Technical Data

PlasmaQuant MS Series
ICP-MS

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Version: 7.0
en · 09/2026
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General

- Compact, benchtop inductively coupled plasma mass spectrometer (ICP-MS)
  - ➔ *with full PC control of all instrument settings and compatible accessories*
- Features patented 90-degree reflecting ion optics system for superior sensitivity
- Innovative RF generator design lowers operating costs, significantly reduced amount of argon plasma gas

Models

PlasmaQuant MS	**PlasmaQuant MS Q**	**PlasmaQuant MS Elite S**	**PlasmaQuant MS Elite**
For sensitive and robust analysis of high matrix samples	For sensitive and robust high throughput analysis	High sensitivity and flexibility for efficient analysis	Ultimate sensitivity for targeted research applications
Sensitivity (Mcps/ppm)	Sensitivity (Mcps/ppm)	Sensitivity (Mcps/ppm)	Sensitivity (Mcps/ppm)
^{7}Li ▪ 65	▪ 100	▪ 150	▪ 250
^{9}Be ▪ 20	▪ 25	▪ 35	▪ 50
^{59}Co ▪ 400	▪ 600	▪ 800	▪ 1000
^{115}In ▪ 500	▪ 800	▪ 1100	▪ 1500
^{208}Pb ▪ 225	▪ 315	▪ 450	▪ 580
^{232}Th ▪ 300	▪ 500	▪ 700	▪ 1000
^{238}U ▪ 300	▪ 500	▪ 700	▪ 1000
BG at 5 amu <0.5 cps	BG at 5 amu <0.7 cps	BG at 5 amu <0.7 cps	BG at 5 amu <1 cps <0.06 %RSD (^{10}B/^{11}B) <0.01 %RSD (^{87}Sr/^{86}Sr) <0.02 %RSD (^{206}Pb/^{207}Pb) <0.07 %RSD (^{235}U/^{238}U)
Detection Limit (ng/L)[1]	Detection Limit (ng/L)[1]	Detection Limit (ng/L)[1]	Detection Limit (ng/L)[1]
^{9}Be ▪ 1.2	▪ 0.8	▪ 0.5	▪ 0.4
^{59}Co ▪ 0.2	▪ 0.1	▪ 0.09	▪ 0.07
^{115}In ▪ 0.03	▪ 0.02	▪ 0.01	▪ 0.01
^{209}Bi ▪ 0.03	▪ 0.02	▪ 0.01	▪ 0.01
^{238}U ▪ 0.02	▪ 0.009	▪ 0.006	▪ 0.005
▪ Plasma performance : CeO^{+}/Ce^{+} <2%, Ba^{++}/Ba^{+} <3%			
▪ Precision: < 3% (20 min), < 4% (240 min)			
▪ Isotope ratio precision: ^{107}Ag/^{109}Ag < 0.07 % RSD			

[1] *The table shows instrumental limits of detection calculated from ten consecutive blank measurements and sensitivity. Limits of detection are subject to many variables such as lab conditions, grade of chemicals etc.*

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Hardware

Sample introduction

Peristaltic pump	4 independent channels, pressure adjustable, variable pump speed 0-100 rpm
Nebulizer	Low flow glass concentric nebulizer – 400 µL/min
Spray chamber	Double pass Scott-type spray chamber, Peltier-cooled with variable temperature room to -15 °C
Torch	One-piece low-flow torch with 2.4 mm id injector, optional torch with 1.5 mm and 0.8 mm id injector
Inert kits	PFA sample introduction kits for low contamination during ultra-trace analysis and for use with hydrofluoric acid samples, semi-demountable torch with sapphire or platinum injector
Organic kits	Organics and volatile organics sample introduction kits including one-piece torch with 1.5 mm and 0.8 mm id injector and solvent resistant pump tubing

Plasma gas control

Gases	3 plasma gases – plasma, auxiliary and nebulizer gas
Control	Plasma and auxiliary gas – sapphire jets, nebulizer gas – MFC controlled
Optional gas flows	Sheath gas flow for aerosol dilution, MFC controlled Nitrox – additional oxygen or nitrogen added to auxiliary gas, MFC controlled

RF generator

Type	Solid-state RF generator, virtually center grounded
Specification	27 MHz, 300 V RMS
Power range	300 to 1600 W, in 10 W increments, no plasma shield

Plasma

Control	Automatic ignition and shutdown, user-customizable ignition sequence for different accessories and plasma types
Alignment	Automatic alignment of plasma position (X, Y and Z) for maximum sensitivity and minimum polyatomic interferences
Gas requirements	Argon min. quality 4.6 (99.996%)
Gas consumption	7.5 -10,5L/min plasma gas, 0,85-1,85 L/min Auxillary gas, 1 L/min nebulizer gas
Cold plasma	Fast switching from hot to cool plasma in one method reduces plasma based spectroscopic interferences for lowest detection limits
Maintenance	Spacious plasma compartment for easy access and simplified routine maintenance

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Plasma interface

Type	ICP-MS interface using sampler and skimmer cone
Specification	Sampler cone orifice 1.1 mm, skimmer cone orifice 0.5 mm
Material	High-performance nickel cones as standard, optional high-performance platinum tip cones
Cooling	Water-cooled for stability including individual and independent cooling of the cones for faster warm-up, improved stability, and faster cool down
Maintenance	Easy access and removal of sampler and skimmer cone from simple threaded mounts

Interference management

Type	Integrated Collision Reaction Cell technology (iCRC)
Gas requirements	Hydrogen and helium, min. quality 4.6 (99.996%), Hydrogen generator possible to use for supply
Control	Accurate control by mass flow controllers
Principle	Injects collision and reaction gases into the plasma as it passes through the orifice of the cones
Feature	BOOST technology increases ion transmission in iCRC reaction gas mode by applying a positive voltage to the skimmer cone
Gas switching	Rapid switchover between gas on and gas off, or between different collision and reaction gases, switching times between the gas modes 3 seconds or less

Ion optics

Type	90 degrees, reflecting ion optics system
Lenses	Set of 3 extraction lenses to focus and shape ion beam, segmented ion mirror with 4 segments (3 user accessible for optimization)
Focusing of analyte ions	▪ Patented ion mirror for three-dimensional focusing of analyte ions by parabolic electrostatic field to aperture of mass analyzer (quadrupole) ▪ Photons and neutrals pass through to the vacuum system
Optimization	Auto-optimization of all ion optics settings, including ion mirror, based on selected optimization criteria such as signal and interferences
Maintenance	Ion mirror incl. extraction lens 3 is maintenance free, easy access to extraction lens 1 and 2 for cleaning without breaking the vacuum

HD Quadrupole

RF frequency	3.0 MHz
Mass range	3–260 amu with 'zero blast' protection
Resolution	0.5-1.2 amu, adjustable (AMR version: for m/z >230 amu resolution >2 amu)
Scan speed	5115 amu/s
Dwell time	min. 50 µs

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Mass calibration stability	0.05 amu per day
Channels per mass	Built-in, on-board multi-channel scaler provides up to 40 channels per mass
Technical specifications	▪ Precision-machined, stainless steel, round rods manufactured to micrometer tolerances and locked into ceramic mounts for a near-perfect hyperbolic field. ▪ Stainless steel construction permits determination of Hg without high memory. ▪ Patented curved entrance rods provide a double off-axis design and low background signal. ▪ Solid-state air-cooled power supply. ▪ All voltages are fully interlocked and under PC control.

AD Detector

Type	Discrete dynode electron multiplier (DDEM), all-digital detector, measuring dynodes mounted off-axis for reduced background
Dynamic range	11 orders linear analytical range, 0.1-10^{10} cps, all pulse counting mode
Signal attenuation	Automated or manual 2 step signal attenuation (auto, medium or high) for optimum data acquisition for each individual isotope
Detector calibration	Regular calibration of attenuation factors (review at any change of detector voltage > 100 V), no frequent analog-to-digital cross calibration necessary

Vacuum system

	PlasmaQuant MS	PlasmaQuant MS Q	PlasmaQuant MS Elite S	PlasmaQuant MS Elite
Rotary pump	Pfeiffer SmartVane55, vacuum line 4 m		Edwards XDS 46 or Kashiyama NeoDry36E, vacuum line 4 m	
Turbomolecular pump	2x Pfeiffer HiPace 300 with maintenance-free ceramic bearings			
Isolation valves	Pneumatic vacuum isolation gate between the first and second vacuum stages, gate automatically closes in the event of a power failure			
Stand-by	Automatic standby mode if no plasma or user activity for an extended period of time			
Restart	Automatic restart of vacuum after a power failure			

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Additional device options

Option	Description
AMR	Adaptive mass range (AMR) for elements > 230 amu (resolution > 2 amu)
Nitrogen or Oxygen supply (for optional Nitrox upgrade)	Additional gas addition (O_2 or N_2) into the auxiliary gas flow of the plasma to improve plasma performance
Aerosol dilution Upgrade	Additional gas supply (Ar) to dilute sample aerosol during sample introduction

Data system

Software	ASpect MS with optional 21 CFR Part 11 compliance
Instrument calibrations	Automated start-up and shut down routines incl. instrument calibrations
Methods	Pre-configured analytical sequences
Quality control	Range of preconfigured quality controls and actions, option for user defined quality controls
Reporting / exporting	Customized reports and export in prn, csv, txt, lim and cdf
Requirements	▪ Operating system: Windows 11 (64-Bit) ▪ RAM: min. 8 GB ▪ Memory: min. 256 GB, SSD recommended ▪ Graphic resolution: min. 1280 x 1024 px. ▪ 2x USB 2.0
GAMP 5 classification	▪ ASpectMS is classified as GAMP5 category 3

Accessories

Accessory	Type	Features
Autosampler	Various	Supports various autosampler models e.g., CETAC ASX-560 (XLR-8), other CETAC ASX-models, ESI-DX series, ASPQ 3300
Discrete sample introduction	Various	Supports different systems e.g., ASXPress Plus, ESI FAST, GE Niagara
HPLC for speciation	PQ LC	Variable LC system in stainless steel or PEEK versions with various upgrades for detection of element species
	Control	Complete control of workflow, incl. PlasmaQuant MS via Clarity CDS software, including real-time display of time resolved chromatographic signals, calibrations, and analysis
Laser ablation	TTL trigger communication	Compatible with a range of laser ablation accessories

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Physical data (basic unit)

	PlasmaQuant MS	PlasmaQuant MS Q	PlasmaQuant MS Elite S	PlasmaQuant MS Elite
Supply voltage	200-240 V AC ±5 %	200-240 V AC ±5 %	200-240 V AC ±5 %	200-240 V AC ±5 %
Frequency	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz	50 / 60 Hz
Fuse protection	25 A (slow fuse or Type C)	25 A (slow fuse or Type C)	25 A (slow fuse or Type C)	25 A (slow fuse or Type C)
Power consumption	Typical average power consumption: 2700 W Line current: 18 A max			
Dimensions	660 mm x 589 mm x 1131 mm (W x D x H)			
Weight	186 kg			
International protection marking	IP class 20			
Environmental requirements	▪ Temperature: +10 °C up to 30 °C (optimum between +15 °C to +25 °C), ΔT <2K/h ▪ Relative Humidity: 20-80% at +20 °C ▪ Non-condensing atmosphere that is free from corrosive fumes ▪ Exhaust extraction: 3.5 m^3/min (110 ft^3/min) – 5.0 m^3/min (160 ft^3/min) ▪ Maximum altitude: certified 2000 m, please contact us for differing requirements			

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