



QL-ICP-MS-7000 Quadrupole Inductively Coupled Plasma Mass Spectrometer



Trace Element Analysis System

System Overview

QL-ICP-MS-7000 is a quadrupole ICP-MS system designed for trace elemental analysis in aqueous and environmental samples.

Operating Principle

- Inductively coupled plasma ionization
- Ion extraction through sampler/skimmer cones
- Quadrupole mass filtering
- Pulse/analog detection

Instrument Type

Quadrupole ICP-MS

Advanced mass spectrometry platform

Mass Range

2–260 amu

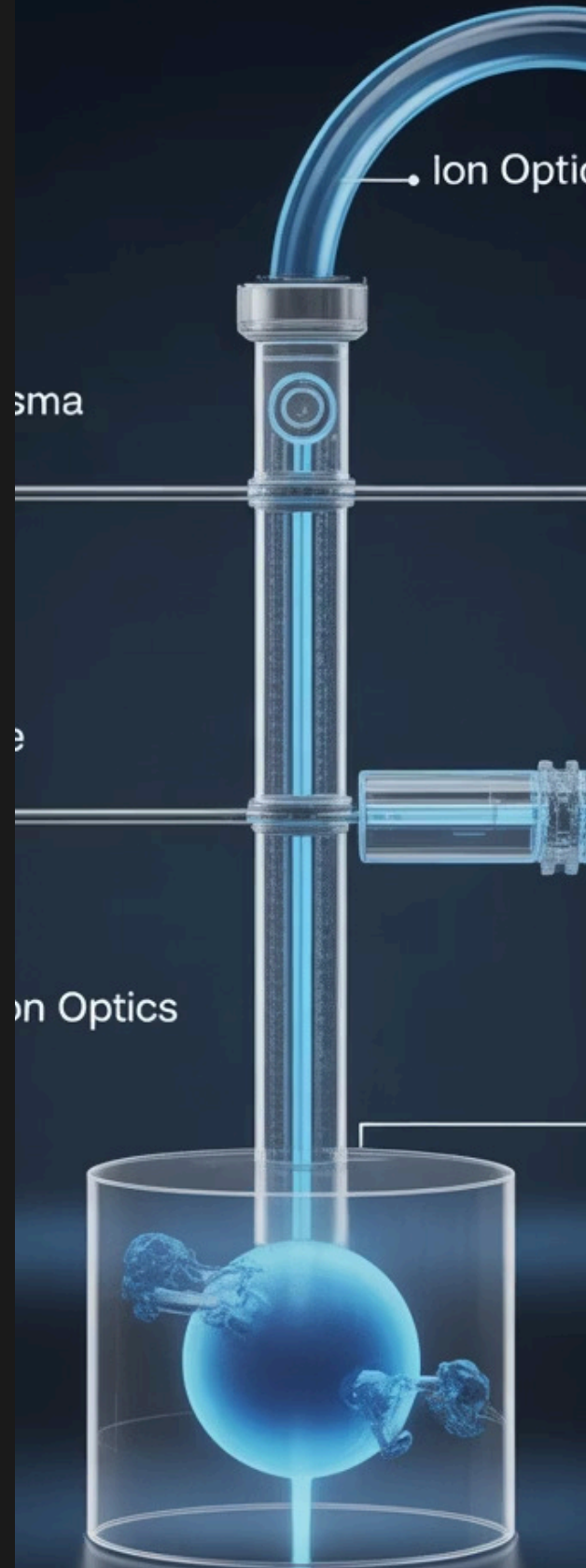
Mass Resolution

Adjustable: 0.3–2.0 amu

Applications

- Drinking water analysis
- Wastewater analysis
- Groundwater and surface water
- Environmental metals

Compliant with EPA Method 200.8 Rev. 5.4 for drinking water and environmental analysis.



Standard Configuration & Supporting Equipment

QL-ICP-MS-7000 Quadrupole ICP-MS System

Standard Instrument Configuration

ICP-MS Main System Includes:

- ICP-MS host system
- Sample cone and skimmer cone
- RF generator compliant with FCC regulations
- Ion extraction lens system
- Collision/reaction cell assembly
- Full mass flow gas controller
- Dual-mode detector
- Mechanical vacuum pump
- Four-channel peristaltic pump
- Pressure regulating module
- Collision cell assembly
- Quartz concentric nebulizer
- Quartz torch assembly with replaceable central tube

Software & Control Modules

- ICP-MS dedicated analysis software with integrated help system
- Fast injection sample control module
- ETV solid injection control module
- Control software module for automatic microwave digestion device
- One set of tuning solution and internal standard solution
- One-year consumables requirements
- Quartz moment tube (1 piece)
- LD, LFB, LFM, LRB automation, QC sequence monitoring, automated reporting

Supporting Equipment

Cooling System

- Refrigeration capacity: 2100 W
- Water tank volume > 2 L
- Operating voltage: 220 V

Peripheral Equipment

- Laser printer

Voltage Regulation

- AC parameter voltage regulator
- 5 kVA input voltage range 140V–300V
- Output voltage 220 V \pm 1%

Uninterruptible Power Supply

- 10 kVA high-frequency UPS
- One-hour backup time
- Configured with 12V 38AH batteries

Plasma Generation & Ion Source System

RF Generator

Integrated RF generator

Stable plasma ignition and operation

Low-power standby mode: 500 W

Designed for stable long-term operation

Optimized to reduce argon consumption during idle state

Plasma Gas System

Argon plasma system

Typical argon consumption: approximately 5 L/min

High-purity argon compatible ($\geq 99.99\%$)

Quartz torch assembly

Replaceable central tube design

Modular torch seating for simplified maintenance

Stable plasma operation for aqueous matrices

Sample Introduction System

Four-channel peristaltic pump

Independent speed control capability

Mass flow controller for:

- Nebulizer gas
- Auxiliary gas
- Cooling gas
- Collision gas

Cyclonic spray chamber (low dead volume)

Quartz concentric nebulizer

Designed for routine environmental sample analysis

Dedicated internal standard channel supported.

Plasma Conditions

- High-temperature argon plasma
- Stable ionization of aqueous matrices
- Compatible with environmental samples

Gas Flow Architecture

- Independent gas channels
- Controlled plasma stabilization
- Collision gas integration

Integrated online internal standard addition capability via mixing tee or autosampler integration.

Interface and Ion Transmission

Cone System

Sampler cone and skimmer cone system

Nickel and platinum cone options

Handle-type cone replacement design

Ion Optics

Off-axis ion transmission design

Reduced neutral particle transmission

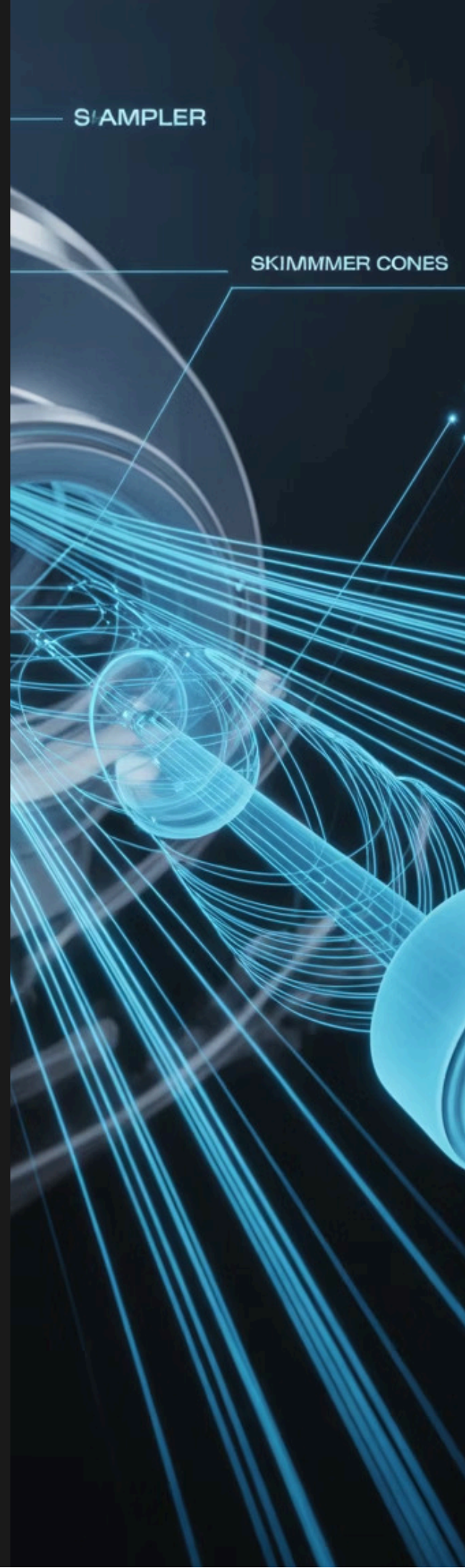
Maintenance-accessible interface structure

Ion Transmission Design

- Off-axis ion path for enhanced signal-to-noise
- Significant reduction of neutral species
- Effective photon suppression for minimal background
- Overall background minimization for improved detection limits

Maintenance Access

- Easy-access cone replacement for quick servicing
- Reduced downtime architecture ensuring continuous operation



Interference Management

Collision/Reaction Cell

Six-pole collision/reaction cell

Distributed gas introduction

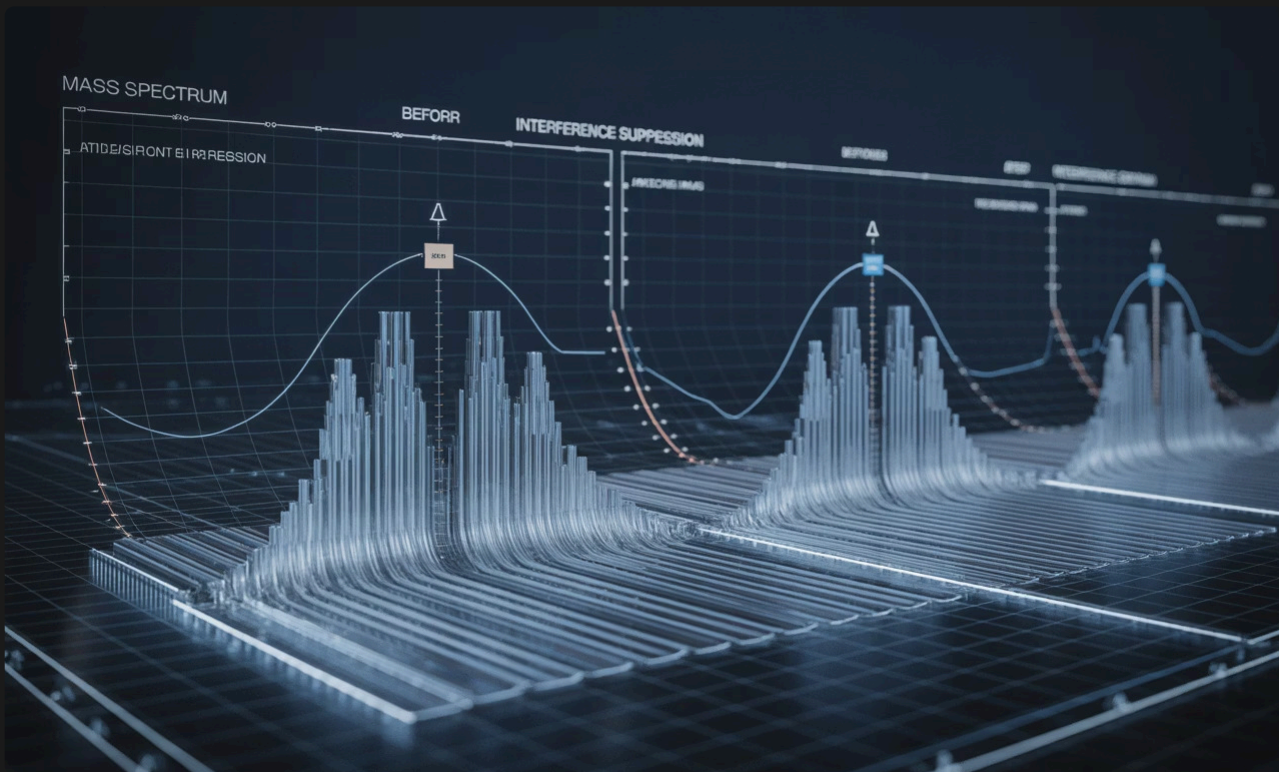
Polyatomic interference reduction capability

Oxide Ratio

$\text{CeO}^+/\text{Ce}^+ < 3\%$

Double Charged Ratio

$\text{Ce}^{++}/\text{Ce}^+ < 3\%$



Interference Reduction Examples

- ArO^+
- ArCl^+
- Matrix-based polyatomic species

Operational Modes

- Standard mode
- Collision mode

Software supports mathematical interference correction equations per EPA Method 200.8. System design meets EPA Method 200.8 memory interference requirements

QL-ICP-MS-7000 Technical Specifications

1. Mass Spectrometer	
Instrument Type	Quadrupole ICP-MS
Mass Range	2–260 amu
Mass Resolution	Adjustable 0.3–2.0 amu
RF Frequency Drive	2.0 MHz
Mass Stability	< 0.05 amu / 24 h
2. Detector System	
Detector Type	Dual-mode (Pulse / Analog)
Linear Dynamic Range	> 9 orders of magnitude
Background Signal	< 0.5 cps @ 5 amu
Isotope Ratio Accuracy	< 0.2% (107Ag/109Ag)
3. Collision / Reaction Cell	
Cell Type	Six-pole collision/reaction cell
Gas Introduction	Distributed gas design
Oxide Ratio (CeO ⁺ /Ce ⁺)	< 3%
Double Charged Ratio (Ce ⁺⁺ /Ce ⁺)	< 3%

QL-ICP-MS-7000 Technical Specifications

4. Analytical Performance	
Sensitivity	
- Li:	> 20 Mcps/ppm
- In:	> 180 Mcps/ppm
- U:	> 200 Mcps/ppm
Detection Limits	
- Li:	< 2 ppt
- In:	< 0.1 ppt
- U:	< 0.1 ppt
Short-Term Stability	RSD < 2% (20 min)
Long-Term Stability	RSD < 3% (2 hours)
Matrix Tolerance	Approx. 0.2% TDS
5. Plasma & Gas System	
Plasma Gas	Argon ($\geq 99.99\%$)
Typical Argon Consumption	~5 L/min
Low Power Standby Mode	500 W
Gas Channels	Cooling Gas, Auxiliary Gas, Nebulizer Gas, Collision Gas
6. Sample Introduction	
Peristaltic Pump	Four-channel
Nebulizer	Quartz concentric
Spray Chamber	Cyclonic, low dead volume
Torch	Quartz with replaceable central tube

Detection limits achievable for all analytes defined in EPA Method 200.8

Mass Spectrometry System

Mass Analyzer

Quadrupole Type: High-precision molybdenum (Mo) quadrupole rods

RF Frequency Drive: 2.0 MHz

Mass Stability: < 0.05 amu / 24h

Mass Range: 2–260 amu

Mass Resolution: Adjustable 0.3–2.0 amu

Scan Speed: Optimized for routine analysis

Ion Transmission Efficiency: Optimized geometry

Optimized for routine environmental sample throughput.

Detector

Detector Type: Dual-mode (Pulse / Analog)

Linear Dynamic Range: > 9 orders of magnitude

Background Signal: < 0.5 cps @ 5 amu

Isotope Ratio Accuracy: < 0.2% ($^{107}\text{Ag}/^{109}\text{Ag}$)

Dead Time: Automatically corrected

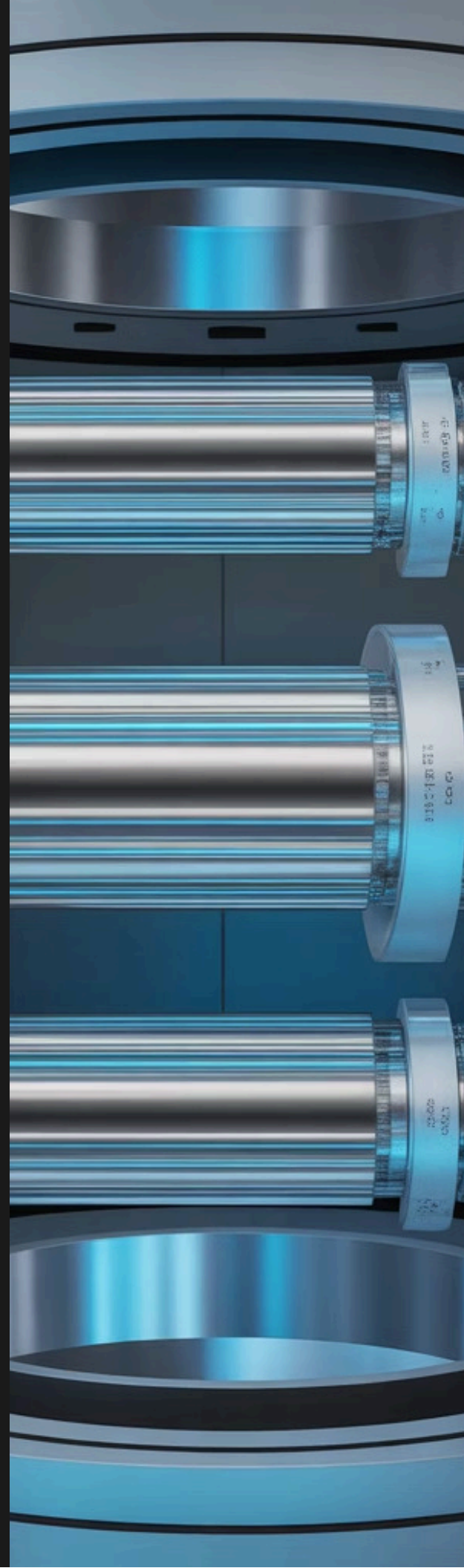
Cross-calibration: Automatic pulse/analog mode switching

Vacuum System

Vacuum Pump: Mechanical rotary vane pump

Operating Pressure: Optimized for ion transmission

Maintenance: Accessible design



Analytical Performance

Sensitivity

Detection Limits

Li

< 2 ppt

In

< 0.1 ppt

U

< 0.1 ppt

Based on 3σ criterion, blank equivalent concentration

Stability Performance

Short-term Stability

RSD < 2% (20 min)

- Measured on 10 ppb In solution
- Continuous aspiration mode

Long-term Stability

RSD < 3% (2 hours)

- Measured on 10 ppb In solution
- Routine operating conditions

Stability Conditions

- Controlled laboratory environment
- Temperature: 20-25°C
- Argon flow stabilized
- Plasma equilibrated

Matrix Tolerance

- Total Dissolved Solids: Approx. 0.2%
- Suitable for environmental water samples
- Dilution recommended for higher TDS matrices

Standard Configuration

Included Components

Core Instrument

- ICP-MS main unit
- RF generator
- Quadrupole mass analyzer
- Collision/reaction cell
- Ion lens system
- Dual-mode detector
- Mechanical vacuum pump

Sample Introduction

- Four-channel peristaltic pump
- Quartz concentric nebulizer
- Cyclonic spray chamber
- Quartz torch assembly
- Central tube assembly

Autosampler includes dual/continuous flowing wash reservoirs to minimize carryover

Control & Support

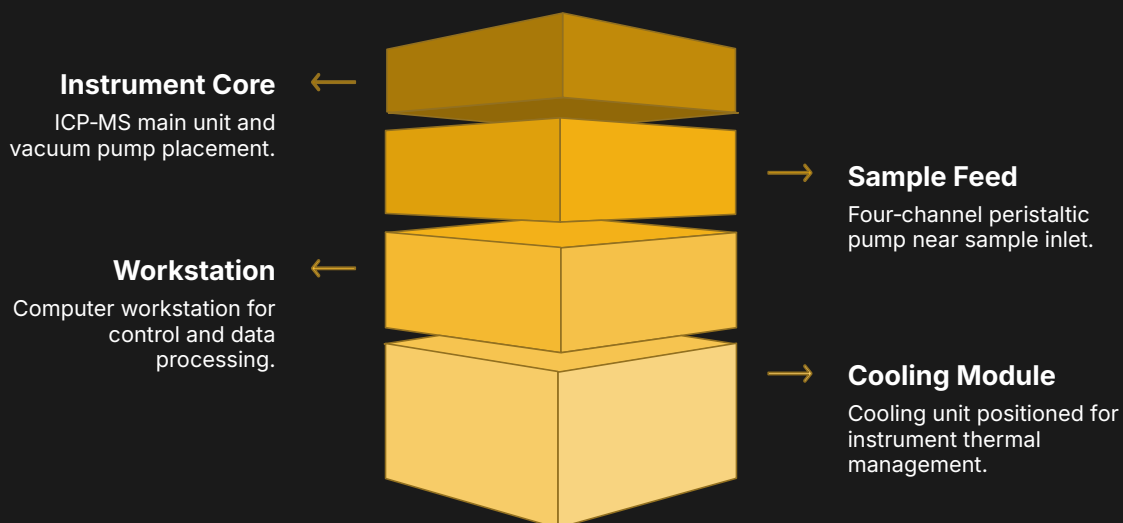
- Cooling water circulation system
- Computer workstation (Windows 11)
- Laser printer
- Computer workstation and peripherals supplied with minimum 3-year warranty.
- Printer supports USB and network connectivity for laboratory reporting.

Autosampler

Online Gas Dilution System

HPLC Interface

Microwave Digestion Interface



On-site installation and operator training available.

Manufacturer-authorized service agreements available including preventive maintenance and repair support.

Advancing Trace Element Analysis with QuakeLogic

The QuakeLogic QL-ICP-MS-7000 Quadrupole ICP-MS System delivers high-precision trace elemental analysis for environmental and laboratory applications.

Connect with QuakeLogic

Corporate Headquarters

QUAKELOGIC INC.

4010 Foothills Blvd. Suite
103/194, Roseville, CA
95747

Factory/Warehouse: 2008
Opportunity Dr. Suite 130,
Roseville, CA 95678

Executive Support Line

+1 (916) 899-0391

Mon-Fri, 9 AM - 5 PM PST. For
advanced technical
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Strategic Inquiries

sales@quakelogic.net

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