

★ ★ ★ Astronomic Dimensions in Mass Spectrometry ★ ★ ★

AMD QuAS³AR



Innovation in Analytical Instrumentation

The AMD QuAS³AR is designed to meet the demanding challenges and applications for mass spectrometry in Life Sciences, Environmental Analyses, Chemical Research and other Areas

The future orientated AMD QuAS³AR mass spectrometer combines all advantages of magnetic sector, time of flight and quadrupole technologies resulting in an unmatched summation of success parameters: Quality of Analyses, Sensitivity, Speed, Specificity, Accuracy, Resolving power = QuAS³AR

A unique combination of ionization techniques results in outstanding features including GC/MS, LC/MS and CE/MS methodologies

Configurations:

- Dedicated GC/MS with unique in-axis EI and CI sources for simultaneous recording of fragment ions and quasi-molecular ions or rapid switching between the ionization techniques
- Dedicated LC/MS with unique in-axis API (ESI/APCI) and EI sources
- Dual Chromatography GC/LC/MS for alternating analyses in both chromatography modes
- Multi Purpose Systems according to customer demands incorporating additional modules as DEI, DIP, DCI, Liquid SIMS (FAB), FI/FD techniques

Features:

- Electric recording of mass spectra covering 1.2 mass decades by simultaneous multi channel scanning
- Fast scan speed achieving up to 30 spectra per sec for full scan
- Accurate mass measurements better than 5 ppm at dynamic working resolution (6000 FWHM)
- Outstanding long term stability of external calibration and use of one lock mass for full mass range
- Large dynamic range and drastically improved specificity for quantitative SIM analyses

Technology:

- A compact double focusing magnetic sector analyzer applying Mattauch-Herzog ion optical geometry
- Focal plane for the detection of highly resolved ions in a wide mass range at constant magnetic field
- Unique AMD QuAS³AR technology using parallel multi channel detection system
- Latest digital hardware technology for data acquisition and processing and sophisticated software

The Innovators in Magnetic Sector Mass Spectrometry

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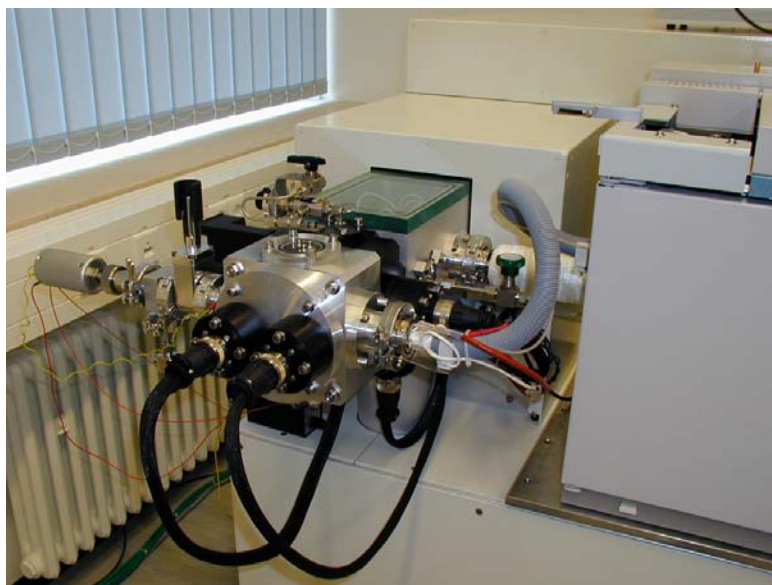
AMD QuAS³AR

Modular Multi Application High Resolution Mass Spectrometer

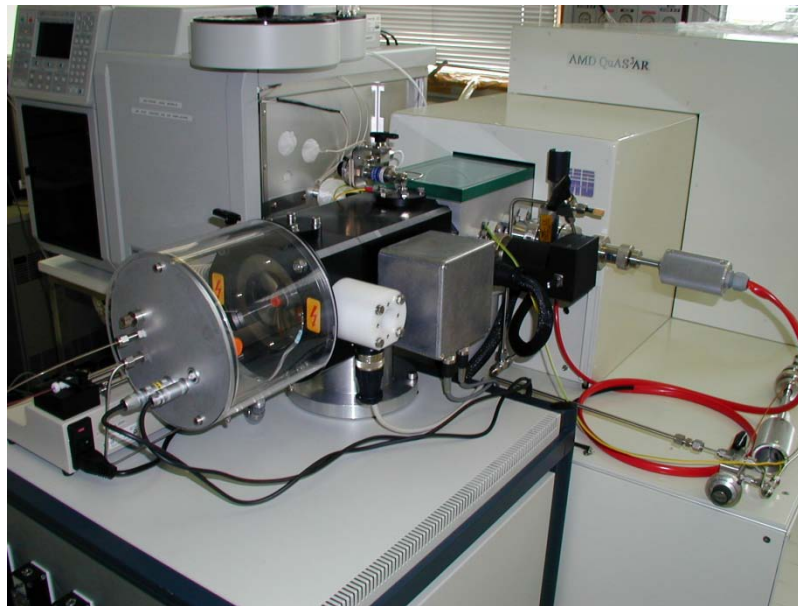
Description of a unique System



GC/MS Configuration with EI ion source and DIP/DEI sample introduction



GC/MS Configuration with Dual EI/CI Ionization module



GC/LC/MS Configuration with EI/CI/ESI Ionization module

Module	Description
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Basic System

QuAS³AR	<p>Double focusing magnetic sector mass spectrometer of the new AMD compact class in special EB configuration</p> <p>Integrated system electronics for bipolar mode</p> <p>Universal ion source housing for different ionization techniques, sample inlet systems and coupling with a choice of peripheral chromatographic systems</p> <p>Turbo molecular pumping system, vacuum control unit with safety circuitry</p>
Detector	Single channel detector for largest deflection radius with post-acceleration and SEM
Multichannel	AMD QuAS³AR Detector Technology with Multi-Exit slit arrangement, post-acceleration, simultaneous multi-channel ion detection system
EI	High Intensity EI-ion source
Reference	Reference inlet system , 250 °C, regulation valve, injection volume

Module Description

Control **Multi-Tasking Instrument-Control-System (AMD MICS)** for processor control of system functions incl. all parameters for ion sources, analyzer, detector and sample introduction systems.

Data System **AMD Data system** (version 2012) for simultaneous data acquisition and data processing

Dual-Processor PC, state of the art technology, Windows™ operating system, large TFT-flat screen monitor, LaserJet Printer

Acquisition and real time display system with digital IO, digital multi satellite communication interface and A/D-D/A satellites for simultaneous V/E scans in multi spectral ranges, resulting in a full mass range spectrum based on unique **AMD QuAS³AR Technology**

Raw data and peak **centroid data** acquisition in all LR and HR scan modes

Exact mass determinations in single channel, multi channel V/E- and B-scan modes

Raw data accumulation, spectra averaging and ion chromatography for LR,HR and Selected Ion Monitoring (SIM)

Options Data System and Scan Techniques

Evaluation **AMD NetCDF Writer**, conversion of files in CDF Format for evaluation of data by off-line programs according to customers choice

Determination of elemental compositions and isotopic distributions

Quantification from ion chromatography data in SIM and scan series modes

NIST **NIST** data base and library search interface

Batch **Control of automatic injection** (batch analyses) in scan and SIM modes (GC or LC with auto sampler required)

Decon **Deconvolution program** for determination of molecular weights from multiple charged ions in **ESI** mode

Module **Description****Options Sample Introduction and Ionization Techniques**

DIP	Direct Inlet System Software controlled direct inlet system (DIP) with high vacuum lock and insertion probe, gas cooled crucible mounting, temperature range from 18°C - 350°C (low temperature cooling possible)
CI-Standard	CI device CI-Ionization box movable into EI ion source via DIP inlet port for GC/MS and CI/DCI operation , shut-off and regulation valve for reagent gas
DEI/DCI	DEI/DCI sample introduction Software controlled DCI/DEI inlet probe for the direct analysis of thermo labile/polar substances, temperature range from 20°C -1000 °C
GC-MS	GC-MS Interface , Temperature up to 280 °C
GC	Gas Chromatograph (customer choice) with split/split-less injector
API-UDIC	API interface in AMD UDIC (Unique Dual Ionization Configuration) „in-axis“ configuration for alternating or simultaneous recording of ions from EI and API ion sources, API housing with counter-electrode, corona needle for calibration and testing, nozzle, lens, skimmer stage with fore pump, ion guide quadrupole with turbo pump
ESI	Electrospray-Ionization (ESI) Module for LC/MS Coupling and Direct Infusion, flow rates 5 - 100 µl/min, split for higher flow rates

Optional configurations

GC/LC/MS	Dual Chromatography GC/LC/MS Configuration structure which allows alternating analyses (injections) in GC/MS or LC/MS modes without system modifications
Transfer	AMD UDIC ion optics (Unique Dual Ionization Configuration) with AMD MICS extension in special „in-axis“ configuration for two ionization modes. Alternatively: API, LSIMS, extended CI/DCI or FD/FI form with the standard EI source a system for simultaneous or alternating recording of ions from two independent ion sources.
CI-UDIC	CI-UDIC Ion source (Module “Transfer” required). Flange with EI ion source structure, AMD MICS extension, movable CI ionization volume, shut-off and regulation valve for reagent gas, high vacuum lock, special “in axis” configuration (with transfer ion optics) for simultaneous or alternating recording of ions from CI/DCI and standard EI ion source

AMD QuAS³AR Performance Specifications:

- 1 Analyzer:** **Magnetic sector analyzer** system in double focusing **EB** configuration for **multichannel parallel ion recording**
- 2 Resolution:** **Point detector** at largest magnetic deflection radius:
300 - 10000 (10 % valley) or 600 - 20000 (FWHM)

Multi channel mode
300 - 3000 (10 % valley) or 600 - 6000 (FWHM)
- 3 Mass range:** 1 - 2,000 Dalton at 6 kV accelerating voltage
2 - 4,000 Dalton at 3 kV accelerating voltage
- 4 Scan range:** **B-scan:** full mass range
V/E-scan in multi channel mode: 1.2 mass decade selectable (e.g. 50 – 800 or 100 – 1600 u)
- 5 Scan speed:** **B-scan:** 0.5 sec/mass decade (cycle time 0.8 sec)

V/E-scan in multi channel mode: 30 msec/1.2 mass decade (cycle time 40 msec)
- 6 Sensitivity:** **5 - 10 picogram** injected on a capillary column result in substance specific mass spectra for standard samples in **GC/MS** EI-mode (identifiable by library search) and in CI mode (quasi molecular ion)

SIM Techniques:

Substance quantitation for standard sample concentrations in the range of **2–5 picogram/μl** in **GC/MS-EICI** mode, (**femto-gram range** at low chemical noise level possible)

100 picogram Reserpine in flow injection **ESI-mode** yield a signal to noise ratio S/N > 100:1 for the protonated molecular ion
- 7 Accuracy of mass determination:** **Computer aided accurate mass determination** (short range V/E-Scan):
2 - 5 ppm at R=3000 (10% valley)

B-Scan mode: precision and accuracy of masses in the range of **0.5 – 2.0 mmu**, averaging of at least 5 spectra (scan speed: 1,0 sec/dec, R = 3000 (10% valley), mass range 70-600 u (100 ions per peak required))

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