

2019

Advanced Sample Introduction Systems

For PerkinElmer NexION 1000/2000 ICPMS




PerkinElmer
For the Better

www.perkinelmer.com

Quick Reference

Introduction to Automation

SC DX Autosamplers

Durable, chemically inert autosamplers featuring dual flowing rinse stations to reduce carryover. DX autosamplers are *FAST* ready and have two rinse pumps to supply independent solutions to each rinse station, while DXe autosamplers have a common rinse pump that uses a tee connection to supply single rinse solution to both stations. (Pages 6-7)

FAST

High-throughput, automated sample introduction system that uses valve injection with rapid vacuum sample loading to more than double the productivity, minimize instrument maintenance, and reduce operating costs. (Pages 8-9)

prepFAST

Automated inline dilution system that eliminates manual dilution, reduces reagent usage, and improves laboratory productivity. These systems use a syringe module to perform precise and accurate inline dilutions of standards and samples. *prepFAST*, base version; *prepFAST e*, economical; *prepFAST M5*, syringe-driven sample loading. (Pages 10-21)

Application Systems

Advanced automation systems that combine *FAST* and *prepFAST* technologies with application specific sample introduction components to allow for the analysis of nanoparticles, high matrix samples, semiconductor chemicals and chromatography samples. (Pages 22-45)

SmartTuner

Automated tuning, rinsing, and ICPMS calibration system. (Pages 46-47)

pergo

Argon humidifier with a water vapor permeable membrane that improves performance and stability of all concentric nebulizers, specifically when analyzing brines, fusion digests, and high TDS samples. (Pages 58-59)

apex Desolvation Systems

Desolvation systems that maximize ICPMS sensitivity, up to 10x, by nebulizing samples into a heated spray chamber, then multi-stage Peltier-cooled condensing systems to remove solvent vapor, reducing oxides. (Pages 80-81)

PC^{3X}

Peltier-cooled or heated inlet system for cyclonic spray chambers that provides thermal stabilization to improve short and long-term stability. (Page 82)

PCH

Peltier-cooled or heated inlet system for PFA barrel spray chamber that provides thermal stabilization to improve short and long-term stability. (Page 83)

Terminology

SMARTintro	Pre-tested, application specific sample introduction kits, that can be installed in minutes to ensure intra laboratory performance and symmetry.
Rinse Pump	Supplies solution to rinse station; DXe has common rinse pump that uses a tee connection to supply single rinse solution to each station; DX has two rinse pumps to supply independent rinse solutions to each station.
Dual Rinse	DX autosamplers come with two rinse stations; the first to remove residue from the previous sample from the probe exterior, and the second for vacuuming rinse solution to rinse the entire system.
MP²	Precision micro peristaltic pump.
FAST (DXe & DX)	Valve and loop combination that rapidly vacuum loads and injects sample.
FAST Pump	Allows rapid, vacuum sample loading into a loop on a <i>FAST</i> valve.
FAST Basic	<i>FAST</i> system that includes nebulizer.
FAST Complete	<i>FAST</i> system that includes torch, injector, spray chamber, nebulizer, and PC. ³

TABLE OF CONTENTS

Automation

SC DX autosamplers	6-7
FAST system.....	8-9
prepFAST inline dilution system.....	10-13
prepFAST e economical autodilution system.....	14-15
prepFAST (prepFAST 2) autodilution system.....	16-17
prepFAST M5 syringe sample loading autodilution system	18-19
prepFAST complete systems comparison	20
prepFAST ordering information	21

Application Systems

prepFAST S5 ultraclean automated sample handling system	22-25
TRUFAST S4 preconcentration system	26
prepFAST IC speciation system.....	28-33
seaFAST seawater analysis system	34-39
Single cell sample introduction	40-41
hydrideICP system.....	42-43
hydride S31	44-45
SmartTuner	46-47

Autosampler Accessories

Enclosures and ULPA filtered environments.....	48
Autosampler stations	49

Nebulizers, Spray Chambers, Torches and Injectors

PFA and polypropylene ST-nebulizers	51-52
Probes and capillaries for ST-nebulizers	53
PFA nebulizers with integrated sample capillaries	54
PFA nebulizers with integrated autosampler probes.....	55
MEINHARD® quartz and glass nebulizers	56-57
pergo argon nebulizer gas humidifier.....	58-59
Spray chambers and accessories.....	60-61
Demountable torches and injectors	62
One-piece torches.....	63
SMARTintro torch modules	64-65
Torch accessories	66
SMARTintro color-coded sample introduction kits	67-75

Peristaltic Pumps

FAST DXi	76
Stand alone peristaltic pumps.....	77
MP ² peristaltic pump tubing	78
Spare syringes.....	79

High Performance Sample Introduction

apex desolvation systems.....	80-81
PC ^{3X} Peltier cooler/heater	82
PCH Peltier cooler/heater, HF-resistant.....	83

Consumables

FAST valves, stators and rotors	84-85
Manual sampling probes / Nebulizer lines	86
Internal standard addition kits and tees	87
Fittings / Tubing / Sample loops.....	88-89
High purity HF-resistant sample vials and bottles.....	90-91
PVDF autosampler vials	92
Sample vessels.....	93
Microplates.....	94-95
Large autosampler racks	96
Heated and micro autosampler racks	97
Super autosampler racks	98-99
Standards racks	100-101
FAST spares kits.....	102

Installation and Training	103
---------------------------------	-----

Autosampler Dimensions	104-105
------------------------------	---------

AUTOMATION

SAMPLE INTRODUCTION

CONSUMABLES



Introducing SMARTintro Kit

Efficient: Quickly change sample introduction hardware

Defined: All components are color-coded for consistent inter-laboratory performance



Blue Base Kit



White High Purity Performance Kit



Gold Geochemical HF-Resistant Kit

See pages 67-75
for more information



Black High Throughput Productivity Kit



NexION 2000

s for All ICPMS Applications

Engineered: Each unique solution is designed for a specific application

Flexible: Upgrade and combine with *FAST* or *prepFAST* products to maximize productivity and performance



Orange Organic Solvents Kit



Purple 1000 Kit



ICPMS



Platinum Semiconductor HF-Resistant Kit



Green Environmental Core Kit

SC DX Family of Autosamplers

SC DX autosamplers are durable, chemically inert, and feature dual flowing rinse stations to reduce carryover. Versatile rack configurations along with the ability to upgrade to any high-throughput *FAST* or autodiluting prep*FAST* system, make the SC DX autosampler the perfect foundation for automation in any trace metal lab. They are available in seven models having five capacities ranging from the SC Micro to the SC 14DX, the largest on the market.

Benefits:

- Durable dual rail system
- Dual flowing rinse stations
- Precision sampling
- Reset probe – prevents probe damage
- Flexible rack configurations
- Upgradeable to *FAST* or prep*FAST*
- SC 2 DXe and SC 4 DXe economical versions available

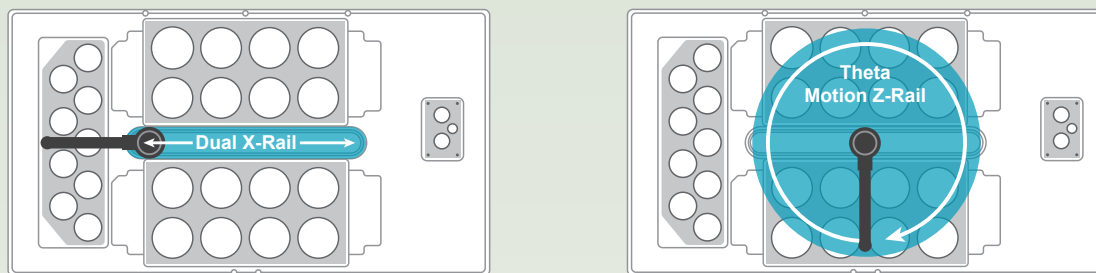
SC DXe Economical Autosampler vs. SC DX FAST Ready Autosampler		
Configurations	DX	DXe
Probe	2	1
Sample & Standards Rack Pkg	1	1
Polypropylene Rinse Bottle (4L)	2	1
<i>FAST</i> Vacuum Pump	1	0
Dual Flowing Rinse Stations	1	1
Rinse Pump	2	1



Economical Autosamplers

SC DX Autosamplers are Engineered to be Precise and Durable

All SC DX autosamplers are designed for the trace metal lab. They utilize a Dual X-rail design combined with a large diameter Z-rail with theta angular motion for precise sampling. All SC DX components are constructed using chemically resistant materials for an exceptionally long lifetime.

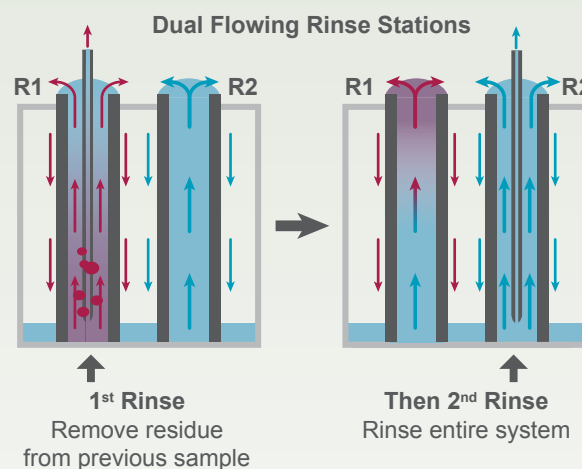


SC Micro DX autosampler shown

Dual Rinse Stations Reduce Carryover

Eliminating carryover is vital for accurate data and paramount to the production laboratory.

All SC DX and SC DXe autosamplers have dual rinse stations to minimize sample-to-sample carryover. Rinse liquid is supplied by a common rinse pump (DXe) split between two rinse stations or with two independent rinse pumps (DX), one for each rinse station. With independent rinse pumps, each station can use a different rinse solution to effectively rinse wide-ranging sample types while minimizing rinse solution consumption.



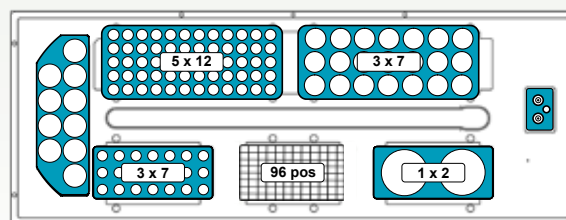
SC DX Autosamplers are Versatile and Upgradeable

SC DX autosamplers are available in a range of sizes, with capacities from 2 micro racks (SC Micro DX) to 14 large racks (SC14 DX).

Flexible rack configurations permit almost any sample size, from microplates and micro vials up to 500 mL and larger bottles to be automatically analyzed.

All SC DX autosamplers have the ability to upgrade to any FAST high throughput or prepFAST autodilution system.

Versatile Rack Configurations



SC4 DX shown with 5 x 12 and 3 x 7 large racks, 3 x 7 micro rack (MR), 96 well microplate, MR bottles - 2 x 250 mL

Model	Part Number	Large Rack Capacity	Microplate/Micro Rack Capacity	MAXIMUM SAMPLE CAPACITY			
				50mL	15mL	8mL	MT-96
SCMicro DX	N8150392	0	2	20	42	80	192
SC2 DX	N8150390	2	4	52	120	180	384
SC2 DXe	N0786010						
SC4 DX	N8150391	4	6	94	240	360	576
SC4 DXe	N0786011						
SC8 DX	N8150393	8	-	208	480	720	-
SC14 DX	N8150394	14	30*	304	840	1260	2880*

*Special version SC14 for microplates



FAST SYSTEM

for NexION 1000/2000 ICPMS

The *FAST* is a high-throughput, automated sample introduction system for the NexION 1000/2000 ICPMS. The *FAST* system uses valve injection with rapid vacuum sample loading to more than double the productivity of the NexION ICPMS, minimize instrument maintenance, and reduce operating costs.

FAST Benefits:

- High sample throughput
- *FAST* uptake, stabilization, and washout
- Specially-designed P-Series valve and loop combination has superb washout
- Options with and without segmented air bubbles ensures high precision for every application

Improved Efficiency

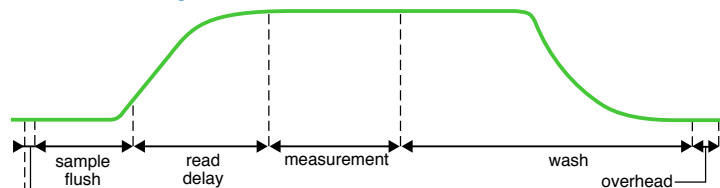
By presenting the sample for a short period of time during the measurement, ICPMS cone deposition is minimized, resulting in long stable analytical runs without maintenance. The *SC-FAST* reduces consumption of argon, power, and reagents.

Increased Sample Throughput

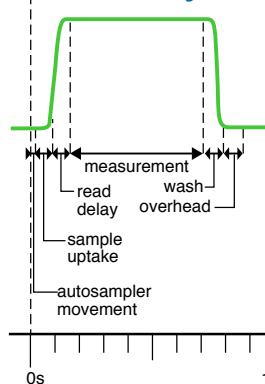
In addition to higher throughput gained by using an autosampler, the *FAST* system analyzes a sample 2-5 times faster than it takes a standard autosampler to perform the same task.

FAST also benefits labs with relatively few samples by reducing operating costs and shortening analytical runs.

Normal Analysis



FAST Analysis



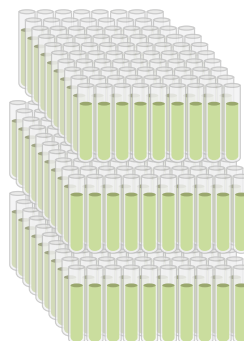
Six Steps in a Standard Analysis

1. Autosampler Movement
2. Uptake
3. Stabilization
4. **Measurement**
5. Wash
6. Overhead

The *SC-FAST* system has the fastest signal stabilization and most complete rinse-out of any sample introduction system. This reduces uptake and wash times while increasing sample throughput.



STANDARD ANALYSIS
96 SAMPLES



FAST ANALYSIS
288 SAMPLES

2-5x HIGHER SAMPLE THROUGHPUT
WITH *FAST* SYSTEM
DEPENDENT ON APPLICATION

Superior P-Series *FAST* Valve

- PFA rotors for long life and low maintenance
- Chemically resistant compression ring
 - Uniform pressure
 - Keyed for easy assembly
 - Prevents damage from overtightening
- All fluoropolymer flow path
- Internal components PTFE-coated to prevent corrosion
- In-valve mixing of internal standard (P7 valve)



P7 *FAST* Valve



Single Valve *FAST* DXi for NexION 1000/2000 ICPMS



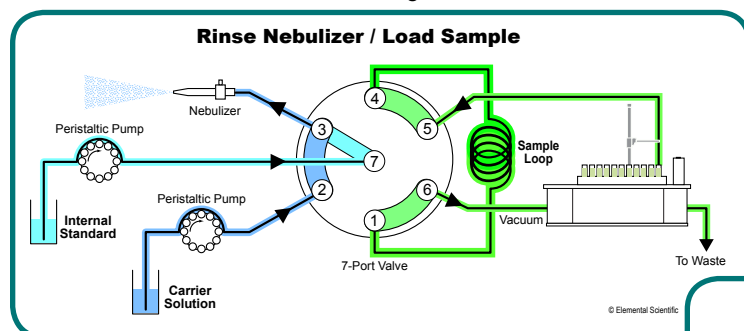
NexION 2000 ICPMS with *FAST* system

AUTOMATION

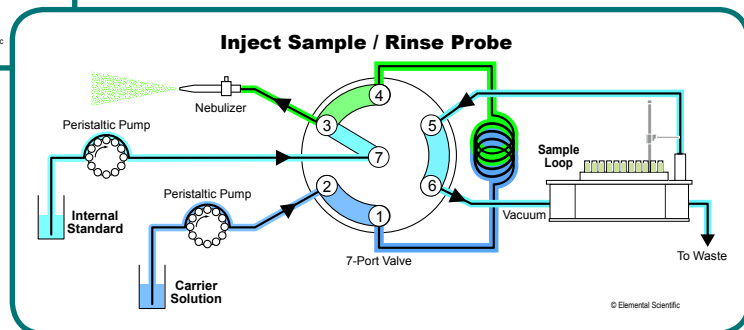
FAST DXi:

- Integrated MP² peristaltic pump and *FAST* valve for the NexION 1000/2000 ICPMS
- High quality ceramic bearing peristaltic pump for long lifetime and high precision
- Upgradeable to prep*FAST*

The *FAST* loads the sample loop as the nebulizer and tubing are cleaned.



The autosampler probe and tubing are rinsed while the sample is analyzed.



FAST SYSTEM PART NUMBERS FOR NexION 1000/2000 BC

Description	Nebulizer	Spray Chamber	PC ^{3X}	Torch Injector	SC2 DX FAST	SC4 DX FAST	SC8 DX FAST	SC14 DX FAST
<i>FAST</i> Complete System for PE NexION 1000/2000 BC ICPMS with PC ³ Peltier cooler (Includes SC DX autosampler and Productivity kit (N8150036))	✓	✓	✓	✓	N8150407	N8150408	N8150422	N8150423
<i>FAST</i> Basic System for PE NexION 1000/2000 BC ICPMS (Includes SC DX autosampler)	✓				N8150478	N8150479		

See page 6 for more information on SC DX autosamplers.



Order online at www.perkinelmer.com/supplies



ORDER TODAY

prepFAST™ Inline Dilution

Variable Autodilution, Inline Autocalibration, and Overrange Dilution

prepFAST is a line of automated inline dilution systems which eliminates manual dilution, reduces reagent usage, and improves laboratory productivity. These systems combine the SC DX autosampler, high-throughput FAST technology and a syringe module to perform precise and accurate inline dilutions of standards and samples.

prepFAST Automates Daily Lab Functions

Autodilution

Samples are automatically inline syringe-diluted and prepared for analysis.

- Automatic inline dilution modes
 - Constant dilution (e.g. all samples diluted 10x)
 - Variable dilution (i.e. user-specified dilution factor sample-by-sample)
- Improve precision and accuracy
- Reduce vial and reagent usage
- Improve sample throughput and washout

Autocalibration

Automate inline preparation of ICPMS calibration standards.

- Save time and improve laboratory efficiency
- Improve linearity
- Standards rack (9 x 125 mL) holds both calibration and QC compliance standards
- Save time and improve laboratory efficiency

Overrange Dilution

Automatically dilute and reanalyze samples having analyte concentrations above the calibration range.

- Autodilute overrange samples
- Automatic serial dilution brings even extremely high concentration samples into range
- Optimize laboratory throughput by generating reportable results from the initial sample run

PerkinElmer Offers Three prepFAST Systems:

- prepFAST e – Economical two syringe dilution system; max dilution factor of 50x
- prepFAST (prepFAST 2) – High-throughput dilution system with rapid washout; max dilution factor of 400x
- prepFAST M5 – High-throughput dilution system with ultimate washout and precision sample loading for viscous and small volume (<2-3 mL) samples; max dilution factor of 400x

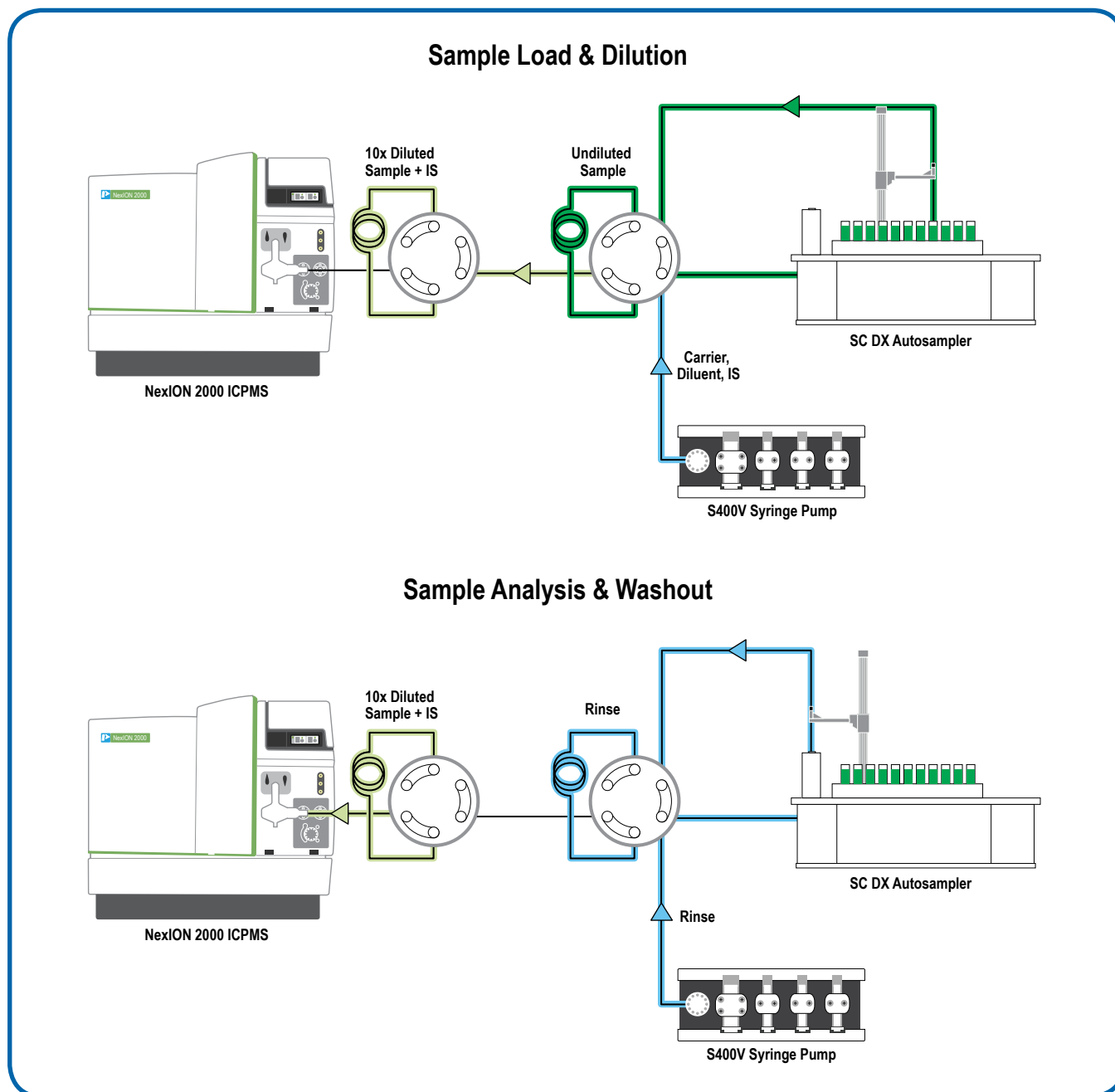


SC2 DX prepFAST

prepFAST™ Autodilution

Rapid, Variable, In-Valve Autodilution

Samples are quickly vacuum-loaded (prepFAST e, prepFAST and prepFAST M5) or precision syringe-loaded (prepFAST M5) into a loop. Sample is mixed with diluent and internal standard using a patented mixing valve at the dilution factor prescribed by Syngistix software. The diluted and mixed sample is then introduced into the ICPMS while the sample loop is syringe rinsed and readied for the next sample. This sampling and dilution process takes place in seconds.



prepFAST dilution diagram for NexION 2000



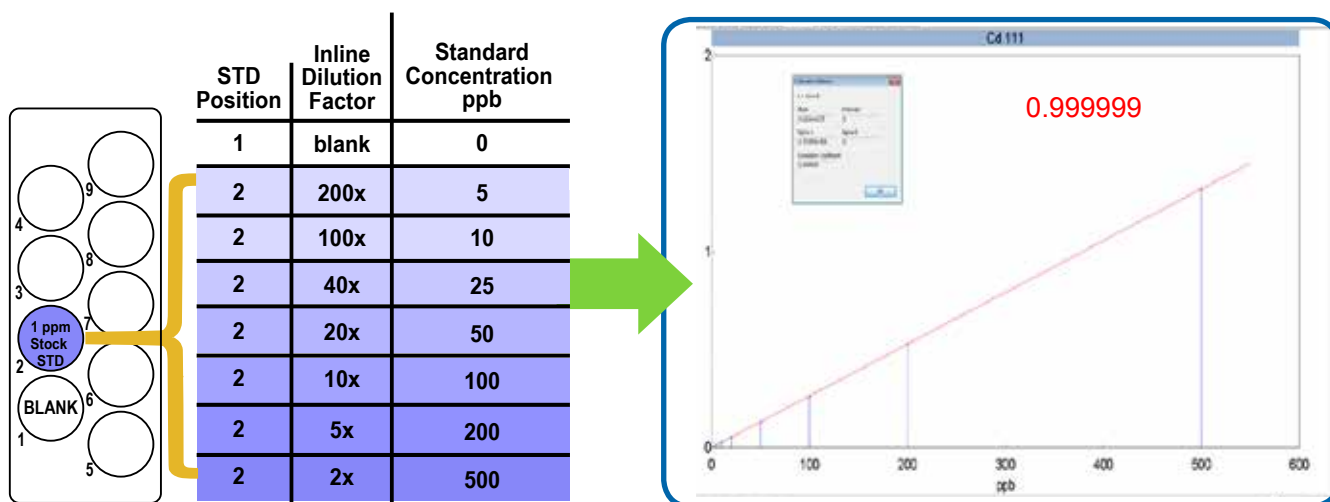
prepFAST™ Autocalibration

Autocalibration

Every prepFAST model can create multipoint calibration curves from a single bottle of stock standard. Each point of the calibration curve is prepared by autodilution of a single stock calibration standard placed on the autosampler deck. The prepFAST automatically generates highly linear and consistent ICPMS calibration curves. If necessary, multiple standards can be used for large concentration ranges or when standard matrices are incompatible.

prepFAST Autocalibration

Inline Prep from 1 Blank + 1 Standard



Autocalibration of Cd from a 1ppm stock standard

Autocalibration improves laboratory efficiency by eliminating the need for labor-intensive and error prone standard preparation. It reduces laboratory waste by reducing calibration vial, reagent, and standard waste. prepFAST autocalibration is particularly important for low concentration standards near the detection limit.

Manual Calibration vs. Autocalibration

30+ MINUTES
- Manual Labor -



5 MINUTES
- AUTOMATED -

- High Risk of -
HUMAN ERROR

- Risk of -
CONTAMINATION
- Airborne, Pipettes,
Vials -

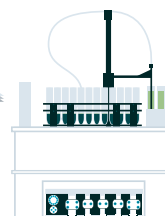


- High use of -
CONSUMABLES



- Reduced -
HUMAN ERROR

- Reduced Risk of -
CONTAMINATION
- Single high stock
standard -

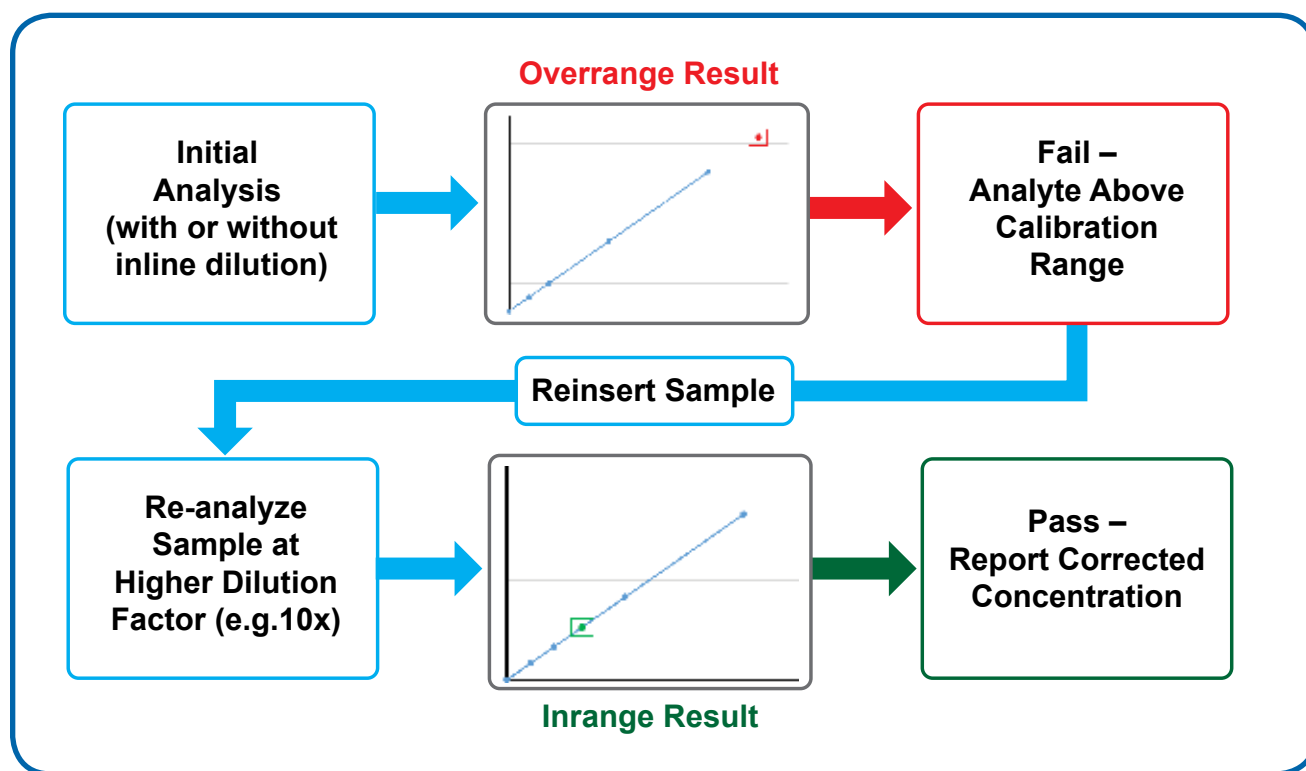


- Reduced use of -
CONSUMABLES

prepFAST™ Overrange Dilution

Overrange Analyte Autodilution

The prepFAST automatically dilutes samples when an analyte goes above method-specified quality control levels. The sample is automatically reinserted into the sample list and reanalyzed at a higher dilution factor until the determined concentration falls within the specified range.



Automated overrange sample dilution maximizes laboratory throughput. Without this feature high concentration samples have to be manually diluted and rerun later. Overrange autodilution automatically dilutes samples into the appropriate range without any user input or time lost waiting for a result.



Economical Inline Autodilution System

The prepFAST e economical inline dilution system provides low cost syringe dilution and laboratory automation. The prepFAST e is especially effective for applications having long analysis times or lower sample throughput requirements. Capable of dilution factors ranging from 1 to 50, the prepFAST e is recommended for use with sample volumes greater than 2-3 mL. The prepFAST e supports final analysis volumes between 0.5 and 6.0 mL.

Features

- Autocalibration
- Autodilution - 1 to 50x
- Automatic overrange dilution
- Peristaltic-pumped internal standard addition
- Fast vacuum sample loading

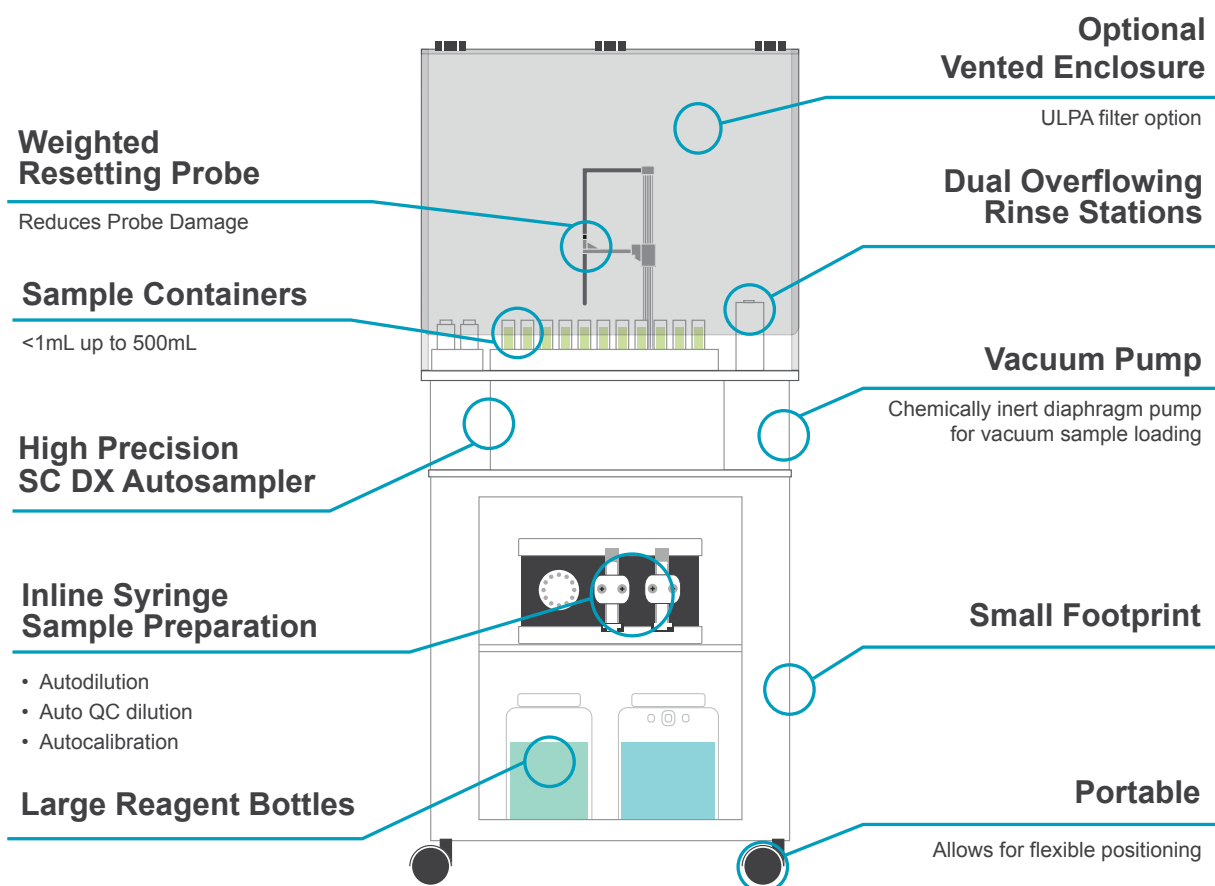
Benefits

- Automate sample dilution
- Reduce laboratory waste
- Available in SC2, SC4, SC8, and SC14 models

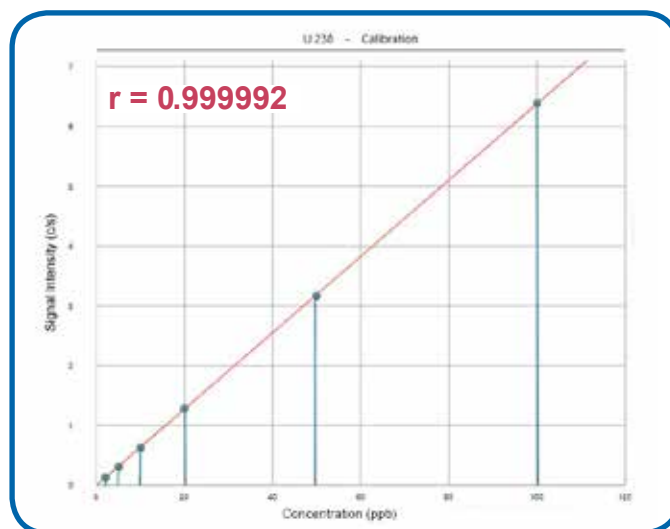
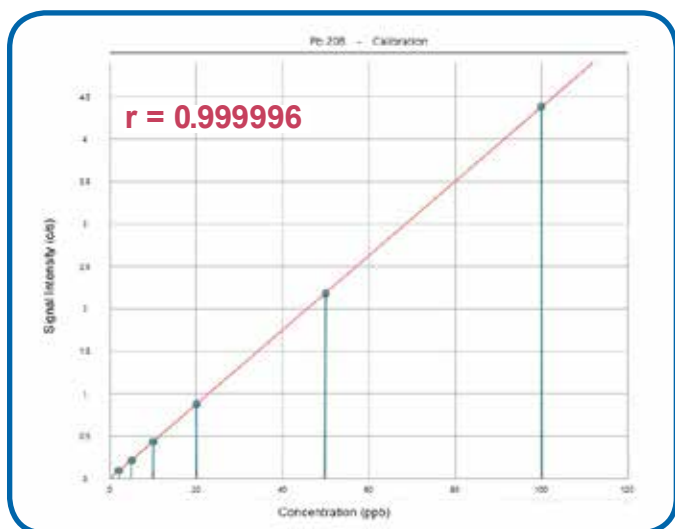


SC2 DX
prepFAST e

prepFAST e Features Diagram



prepFAST e Automated Calibrations



Autocalibrations on NexION 2000 with prepFAST e. Calibration standards automatically prepared at 2, 5, 10, 20, 50, and 100 ppb, from a 100 ppb stock standard.



Fully Automated Inline Dilution

The prepFAST (prepFAST 2) inline dilution system fully automates laboratory dilutions while providing high sample throughput. The prepFAST delivers high precision autodilution, syringe-driven internal standard addition, and high speed washout. Capable of dilution factors from 1 to 400, the prepFAST is suggested for labs requiring the highest sample throughput and where the available sample volume is about 2-3 mL or more.

Features

- Autocalibration
- Autodilution – 1 to 400x
- Auto QC dilution
- Syringe-driven internal standard
- High speed rinse
- FAST vacuum sample loading

Benefits

- Automate sample dilution
- Improve sample throughput
- Reduce laboratory waste
- Available in SC2, SC4, SC8, and SC14 models



SC4 DX prepFAST

prepFAST Features Diagram

Weighted Resetting Probe

Reduces Probe Damage

Sample Containers

<1mL up to 500mL

High Precision SC DX Autosampler

Inline Syringe Sample Preparation

- Sample dilution
- Internal standard addition
- Overage dilution

Large Volume Reagent Bottles

Optional Vented Enclosure

ULPA filter option

Dual Overflowing Rinse Stations

Vacuum Pump

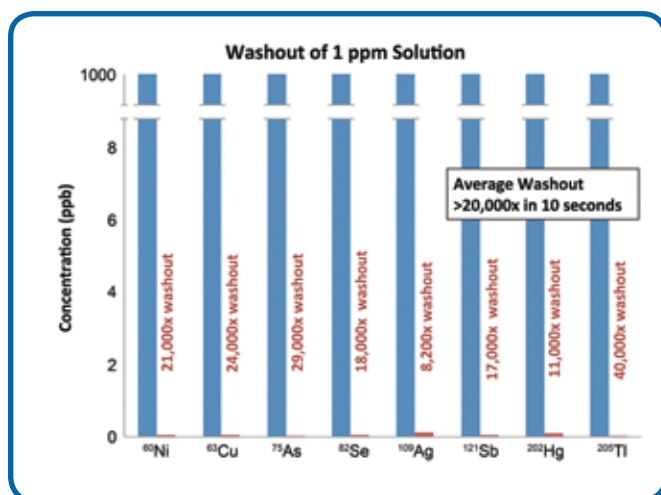
Vacuum loaded sampling
Rapid rinsing & cleaning

Small Footprint

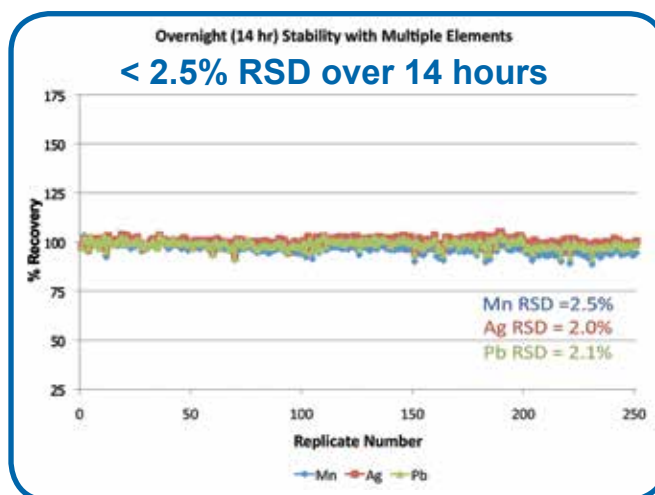
Portable

Allows for flexible positioning

prepFAST Performance



FAST washout even for memory-prone elements



Long-term stability



Order online at www.perkinelmer.com/supplies



ORDER TODAY

prepFAST M5TM for NexION 1000/2000 ICPMS

Syringe Sample Loading + Syringe-driven Inline Dilution

The prepFAST M5 inline dilution system delivers maximum laboratory automation. The prepFAST M5 provides precision syringe loading of samples or high-throughput vacuum loading. Syringe loading is used when sample volumes are limited – 2-3 mL – or when sample viscosity becomes an issue, such as organic solvents, viscous brines or biological samples. FAST vacuum loading can be used when sample volumes are large – above 2-3 mL – or when sample viscosity is not an issue. The prepFAST M5 delivers high precision autodilution, syringe-driven internal standard addition, flexible sample loading and ultimate sample washout. Capable of dilution factors from 1 to 400, the prepFAST M5 is perfect for labs requiring high sample throughput and where available sample volumes are as low as 0.1 mL.



S500V2 Syringe Module

Features

- Autocalibration
- Autodilution – 1 to 400x
- Auto QC dilution
- Syringe-driven internal standard addition
- High speed rinse
- Ultimate washout
- Precision syringe loading or high speed vacuum loading
- High pressure syringe-driven probe rinsing

Benefits

- Automate sample dilution
- High sample throughput
- Minimize sample use
- Reduce laboratory waste
- Best rinse-out performance
- Available in SC2, SC4, SC8, and SC14 models



SC4 DX
prepFAST M5

prepFAST M5 Features Diagram

Weighted Resetting Probe

Reduces Probe Damage

Sample Containers

<1mL up to 500mL

High Precision SC DX Autosampler

Inline Syringe Sample Preparation

- Sample dilution
- Internal standard addition
- Washing
- Overrange dilution

Large Reagent Bottles

Optional Vented Enclosure

ULPA filter option

Dual Overflowing Rinse Stations

Vacuum Pump

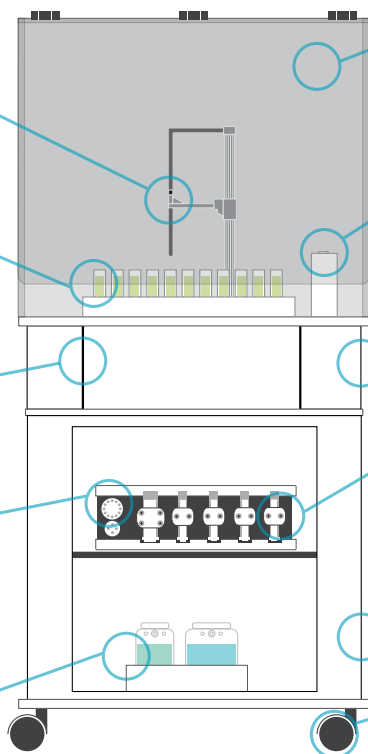
Optional vacuum loaded sampling.
Rapid rinsing & cleaning.

Syringe Sample Loading

Precise sample loading for small samples or multiple reanalysis.

Small Footprint

Portable



Automated micro sample analysis in a difficult matrix

prepFAST M5 with 100 μ L Urine Samples

250 Replicate Urine Analysis
Average RSDs <4%



prepFAST Systems Comparison

prepFAST inline dilution systems automatically perform precise and accurate dilutions for samples and standards, improving laboratory workflow, productivity, and data quality.



SC4 DX Autosampler
with Mobile Station

prepFAST e Provides:

- Autocalibration
- Autodilution
- Auto overrange dilution
- Peristaltic pump driven internal standard addition
- Dilution range: 1-50

prepFAST (prepFAST 2) Provides:

- Autocalibration
- Autodilution
- Auto overrange dilution
- Improved washout and higher throughput
- Syringe-driven internal standard addition
- Dilution range: 1-400

prepFAST M5 Provides:

- Autocalibration
- Autodilution
- Auto overrange dilution
- Precision syringe sample loading for micro or viscous samples
- Best washout performance of any sample introduction system
- Syringe-driven internal standard addition
- Dilution range: 1-400



prepFAST e



prepFAST



prepFAST M5

prepFAST™ Ordering Information

prepFAST Systems Comparison

PerkinElmer offers three versions of prepFAST: prepFAST e, prepFAST, and the prepFAST M5. Compare each system's features below to determine which prepFAST system is right for your lab.

Description	Autocalibration	Autodilution	Auto Overrange Dilution	Syringe-Driven Internal Standard	High Pressure Rinse Ultimate Washout	Micro Volume Sample Analysis	Volatile Organic Solvent Analysis	Dilution Range
prepFAST e	✓	✓	✓					1 - 50
prepFAST	✓	✓	✓	✓				1 - 400
prepFAST M5	✓	✓	✓	✓	✓	✓	✓	1 - 400

NexION 2000P*

prepFAST e

	Part Number
SC2 DX	N8150431
SC4 DX	N8150432
SC8 DX	N8150433
SC14 DX	N8150434

prepFAST

	Part Number
SC2 DX	N8150472
SC4 DX	N8150473
SC8 DX	N8150474
SC14 DX	N8150475

prepFAST M5

	Part Number
SC2 DX	N8150464
SC4 DX	N8150465
SC8 DX	N8150466
SC14 DX	N8150467

NexION 1000 & 2000B/C

prepFAST e

	Part Number
SC2 DX	N8150409
SC4 DX	N8150410
SC8 DX	N8150411
SC14 DX	N8150412

prepFAST

	Part Number
SC2 DX	N8150468
SC4 DX	N8150469
SC8 DX	N8150470
SC14 DX	N8150471

prepFAST M5

	Part Number
SC2 DX	N8150460
SC4 DX	N8150461
SC8 DX	N8150462
SC14 DX	N8150463

* prepFAST upgrade from FAST system supplied with NexION 2000P



prepFAST S5™

Automated Sample Preparation and Introduction System for Semiconductor Applications

The prepFAST S5 has revolutionized the way ultrapure semiconductor grade chemicals are analyzed with ICPMS detection. The prepFAST S5 utilizes syringe-driven flows of UPW, semiconductor grade acids, and standard solution to automate both sample dilutions and standard curve generation. It eliminates manual handling of samples to deliver sub-ppt detection limit capabilities.

prepFAST S5 Features:

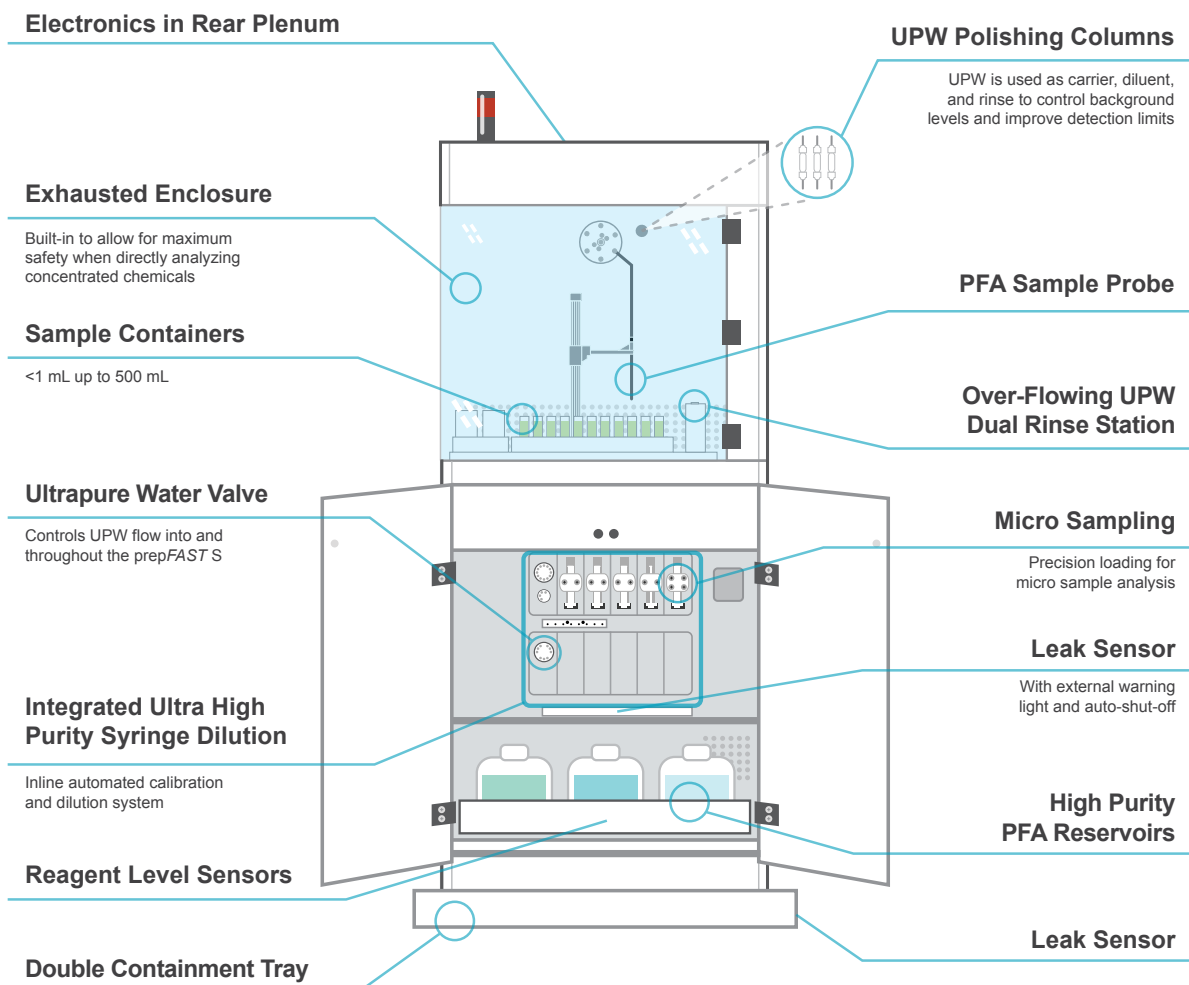
- Automated external and MSA calibrations
- Automated ultraclean sample preparation
- Automated acid addition
- Syringe-driven sample introduction
- Automated sample sensing and method adjustment for viscous samples
- Integrated ultraclean sample environment
 - Includes ultraclean air shower
 - Options include:
 - ULPA filter
 - Sample racks for PFA containers (<1 mL to 500 mL)
- Continuously-flowing high purity UPW rinse (user-supplied UPW)
- UPW polishing columns
- PPT/PPQ detection limits for all semiconductor elements
- Capability to analyze all semiconductor grade chemicals



prepFAST S5
System

prepFAST S5 System for PerkinElmer NexION 1000/2000						
System	Integrated Mobile Autosampler & Enclosure	Integrated FAST valve modules	FAST DXi Module	PFA Nebulizer with Integrated Capillary	PFA Sample Probes	Syringe Pump S500V2
prepFAST S5	✓	✓	✓	✓	✓	✓

prepFAST S5 Features Diagram



Examples of semiconductor chemicals analyzed at the ppt level with prepFAST S5

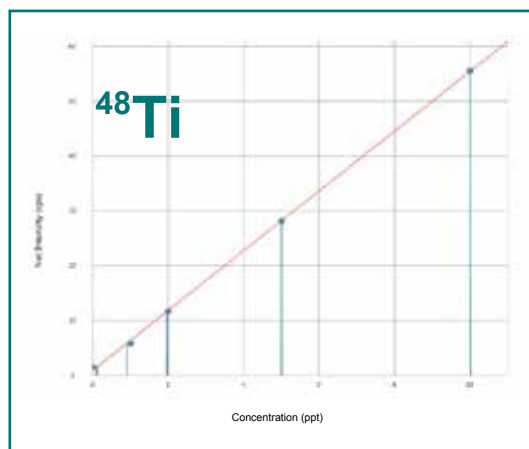
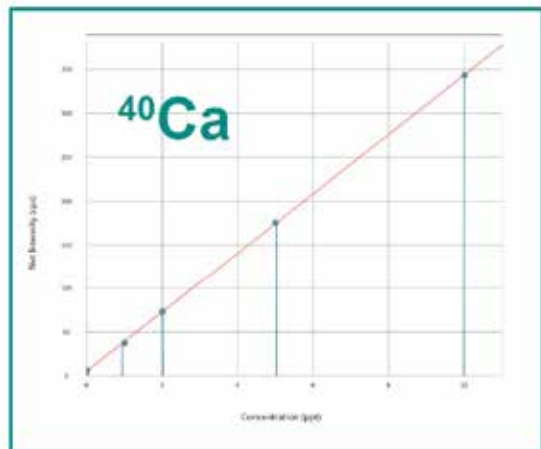
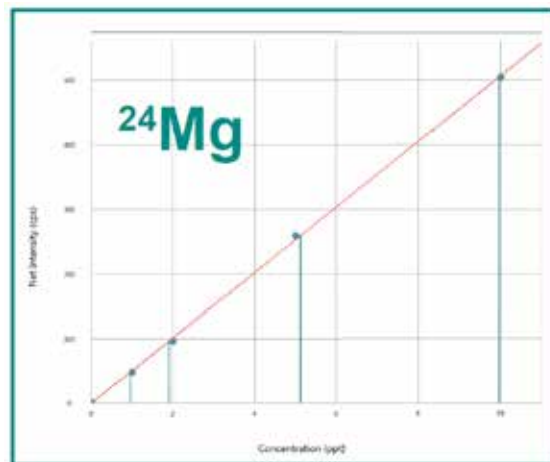
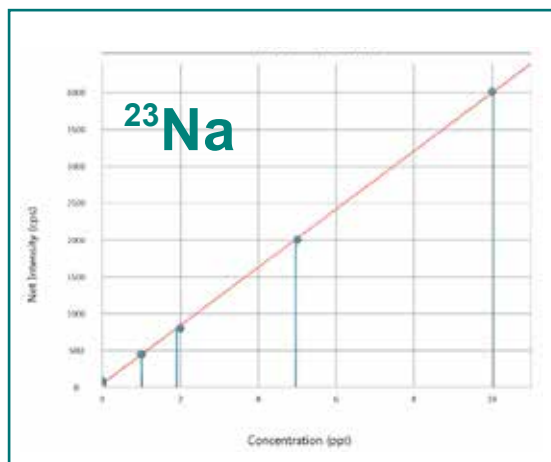
Acids	Bases	Organics
98% H ₂ SO ₄	22% NH ₄ OH	IPA
89% H ₃ PO ₄	2.38% TMAH	PGMEA/PGME
70% HNO ₃	25% TMAH	Photoresist
49% HF	KOH	NMP
35% HCl		Butyl Acetate
30% H ₂ O ₂		Cyclohexanone

This table contains only a partial list of chemicals which can be analyzed using prepFAST S5.



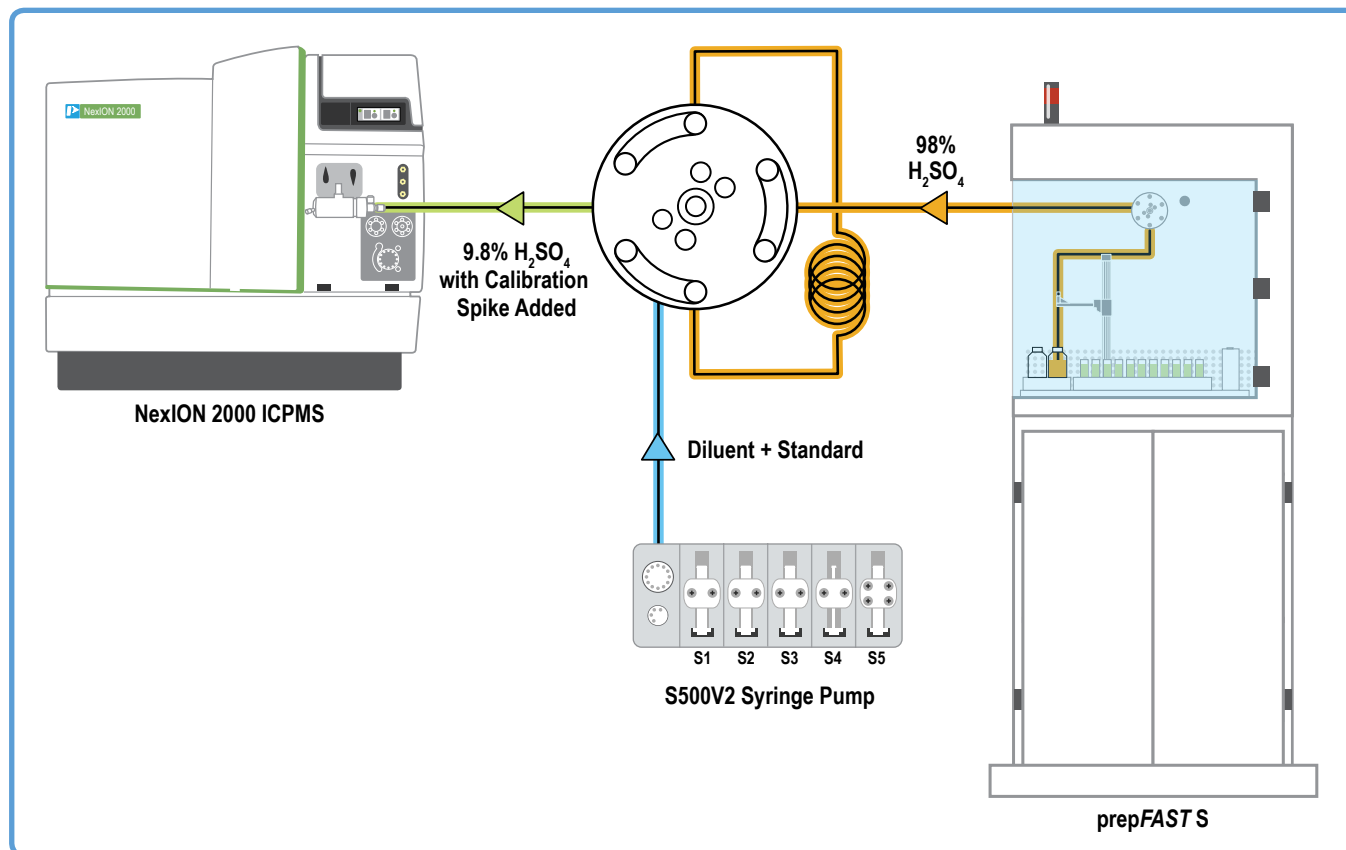
prepFAST S5™

prepFAST S5 Autocalibration at 1, 2, 5, and 10 ppt for Na, Mg, Ca, and Ti in UPW



The prepFAST S5 automatically prepares calibration curves for over 40 elements controlled in semiconductor manufacturing processes. Calibrations are generated by automatically diluting an enclosed multielement stock standard. Automation with the high-purity prepFAST S5 achieves low to sub-ppt calibrations. Combined with the interference reduction modes of the NexION 2000 ICPMS (e.g. DRC, KED and cold plasma modes), the prepFAST S5 delivers ppq range detection of ICPMS accessible elements.

prepFAST S5 Inline Dilution of Semiconductor-grade Chemicals



prepFAST S5 10x inline dilution of concentrated H_2SO_4

The prepFAST S5 allows dilution by volume or weight for all semiconductor-grade chemicals. Metals are quantified using automated inline MSA or external calibration. Automated direct analysis of concentrated chemicals eliminates sample contamination caused by manual dilution into a secondary container.

prepFAST S5 Systems	
Description	Part Number
prepFAST S5, 2 EX system, 2 sample rack capacity	N8150476
prepFAST S5, 4 EX system, 4 sample rack capacity	N8150477
Air Shower with pressure regulator for ultrapure air for 2 EX prepFAST S5 system (spare)	N8145482
Air Shower with pressure regulator for ultrapure air for 4 EX prepFAST S5 system (spare)	N8152673
ULPA (ultrapure air) Filter for 2 EX prepFAST S5 system	*
ULPA (ultrapure air) Filter for 4 EX prepFAST S5 system	*
NexION 1000/2000 White high performance non-HF semiconductor sample introduction kit	N8150037
NexION 1000/2000 Platinum HF-resistant semiconductor sample introduction kit	N8150033
PCH Peltier cooler/heater thermally stabilized inlet system with PFA spray chamber and PFA-ST nebulizer	N8150446

*Contact your sales rep for ordering information



Automated Online Preconcentration of Radionuclides for NexION 1000/2000 ICPMS

The TRUFAST automatically performs online preconcentration of specific radionuclides to reduce matrix-related interferences and enhances signal-to-background in real sample matrices by up to two orders of magnitude. TRUFAST can eliminate lengthy offline sample preparation, speed analytical results, better control blanks, and improve detection limits for radioisotopes by ICPMS.

Various applications are available, including:

Ra

Radium analysis in natural waters: Polyatomic interferences arising from Ba and Sr are automatically removed online using ion exchange techniques, providing extremely low background levels and superb detection limits. (*Cation exchange column, Sr preconcentration column*)

Th, U

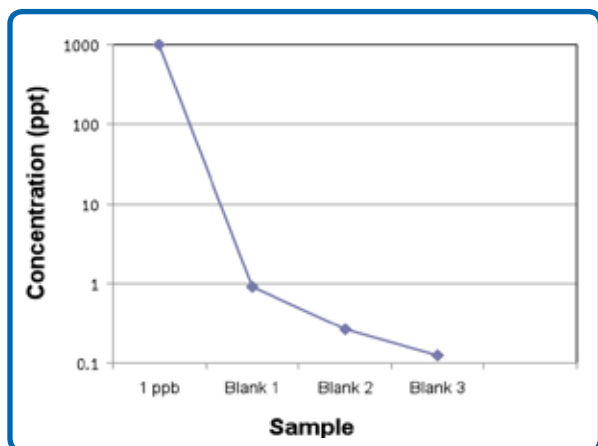
Th in transition metal matrices: Thorium impurities in high purity Cu may be measured by chelating Th while removing the Cu matrix ions via an ion exchange column. Thorium is then eluted and measured in an ICPMS. (*Th/U preconcentration column*)



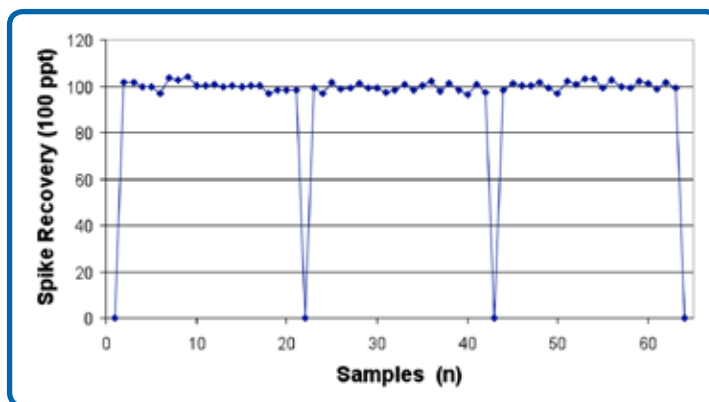
SC4 EX
TRUFAST system

TRUFAST Systems For PerkinElmer NexION 1000/2000

System	SC4 EX FAST	FAST DXi dual valve module	PC ^{3X}	Cation exchange column	Sr preconcentration column	Th/U preconcentration column	Sapphire injector	PFA-ST nebulizer
TRUFAST	✓	✓	✓	✓	✓	✓	✓	✓



Washout analysis of 3 blanks after a 1ppb sample



60 replicate determinations of 100 ppt Th in 1% Cu from three 100 mL sample bottles

TRUFAST System for the NexION 1000/2000

System	Part Number
SC4 EX TRUFAST System	N8150486

Columns for the NexION 1000/2000

Column	Part Number
Ra preconcentration column	N8145230
Sr preconcentration column	N8145231
Th/U preconcentration column	N8145232

Direct ICPMS Analysis of Solid Samples

NWR Series Laser Ablation

Laser Ablation (LA) is a direct, solid sample introduction technique for Inductively Coupled Plasma Mass Spectrometry (ICPMS) and Optical Emission Spectroscopy (OES). LA can be used to directly analyze any solid sample. The sample is accommodated inside an ablation cell and interrogated by a high power, pulsed laser ranging from a few microns (for high resolution spatial analysis) or hundreds of microns (for bulk analysis) in diameter. The aerosol generated is swept to the ICP/ICPMS for subsequent vaporization and ionization via a simple transport line.

The NWR laser ablation platform was designed and developed with an emphasis on superior performance and analytical results, application flexibility, operating convenience and reliability.

Elemental Scientific has a complete laser product portfolio including:

- UV Femtosecond
- Infrared
- 193 nm Eximer
- Imaging Systems
- 213 nm Solid State
- Automated Sampling
- 266 nm Solid State



NWR
Platform

Applications Include*:

Geochemistry
Geochronology
Fluid Inclusions
Elemental ratios
Isotope ratios
Purity testing
Material characterization
Bulk Analysis
Failure Analysis
(Bio-) Imaging/Mapping
Depth Profiling

Materials Include*:

Alloys
Rocks
Minerals
Glasses
Plastics
Powders
Biological
Thin films
Ceramics
Metals



INNOVATION to ILLUMINATE

*The lists above are not exhaustive.

Automated Speciation and Total Metal Analysis System

prepFAST IC combines ultra-clean liquid chromatography technology with the highest performance autodilution system on the market. One prepFAST IC system fully automates calibration and analysis of total metals, or metal speciation or both total metals and metal speciation using ICPMS detection.

prepFAST IC's automated inline dilution capability at the time of analysis eliminates potential species conversion while providing fast, accurate, and reproducible separations.

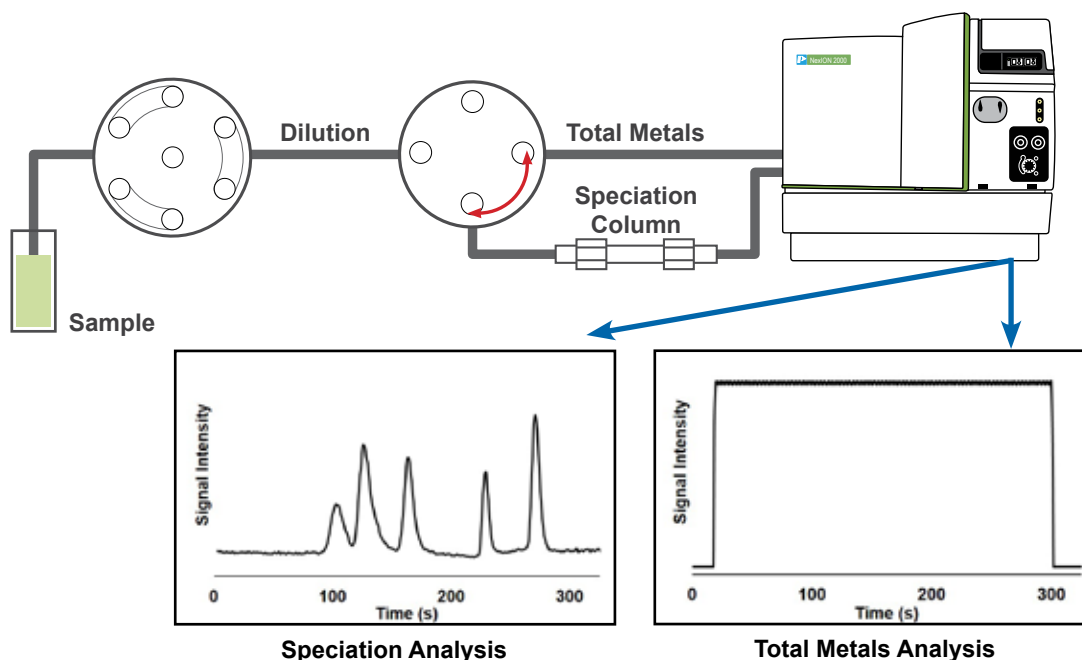
prepFAST IC Features:

- Automated switching between total metal analysis and speciation analysis modes
- Automated sample dilution
- Syringe-driven sample introduction
- Micro sample compatible selectable sample loop loading
- Enclosed mobile station preserves sample integrity
 - Optional ULPA filter
- PFA-ST nebulizer and PFA encased sample probes



prepFAST IC System

Unique Design Supports Unattended Analysis of Both Trace Metals and Speciation



prepFAST IC

Electronics in Rear Plenum

Optional ULPA Filter

Autodilution Module

Ultra High Purity Syringe Dilution:
Inline automated calibration and
dilution system.

Speciation/FAST Injection Valves

Choose between direct
analysis and speciation.

Optional Exhausted Enclosure

Sample Containers

<1mL up to 500mL

High Precision
SC-DX Autosampler

Autodilution Module

Syringe Sample Loading:
For viscous and small
volume samples.

Speciation Module

Ultra High Purity, Metal Free Pump
Gradient Elution
Post-Column:
- Addition of Internal Standard
- Dilution
- Derivatization

Reagent Reservoirs

For autodilution and
elution reagents.

Species Specific Autocalibration

	STD Position	Inline Dilution Factor	Standard Concentration ppt
	1	blank	0
Cr (III)	2	20x	5
Cr(VI) (100ppt)	2	10x	10
100ppt Mix	2	6.6x	15
BLANK	2	5x	20
	2	4x	25
	2	2x	50

prepFAST IC provides autodilution of calibration solutions and samples at the time of analysis. This minimizes effects of species conversion after preparation

prepFAST IC Speciation Kits

Kit Name	Species Separated
Arsenic	As(III), As(V), AsB, AsC, DMA, MMA
Selenium	Se(IV), Se(VI)
Chromium	Cr(III), Cr(VI)
Mercury	Hg ⁺ , MeHg ⁺
Chlorine	Cl ⁻ , ClO ₂ ⁻ , ClO ₃ ⁻ , ClO ₄ ⁻
Bromine	Br ⁻ , BrO ₃ ⁻
Iodine	I ⁻ , IO ₃ ⁻
Halogens	Cl ⁻ , ClO ₂ ⁻ , ClO ₃ ⁻ , ClO ₄ ⁻ , Br ⁻ , BrO ₃ ⁻ , I ⁻ , IO ₃ ⁻

prepFAST IC Systems

Description	Part Number
4 EX prepFAST IC system	N8150435
On-site, 4-day installation and application development for prepFAST IC systems	N8152751



Order online at www.perkinelmer.com/supplies

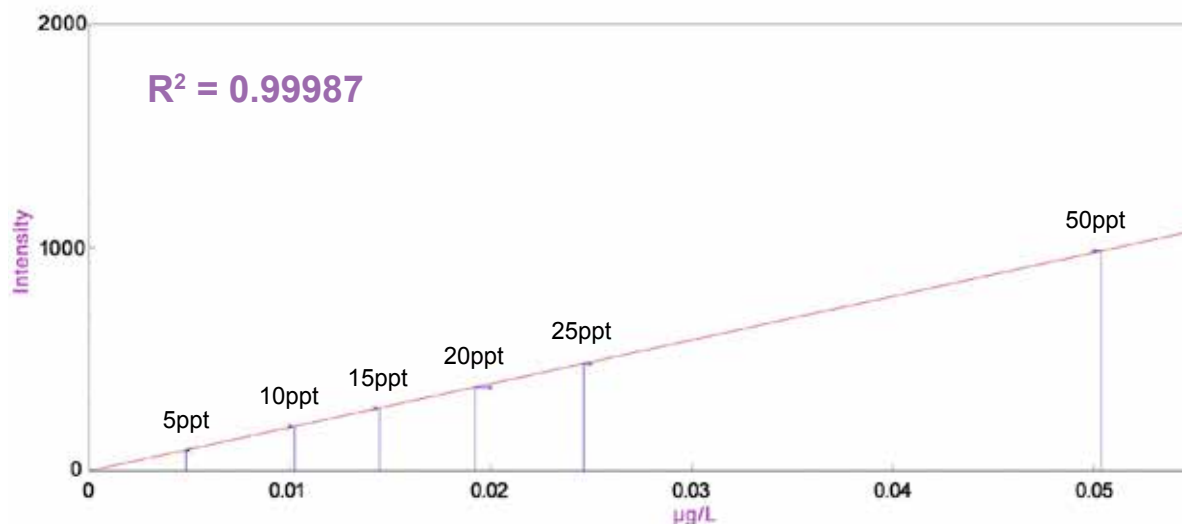


ORDER TODAY

Chromium Speciation

Chromium exists in the environment in several forms which differ significantly in their effects upon organisms. Chromium (III) is often considered as an essential nutrient, but Chromium (VI) is toxic and considered carcinogenic. This makes identification of the specific forms of Chromium present in a sample very critical. The prepFAST IC provides for fast automated analysis of both total and the speciated forms of Chromium.

Cr (VI) Autocalibration



Inline preparation of low level standards from concentrated stock solutions eliminates environmental contamination. This provides linear calibration curves in the single digit ppt range.

Migration Limits for Cr from Toys

Element	Category I (mg/kg)	Category II (mg/kg)	Category III (mg/kg)
Chromium (III)	37.5	9.4	960
Chromium (VI)	0.02	0.005	0.2

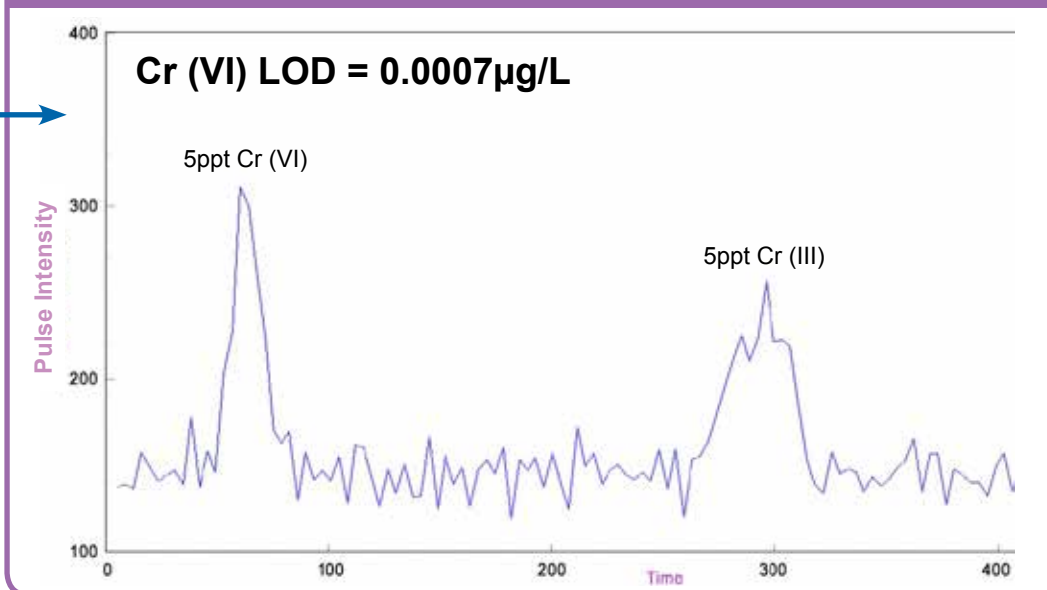
500x dilution

Element	Category I (µg/L)	Category II (µg/L)	Category III (µg/L)
Chromium (III)	75	18.8	1920
Chromium (VI)	0.04	0.01	0.4
Cr (III) / Cr (VI) Max	1875	1880	4800

For 100 mg sample prepared in 5 ml migration solution (EN 71-3:7.4.2.2) with additional 10x dilution at analysis (EN 71-3:F.4) (500x total dilution)

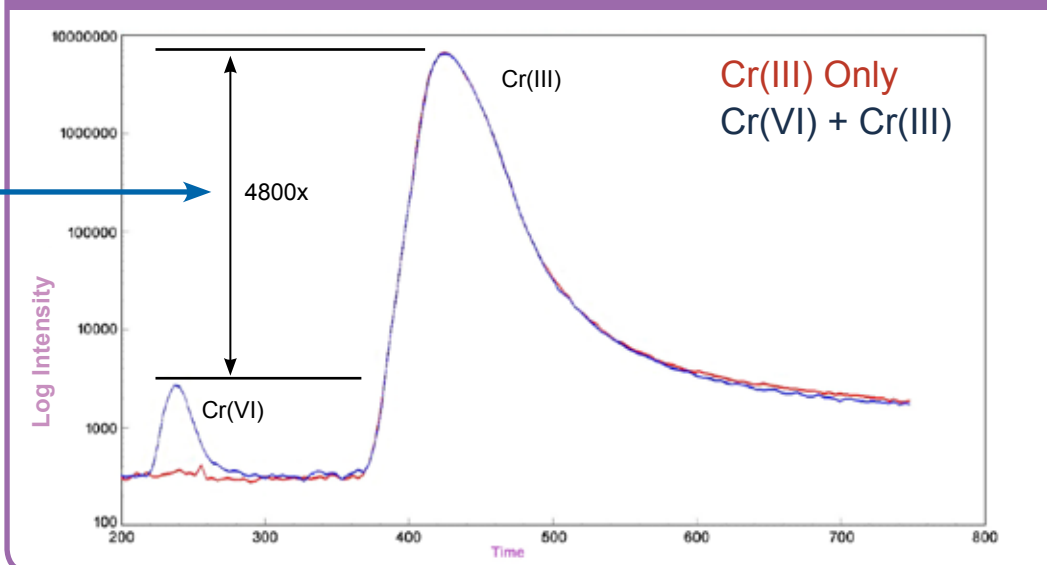
prepFAST IC with NexION 2000 more than meets LOD requirements

Cr (VI) Limit of Detection



Chromatograph illustrates 10ppt Cr (VI) EN 71-3 requirements are easily achieved.

Cr (III) / Cr (VI) > 4800x



Ability to determine Cr (VI)
in 4800 fold excess of Cr (III)

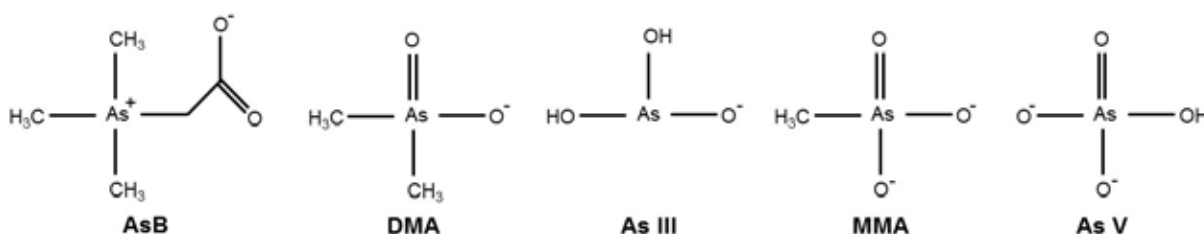
A log scale chromatograph demonstrates more than sufficient resolution to determine Cr (VI) in the presence of 4800x Cr (III). The system automatically applies extra rinse times when Cr (III) levels are high to ensure complete rinse out before the next sample is analyzed.



Arsenic Speciation

Both inorganic forms of Arsenic [As (III) & As (V)] are considered toxic at low levels, while the organometallic forms are much less toxic. Determination of the chemical form(s) of the total Arsenic metal present in a sample is often crucial in sample determinations. The analysis of both total and speciated forms of Arsenic in clinical, pharmaceutical, food, and environmental samples is fully automated with the prepFAST IC.

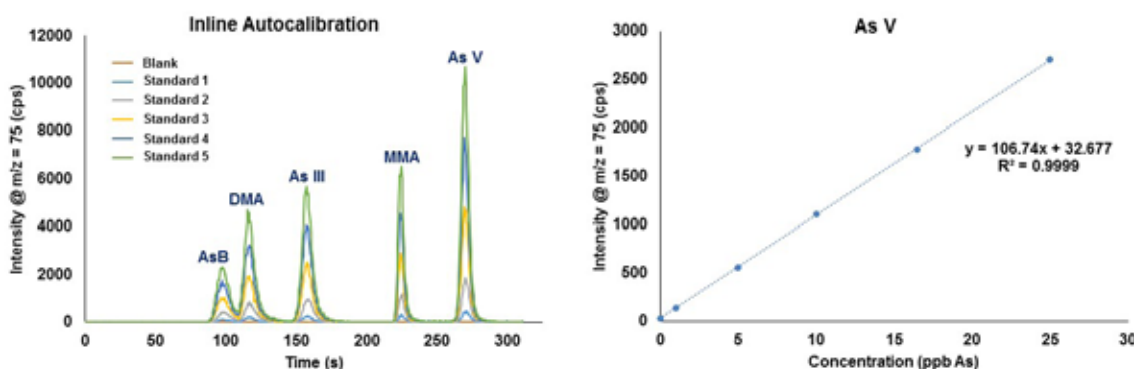
Arsenic Species



Arsenic Species @ pH = 9.6 (Eluent 1 Conditions)

Arsenic Species	Abr.	pKa	Net Charge @ pH = 9.6
Arsenobetaine	AsB	2.2	0
Dimethylarsinic Acid	DMA	6.2	-1
Arsenite	As III	9.2, 12.1, 13.4	-1
Monomethylarsonic Acid	MMA	3.6, 8.2	-2
Arsenate	As V	2.3, 6.8, 11.6	-2

Autocalibration



Limits of detection and quantification

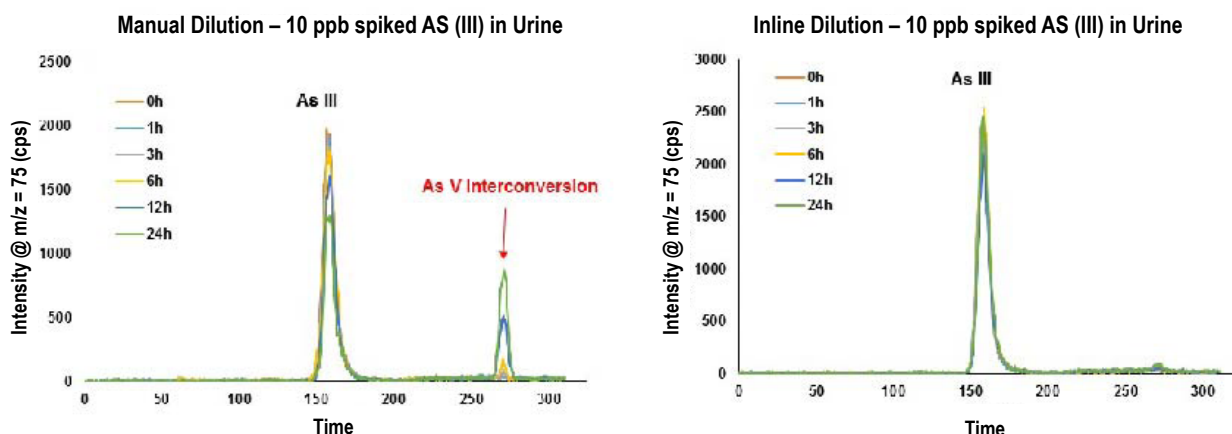
	AsB	DMA	As III	MMA	As V
LOD (ppt)	1.7	0.7	0.6	1.0	0.3
LOQ (ppt)	5.8	2.5	1.9	3.2	1.0

The images on pages 32-33 can be found in the published article referenced below:
 C D Quarles Jr., P Sullivan, M P Field, S Smith, D R Wiederin, Use of an inline dilution method to eliminate species interconversion for LC- ICP-MS based applications: focus on arsenic in urine, J. Anal. At. Spectrom., 2018, 33, 745-751.
 Digital publication: <http://pubs.rsc.org/en/content/articlehtml/2018/ja/c8ja00038g>

Arsenic Speciation – Manual Dilution vs. prepFAST IC Inline Dilution

Several oxidation states of metals are not stable when they are diluted into a different matrix. Below are examples of this effect when standards and samples of Arsenic are manually diluted prior to the speciation analysis. This issue of species conversion in dilutions of standards and samples is addressed by the prepFAST IC, since all dilutions are carried out at the time of analysis.

Inline Dilution Prevents Species Interconversion



% of As III Species Detected Over 24 Hour Study

Manual Dilution	Time (h)	10 ppb As III Spiked Urine Samples		
		As III %	As V %	As III + As V
	0	100.0	0.0	100.0
	1	95.7	0.0	95.7
	3	92.8	0.2	93.0
	6	91.3	1.6	92.9
	12	78.5	12.0	90.6
	24	61.9	21.4	83.4

Inline Dilution	Time (h)	10 ppb As III Spiked Urine Samples		
		As III %	As V %	As III + As V
	0	100.0	0.0	100.0
	1	102.8	0.0	102.8
	3	105.2	0.0	105.2
	6	106.4	0.0	106.4
	12	95.1	0.5	95.6
	24	102.9	1.3	104.2

As III % = (x h As III / 0 h As III) * 100

As V % = (x h As V / 0 h As III) * 100

As III + As V = As III % + As V %

Automated Inline Dilution Improves Recovery (10 ppb As Species Spiked Urine Samples)

	Average % Recovery Over 24 h				
	AsB	DMA	As III	MMA	As V
Manual Dilution	91	90	86	92	94
Inline Dilution	98	94	102	101	105



Automated Seawater Analysis for the NexION 1000/2000 ICPMS

The seaFAST automatically prepares seawater and other high matrix samples for ICPMS analysis in <10 minutes to produce analytical results that might otherwise require time-consuming and contamination-prone offline sample preparation.

The accurate determination of trace metals in seawater is important both for scientific research and environmental monitoring. Because many transition metals and other analytes are present at low to sub-ppt concentrations in seawater, and because the saline matrix suppresses signal and causes mass spectral interferences, it is necessary to separate and concentrate analytes from the seawater matrix prior to ICPMS analysis.

seaFAST S-Series systems are syringe-driven sample introduction systems for multi-mode analysis of high matrix samples. For more complete automation and simple day-to-day usage, the seaFAST SP-Series systems have integrated prepFAST autocalibration and autodilution features.

High Performance:

- Automated preconcentration
- Automated matrix elimination
- Ultraclean ultra-low blanks
- Applicable to seawater, groundwater, brines, or other high matrix samples

seaFAST SP3

- Completely syringe-driven
- Multimode:
 - Preconcentration
 - Direct
 - Hydride
- Autocalibration, Autodilution
- Auto matrix matching
- Auto standard addition
- Ultratrace metals determination in high matrix samples



seaFAST Systems									
System	High Purity Autosampler Enclosure	Syringe Sample Loading	Offline Preconcentration	Online Preconcentration	Direct Mode Inline Dilution	Hydride Mode	Auto-calibration	Auto-dilution	Auto Matrix Matching/ Auto MSA
seaFAST S2	✓	✓	✓	✓	✓				
seaFAST S3	✓	✓	✓	✓	✓	✓			
seaFAST SP2	✓	✓	✓	✓	✓		✓	✓	✓
seaFAST SP3	✓	✓	✓	✓	✓	✓	✓	✓	✓

seaFAST Systems Comparison

seaFAST S2

Preconcentration and Direct Modes:

A chelation column concentrates transition metals and rare earth elements, but allows matrix Na^+ , Cl^- , Ca^{2+} and Mg^{2+} ions to be rinsed out. After the preconcentration step, analytes are eluted and detected. Analytes that are not chelated by the preconcentration column are measured by direct dilution with internal standard during the same analytical run.

seaFAST S3

Preconcentration, Direct and Hydride Modes:

Adds hydride generation to the capabilities of the seaFAST S2 to allow high sensitivity detection of As, Se and other hydride-forming elements.

seaFAST SP2

Preconcentration and Direct Modes with Autodilution:

The capabilities of seaFAST S2 plus autocalibration, autodilution, auto matrix matching, and auto method of standard addition (MSA) in both modes.

seaFAST SP3

Preconcentration, Direct and Hydride Modes with Autodilution:

The capabilities of seaFAST S3 plus autocalibration, autodilution, auto matrix matching, and auto method of standard addition (MSA) in all modes.

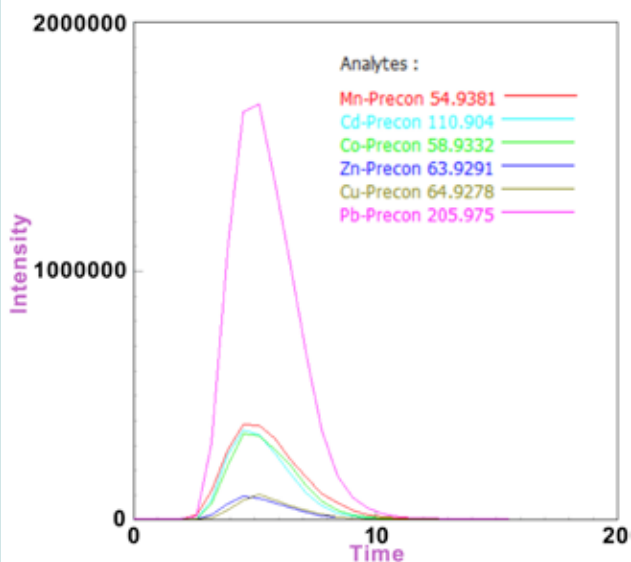
seaFAST

1 H																		2 He
3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne	
11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar	
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr	
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe	
55 Cs	56 Ba		72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn	
87 Fr	88 Ra																	
		Lanthanides	57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu	
		Actinides	89 Ac	90 Th	91 Pa	92 U												

Preconcentration or Direct Mode
 Direct mode
 Hydride or Direct Mode (S3/SP3 only)

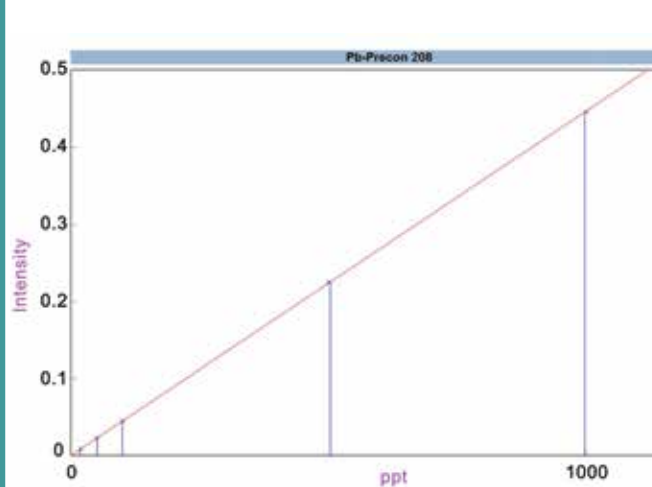


Preconcentration and Matrix Removal



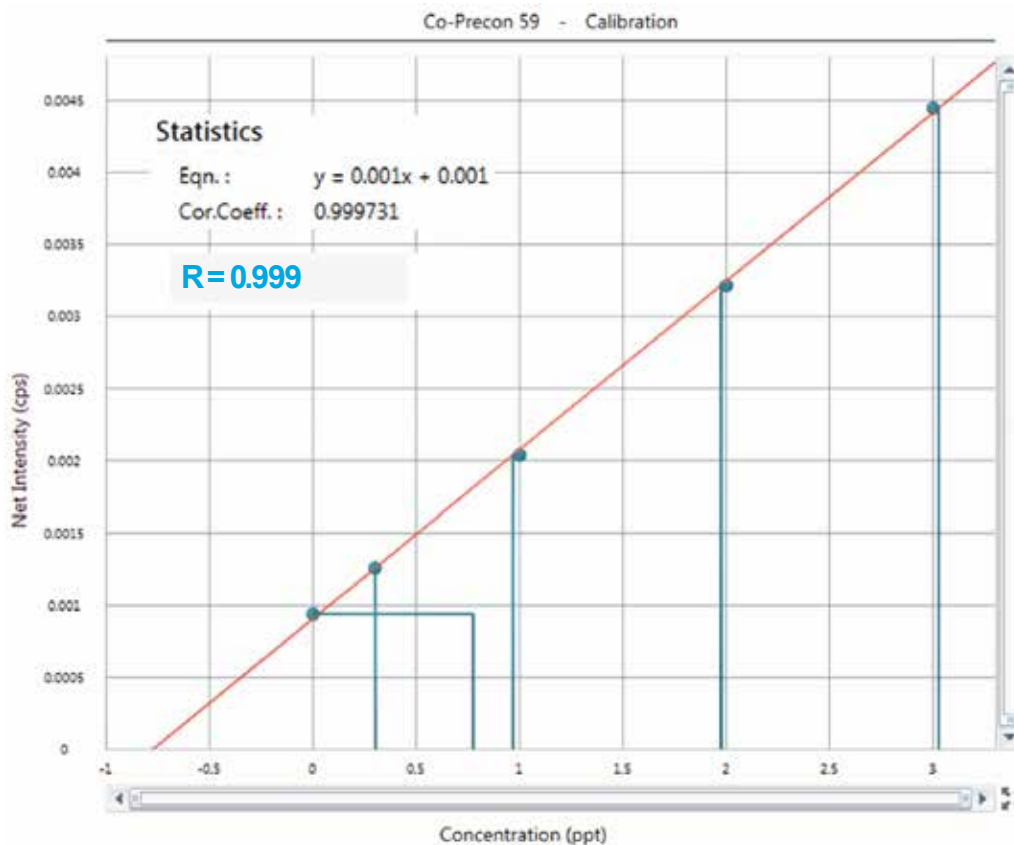
Simultaneous elution of six elements in Preconcentration mode, 1 ppb.

Preconcentration Mode Autocalibration



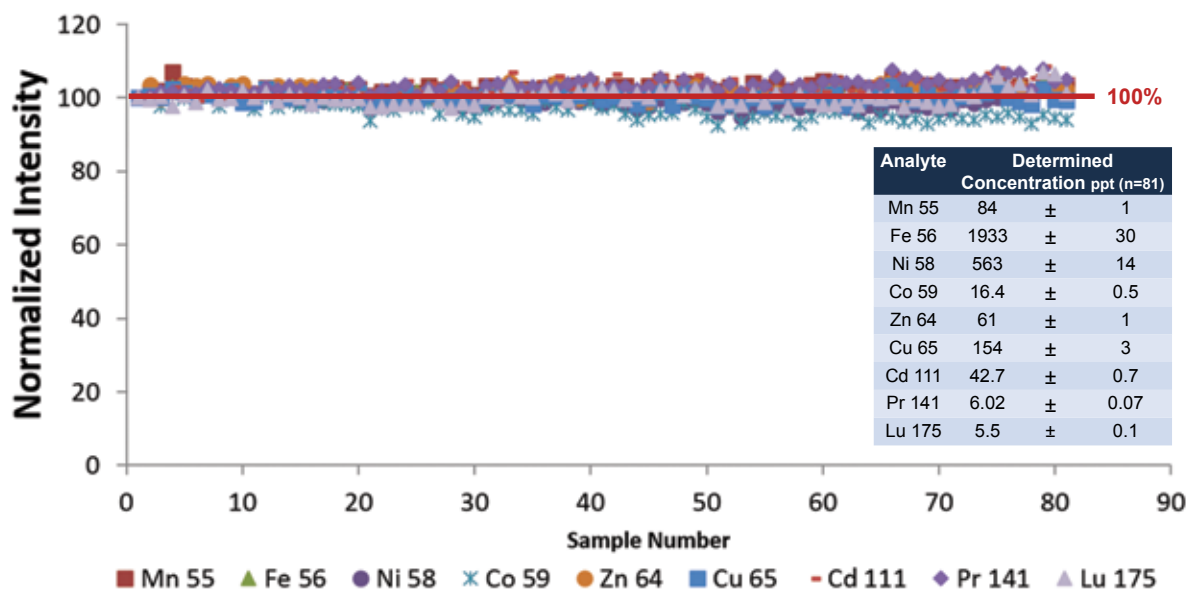
Autocalibrated from a single, 1 ppb standard. Auto Matrix Matched to 3% NaCl with seaBlank.

Automatic Standard Addition Calibrations



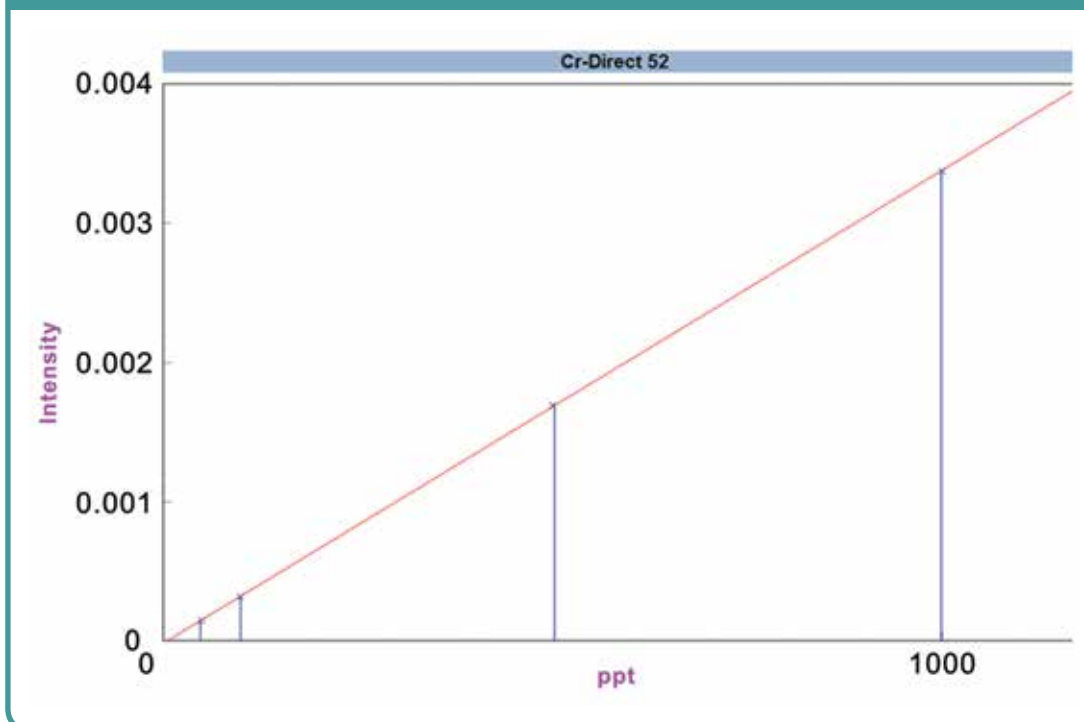
Automatic standard addition (MSA) calibration for Co in GSP North Pacific surface seawater. Analyte concentration is less than 1 ppt. Addition spikes at 0.25 ppt, 1 ppt, 2 ppt, and 3 ppt show seaFAST NexION capabilities to accurately and automatically measure extremely low concentrations of metals in saline samples.

Long-term Stability



Common transition metals and selected rare earth elements (REEs) were determined in synthetic seawater consecutively for over 14 hours (n=81). Auto-matrix-matched blanks and QC standards not shown, for clarity. Average precision over 14 hours was better than 2% with internal standard correction. REEs were spiked at 5 ppt.

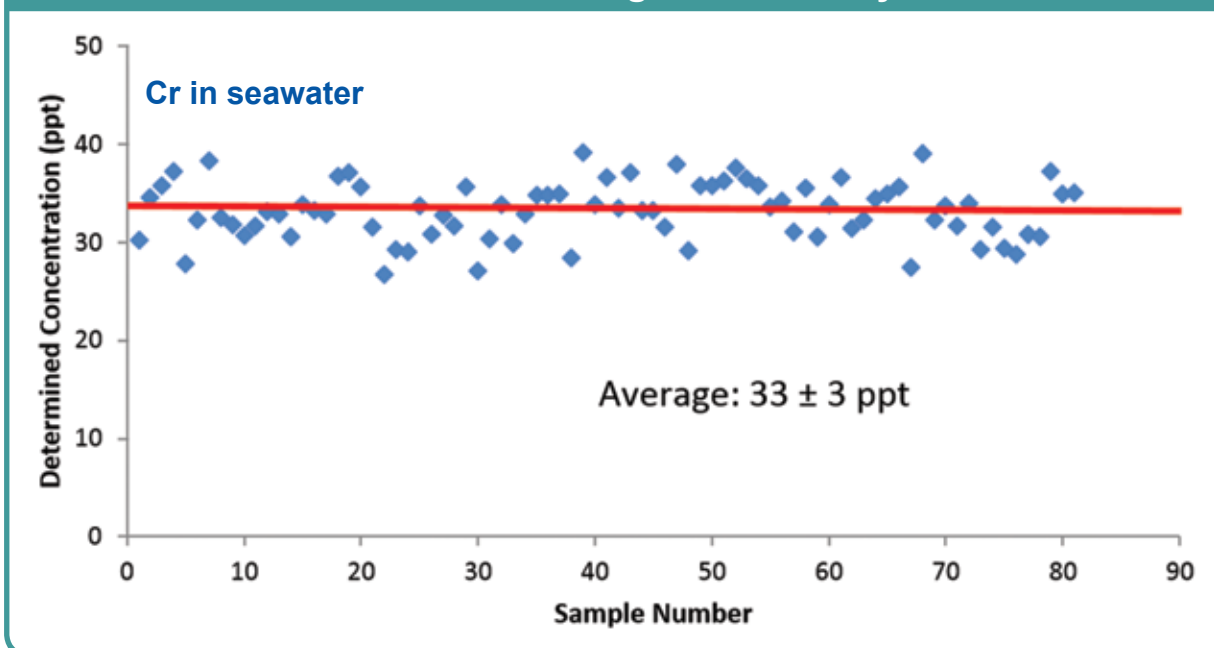
Direct Mode Autocalibration



Autocalibrated from a single, 1 ppb standard. Auto Matrix Matched to 3% NaCl with seaBlank.

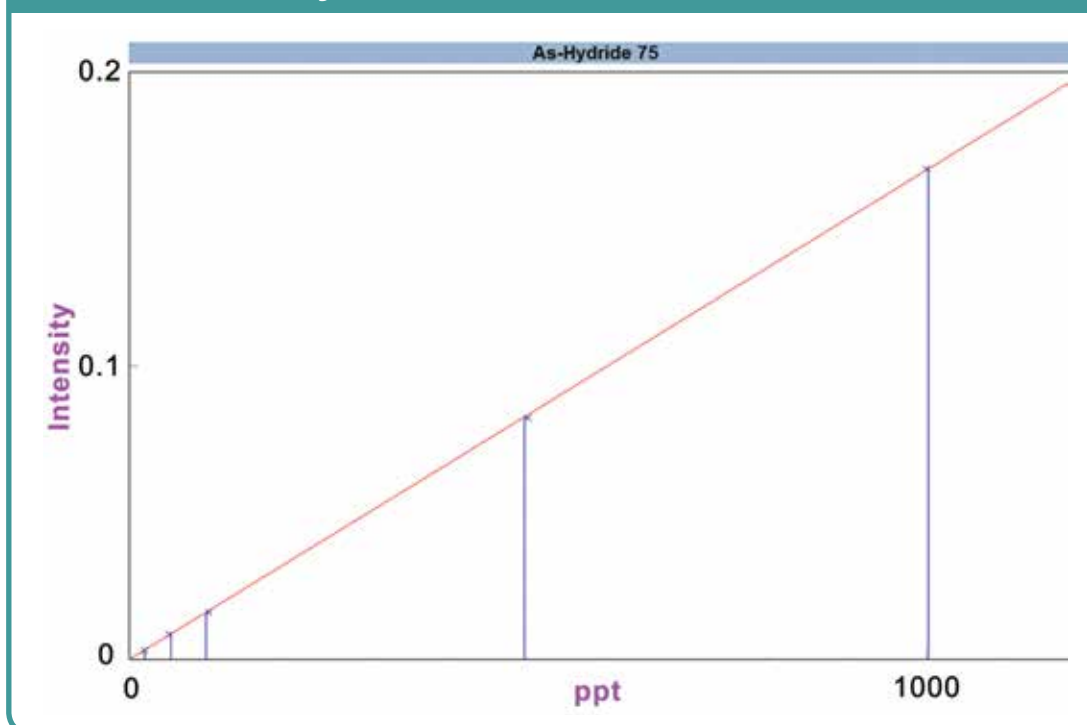


Direct Mode Long-term Stability



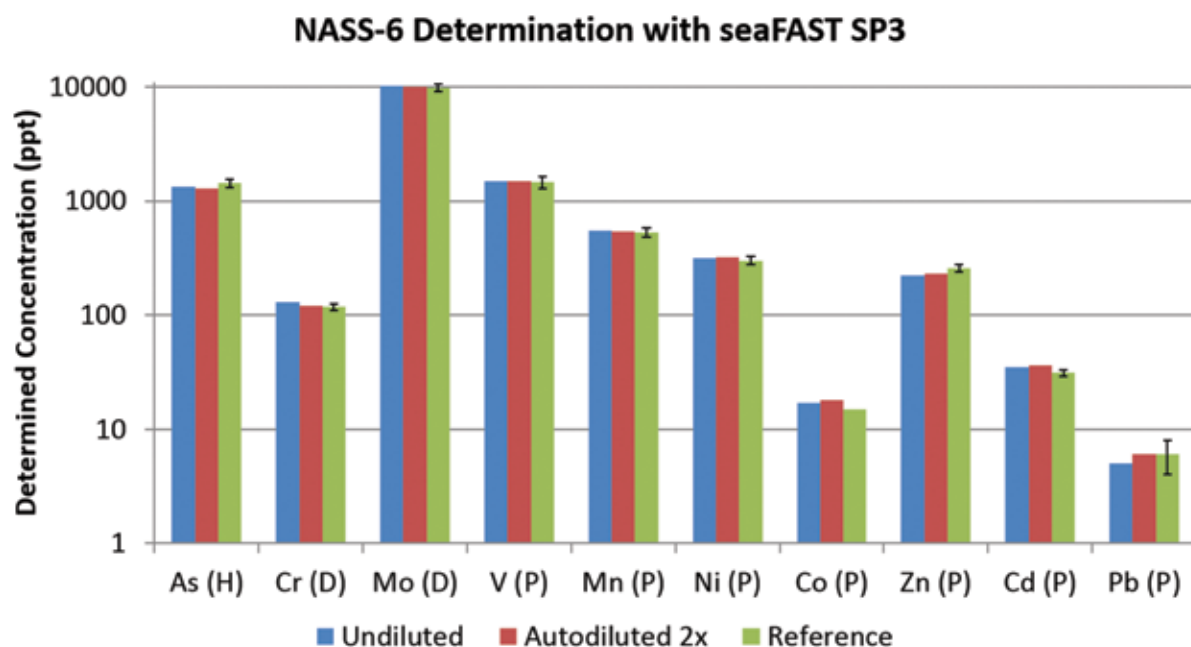
Cr in synthetic seawater. >14 hours of repeated determinations with internal standard correction. Direct mode with 10x inline dilution. Determined concentration was 33 ± 3 ppt.

Hydride Mode Autocalibration



Autocalibrated from a single, 1 ppb standard. Auto Matrix Matched to 3% NaCl with seaBlank.

NASS-6 Determination with seaFAST SP3



NASS-6 was analyzed in all three modes, Preconcentration (P), Direct with 10x inline dilution (D) and Hydride (H). NASS-6 was run undiluted and with a 2x autodilution using automatic, inline matrix matching with seaBlank ultrapure sodium chloride solution. The seaFAST achieves excellent accuracy in all three modes, with and without autodilution.

Now with Syringe-driving Sample Loading

All seaFAST systems now include syringe-loading capability to ensure samples and standards are loaded accurately each and every time. Eliminate variable vacuum-loading times for samples with varying viscosities and simplify daily operation.

For offline preconcentration mode, the smaller-volume eluted fraction may be accurately syringe-loaded for analysis by seaFAST Direct mode.

seaFAST Systems

Description	Part Number
seaFAST S2 system	N8150414
seaFAST S3 system	N8150415
seaFAST SP2 system	N8150416
seaFAST SP3 system	N8150417

seaFAST System Columns

Description	Part Number
Spare seaFAST analytical and cleanup column	N8145073
P-type seaFAST analytical column for enhanced Ag determination	N8145480
P-type seaFAST cleanup column for enhanced Ag determination	N8145479

seaFAST System Reagents

Description	Part Number
seaBlank 10.5% ultrapure NaCl, 500 mL	N8145401
seaFAST S-Series Ultrapure buffer, 1 L	N8145472



Single Cell Sample Introduction

Single Cell Sample Introduction for NexION 1000/2000

The NexION ICP-MS Single Cell Analysis System, offers a first-to-market complete solution to quantitatively measure the metal content in individual biological cells. In a single analysis and without subsequent data processing the system can determine cell metal or particulate content, cell-containing metal concentration, mass per cell, and mass distribution.

Laboratories analyzing metal content in cells use the single cell application tool to differentiate and quantify the media and cellular fractions of the same analyte. This includes measuring the intrinsic metal content of the cell, content from bioaccumulation of metals or metallic nanoparticles in solution.

NexION 1000/2000 SMARTintro Single Cell Solution

Perkin Elmer's Single Cell ICP-MS Sample Introduction Kit is compatible with all NexION 1000 & 2000 ICP-MS systems.

Includes:

- Syngistix™ ICP-MS Single Cell software module
- Proprietary Asperon™ Spray Chamber
- HEN Single Cell Nebulizer, torch, and injector
- Additional consumables



Asperon Single Cell Spray Chamber: N8152493

Asperon Single Cell Spray Chamber

The Asperon™ Spray Chamber, part of PerkinElmer's NexION® ICP-MS Single Cell Analysis System, is a proprietary sample introduction system that ensures cells are delivered intact to the ionization source for single cell analysis.

Single Cell HEN Nebulizer

The Single Cell HEN MicroFlow High Efficiency Nebulizer is specially designed to convert liquid samples to aerosol at sample liquid flow rates as low as 10 µL/min while minimizing rupture of biological cells. Combined with the Asperon Spray Chamber the HEN Nebulizer delivers cells intact to the ionization source.



Single Cell HEN Nebulizer: N8152496

Single Cell MicroFAST DX

Single Cell MicroFAST DX Autosampler

The Single Cell Micro DX Autosampler is a microfluidic automation platform for precise microliter sampling of limited-volume samples.

The Single Cell Micro DX Autosampler for the NexION 1000/2000 ICPMS gently agitates the sample, precisely and accurately loads the sample loop, and smoothly delivers the content of the loop to a MicroFlow high efficiency nebulizer (HEN) at defined rates from 10-100 $\mu\text{L}/\text{min}$. It ensures reliable delivery of intact cells to the ICP plasma while minimizing sample uptake and wash time.

Benefits:

- Enables single-digit microliter sample handling
- Allows cell resuspension through user-defined agitation protocol
- Engineered to fit most microplates



Single Cell MicroFAST DX Autosampler: N8150039

Single Cell MicroFAST for NexION 1000/2000	
Description	Part Number
Asperon Single Cell Spray Chamber	N8152493
Single Cell HEN Nebulizer	N8152496
NexION 1000/2000 Single Cell Sample Introduction System	N8150061
Single Cell MicroFAST DX Autosampler	N8150039

Microplates pp 94-95



hydrideICP™

Compact Hydride Generation System for NexION 1000/2000 ICPMS

The hydrideICP, a standalone hydride generation system with precision micro peristaltic pump, provides ultralow detection limits for hydride-forming elements such as As, Se, Sb, and Hg.

Benefits:

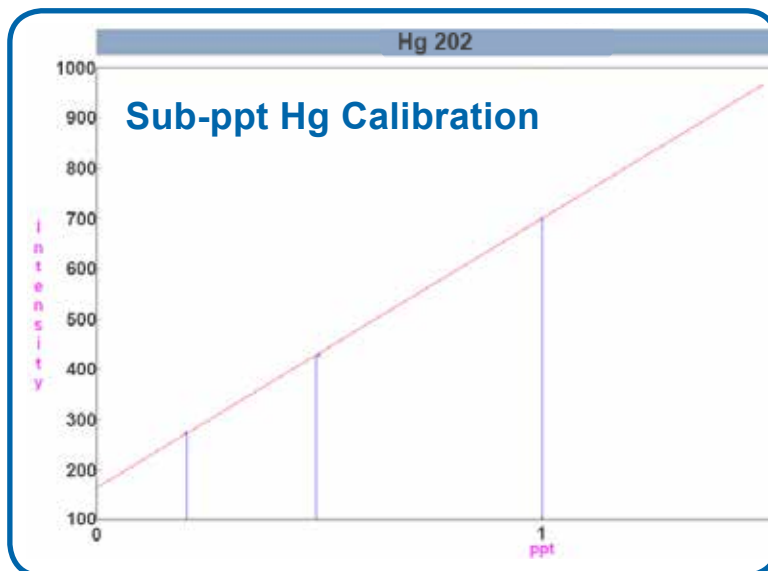
- Increased sensitivity, up to 100x for hydride-forming elements
- Improved detection limits for As, Hg, Se, Sb, and other hydride-forming elements
- Improved stability
 - MP² micro peristaltic pump precisely mixes sample and reagents, producing a stable formation of H₂ gas and hydrides
- Compact
 - hydrideICP is the smallest system of its kind on the market (95 mm x 118 mm x 140 mm)
- Chemically resistant construction
 - MP² micro peristaltic pump with ceramic pins, a PFA mixing block and quartz GLS
- Convenient
 - hydrideICP is completely integrated into the MP² pump



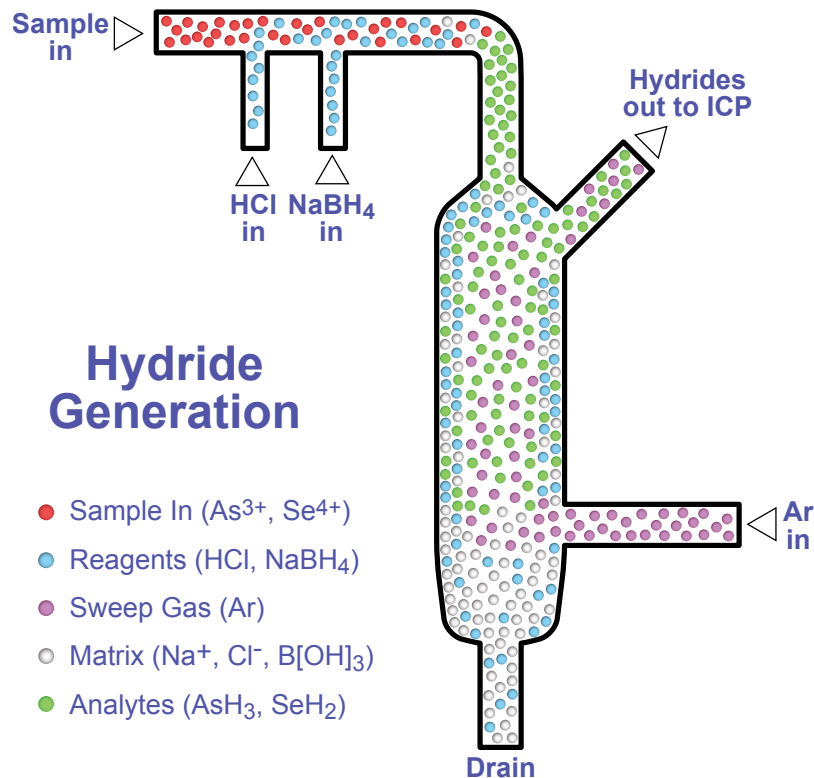
hydrideICP system



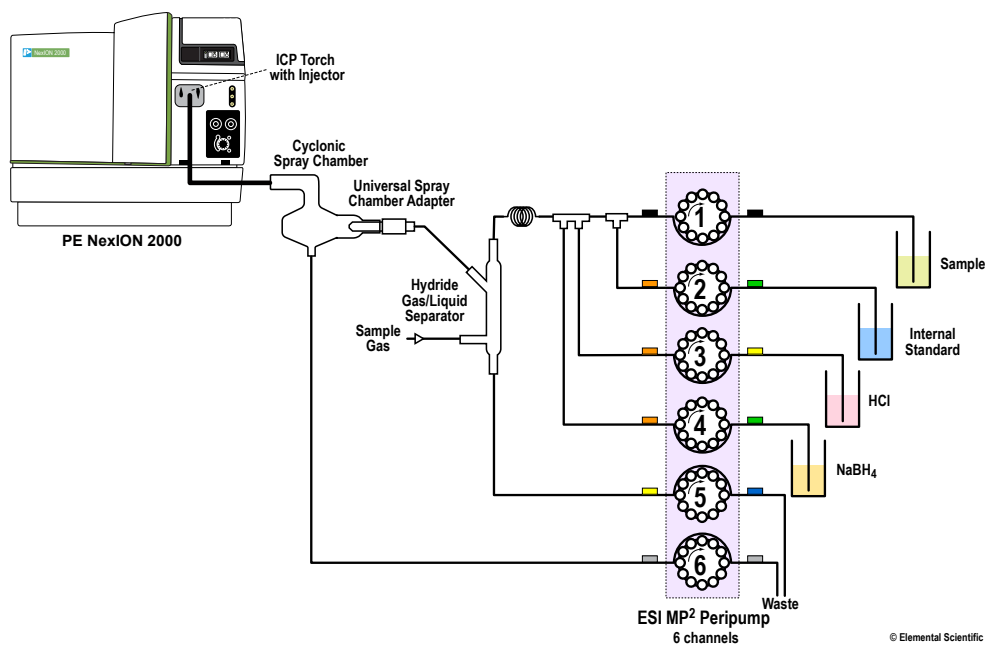
The universal spray chamber adapter is a gas-liquid separator to the NexION 1000/2000 spray chamber.



hydrideICP greatly increases Hg sensitivity, over 500 cp/s for 1 ppt Hg.



HydrideICP's gas liquid separator is the smallest, highest performing and most stable on the market. The design promotes rapid mixing of sample and reagents, resulting in an efficient reaction and separation of hydride gases from sample liquids in a small volume.



hydrideICP with internal standard system diagram

Description	Part Number
hydrideICP hydride generation system. hydrideICP Generator Kit (Hydride quartz gas-liquid separator, four way tee, MP ² precision micro peristaltic pump, universal spray chamber adapter and mounting plate).	N8122470



hydride S31™

Hydride Generation with hydride S31 FAST

The hydride S31 is a compact, syringe-driven hydride generation system that produces ultra-low detection limits for hydride-forming elements.

The 3-in-1 syringe barrel on the syringe module provides pulse-free reagent delivery for the best precision, and the patent-pending hydride gas liquid separator provides high sensitivity. The FAST sample valve in the S31 system provides high sample throughput and excellent analyte washout.



hydride S31 system for the NexION 1000/2000 ICPMS

Design Features:

- Syringe-driven reagents for hydride generation; no peristaltic pump reagent lines to replace
- FAST for high-throughput and excellent washout
- Sub-ppb detection limits for hydride-forming elements
- Simple operation with NexION 1000/2000 ICPMS and SC-DX autosamplers

hydride S31 for the PerkinElmer NexION 1000/2000 ICPMS				
Detection limits (3s) for hydride-forming elements (in hydride mode)	Analyte	Mass	LOD (ppb)	Mode
	As	75	0.0003	STD
	Se	80	0.0006	DRC-NH3
	Sb	121	0.0007	DRC-NH3
	Hg	201	0.0001	STD

hydride S31

Hydride-forming elements, analyzed in hydride or nebulization modes

Direct nebulization elements

1 H																	2 He		
3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne		
11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar		
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr		
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe		
55 Cs	56 Ba			72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn	
		57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu			
		89 Ac	90 Th	91 Pa	92 U														

hydride S31

Hydride-forming elements, analyzed in hydride or nebulization modes

Direct nebulization elements

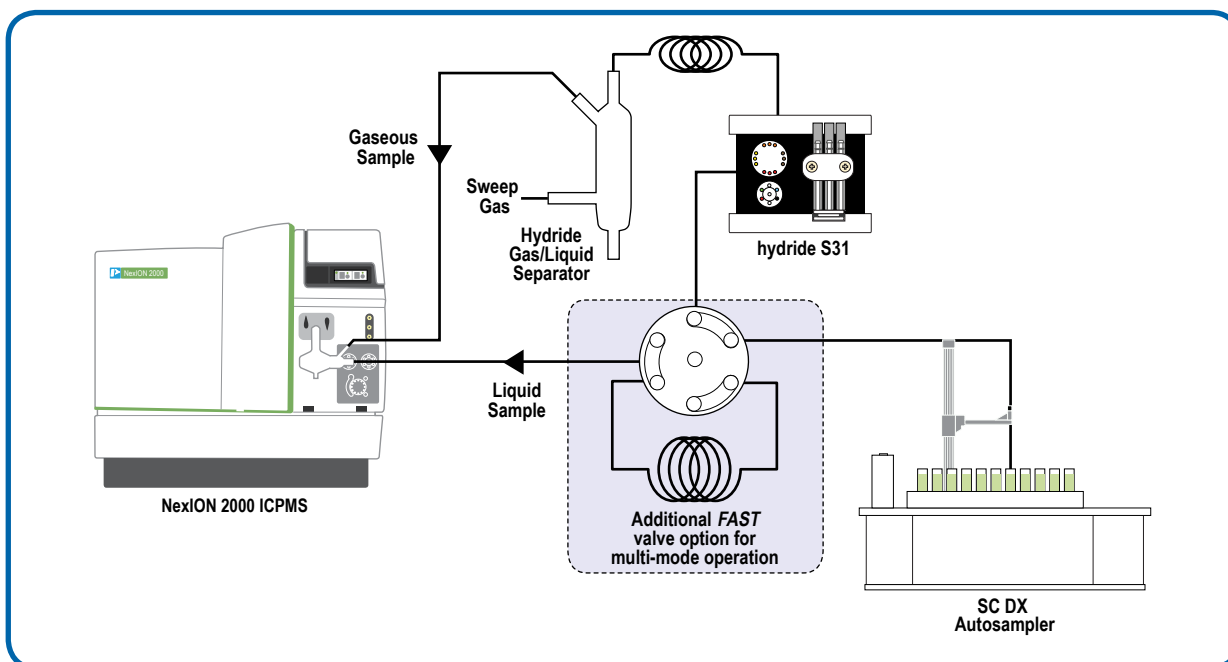
Simultaneous Hydride Generation and Direct Nebulization with hydride S31

The integration of an additional *FAST* valve provides multi-mode functionality to the hydride S31 and the NexION 1000/2000 for the highest flexibility and sample throughput.

- Selection between the following modes of operation:
 - Simultaneous determination of hydride-forming elements with hydride generation and direct nebulization for other elements
 - Hydride and direct nebulization determinations run sequentially
 - Independent analysis by either hydride or direct nebulization



Single Valve *FAST* DXi for NexION 1000/2000 ICPMS required for simultaneous hydride and direct nebulization option (not included)



Hydride S31 configuration with additional *FAST* valve for high throughput multi-mode analysis. Non-hydride forming elements are analyzed through the Liquid Sample pathway using a nebulizer. Hydride forming elements benefit from high sensitivity hydride generation through Gaseous Sample pathway. The NexION 1000/2000 acquisition can be configured to analyze interfered elements (such as As, Se) when the nebulizer is introducing carrier liquid, thus avoiding Cl or other polyatomic interferences. Hydride S31 can also be operated simultaneously or sequentially with direct nebulization.

hydride S31 System	
Description	Part Number
hydride S31 module for any DX <i>FAST</i> system. Includes S31 module for hydride generation. (SC DX <i>FAST</i> autosampler and N8145562 spray chamber required, not included)	N0786018
Quartz AMS Hydride spray chamber; includes matrix gas port, AMS metal-free matrix gas line, additional hydride port, and drain line (see page 60)	N8145562

Turn ANY DX *FAST* System Into a hydride S31 System!

Just add the hydride S31 module



SmartTuner

SmartTuner

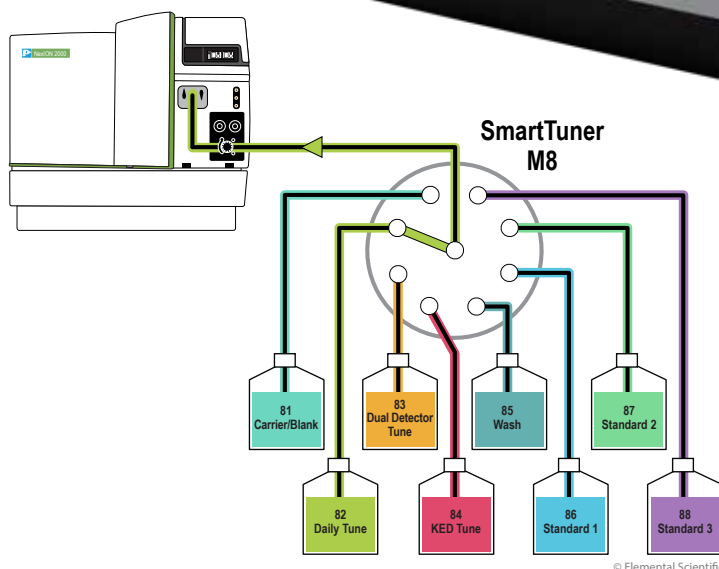
Automated Tuning, Rinsing, and Calibration for NexION 1000/2000 ICPMS

The SmartTuner combines a multiposition valve with the NexION SmartTune software to automatically perform daily tuning and dual detector calibration. SmartTuner provides rapid and automated ICPMS calibration from standard solutions kept in enclosed bottles protected from evaporation and contamination. The SmartTuner can also supply custom rinse solutions, organic solvents, and even chromatography eluents to the ICPMS. Solutions can be changed on the fly, without manual probe movements.



SmartTuner Features

- Automated daily tuning
- Automated dual detector calibration
- Automated ICPMS calibration from large standard reservoirs
- Delivery of special rinse solutions, organic solvents, and chromatography eluents
- NexION Scheduler allows for true automated instrument startup, tuning, and calibration routines



SmartTune Scheduler








The screenshot displays the SmartTune Scheduler software interface. At the top, there are tabs for 'Syngistix' and 'Applications'. Below these are several functional buttons: 'Control Diagnostics', 'SmartTune Conditions LogBook', 'Method Sample Dataset', 'Reporter Realtime Interactive CalibView', 'Scheduler', 'Review', 'Radiant', and 'Status: Not installed'. The 'Scheduler' tab is active, showing a table of tasks.

<input checked="" type="checkbox"/>	Task	Details	Status
<input checked="" type="checkbox"/>	AutoStart	7/4/2019 5:26:24 AM	
<input checked="" type="checkbox"/>	Warm-up	30 minutes	
<input checked="" type="checkbox"/>	SmartTune	SmartTunerM8 Daily.swz	
<input checked="" type="checkbox"/>	Wait		
<input checked="" type="checkbox"/>	Analyze Samples	Example.sam	
<input checked="" type="checkbox"/>	Wash	15 minutes	
<input checked="" type="checkbox"/>	AutoStop		

SmartCalibration with SmartTuner

- Place calibration standards in the provided bottles, and the SmartTuner becomes the SmartCalibrator
- Calibration standards are automatically pumped into NexION 1000/2000
- Autosampler space not used for calibration standards
- Refill calibration standards less often

Report View

Current Sample	Raw Intensities	Net Intensities	Concentrations	Unfactored Concentrations	Internal Standards	QC		
<input type="checkbox"/> Show RSDs								
	Sample Id	V 51 (ppb)	Co 59 (ppb)	Sr 88 (ppb)	Cd 111 (ppb)	Ba 138 (ppb)	Pb 208 (ppb)	U 238 (ppb)
1	Blank							
2	5	4.976	5.175	5.017	5.007	5.207	5.125	5.080
3	10	9.957	10.165	9.919	10.036	10.185	9.991	10.136
4	50	49.506	48.799	49.093	49.249	48.711	49.970	50.684
5	100	100.252	100.575	100.461	100.372	100.616	100.010	99.640
6	Calibration Curves							
7	5ppb QC	5.034	5.206	4.939	5.103	5.100	5.140	5.167
8	Blank QC	0.010	0.009	0.016	0.032	-0.030	-0.012	0.005

SmartTuner multielement calibration



SmartTuner Rack

SmartTuner rack with (1) 500 mL bottle, (3) 125 mL bottles, (4) 50 mL vials. Eight PTFE sample probes are included with each SmartTuner.

SmartTuner Requires a SC DX Autosampler For Operation

Description	Part Number
SmartTuner M8 for NexION 1000/2000. (DX autosampler required, not included). Includes chemically inert PTFE SmartTuner tray.	N8150480
Simplify and automate reagent-selection for daily, weekly, and monthly optimization procedures for NexION. Easily switch between different solvent types.	



Autosampler Enclosures and ULPA Filtered Environments

Autosampler Enclosures

Enclosures protect samples and standards from airborne contamination. An exhaust port (100 mm, included) may be connected to the laboratory ventilation system to exhaust acid fumes and protect the laboratory environment and equipment. Enclosures can be purchased with or without an ULPA filter.



N0777208
Enclosure for DX autosampler with
ULPA Filter (autosampler not included)

Autosampler Model	Enclosure Only	Enclosure with ULPA Filter
Enclosure for 2 DX	N0777209	N0777208
Enclosure for 4 DX	N0777210	SC-1407-DX-1200
Enclosure for 8 DX	N0777347	N0777346
Enclosure for 14 DX	N0777325	N0777041

See pages 104-105 for dimension specifications

Ultra-Low Particulate Arrester Air Filter and Mounting Plate

The ULPA filter creates a clean, positive pressure environment for samples and standards and prevents airborne contamination. The ULPA filter removes 99.999% of 0.12 micron particles.

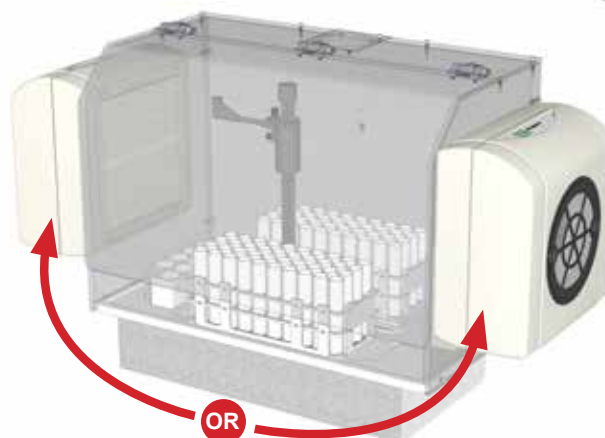
ULPA Filter Specifications

Air Volume	Noise level	Power
1 m ³ /min	56 dBA	25W

Description	Part Number
ULPA filter for autosampler enclosure	N8145081
ULPA filter mounting plate for 2 DX or 4 DX	N0777831

The ULPA filter mounting plate fits the 2 DX and 4 DX on either the right or left side of the enclosure.

N8145081
ULPA Filter



Mobile Stations for 2 DX and 4 DX Autosampler

2 DX and 4 DX Mobile Autosampler Stations

The mobile autosampler station provides a small-footprint platform for the 2 DX or 4 DX.

Benefits:

- Mobile with locking wheels for flexible positioning
- Convenient location for rinse and waste containers
- Shelf for additional sample introduction equipment, such as prepFAST



N0777206 mobile station with 2 DX autosampler



N0777748 mobile station with 4 DX autosampler

Description	Part Number
Mobile autosampler station for 2 DX including electrical conduit for D-type valves (autosampler not included)	N2024021
Mobile autosampler station for 2 DX (autosampler not included)	N8145574

Description	Part Number
Mobile autosampler station for 4 DX including electrical conduit for D-type valves (autosampler not included)	N2024041
Mobile autosampler station for 4 DX (autosampler not included)	N8145575



Storage space for racks, solutions and accessories



Accessible rinse bottle can be refilled in place



NexION 1000/2000

SMARTIntro Black Solution



*Black productivity
torch cassette and
spray chamber*

FAST DXi



PC^{3X} Peltier
Cooler/Heater

PerkinElmer introduces NexION 1000/2000 Black Productivity Solution. Engineered with *FAST* capabilities, this high-performance system utilizes superior components and Peltier chiller to maximize accuracy, precision, and ICPMS productivity.

Features

- Just add a DX Autosampler for a complete *FAST* system and increased throughput
- Increased accuracy and precision
- Ability to quickly change sample introduction hardware

Description	Part Number
NexION 1000/2000 Black productivity high throughput sample introduction solution (DX autosampler required, not included)	N8150036



PerkinElmer[®]

PFA and Polypropylene ST-Nebulizers

PFA and Polypropylene High-Efficiency MicroFlow Nebulizers for the NexION 1000/2000 ICPMS

MicroFlow nebulizers are resistant to clogging and are reliably self-aspirated or pumped to produce a fine aerosol for high transport efficiency and high sensitivity.

PFA-ST Nebulizers

The PFA-ST MicroFlow nebulizer is made from high purity, HF resistant PFA. It has an exchangeable external sample uptake capillary. The sample uptake rate is controlled by the diameter of the external capillary or probe.

Benefits:

- All PFA construction
- Exchangeable uptake capillaries allow one nebulizer to be used at different self-aspiration rates from 20 $\mu\text{L}/\text{min}$ to 700 $\mu\text{L}/\text{min}$
- Chemically resistant – ideal for strong acids, alkalis and organics
- Can be pumped from $< 0.02 \text{ mL}/\text{min}$ to $3.0 \text{ mL}/\text{min}$
- Direct analysis of volatile and non-volatile organic solvents
- Longer lifetime than glass or quartz nebulizers

Description	Application	Part Number
ST3 MicroFlow PFA nebulizer with external 1/4-28 threaded connector and gas line.	For general high sensitivity and high performance	N8152378
PFA-ST for prepFAST self-aspirating nebulizer with external 1/4-28 threaded connector and gas line.	prepFAST	N8152576
PFA MicroFlow high solids large bore nebulizer with external 1/4-28 threaded connector and gas line. Ideal for strong acids, high solids, alkalis, organic solvents, soils and high salt solutions.	High solids samples	N8152577

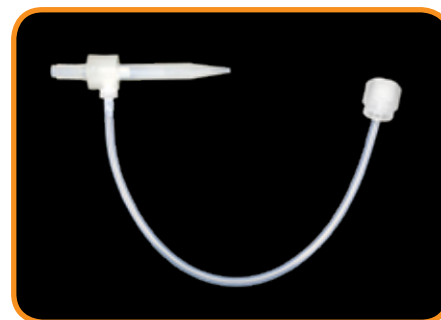


SAMPLE INTRODUCTION

PolyPro-ST Nebulizer

The PolyPro-ST nebulizer is a low-cost, HF-resistant alternative to the PFA nebulizer. The PolyPro nebulizer has a lower chemical resistance than the PFA nebulizer but has the same high-efficiency aerosol generation. Both are robust nebulizers that can self-aspirate with an exchangeable external sample uptake capillary or can be used with a peristaltic pump.

Description	Part Number
Poly-pro self-aspirating nebulizer with external 1/4-28 threaded connector and gas line.	N8152578



PFA and Polypropylene ST-Nebulizers

PFA and Polypropylene ST-Nebulizers for the NexION 1000/2000 ICPMS

apex MicroFlow PFA Self-Aspirating Nebulizers

apex nebulizers are specially designed to operate at extremely high efficiency and at elevated temperatures. These nebulizers are well-suited for apex applications or with heated PC^{3X} or heated PCH Peltier systems.

See pages 80-83 for more information on particular systems

Description	Part Number
High temperature apex-ST PFA MicroFlow nebulizer with external 1/4-28 threaded connector and gas line.	N8152579
High temperature apex-100 PFA nebulizer with integrated 90-150 µL/min self-aspiration capillary and gas line.	N8152580
High temperature apex-100 PFA nebulizer with Ultem manual sampling probe and gas line, 90-150 µL/min, 80 cm capillary	N8152581



Syringe Flush Kit for ST Nebulizers

The syringe flush kit is used in two ways. With the white fitting it can back flush the sample capillary leading to the ST nebulizer. With the red fitting it can attach to the sample liquid port on the ST nebulizer for foreflushing.

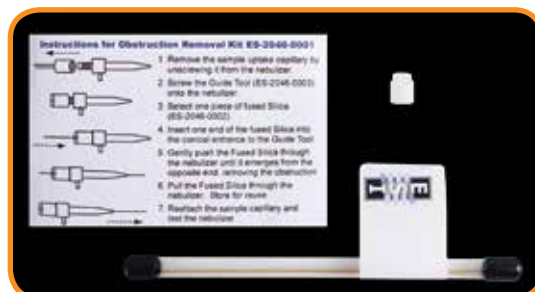
Description	Part Number
Syringe flush kit. Includes 3 mL syringe, two luer to 1/4-28 adapters.	N8121035



Nebulizer Obstruction Removal Kit

While naturally resistant to obstructions, PFA nebulizers may occasionally require maintenance. Use this kit to safely remove obstructions in all PFA-ST nebulizers for long-term high performance. Never back-flush a PFA-ST nebulizer.

Description	Part Number
Fused silica obstruction removal kit for ST-type nebulizers. Includes one guide, 10 pieces of fused silica and instructions.	N8145236



Probes and Capillaries for ST-Nebulizers

Sample Capillaries/Probes

Sample Capillaries for ST Nebulizers

I.D.	Self-aspiration rate (@1L/m Ar)		Part Number
0.15 mm	20 µL/min	■ (red)	N8122382
0.20 mm	50 µL/min	■ (purple)	N8145135
0.25 mm	100 µL/min	■ (green)	N8122383
0.30 mm	200 µL/min	■ (yellow)	N8145136
0.50 mm	400 µL/min	■ (orange)	N8122384
0.80 mm	700 µL/min	■ (blue)	N8145137
1.00 mm	1 mL/min	■ (gray)	N8145138



Sample capillary
attached to PFA
Nebulizer

Carbon Fiber Supported Autosampler Probes for ST Nebulizers

ST nebulizer probes connect directly to any ST-type nebulizer. The 1/4-28 threaded fitting provides a secure, zero-dead-volume connection with no additional fittings required.

Probes for SC DX Autosamplers			
Probe i.d.	Capillary Length	Self-aspiration rate (@1L/m Ar)	Part Number
0.25 mm	80 cm	100 µL/min	N0777223
0.50 mm	80 cm	400 µL/min	N0777225
0.25 mm	150 cm	100 µL/min	N0777826
0.50 mm	150 cm	400 µL/min	N0777827

Also available with Ultem support



PFA Nebulizers with Integrated Capillaries for the NexION 1000/2000 ICPMS

PFA Nebulizers with Integrated Capillaries

Self-aspirating PFA MicroFlow fluoropolymer nebulizers are chemically resistant and an essential part of the ICPMS laboratory. PFA nebulizers can produce a fine aerosol from aggressive acids, alkalis, organics, and high-salt solutions. They are resistant to clogging and produce high sensitivity at a low sample flow rate. They are the ideal nebulizer for ICPMS instruments with a wide range of sample types or when unknown samples are analyzed.

Benefits:

- Integrated capillary for connection-free introduction of samples at low flow rates
- Available with self-aspiration rates between 20 and 400 microliters per minute
- Chemically-resistant, ideal for strong acids, alkalis, and organic solvents
- Produces a fine aerosol for high transport efficiency and high-sensitivity
- Permanent gas line connector with easy installation on NexION 1000/2000
- Can be peristaltic pumped organic solvents



PFA Nebulizers with Integrated Fluoropolymer Capillaries		
Model	Measured self-aspiration rate (@1L/m Ar)	Part Number
PFA-20	20 μ L/min	N8152582
PFA-50	50 μ L/min	N8152583
PFA-100	100 μ L/min	N8152584
PFA-200	200 μ L/min	N8152585
PFA-400	400 μ L/min	N8152586

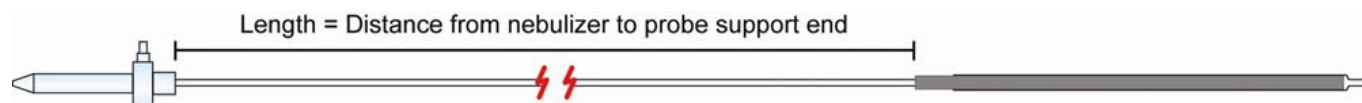
Other flow rates made to order

PFA Nebulizers with Integrated Probes for the NexION 1000/2000 ICPMS

Self-Aspirating PFA Nebulizers with Integrated Probes

These nebulizers self-aspirate at low flow rates with the same benefits of the PFA MicroFlow nebulizer. The integrated sampling probe is constructed by encapsulating a rigid support material between layers of fluoropolymer to provide a chemically-resistant probe that is mechanically stable and resilient.

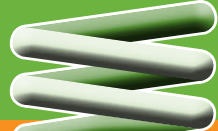
Probes can be custom made to specific lengths and materials at no extra charge.



PFA MicroFlow Nebulizers with Integrated Autosampler Probe

Model	Autosampler Type	Self-aspiration rate (@1L/m Ar)	Length	support material	Application	Part Number
PFA-20	SCMicro DX SC DX	20 μ L/min	80 cm	Carbon Fiber	Environmental/Clinical	N8152587
			100 cm	Ultem	High Purity Semiconductor	N8152592
PFA-50	SCMicro DX SC DX	50 μ L/min	80 cm	Carbon Fiber	Environmental/Clinical	N8152588
			100 cm	Ultem	High Purity Semiconductor	N8152593
PFA-100	SCMicro DX SC DX	100 μ L/min	100 cm	Carbon Fiber	Environmental/Clinical	N8152589
				Ultem	High Purity Semiconductor	N8152594
PFA-200	SCMicro DX SC DX	200 μ L/min	100 cm	Carbon Fiber	Environmental/Clinical	N8152590
				Ultem	High Purity Semiconductor	N8152420
PFA-400	SCMicro DX SC DX	400 μ L/min	100 cm	Carbon Fiber	Environmental/Clinical	N8152591
				Ultem	High Purity Semiconductor	N8152595





MEINHARD®

Concentric Nebulizers for the NexION 1000/2000 ICPMS

MEINHARD® Plus Nebulizers have the lowest dead volume of any glass or quartz nebulizer. The low dead volume and high sensitivity provide excellent detection limits and washout.

Each MEINHARD® Plus nebulizer comes with the FitKit+ gas and sample quick connect fittings. Patented permanent non-degradable PFA connector eliminates contamination risk and risk of leak. The gas connection fits snugly over the maria on the sidearm of the nebulizer.

Features for all MEINHARD® Plus Nebulizers:

- Self aspiration rate 0.5 mL/min with argon flow 1 L/min at 50 PSI (3.4 bar/345 kPa).
- Peristaltic pumped rate 0.1 mL/min to 3.0 mL/min.
- Includes FG Gas Quick Connect (PFA).

SilQ+ Ultra-high Purity Quartz Nebulizer

- Highest purity quartz
- Lowest contamination, especially for Al, Fe, K

Description	Part Number
MEINHARD® SilQ Plus High Sensitivity, High Purity quartz concentric nebulizer	N8152384



TQ+ Quartz Nebulizer

- Quartz
- Low blank levels compared to glass nebulizers

Description	Part Number
MEINHARD® TQ+ quartz concentric nebulizer	N8152372



TR+ Glass Nebulizer

- Borosilicate glass
- Economical high performance nebulizer

Description	Part Number
MEINHARD® TR+ quartz concentric nebulizer	N8152373



Nebulizer Cleaner

Description	Application	Part Number
Pearl nebulizer cleaner for all glass and quartz concentric nebulizers	The pearl backflushes glass and quartz nebulizers to remove blockages.	N8145457



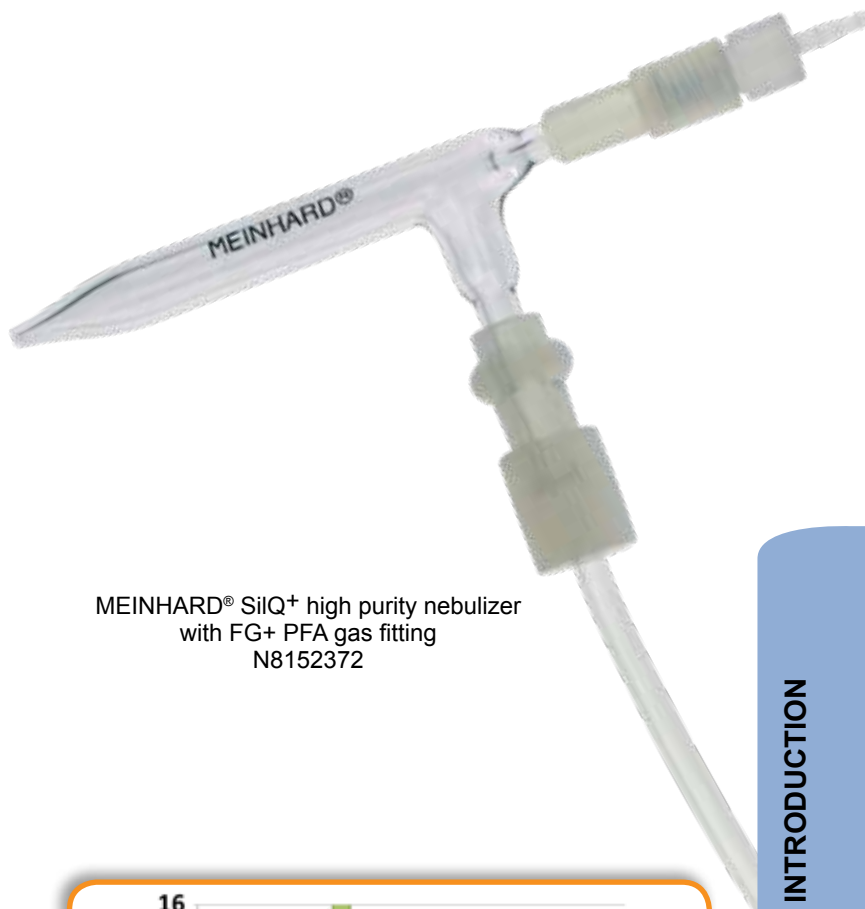
Note: Do not use Pearl to clean PFA nebulizers

SilQ⁺ High Purity Quartz Plus Nebulizer

The SilQ⁺ nebulizer by Meinhard is made from the highest purity synthetic quartz. SilQ nebulizers have low levels of Al, Fe, Mg and other contaminants, generating low, stable blanks that can enhance ICPMS detection limits. SilQ nebulizers are recommended for the analysis of high purity chemicals that do not contain HF.

SilQ⁺ nebulizers come equipped with a patented PFA gas connection (FG⁺) and FitKit quick sample connector. The fittings can be rapidly attached and removed. The gas quick connect creates a snug seal around the maria on the SilQ⁺ sidearm.

Each nebulizer is manufactured and tested to exact specifications. The standard SilQ⁺ nebulizer requires 50 psi for 1 L/min of argon carrier and 0.5 mL/min solution uptake. Other versions are available.

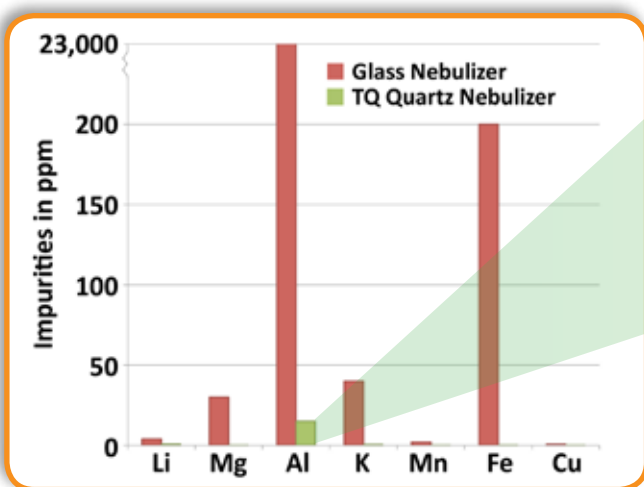


MEINHARD[®] SilQ⁺ high purity nebulizer
with FG+ PFA gas fitting
N8152372

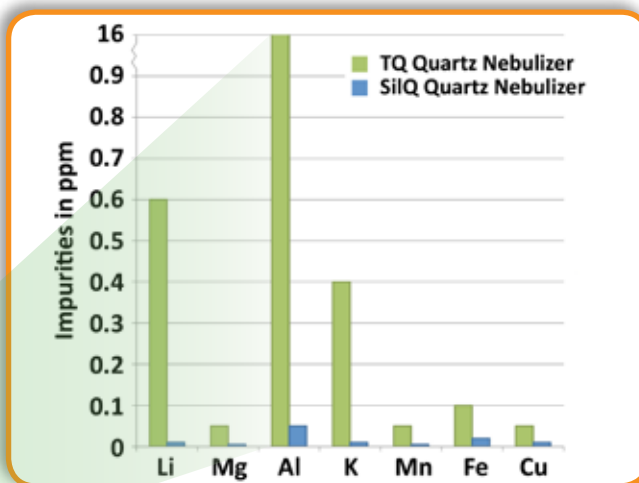


MEINHARD[®] Plus Nebulizer
to micro fitting adapter
N8152387

Potential Blank from Nebulizer



Comparison of metal impurity in Glass and TQ⁺ Quartz nebulizers. Glass nebulizers have high levels of impurity for elements such as Al, Fe, K, Mg.



Comparison of metal impurity in SilQ⁺ and TQ⁺ Quartz nebulizers. SilQ⁺ impurities on average are 60 times lower than standard quartz nebulizers. Aluminum impurities in SilQ⁺ nebulizers are more than 400,000 times lower than glass.



pergo High Solids Accessory

The *pergo* improves performance of all concentric nebulizers for the routine analysis of brines, fusion digests, and other high-TDS samples.

A water vapor permeable membrane humidifies the ICPMS nebulizer gas stream. By increasing humidity in the argon nebulizer gas, the *pergo* prevents salt deposits at the nebulizer, improving short and long-term signal stability.

Benefits:

- Improved RSDs
- Improved short and long-term stability
- Improved detection limits
- Faster washout
- Ability to use high-sensitivity nebulizers for high-TDS samples
- Reduce long-term drift
- Extends the length of analytical runs

Advantages:

- Higher, more consistent humidity
- Superior long-term stability
- Safe and easy to use
 - Atmospheric pressure water reservoir
- Optional USB communication for programmable humidity levels

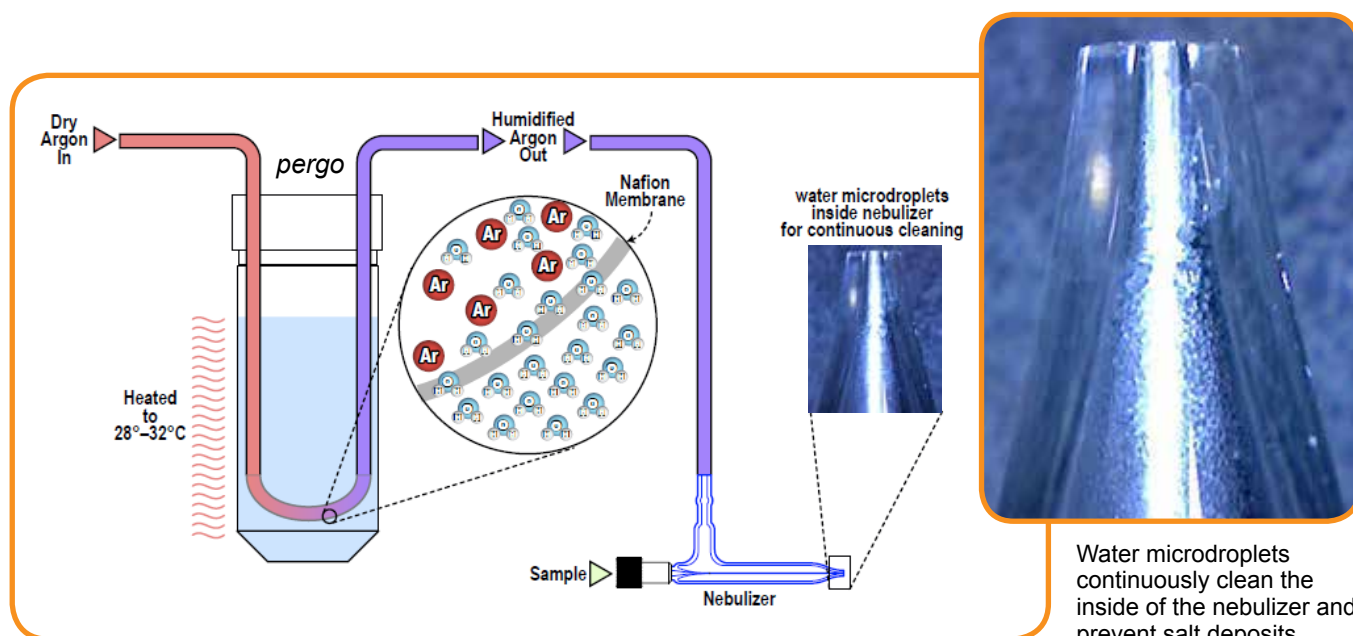
The unique *pergo* design offers many advantages over other types of argon humidifiers.



N8145315 *pergo* high solids accessory



NexION 1000/2000 with the
N8145315 *pergo* high solids accessory



Ar nebulizer gas is humidified using a tube-shaped membrane placed in a PFA water reservoir at atmospheric pressure. The water vapor condenses inside the nebulizer tip, preventing salt build-up.

pergo 2

The *pergo 2* adds a second humidifier for the AMS matrix gas flow. Pergo 2 enhances NexION performance and long-term stability when high solids samples are analyzed using AMS.



Humidifies both the nebulizer gas and the AMS matrix gas.

pergo Options

pergo for ICP or ICPMS without AMS	pergo 2 for ICPMS with AMS
--	----------------------------------

Description	pergo Part Number	pergo 2 Part Number
pergo argon high solids accessory.	N8145315	N8140743
pergo argon high solids accessory. Includes a MEINHARD® TR+ high performance nebulizer.	N8145316	N8150428
pergo argon high solids accessory. Includes a PFA-ST HF-resistant high performance nebulizer.	N8150427	N8150429
pergo 2000 gas line kit.	N8152683	N8152692
pergo 2000 gas extensions.	N8152688	



Spray Chambers and Accessories

NexION 1000/2000 C3 High Sensitivity Cyclonic Spray Chambers

Description	Application	Material	AMS	Part Number
Glass cyclonic spray chamber	All-purpose for non-HF samples	Glass		N8152375
Glass cyclonic spray chamber, with AMS matrix gas port		Glass	AMS	N8152389
Quartz cyclonic spray chamber, with matrix gas port	All-purpose for non-HF samples. Provides excellent sensitivity, stability, and reduced boron blank.	Quartz	AMS	N8152383
Quartz cyclonic spray chamber with both hydride and AMS matrix gas ports. Used for simultaneous hydride generation.	For interfacing Hydride S31, Hydride ICP, seaFAST S3 and seaFAST SP3.	Quartz	AMS + Hydride	N8145562
SilQ quartz cyclonic spray chamber	All-purpose for non-HF samples. Provides excellent sensitivity, stability and ultra-low blanks.	SilQ		N8152424
SilQ quartz cyclonic spray chamber, with AMS matrix gas port	All-purpose for non-HF samples. Provides excellent sensitivity, stability and ultra-low blanks.	SilQ	AMS	N8152539



Cyclonic Spray Chamber Lines

Matrix Port Gas Line

Description	Part Number
AMS matrix gas line (gas dilution) (0.25 mm i.d.) for cyclonic spray chamber	N8152374
Addition gas line (e.g. 20% O ₂ 80% Ar) (0.8 mm i.d.) for cyclonic spray chamber	N8152426



Spare Spray Chamber Drain Line

Description	Part Number
Spray chamber drain line kit for NexION 1000/2000. Includes 32 cm line leading from spray chamber drain to peripump and 160 cm line from peripump to waste bottle. 32 cm line has 1/4-28 fitting common to all NexION 1000/2000 spray chamber drain ports.	N8152456



High Performance HF-resistant PFA Spray Chambers

Description	Application	Part Number
High Performance PFA spray chamber with o-ring-free PFA endcap and additional gas port	HF resistant, high sensitivity PFA spray chamber for semiconductor and other high purity applications.	N8150450
High Performance PFA spray chamber with o-ring-free PFA endcap		N8152390



Not for Peltier cooler PCH

Spray Chamber Accessories

Light Shields

Description	Application	Part Number
Cyclonic spray chamber/cassette light shield	UV shield for cyclonic spray chamber	N8152425



Description	Application	Part Number
PC ^{3X} UV shield	UV shield for PC ^{3X} Peltier cooler/heater	N8152475



Spray Chamber Plugs

Description	Application	Part Number
Cyclonic spray chamber AMS matrix gas plug	Plugs the matrix gas port when AMS gas is not used or during storage.	N8145516



Description	Application	Part Number
Spray chamber nebulizer port plug	Plugs the nebulizer port to prevent contamination during storage.	N8145517



Description	Application	Part Number
Spray chamber outlet plug	Plugs the spray chamber outlet to prevent contamination.	N8145518



PFA Secure Nut

Description	Application	Part Number
Long (6mm) PFA spray chamber secure nut	Secures nebulizer to NexION spray chamber.	N8145321



Spray Chamber Adapter

Description	Application	Part Number
NexION 1000/2000 cyclonic spray chamber adapter	Adapts cyclonic spray chamber to NexION sapphire and platinum injectors.	N8152551



Demountable Torches and Injectors

Demountable Torches for the NexION 1000/2000 ICPMS

NexION 1000/2000 Demountable Quartz Torches

The demountable quartz torch uses a removable and replaceable injector. It is recommended for HF applications (sapphire or Pt injectors) or when the user prefers to remove the injector for cleaning without dismounting the torch.

Description	Code	Part Number
Demountable quartz torch with PVDF oring-free holder, Blk	●	N8152379
Demountable SilQ torch, High Purity Quartz with PVDF oring-free holder, Pt	●	N8152448
Demountable Organics torch, Org/Blk	● ●	N8152596

N8152377 torch light shield included with each torch



Injectors for Demountable Torches

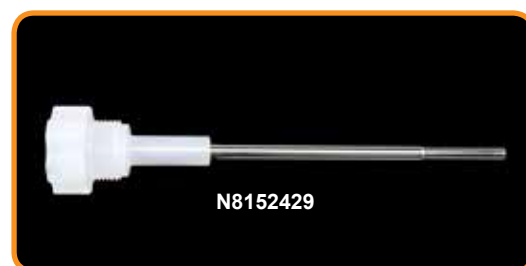
Demountable injectors that fit standard torches for the NexION 1000/2000 ICPMS.

Platinum Injectors for Demountable NexION 1000/2000 Torch

Platinum injectors are used for analysis of HF-containing semiconductor-grade chemicals and solvents. They have Pt-colored (grey) markers.

Description	Code	Size	Part Number
Platinum injector, Pt/Pt/Pt	● ● ●	1.0 mm	N8152603
Platinum injector, Pt/Pt	● ●	1.5 mm	N8152604
Platinum injector, Pt	●	2.0 mm	N8152429

N8152681 injector light shield included with each injector



Sapphire Injectors for Demountable NexION 1000/2000 Torch

Sapphire injectors are used for environmental, geochemistry, and HF applications.

Description	Code	Size	Part Number
Sapphire injector, Blk/Gld/Gld	● ● ●	1.5 mm	N8152606
Sapphire injector, Blk/Gld	● ●	2.0 mm	N8152447

N8152681 injector light shield included with each injector



Quartz Injectors for Demountable NexION 1000/2000 Torch

Quartz injectors are used for volatile organic solvent introduction and recommended for a wide range of non-HF applications.

Description	Code	Size	Part Number
Quartz injector, Blk/Org/Org	● ● ●	1.0 mm	N8152444
Quartz injector, Blk/Org	● ●	1.5 mm	N8152445
Quartz injector, Blk	●	2.0 mm	N8152376
Quartz injector, Blk/Grn	● ●	2.5 mm	N8152446

N8152682 injector light shield included with each injector



One-Piece Torches for the NexION 1000/2000 ICPMS

One-Piece Quartz Torches

The one-piece quartz torch has an integrated quartz injector. Easy maintenance and quick torch alignment.

Description	Code	Part Number
One-piece quartz torch for NexION 1000/2000, 1 mm injector, Blu/Blu/Blu	• • •	N8152699
One-piece quartz torch for NexION 1000/2000, 1.5 mm injector, Blu/Blu	• •	N8152427
One-piece quartz torch for NexION 1000/2000, 2 mm injector, Blu/Prp	• •	N8152472
One-piece quartz torch for NexION 1000/2000, 2.5 mm injector, Grn	•	N8152473



One-Piece SiIQ Torches

Ultra high purity quartz one-piece torch with integrated injector of the same high purity SiIQ synthetic quartz. For high purity chemicals analysis (non-HF).

Description	Code	Part Number
One-piece SiIQ torch for NexION 1000/2000, 1 mm injector, Wht/Wht/Wht	○ ○ ○	N8152600
One-piece SiIQ torch for NexION 1000/2000, 1.5 mm injector, Wht/Wht	○ ○	N8152601
One-piece SiIQ torch for NexION 1000/2000, 2 mm injector, Wht	○	N8152428



One-Piece Organics Torch

The NexION 1000/2000 organics torch is made from a special grade of quartz that is highly resistant to degradation by light and heat when organic solvents are analyzed.

Description	Code	Part Number
One-piece organics quartz torch for NexION 1000/2000, 1 mm injector, Org/Org	• •	N8152474
One-piece Organics torch for NexION 1000/2000, 1.5 mm injector, Org	•	N8152616



SMARTintro Torch Modules

Blue Base Torch Module

Description	Application	Part Number
Blue torch module, includes: Cassette Blue, one-piece quartz torch with 2 mm injector, torch injector nut, PTFE torch light shield, and torch injector removal tool	Base	N8152437



Green Core Torch Module

Description	Application	Part Number
Green torch module, includes: Cassette Green, one-piece quartz torch with 2.5mm injector, torch injector nut, PTFE torch light shield, and torch injector removal tool	Environmental	N8152438



Orange Organic Torch Module

Description	Application	Part Number
Orange torch module, includes: Cassette Orange, one-piece organics quartz torch with 1.5 mm injector, torch injector nut, PTFE torch light shield, and torch injector removal tool	Organic Solvents	N8152442



Black Productivity Torch Module

Description	Application	Part Number
Black torch module, includes: Cassette Black, 2 mm demountable quartz injector, demountable torch quartz, torch injector nut, PTFE torch light shield, and torch injector removal tool	Productivity high throughput	N8152440



White Performance Torch Module

Description	Application	Part Number
White torch module, includes: Cassette White, one-piece SiIQ torch with 2 mm injector, torch injector nut, PTFE torch light shield, and torch injector removal tool	Semiconductor non-HF	N8152439



Platinum HF-Resistant Semiconductor Torch Module

Description	Application	Part Number
Platinum torch module, includes: Cassette Platinum colored, 2 mm demountable platinum injector, demountable SiIQ torch, torch injector nut, PTFE torch light shield, and torch injector removal tool	Semiconductor HF-resistant	N8152441



Gold Geochemical Torch Module

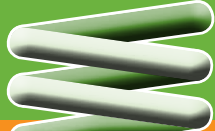
Description	Application	Part Number
Gold torch module, includes: Cassette Gold, demountable quartz torch, 2 mm demountable sapphire injector, torch injector nut, PTFE torch light shield, and torch injector removal tool.	Geochem	N8152535



Purple NexION 1000 Torch Module

Description	Application	Part Number
Purple torch module, includes: Cassette Purple, one piece quartz torch with 2 mm injector, torch injector nut, PTFE torch light shield, and torch injector removal tool.	Torch Module NexION 1000	N8152536





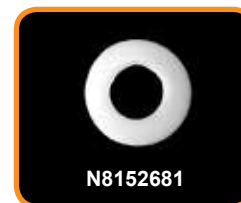
Torch Accessories

NexION 1000/2000 Torch Accessories

Injector and Torch Light Shields

The light shield protects the torch and injector base from discoloration caused by the plasma.

Description	Part Number
Torch light shield disk	N8152377
Injector light shield disk for platinum and sapphire injectors	N8152681
Injector light shield disk for quartz injectors	N8152682



Tools

Description	Part Number
NexION 1000/2000 Torch mounting nut	N8152451
Torch and Injector removal tool	N8152443



Injector Adapters

Description	Part Number
PFA adapter for NexION 1000/2000 injectors	N8152719
Laser connector for NexION 2000 injector. Includes 1 meter of PFA-lined tygon tubing (6 mm o.d.) and connector for laser.	N8152721



Exchange Application Specific Sample Intro Kits in Minutes

The PerkinElmer NexION 1000/2000 ICPMS establishes the new standard for simplified and fully-automated analysis. All aspects of NexION 1000/2000 instrument operation, from sample introduction system to acquisition methods and parameters to final reporting, are pre-determined and certain.

NexION 1000/2000 SMARTintro sample introduction solutions are tested as a complete unit to ensure intra- and inter-laboratory performance. Each system utilizes specific combinations of sample introduction components and the kits are color-coded according to the application of the user. The nebulizer, spray chamber, injector, and torch are determined based upon the types of chemicals and samples analyzed; specific combinations of these components create the NexION 1000/2000 Blue, Green, Orange, Black, White, Platinum, Purple, and Gold sample introduction kits.

Benefits of Each NexION 1000/2000 SMARTintro Kit

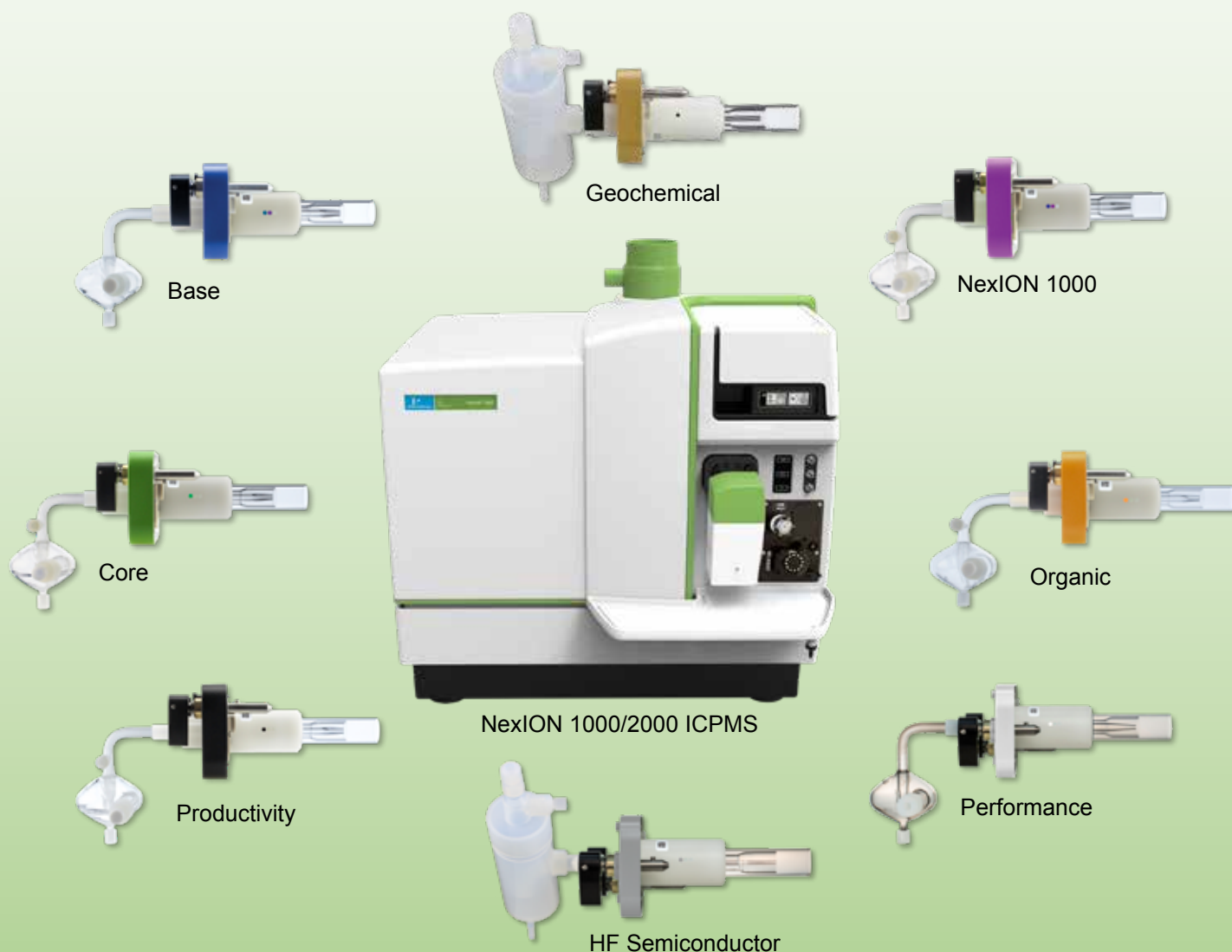
Efficient: Quickly change sample introduction hardware

Engineered: Each unique kit is designed for a specific application

Defined: All components are color-coded for consistent inter-laboratory performance

Flexible: Upgrade and combine with *FAST* or *prepFAST* products to maximize productivity and performance

Each sample introduction kit can be easily implemented and delivers absolute accuracy and precision.





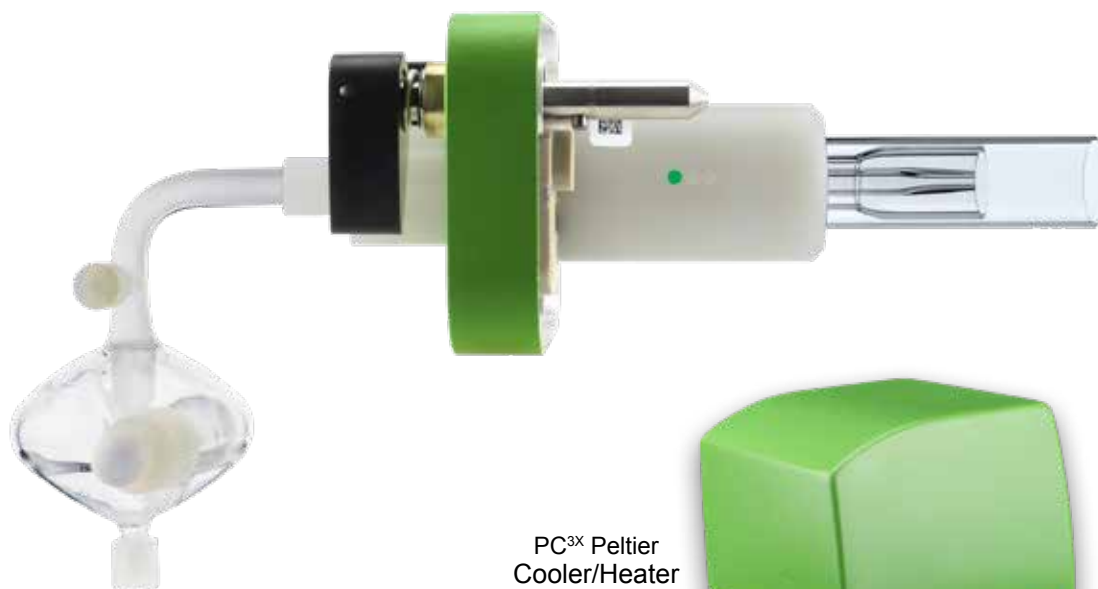
NexION 1000/2000 SMARTintro Blue Kit

PerkinElmer introduces NexION 1000/2000 Blue solution-ready sample introduction technology. Engineered for the widest range of ICPMS analyses.

Hardware

- Glass Concentric Type C Nebulizer (N8152373)
- Glass Cyclonic C3 High Sensitivity Spray Chamber (N8152375)
- Fixed 2.0 mm I.D. Injector Quartz Torch (N8152472)
- MEINHARD® Nebulizer Sample Line (N8145503)
- PeriPump Tubing Starter Kit (N8150060)
- Plasma Light Shield (N8152377)
- MEINHARD® Internal Standard Nebulizer Tee (N8152386)
- Spray Chamber Light Shield (N8152425)
- Blue Torch Cassette (N8152430)
- Torch Injector Nut Removal Tool (N8152443)
- Internal Standard Probe, Qty. 2 (N8152452)
- PeriPump Union Male Fitting (N8152453)
- 0.8 mm I.D. PTFE Drain Line Tubing with 1/4-28 Fitting (N8152456)
- Torch Injector Nut (N8152451)

Description	Part Number
NexION 1000/2000 Blue base sample introduction kit	N8150034



PC^{3x} Peltier
Cooler/Heater

NexION 1000/2000 SMARTintro Green Kit

PerkinElmer introduces NexION 1000/2000 Green solution-ready sample introduction technology. Engineered for the analysis of environmental samples, this system utilizes a high sensitivity glass spray chamber and nebulizer, Peltier cooler, and large diameter injector to enhance the analysis of environmental samples with varying matrices.

Hardware

- Glass Concentric Type C Nebulizer (N8152373)
- Glass Cyclonic C3 High Sensitivity Spray Chamber with Matrix Gas Port (N8152389)
- Fixed 2.5 mm I.D. Injector Quartz Torch (N8152473)
- MEINHARD® Nebulizer Sample Line (N8145503)
- PeriPump Tubing Starter Kit (N8150060)
- Matrix Gas Line 9" (N8152374)
- Plasma Light Shield (N8152377)
- PC^{3x} Peltier Cyclonic Spray Chamber System (N8152382)
- MEINHARD® Internal Standard Nebulizer Tee (N8152386)
- Spray Chamber Light Shield (N8152425)
- Green Torch Cassette (N8152431)
- Torch Injector Nut Removal Tool (N8152443)
- Internal Standard Probe (N8152452)
- PeriPump Union Male Fitting (N8152453)
- 0.8 mm I.D. PTFE Drain Line Tubing with 1/4-28 Fitting (N8152456)
- PC³ Spray Chamber Light Shield (N8152475)
- Torch Injector Nut (N8152451)

Description

NexION 1000/2000 Green core environmental sample introduction kit

Part Number

N8150035





NexION 1000/2000 SMARTintro Orange Kit

PerkinElmer introduces NexION 1000/2000 Orange solution-ready sample introduction technology. Engineered for the analysis of solvents, this organics optimized system incorporates quartz sample introduction components, organics torch, narrow injector, and addition gas line to enhance the analysis of samples containing organic materials.

Hardware

- Quartz Concentric Type CT Nebulizer (N8152372)
- Cyclonic Quartz C3 High Sensitivity Spray Chamber with Matrix Gas Port (N8152383)
- Fixed 1.5 mm I.D. Injector Organics Quartz Torch (N8152616)
- Sample Line for MEINHARD® Nebulizer (N8145503)
- Torch Light Shield Disk (N8152377)
- 0.5 mm I.D. MEINHARD® Internal Standard Nebulizer Tee (N8152386)
- Cyclonic Spray Chamber/Cassette UV Light Shield (N8152425)
- Organics Addition Gas Line (N8152426)
- Orange Torch Cassette (N8152435)
- Torch Injector Nut Removal Tool (N8152443)
- Torch Injector Nut (N8152451)
- Internal Standard Probe (N8152452)
- PeriPump Union Male Fitting (N8152453)
- 0.8 mm I.D. PTFE Drain Line Tubing with 1/4-28 Fitting (N8152456)

Description	Part Number
NexION 1000/2000 Orange organic sample introduction kit	N8150031

Black Productivity High-Throughput Kit



SAMPLE INTRODUCTION

NexION 1000/2000 SMARTintro Black Kit

Perkin Elmer introduces NexION 1000/2000 Black Productivity Solution. Engineered with *FAST* capabilities, this high-performance system utilizes superior components and Peltier chiller to maximize accuracy, precision, and ICPMS productivity.

Hardware

- 2.0 mm I.D. Demountable Quartz Injector (N8152376)
- Type C PFA ST3 Nebulizer (N8152378)
- Demountable Quartz Torch (N8152379)
- Glass Cyclonic C3 High Sensitivity Spray Chamber with Matrix Gas Port (N8152389)
- PC^{3X} Peltier Cyclonic Spray Chamber System (N8152382)
- Torch Light Shield Disk (N8152377)
- Female CTFE Barb Fitting (N8145018)
- FAST 1 Valve with P7 (N8152359)
- MP² Peristaltic Pump (N8152364)
- Matrix Gas Line (N8152374)
- FAST Pump Tubing Starter Kit (N8152380)
- Cyclonic Spray Chamber/Cassette UV Light Shield (N8152425)
- Black Torch Cassette (N8152433)
- Torch Injector Nut Removal Tool (N8152443)
- Torch Injector Nut (N8152451)
- 0.5 mm I.D. Sample Introduction Line for PFA-ST Nebulizer (N8152455)
- 0.8 mm I.D. PTFE Drain Line Tubing with 1/4-28 Fitting (N8152456)
- PC^{3X} Spray Chamber/Cassette UV Light Shield (N8152475)
- 1/4-28 Port CTFE Plug (N8152718)

Description	Part Number
NexION 1000/2000 Black productivity high throughput sample introduction kit (DX autosampler required, not included)	N8150036

For a complete *FAST* system add a DX Autosampler – see page 6



Order online at www.perkinelmer.com/supplies



ORDER TODAY

White Performance Semiconductor Non-HF Kit



PC^{3X} Peltier
Cooler/Heater

NexION 1000/2000 SMARTintro White Kit

PerkinElmer introduces NexION 1000/2000 White solution-ready sample introduction technology. Engineered for analysis in the semiconductor industry, this high-performance system utilizes SilQ ultra high purity quartz spray chamber, torch, and injector to minimize contamination and delivers absolute accuracy and precision.

Hardware

- Type C PFA ST3 Nebulizer (N8152378)
- SilQ Cyclonic C3 High Sensitivity Spray Chamber (N8152424)
- Fixed 2.0 mm I.D. Injector SilQ Torch (N8152428)
- Female CTFE Barb Fitting (N8145018)
- PeriPump Starter Tubing Kit (N8150060)
- Torch Light Shield Disk (N8152377)
- PC^{3X} Peltier Cyclonic Spray Chamber System (N8152382)
- PFA-ST Internal Standard Addition Tee (N8152423)
- Cyclonic Spray Chamber/Cassette UV Light Shield (N8152425)
- White Torch Cassette (N8152432)
- Torch Injector Nut Removal Tool (N8152443)
- Torch Injector Nut (N8152451)
- Internal Standard Probe, Qty. 2 (N8152452)
- 0.5 mm I.D. Sample Introduction Line for PFA-ST Nebulizer (N8152455)
- 0.8 mm I.D. PTFE Drain Line Tubing with 1/4-28 Fitting (N8152456)
- PC³ Spray Chamber Light Shield (N8152475)

Description	Part Number
NexION 1000/2000 White high performance semiconductor sample introduction kit	N8150037



NexION 1000/2000 SMARTintro Platinum Kit

PerkinElmer introduces NexION 1000/2000 Platinum solution-ready sample introduction technology. Engineered for analysis in the semiconductor industry, this high-performance HF-resistant system utilizes a PFA nebulizer, platinum injector, and SilQ ultra high purity quartz torch, to minimize contamination and deliver absolute accuracy and precision.

Hardware

- PFA Barrel Spray Chamber with Additional Gas Port (N8150450)
- Torch Light Shield Disk (N8152377)
- PFA-200 Self-Aspirating Nebulizer with Ultem Probe (N8152420)
- 2.0 mm I.D. Demountable Platinum Injector (N8152429)
- Platinum Torch Cassette (N8152434)
- Torch Injector Nut Removal Tool (N8152443)
- Demountable SilQ Torch (N8152448)
- Gas Line (N8152449)
- Torch Injector Nut (N8152451)
- 0.8 mm I.D. PTFE Drain Line Tubing with 1/4-28 Fitting (N8152456)
- Injector Chamber Adapter (N8152551)

Description	Part Number
NexION 1000/2000 Platinum HF-resistant semiconductor sample introduction kit	N8150033



Gold Geochem HF-Resistant Kit



NexION 1000/2000 SMARTintro Gold Kit

PerkinElmer introduces NexION 1000/2000 Gold solution-ready sample introduction technology. Engineered for analysis of geochemical samples containing HF-resistant system utilizes a PFA nebulizer, sapphire injector, and quartz torch to deliver absolute accuracy and precision.

Hardware

- PeriPump Tubing Starter Kit (N8150060)
- PFA Spray Chamber with PFA End Cap (N8150450)
- Plasma Light Shield (N8152377)
- PFA Nebulizer (N8152378)
- Quartz Torch (N8152379)
- Internal Standard Addition Tee for PFA ST Nebulizer (N8152423)
- Torch Injector Nut Removal Tool (N8152443)
- Sapphire 2 mm Injector (N8152447)
- Gas Line Addition (N8152449)
- Torch Injector Nut (N8152451)
- Internal Standard Probe Qty. 2 (N8152452)
- Sample Introduction Line for PFA-ST Nebulizer (N8152455)
- Spray Chamber Drain Line 1/4-28 Fitting (N8152456)
- PC³ Spray Chamber Light Shield (M8152475)
- Cassette Only Gold (N8152532)

Description	Part Number
NexION 1000/2000 Gold Geochem HF-resistant sample introduction kit	N8150040

Purple NexION 1000 Kit



NexION 1000 SMARTintro Purple Kit

PerkinElmer introduces NexION 1000 Purple solution-ready sample introduction technology. Engineered for the widest range of NexION 1000 ICPMS analyses.

Hardware

- MEINHARD® Nebulizer Sample Line (N8145503)
- PeriPump Tubing Starter Kit (N8150060)
- Glass Nebulizer Type C (N8152373)
- Matrix Gas Line 9 in. (N8152374)
- Plasma Light Shield (N8152377)
- Glass Cyclonic C3 High Sensitivity Spray Chamber with Matrix Port (N8152389)
- Spray Chamber Light Shield (N8152425)
- Torch Injector Nut Removal Tool (N8152443)
- Torch Injector Nut (N8152451)
- Internal Standard Probe Qty. 2 (N8152452)
- PeriPump Union Male Fitting (N8152453)
- Spray Chamber Drain Line 1/4 28 Fitting (N8152456)
- One Piece 2.0 mm Quartz Torch (N8152472)
- Cassette Only Purple (N8152533)

Description

Part Number

NexION 1000 Purple sample introduction kit

N8150038



Order online at www.perkinelmer.com/supplies



ORDER TODAY

FAST DXi

Upgradable Integrated Precision Micro Peristaltic Pump for NexION 1000/2000

The FAST DXi is a microperistaltic pump integrated to the NexION 1000/2000. It can be easily upgraded to FAST, prepFAST or other automation applications by adding valve actuators and other necessary components. It allows laboratories the flexibility to start with a high-quality, long-lived peristaltic pump and add automation components as needed.

- Direct replacement for standard peristaltic pump
- Connects to any SC-DX autosampler
- Integrated to Syngistix software control

Precision

- Accurate pumping across a wide range of rates from low 0.20 $\mu\text{L}/\text{min}$ to 10 mL/min
- Faster analysis with high precision.

Low Pulsation

- 12 closely-spaced rollers maintain consistent flow rate and improve signal stability

Chemical Resistance

- Ceramic pins and PTFE-coated metal components are resistant to acids and organic solvents
- Long-life motor and drive assembly



N8152675
FAST valve actuator



N8152384
FAST DXi populated with a single valve actuator (Valve shown but not included)

FAST DXi's for NexION 1000/2000

Description	# Valve Actuators*	Part Number
FAST DXi MP ² Peristaltic pump NexION 1000/2000, 4 ch, with upgrade ports for FAST and prepFAST, including controller	0	N8152436
FAST DXi MP ² Peristaltic pump NexION 1000/2000, 4 ch, with FAST actuator	1	N8152364
FAST DXi MP ² Peristaltic pump NexION 1000/2000, 4 ch, with two actuators for prepFAST	2	N8150443

*Valve not included with actuators

FAST Valve Actuator

Description	Part Number
Additional FAST valve actuator to convert FAST DXi from FAST to prepFAST with two actuators for prepFAST.	N8152675

Stand Alone Peristaltic Pumps

Stand Alone MP² Precision Micro Peristaltic Pumps

MP² Precision Micro Peristaltic Pumps

The MP² is a compact, precise, stand-alone micro peristaltic pump with a flow rate range from 0.20 $\mu\text{L}/\text{min}$ to 10 mL/min and is available with one to eight channels. Optimized for low-flow rates, the MP² uses either MPP tubing or standard 3-stop pump tubing.



N8145095
stand-alone, precision
micro peristaltic pump

SAMPLE INTRODUCTION

CONTROLLED BY THE INSTRUMENT PC USB PORT



Number of Channels	Part Number
1 channel MP ² precision micro peristaltic pump	N8145092
2 channel MP ² precision micro peristaltic pump	N8145093
3 channel MP ² precision micro peristaltic pump	N8145094
4 channel MP ² precision micro peristaltic pump	N8145095
6 channel MP ² precision micro peristaltic pump	N8145096
8 channel MP ² precision micro peristaltic pump	N0777833

Includes: Cable to control with stand alone software

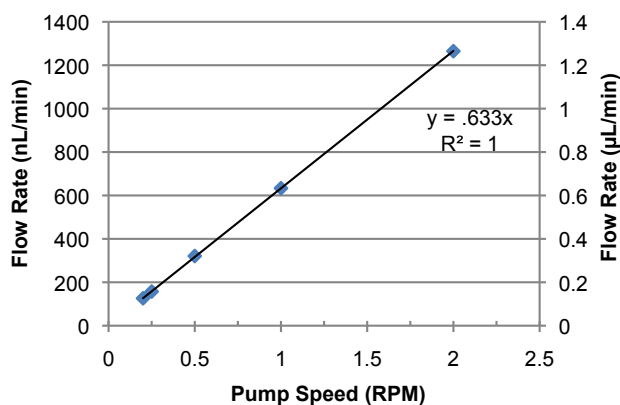
Perilink Fittings Adapts 10/32 to pump tubing

	Qty	Size	Part Number
	5	Female	N0786030
	5	Male	N0786036

Perilink Fittings (Barbed) Adapts 10/32 to pump tubing

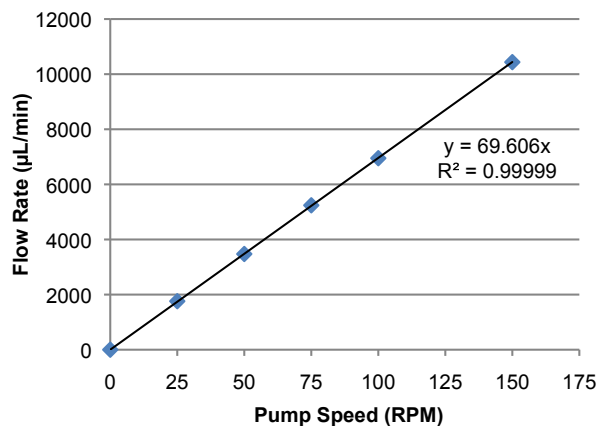
	Qty	Size	Part Number
	5	Female	N8152388
	5	Male	N8152453

ORG BLK



MP² pump linearity < 1 $\mu\text{L}/\text{min}$

BLK WHT



MP² pump linearity up to 10 mL/min



MP² Peristaltic Pump Tubing

MP² Pump Tubing



Tubing for MP² Micro Peristaltic Pumps (Packs of 12)

				Non-Flared			Flared*	
i.d.	Stop Colors		Calibration Slope ($\mu\text{L}/\text{min}$ per RPM)	PVC 2-stop	**Santoprene® 2-stop	Solva 2-stop	PVC 2-stop	Solva 2-stop
0.13 mm	Orange	Black	0.6	N8145145			N8145194	N8145208
0.19 mm	Orange	Red	1.3	N8145146			N8145195	N8145209
0.27 mm	Orange	Blue	2.7	N8145147			N8145196	N8145210
0.38 mm	Orange	Green	4.7	N8145148	N8145171		N8145197	N8145211
0.44 mm	Green	Yellow	7.6	N8145149			N8145198	N8145212
0.51 mm	Orange	Yellow	9.5	N8145150			N8145199	N8145213
0.57 mm	White	Yellow	11	N8145151			N8145200	N8145214
0.64 mm	Orange	White	14	N8145152			N8145201	N8145215
0.76 mm	Black	Black	19	N8145153	N8145172	N8145176	N8145202	N8145216
0.89 mm	Orange	Orange	24	N8145154		N8145177	N8145203	N8145217
0.95 mm	White	Black	28	N8145155		N8145178	N8145204	N8145218
1.02 mm	White	White	31	N8145156		N8145179	N8145205	N8145219
1.09 mm	White	Red	33	N8145157		N8145180	N8145206	N8145220
1.14 mm	Red	Red	35	N8145158		N8145181	N8145207	
1.22 mm	Red	Grey	46	N8145159		N8145182		
1.30 mm	Grey	Grey	47	N8145160	N8145173	N8145183		
1.42 mm	Yellow	Yellow	50	N8145161		N8145184		
1.52 mm	Yellow	Blue	51	N8145162	N8145174	N8145185		
1.65 mm	Blue	Blue	55	N8145163		N8145186		
1.75 mm	Blue	Green	58	N8145164		N8145187		
1.85 mm	Green	Green	61	N8145165		N8145188		
2.06 mm	Purple	Purple	64	N8145166		N8145189		
2.29 mm	Purple	Black	65	N8145167		N8145190		
2.54 mm	Purple	Orange	67	N8145168		N8145191		
2.79 mm	Purple	White	69	N8145169		N8145192		
3.17 mm	Black	White	70	N8145170	N8145175	N8145193		
Bridge Length				72 mm	72 mm	72 mm	72 mm	72 mm

*For easy insertion of PFA capillaries

i.d. = internal diameter

Non-Flared



PVC

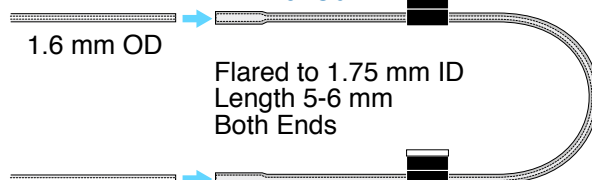


Santoprene®



SOLVA

Flared



MP² PUMP TUBING KIT

Description	Part Number
MP ² Pump Tubing Kit comprised of 34 packs of 12 tubes, one package of each white highlighted part number in the table above. Includes: 26 packs of PVC tubing (0.13 to 3.17 mm i.d.) 3 packs of Santoprene® tubing and 5 packs of Solva tubing. Kit also includes: 30 CTFE Fluoropolymer Peristaltic pump Fittings: 5 small female, 5 small male, 5 medium female, 5 medium male, 5 large female and 5 large male.	N8145221

**Santoprene® is a product of ExxonMobil

Replacement Syringes for Syringe Pumps

0.3 mL Syringes

Description	Part Number
0.3 mL quartz syringe o-ring free quartz syringe for prepFAST Syrix syringe pump	N8145222
0.3 mL o-ring free fluoropolymer syringe for prepFAST syringe pump	N8145225



0.3 mL quartz syringe
N8145222

3 mL Syringes

Description	Part Number
3 mL quartz syringe	N8145223
3 mL quartz syringe, pre-cleaned for prepFAST S	N8152752
3 mL CTFE syringe	N8145226
3 mL CTFE syringe, pre-cleaned for prepFAST S	N8152753



3 mL quartz syringe
N8145223

6 mL Syringes

Description	Part Number
6 mL quartz syringe for prepFAST e	N8152754
6 mL quartz syringe, pre-cleaned for prepFAST S	N8152755
6 mL CTFE syringe	N8152756
6 mL CTFE syringe, pre-cleaned for prepFAST S	N8152757



6 mL Quartz syringe
N8152754

12 mL Syringe

Description	Part Number
12 mL quartz syringe	N8145227



12 mL PFA syringe
N8145227



apex Ω and apex 2 High Sensitivity Sample Introduction Systems

The next generation of the highly successful apex systems feature software control of temperatures for the heated spray chamber and Peltier-cooled condenser (and heated membrane for apex Ω) as well as precise MFC control of nitrogen and argon additional gas/sweep gas flows.

The systems maximize ICPMS sensitivity, up to 10x, by nebulizing liquid samples into a heated cyclonic spray chamber. The multi-stage Peltier-cooled condensing systems remove the solvent vapor, reducing oxides. The new apex systems are available in either quartz or HF-resistant PFA models with options for additional membrane desolvation or mixing chambers.

The new apex Systems:

- Are available with quartz or HF-resistant PFA flow path
- Have complete software control of:
 - Heated spray chamber temperature
 - Peltier-cooled condenser temperature
 - N₂ addition gas mass flow controller
 - Ar addition gas mass flow controller
 - Drain micro peristaltic pump

Key Differences:

apex 2

- Reduces oxides (1% CeO⁺/Ce⁺)
- Does not include membrane desolvator

apex Ω

- Significantly reduce oxides and solvent removal (0.01% CeO⁺/Ce⁺)
- Includes software control of heated membrane temperature
- Two stage desolvation (Peltier-cooled and EPTFE membrane) imparts matrix tolerance higher than any membrane desolvator on the market



apex 2 Q



apex Ω

Model	Description	Part Number
apex Ω	apex Omega high performance membrane desolvation system with quartz spray chamber, Peltier-cooled quartz condenser, and EPTFE membrane desolvator.	N8150484
apex Ω HF	apex Omega HF high performance membrane desolvation system with PFA spray chamber, Peltier-cooled PFA condenser, and EPTFE membrane desolvator.	N8150485
apex 2 Q	apex 2 Q desolvation system with quartz spray chamber and Peltier-cooled quartz condenser.	N8150481
apex 2 HF	apex 2 HF desolvation system with PFA spray chamber and Peltier-cooled PFA condenser.	N8150483

apex Q and apex HF

Classic apex systems still enhance sensitivity up to 10x by nebulizing liquid samples into a heated cyclonic spray chamber. The multi-stage Peltier-cooled condensing systems remove the solvent vapor, reducing oxides. Nitrogen gas flow is manually adjusted while optimizing ICPMS signal with the classic apex systems. Quartz or HF-resistant models are available, each having options for additional membrane desolvation and mixing chambers.

- High sensitivity
- Reduced oxides (1% CeO+/Ce+)
- Two temperature setpoints for spray chamber (140°C and 100°C)
- Two temperature setpoints for Peltier-cooled condenser (2°C and -3°C)
- N₂ addition gas with manual control valve
- Drain peristaltic pump with manual speed control

See page 52 for additional information on the apex-100 PFA nebulizers



apex Q

Model	Description	Part Number
apex Q	apex Q desolvation system with quartz spray chamber and Peltier-cooled quartz condenser.	N8145290
apex HF	apex HF desolvation system with PFA spray chamber and Peltier-cooled PFA condenser.	N8145292

Model	High Sensitivity	Membrane Desolvation	HF-Resistant	Software Control	MFC Control	Part Number
apex Ω	✓	✓		✓	✓	N8150484
apex Ω HF	✓	✓	✓	✓	✓	N8150485
apex 2 Q	✓			✓	✓	N8150481
apex 2 HF	✓		✓	✓	✓	N8150483
apex Q	✓					N8145290
apex HF	✓		✓			N8145292

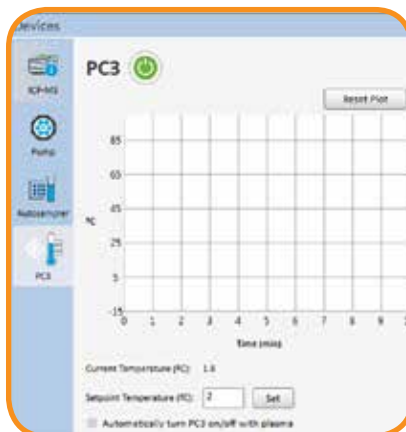


PC^{3X} Peltier Cooler/Heater

PC^{3X} for Cyclonic Spray Chamber

The PC^{3X} is a compact, Peltier-cooled or heated inlet system which incorporates the NexION cyclonic spray chamber. In cooling mode the PC^{3X} cools the outer walls of the cyclonic spray chamber, reducing the water or solvent vapor loading on the plasma, resulting in enhanced stability and oxide performance. In heating mode, sensitivity can be improved for low flow rate applications.

- Temperature control from -10°C to +80°C
- Controlled directly through Syngistix 2.0 and higher
- Thermal stabilization of spray chamber improves long-term stability
- Improved oxide performance
- Compatible with all cyclonic spray chambers for NexION 1000/2000



Control of PC^{3X} is integrated in the Syngistix software



Description	Part Number
PC ^{3X} thermally stabilized inlet system for cyclonic spray chamber for NexION 1000/2000 (Spray chamber not included)	N8152382

Cyclonic Spray Chambers for PC^{3X}

C3 High Sensitivity Cyclonic Spray Chambers

All chambers shown fit the NexION 1000/2000 PC^{3X}. See page 60 for additional information on spray chambers and cyclonic spray chamber lines.

Description	Application	Material	AMS	Part Number
Glass cyclonic spray chamber	All-purpose for non-HF samples	Glass		N8152375
Glass cyclonic spray chamber, with AMS matrix gas port		Glass	AMS	N8152389
Quartz cyclonic spray chamber, with matrix gas port	All-purpose for non-HF samples. Provides excellent sensitivity, stability, and reduced boron blank.	Quartz	AMS	N8152383
Quartz cyclonic spray chamber with both hydride and AMS matrix gas ports. Used for simultaneous hydride generation.	For interfacing Hydride S31, Hydride ICP, seaFAST S3 and seaFAST SP3.	Quartz	AMS + Hydride	N8145562
SilQ quartz cyclonic spray chamber	All-purpose for non-HF samples. Provides excellent sensitivity, stability and ultra-low blanks.	SilQ		N8152424
SilQ quartz cyclonic spray chamber, with AMS matrix gas port	All-purpose for non-HF samples. Provides excellent sensitivity, stability and ultra-low blanks.	SilQ	AMS	N8152539



N8152375



N8152383

PCH Peltier Cooler/Heater

PCH for High Performance PFA Spray Chamber

PCH is a Peltier cooler/heater for the high performance PFA spray chamber. It is a temperature controlled inlet system that offers the advantages of low memory effects, rapid wash-out, and high sample transport efficiency for HF containing samples. The outer walls of the PCH spray chamber can be cooled to reduce the water or solvent vapor loaded on the plasma, achieving enhanced stability and performance. In heating mode, sensitivity can be improved for low-flow applications. Temperature control is available from -10°C to +80°C.



Description	PCH	SC	PFA Neb	Part Number
PCH Peltier cooler/heater thermally stabilized inlet system with PFA spray chamber and PFA-ST nebulizer	✓	✓	✓	N8150446
PCH Peltier cooler/heater thermally stabilized inlet system with PFA spray chamber (Nebulizer not included)	✓	✓		N8150445
PCH Peltier cooler/heater thermally stabilized inlet system for PFA spray chamber (Spray chamber and nebulizer not included)	✓			N8150451

PFA Spray Chamber for PCH

High Performance PFA Spray Chamber

Description	Application	Part Number
High performance PFA spray chamber with end cap. Fits PCH Peltier cooler/heater for NexION 1000/2000. (PCH not included.) Includes o-ring-free PFA end cap and gas port with 1/4-28 fitting.	HF resistant, high sensitivity PFA spray chamber for semiconductor and other high purity or HF applications.	N8150454

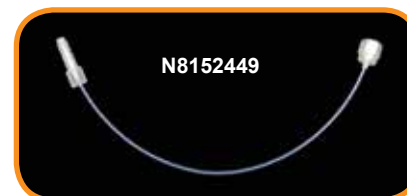


High Performance PFA Spray Chamber with end cap

PFA Spray Chamber Lines

Addition Gas Line for High Performance PFA Spray Chamber

Description	Part Number
Addition Gas Line for PFA Spray Chamber (0.8 mm i.d.) used for adding 20% O ₂ /80% Ar when organic solvents are analyzed	N8152449




Addition Gas Line for HP PFA Spray Chamber



High Purity Valves

High purity valve stators and rotors provide for the selection of liquid flow path with low contamination and low carryover for the optimum ICPMS results.

- P-Series** Two position sampling valves
- V-Series** Syringe pump refill valves
- M-Series** Multiposition stream selector/flow director valves
- S-Series** Semiconductor grade ultra-high purity valves



8 Port Valve - P7+ Part Number: N0777750

Description: P7+ CTFE high-flow 8 port valve head for prepFAST
Specifications: CTFE stator, PFA rotor, 1 mm, 0.5 mm
Applications: prepFAST, inline dilution and internal standard addition

7 Port Valve - P7 Part Number: N8145371

Description: 7 port syringe loading valve
Specifications: CTFE stator, PFA rotor, 1.0 mm
Applications: FAST, prepFAST e

12 Port Syringe Valve - V12 Part Number: N8145388

Description: 12 port syringe loading valve
Specifications: CTFE stator, PFA rotor, 1.0 mm
Applications: S400V, brineFAST syringe valve

8 Port Valve - M8 Part Number: N8145454

Description: M8 CTFE high-flow 8 port stream selector valve
Specifications: CTFE stator, PFA rotor
Applications: SmartTuner

11 Port Syringe Valve - S11 Part Number: N8152664

Description: 11 port syringe loading valve
Specifications: CTFE stator, PFA rotor, 1.0 mm
Applications: prepFAST S and scoutDX

Examples of a Stator and Rotor



Description
CTFE replacement stator for V12 FAST valve



Description
1 mm PFA rotor

High Purity Valves with Spare Rotors and Stators

P-SERIES VALVES WITH REPLACEMENT STATORS AND ROTORS						
# of Ports	Bore Size	Stator Material	Rotor Material	Part Number Complete Valve	Part Number Stator	Part Number Rotor
3 - P3	1.0 mm	CTFE	PFA	N8152617	N8152618	N8152619
4 - P4	1.0 mm	CTFE	PFA	N8145369	N8145377	N8145383
6 - P6	P6	CTFE	PFA	N8145370	N8145378	N0777751
7 - P7	P7	CTFE	PFA	N8145371	N0777752	N0777751
7 - P7	P7	PPS	PFA	N8145372	N8145380	N0777751
8 - P7+	P7	CTFE	PFA	N0777750	N8145379	N8145384
8 - P8	1.0 mm	CTFE	PFA	N8145373	N8145381	N8145385
10 - P10	1.0 mm	CTFE	PFA	N8145374	N8145382	N8145386
11-P11	1.0 mm	CTFE	PFA	N8145375	N8145393	N8145386
11-A11b	A11b	CTFE	PFA	N8145376	N8145392	N8145396
13 - P13	P13	CTFE	PFA	N8145455	N8152620	N8152621
5 - A5e	A5e	CTFE	PFA	N8145451	N8152622	N8152623
7 - A7μ	A7μ	CTFE	PFA	N8145452	N8152624	N8152625
6 - PM6	0.5 mm	CTFE	PFA	N8152626	N8152627	N8152628
8 - PM7+	0.5 mm	CTFE	PFA	N8152629	N8152630	N8152628
4 - P4H	1.6 mm	CTFE	PFA	N8152631	N8152632	N8152633
5 - P5H	1.6 mm	CTFE	PFA	N8152634	N8152635	N8152633

V-SERIES VALVES WITH REPLACEMENT STATORS AND ROTORS						
# of Ports	Bore Size	Stator Material	Rotor Material	Part Number Complete Valve	Part Number Stator	Part Number Rotor
6 - V6	1.0 mm	CTFE	PFA	N8145387	N8145390	N8145395
6 - V6H	1.6 mm	CTFE	PFA	N8145453	N8152637	N8152638
9 - V9	1.0 mm	CTFE	PFA	N0777758	N0777761	N0777759
12 - V12	1.0 mm	CTFE	PFA	N8145388	N8145391	N8145397
13 - V13	1.0 mm	CTFE	PFA	N8145389	N8145394	N8145398
V8C	1.0 mm	CTFE	PFA	N8145559	N8152640	N8145397
V9H	1.6 mm	CTFE	PFA	N8152641	N8152642	N8152643

M-SERIES STREAM SELECTION VALVE						
# of Ports	Bore Size	Stator Material	Rotor Material	Part Number Complete Valve	Part Number Stator	Part Number Rotor
3 - M3H	1.6 mm	CTFE	PFA	N8152644	N8152645	N8152646
4 - M4	M4	CTFE	PFA	N8152647	N8152648	N8152649
6 - M6	M6	CTFE	PFA	N8152650	N8152651	N8152652
8 - M8	M8	CTFE	PFA	N8145454	N8152653	N8152654
10 - M10	M10	CTFE	PFA	N8152655	N8152656	N8152657

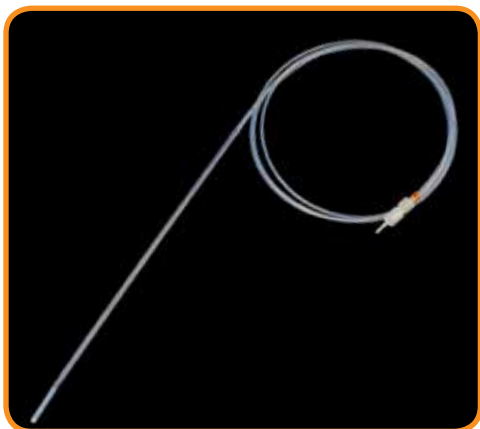
S-SERIES VALVES WITH REPLACEMENT STATORS AND ROTORS						
# of Ports	Bore Size	Stator Material	Rotor Material	Part Number Complete Valve	Part Number Stator	Part Number Rotor
4 - S4	S4	CTFE	PFA	N8145560	N8152659	N8152660
9 - S9	S9	CTFE	PFA	N8152661	N8152662	N8152663
11 - S11	S11	CTFE	PFA	N8152664	N8152665	N8152666



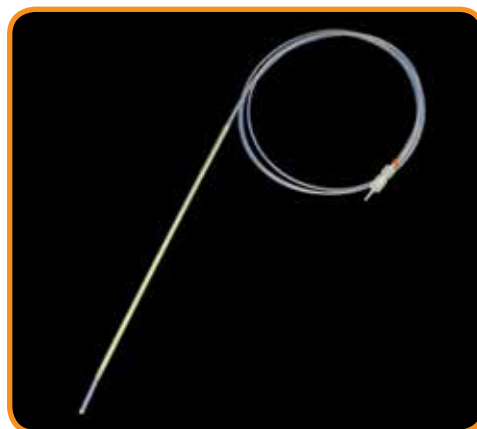
Manual Sampling Probes

Probes

These probes offer high chemical resistance for applications involving strong acids, alkalis, and organics. A contoured design reduces carryover, while an all-fluoropolymer wetted sample flow path reduces contamination.



Description	Size	Part Number
Internal standard probe with carbon fiber support for NexION 1000/2000. Includes fluoropolymer micro fitting.	0.50 mm i.d. ■ (orange), 150 cm	N8152452



Description	Size	Part Number
Sample probe with Ultem support for NexION 1000/2000. Includes fluoropolymer micro fitting.	0.50 mm i.d. ■ (orange)	N8145504

Nebulizer Lines

Low Volume Nebulizer Sample Lines

Description	Part Number
Sample line 0.5 mm i.d. ■ (orange) for PFA-ST nebulizer	N8152455



Description	Part Number
Sample line 0.5 mm i.d. ■ (orange) for MEINHARD® Plus nebulizer	N8145503



Nebulizer Gas Lines

Description	Part Number
PFA nebulizer gas line for PFA-ST nebulizer; includes 1/8" Swagelok	N8145531



Description	Part Number
6" metal free nebulizer gas line for glass and quartz nebulizers on NexION 2000	N8152385



Internal Standard Addition Kits and Tees

Internal Standard Addition Kits

Internal Standards Kits

NexION 1000/2000 internal standards kits utilize a low-internal volume mixing tee for inline addition of internal standard with the sample. Kits are available for both PFA-ST and MEINHARD® Plus nebulizers.

For Addition of Internal Standard with PFA-ST Nebulizers

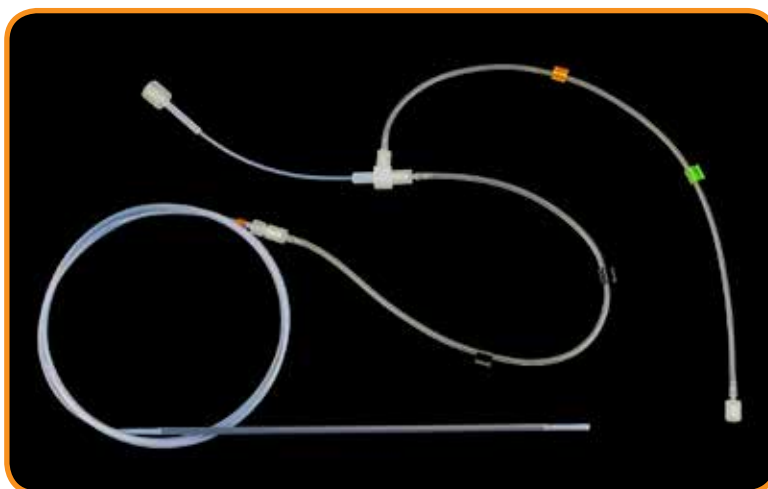
Includes:

- Fluoropolymer mixing tee (0.5 mm i.d.)
- Internal standard probes
- Fluoropolymer peristaltic pump fittings
- MP² peristaltic pump tubing

For Addition of Internal Standard with MEINHARD® Plus Nebulizers

Includes:

- Fluoropolymer mixing tee (0.5 mm i.d.)
- Internal standard probes
- Fluoropolymer peristaltic pump fittings
- MP² peristaltic pump tubing



Description	Type	Part Number
Internal Standards Kit for MEINHARD® Nebulizer. Includes PFA tee, fittings, IS probe, SPP Starter Flared Pump Tubing Pack (org/grn, blk/blk, pharmed gry/gry)	MEINHARD®	N8152421
Internal Standards Kit for PFA-ST Nebulizer. Includes PFA tee, fittings, IS probe, SPP Starter Flared Pump Tubing Pack (org/grn, blk/blk, pharmed gry/gry)	PFA-ST	N8152571
Organic Solvent IS Kit for MEINHARD® Nebulizer. Includes PFA tee, fittings, IS probe, SPP Starter Viton Pump Tubing Pack (PVC org/grn/ viton blk/blk, viton gry/gry)	MEINHARD®	N8152422

Internal Standard Addition Tees

Internal Standard Addition Tees

NexION 1000/2000 internal standard mixing tee for online addition of internal standard or online dilution. Achieves excellent mixing with minimal dead volume.

Description	Part Number
Internal standard addition tee 0.5 mm i.d. ■ (orange) for PFA-ST nebulizer.	N8152423


















Description	Part Number
Internal standard addition tee 0.5 mm i.d. ■ (orange) for MEINHARD® Plus nebulizer.	N8152386



Fittings / PFA Tubing / Spares Kits

Easy to use, ultra-clean fittings and PFA tubing are ideal for all trace metal analysis applications. Ferrules install quickly and easily for high-flow applications. Low-flow valve fittings have low dead volume, leak-free integrated ferrule connections.

	Description	Qty	Suggested Use	P/N
	Black, high-flow nut (1/4-28) for FAST valve and 1/16" (1.6 mm) ferrule	10	Use with 1/16" (1.6 mm) o.d. PFA tubing for low and moderate flow rates (0.1 mL/min - 2 mL/min)	N0777283
	White, high-flow nut (1/4-28) for FAST valve and 1/8" (3.2 mm) ferrule	10	Use with 1/8" (3.2 mm) o.d. PFA tubing for high-flow rates and vacuum applications (> 2 mL/min)	N0777297
	1/16" (1.6 mm) Ferrule for high-flow fitting (1/4-28)	10	Use with 1/16" (1.6 mm) o.d. PFA tubing	N8145237
	1/8" (3.2 mm) Ferrule for high-flow fitting (1/4-28)	10	Use with 1/8" (3.2 mm) o.d. PFA tubing	N8145238
	Black, low-flow nut (M5/10-32) for FAST valve	10	Use with 1/16" (1.6 mm) o.d. PFA tubing for low-flow rates (<0.1 mL/min)	N0777284
	Female Perilink fitting, barbed	1	Adapts 10/32 to pump tubing	N8152388
	Female Perilink fitting	5	Adapts 10/32 to pump tubing	N0786030
	Male Perilink fitting, barbed	1	Adapts 10/32 to pump tubing and for use with internal standard tee	N8152453
	Male Perilink fitting	5	Adapts 10/32 to pump tubing and for use with internal standard tee	N0786036
	PFA-ST Nebulizer to Micro Fitting Adapter, PFA	1	Allows for use of tubing with 10/32 fitting with PFA-ST nebulizer	N8145520
	MEINHARD® Plus Nebulizer to micro fitting adapter	1		N8152387
	CTFE peristaltic pump fittings, female	1	For use in low pressure applications.	N8145018
	CTFE peristaltic pump fittings, female, barbed	1	For use in high pressure applications	N0777829
	CTFE peristaltic pump fittings, male	1	For use in low pressure applications	N8145017
	CTFE peristaltic pump fittings, male, barbed	1	For use in high pressure applications	N0777830

High Purity Fluoropolymer Tubing (5 m coil)			
I.D.	O.D.	Color Code	Part Number
0.006" (0.15 mm)	1/16" (1.6 mm)	■ (red)	N8145239
0.008" (0.20 mm)	1/16" (1.6 mm)	■ (purple)	N8145240
0.010" (0.25 mm)	1/16" (1.6 mm)	■ (green)	N8145241
0.014" (0.30 mm)	1/16" (1.6 mm)	■ (yellow)	N8145242
0.019" (0.50 mm)	1/16" (1.6 mm)	■ (orange)	N8145243
0.031" (0.80 mm)	1/16" (1.6 mm)	■ (blue)	N8145244
0.039" (1.00 mm)	1/16" (1.6 mm)	■ (gray)	N8145245
0.063" (1.60 mm)	1/8" (3.2 mm)		N8145246



Sample Loops

PTFE crimp free *FAST* or prep*FAST* loops provide low resistance for fast loading and rinse out.

Standard for *FAST* Systems

1 mm i.d. *FAST* High-Flow Sample Loops

Description	Size	Part Number
Recommended for use with 1.0 mm i.d. ■ (gray) probe. 1.6 mm o.d., 1/4-28 fittings.	300 µL loop	N0777477
	500 µL loop	N0777478
	1.0 mL loop	N0777664
	1.5 mL loop	N0777665
Applications	2.0 mL loop	N0777479
<i>FAST</i> , prep <i>FAST</i> , prep <i>FAST</i> M5, prep <i>FAST</i> e, brine <i>FAST</i> , sea <i>FAST</i>	2.5 mL loop	N0777666
	3.0 mL loop	N0777667
	4.0 mL loop	N0777480



0.8 mm i.d. *FAST* High-Flow Sample Loops

Description	Size	Part Number
Recommended for use with 0.8 mm i.d. ■ (blue) probe. 1.6 mm o.d., 1/4-28 fittings.	100 µL loop	N0777428
	200 µL loop	N0777429
	300 µL loop	N0777430
	500 µL loop	N0777289
	1.0 mL loop	N0777290
Applications	1.5 mL loop	N0777668
Legacy <i>FAST</i> systems, and special applications	2.0 mL loop	N0777431
	2.5 mL loop	N0777669
	3.0 mL loop	N0777670
	4.0 mL loop	N0777671



1.6 mm i.d. *FAST* High-Flow Sample Loops

Description	Size	Part Number
Recommended for use with 1.0 mm i.d. ■ (gray) probes and applications requiring larger sample volumes or high flow rates. 3.2 mm o.d., 1/4-28 fittings.	250 µL loop	N0777046
	500 µL loop	N0777832
	1.0 mL loop	N8145469
	2.0 mL loop	N0777291
Applications	3.0 mL loop	N0777292
soil <i>FAST</i> , oil <i>FAST</i> , and large volume <i>FAST</i>	4.0 mL loop	N0777293
	6.0 mL loop	N0777653
	8.0 mL loop	N0777654




PFA Sample Vessels

PFA Vials


PFA vials are ideal for applications that require the highest purity. Made of ultrapure, ultra-chemically resistant material, these vials are an excellent choice for high purity, semiconductor and micro samples.


- Non-contaminating
- Graduated
- Temperature range of -200 °C to 260 °C
- HF-resistant
- Conical bottom
- Self-standing


Vials	Fits Racks
N0777403	N0777229 (pg 97), N0777230 (pg 97), N0777397 (pg 99)
N0777404	
N0777405	


	Part Number	Qty
	N0777403	10
	Description	Volume
	14 mm o.d. graduated PFA micro vial	1 mL Brim full 2 mL


	Part Number	Qty
	N0777402	10
	Description	
	PFA cap for 14 mm micro vials	

	Part Number	Qty
	N0777404	10
	Description	Volume
	14 mm o.d. graduated PFA micro vial	2 mL Brim full 3 mL

	Part Number	Qty
	N0777393	10
	Description	
	PFA snap-on cap for 14 mm graduated PFA micro vials	

	Part Number	Qty
	N0777405	10
	Description	Volume
	14 mm o.d. graduated PFA micro vial	4 mL Brim full 4.5 mL

	Part Number	Qty
	N0777392	10
	Description	
	PFA cap with knob for 14 mm graduated PFA micro vials.	

	Part Number	Qty
	N0777396	1
	Description	
	ETFE tweezers for removal of PFA cap with knob	



PFA Bottles and Vials


PFA bottles and vials are ideal for a wide range of demanding fluid handling and storage applications in general laboratory, semiconductor, and environmental industries.

Bottles / Vials	Fits Racks
N8145132	N0777249 (pg 98), N8122463 (pg 97)
N8145133	N8145130 (pg 98), N8122463 (pg 97), N8145131 (pg 100)
N8145134	N0777242 (pg 96), N0777641 (pg 96), N8145130 (pg 98), N0777639 (pg 95), N8145131 (pg 100)
N0777406	N0777248 (pg 98), N0777228 (pg 100)
N0777407	N0777252 (pg 98), N0777772 (pg 101), N0777771 (pg 101), N0777822 (pg 99)


	Part Number	Qty
	N0777406	5
	Description	Volume
	28 mm o.d. PFA bottle and cap	20 mL


	Part Number	Qty
	N0777407	1
	Description	Volume
	50 mm o.d. PFA bottle and cap with TFM insert	125 mL

- Semiconductor, high-purity, and aggressive chemical applications
- The most translucent PFA vials available
- Low absorption of biological materials for many research applications

	Part Number	Qty
	N8145132	10
	Description	Volume
	30 mm o.d. graduated PFA vial	15 mL

	Part Number	Qty
	N8145133	10
	Description	Volume
	30 mm o.d. graduated PFA vial	30 mL

	Part Number	Qty
	N8145134	10
	Description	Volume
	30 mm o.d. graduated PFA vial	60 mL

	Part Number	Qty
	N8145105	10
	Description	
	Screw cap for 30 mm o.d. vials	



2 mL PVDF Autosampler Vial

A low cost alternative to PFA for many ultra-trace metal analyses

PVDF sample vials are a lower cost alternative to our high-performance PFA vials. These high-tensile-strength, fluoropolymer vials can replace more expensive PFA vials in many applications.

- Semiconductor-grade PVDF fluoropolymer
- High dielectric and mechanical strength, flexible
- Excellent for the analysis of Nitric Acid, Hydrochloric Acid, Hydrofluoric Acid, or Ammonium Hydroxide
- Resistant to most mineral and organic acids, as well as aliphatic and aromatic hydrocarbons, alcohols, halogenated solvents, and oxidizing agents
- Self-standing
- Conical internal bottom for micro-sample analysis
- Suitable for most semiconductor pure chemicals
- Not recommended for ketones, acetone, ethyl acetate, and MIBK
- Optional PFA enclosures
- Available standard or pre-cleaned

PVDF Vials and PFA Caps		
Description	Qty	Part Number
PVDF vial, 2 mL	10	N8145473
PVDF vial, 2 mL	100	N8145474
PVDF vial, 2 mL	1000	N8145475
PFA cap for V-14 vial	10	N0777402
PFA cap for V-14 vial	100	N8145476

Pre-cleaned PVDF Vials and Caps		
Description	Qty	Part Number
Pre-cleaned PVDF vial, 2 mL	100	N8145352
Pre-cleaned PFA cap for V-14 vial	100	N8145353

Bottles/Vials	Fits Racks
N8145473	N0777229 (pg 97), N0777230 (pg 97), N0777397 (pg 99)



N8145473
2 mL PVDF
autosampler vial




N8145473
2 mL PVDF autosampler vial
with PFA cap


Non-PFA Sample Vessels


Non-PFA Vials, Tubes and Bottles


Non-PFA sample vessels manufactured from plastics, such as polypropylene, polyethylene, and polystyrene, are a sensible alternative to consider when breakage, surface inertness, and/or disposal costs are a concern.


Vials	Fits Racks
N8121043	N0777231 (pg 97), N0777232 (pg 97)
N8145125	N0777245 (pg 96), N0777643 (pg 96), N0777644 (pg 96), N8145317 (pg 100)
N0777815	N0777243 (pg 96)
N0777471	N0777640 (pg 95), N0777244 (pg 96), N0777642 (pg 96), N0777247 (pg 98), N8145317 (pg 100)
N8145124	N0777639 (pg 95), N0777228 (pg 100), N0777242 (pg 96), N0777641 (pg 96), N0777248 (pg 98), N8145317 (pg 100), N0782019 (pg 100)
N0777820	N0777822 (pg 99), N0777252 (pg 98), N8145317 (pg 100), N0777772 (pg 101), N0777771 (pg 101)
N0777818	N0777823 (pg 99), N8122464 (pg 101), N8145317 (pg 100), N0782019 (pg 100)

	Part Number Qty	
	N8121043	100
	N0777813	500
	Description Volume	
	8 mm o.d. centrifuge tube	0.5 mL


	Part Number Qty	
	N8145125	90
	N0777814	500
	Description Volume	
	13 mm o.d. polypropylene tube with rounded bottom	8 mL

	Part Number Qty	
	N0777471	60
	B0193233	500
	Description Volume	
	16 mm o.d. polypropylene tube with screw cap	15 mL

	Part Number Qty	
	N8145079	50
	N0777815	500
	Description Volume	
	20 mm o.d. polypropylene tube with screw cap	20 mL

	Part Number Qty	
	N8145124	50
	B0193234	500
	Description Volume	
	28 mm o.d. polypropylene tube with screw cap	50 mL

	Part Number Qty	
	N0777820	12
	N0777821	24
	Description Volume	
	50 mm o.d. HDPE wide mouth bottle with cap	125 mL

	Part Number Qty	
	N0777818	12
	N0777819	100
	Description Volume	
	61 mm o.d. polyethylene wide mouth bottle	250 mL

Microplates

Microplates

Microplates are ideal for micro-volume applications such as storage and sample transfer.

All microplates can be used on the following SC DX autosamplers:

SC2 DX, SC4 DX



Description	Part Number
1 Pk (5 ea) 24 well, 10 mL microplate, square well, pyramid bottom	N0777236



Description	Part Number
1 Pk (5 ea) 48 well, 5 mL microplate, square well, pyramid bottom	N0777237



Description	Part Number
1 Pk (3 ea) 48 well, 7.5 mL microplate, square well, pyramid bottom	N0777238



Description	Part Number
1 Pk (5 ea) 96 well, 2 mL microplate, square well, pyramid bottom	N0777239
1 Pk (5 ea) 96-well, 500 μ L microplate, polystyrene	N8145354

X-Piercing Film Cover / XP Probe Arm

X-Piercing Microplate Cover

The X-piercing cover minimizes evaporation of micro samples awaiting analysis and protects against environmental contamination.



Remove X-Piercing cover from it's backing and place on the microplate



X-Piercing cover helps prevent contamination during sampling



Description	Qty	Part Number
X-Piercing film cover for 96 well microplate	50	N8145129

XP Probe Arm

The XP probe arm must be used in place of the reset probe arm when an X-Piercing cover has been applied to a 96 well microplate.

Description	Qty	Part Number
XP Probe arm for 2 DX / 4 DX Autosampler	1	N8145271



Large Autosampler Racks

Autosampler Racks (LR Size)

Plastic large racks are recommended for aqueous samples.

All LR racks can be used on the following SC DX autosamplers: SC2 DX/SC2 DXe, SC4 DX/SC4 DXe



Description	Diam.	Part Number
90 position large polypropylene sample rack for 8 mL tubes	13 mm	N0777245



Description	Diam.	Part Number
60 position large polypropylene sample rack for 15 mL tubes	16 mm	N0777244



Description	Diam.	Part Number
40 position large polypropylene sample rack for 20 mL tubes	20 mm	N0777243



Description	Diam.	Part Number
21 position large polypropylene sample rack for 50 mL and 60 mL tubes	30 mm	N0777242

Autosampler Coated Metal Racks (LR Size)

Metal racks are coated with an epoxy paint that forms a protective barrier over the rack material.

All coated metal racks can be used on the following SC DX autosamplers: SC2 DX/SC2 DXe, SC4 DX/SC4 DXe



Description	Diam.	Part Number
90 position metal large sample rack for 8 mL tubes	13 mm	N0777643



Description	Diam.	Part Number
90 position 3 tier metal large sample rack for 8 mL tubes	13 mm	N0777644



Description	Diam.	Part Number
60 position metal large sample rack for 15 mL tubes	16 mm	N0777642

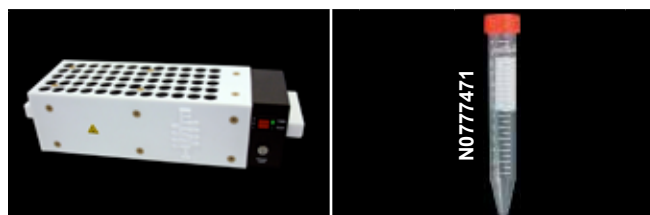


Description	Diam.	Part Number
21 position metal large sample rack for 50 mL and 60 mL tubes	30 mm	N0777641

Heated and Micro Autosampler Racks

Autosampler Heated Racks (LR Size)

All heated racks can be used on the following SC DX autosamplers: SC2 DX/SC2 DXe, SC4 DX/SC4 DXe



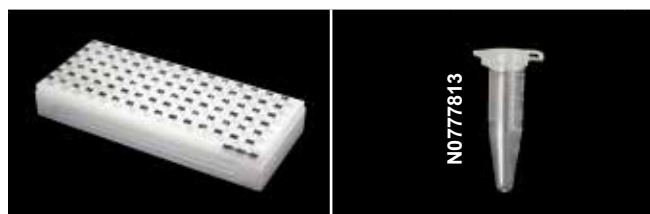
Description	Diam.	Part Number
60 position heated large sample rack for 15 mL tubes	16 mm	N0777640



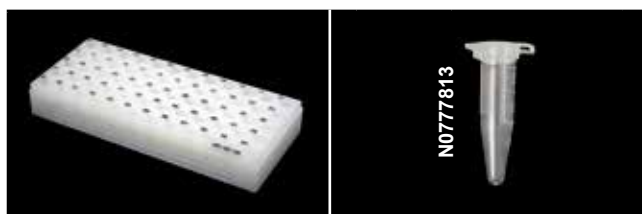
Description	Diam.	Part Number
21 position heated large sample rack for 50 mL and 60 mL tubes	30 mm	N0777639

Autosampler Racks (MR Size)

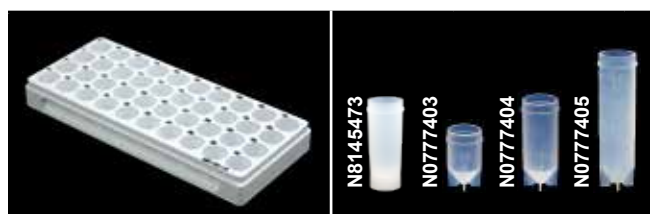
All MR racks can be used on the following SC DX autosamplers: SC2 DX/SC2 DXe, SC4 DX/SC4 DXe



Description	Diam.	Part Number
90 position CPVC micro sample rack for 0.5 mL tubes	8 mm	N0777232



Description	Diam.	Part Number
60 position CPVC micro sample rack for 0.5 mL tubes	8 mm	N0777231



Description	Diam.	Part Number
40 position CPVC micro sample rack for 1 mL, 2 mL and 4 mL tubes	14 mm	N0777230



Description	Diam.	Part Number
21 position CPVC micro sample rack for 1 mL, 2 mL and 4 mL tubes	14 mm	N0777229



Description	Diam.	Part Number
10 position PVCC micro sample rack for 15 mL and 30 mL tubes	30 mm	N8122463



Description	Part Number
PVCC Cover for SC-micro racks	N0777233



Super Autosampler Racks

Large-volume samples can be analyzed using NexION super racks without transferring the sample to a smaller tube, reducing prep time and chance of contamination.

Autosampler Racks (SR2 Size)

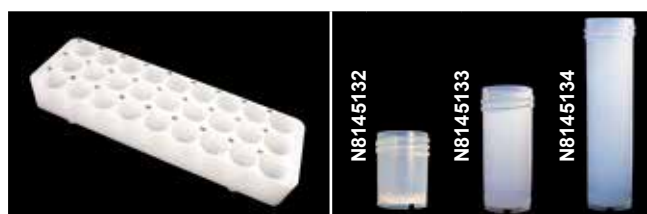
All SR2 racks can be used on the following SC DX autosamplers: SC2 DX/SC2 DXe



Description	Diam.	Part Number
80 position HMPE super sample rack for 15 mL tubes	16 mm	N0777247



Description	Diam.	Part Number
27 position HMPE super sample rack for 20 mL and 50 mL tubes	28 mm	N0777248



Description	Diam.	Part Number
27 position HMPE super sample rack for 15 mL, 30 mL and 60 mL tubes	31 mm	N8145130



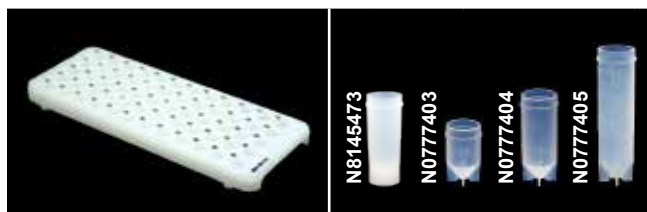
Description	Diam.	Part Number
21 position HMPE super sample rack for 15 mL tubes	30 mm	N0777249



Description	Diam.	Part Number
12 position HMPE super sample rack for 125 mL bottles	50 mm	N0777252

Autosampler Racks (SR4 Size, Type 1)

All SR4 racks can be used on the following SC DX autosamplers: SC2 DX/SC2 DXe, SC4 DX/SC4 DXe



Description	Diam.	Part Number
60 position HMPE super sample rack for 1 mL, 2 mL and 4 mL tubes	14 mm	N0777397



Description	Part Number
PP Cover for 60 position SR-4 super rack	N0777398

Autosampler Racks (SR4 Size, Type 2)

All SR4 type 2 racks can be used on the following SC DX autosamplers: SC4 DX/SC4 DXe



Description	Diam.	Part Number
15 position HMPE super sample rack for 250 mL bottles	60 mm	N0777823



Description	Diam.	Part Number
20 position HMPE super sample rack for 125 mL bottles	50 mm	N0777822

The N0777823 super rack will hold fifteen 100 mL volumetric flasks or 250 mL bottles




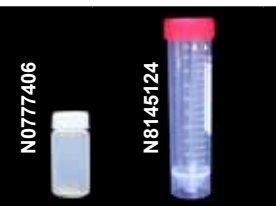
N0777823 super rack with 100 mL volumetric flasks




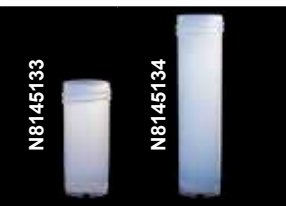
Standards Autosampler Racks

Autosampler Racks (ST Size, Type 1)



All ST type 1 racks can be used on the following SC DX autosamplers: SC2 DX/SC2 DXe, SC4 DX/SC4 DXe



Description	Diam.	Part Number
10 position PVDF standards rack for 20 mL and 50 mL tubes	28 mm	N0777228

Description	Diam.	Part Number
10 position PP high purity standards rack for 30 mL and 60 mL tubes	30 mm	N8145131

Description	Diam.	Part Number
5 position HMPE extra standards rack for 50 mL and 250 mL bottles. Fits over SC DX rinse station.	28 mm 60 mm	N0782019

Description	Diam.	Part Number
5 position HMPE priority samples rack for 8 mL, 15 mL, 50 mL, 125 mL and 250 mL bottles. Fits over DX rinse station. For PE prepFAST only.	13 mm 16 mm 28 mm 50 mm 60 mm	N8145317

Autosampler Racks (ST Size, Type 2)

All ST type 2 racks can be used on the following SC DX autosamplers: SC2 DX/SC2 DXe



Description	Diam.	Part Number
9 position HMPE standards rack for 125 mL bottles. Recommended for prepFAST with SC DX. Includes 9, 125 mL HDPE bottles w/cap.	50 mm	N0777772

Autosampler Racks (ST Size, Type 3)

The ST type 3 rack can be used on the following SC DX autosamplers: SC4 DX/SC4 DXe



Description	Diam.	Part Number
7 position HMPE standards rack for 250 mL bottles	60 mm	N8122464



Description	Diam.	Part Number
9 position HMPE standards rack for 125 mL bottles. Recommended for prepFAST. Includes 9, 125 mL HDPE wide mouth standard bottles w/caps.	50 mm	N0777771

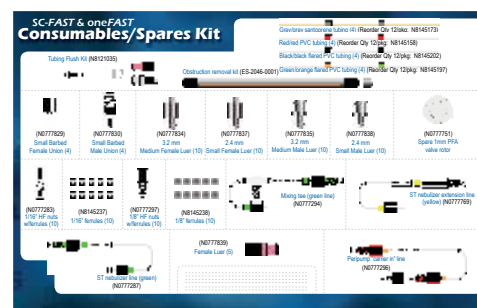


FAST Spares Kits

FAST Spares Kit

Assorted fittings and tubing for *FAST* systems

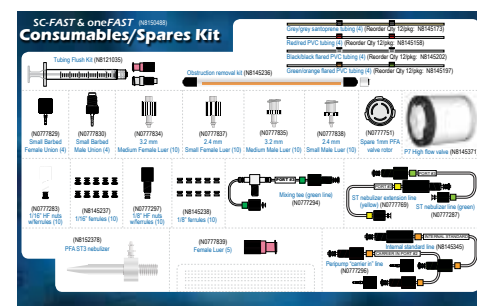
Description	Part Number
FAST Spares Kit for NexION 1000/2000	N8150487



FAST Deluxe Spares Kit

All of the assorted fittings and tubing in the *FAST* Spares Kit with the addition of a PFA-ST nebulizer, spare *FAST* valve, and internal standard tee.

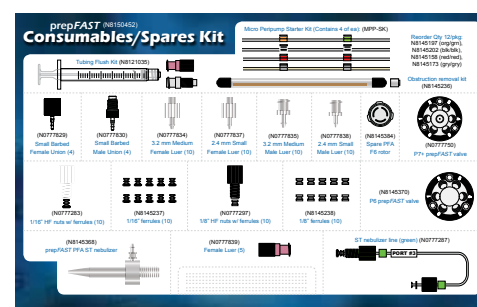
Description	Part Number
FAST Deluxe Spares Kit for NexION 1000/2000	N8150488



prepFAST Spares Kit

Includes prepFAST PFA-ST3 nebulizer, P7+ and P6 valves, PFA F6 rotor, tubing flush kit, ST nebulizer line, and spare fittings and tubing for prepFAST.

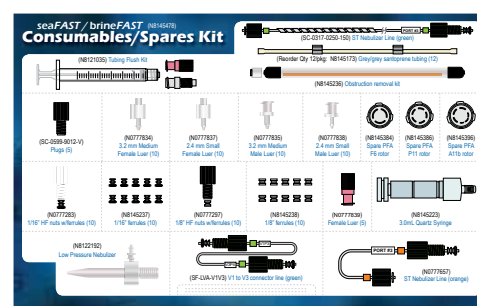
Description	Part Number
prepFAST Spares Kit	N8150452



seaFAST / brineFAST Spares Kit

Includes all of the assorted fittings and tubing in the *FAST* Spares Kit with the addition of a PFA-ST nebulizer, 3 mL quartz syringe, and assorted fittings.

Description	Part Number
seaFAST/brineFAST Spares Kit	N8145478



Installation and Training

Silver Level ESI Installation & Training

The silver level installation and training package is a 1-day on-site installation and method development for SC-FAST.

Includes: Hardware installation
Software methods
Basic system familiarization
Travel time & expenses for ESI employee or contractor
SC-FAST standard spares kit (N8145126)

Description	Part Number
On-site, 1-day installation and application development for SC-FAST high throughput system	N0777426

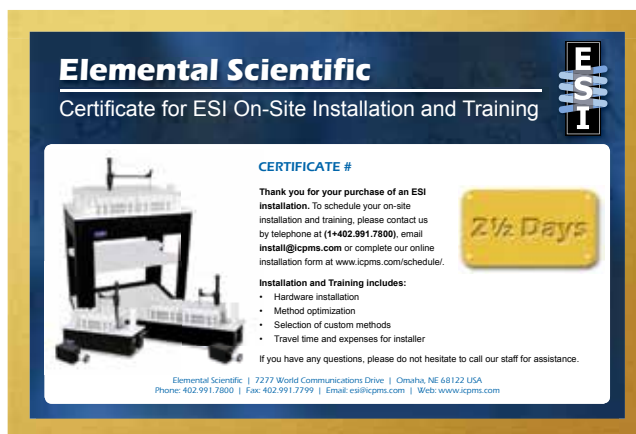


Gold Level ESI Installation & Training

The gold level installation and training package is a 2½-day, on-site installation and method development for the SC-FAST and prepFAST.

Includes: Hardware installation
Software methods
Basic system familiarization
Necessary method validation
User training
Travel time & expenses for ESI employee or contractor
Spares kit (see page 102)

Description	Part Number
On-site, 2½-day installation and application development for SC-FAST systems	N0777205
On-site, 2½-day installation and application development for prepFAST systems	N8145366
On-site, 2½-day installation and application development for seaFAST/brineFAST systems	N8145477
On-site, 4-day installation and application development for prepFAST IC systems	N8152751

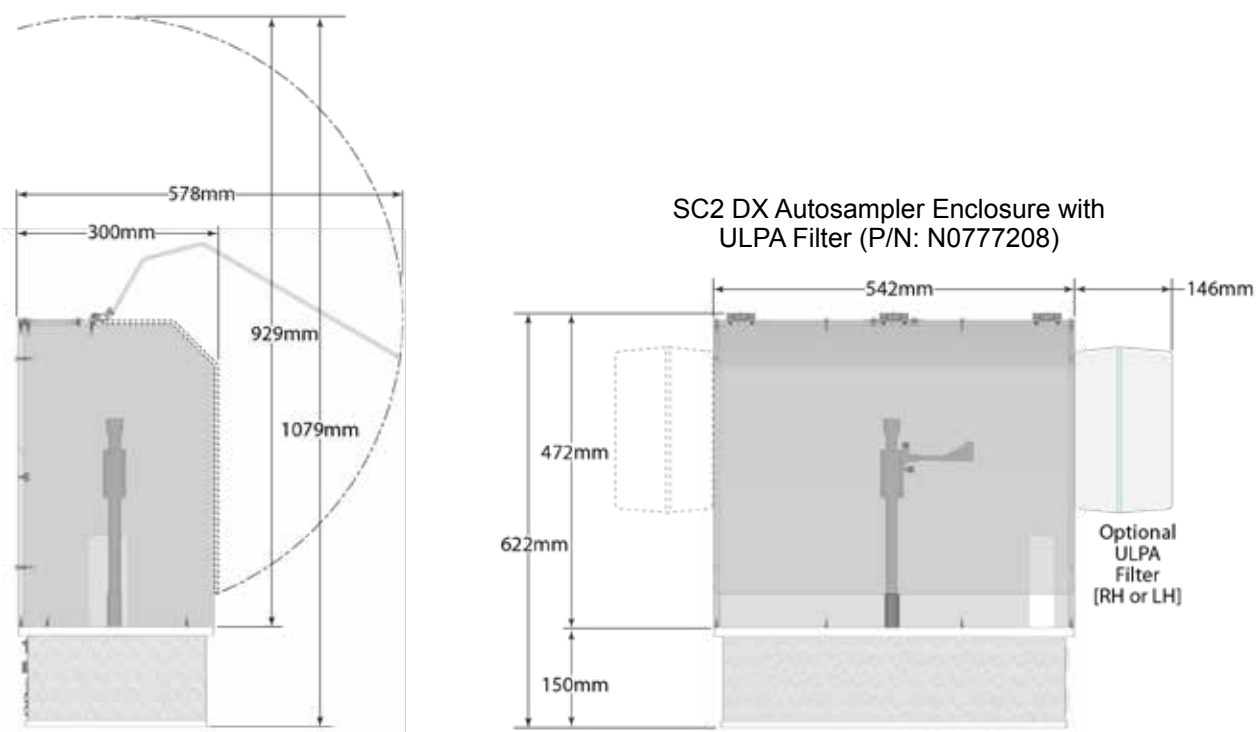


The FAST Deluxe, prepFAST, or seaFAST/brineFAST Spares Kit is included with the Gold Installation & Training.



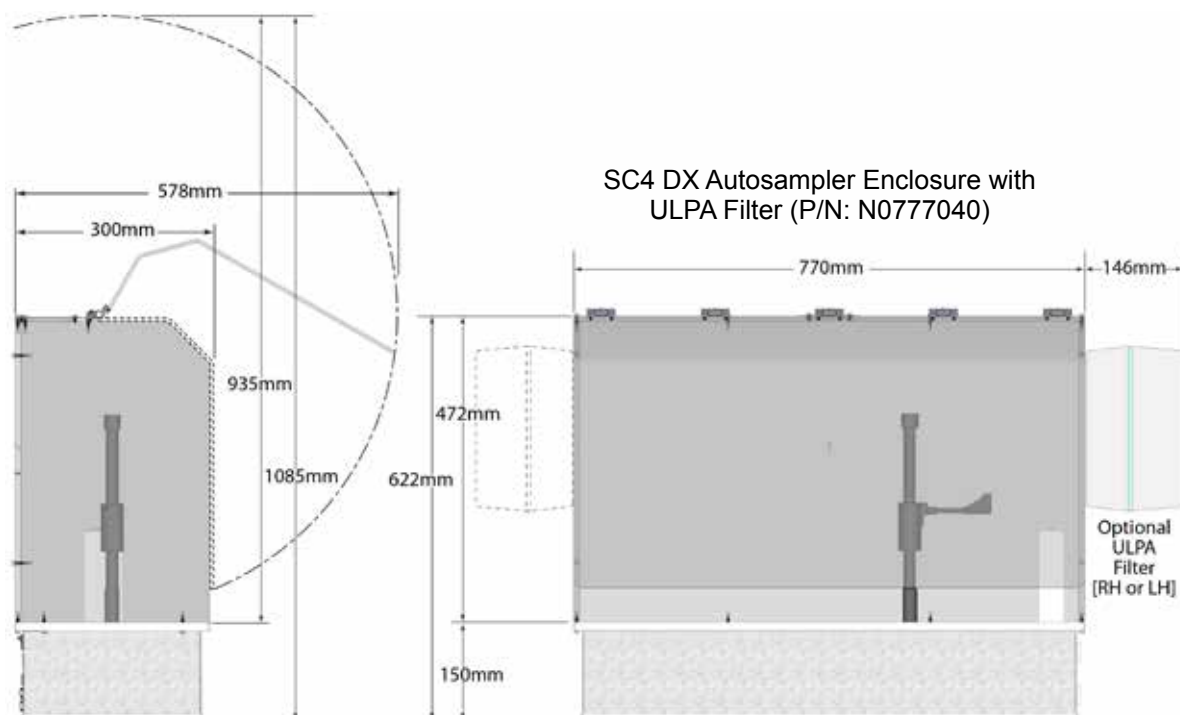
Autosampler Dimensions

SC2 DX Autosampler with Enclosure and ULPA Filter Dimensions



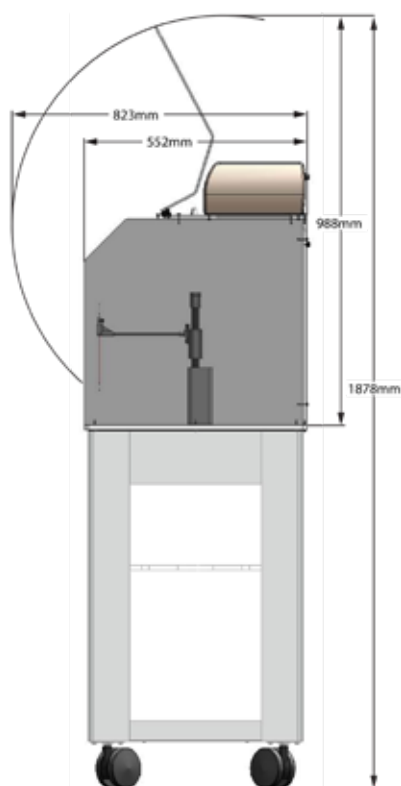
SC2 DX autosampler with mobile stand and enclosure and ULPA Filter, W x D X H: 54.2 cm x 34.6 cm x 127.3 cm

SC4 DX Autosampler with Enclosure and ULPA Filter Dimensions

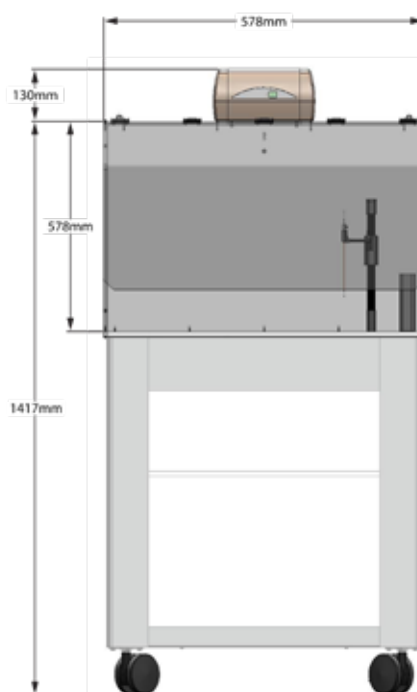


SC4 DX autosampler with mobile stand and enclosure and ULPA filter, W x D X H: 77.0 cm x 34.6 cm x 127.3 cm

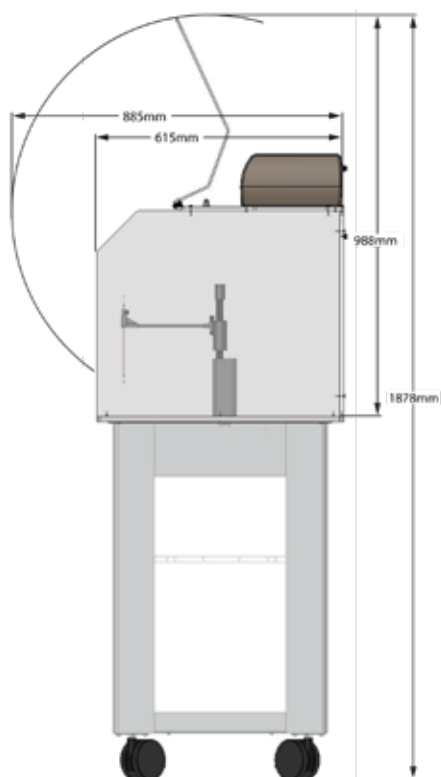
SC8 DX Autosampler with Enclosure and ULPA Filter Dimensions



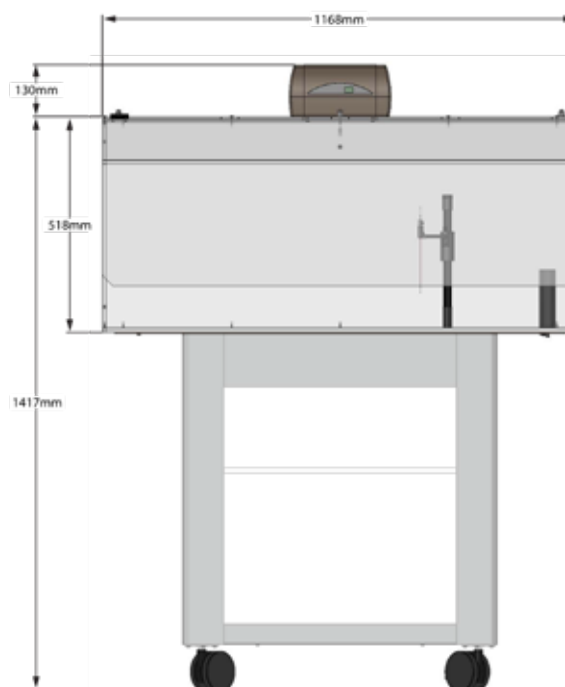
SC8 DX Autosampler Enclosure with ULPA Filter (P/N: N0777346)



SC14 DX Autosampler with Enclosure and ULPA Filter Dimensions



SC14 DX Autosampler Enclosure with ULPA Filter (P/N: N0777041)



Index

P/N.....Page	P/N.....Page	P/N.....Page	P/N.....Page	P/N.....Page	P/N.....Page
N0777041.....105	N0777407.....91	N0777830.....88	N8145148.....78	N8145196.....78	N8145315.....59
N0777046.....89	N0777426.....103	N0777831.....48	N8145149.....78	N8145197.....78	N8145316.....59
N0777205.....103	N0777428.....89	N0777832.....89	N8145150.....78	N8145198.....78	N8145317.....100
N0777206.....49	N0777429.....89	N0777833.....77	N8145151.....78	N8145199.....78	N8145321.....61
N0777208.....48,104	N0777430.....89	N0782019.....100	N8145152.....78	N8145200.....78	N8145352.....92
N0777209.....48	N0777431.....89	N0786010.....7	N8145153.....78	N8145201.....78	N8145353.....92
N0777210.....48	N0777471.....93	N0786011.....7	N8145154.....78	N8145202.....78	N8145354.....94
N0777223.....53	N0777477.....89	N0786018.....45	N8145155.....78	N8145203.....78	N8145366.....103
N0777225.....53	N0777478.....89	N0786030.....77,88	N8145156.....78	N8145204.....78	N8145369.....85
N0777228.....100	N0777479.....89	N0786036.....77,88	N8145157.....78	N8145205.....78	N8145370.....85
N0777229.....97	N0777480.....89	N814385.....86	N8145158.....78	N8145206.....78	N8145371.....85
N0777230.....97	N0777639.....97	N2024021.....49	N8145159.....78	N8145207.....78	N8145372.....85
N0777231.....97	N0777640.....97	N2024041.....49	N8145160.....78	N8145208.....78	N8145373.....85
N0777232.....97	N0777641.....96	N8121035.....52	N8145161.....78	N8145209.....78	N8145374.....85
N0777233.....97	N0777642.....96	N8121043.....93	N8145162.....78	N8145210.....78	N8145375.....85
N0777236.....94	N0777643.....96	N8122382.....53	N8145163.....78	N8145211.....78	N8145376.....85
N0777237.....94	N0777644.....96	N8122383.....53	N8145164.....78	N8145212.....78	N8145377.....85
N0777238.....94	N0777653.....89	N8122384.....53	N8145165.....78	N8145213.....78	N8145378.....85
N0777239.....94	N0777654.....89	N8122463.....97	N8145166.....78	N8145214.....78	N8145379.....85
N0777242.....96	N0777664.....89	N8122464.....101	N8145167.....78	N8145215.....78	N8145380.....85
N0777243.....96	N0777665.....89	N8122470.....43	N8145168.....78	N8145216.....78	N8145381.....85
N0777244.....96	N0777666.....89	N8140743.....59	N8145169.....78	N8145217.....78	N8145382.....85
N0777245.....96	N0777667.....89	N8145017.....88	N8145170.....78	N8145218.....78	N8145383.....85
N0777247.....98	N0777668.....89	N8145018.....88	N8145171.....78	N8145219.....78	N8145384.....85
N0777248.....98	N0777669.....89	N8145073.....39	N8145172.....78	N8145220.....78	N8145385.....85
N0777249.....98	N0777670.....89	N8145079.....93	N8145173.....78	N8145221.....78	N8145386.....85
N0777252.....98	N0777671.....89	N8145081.....48	N8145174.....78	N8145222.....79	N8145387.....85
N0777283.....88	N0777748.....49	N8145092.....77	N8145175.....78	N8145223.....79	N8145388.....85
N0777284.....88	N0777750.....85	N8145093.....77	N8145176.....78	N8145225.....79	N8145389.....85
N0777289.....89	N0777751.....85	N8145094.....77	N8145177.....78	N8145226.....79	N8145390.....85
N0777290.....89	N0777752.....85	N8145095.....77	N8145178.....78	N8145227.....79	N8145391.....85
N0777291.....89	N0777758.....85	N8145096.....77	N8145179.....78	N8145230.....26	N8145392.....85
N0777292.....89	N0777759.....85	N8145105.....91	N8145180.....78	N8145231.....26	N8145393.....85
N0777293.....89	N0777761.....85	N8145124.....93	N8145181.....78	N8145232.....26	N8145394.....85
N0777297.....88	N0777771.....101	N8145125.....93	N8145182.....78	N8145236.....52	N8145395.....85
N0777325.....48	N0777772.....101	N8145129.....95	N8145183.....78	N8145237.....88	N8145396.....85
N0777346.....48,105	N0777813.....93	N8145130.....98	N8145184.....78	N8145238.....88	N8145397.....85
N0777347.....105	N0777814.....93	N8145131.....100	N8145185.....78	N8145239.....88	N8145398.....85
N0777392.....90	N0777815.....93	N8145132.....91	N8145186.....78	N8145240.....88	N8145401.....39
N0777393.....90	N0777818.....93	N8145133.....91	N8145187.....78	N8145241.....88	N8145451.....85
N0777396.....90	N0777819.....93	N8145134.....91	N8145188.....78	N8145242.....88	N8145452.....85
N0777397.....99	N0777820.....93	N8145135.....53	N8145189.....78	N8145243.....88	N8145453.....85
N0777398.....99	N0777821.....93	N8145136.....53	N8145190.....78	N8145244.....88	N8145454.....85
N0777402.....90,92	N0777822.....99	N8145137.....53	N8145191.....78	N8145245.....88	N8145455.....85
N0777403.....90	N0777823.....99	N8145138.....53	N8145192.....78	N8145246.....88	N8145457.....56
N0777404.....90	N0777826.....53	N8145145.....78	N8145193.....78	N8145271.....95	N8145469.....89
N0777405.....90	N0777827.....53	N8145146.....78	N8145194.....78	N8145290.....81	N8145472.....39
N0777406.....91	N0777829.....88	N8145147.....78	N8145195.....78	N8145292.....81	N8145473.....92

P/N.....Page	P/N.....Page	P/N.....Page	P/N.....Page	P/N.....Page	P/N.....Page
N8145474.....92	N8150427.....59	N8152375.....60,82	N8152456.....60	N8152627.....85	N8152751.....103
N8145475.....92	N8150428.....59	N8152376.....62	N8152472.....63	N8152628.....85	N8152752.....79
N8145476.....92	N8150429.....59	N8152377.....66	N8152473.....63	N8152629.....85	N8152753.....79
N8145477.....103	N8150431.....21	N8152378.....51	N8152474.....63	N8152630.....85	N8152754.....79
N8145478.....102	N8150432.....21	N8152379.....62	N8152475.....61	N8152631.....85	N8152755.....79
N8145479.....39	N8150433.....21	N8152382.....82	N8152493.....41	N8152632.....85	N8152756.....79
N8145480.....39	N8150434.....21	N8152383.....60,82	N8152496.....41	N8152633.....85	N8152757.....79
N8145482.....25	N8150435.....29	N8152384.....56	N8152532.....74	N8152634.....85	
N8145503.....86	N8150443.....76	N8152385.....86	N8152533.....75	N8152635.....85	
N8145504.....86	N8150445.....83	N8152386.....87	N8152535.....65	N8152637.....85	
N8145516.....61	N8150446.....83	N8152387.....88	N8152536.....65	N8152638.....85	
N8145517.....61	N8150450.....60	N8152388.....77,88	N8152539.....60,82	N8152640.....85	
N8145518.....61	N8150451.....83	N8152389.....60,82	N8152551.....61	N8152641.....85	
N8145520.....88	N8150452.....102	N8152390.....60	N8152571.....87	N8152642.....85	
N8145531.....86	N8150454.....83	N8152420.....55	N8152576.....51	N8152643.....85	
N8145559.....85	N8150460.....21	N8152421.....87	N8152577.....51	N8152644.....85	
N8145560.....85	N8150461.....21	N8152422.....87	N8152578.....51	N8152645.....85	
N8145562.....45,60,82	N8150462.....21	N8152423.....87	N8152579.....52	N8152646.....85	
N8145574.....49	N8150463.....21	N8152424.....60,82	N8152580.....52	N8152647.....85	
N8145575.....49	N8150464.....21	N8152425.....61	N8152581.....52	N8152648.....85	
N8150031.....70	N8150465.....21	N8152426.....60	N8152582.....54	N8152649.....85	
N8150033.....73	N8150466.....21	N8152427.....63	N8152583.....54	N8152650.....85	
N8150034.....68	N8150467.....21	N8152428.....63	N8152584.....54	N8152651.....85	
N8150035.....69	N8150468.....21	N8152429.....62	N8152585.....54	N8152652.....85	
N8150036.....50,71	N8150469.....21	N8152430.....68	N8152586.....54	N8152653.....85	
N8150037.....72	N8150470.....21	N8152431.....69	N8152587.....55	N8152654.....85	
N8150038.....75	N8150471.....21	N8152432.....72	N8152588.....55	N8152655.....85	
N8150039.....41	N8150472.....21	N8152433.....71	N8152589.....55	N8152656.....85	
N8150040.....74	N8150473.....21	N8152434.....73	N8152590.....55	N8152657.....85	
N8150060.....68	N8150474.....21	N8152435.....70	N8152591.....55	N8152659.....85	
N8150061.....41	N8150475.....21	N8152436.....76	N8152593.....55	N8152660.....85	
N8150390.....7	N8150476.....25	N8152437.....64	N8152596.....62	N8152661.....85	
N8150391.....7	N8150477.....25	N8152438.....64	N8152600.....63	N8152662.....85	
N8150392.....7	N8150478.....9	N8152439.....65	N8152601.....63	N8152663.....85	
N8150393.....7	N8150479.....9	N8152440.....64	N8152603.....62	N8152664.....85	
N8150394.....7	N8150480.....47	N8152441.....65	N8152604.....62	N8152665.....85	
N8150407.....9	N8150481.....80,81	N8152442.....64	N8152606.....62	N8152666.....85	
N8150408.....9	N8150483.....80,81	N8152443.....66	N8152616.....63	N8152673.....25	
N8150409.....21	N8150484.....80,81	N8152444.....62	N8152617.....85	N8152675.....76	
N8150410.....21	N8150485.....80,81	N8152445.....62	N8152618.....85	N8152681.....66	
N8150411.....21	N8150486.....26	N8152446.....62	N8152619.....85	N8152682.....66	
N8150412.....21	N8150487.....102	N8152447.....62	N8152620.....85	N8152683.....59	
N8150414.....39	N8150488.....102	N8152448.....62	N8152621.....85	N8152688.....59	
N8150415.....39	N8152359.....71	N8152449.....83	N8152622.....85	N8152692.....59	
N8150416.....39	N8152364.....76	N8152451.....66	N8152623.....85	N8152699.....63	
N8150417.....39	N8152372.....56	N8152452.....86	N8152624.....85	N8152718.....71	
N8150422.....9	N8152373.....56	N8152453.....77,88	N8152625.....85	N8152719.....66	
N8150423.....9	N8152374.....60	N8152455.....86	N8152626.....85	N8152721.....66	



27 Co Cobalt 102.90550	28 Ni Nickel 106.42	29 Cu Copper 107.8682	30 Zn Zinc 112.411	31 Ga Gallium 114.718	32 Ge Germanium 118.710	33 As Arsenic 119.724	34 Se Selenium 127.60	35 Br Bromine 159.808	36 Kr Krypton 83.80
45 Rh Rhodium 102.922	46 Pd Palladium 106.42	47 Ag Silver 107.8682	48 Cd Cadmium 112.411	49 In Indium 114.718	50 Sn Tin 118.710	51 Sb Antimony 121.757	52 Te Tellurium 127.60	53 I Iodine 126.905	54 Xe Xenon 131.29
77 Ir Iridium 226.107	78 Pt Platinum 195.084	79 Au Gold 196.96657	80 Hg Mercury 200.59	81 Tl Thallium 204.3833	82 Pb Lead 207.2	83 Bi Bismuth 208.9804	84 Po Polonium [209]	85 At Astatine [210]	86 Rn Radon [222]

27 Co Cobalt 102.90550	28 Ni Nickel 106.42	29 Cu Copper 107.8682	30 Zn Zinc 112.411	31 Ga Gallium 114.718	32 Ge Germanium 118.710	33 As Arsenic 119.724	34 Se Selenium 127.60	35 Br Bromine 159.808	36 Kr Krypton 83.80
45 Rh Rhodium 102.922	46 Pd Palladium 106.42	47 Ag Silver 107.8682	48 Cd Cadmium 112.411	49 In Indium 114.718	50 Sn Tin 118.710	51 Sb Antimony 121.757	52 Te Tellurium 127.60	53 I Iodine 126.905	54 Xe Xenon 131.29
77 Ir Iridium 226.107	78 Pt Platinum 195.084	79 Au Gold 196.96657	80 Hg Mercury 200.59	81 Tl Thallium 204.3833	82 Pb Lead 207.2	83 Bi Bismuth 208.9804	84 Po Polonium [209]	85 At Astatine [210]	86 Rn Radon [222]