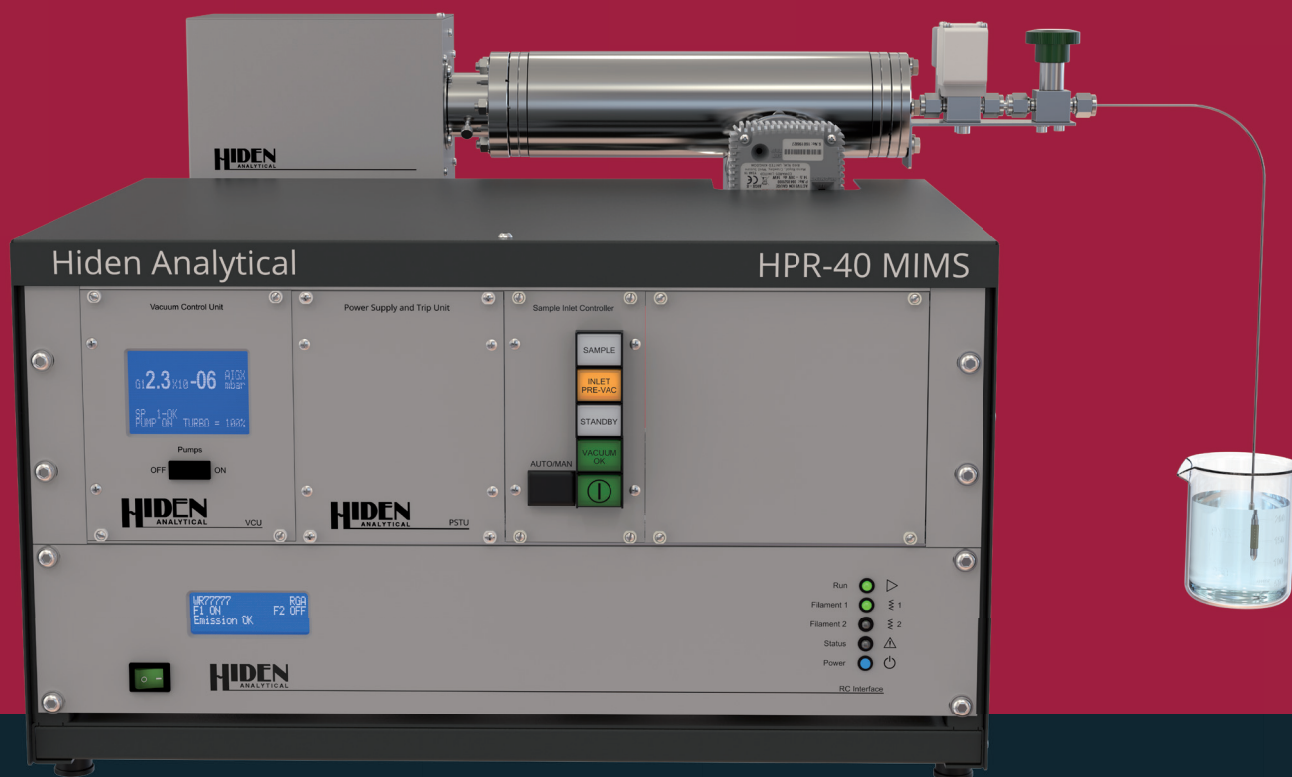




HPR-40 MIMS

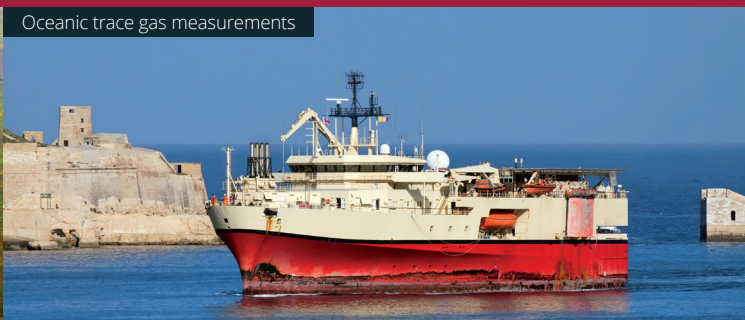
► Membrane Inlet Mass Spectrometers for Dissolved Species Analysis

Membrane Inlet Mass Spectrometer – Applications

Wastewater, sludge and soil core analysis



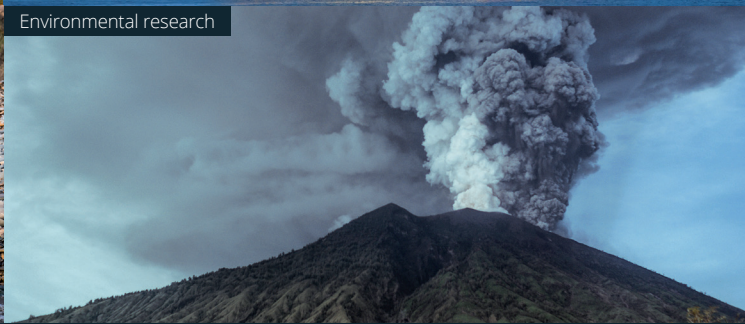
Oceanic trace gas measurements



Denitrification studies



Environmental research

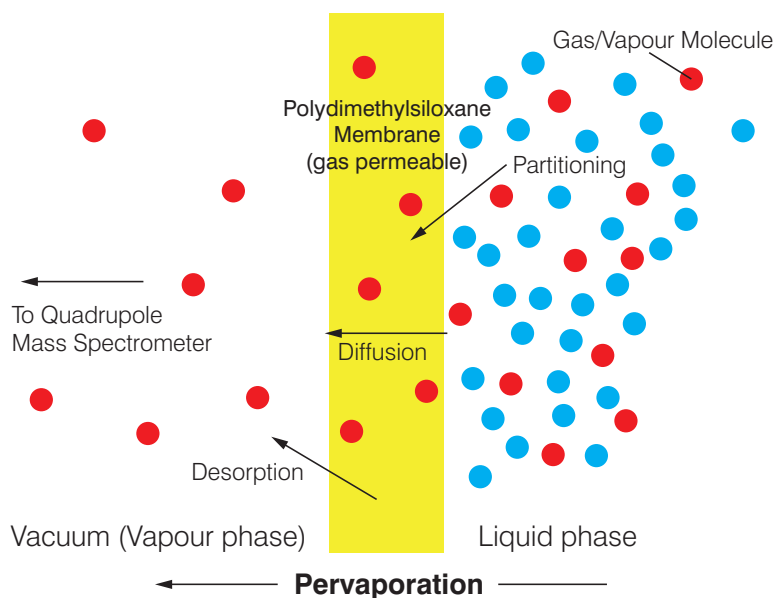


Membrane Inlet Mass Spectrometry (MIMS) for direct analysis of dissolved gases and volatile compounds.

Applications:

- ▶ Groundwater studies
- ▶ Volatile organic compounds (VOCs) detection
- ▶ Pollution monitoring
- ▶ Denitrification studies
- ▶ Environmental research
- ▶ Oceanic trace gas measurements
- ▶ Wastewater, sludge & soil core analysis
- ▶ Enzyme activity studies
- ▶ Swimming pool analysis

Membrane Inlet Mass Spectrometry (MIMS)



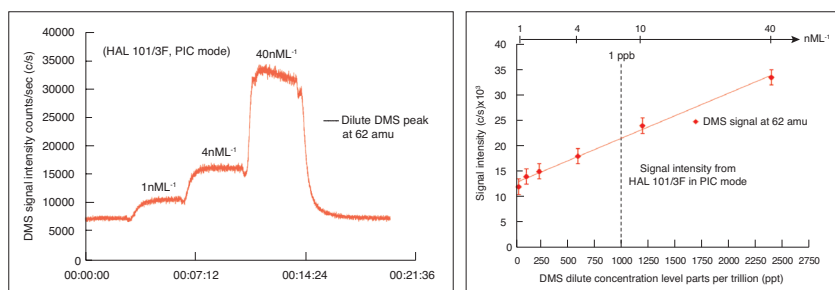
Example Data

PPT Level Detection of Volatiles in Water

The HPR-40 MIMS was used to detect trace amounts of CH_3SCH_3 (Dimethylsulfide DMS) in ocean water. DMS is a naturally occurring substance produced from micro-organisms and related to global climate change and regulation.

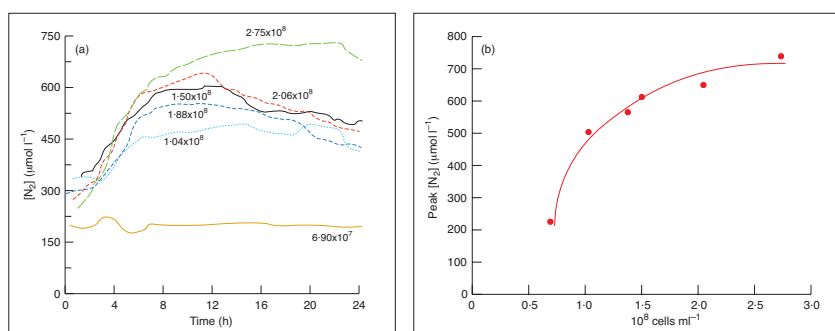
The amounts which were detected in this application go down to 60 ppt (parts per trillion), which corresponds to dilute concentrations of DMS of less than 1 nML^{-1} .

The diagrams show the calibration curve and raw data obtained from DMS solutions in different concentrations.



Denitrification Studies

The HPR-40 MIMS was used to investigate denitrification by *Pseudomonas stutzeri* in a static lakewater column. Continuous real-time measurement of gases enabled the dynamics of the process to be investigated. Concentrations of 17 mmol/L nitrate and 10 mmol/L nitrite were identified as optimal for denitrification under nutrient-limited conditions (i.e., produced the highest concentrations of N_2). Available carbon was the major rate-limiting factor in lakewater when nitrate or nitrite was present. No stratification of the process with depth was observed, and aerobic denitrification was apparent under all the conditions employed.



Analysis of denitrification by *Pseudomonas stutzeri* under nutrient-limited conditions using membrane inlet mass spectrometry.

Journal of Applied Microbiology (2000) 88, 5, 853-859.

Example Data

Sub ppb Level Detection of Environmentally and Industrially Significant Gases

The HPR-40 MIMS paired with the MIMS Probe enables rapid, direct measurement of dissolved gases in water with exceptional sensitivity. The examples shown demonstrate detection of carbon disulphide (CS_2) over a wide dynamic range from parts-per-billion to parts-per-million concentrations, together with measurement of dissolved methane at trace environmental levels. When the methane supply is stopped, the signal rapidly falls to near-zero, illustrating the system's ability to resolve very low concentrations and respond quickly to changes in dissolved gas levels. This capability makes MIMS a powerful tool for environmental research, supporting studies of trace gases, pollution monitoring, and biogeochemical processes in natural and engineered water systems.

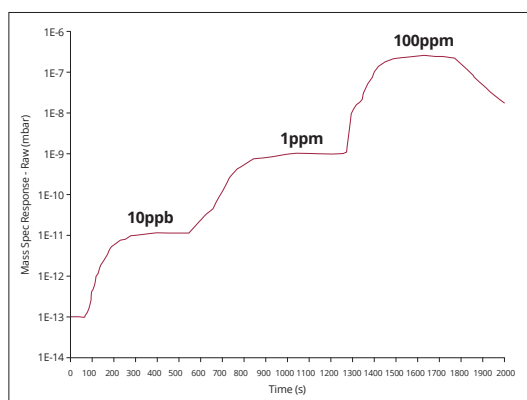


Figure 1: Realtime QGAsoft trace of CS_2 measurement from 10 ppb to 100 ppm

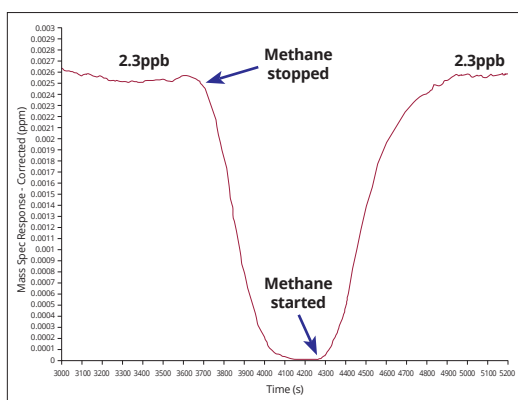


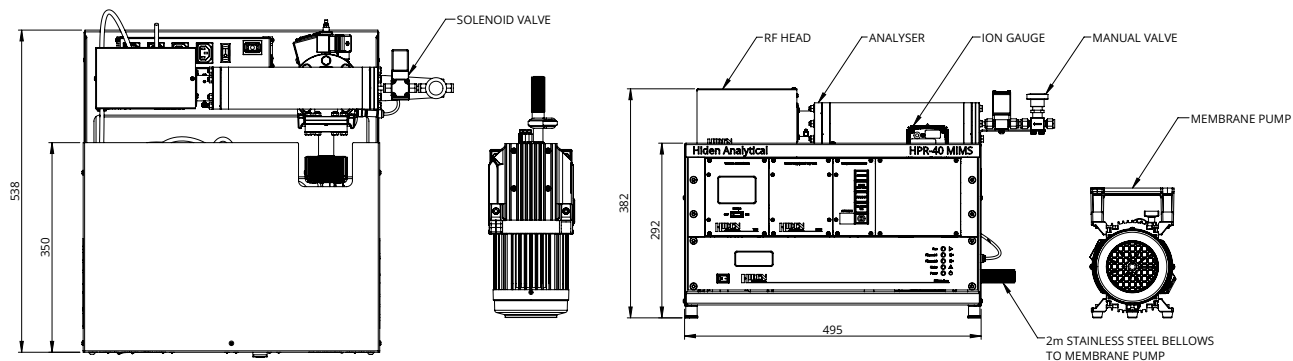
Figure 2: Realtime QGAsoft trace of dissolved methane measurement

Accredited Technology for Groundwater Monitoring

Hidden Analytical's HPR-40 MIMS has been incorporated into a DAkkS-accredited groundwater analysis method operated by Aqua Service Schwerin (AQService Schwerin) in Germany for nitrogen excess (N_2/Ar) measurement. This accreditation confirms that Hidden's membrane inlet mass spectrometry workflow is suitable for routine, regulator-recognised groundwater monitoring, supporting water management, environmental protection and compliance reporting. The HPR-40 MIMS enables continuous, in-situ analysis of dissolved gases including N_2 , Ar , O_2 , CO_2 , CH_4 and N_2O directly in water, providing accurate, reproducible data for applications such as groundwater protection programmes, nitrate and nitrite risk assessment, denitrification studies and early risk detection for drinking water supply. As regulatory requirements for groundwater and raw water monitoring continue to grow in Germany, this milestone highlights the HPR-40 MIMS as a trusted solution for accredited laboratories, water utilities and environmental authorities.



Technical Data



Dimensions in mm

Mass ranges, amu:

1-200 / 1-300 amu

Sensitivity:

100% to 60 ppt (species dependent) subject to spectral interference

Speed:

Up to 1000 measurements/second

Software:

MASsoft Professional

QGAssoft

Windows compatible

Interface:

Ethernet/USB/Serial (RS-232) connections

Detector:

Dual Faraday/electron multiplier detector

External I/O options:

Analogue I/O, Digital I/O, 24 V DC Auxiliary Supply

Dimensions (L x W x H), mm:

495 x 538 x 382 mm

Weight, kg:

Typically 31 kg and external membrane backing pump 7 kg

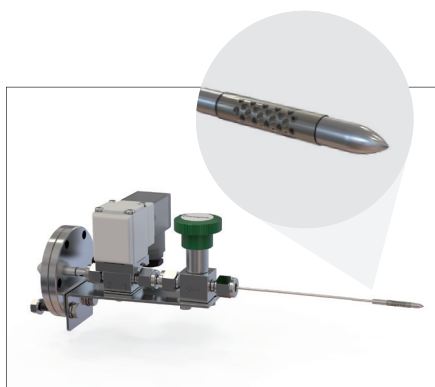
Power requirement:

110/220/240 V AC, 50/60 Hz, 1.2 kVA

System Configuration & Options

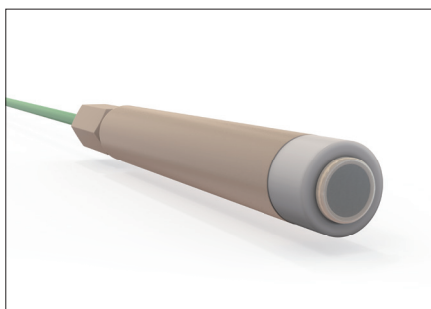
ITEM	DESCRIPTION	PARTCODE
	HPR-40 MIMS SYSTEM	
DSP 1.1	HPR-40 MIMS Membrane Inlet Mass Spectrometer Benchtop System, including Hiden HAL 201 RC quadrupole mass spectrometer with dual Faraday/electron multiplier detector. Mass Range 200 amu.	305200
QC 2.1	Extended Mass Range. 300 amu - 3F Series HAL/3F RC 301 triple filter quadrupole mass spectrometer, system integrated and tested in place of the standard HAL 201 RC, providing 300 amu mass range and enhanced sensitivity for high mass species. Detection limit is application specific.	305021
	SAMPLING INLETS	
GA 3.7.0a	MIMS Probe: Membrane Inlet MS Probe - 500 mm long for analysis of dissolved species in fermentation cultures, soil samples, and general applications where analysis of dissolved species in liquid sample is required.	303416
GA 3.7.0b	MIMS Proximity Probe: Membrane sampling probe, 6 mm OD with 4 mm membrane diameter, approx. 50 mm overall length for ultra-low volume and thin-layer sampling in confined or space-limited setups. Non-metallic.	303418
GA 3.7.1	MIMS MultiStream 4-way: Multi-stream selector, for sampling from up to four reactors, type 303631. Four additional probes are included, item GA 3.7.0a.	303632
GA 3.7.2	MIMS MultiStream 8-way: Multi-stream selector, for sampling from up to eight reactors, type 303641. Eight additional probes are included, item GA 3.7.0a.	303642
	Flow Through Series	
GA 3.7.3f	FT-Standard: Flow through inlet, with liquid connections for continuous analysis of environmental water samples, ideal for ground, sea and wastewater analysis. Includes one probe, item GA 3.7.0a and integrated thermocouple and thermocouple interface.	303420
GA 3.7.3g	FT-High Sensitivity: High sensitivity flow through inlet with liquid flow connections, for wastewater, slurry, solvent and oil analysis, including silicone-incompatible media. Circular carrier including x44 membrane. Integrated thermocouple and thermocouple interface.	303437
GA 3.7.3h	FT-Low Volume: Flow through inlet for low sample volumes requiring high sensitivity analysis suited to vial analysis and denitrification studies. Includes stainless steel U-tube connection for use with liquid N ₂ Dewar for water removal (Dewar not included).	303438
	Gas Sampling Capillary Inlet	
QIC uF-2	Micro-flow Inlet: 2 metre micro-flow capillary inlet, with sample flow rate 12 µl/min, for gas sampling at atmospheric pressure.	303456

Inlet Options



MIMS Probe

Designed for direct, in-situ analysis of static samples where pumping/flow isn't possible, enabling robust, flexible sampling of liquids and slurries (e.g., fermenter liquors) and other heterogeneous matrices across single or multiple sample environments.



MIMS Proximity Probe

Enables ultra-low-volume, thin-layer sampling in confined setups, delivering fast, high-sensitivity surface/interfacial measurements for inline monitoring, kinetics, droplet and biofilm studies.



MIMS MultiStream

Supports multi-point sampling with automatic sequential measurement, enabling high-throughput vial and batch workflows while maintaining consistent, repeatable results.

FLOW THROUGH SERIES



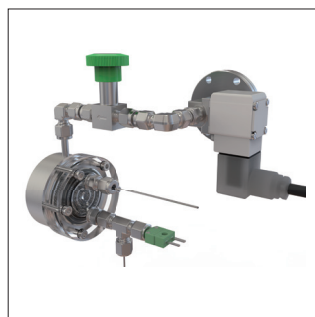
FT-Standard

Flow-through inlet for continuous environmental water analysis, designed for stable routine monitoring across ground, sea, and wastewater samples.



FT-Low Volume

Low-volume inlet delivering high sensitivity with minimal dead volume for improved temporal resolution, ideal for vial analysis, denitrification studies, and dynamic environmental measurements.



FT-High Sensitivity

Flow-through inlet optimised for enhanced analyte transfer in challenging matrices, compatible with alternative membranes for targeted species analysis in wastewater, slurries, solvents, oils, and silicone-incompatible media.

GAS SAMPLING CAPILLARY INLET



Micro-flow Inlet

2 m microflow capillary for atmospheric-pressure gas sampling, providing ~12.5 $\mu\text{L}/\text{min}$ (air) flow with ~16 s response time.

HiddenAPPLICATIONS

Hidden's quadrupole mass spectrometer systems address a broad application range in:

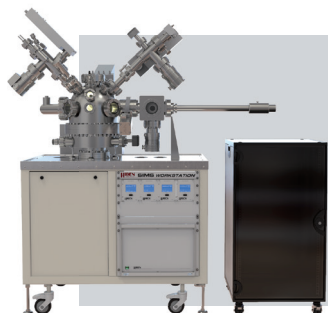
GAS ANALYSIS

- ▶ Dynamic measurement of reaction gas streams
- ▶ Catalysis and thermal analysis
- ▶ Electrochemical analysis
- ▶ Dissolved gas analysis
- ▶ Fermentation, environmental and ecological studies



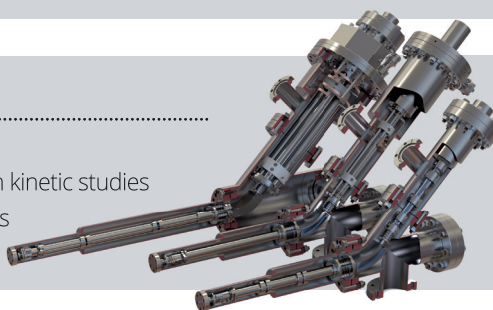
SURFACE ANALYSIS

- ▶ UHV TPD/TDS
- ▶ ToF qSIMS and SIMS analysers
- ▶ End point detection in ion beam etch
- ▶ Elemental imaging – 3D mapping
- ▶ SIMS system with simultaneous dual polarity analysis



PLASMA DIAGNOSTICS

- ▶ Plasma source characterisation
- ▶ Etch and deposition process reaction kinetic studies
- ▶ Analysis of neutral and radical species



VACUUM ANALYSIS

- ▶ Partial pressure measurement and control of process gases
- ▶ Reactive sputter process control
- ▶ Vacuum diagnostics
- ▶ Vacuum coating process monitoring



HIDEN

ANALYTICAL

Hidden Analytical Ltd.
420 Europa Boulevard
Warrington WA5 7UN England

T +44 [0] 1925 445 225
E info@hidden.co.uk
W www.HiddenAnalytical.com



Sales Offices:

We have sales offices situated around the globe. **Visit our website for further information.**