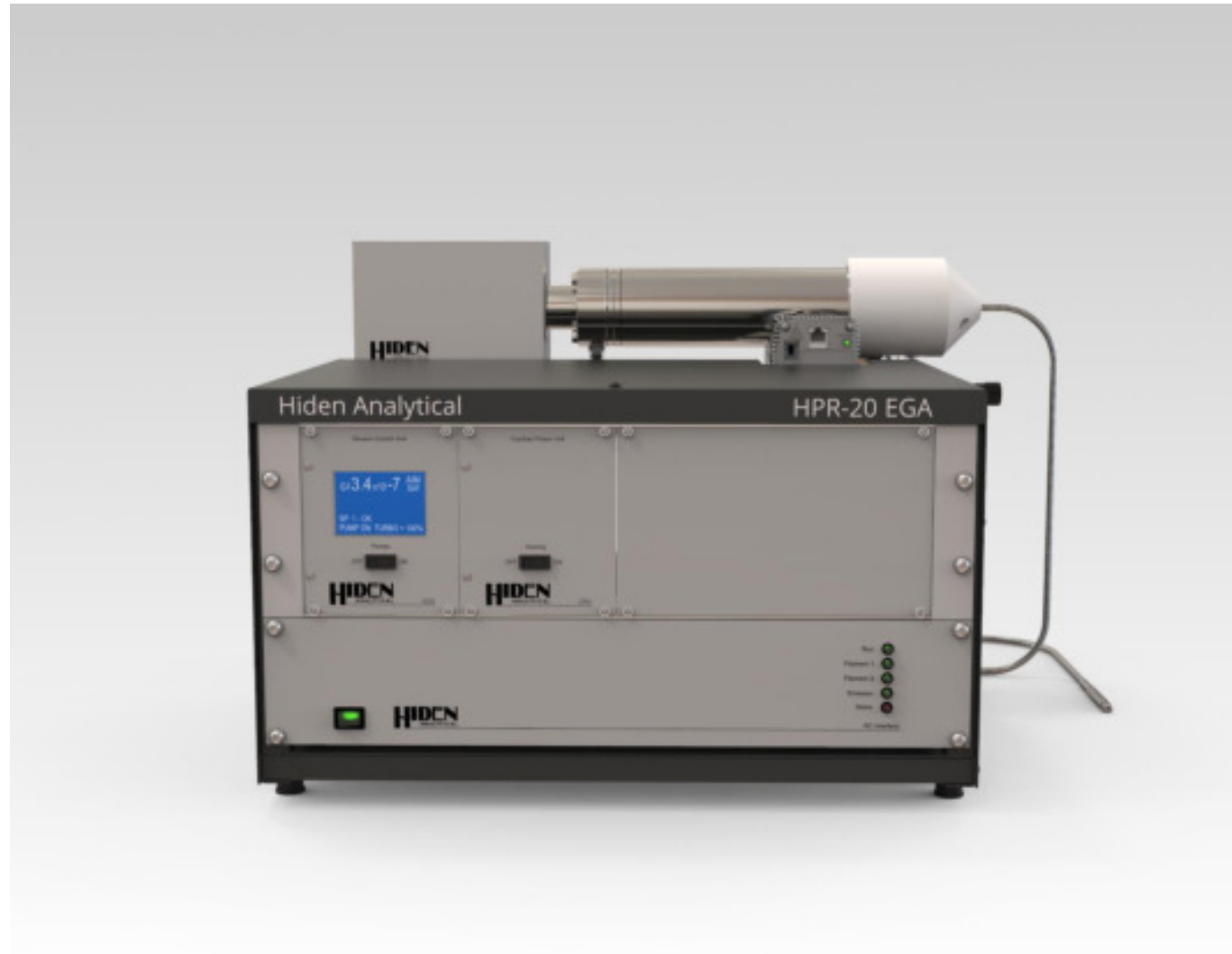


Hidden HPR-20 EGA

for evolved gas analysis in TGA-MS

Quadrupole Mass Spectrometers for Advanced Science



Introduction

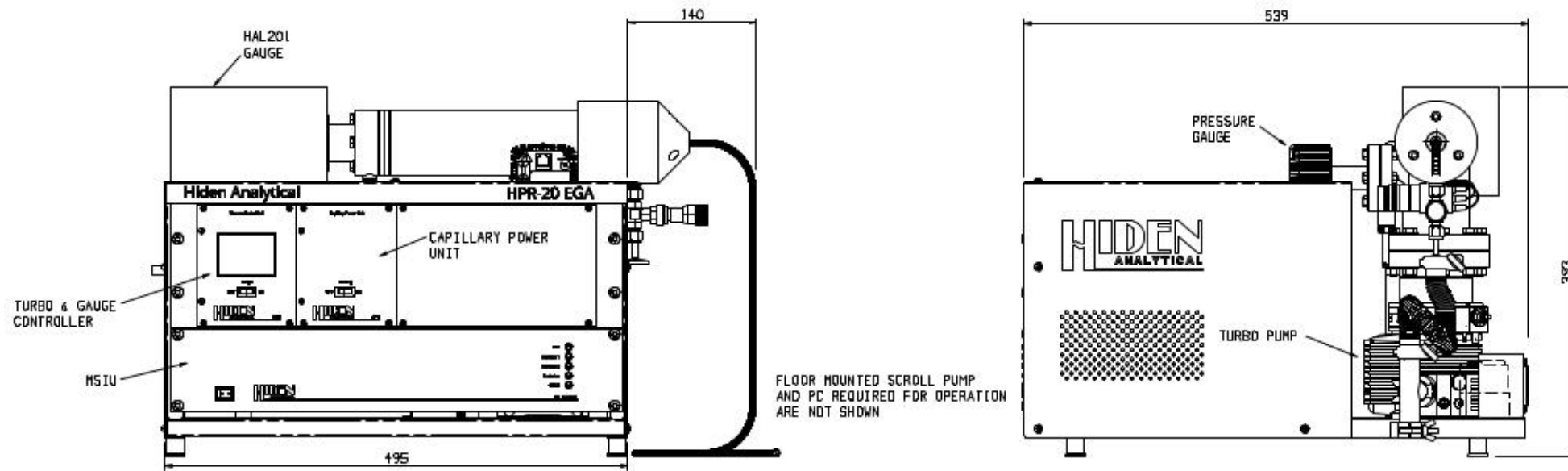
The Hiden HPR-20 EGA is configured for continuous analysis of **gases and vapours** from **thermogravimetric analysers (TGA)**.

Operating to 200°C, the QIC (quartz inert capillary) flexible 2 m capillary inlet provides fast response times of less than 300 ms.

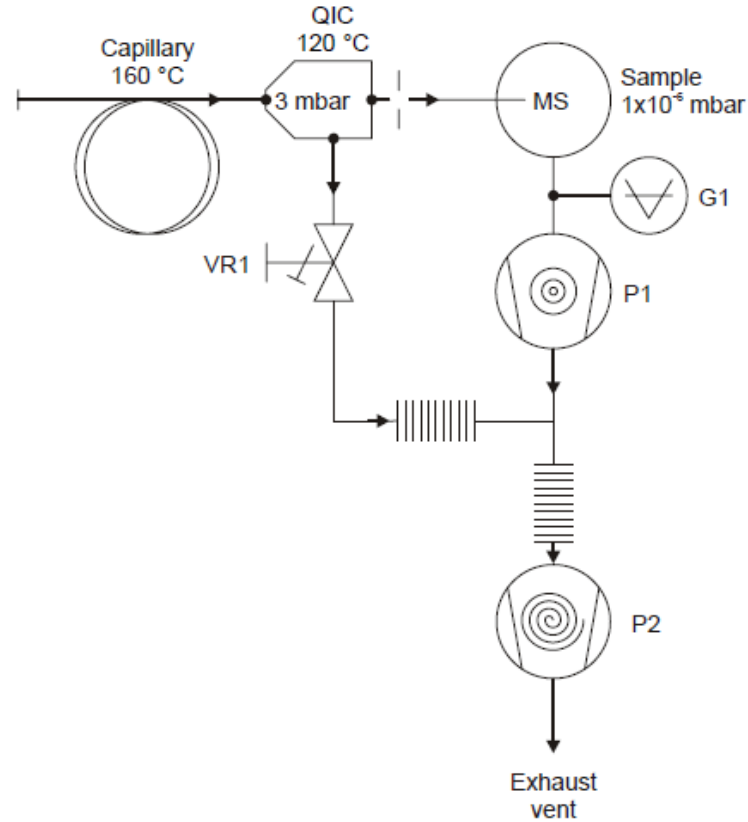
The HPR-20 EGA system has a mass range of 200 amu (300, 510 amu options) and a detection capability from **100% to less than 100 ppb**.

The external scroll pump provides enhanced pumping for light gases.

HPR-20 EGA System Schematic

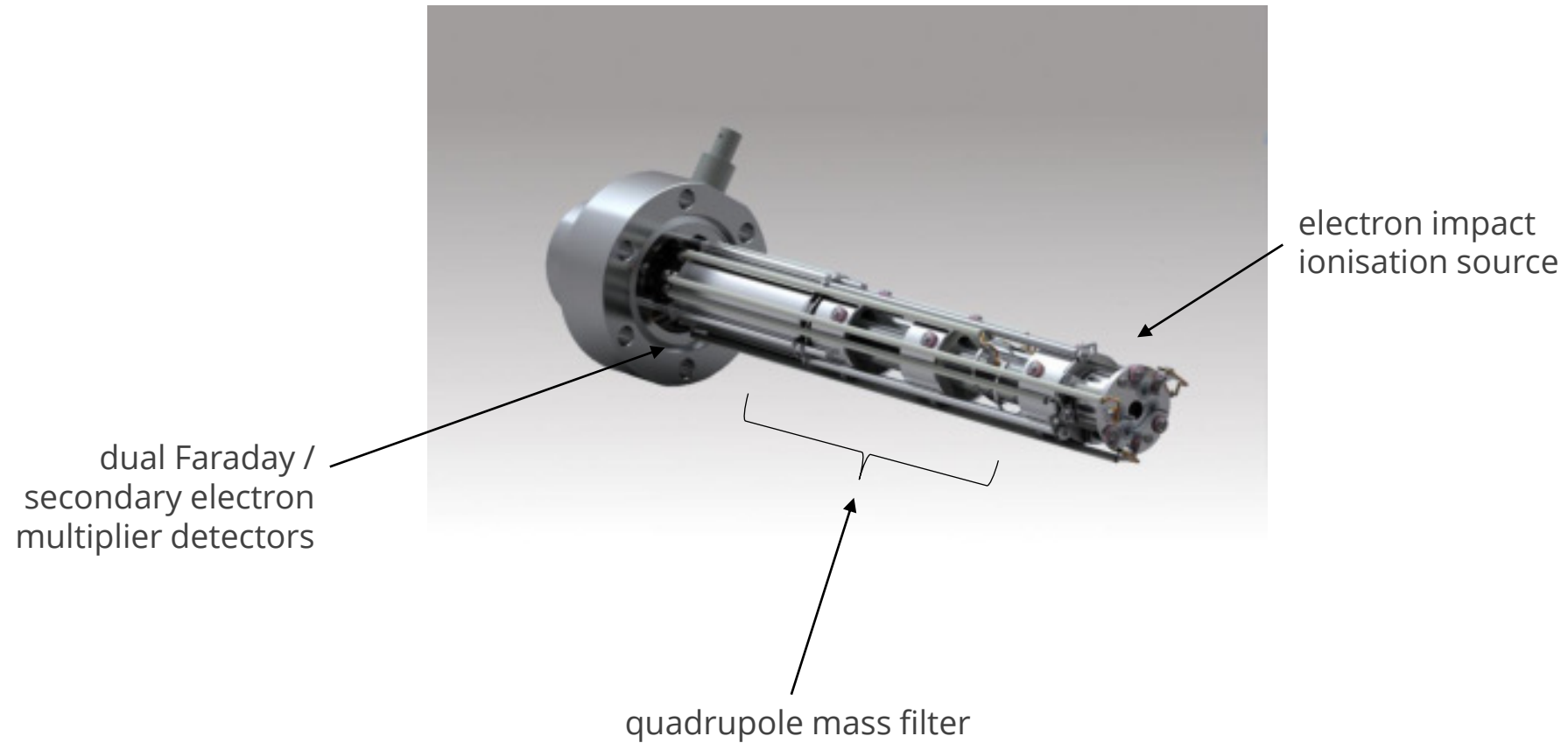


HPR-20 EGA Vacuum Schematic

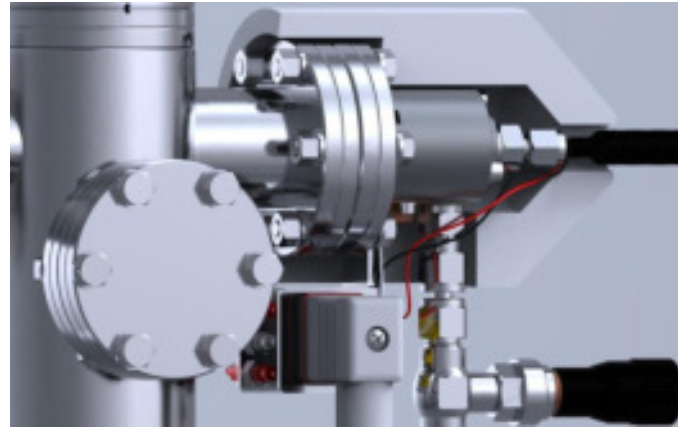


- Key**
G1 Total pressure gauge
VR1 QIC Inlet bypass control valve
P1 60 l/s turbo drag pump
P2 Scroll pump
MS Mass spectrometer vacuum chamber

HPR-20 EGA Mass Spectrometer

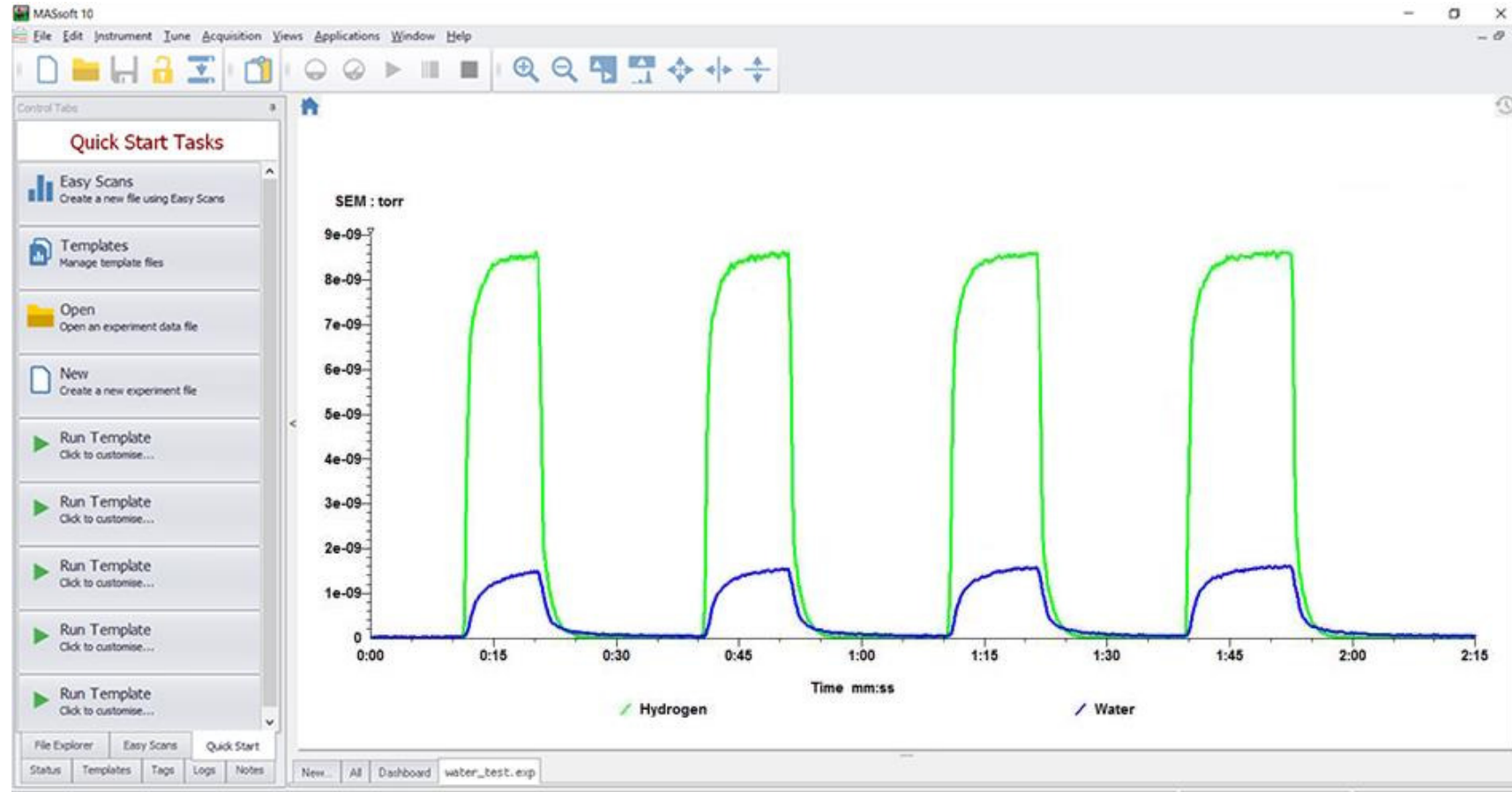


QIC Inlet Technology



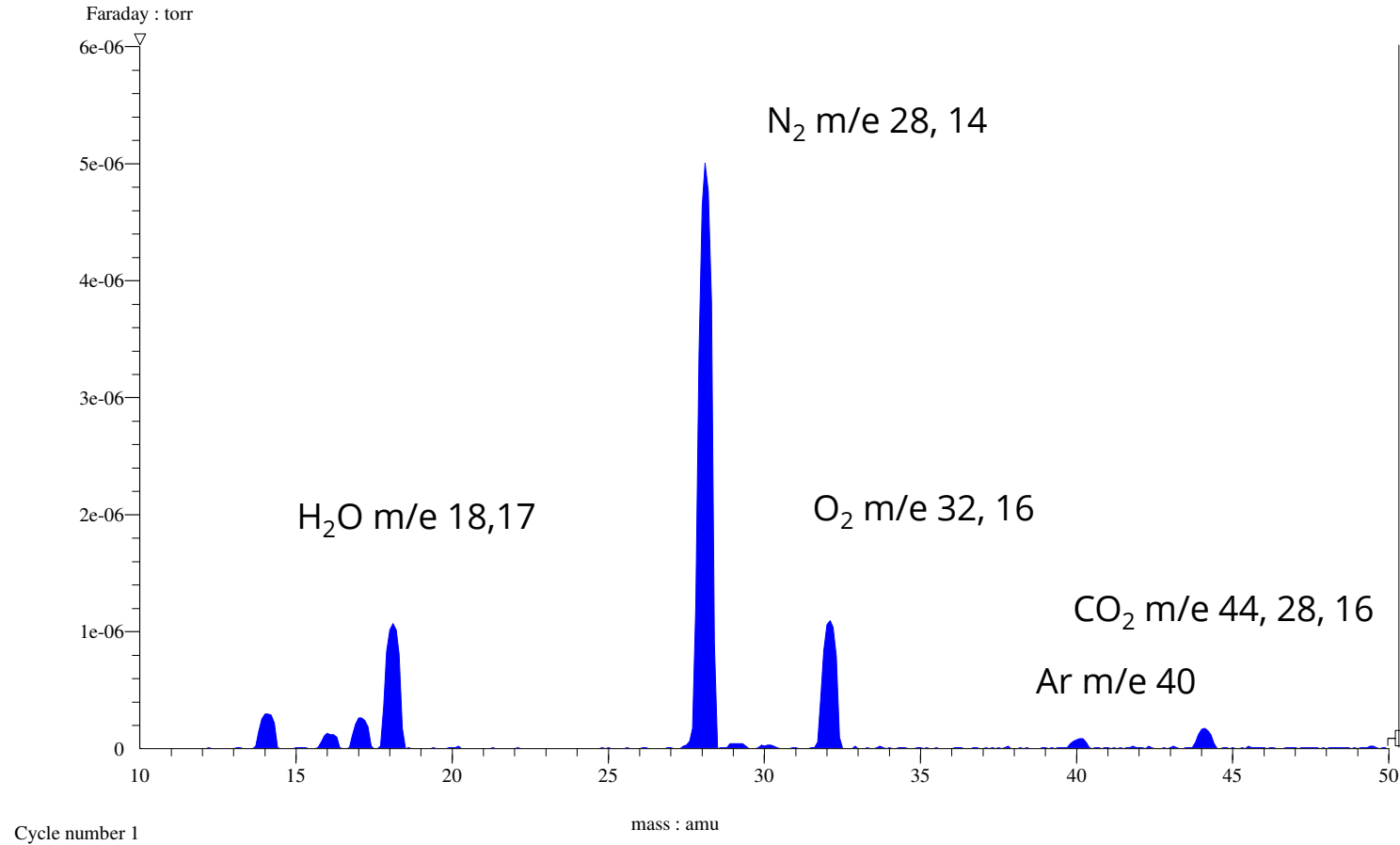
- | | | |
|--------------------------------------|---|--------------------------------|
| Quartz and Platinum Wetted Surfaces | → | No memory effects |
| Heated Capillary | → | No condensation effects |
| Flow Matched | → | Optimum response / recovery |
| Minimal Internal Volume | → | PPB detection |
| Interchangeable Sampling Capillaries | → | Analysis from 10 mbar to 2 Bar |

Fast Response to Permanent Gases / Vapours



Data shows the response of a HPR-20 system to gas and vapour during switching between a dry He stream and a wet H₂ and Ar flow. For clarity, only the H₂ and H₂O data is shown in the graph.

Typical Mass Spectrum of Air



Note: Different species can have the same mass e.g. CO, N₂ m/e 28

Soft Ionisation

Unique to Hiden gas analysis systems, soft ionisation allows users to selectively ionise different gases by setting the ionisation energy for a particular mass.

This powerful technique can simplify the analysis of otherwise complex cracking patterns from multi-component gas/vapour mixtures.

The ionisation energy can be altered from 4 to 150 eV, in 0.1 eV increments. Standard operation is at 70 eV.

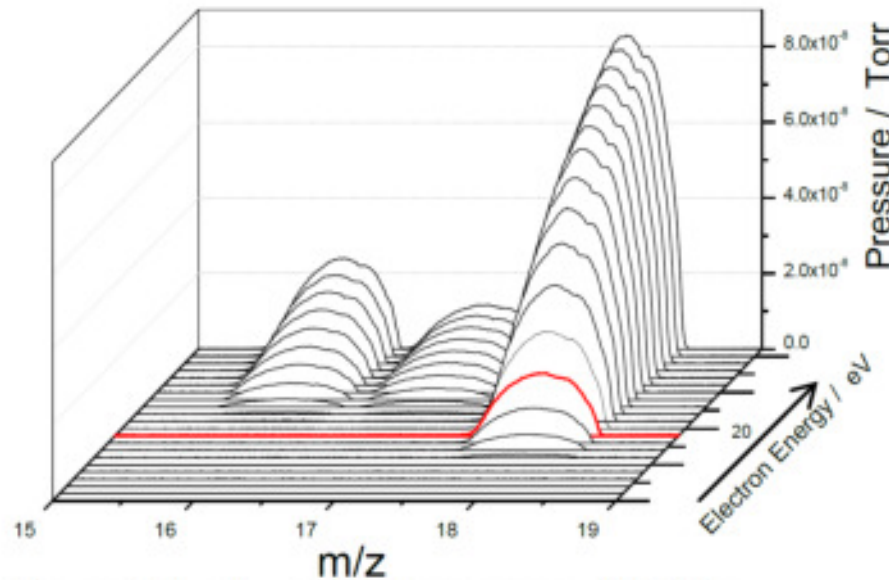


Figure 1 A: m/z vs Electron energy-H₂O/Air

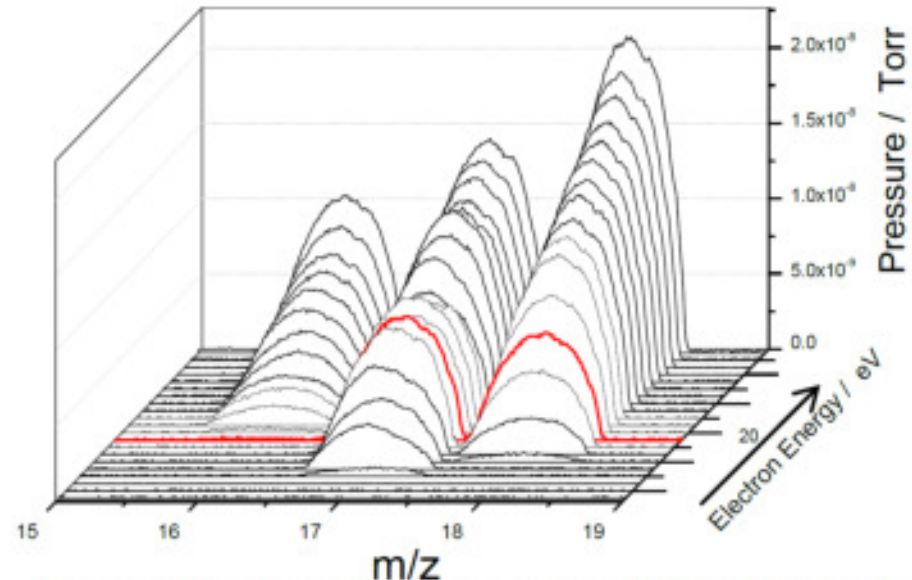
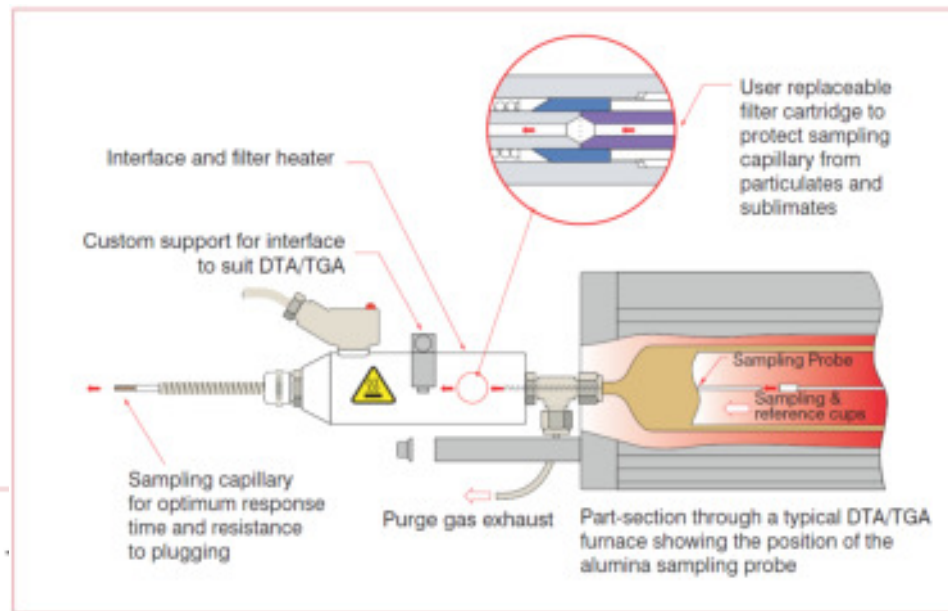


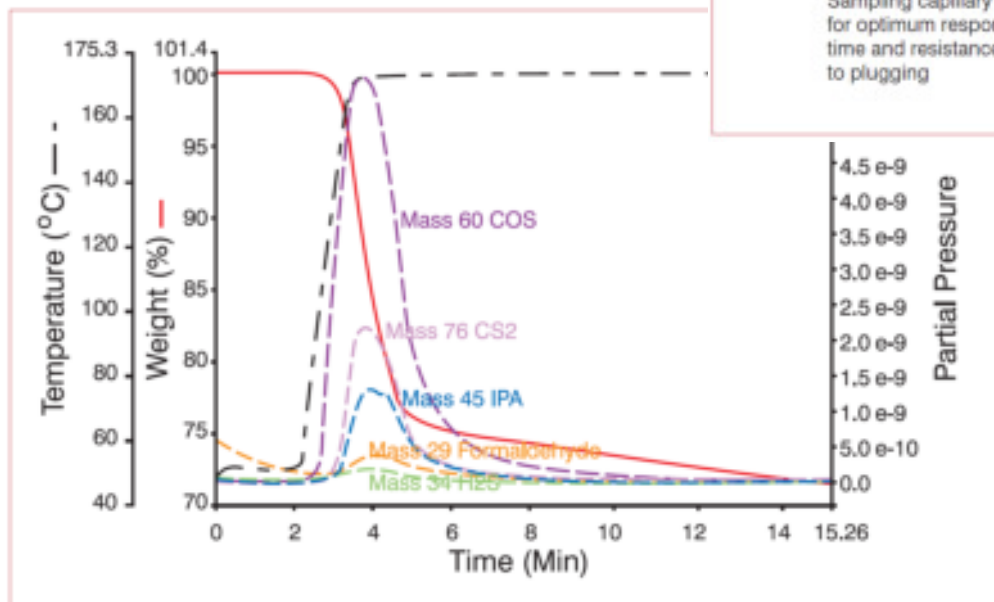
Figure 1 B: m/z vs Electron energy-NH₃/H₂O/Air mix

Thermal Analysis Mass Spectrometry

Fast response, low dead volume custom engineered interfaces for most TGA/STA systems.



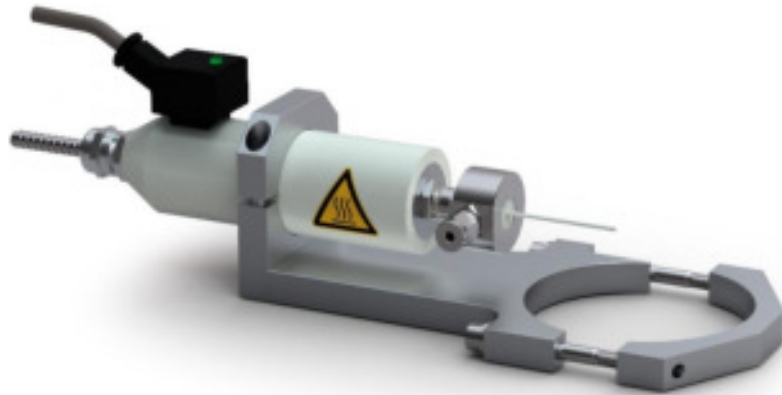
Typical TGA Inlet



TGA-MS data

TGA-MS

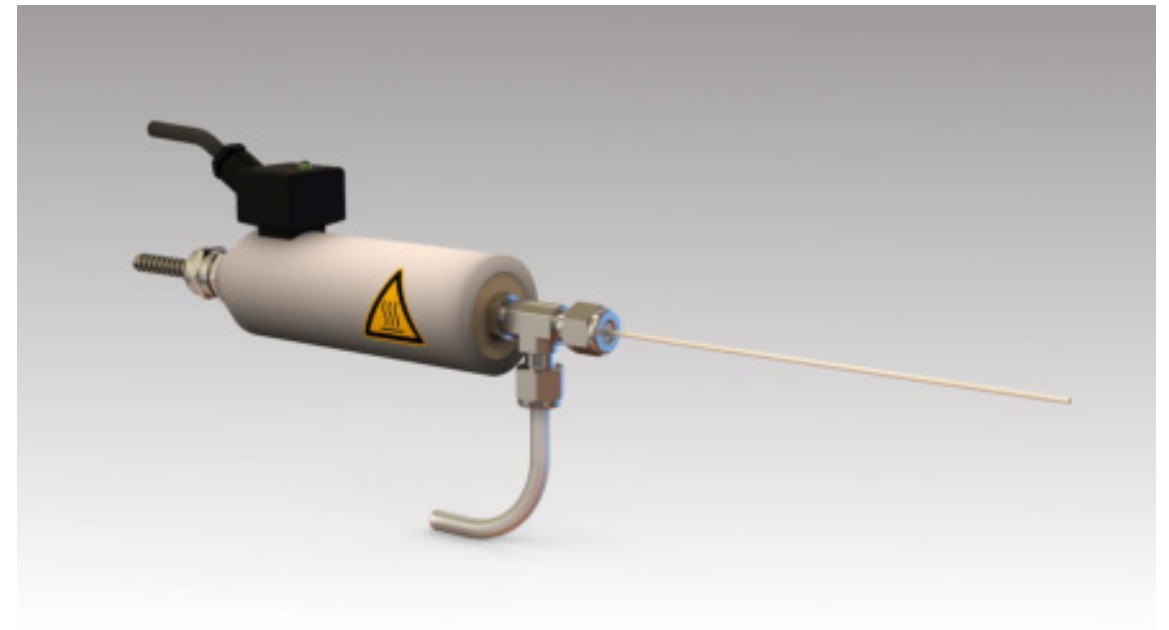
MS Inlets for Coupling to TGA Systems



A wide range of custom engineered interfaces are available to suit most TGA instruments.

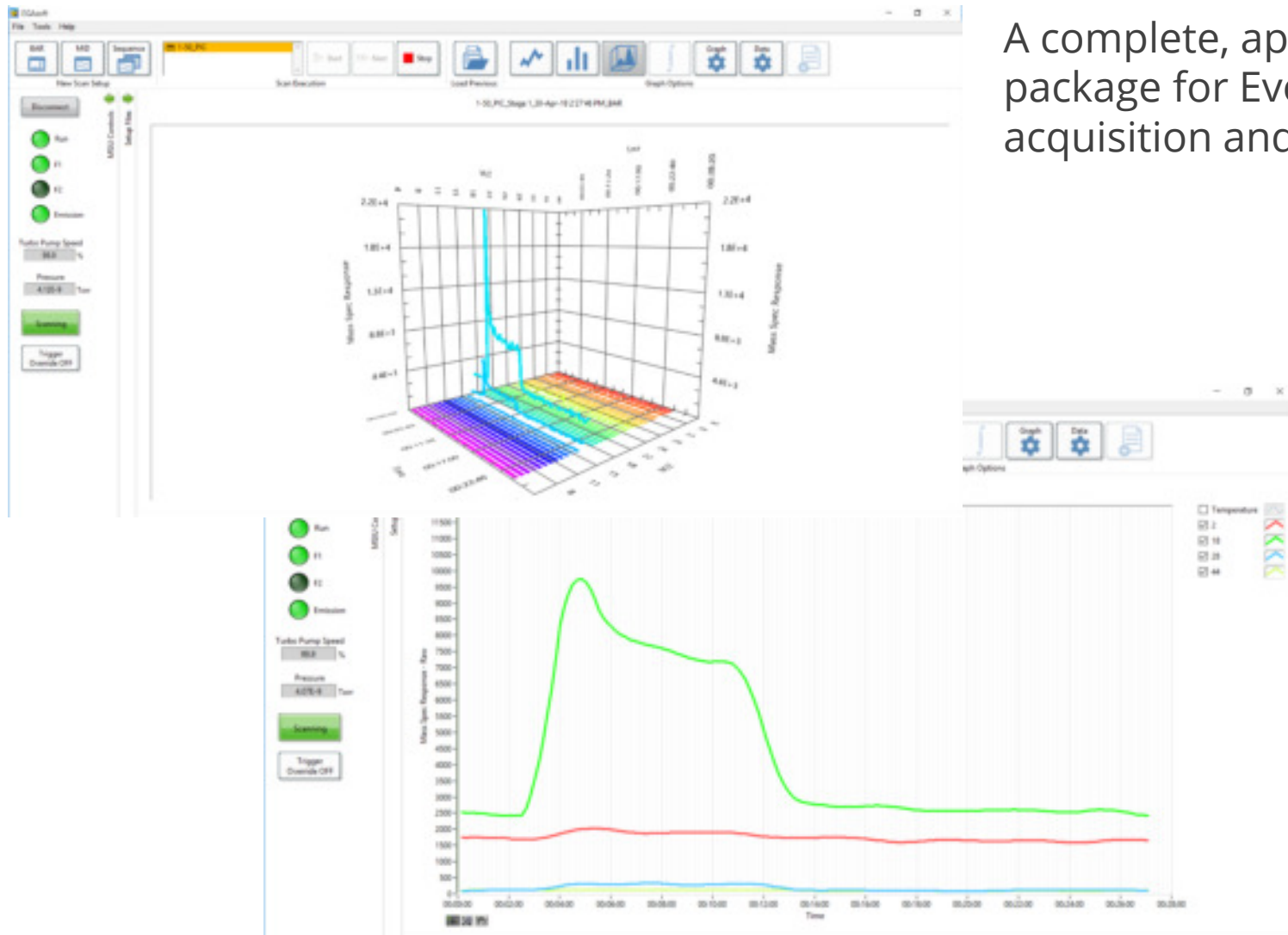
Features:

- Minimum dead volume
- Controllably heated sample inlet – no cold spots
- Inert materials



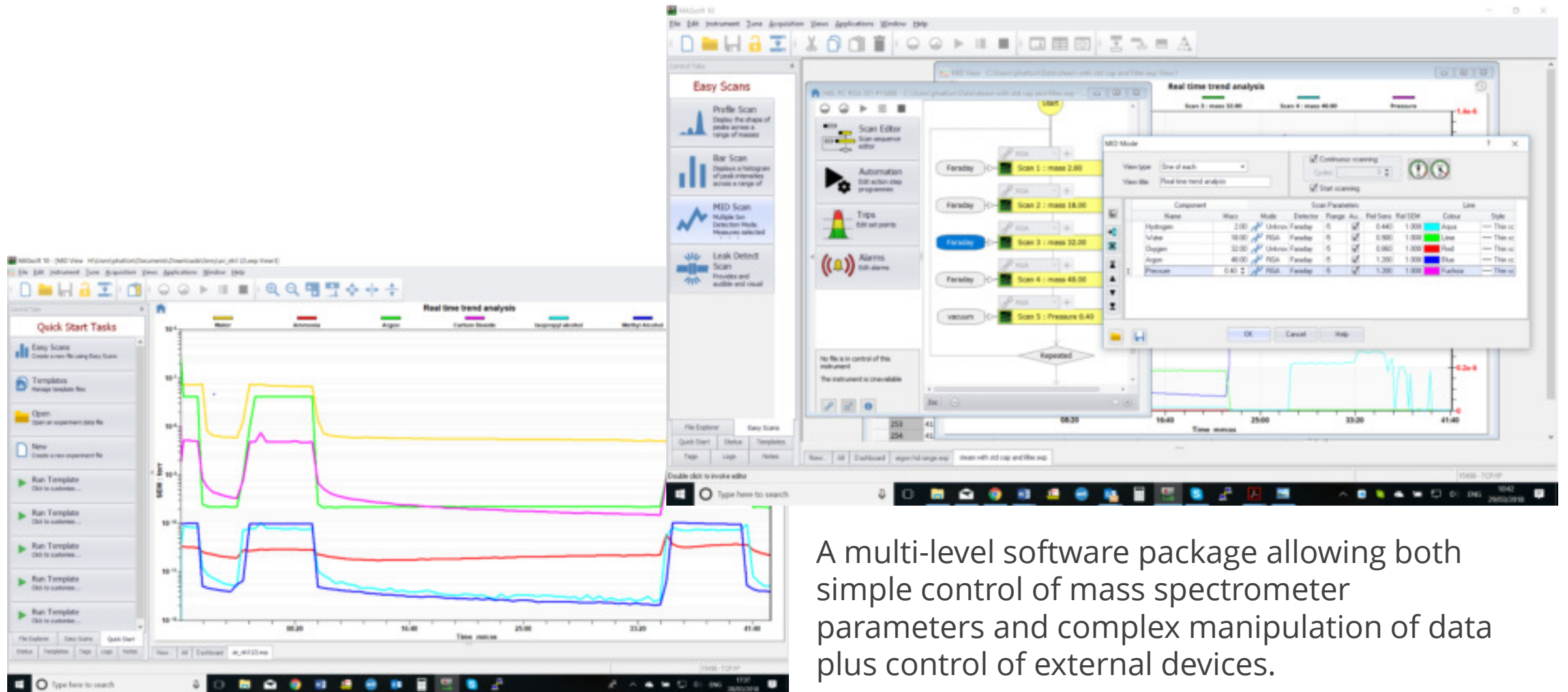
EGAsoft Software for Evolved Gas Analysis

A complete, application specific, software package for Evolved Gas Analysis data acquisition and analysis.



- 3D bar scan view for easy determination of trends in bar data
- Simple automatic export in formats specific for import to any TGA/STA manufacturer
- Automatic spectral deconvolution in MID mode
- Automatic start/stop facility
- Auto-sequencing of MS data acquisition files e.g. for use with auto samplers
- Peak integration and data analysis routines

MASsoft Professional control software



A multi-level software package allowing both simple control of mass spectrometer parameters and complex manipulation of data plus control of external devices.

Hidden HPR-20 Users

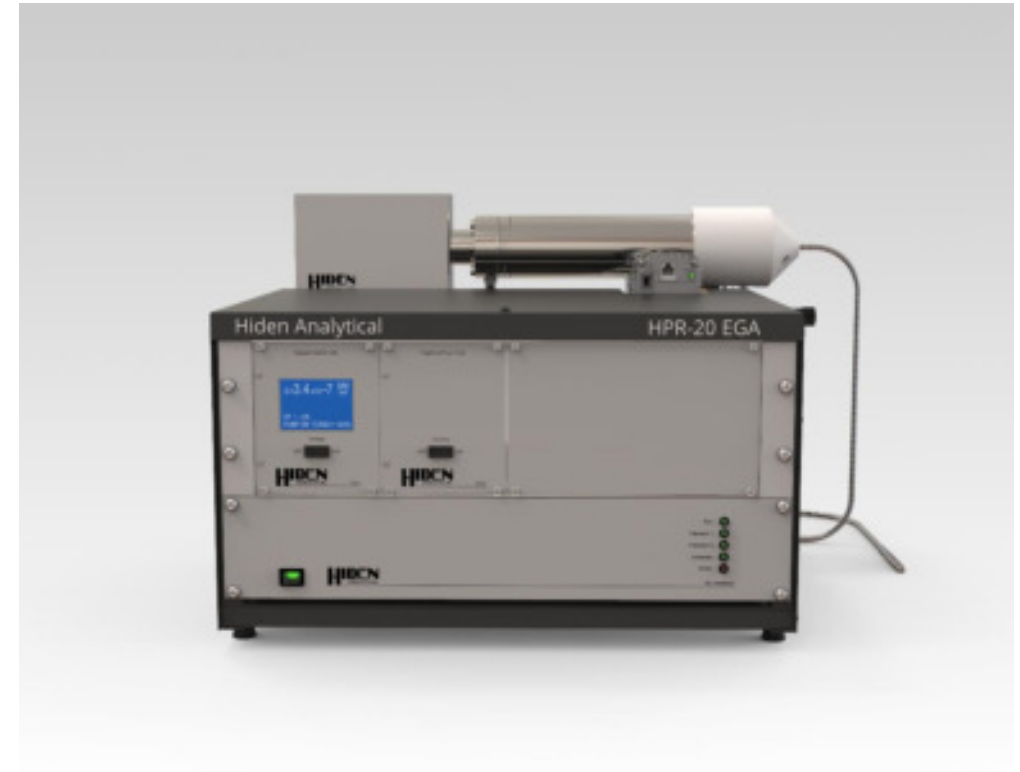


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University of Queensland
BASF
Seoul National University
Suzuki
University of Cambridge
Beijing Institute of Technology
Samsung
ETH Zürich
KAUST
Durham University
Siemens
Shell



Summary

- Bench-top quadrupole mass spectrometer gas analysis system configured for continuous analysis of gases and vapours from thermogravimetric analysers (TGA).
- Real-time, multi-species analysis – 100 PPB to 100%
- Fast response to permanent gases and vapours – less than 300 ms response time
- Soft ionisation for reduced spectral fragmentation and simplified data interpretation





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