a large quantity of samples can be achieved easily, with autosamplers and diluters available to make the process more efficient. H, C, N, O and S can be sampled quickly and precisely, using gas, liquid or solid phase samples, whilst maintaining high sensitivity.

Dual Inlet

Manufactured to the highest specifications, IsoPrime's Dual Inlet performance ensures high precision measurements for smallest sample sizes, or gases such as SO₂, without memory effects. The Dual Inlet valve blocks are carefully engineered to give minimum dead volume whilst maintaining fault-free performance for millions of operations. The high compression ratio 100mL bellows enables the Dual Inlet to analyse the largest range of sample size.

IsoPrime can manage large automated sample runs. For small gaseous samples, IsoPrime's Micro Volume ACF (Automatic Cold Finger) allows accurate performance for even the smallest sample size.



More sensitivity

IsoPrime's ultra-high sensitivity ion source provides exceptional and stable ion production for all molecules of interest with an unparalleled dynamic range of greater than 30:1 for H₂ in CF mode. Consistently low H₃⁺ ion formation achieved by the IsoPrime is essential to H/D ratio analysis.

IsoPrime's excellent vacuum properties with the turbo molecular pump mounted directly under the source ensures that the ion source operates under the very cleanest vacuum ensuring that ion generation is more efficient and the ion source has zero memory.

The rapid peak jumping electromagnet provides superior performance compared with a permanent magnet analyser. This allows for high sensitivity and simultaneous extended mass range for your most challenging peak jumping applications such as jumping from H₂ to CO for simultaneous analysis of H and O analysis of waters by pyrolysis or from H₂ to SO₂ for simultaneous CHNS analysis.

Standard Specifications for the IsoPrime: Reference Gas Injector and Dual Inlet *

Isoprime

Sensitivity - Absolute sensitivity of CO ₂ per m/z 44 ion in dual inlet mode (molecules/ion)	850
H ₃ ⁺ contribution	<10ppm/nA
H ₃ ⁺ factor stability	<0.03ppm/nA/h
Mass Resolution (10% valley definition)	100
Abundance sensitivity (Dual Inlet)	<4ppm

Reference Gas Precision & Linearity

Gas	Analysis	Precision (‰) Measured at 5nA	Linearity (‰/nA)
CO ₂	δ ¹³ C	0.08	0.03
	δ ¹⁸ O	0.08	0.04
N ₂	δ ¹⁵ N	0.08	0.03
H ₂	δD	0.2	--

Dual Inlet Internal Precision

Gas	Analysis	Internal Precision ($\sigma_{\text{int}} = 12$; ‰)	Sample size (bar µL) Standard Inlet	Sample size (bar µL) Cold finger
CO ₂	δ ¹³ C	≤0.01	100	>5
	δ ¹³ C	≤0.02	--	>1
	δ ¹⁸ O	≤0.016	100	>5
	δ ¹⁸ O	≤0.03	--	>1
O ₂	δ ¹⁸ O	≤0.01	100	--
N ₂	δ ¹⁵ N	≤0.01	100	--
H ₂	δD	≤0.1	200	n/a
SO ₂	δ ³⁴ S	≤0.01	100	>20

* Non-Standard specifications available in some cases. Please consult your IsoPrime Limited representative.

Superior electronics & vacuum system

Advanced Vacuum System:

Efficient and reliable vacuum pumps are integral to IsoPrime's fully interlocking system, providing base pressures in the 10^{-8} mbar range.

Pirani and Penning gauges measure vacuum performance and the entire system has built-in fail-safe protection. This enables ultimate performance without the necessity of differential pumping, thereby optimising maintenance intervals.

Robust Modular Electronics:

IsoPrime is powered by a reliable single plug-in unit. Computer controlled source parameters, system & data acquisition management and full valve control are integral to IsoPrime, providing realtime readbacks for instrument monitoring and diagnosis – from anywhere in the world.

High stability Head Amplification:

High precision electrometer amplifiers and low temperature coefficient resistors form the basis of IsoPrime's Head Amplifier.

Carefully chosen components give the high stability and resolution for the optimum analytical performance. This gives IsoPrime high stability and easy serviceability, operating at maximum performance without the need for an evacuated head amplifier housing.

- Powerful Turbomolecular pump**
- 30:1 dynamic range (CF mode)**
- Superior electromagnet performance**
- Advanced electronics module**
- Robust monitoring**
- High stability Head Amplification**



More collectors

Patented collector system:

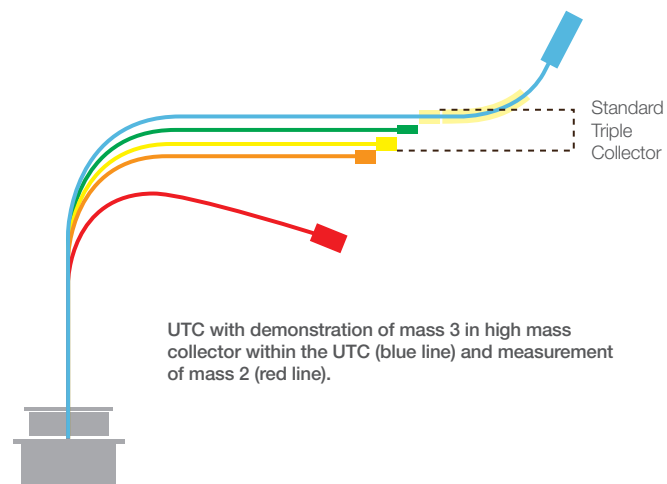
The unique IsoPrime Universal Triple Collector (UTC) design features patented high performance Faraday buckets, with a proven performance lifetime in excess of 10-years. The addition of a factory-standard state-of-the-art Electrostatic Filter (ESF), provides unparalleled CF H_2 capability.

Isotopic analysis without adjustment of collectors/amplifiers, for:

N_2 : (m/z 28,29 & 30); O_2 : (m/z 32,33 & 34)

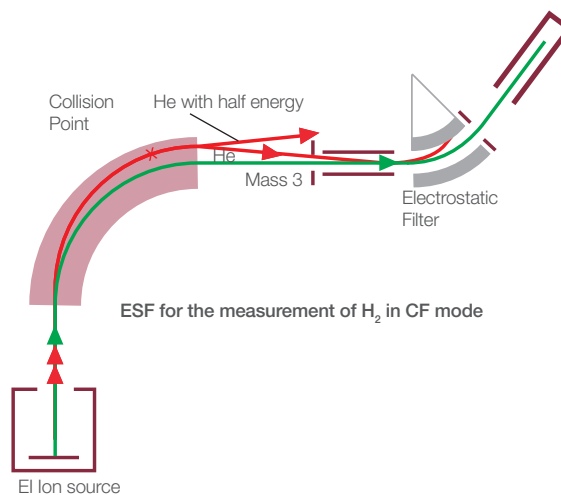
CO_2 : (m/z 44,45 & 46); SO_2 : (m/z 64 & 66)

CO : (m/z 28 & 30); N_2O : (m/z 44,45 & 46)



Electrostatic Filter (ESF) – factory standard:

H_2 measurement in CF mode is achieved using the advanced factory-fitted ESF. The ESF facilitates complete baseline separation of mass 4 (He) from mass 3 (HD) – essential for accurate D/H analysis in CF mode. An additional deep Faraday collector for mass 2 is utilised, whilst mass 3 (HD) is measured using the high-mass Faraday collector within the UTC



Improved detection

Extended Multi Collector Array (MCA)

IsoPrime can incorporate up to 10 detectors, enabling the configuration of a Multi Collector Array (MCA), providing analysts with maximum flexibility in their choice of applications. Examples of measurements that can be made include $N_2/O_2/Ar/CO_2$ ratios, multiply-substituted isotopologues of CO_2 , isotopomers of N_2O for determination of $\delta^{15}N^a$ and $\delta^{15}N^b$ and chlorine and bromine isotopes. IsoPrime's long focal plane enables the geometry to be tailored for many applications.

Unique patented UTC

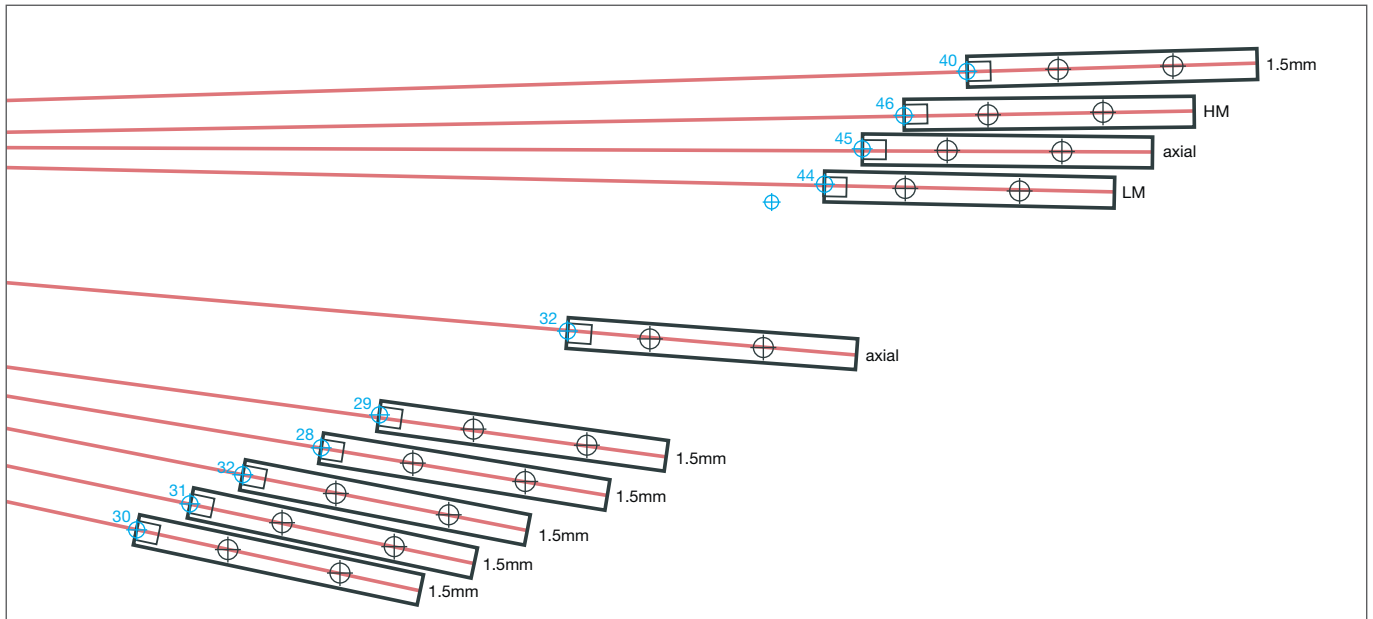
Patented Faraday buckets

Factory fitted ESF

>10 Year lifetime

Up to 10 collectors

Extended MCA



Advantage - IonVantage software

IonVantage® provides a major leap forward in IRMS software development. The reliable IonVantage® Windows-based GUI platform is capable of simultaneous MS & Inlet Management, with built-in intelligence enabling sample list modifications whilst sample analysis is still running. IonVantage also has the flexibility for editing methods, direct control of the GC parameters, easy integration with LIMS and creating customised inlets and scripting. Together, MS, Inlet & Sample Management are integrated into the leading IRMS software suite – IonVantage®.

Inlet Management:

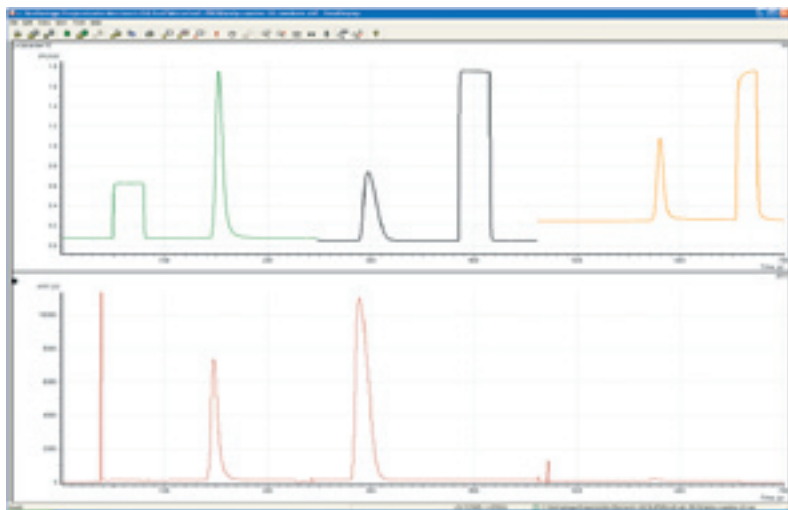
The Inlet Configuration Wizard enables simple yet powerful configuration for standard or custom inlets. Manual control for method preparation is achieved using a simple graphic interface. Operating parameters can be adjusted, saved and loaded later as required. The inlet script files can be used as written or new ones can be written for your own particular applications or inlet hardware.

MS Analyser Management:

With a configurable graphical and numeric display of ion beams and pressure gauges, IonVantage® delivers unprecedented flexibility in the operating of the MS and preparation systems. The software makes tuning, vacuum control and operator assessment of data quality, throughout multiple programme operation, a simple process.

Sample Management:

With the ability to change sample lists whilst running, this maximises lab efficiency. For samples run as a batch from the sample list page, a batch report can be produced with user defined data fields. Data can be displayed in real time from the sample list. Sample Management is made simple and operates seamlessly in both DI and CF modes. Above the sample list level, IonVantage is organized in projects for easy organization of work. Each project holds all the information required for a particular type of analysis, and all the data collected when the instrument is in use.



Windows-based software
fully Integrated MS, Inlet & Sample Management
capable of providing raw data analysis
full control over inlet management
MS Analyser management
advanced CF & DI sample management
complete control over sample management

Service & support

Isoprime Limited has worldwide representation in more than 50 countries with regional centres in Europe, America and Asia with dedicated service engineers and technical/application specialists to support the worldwide installed base of hundreds of IsoPrimes and legacy products. This is also the basis for fostering the communication within the big IsoPrime user community for the benefit of experienced and new members.

The in-house applications laboratory and lecture rooms in the UK headquarters is equipped with the complete product portfolio for full applications support for customers. IRMS demonstrations and customer, service engineer and sales agent training are regularly conducted in the applications laboratory and conference facility at Isoprime house. Customer training courses are customised according to configuration and are geared towards building on the basic training during commissioning of the IsoPrime system.

Further after sales support including software downloads, application notes, operating manuals and further support material are available at www.isoprime.co.uk.

Operating requirements:

Compressed air: CF (4 bar), DI (7 bar)

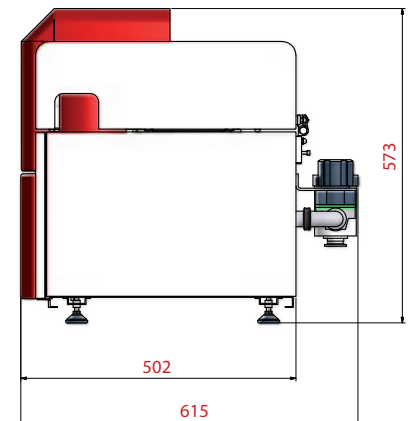
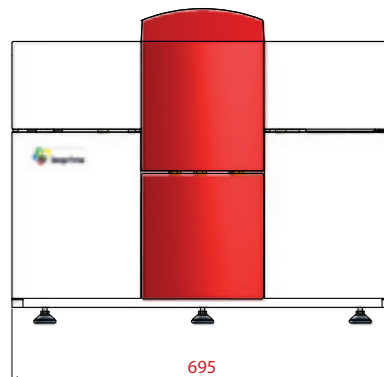
Power: 110/230 AC, 50-60Hz single phase

Water supply: n/a

Software: Windows-based PC
(network & Internet connection required for remote access)

Weight: 127Kg (including electromagnet)

Operations conditions: 22°C (+/- 1°C/hour), Humidity <60%





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