

PlasmaQuant MS Series ICP-MS



Technical Data

PlasmaQuant MS Series

General

Compact, benchtop inductively coupled plasma mass spectrometer (ICP-MS) with full PC control of all instrument settings and compatible accessories. It features a patented 90-degree reflecting ion optics system for superior sensitivity and innovative RF generator design that lowers operating costs by significantly reducing the amount of argon plasma gas required.

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 | For efficient analysis of demanding samples | For targeted research applications |
| <ul style="list-style-type: none"> >500 kcps/ppb ¹¹⁵In BG at 5 amu <0.5 cps | <ul style="list-style-type: none"> 800 kcps/ppb ¹¹⁵In BG at 5 amu <0.7 cps | <ul style="list-style-type: none"> 1100 kcps/ppb ¹¹⁵In BG at 5 amu <0.7 cps | <ul style="list-style-type: none"> 1500 kcps/ppb ¹¹⁵In BG at 5 amu <1 cps |
| <ul style="list-style-type: none"> Plasma performance: <2% CeO⁺/Ce⁺, <3% Ba⁺⁺/Ba⁺ Precision: 20 min < 3%, 240 min < 4% | | | |

Device option

| Option | Description | PQ MS | PQ MS Q | PQ MS Elite S | PQ MS Elite |
|--------------------------|--|-------|---------|---------------|-------------|
| AMR | Adaptive mass range (AMR) for elements > 230 amu (resolution > 2 amu) | ✓ | ✓ | ✓ | ✓ |
| Nitrox upgrade | Additional gas addition (O ₂ , 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 | ✓ | ✓ | ✓ | ✓ |

Hardware

Sample introduction

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|------------------|---|
| 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 2.4mm id injector, optional torch with 1.5 and 0.8 mm id injector |

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| Inert kits | PFA sample introduction kits for low contamination during high purity analyses 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 and 0.8 mm id injector and solvent resistant pump tubing |

Gas control

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| 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

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| 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

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| 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 to 10.5 L/min plasma cooling gas, 1.2-2.0 L/min auxiliary gas – total gas flow 10–12.5 L/min |
| Cool 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 |

Plasma interface

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| 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 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 |

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Interference management

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| 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 |

Ion optics

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| Type | 90 degree, reflecting ion optics system |
| Lenses | Set of 3 extraction lenses to focus and shape ion beam, segmented ion mirror with 4 lenses (3 user accessible for optimization) |
| Focusing of analyte ions | <ul style="list-style-type: none"> ▪ Patented ion mirror for 3 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

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| 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 μ s |
| 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 | <ul style="list-style-type: none"> ▪ 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 signals ▪ Solid-state air-cooled power supply ▪ All voltages are fully interlocked and under PC control |

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AD Detector

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| 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 | Leybold SV40, vacuum line 4 m | | Edwards XDS 46 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 | | | |

Data system

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| 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 methods |
| 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: PC – Windows 10 (32-Bit or 64-Bit), Windows 7, 8.1 are supported PC: Graphic resolution 1280 x 1024 pixels or higher, mouse / trackball 2 USB 2.0 interface |

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Accessories

| Accessory | Type | Features |
|------------------------------|--------------------------------|--|
| Autosampler | Various | Supports various autosampler models e.g. CETAC ASX-560 (XLR-8), other CETAC ASX-models, ESI-DX series, ASPO 3300 |
| Discrete sample introduction | Various | Supports different systems e.g. ASXPress Plus, ESI FAST, GE Niagara |
| HPLC / IC for speciation | PQ LC compact, PQ LC and PQ IC | Variable LC and IC system in different options, 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 |

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 | <ul style="list-style-type: none"> ▪ Temperature: +10 °C up to 30 °C (optimum between +15 °C to +25 °C) ▪ Relative Humidity: 20-80% at +20 °C ▪ Non-condensing atmosphere that is free from corrosive fumes ▪ Exhaust extraction: 3.0 m³/min (110 ft³/min) – 4.5 m³/min (160 ft³/min) ▪ Maximum altitude: certified 2000 m, please contact us for differing requirements | | | |



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