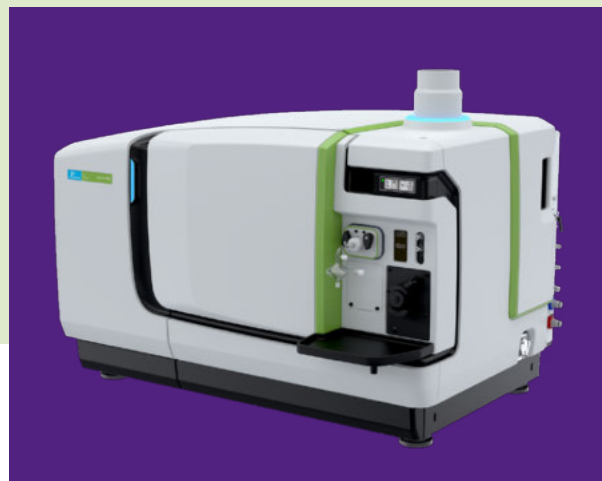


ICP - Mass Spectrometry

NexION® 5000 Multi-Quadrupole
ICP-MS Installation Specifications

The following performance is guaranteed for every manufactured instrument and at the point of installation with the use of the chemicals provided with the instrument.

Detection Limits

Based on three times the standard deviation of the blank using three-second integration time and peak hopping at one point per mass.

Element	Detection Limits ng/L (ppt)
⁹ Be	< 0.5
³¹ P	< 20
³² S*	< 50
⁵² Cr	< 0.7 (Reaction mode, with ammonia in a cleanroom)
⁵⁶ Fe	< 0.7 (Reaction mode with ammonia in a cleanroom)
¹¹⁵ In	< 0.1
²³⁸ U	< 0.1

Sensitivity

Element	Sensitivity Mcps/(mg/L)
⁹ Be	> 15
¹¹⁵ In	> 500
²³⁸ U	> 300
⁵⁶ Fe (Reaction mode with ammonia)	> 250

Oxide Species

Measured under identical operating conditions used to achieve sensitivity and detection-limit specifications.

CeO⁺/Ce⁺

< 0.03

Short-term Precision

Defined as the relative standard deviation (% RSD) of signal (six replicates per mass) for a 0.2-1 µg/L (ppb) multi-element solution, using a mixed-mode method with a three-second integration time.

< 3% RSD

Long-term Stability

Measured after a one-hour warm-up period. Defined as the relative standard deviation of the mean signal for a 0.2-1 µg/L (ppb) multi-element solution, using a mixed-mode method and automatically cycling between Standard and Reaction modes, measured once every 10 minutes (six replicate measurements per mass) without internal standardization, and at the maximum mode switching speed.

< 4% RSD over four hours

Isotope-ratio Precision

Defined for the isotope ratio of ¹⁰⁷Ag/¹⁰⁹Ag. Obtained using single-point peak hopping.

< 0.08% RSD (*or within a factor of two of the counting statistics limit)*

Mass Calibration Stability

Measured using a 0.2 µg/L (ppb) multi-element solution containing ⁷Li, ²⁴Mg, ¹¹⁵In and ²³⁸U. Defined in terms of the shift in spectral position corresponding to maximum spectral peak intensity for each element, obtained without the use of multiple-point, peak-searching algorithms.

< 0.05 amu over eight hours of continuous operation

Quadrupole Peak Hop (Slew) Speed

Defined as the maximum rate at which the quadrupole can jump over 160 amu without affecting the precision of the analytical measurement.

1.6 M amu/sec*

Quadrupole Scan Speed

Defined as the maximum rate at which the quadrupole can be scanned while acquiring continuous spectral data at every mass from the minimum to the maximum mass of the instrument (1-285 amu) at 20 data points per amu.

5000 amu/sec*

Detector Linear Range

The SimulScan™ detection system operates from < 0.1 cps to > 10⁹ cps. This provides over 10 orders of magnitude of linear dynamic range in a single continuous scan. The linear dynamic range can be further increased to 12 orders of magnitude when EDR functionality is used.*

Transient Data Acquisition Speed

Measured during a normal mode of operation (non-nanomode).

> 3000 temporal data points/sec maximum*

Abundance Sensitivity

The abundance sensitivity reduces with increasing mass. Therefore, for the NexION 5000 ICP-MS, the abundance sensitivity is measured at the highest naturally occurring isotope, ²³⁸U.

Owing to the novel design of the NexION 5000, the system delivers 10⁻⁸ abundance sensitivity in Single Quad mode.

In MS/MS mode, the abundance sensitivity far exceeds the dynamic range of the detector (10⁻¹⁰), and therefore the guaranteed abundance sensitivity performance specification for the NexION 5000 in MS/MS mode is 10⁻¹⁰.

Semi S2/S8

Designed to be upgradeable (with optional kits) to meet S2 guidelines for safety and electrical requirements and S8 for the ergonomics of semiconductor engineering. This may include safety interlocks, emergency shutdown, fire protection and seismic restraints in the case of earthquakes.

*Denotes measured in the factory only.