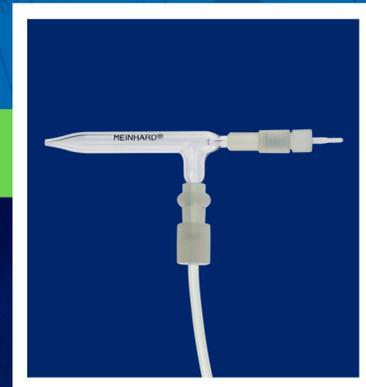


Advanced Automation and Sample Introduction Systems

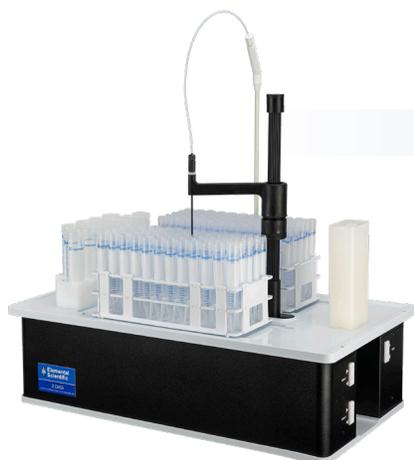
for PerkinElmer™ NexION™ 1000/2000/5000 ICPMS



FEATURED PRODUCTS

SampleSense FAST and prepFAST

SampleSense is a revolutionary valve for FAST and prepFAST systems that uses optical sensors to automatically detect, then inject samples into NexION 1000/2000/5000 ICPMS instruments to maximize productivity. (Pages 12-23)

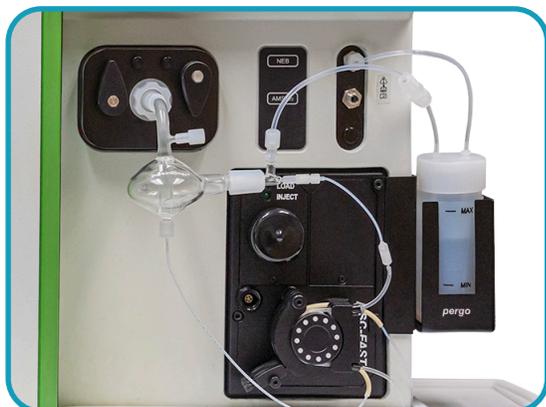


DXCi Autocorrecting Autosampler

DXCi autosamplers are the next generation of automation and productivity. They automatically realign – even if obstructed – correcting the probe position for all axes of motion. (Pages 4-7)

prepFAST X Autodilution & Autocalibration

Every lab needs to improve productivity and further automate metal analysis. The single valve prepFAST X inline autodilution system automatically calibrates the ICPMS, autodilutes samples and autodilutes overrange samples to bring them into range. prepFAST autodilution systems elevate performance of all NexION Series ICPMS systems with SampleSense automated sample loading. (Pages 16-23)



pergo 2000

Humidifies the nebulizer gas to prevent deposits in the nebulizer and improves stability. Highly recommended for clinical, environmental, and many other ICPMS applications. (Pages 64-65)

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AUTOMATION

SAMPLE INTRODUCTION

CONSUMABLES

DX-Series Autosamplers

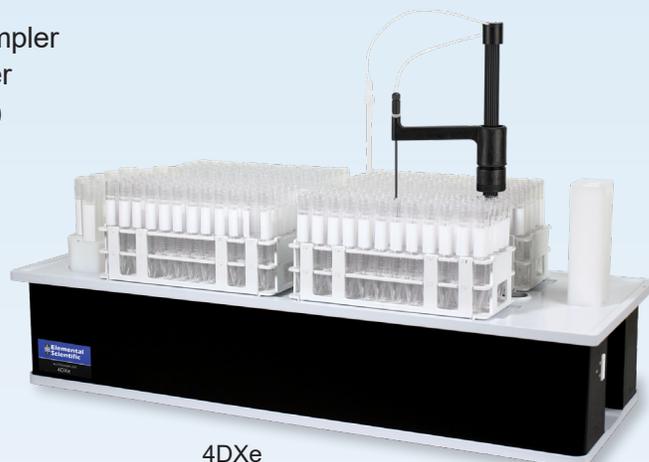
Support and Automate Every Inorganic Application

Elemental Scientific has the most complete range of autosampler offerings for metals analysis by ICP and ICPMS. Autosampler models range from the MicroDX autosampler (2 micro racks) to ultra-high sample capacity 14DX (14 large racks). These models are now available with three feature sets to meet the needs of laboratories.

DXe – Economical

Autosamplers with superior features at a competitive price:

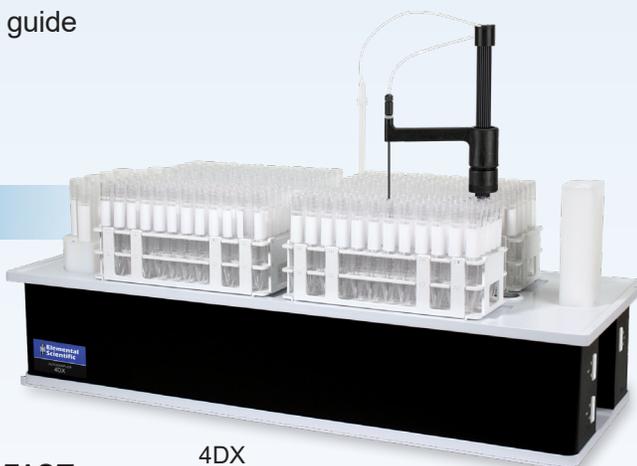
- Durable dual rail system
- Dual flowing rinse stations
- AutoAlign Arm with inert fluoropolymer probe guide
- Reset probe – prevents probe damage
- Flexible rack configurations



DX – FAST Ready

Includes the features of the DXe autosamplers **PLUS**:

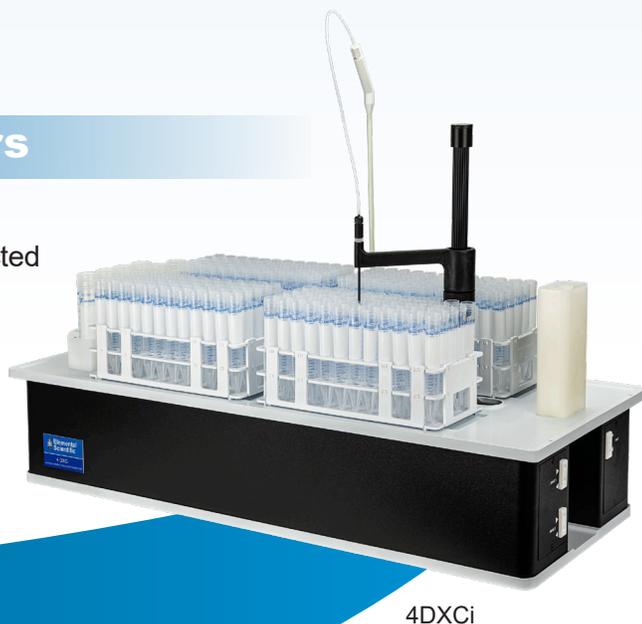
- **Independently pumped** dual flowing rinse stations
- High throughput *FAST Ready*
 - Easily upgrade to *FAST* or SampleSense *FAST*
- Autodilution prep*FAST Ready*
 - Easily upgrade to prep*FAST* or SampleSense prep*FAST*



DXCi – Autocorrecting Autosamplers

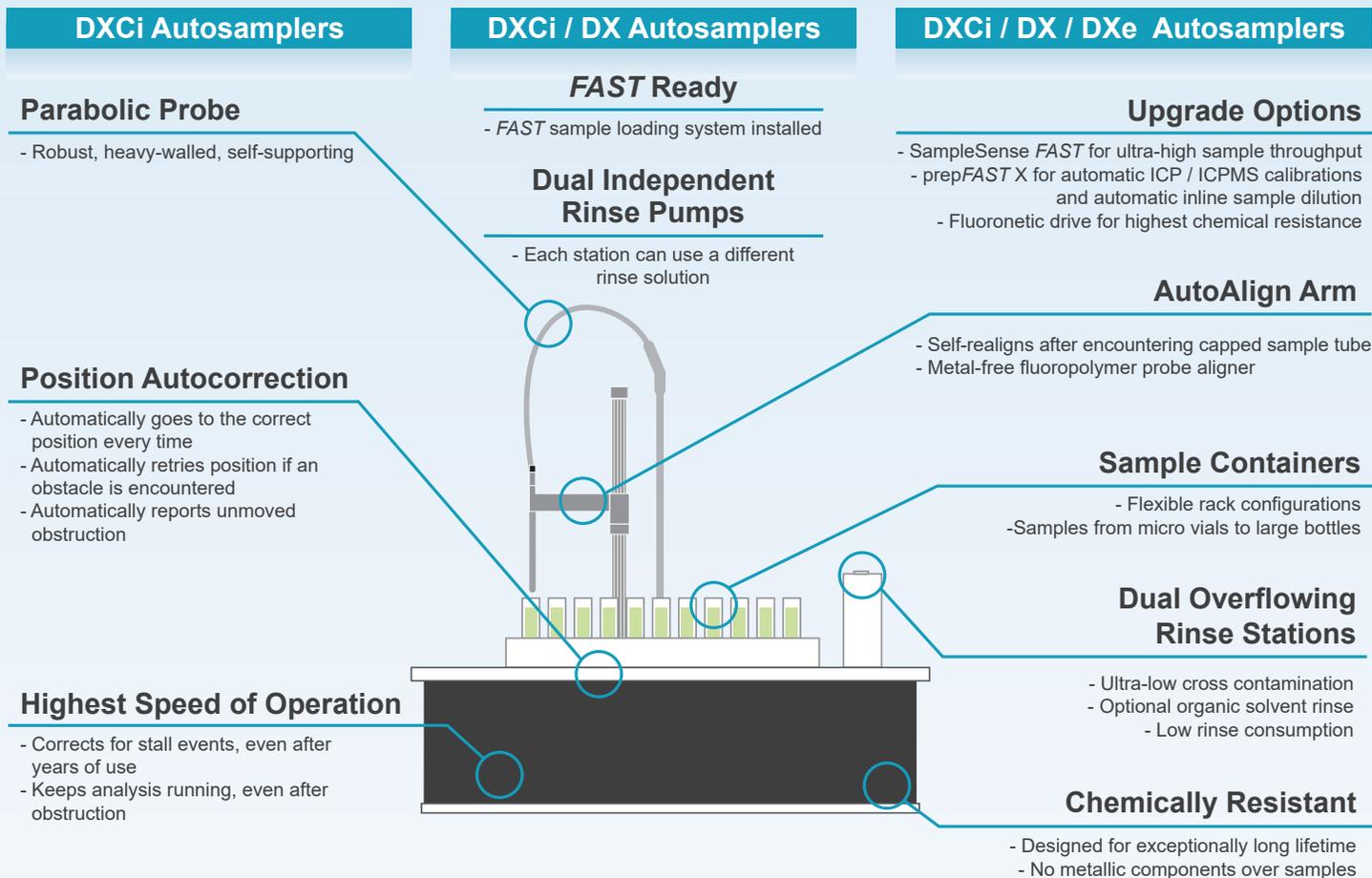
Includes the features of the DX autosamplers **PLUS**:

- Intelligently autocorrects position, even if accidentally obstructed
- Ultra high throughput compatible
 - Enhances productivity
- Reports obstructions to instrument software
- Septum piercing option available
- Parabolic probe – Anti-kinking probe
- High accuracy – Optimal for microplates and small samples



Now available with chemically-resistant Fluoronetic drive option.
See pages 8-9

DX-Autosamplers Features Diagram



DXCi

the **ONLY AUTOSAMPLER**

that automatically

CORRECTS the probe

Position

even when **Obstructed!**



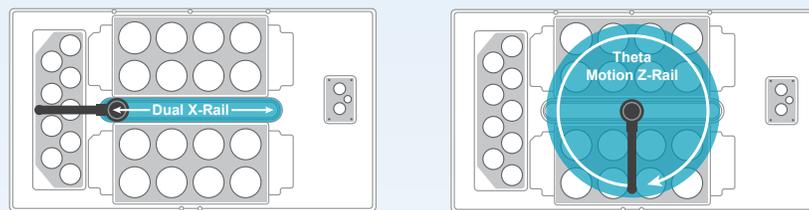
See it in Action!

DXe, DX and DXCi Hardware Configurations			
Hardware	DXe	DX	DXCi
Dual Flowing Rinse Stations	1	1	1
Rinse Pump	1	2	2
FAST Vacuum Pump	-	1	1
Parabolic Probe	-	-	1
X-Y-Z Autocorrecting	-	-	1

DX-Autosampler Benefits

Engineered for Precision and Durability

All 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 DX components are constructed using chemically resistant materials for an exceptionally long lifetime.

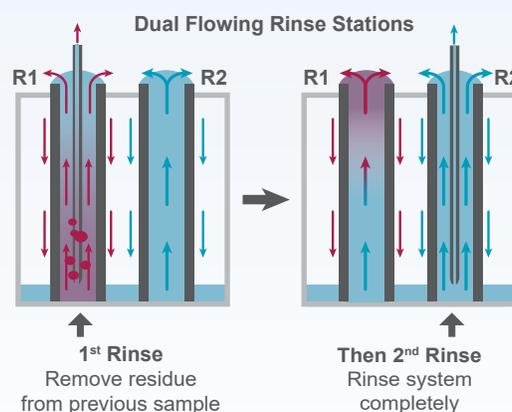


MicroDX autosampler shown

Dual Rinse Stations Reduce Carryover and Cross Contamination

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

All DX-autosamplers have adjustable dual overflowing rinse stations to minimize sample-to-sample carryover. Rinse liquid is supplied by an independent rinse pump split between two rinse station positions on the DXe models. With independent dual rinse pumps on the DX and DXCi models, each station can use a different rinse solution to effectively rinse wide-ranging sample types. The rinse pumps in all configurations supply solution only during the rinse events, significantly minimizing rinse solution consumption.

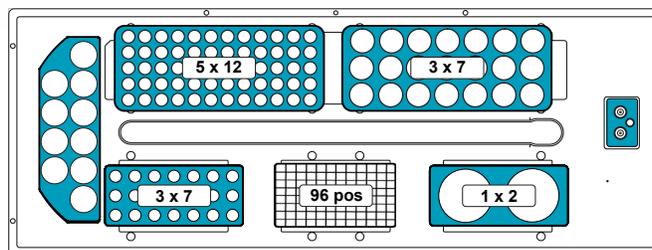


DX-Autosamplers are Versatile and Upgradeable

DX-autosamplers are available in a range of sizes, with capacities from 2 micro racks to 14 large racks.

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

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



Versatile Rack Configurations

4DX 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

Intelligently Finds Sample Position

The DXCi autosampler models automatically monitors and corrects positions for all axes of motion. When it experiences an accidental obstruction, the autosampler corrects the probe position. These unique capabilities permit the metal-free AutoAlign Arm to operate at the highest possible speeds and provide the highest accuracy for microplates and small sample volumes. Heavy-walled and self-supporting Parabolic Probe line resists kinking of the sample uptake line.



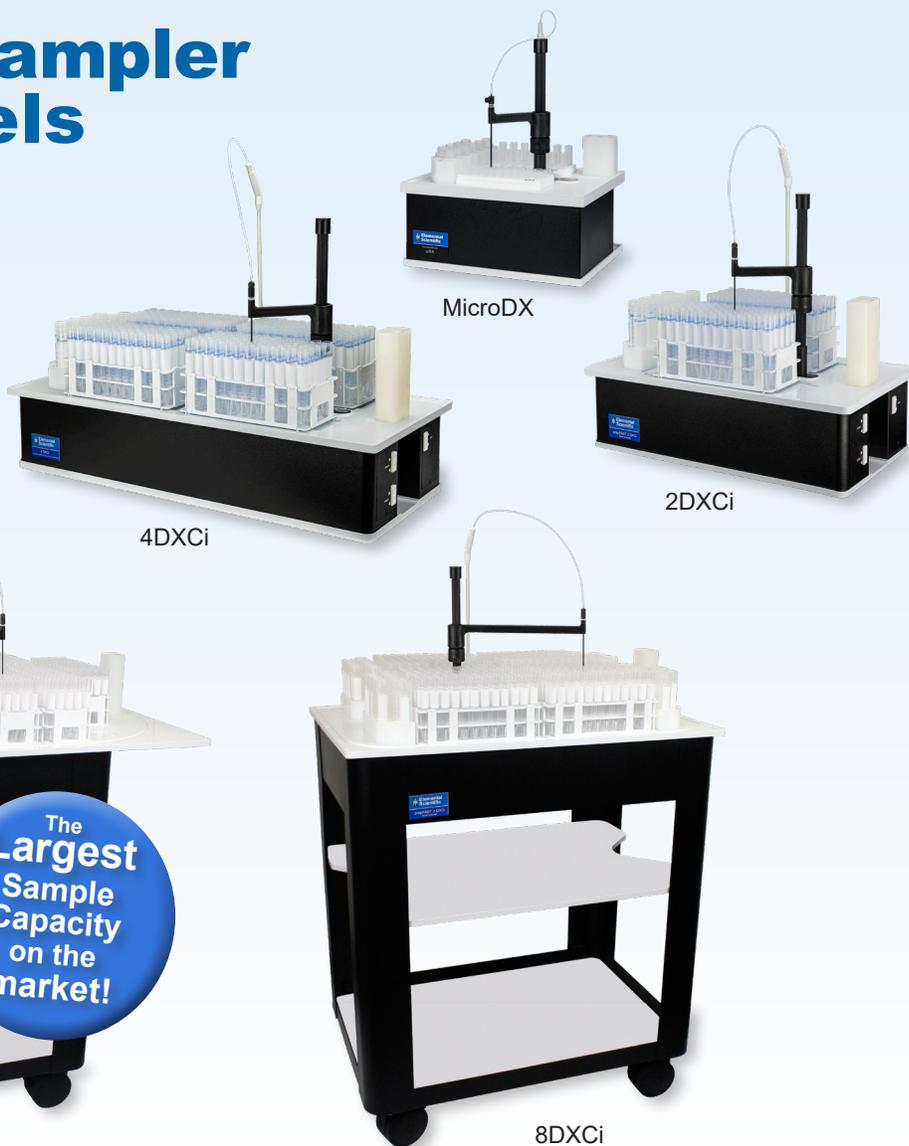
AutoAlign Arm and Parabolic Probe

ESI DX-Autosampler Models

From **2** Micro Racks

UP To

14 Large Racks



AUTOMATION

DX-Autosamplers Models	Part Number	Mobile Stand	Large Rack Capacity	Microplate/Micro Rack Capacity	MAXIMUM SAMPLE CAPACITY			
					50 mL	15 mL	8 mL	MT-96
MicroDX	m-DX	N/A	-	2	20	42	80	192
2DXe	2DXe	SC-1210-DX (optional)	2	4	52	120	180	384
2DX	2DX							
2DXCi	2DXCi							
4DXe	4DXe	SC-1410-DX (optional)	4	6	94	240	360	576
4DX	4DX							
4DXCi	4DXCi							
8DX Benchtop	8DX-BT	N/A	8	-	208	480	720	-
8DXCi Benchtop	8DXCi-BT							
8DX	8DX	Included	14	-	304	840	1,260	-
8DXCi	8DXCi							
14DX	14DX	Included	14	-	304	840	1,260	-
14DXCi	14DXCi							

Fluoronic Autosamplers

Most robust, chemically resistant autosamplers on the market

100% fluoropolymer magnetically coupled linear drive provides the highest level of chemical resistance. Recommended for semiconductor, geochem and other applications where aggressive acids are analyzed and where lowest detection limits possible are required.

- Chemically resistant to eliminate corrosion
 - No exposed metal in or above sample area
- Long-lived for hundreds of thousands of sample cycles
- Autocorrecting position autosampler – automatically goes to the correct position every time, even when temporarily obstructed
- Upgradable to SampleSense FAST & prepFAST technology
- Available in two configurations:
 - FNX Fluoronic Autosampler for corrosive environments
 - FNXS Ultraclean Fluoronic Autosampler with metal-free enclosure for ultimate in clean sample conditions



See it in Action!

FNX Fluoronic Autosampler Features Diagram

AutoAlign Arm

- Self-realigns after encountering capped sample tube
- Metal-free fluoropolymer probe aligner

Sample Containers

- <1 mL up to 500 mL

PTFE Autosampler Deck

- Chemically resistant for long lifetime

Position Autocorrection

- Adapts to every position automatically
- Automatically retries position if there is an obstacle
- Keeps analysis running, after years of use

Parabolic Probe

- Robust, heavy-walled, self-supporting
- Upgradable to PFA Fluorall Probe

Fluoronic Drive

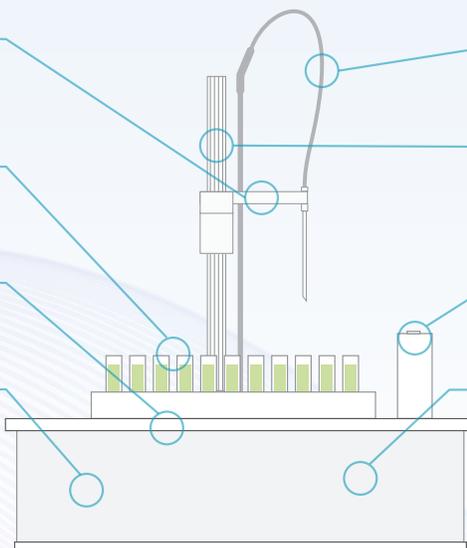
- True fluoropolymer mechanical action
- Magnetically coupled linear drive
- Chemically resistant and long-lived

Dual Overflowing Rinse Stations

- Ultra-low cross-contamination
- Independently pumped for low rinse consumption

SampleSense FAST & prepFAST Option

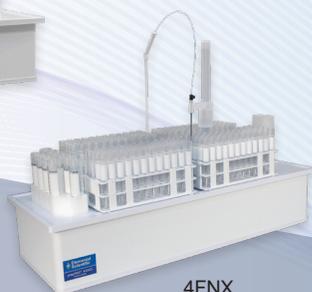
- Automated, ultra-high sample throughput with SampleSense FAST
- Autocalibration, autodilution, and automated sample loading with SampleSense prepFAST



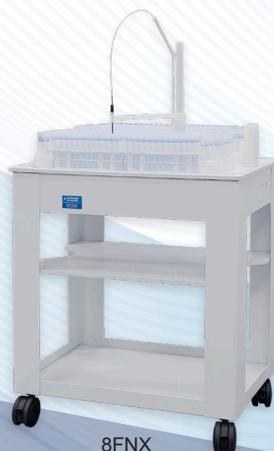
FNX Models



2FNX



4FNX



8FNX



14FNX

Fluoronic Drive Delivers



Superior Chemical/
Corrosion Resistance



Chemically Inert
Non-contaminating



Magnetic Coupling
Eliminates Metal Components

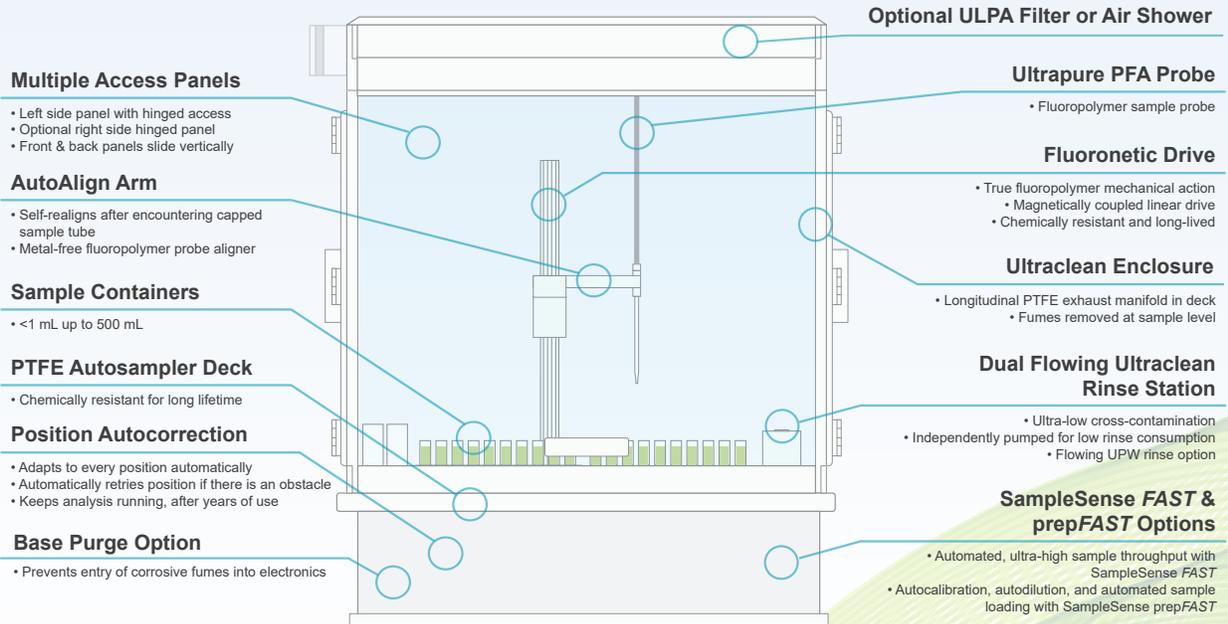


Intelligent Autocorrection
Always Finds Sample Position

Features and Capabilities

Fluoronic Autosampler Model	Part Number	Integrated Enclosure	Large Rack Capacity	Microplate/ Micro Rack Capacity	MAXIMUM SAMPLE CAPACITY			
					50 mL	15 mL	8 mL	MT-96
2FNX	2FNX		2	4	52	120	180	384
4FNX	4FNX		4	6	94	240	360	576
8FNX	8FNX		8	-	208	480	720	-
14FNX	14FNX		14	-	304	840	1,260	-
2FNXS Ultraclean	2FNXS	✓	2	4	52	120	180	384
4FNXS Ultraclean	4FNXS	✓	4	6	94	240	360	576

FNXS Fluoronic Ultraclean Autosampler



FNXS Ultraclean Models



2FNXS



4FNXS

FAST Automation

for NexION 1000/2000/5000 ICPMS

FAST is a high-throughput, automated sample introduction system for ICP and ICPMS. The FAST system uses valve injection with rapid vacuum sample loading to speed sample introduction.

High Throughput

- FAST uptake, stabilization, and washout
- High performance economical P-Series and automatic SampleSense valve option
- Operation with or without segmented air bubbles to optimize every application

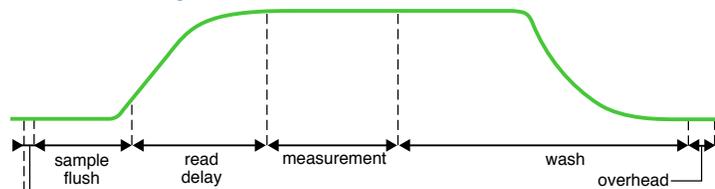
Improved Efficiency

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

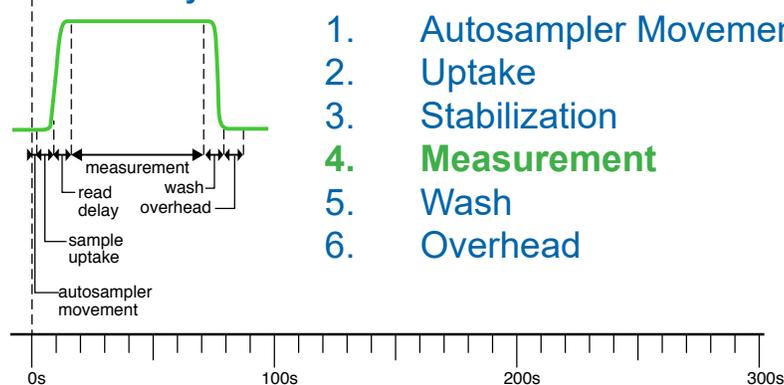
Improved Lab Productivity

- The FAST system analyzes samples 2-5 times faster than a standard autosampler
- Reduces cost per analysis by lowering operating costs and shortening analytical runs

Normal Analysis



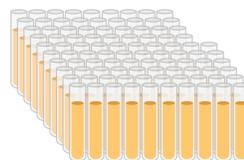
FAST Analysis



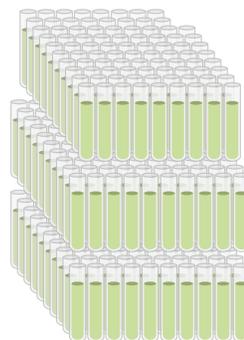
Six Steps in a Standard Analysis

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

The 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

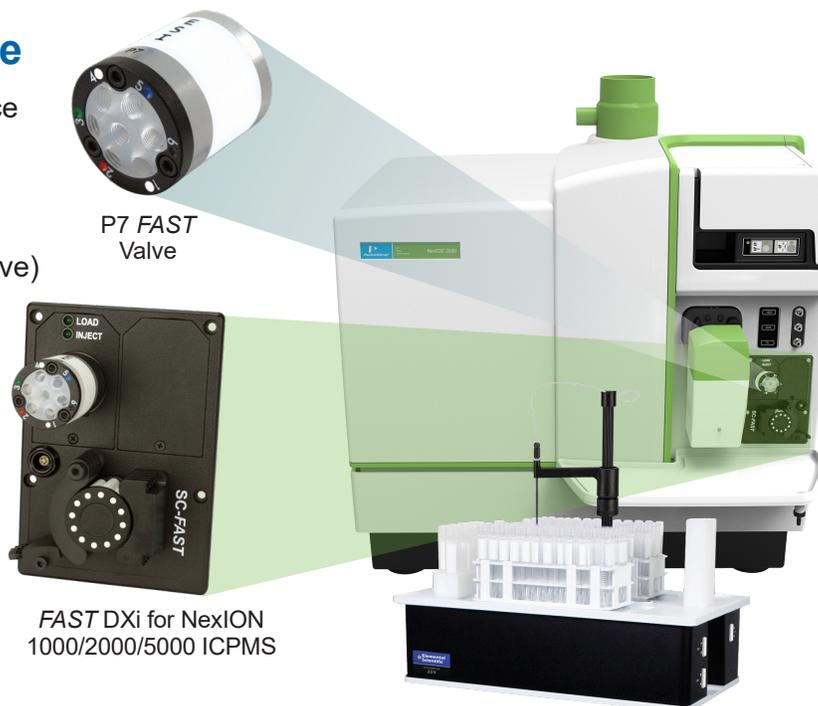
2-5x HIGHER SAMPLE THROUGHPUT
WITH FAST SYSTEM
DEPENDENT ON APPLICATION

Superior P-Series FAST Valve

- PFA rotors for long life and low maintenance
- Chemically resistant compression ring
- All fluoropolymer flow path
- In-valve mixing of internal standard (P7 valve)

FAST DXi:

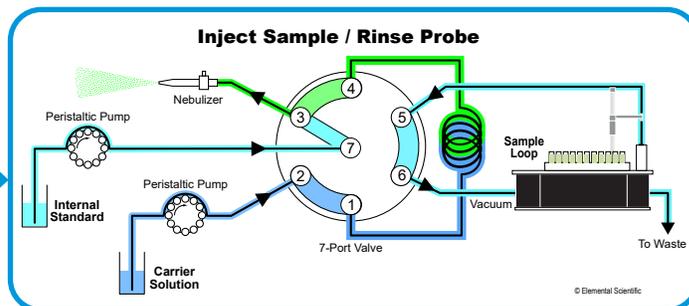
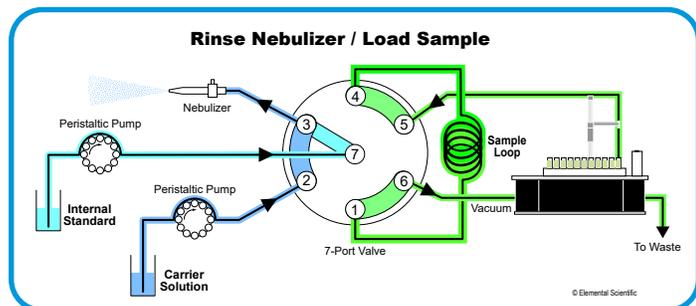
- Integrated MP² peristaltic pump and FAST valve for the NexION 1000/2000/5000 ICPMS
- High quality ceramic bearing peristaltic pump for long lifetime and high precision
- Upgradeable to prepFAST X



NexION 2000 ICPMS with FAST system

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 Systems for NexION 1000/2000/5000 ICPMS

Description	Nebulizer	Probe	2DX	4DX	8DX Benchtop	8DX	14DX
FAST System for NexION ICPMS. Includes DX autosampler	✓	✓	2DXF-64A	4DXF-64A	8DXF-BT-64A	8DXF-64A	14DXF-64A

See page 4 for more information on DX-autosamplers.

See page 12 for **SampleSense FAST** system

FAST with SampleSense Valve



SAMPLESENSE

Revolutionary New Valve for *FAST* and prep*FAST*

SampleSense is a revolutionary valve for *FAST* and prep*FAST* systems that uses optical sensors to automatically sense and inject samples into NexION 1000/2000/5000 ICPMS instruments.

Enhance Workflow

- Eliminates method timing parameters
 - Optimizes loading conditions for each sample matrix
 - Automatically loads loop with samples of varying viscosities
- Reduces sample consumption
- Actively detects and reports sample loading issues
- Automatically compensates for drift caused by kinked lines or partial blockages
- SampleSense triggers the ICPMS at exactly the right time
- Operation fully integrated into Syngistix™ software

How it Works

SampleSense simplifies method development by eliminating read delays as well as sample uptake and injection timers, allowing sample loop sizes and sample types to be changed without adjusting method settings. SampleSense also minimizes sample consumption by automatically loading samples of varying viscosities and switching the valve into the inject position immediately after the sample loop is successfully loaded.

Detect Loading Issues

SampleSense monitors and logs sample loading issues caused by:

- Empty tubes or positions
- Vials inadvertently left capped
- Empty standard or QC
- Bubbles caused by incomplete loading
- Reports sample loading issues into Syngistix™



SampleSense Advantages



Innovative Sample Loading

SampleSense accounts for viscosity and automatically adjusts timing. One valve, one loop and one method for multiple sample types.



Time Savings

Operator time for sample introduction method development is eliminated. Just run samples.



Sample Savings

The sample is injected at precisely the right time. Every time. Even for small samples.



Error Notification

Incomplete sample loading or bubbles in the sample are detected and logged.

SampleSense FAST on NexION 1000 / 2000 / 5000 Maximizes Productivity with:

- Optical sensing of sample arrival
- Minimizes sample consumption by stopping sample load after loop is filled
- Unsensed samples (empty or capped tubes, low volume) are reported
- DXCi Autocorrecting Autosampler – always goes to the right position



Sample not present, sensors not activated



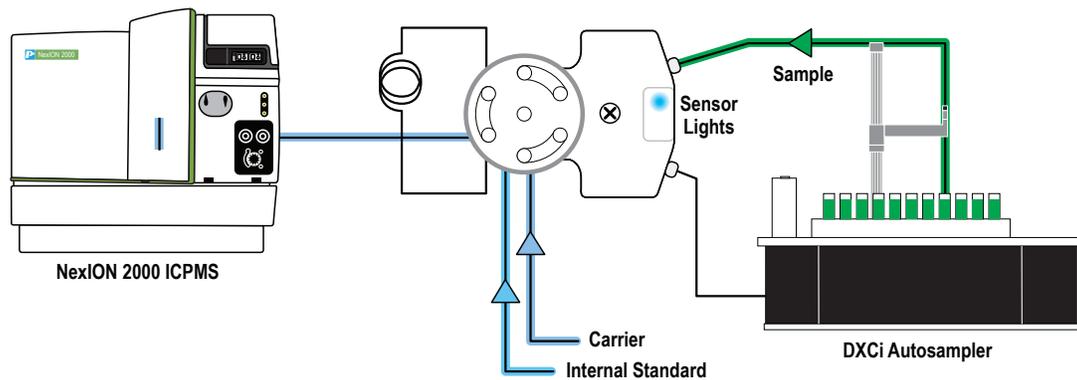
Valve sensors activated, sample is sensed



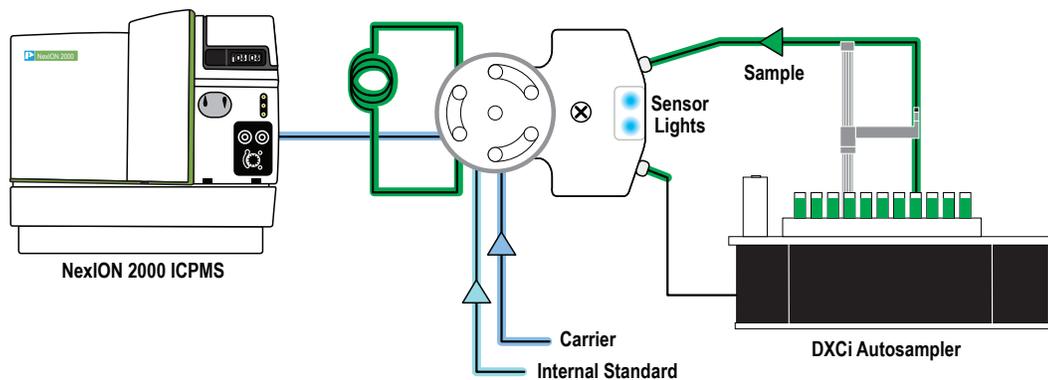
SAMPLESENSE FAST

Automated Loading

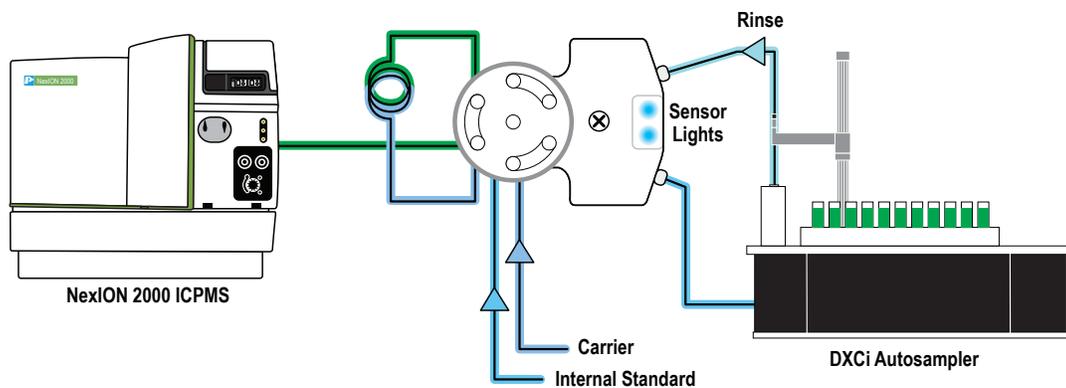
Start Sample Load / Rinse Nebulizer



Sample Load Complete / Rinse Nebulizer



Rinse Probe / Inject Sample



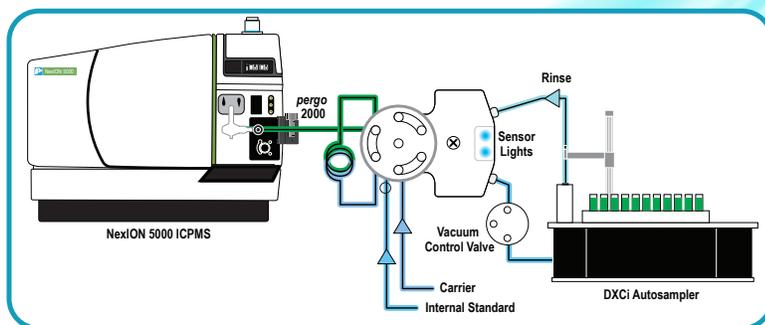
SampleSense FAST operation with NexION 2000 ICPMS

SAMPLESENSE FAST

Ultra-high Throughput Systems for NexION 1000/2000/5000 ICPMS

These SampleSense systems are optimized for ultra-high sample throughput for laboratory applications where analysis speed is critical.

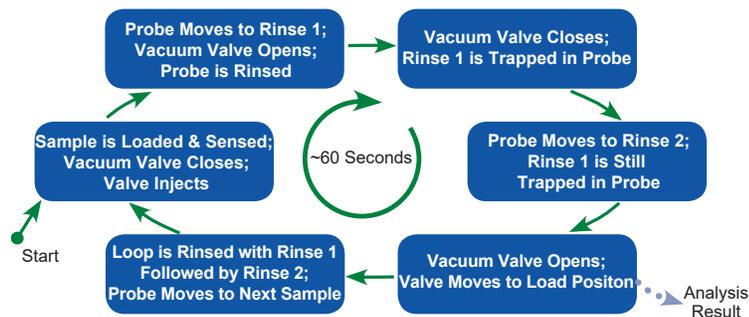
- Vertical autosampler rail optimized for height of containers
- Vacuum control valve added to support:
 - Rinsing of uptake path while the sample is being analyzed, eliminating carryover and speeding total analysis time
 - Reduced sample consumption to support minimal volumes and permit repeat analyses when required
- *pergo* 2000 argon gas humidifier to maintain nebulizer efficiency with heavy matrix samples on long analysis runs



SampleSense Enviro

- Optimizes sample load time for all sample types with no method development time required
- Sample consumption minimized with vacuum control valve, providing for repeat analysis from one vial/tube
- Loading of rinse solution into uptake path (during the sample analysis) speeds sample-to-sample time
- Delivers ICPMS analysis speeds approaching 1 sample/minute without sample carryover issues

SampleSense Enviro Analytical Cycle



SampleSense Clinical

- Configured for high-speed analysis of blood, urine & serum
- Traps customized clinical rinse in uptake path (during sample analysis) to speed analysis and eliminate sample deposits
- Provides confirmation of successful sample loading
- Supports microtiter plates to maximize sample capacity
- Analyzes Blood Pb samples at rate of 3 samples/minute



NexION 2000 ICPMS with SampleSense Clinical system and optional enclosure

prepFAST X/MX/MAX

Fully Automated Sample Handling

Fully Automated Sampling with Inline Dilution

prepFAST inline dilution systems fully automate the ICP and ICPMS analysis process. Preparation of calibration standards, dilution of samples, addition of internal standards, and automated SampleSense FAST sample loading are combined along with the unique DXCi autocorrecting autosampler for the complete automation solution for trace metal analysis.

The prepFAST X systems are a new generation of automated inline dilution models that have been enhanced to offer more intelligent operation, higher speed and improved performance. Designed for all applications up to 40,000-fold dilution, three prepFAST X models are available.

prepFAST Fully Automates Daily Lab Functions for ICP and ICPMS Analysis

- Provides fully automated inline calibration
- Automatically dilutes samples inline
- Reduces new operator training
- Reduces sample consumption & waste
- Improves laboratory productivity



4DXCi prepFAST X

prepFAST automatically dilutes samples right at the moment of analysis



Intelligent DXCi
autocorrecting autosampler



High throughput
SampleSense FAST valve



Accurate automated inline
syringe dilution

prepFAST with SampleSense



4DXCi prepFAST X

prepFAST X

- Autocalibration, autodilution, and auto overrange dilution
- SampleSense automated vacuum sample loading
- Syringe-driven internal standard addition
- Improved washout and high throughput
- Autocorrecting DXCi autosampler available in 2, 4, 8, and 14 rack capacities
- **Dilution range 1-400x**



4DXCi prepFAST MX

prepFAST MX

- All features of prepFAST X plus:**
- Precision syringe sample loading for viscous and small sample volumes
 - Enhanced syringe washout performance
 - **Dilution range 1-400x**



4DXCi prepFAST MAX

prepFAST MAX

- All features of prepFAST MX plus:**
- Dual stage dilution
 - **Dilution range 1-40,000x**

prepFAST X Systems Comparison										
Model	SampleSense	Auto calibration	Auto dilution	Auto Overrange Dilution	Syringe-driven Internal Standard	High Speed Rinse Ultimate Washout	Micro-volume Sample Analysis	Volatile Organic Solvent Analysis	Dual Stage Dilution	Dilution Range
prepFAST X	✓	✓	✓	✓	✓					1-400x
prepFAST MX	✓	✓	✓	✓	✓	✓	✓	✓		1-400x
prepFAST MAX	✓	✓	✓	✓	✓	✓	✓	✓	✓	1-40,000x

prepFAST - Unleash your ICP/ICPMS!

prepFAST X/MX/MAX

Fully Automated Sample Handling

Automated Sample Sensing - SampleSense

Optical sensors in the SampleSense valve monitor the sample arrival in the valve - automating the sample loading process.



Innovative Sample Loading

SampleSense accounts for viscosity and automatically adjusts timing. One valve, one loop and one method for multiple sample types.



Time Savings

Operator time for sample introduction method development is eliminated. Just run samples.



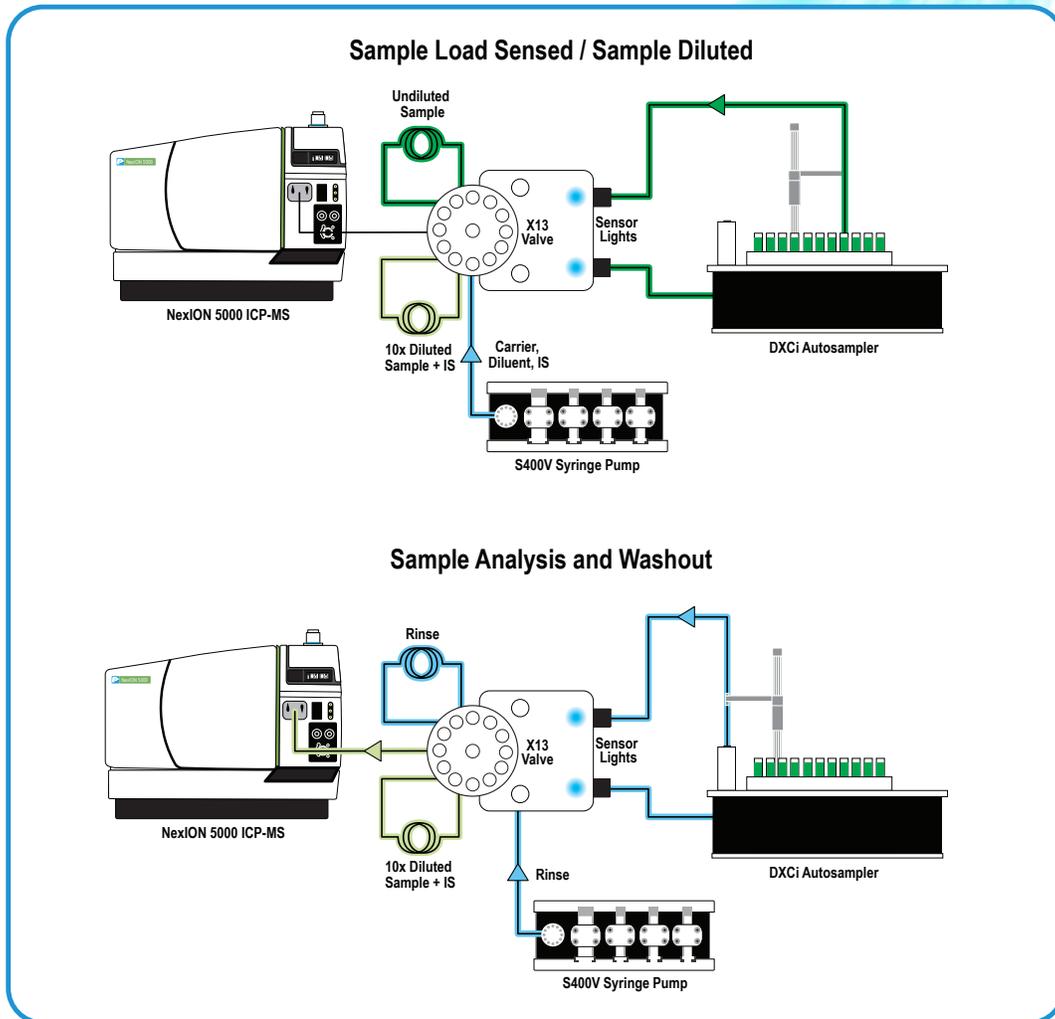
Sample Savings

The sample is injected at precisely the right time. Every time. Even for small samples.



Error Notification

Incomplete sample loading or bubbles in the sample are detected and logged.

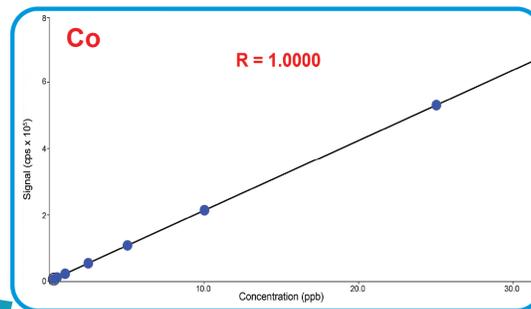


More Results. Less Hassle. prepFAST

Autocalibration

Automates inline preparation of ICP/ICPMS calibration standards

- Save time and improve laboratory efficiency by eliminating labor-intensive standard preparation
- Prepare from single or multiple stock standards
- Improve calibration linearity and minimize contamination
- Reduce laboratory waste and cleaning of labware
- Operation full integrated in Syngistix™ software



Manual Calibration vs. Autocalibration

<p>30+ MINUTES - Manual Labor -</p>	<p>5 MINUTES - AUTOMATED -</p>
<p>- High Risk of - HUMAN ERROR</p> <p>- Risk of - CONTAMINATION - Airborne, Pipettes, Vials -</p> <p>- High use of - CONSUMABLES</p>	<p>- Reduced - HUMAN ERROR</p> <p>- Reduced Risk of - CONTAMINATION - Single high stock standard -</p> <p>- Reduced use of - CONSUMABLES</p>

You make one standard – prepFAST makes the rest

Autodilution

prepFAST dilutes samples right at the moment of analysis

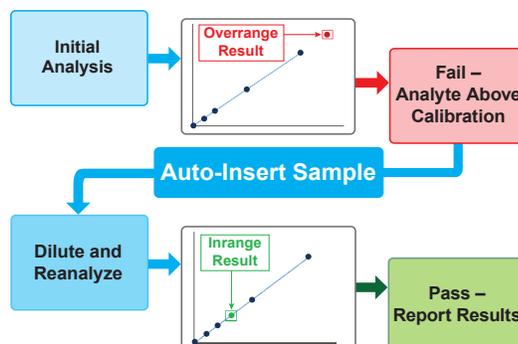
- Dilutes all samples by same factor, or on sample-by-sample basis
- Improves precision & accuracy by eliminating manual procedures
- Reduces vial and reagent usage
- Improves sample throughput & washout with FAST technology
- Reduces required training and experience for operators

Eliminate Manual Dilutions



Dilutes and reanalyzes out-of-range samples

- Autodilutes & re-runs when concentrations exceed calibration range
- Generate reportable results for all samples in the initial run
- Eliminate operator intervention otherwise required



Get the right results automatically!

prepFAST X/MX/MAX

Fully Automated Sample Handling

Features Diagram

AutoAlign Arm

- Self-realigns after encountering capped sample tube
- Metal-free fluoropolymer probe aligner

Sample Containers

- Flexible rack configurations
- Sample from micro vials to large bottles

Position Autocorrection

- Automatically goes to the correct position every time
- Automatically retries position if an obstacle is encountered

Highest Speed of Operation

- Corrects for stall events, even after years of use
- Keep analysis running, even after obstruction

High Performance Syringes

- Autocalibration and sample dilution
- Internal standard addition
- Rinsing/Washing
- Four syringe S400V (prepFAST X)
- Five syringe S500V2 (prepFAST MX & MAX)

Large Volume Reagent Bottles

Parabolic Probe

- Robust, heavy-walled, self-supporting

Optional Vented Enclosure

- ULPA filter option

Dual Overflowing Rinse Stations

- Ultra-low cross-contamination
- Optional organic solvent rinse
- Independently pumped for low rinse consumption

Vacuum Pump

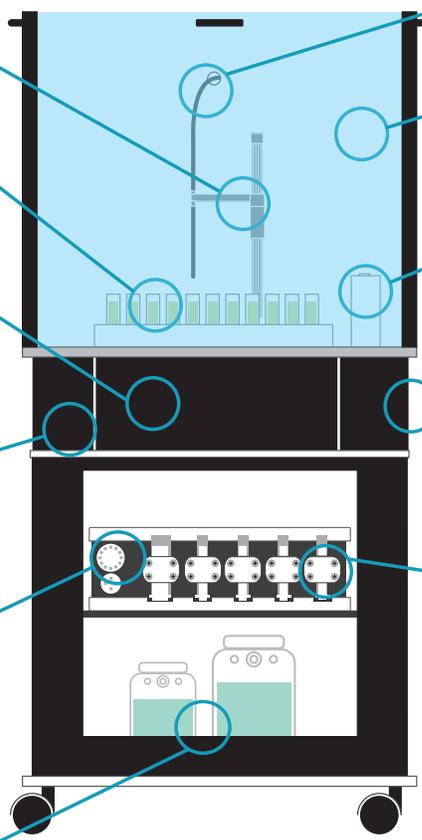
- High-speed vacuum sample loading
- Rapid rinsing & cleaning

Syringe Sample Loading

- Precise sample loading for small samples or organic solvents (prepFAST MX & MAX)

SampleSense Valve Module

- Automatic optically-sensed sample loading
- Single valve 400x dilution range (prepFAST X & MX)
- Dual-stage 40,000x dilution range (prepFAST MAX)



prepFAST X Automated Inline Dilution

- Automatically dilutes calibration standards, overrange samples, and internal standard out-of-range samples without operator intervention
- Automated dilutions performed in same analysis as original samples, improving workflow

[See the prepFAST X in action](#) →



Model Selection Guide

Model	Features	Benefits
prepFAST X	SampleSense FAST high-speed vacuum sample loading	<ul style="list-style-type: none"> Actively monitors & optimizes each sample uptake Adjusts for varying sample viscosities & eliminates method timings Minimizes sample consumption Logs sample loading issues Single FAST valve design speeds washout & simplifies operation
	Autocalibration from single or multiple standards	<ul style="list-style-type: none"> Saves time & eliminates labor-intensive standard preparation Improves calibration linearity & minimizes contamination Reduces lab waste & cleaning of labware
	Autodilution and overrange sample dilution	<ul style="list-style-type: none"> Automatically inline dilutes samples at the time of analysis Saves sample preparation time & reduces labware/reagent usage Generates reportable results for out-of-range samples Reduces operator intervention & training requirements
	Syringe-driven internal standard addition	<ul style="list-style-type: none"> Eliminates manual addition & imprecise peripump introduction
	DXCi Autocorrecting Autosampler	<ul style="list-style-type: none"> Probe arm automatically re-aligns after accidental obstruction Fastest probe speed & accuracy for microplates/small vessels Available autosampler capacities: 2DXCi, 4DXCi, 8DXCi, 14DXCi
	Fully automated sample introduction system	<ul style="list-style-type: none"> Customized valve mounting for all major ICP/ICPMS systems Rapid return on investment from reduced labor, increased sample throughput & enhanced performance Dilution range 1-400x
prepFAST MX	All the capabilities of the prepFAST X plus:	
	Precision syringe sample loading	<ul style="list-style-type: none"> Supports viscous and small sample volumes Optimal for organic solvent samples Enhanced syringe washout of sample uptake pathway Dilution range 1-400x
prepFAST MAX	All the capabilities of the prepFAST MX plus:	
	Dual stage dilution	<ul style="list-style-type: none"> Enhanced dilution capacity for higher sample concentration Dilution range 1-40,000x

prepFAST X equipped with DXCi Autosampler

- DXCi autocorrecting autosampler intelligently autocorrects probe position, even if accidentally obstructed
- Parabolic probe design eliminates line kinking
- Available in 4 capacity sizes to fit lab requirements
 - 2DXCi, 4DXCi, 8DXCi, 14DXCi

[See the DXCi in action](#) →



SampleSense Configuration

SampleSense FAST & prepFAST X/MX/MAX

SampleSense Base Module

The SampleSense base module is fully integrated with the NexION ICPMS. The Base Module sets the stage for advanced SampleSense automation by allowing flexibility and fast implementation.



SSB-64: SampleSense Base Module for NexION 1000/2000/5000 Series

System Integration

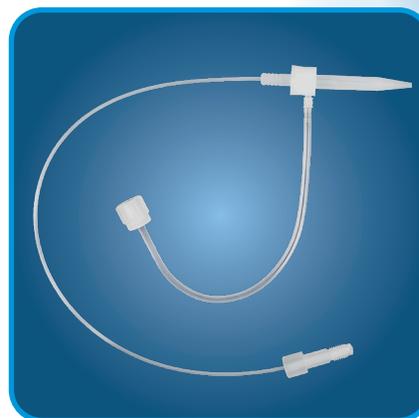
SampleSense automatically triggers PerkinElmer NexION instruments, eliminating read delay, sample uptake and injection timers. The SampleSense valve communicates with the ICPMS to begin analysis after successfully loading a sample loop. All SampleSense systems are compatible with PerkinElmer Syngistix[®] software.



Base Module integrated with NexION 2000 ICPMS
PC³ Peltier Cooler shown but not included

PFA-ICN Nebulizer

A high performance PFA-ICN nebulizer is included with the base module for high sensitivity, fast washout and chemical resistance. The low internal-volume PFA nebulizer has integrated fittings for direct connection to the NexION. The PFA-ICN nebulizer is easy to install, resistant to clogging and maximizes performance for long-term, consistent operation.



PFA-ICN Nebulizer for NexION 1000/2000/5000

SampleSense Builder					
Component	Autosampler Capacity	SampleSense FAST	prepFAST X	prepFAST MX	prepFAST MAX
Autosampler with Autocorrecting Technology (Select One)	2 Rack	2DXCi			
	4 Rack	4DXCi			
	8 Rack	8DXCi			
	14 Rack	14DXCi			
Configuration for Application	for NexION	SSF-64	PFXSS-64	PFMX-64	PFMAX-64
Mobile Station (prepFAST option)	for 2DXCi	SC-1210-DX-P (Optional)	SC-1210-DX-P (Required)		
	for 4DXCi	SC-1410-DX-P (Optional)	SC-1410-DX-P (Required)		



2DXCi SampleSense FAST for NexION



4DXCi prepFAST X for NexION with Mobile Station



4DXCi prepFAST MX for NexION with Mobile Station



4DXCi prepFAST MAX for NexION with Mobile Station

prepFAST S™

Automated Sample Preparation and Introduction System for Semiconductor Applications

The prepFAST S has revolutionized the way ultrapure semiconductor grade chemicals are analyzed by ICPMS. The prepFAST S 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 S Features:

- Ultraclean Fluoronetic Autosampler
- Automated external and MSA calibrations
- Automated ultraclean sample preparation & 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 to 500 mL)
- Continuously flowing UPW rinse with polishing columns
- PPT/PPQ detection limits for all semiconductor elements
- Capability to analyze all semiconductor grade chemicals
- Also available in analytical station, which houses prepFAST S and supports NexION instruments.



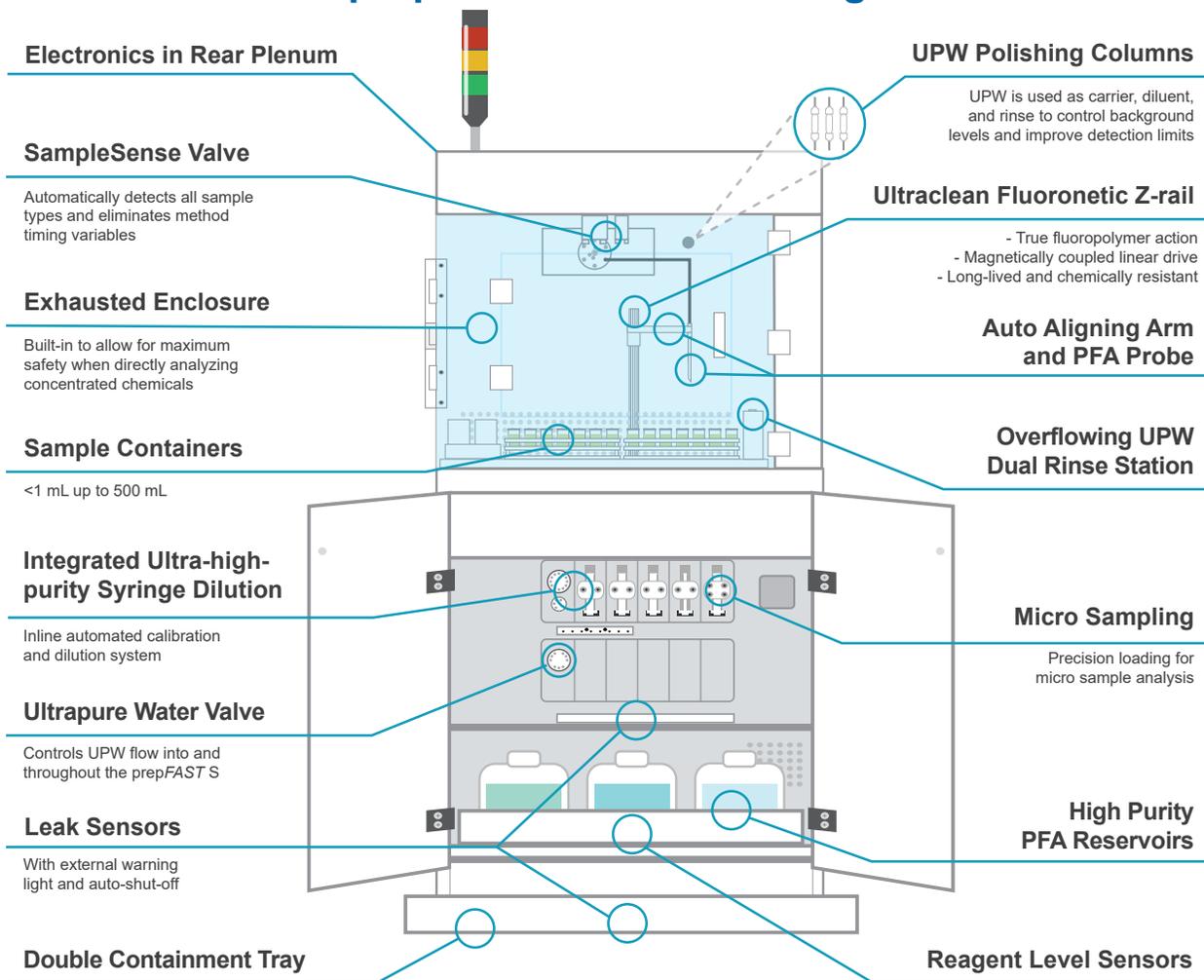
prepFAST S System



See Fluoronetic Autosampler in Action!

prepFAST S System for the NexION 1000/2000/5000						
System	Integrated Fluoronetic Autosampler & Enclosure	Integrated FAST valve modules	FAST DXi Module	PFA Nebulizer with Integrated Capillary	PFA Sample Probes	Syringe Pump S500V2
prepFAST S	✓	✓	✓	✓	✓	✓

prepFAST S Features Diagram

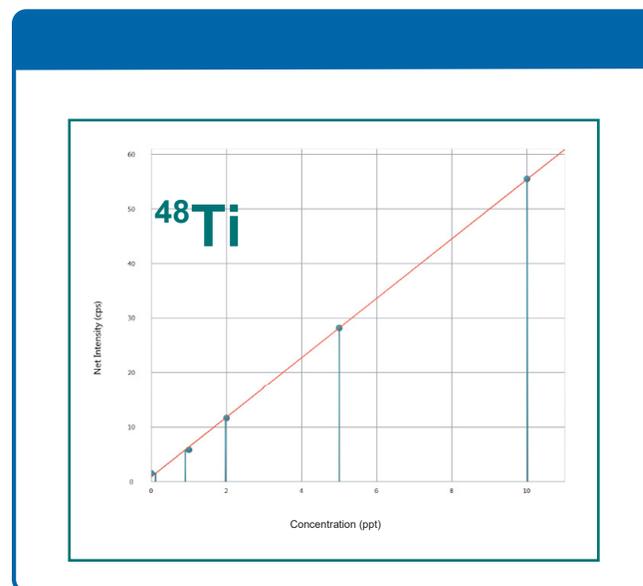
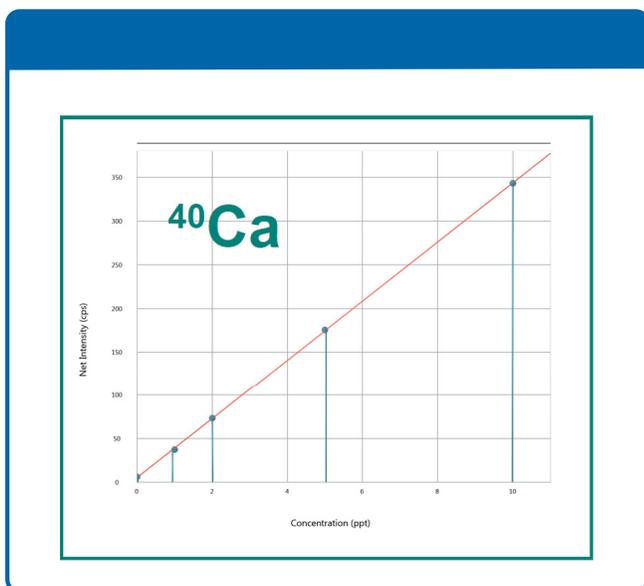
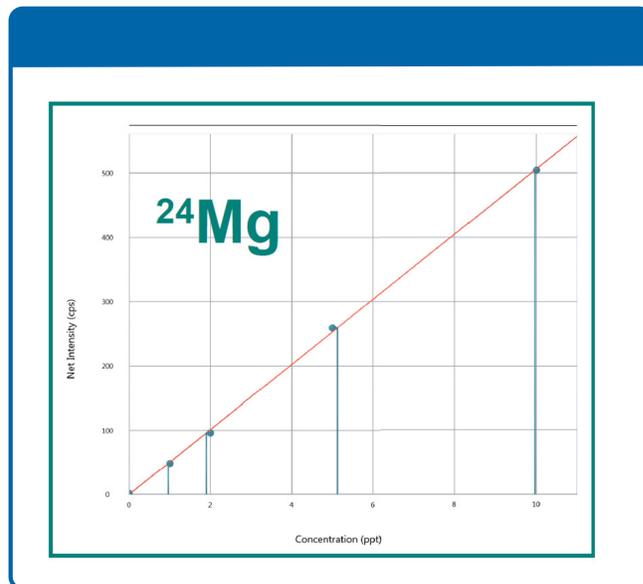
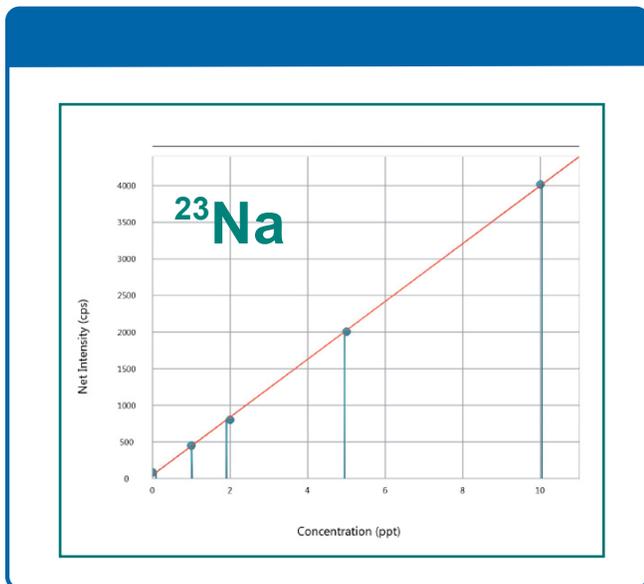


Examples of semiconductor chemicals analyzed at the ppt level with prepFAST S

Acids	Bases	Organics	Process Chemicals
98% H ₂ SO ₄	22% NH ₄ OH	IPA	BOE
89% H ₃ PO ₄	2.38% TMAH	PGMEA/PGME	SC-1
70% HNO ₃	25% TMAH	Photoresist	SC-2
49% HF	KOH	NMP	BOE
35% HCl		Butyl Acetate	DSP
30% H ₂ O ₂		Cyclohexanone	SPM
			FPM
			Etchant

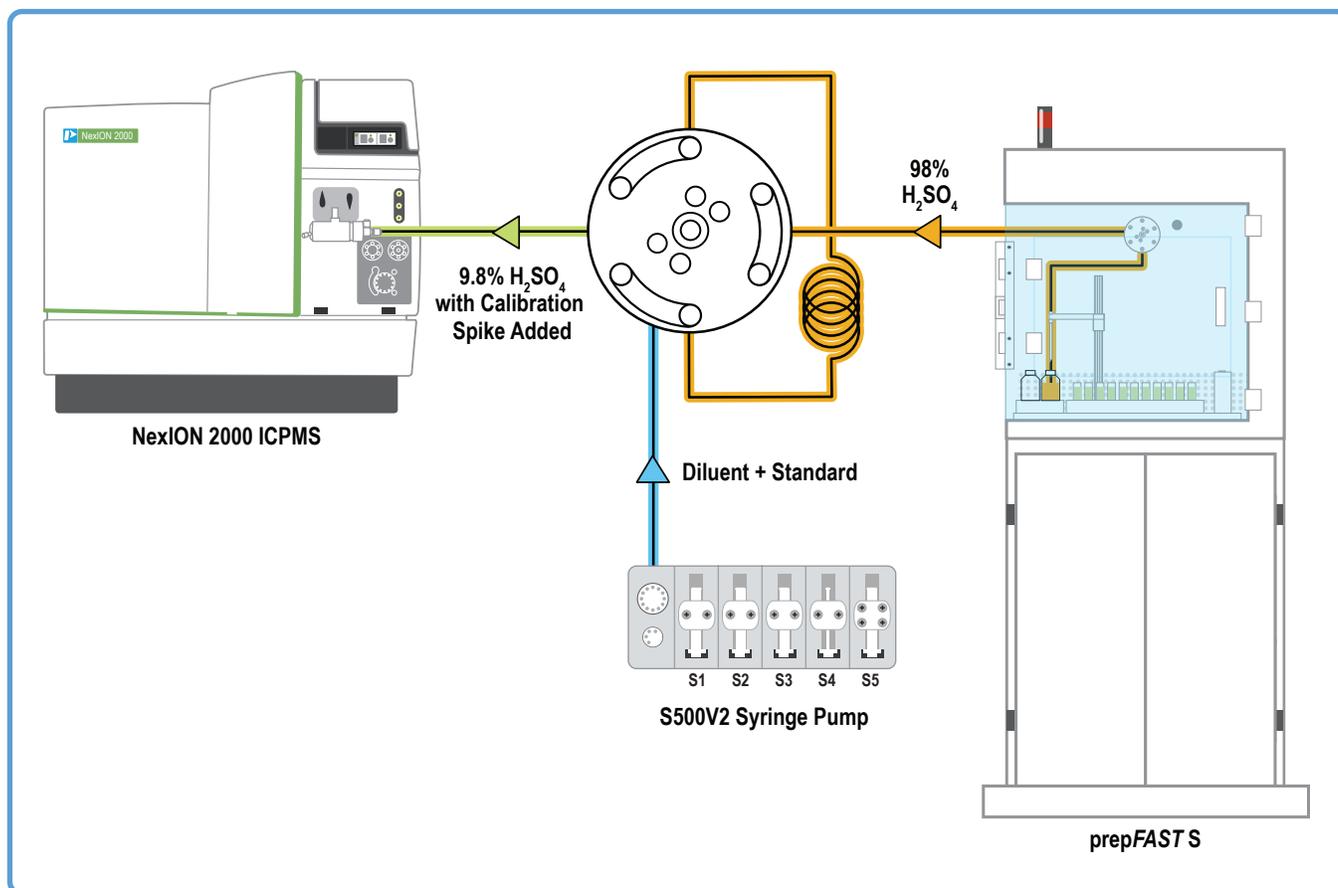
This table contains only a partial list of chemicals which can be analyzed using prepFAST S

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



The prepFAST S automatically prepares calibration curves for over 70 elements controlled in semiconductor manufacturing processes. Calibrations are generated by automatically diluting an enclosed multielement stock standard. Automation with the high-purity prepFAST S 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 S delivers ppq range detection of ICPMS accessible elements.

prepFAST S Inline Dilution of Semiconductor-grade Chemicals



prepFAST S 10x inline dilution of concentrated H₂SO₄

The prepFAST S 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 S NexION 5000
Semiconductor Grade Chemical
Applications Handbook](#)

prepFAST S Systems	
Description	Part Number
prepFAST S2 system, 2 sample rack capacity	2PF-SF-64
prepFAST S4 system, 4 sample rack capacity	4PF-SF-64
prepFAST S4 analytical station for NexION ICPMS, 4 sample rack capacity	4PF-SF-64-AS
ULPA (ultrapure air) Filter for 2 CX prepFAST S system	ULPA-2CX
ULPA (ultrapure air) Filter for 4 CX prepFAST S system	ULPA-4CX

prepFAST SE™

Benchtop System for Automated Sample Introduction of Ultrapure Chemicals

The prepFAST SE provides automated introduction of ultrapure chemicals and samples that can be analyzed neat. The system can be customized to further control contamination from both airborne and sample-based sources.

Features:

- Ultraclean Fluoronetic Autosampler
- PTFE autosampler deck
- Integrated exhausted enclosure with 3 side access
- Automated external and MSA calibration
- Automated QC spiking
- Syringe-driven sample introduction
- Continuously flowing UPW rinse



prepFAST SE micro

Syringe Sample Introduction

- Eliminates clogs in nebulizer common with natural aspiration
- Flow rates determined independently for each chemical:
 - <50 $\mu\text{L}/\text{min}$ up to 400 $\mu\text{L}/\text{min}$
- Precise analysis of small volume samples
- High speed washout of nebulizer & spray chamber between chemical types

Fluoronetic Autosampler

- True fluoropolymer mechanical action is chemically resistant – no exposed metal in or above sample area
- Magnetically coupled linear drive for long lifetime
- Autocorrecting autosampler - goes to the correct position - even when temporarily obstructed
- Small benchtop footprint, available in two models:
 - prepFAST SE micro (2 micro racks)
 - prepFAST SE 2DX (2 large racks, 4 micro racks)

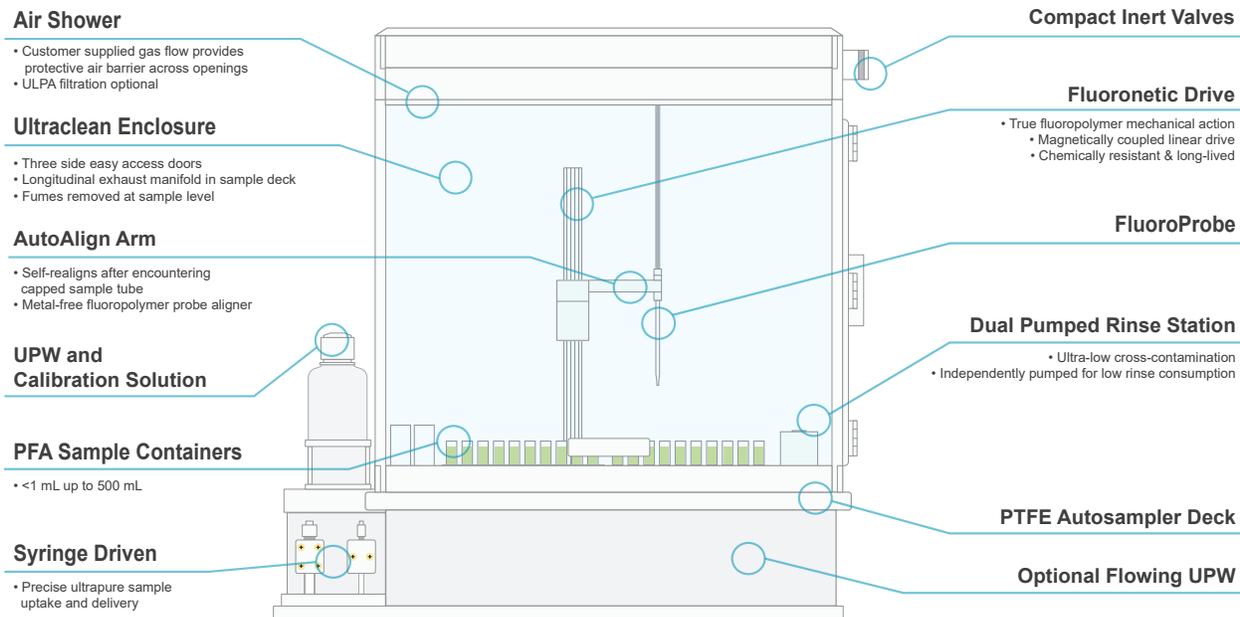
Additional Options

- Clean air shower
- Leak sensors
- Valve for automated introduction ICPMS tuning solutions
- UPW Intake Manifold and compact UPW valve
- Configurable with many PFA sample containers, including:
 - Micro sample vials (<1 mL)
 - 15, 30, & 60 mL PFA vials
 - 100, 250, & 500 mL bottles

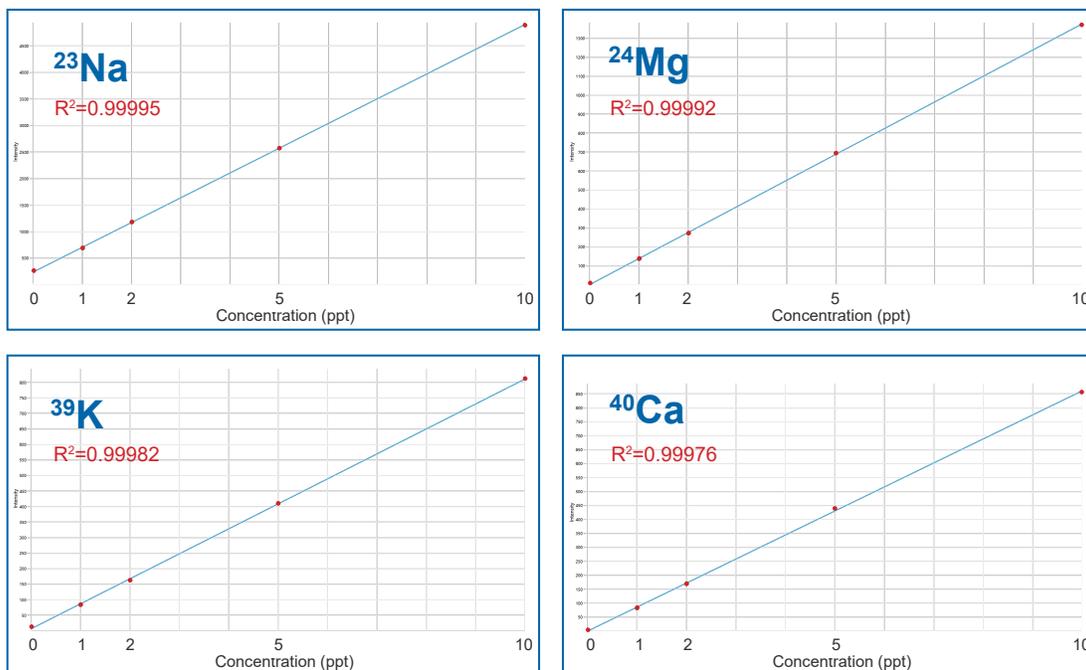


prepFAST SE micro
with doors open

prepFAST SE 2DX Features Diagram



prepFAST SE Autocalibration – Na, K, Ca, Mg at 1, 2, 5, & 10 ppt in UPW



prepFAST SE Systems

Description	Part Number
prepFAST SE micro system, 2 micro rack capacity	PF-SE-64
prepFAST SE 2DX system, 2 large racks, 4 micro rack capacity	PF-SE-2FNXS-64

prepFAST IC™

Automated Speciation and Total Metal Analysis System

The prepFAST IC integrates ultra-clean high-pressure liquid chromatography technology along with an enclosed autosampler for both elemental speciation and total metal analysis.

The system is offered in a base model with a selection of options allowing the customization of the system. The fully featured prepFAST IC model automates calibration and the analysis of total metals, metal speciation, or both techniques combined using ICPMS detection. Also available is a gradient speciation module along with the prepFAST autodilution module. This offers users fully automated inline dilution capability at the time of analysis, eliminating potential species conversion. Other options include a SampleSense FAST introduction system, autotuning module, and an additional syringe for post column additions or a third chromatographic eluent.

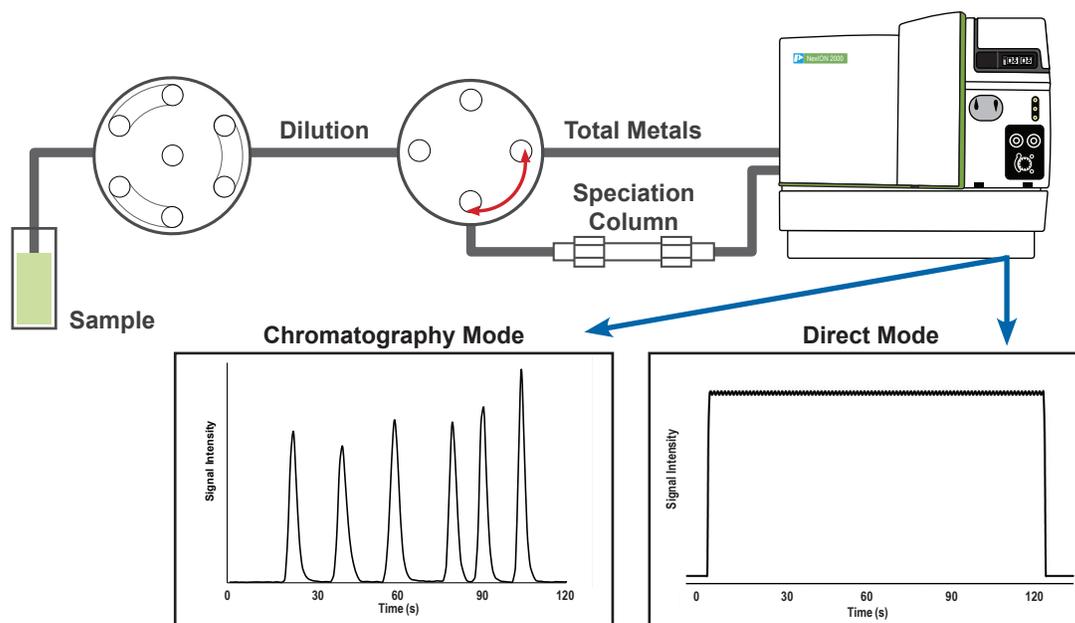


prepFAST IC System

Features and Options:

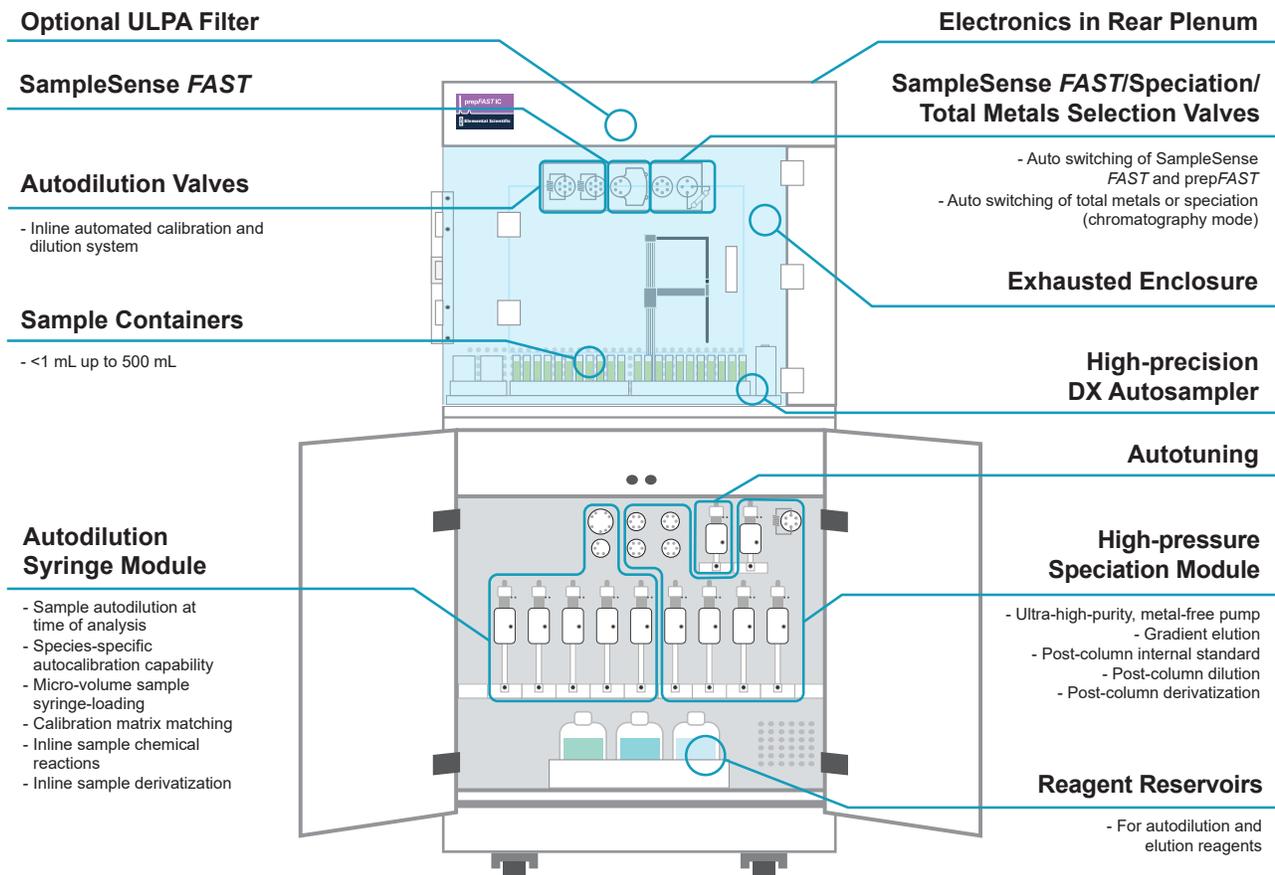
- High pressure eluent delivery (HPLC)
- Gradient elution option
- Automated in-line sample dilution and syringe-driven sample loading option
- Automated switching between total metal analysis and speciation option
- Micro sample compatible with selectable sample loop loading
- Enclosed mobile station with optional ULPA filter preserves sample integrity
- PFA-ICN nebulizer and PFA encased sample probes
- Xceleri Chromatography Data Software

Unique Design Supports Unattended Analysis of Both Trace Metals and Speciation

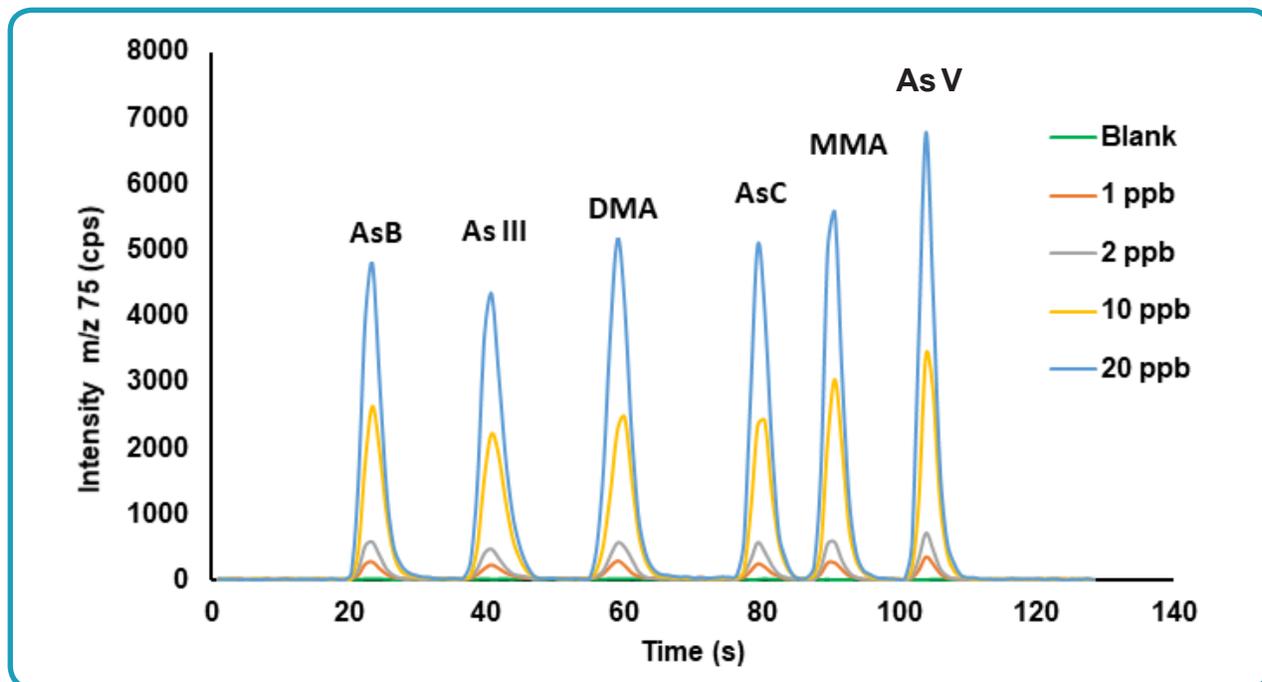


prepFAST IC Autoselects Chromatography Mode or Direct Mode

prepFAST IC Features Diagram



Species Autocalibration with prepFAST IC



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

prepFAST IC™

Xceleri Software for Automated Total Metals and Speciation Analysis

Complete Instrument Control Software

- Triggers ICPMS, retrieves and processes data

Automated Data Processing

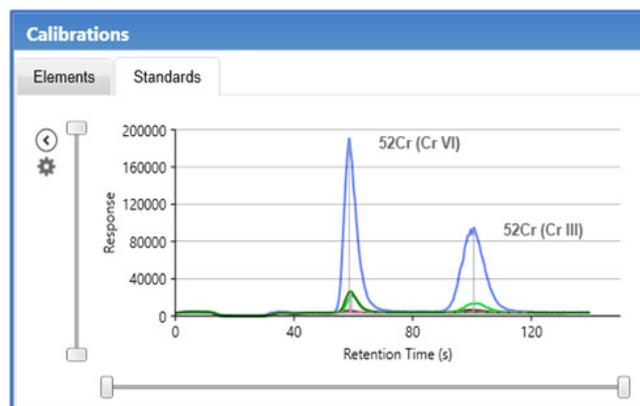
- Total metals and speciation
- Easy to customize QC and sample rules
- Over-range samples automation when value exceeds defined threshold:
 - Reanalysis for confirmation
 - Intelligent dilution
 - Re-run in speciation mode

Data Viewing

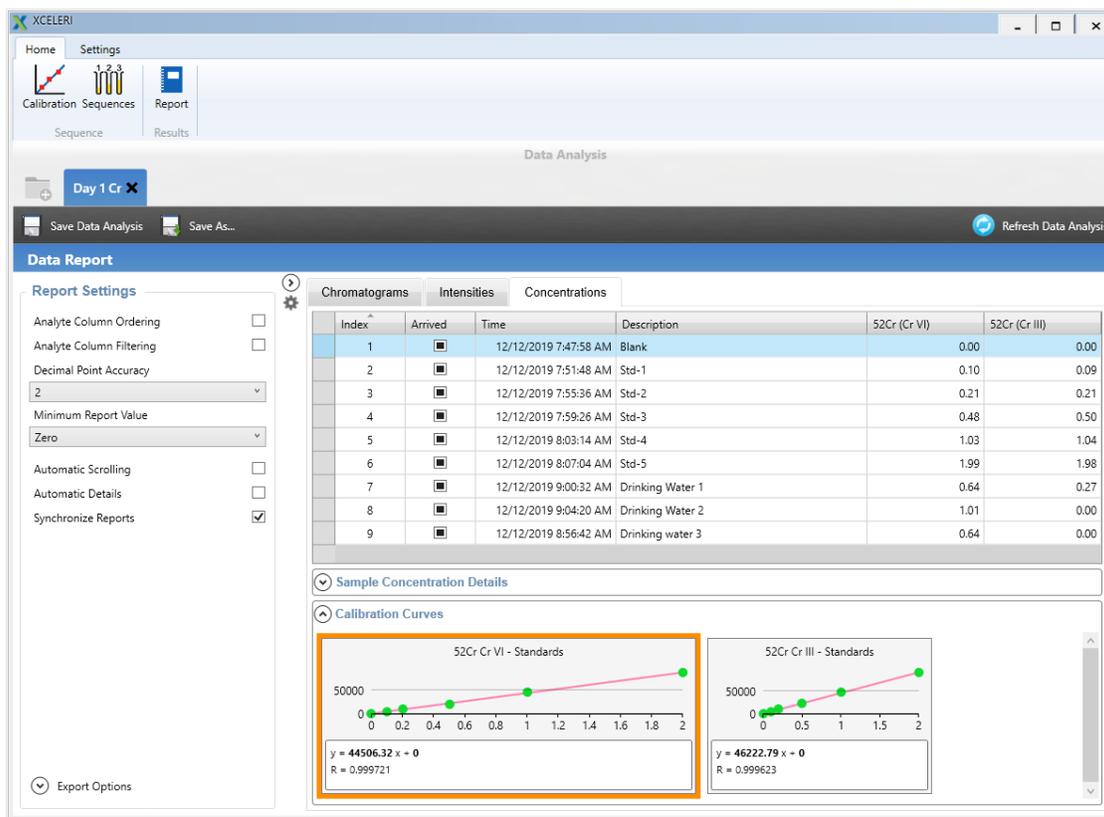
- Automated peak selection and integration techniques
- Visualization functions for easy comparisons of chromatograms for standards or samples

Advanced Reporting Functions

- Report function offers comprehensive overview of the results including:
 - Calibration curves
 - Calculated concentrations
 - Raw intensities
 - Chromatograms



Example overlay of Cr speciation chromatograms

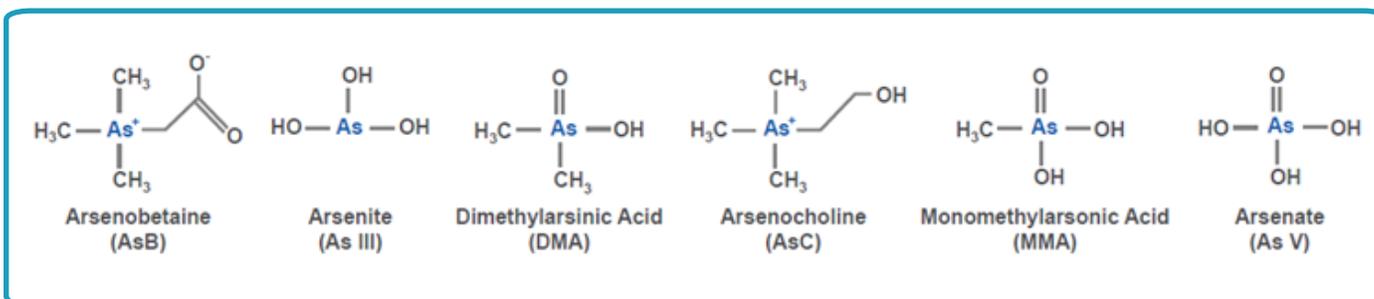


Elemental Scientific Xceleri chromatography software processed results for chromium speciation of drinking water performed with the prepFAST IC coupled to the NexION 2000

Arsenic Speciation

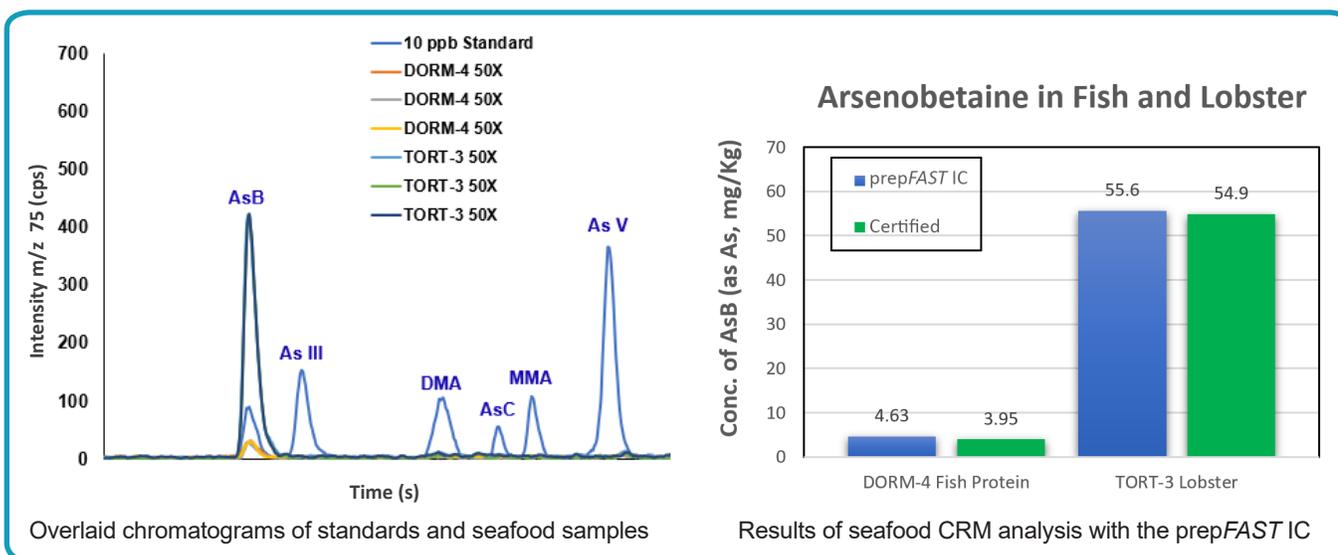
Both forms of inorganic arsenic (As III & As V) are considered toxic at low levels, while the organometallic forms are much less toxic. Determination of the chemical form(s) of the total arsenic metal present in a sample is often critical in sample determinations. The analysis of both total and speciated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

Arsenic Species



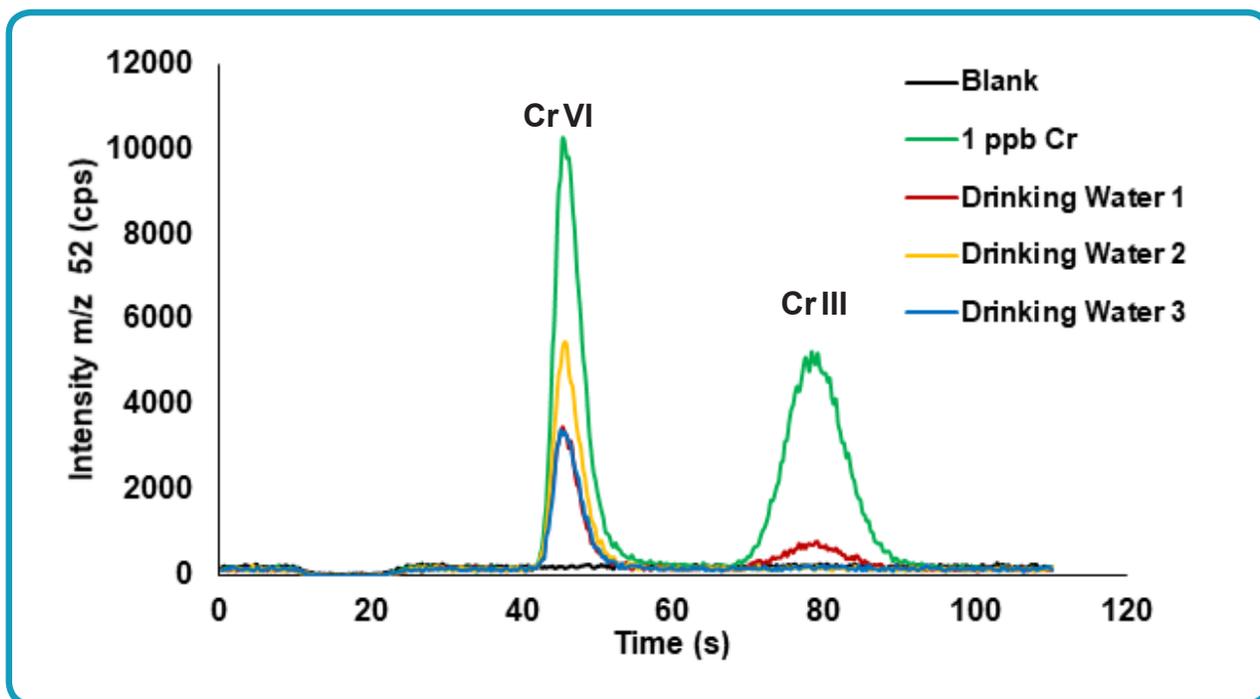
Arsenobetaine in Food with prepFAST IC - Fish and Lobster

Agencies around the world are starting to require testing of seafood for arsenic species. Arsenobetaine (AsB) is often found to be the major As component present in many types of seafood. The more toxic forms of As III and As V can also be detected. The capability of the prepFAST IC to perform an inline dilution aids in properly performing the speciation analysis. Below are examples of the wide range of arsenic species concentrations that can be successfully determined with the prepFAST IC system.



Chromium Speciation Analysis of Drinking Water

Chromium exists in the environment in several forms which differ significantly in their effects upon organisms. Chromium (III) is often considered an essential nutrient, but chromium (VI) is toxic and considered carcinogenic. This makes the 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. Chromatograms below displays overlaid standards and samples response.



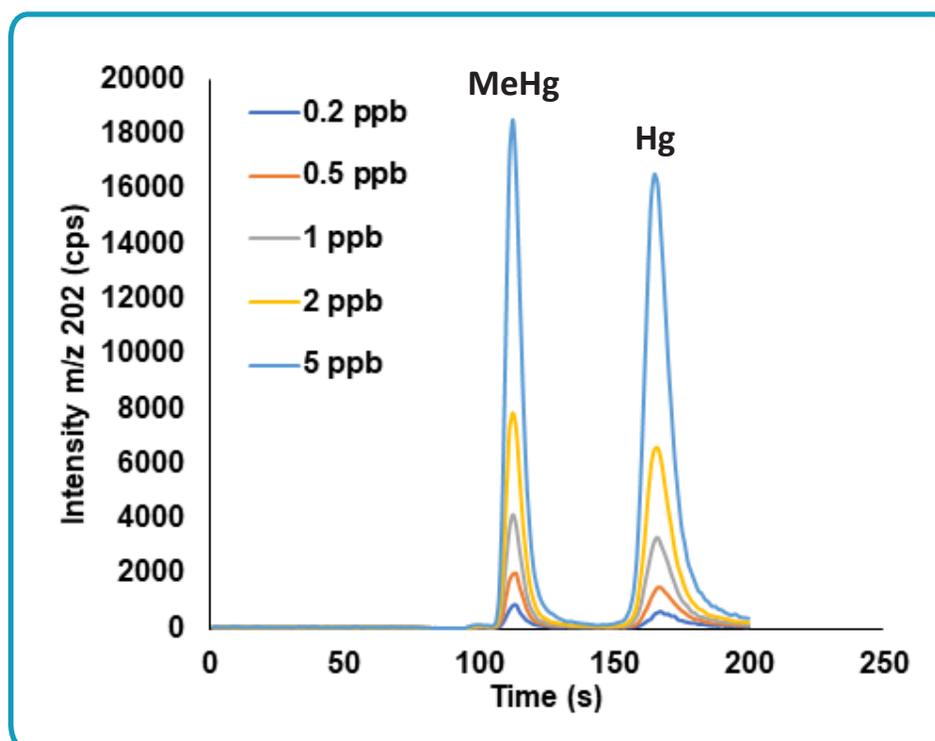
Chromium speciation analysis of drinking water samples performed with the prepFAST IC coupled to the NexION 2000

Chromium Speciation Results for Drinking Waters

Sample	Cr VI Conc. ($\mu\text{g/L}$)	Cr III Conc. ($\mu\text{g/L}$)
Drinking Water 1	0.64	0.27
Drinking Water 2	1.01	0.00
Drinking Water 3	0.64	0.00

Mercury Speciation

The presence of mercury in marine environments is of particular concern due to bioaccumulation that occurs in the tissues of marine organisms, like fish, oysters, and shrimp. With the toxicity of inorganic mercury (Hg) and especially the methyl mercury form (MeHg), significant public health concerns have arisen over the amount of fish consumed. At particular risk are pregnant or breast-feeding mothers due to the neurological impacts on fetal and infant development. The prepFAST IC provides autocalibration and inline dilution to aid in the quick determination of the individual forms of mercury present in fish tissues.



Mercury Speciation - Analysis of MeHg in Fish Tissue with prepFAST IC

Sample	Experimental Results				
	Mass (g)	Volume (L)	Target Value ($\mu\text{g/L}$)	Measured Value ($\mu\text{g/L}$)	Recovery
NIST SRM 1946 Lake Superior Fish Tissue	0.250	0.03	3.28	3.24	100%
NRCC DORM-4 Fish Protein	0.250	0.03	2.96	3.00	100%

prepFAST IC Configuration Options

Description	Part Number
Base FASTIC. ICPMS chromatography system with Isocratic elution and syringe sample loading. Includes 4 rack ultraclean autosampler.	IC-0101
Binary Gradient Elution Option – Gradient elution capability for advanced chromatography	IC-0109
Quarternary Gradient Elution Option – Gradient elution capability for advanced chromatography	IC-0102
prepFAST Option – Autocalibration and autodilution capabilities	IC-0103
Automated Speciation and Total Metals Option – Automated switching between total metals and speciation	IC-0104
ICPMS Autotuning Option – Switching valve for introduction of tuning solutions	IC-0105
Post-Column Option – Additional syringe module	IC-0106
SampleSense FAST UHT Option – SampleSense optical sensing Injection valve	IC-0107
pergo Option – Nebulizer gas humidifier accessory	IC-0108
SampleSense Upgrade for FAST IC or prepFAST IC – Adds SampleSense valve	IC-0110
Analytical Station – Upgrade to fully integrated benchtop	IC-0111
Additional Inline Column Valve – Adds additional column valve for advanced chromatography methods	IC-0112
Xceleri Chromatographic Software – Powerful and easy-to-use data processing software	IC-0201

prepFAST IC Speciation Kits

Kit Name	Description	Part Number
As	Inorganic and Organometallic Arsenic Speciation Kit. CF-As-01 column, single species standards for As III, As V, AsB, DMA, MMA (10 mg/L, 100 mL), and method guide. Also used for AsC and Roxarsone.	ICX-As35
As + TMAO	ICX-As35 + TMAO Arsenic Speciation Kit. CF-As-01 & CF-As-03 columns, single species standards for As III, As V, AsB, DMA, MMA (10 mg/L, 100 mL), and method guide. Also used for AsC, TMAO and Roxarsone.	ICX-AsTMAO
Se	Inorganic and Organometallic Selenium Kit. CF-Se-01 column, single species standards for Se IV & Se VI, (1000 µg/mL, 100 mL) and method guide.	ICX-Se46
Cr	Inorganic Chromium Speciation Kit. CF-Cr-01 column, single species standards for Cr III, Cr VI, and Tm (1000 µg/mL, 100 mL), and method guide.	ICX-Cr36
Hg	Inorganic and Organometallic Mercury Speciation Kit. CF-Hg-01 column, single species standards for Hg ²⁺ (1000 µg/mL, 50 mL) and MeHg ⁺ (1000 µg/mL, 25 mL), and method guide.	ICX-Hg
Gd	Gadolinium Imaging Agents Speciation Kit. CF-Gd-01 column, single species standard for Gd (1000 µg/mL, 100 mL) and method guide. Used for Gd ⁺³ and Gd-based contrast agents.	ICX-Gd
Cu	Bound and Free Copper Speciation Kit. CF-Cu-01 column and method guide. For determination of bound Cu and free Cu in serum.	ICX-Cu
Fe	Inorganic Iron Speciation Kit. CF-Fe-01 column, single species standards for Fe ⁺² and Fe ⁺³ (1000 µg/mL, 100 mL), and method guide.	ICX-Fe23
U	Trace Elements in Uranium Matrix Kit. CF-UTEVA-02 column, single species standard for U (100,000 mg/L, 100 mL) and multielement standards (Al, As, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, An, Ba, Ce, Ga, Li, P, Sr, U, 1000 mg/L, 100 mL) and method guide. For removal of U matrix.	ICX-UTEVA
Cl	Inorganic Chlorine Speciation Kit. CF-Cl-01 column, single species standards for Cl ⁻ , ClO ₂ ⁻ , ClO ₃ ⁻ , ClO ₄ ⁻ (1000 µg/L, 100 mL), and method guide.	ICX-CICIO3
Br	Inorganic Bromine Speciation Kit. CF-Br-01 column, single species standards for Br & BrO ₃ ⁻ (1000 µg/mL, 100 mL) and method guide.	ICX-BrBrO3
I	Inorganic Iodine Speciation Kit. CF-I-01 column, single species standards for I ⁻ & IO ₃ ⁻ (1000 µg/mL, 100 mL) and method guide.	ICX-IIO3
Cl Br I	Inorganic Halogens Speciation Kit. CF-Halogen-01 column, single species standards for Cl ⁻ , ClO ₂ ⁻ , ClO ₃ ⁻ , ClO ₄ ⁻ , Br ⁻ , BrO ₃ ⁻ , I ⁻ , IO ₃ ⁻ (1000 µg/mL, 100 mL), and method guide.	ICX-CIBrI
V	Vanadium Speciation Kit. CF-V-01 column and method guide	ICX-V45
P	Phosphorous Speciation Kit. CF-P-01 column and method guide	ICX-PO234

Ultrapure Reagents

AUTOMATION



Elemental Scientific offers ultrapure reagents to support the analysis of difficult matrices such as seawater and clinical matrices.

Features

- Purified and packaged under Class 100 clean room conditions
- Low-or sub-ppb contamination for most elements on the periodic table
- Certificate of analysis included

Applications

- Improve accuracy for seawater or clinical samples with matrix-matched calibrations while maintaining excellent blanks
- Simulate complex clinical matrices for analyses such as urine, whole blood and serum/plasma

Description	Application	Part Number
seaBlank 10.5% ultrapure NaCl, 500 mL	Analysis of seawater, brines, environmental water or ultrapure matrix modifier for any high-saline application	seablank-0500
seaFAST ultrapure buffer, 1 L	Inline adjustment of pH for preconcentration and matrix removal	UPB-4M-1L
Ultrapure Clinical Matrix, 500 mL	Analysis of urine, whole blood, serum/plasma	CLIN-0500



Automated Seawater Analysis for the NexION 1000/2000/5000 ICPMS

The seaFAST automatically prepares seawater and other high-matrix samples for ICPMS analysis in <10 minutes to produce analytical results that 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 to eliminate matrix effects and spectral interferences caused by the saline matrix, 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. The seaFAST Litre offers enhanced features for high-volume preconcentration for ultratrace determination or isotope ratio analysis.



SeaFAST SP3 system

High Performance:

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

Features:

- Completely syringe driven
- Multimode operation:
 - Preconcentration
 - Direct
 - Hydride
- SP models deliver:
 - Autodilution and Autocalibration
 - Automatic matrix matching and standard addition
- Litre offers:
 - Integrated connection to pressurized ultrapure water source
 - Automatic matrix matching and standard addition

seaFAST Systems								
System	Syringe Sample Loading	Offline & Online Preconcentration	Direct Mode Inline Dilution	Directly Connect to DIW Source	High-Volume Preconcentration	Autocalibration & Autodilution	Auto Matrix Matching/ Auto MSA	Hydride Mode
seaFAST S2	✓	✓	✓					
seaFAST Litre	✓	✓	✓	✓	✓			
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 Litre

Preconcentration and Direct Modes:

Optimized for high-volume preconcentration, the seaFAST Litre offers the best detection limits for determination of ultratrace concentrations or isotope ratios. In addition to routine sampling from autosampler racks, large-volume samples may be preconcentrated directly from bottles connected to the seaFAST through a stream-selector valve. Direct connection to a pressurized ultrapure water source reduces contamination and maintenance of reagents.

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.

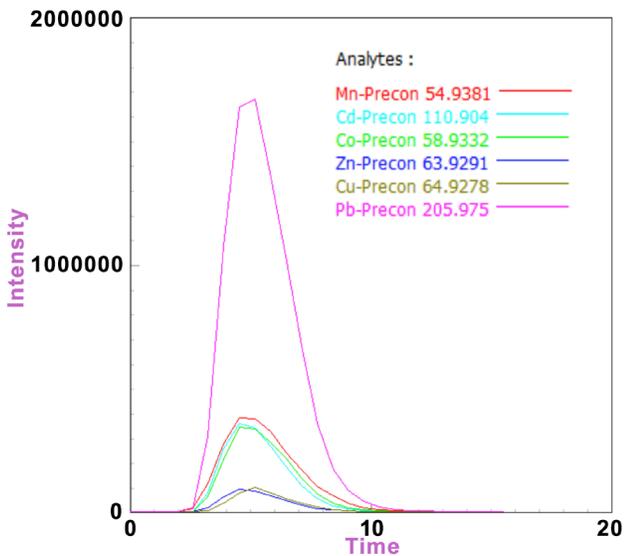
seaFAST SP3

Preconcentration, Direct and Hydride Modes with Autodilution:

Adds hydride generation to the capabilities of the seaFAST SP2 to allow high sensitivity detection of As, Se and other hydride-forming elements.

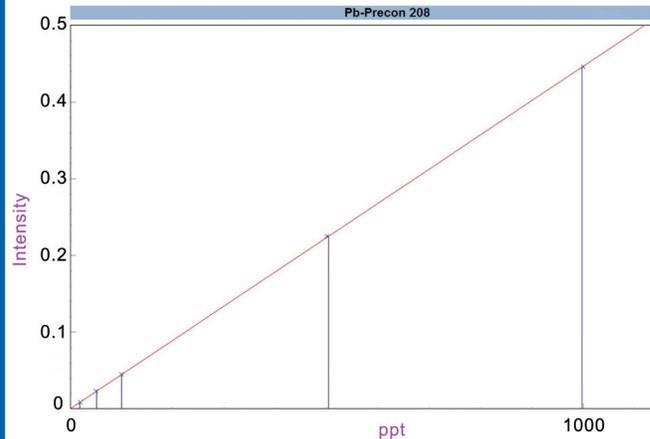
1																		2																	
H																	He																		
3	4											5	6	7	8	9	10																		
Li	Be											B	C	N	O	F	Ne																		
11	12											13	14	15	16	17	18																		
Na	Mg											Al	Si	P	S	Cl	Ar																		
19	20	21	22	23	24	25	26	27	28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

Preconcentration and Matrix Removal



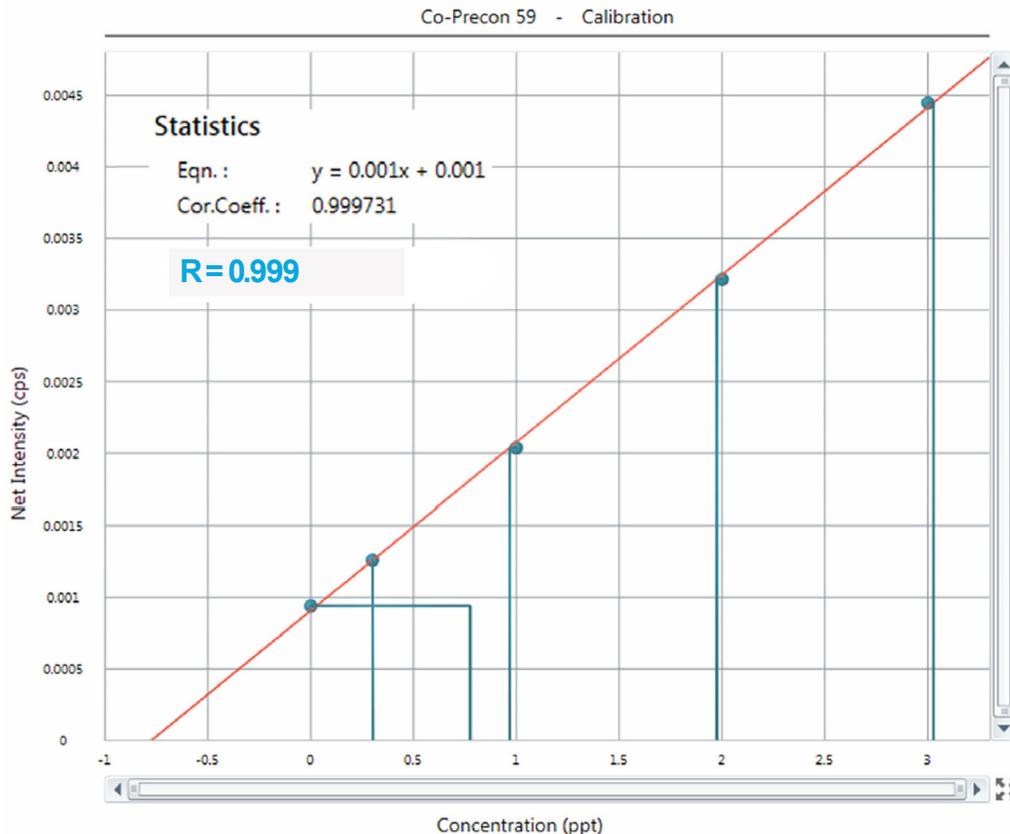
Simultaneous elution of six elements in Preconcentration mode, 1 ppb.

Preconcentration Mode Autocalibration

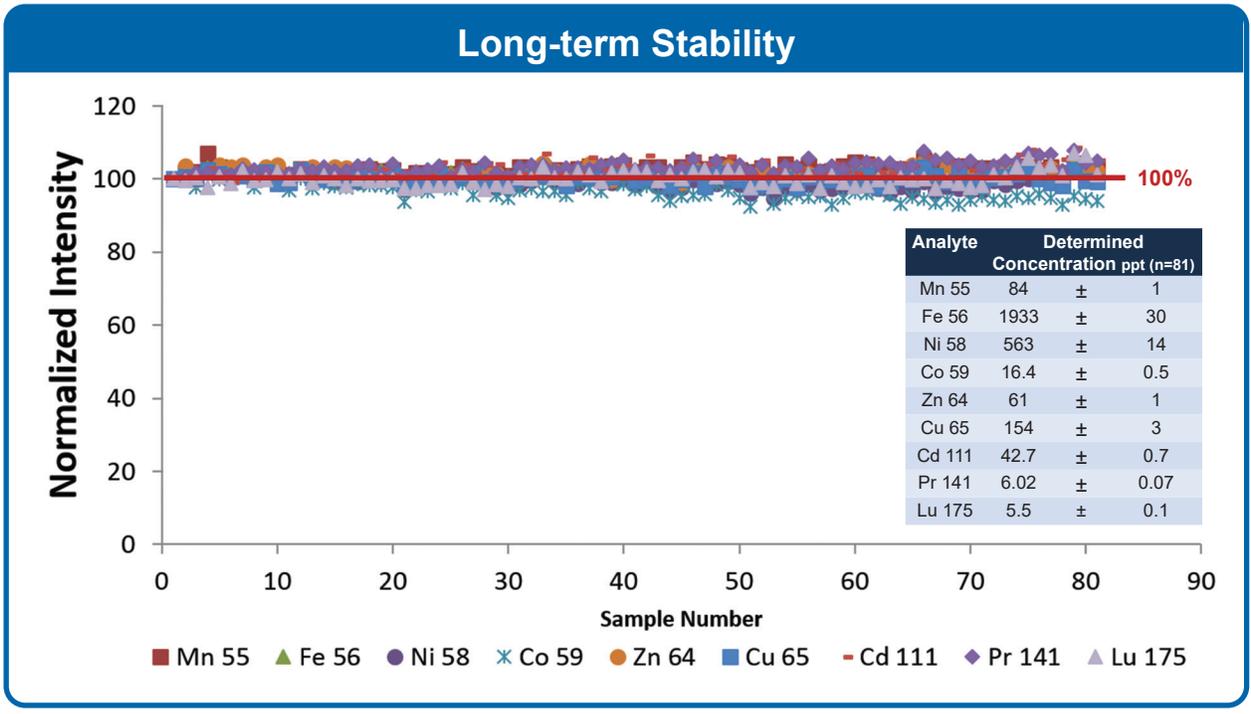


Autocalibrated from a single, 1 ppb standard. Auto Matrix Matched to 3% NaCl with seaBlank.

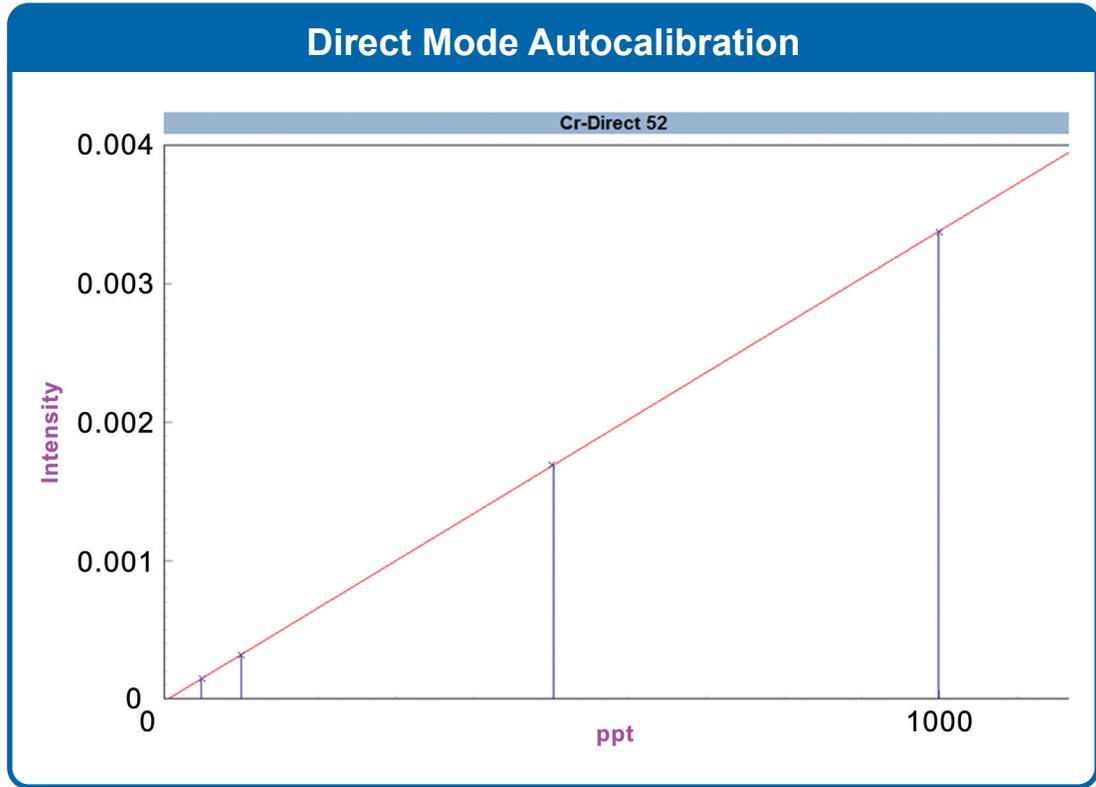
Automatic Standard Addition Calibrations



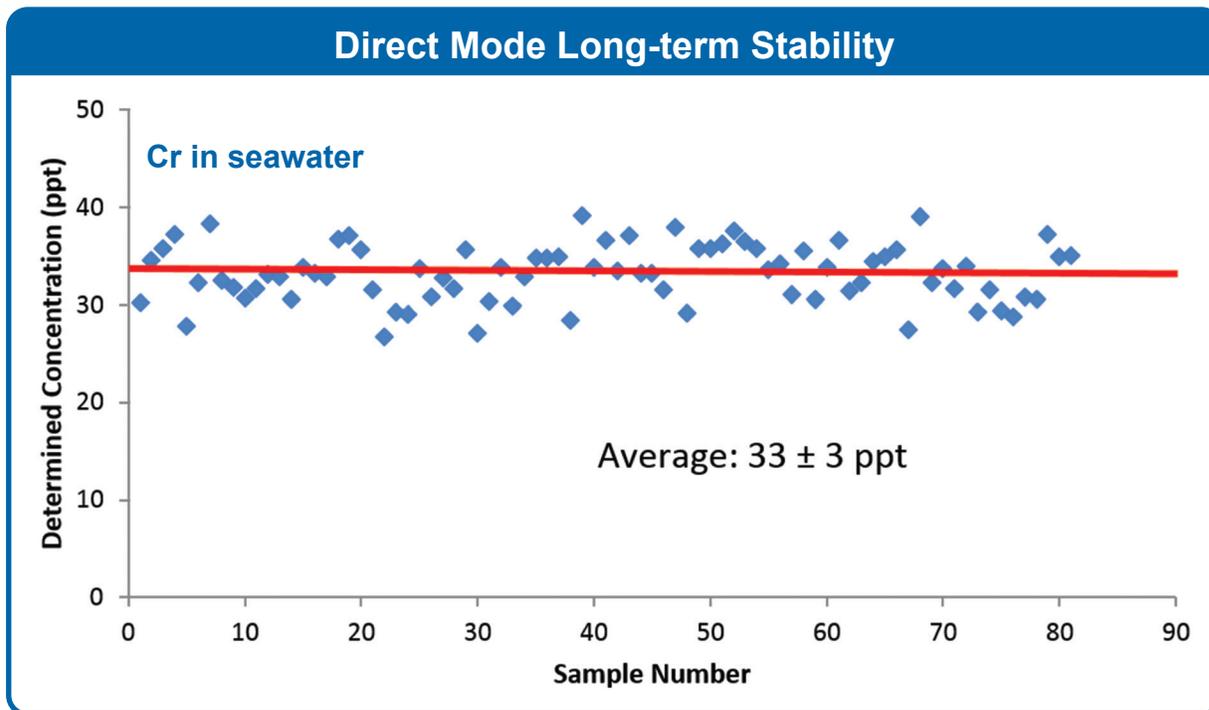
Automatic standard addition (MSA) calibration for Co in GSP North Pacific surface seawater. Analyte concentration is less than 1 ppt. Addition spikes at 0.25 ppt, 1 ppt, 2 ppt, and 3 ppt show seaFAST NexION capabilities to accurately and automatically measure extremely low concentrations of metals in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



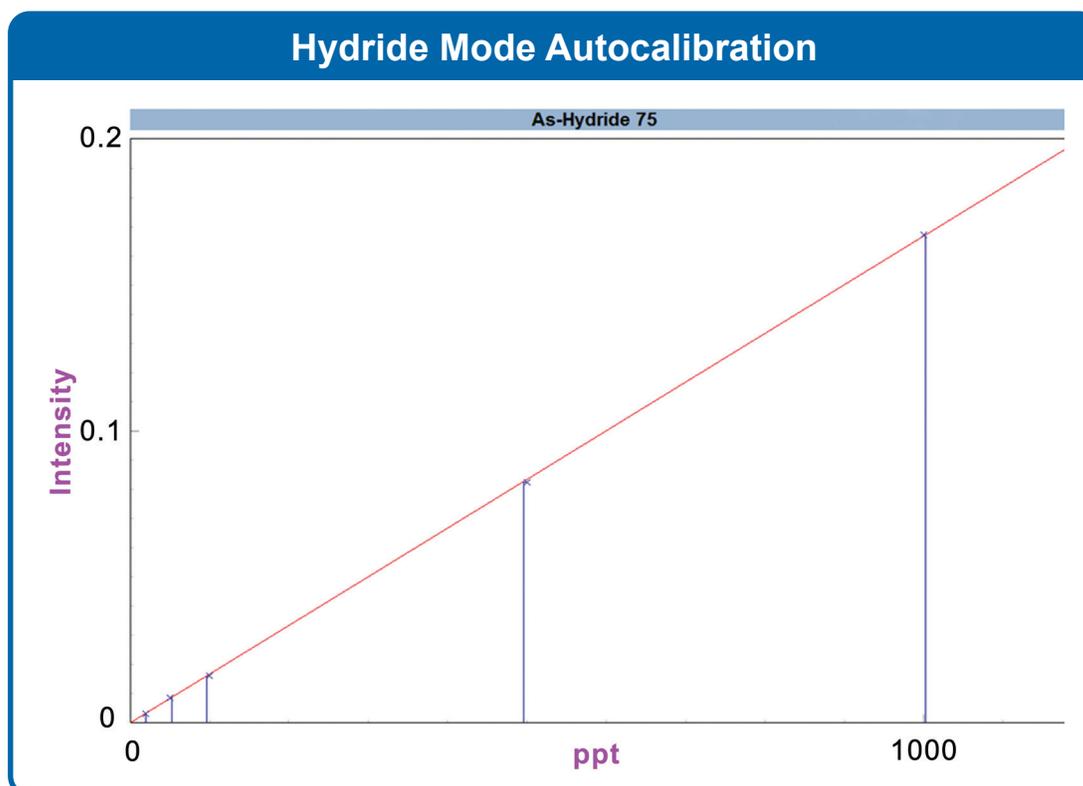
Common transition metals and selected rare earth elements (REEs) were determined in synthetic seawater consecutively for over 14 hours (n=81). Auto-matrix-matched blanks and QC standards not shown, for clarity. Average precision over 14 hours was better than 2% with internal standard correction. REEs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



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

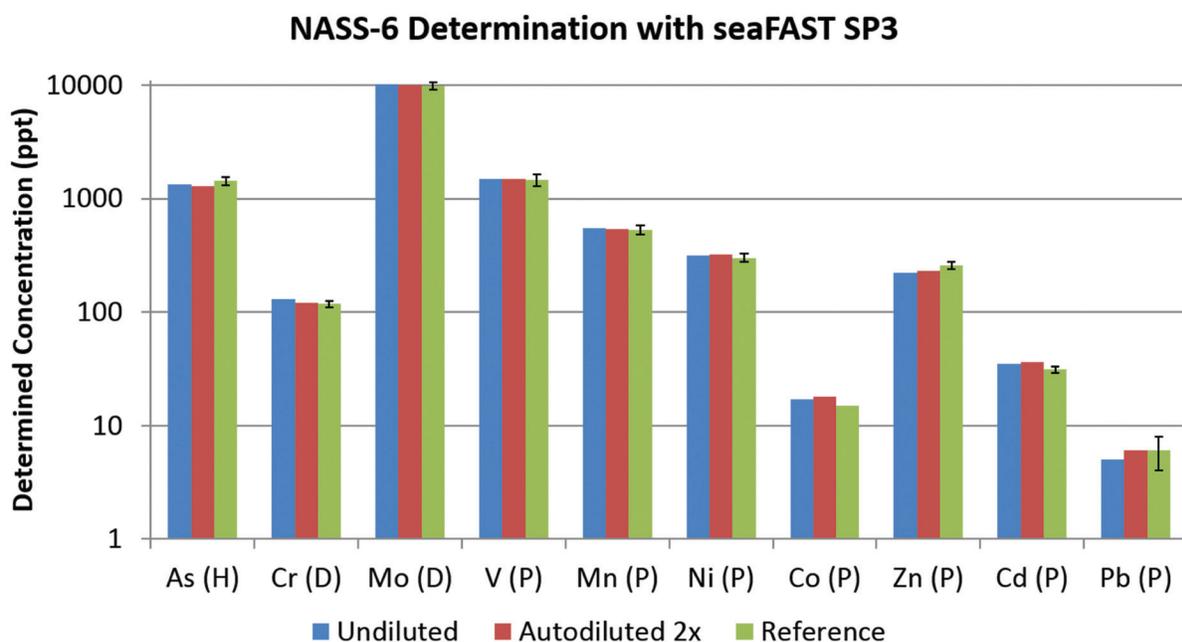


Chromium in synthetic seawater. > 14 hours of repeated determinations with internal standard correction. seaFAST operated in direct mode with 10x inline dilution, measured utilizing NH_3 DRC mode. Determined concentration was 33 ± 3 ppt.



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-driven 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 low-volume eluted fraction may be accurately syringe-loaded for analysis by seaFAST Direct mode.

seaFAST Systems

Description	4DX Part Number
seaFAST S2 system	4SF-S2
seaFAST Litre system	4SF-LTR
seaFAST SP2 system	4SF-SP2
seaFAST SP3 system	4SF-SP3

seaFAST System Columns

Description	Part Number
Spare seaFAST preconcentration / cleanup column	4SF-LTR
Alternate seaFAST column for determination of Ag and other transition metals	CF-WP-0200

seaFAST System Reagents

Description	Part Number
seaBlank 10.5% Ultrapure NaCl, 500 mL	seablank-0500
seaFAST Ultrapure Buffer, 1 L	UPB-4M-1L

microFAST SC

for NexION 1000/2000/5000 ICPMS

Complete Solution for Single Cell and Nanoparticle ICPMS Applications

The ability to introduce single cells into an ICPMS and measure the elemental content in each cell, or tagged to each cell, accurately takes a dedicated and well-designed sample introduction system. Having this ability allows investigators to better understand how much of a specific nanoparticle, metal/drug, or metal-based compound enters the cell. The typical cell types of interest will vary and with that the stability of the cell-line also varies.

The microFAST SC is designed specifically to provide gentle and highly controlled nebulization in order to not disrupt or lyse the cells. It provides the complete system from sampling, nebulization, spray chamber, and on to the torch for optimal ICPMS analysis of single cells and nanoparticles.

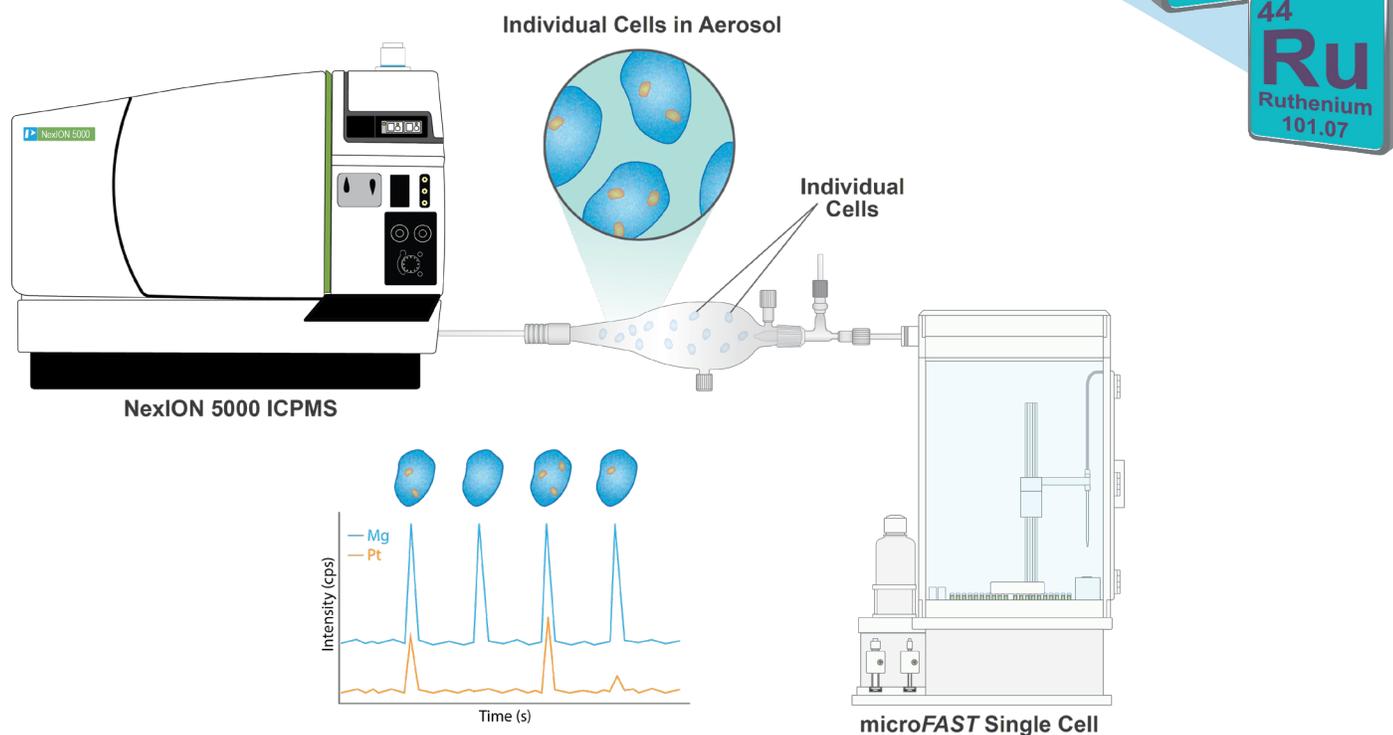


microFAST SC

Benefits:

- Flexible sample sizes – μL to mL of sample
- Automated sample introduction in clean environment
- Low pressure sample introduction
 - Ensures cells stay intact
- High transport efficiency

Detection of Cells with microFAST SC



microFAST SC Features Diagram

CytoSpray

- Specifically designed for single cell and nanoparticle applications
- Designed for high-transport efficiency

CytoNeb

- Low backpressure and dead volume
- Unmatched nebulization efficiency

Carrier and Working Solution

Sample Containers

- 0.5 mL vials to 30 mL tubes
- Microplates

Syringes

- High precision syringes
- Stable at low flow rates (e.g. 10 $\mu\text{L}/\text{min}$)

Optional ULPA Filter or Air Shower

Exhausted Enclosure

- Three side easy access doors

Fluoronetic Z-rail

- True fluoropolymer mechanical action
- Magnetically coupled linear drive
- Chemically resistant and long-lived

AutoAlign Arm

- Self-realigns after encountering capped sample tube

Tapered Probe

Dual Rinse Station

- Low rinse consumption

PTFE Autosampler Deck



CytoNeb and CytoSpray

microFAST SC for NexION 1000/2000/5000 ICPMS

Description	Part Number
microFAST Single Cell Sample Introduction System	MF-SC-64
Single Cell Sample Introduction Kit	SC-SI-64

SmartTuner

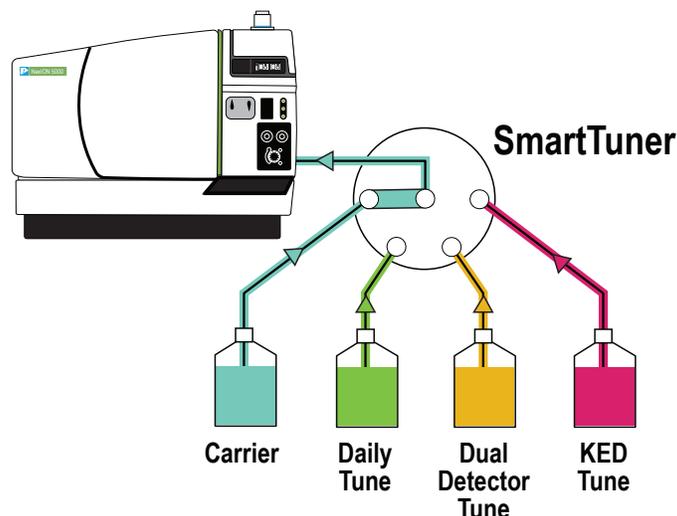
Automated Tuning, Rinsing, and Calibration for NexION 1000/2000/5000 ICPMS

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 selection of tuning and carrier solutions
- NexION Scheduler allows for true automated instrument startup and tuning
- LCD valve position indicator
- Requires DX/DXci autosampler for operation



Description	Part Number
SmartTuner M for NexION 1000/2000/5000. (DX autosampler required, not included). Includes chemically inert PTFE SmartTuner tray.	SMT-M4-64

Task	Details	Status
<input checked="" type="checkbox"/> AutoStart	7/5/2022 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		

SmartTuner Scheduler in Syngistix™ software.

ANALAB[®]

An Elemental Scientific Company

Better Sample Preparation = Better Results!

Analab products are designed for clean and reproducible sample preparation. From vessel cleaning to sub-boiling acid distillation, innovative and reliable products from Analab mean better results.



EasyTrace

Labware Cleaning & Conditioning

Automated decontamination and conditioning by vapor generation and condensation



FluoroBloc and FluoroPlate

Sample Digestion

Optimal uniform heating and PFA-coated specialty graphite work surface for maximum resistance to aggressive chemicals



CleanAcids

Reagent Purification

Generate ultra-pure reagents required for trace metal analysis from inexpensive reagent-grade starting materials

For more information visit: www.icpms.com/web/analab

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.

Enclosures for DXe, DX and DXCi Autosamplers

Autosampler Model	Enclosure Only	Enclosure with ULPA Filter
Enclosure for MicroDX	SC-1607-DX	SC-1607-DX-1000
Enclosure for 2DX	C3V2	C3V2-ULPA
Enclosure for 4DX	C3V4	C3V4-ULPA
Enclosure for 8DX	C3V8	C3V8-ULPA
Enclosure for 14DX	C3V14	C3V14-ULPA



C3V2-ULPA
Enclosure for 2DX autosampler with
ULPA Filter

Ultra-low Particulate Arrester Air Filter

The ULPAClean 10 filter creates a clean, positive pressure environment for samples and standards and prevents airborne contamination. The ULPAClean 10 removes 99.9995% of 0.1 µm particles or larger.

ULPAClean 10 can run off the autosampler power or can be plugged directly into an outlet (24VDC operation). Two air volume settings are available for quiet operation, 1.0 or 0.5 m³/min.



ULPA10
ULPAClean 10 Filter

Description	Part Number
ULPAClean 10 filter for autosampler enclosure	ULPA10

Mobile Autosampler Stations

Mobile Stations for DXe, DX and DXCi Autosamplers

Mobile Autosampler Stations

The mobile autosampler station provides a small-footprint platform for 2 and 4 DX-series autosamplers.

Benefits:

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



SC-1210-DX mobile station with 2DX autosampler



SC-1410-DX mobile station with 4DX autosampler

Description	Part Number
Mobile autosampler station for 2DX autosampler including electrical conduit for D-type valves (autosampler not included)	SC-1210-DX-P
Mobile autosampler station for 2DX autosampler (autosampler not included)	SC-1210-DX

Description	Part Number
Mobile autosampler station for 4DX autosampler including electrical conduit for D-type valves (autosampler not included)	SC-1410-DX-P
Mobile autosampler station for 4DX autosampler (autosampler not included)	SC-1410-DX



Fluorospray Sample Introduction Kits for the NexION 1000/2000/5000

Fluorospray Sample Introduction Kits are designed to be extremely stable and provide the highest performance for semiconductor grade ultrapure chemicals, geochemical samples, and every application in between. They provide high sensitivity and are chemically resistant.

Benefits

- Refined design for high aerosol transport efficiency
- Vertical outlet prevents condensation in the injector, improving short- and long-term stability
- HF-Resistant and precleaned components for maximum productivity



Fluorospray Sample Introduction Kit

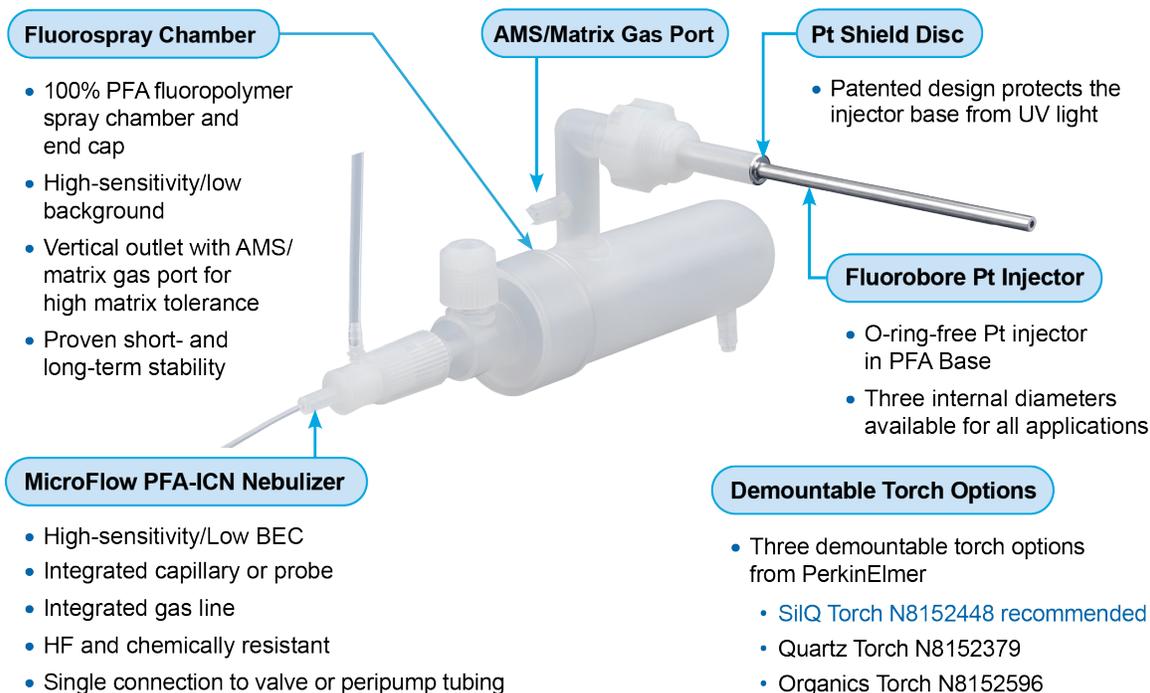
Fluorospray Kits Include:

- Fluorospray PFA spray chamber with AMS/Matrix gas port and PFA endcap with make-up gas port
- Fluorobore straight-bore injector with Pt shield disc
 - Platinum injector for ultra-trace chemical analysis
 - Sapphire injector for HF resistance
- O-ring-free injector
 - Platinum injector for ultrapure semiconductor-grade samples
 - Sapphire injector for geochemical and general HF resistance
- Labeled lines for nebulizer, make-up gas and AMS/Matrix gas
- MicroFlow PFA-ICN Integrated Capillary Nebulizer



Fluorospray Sample Introduction Kit assembled on NexION 5000 ICPMS

Fluorospray Platinum Ultrapure Sample Introduction Kit Features Diagram

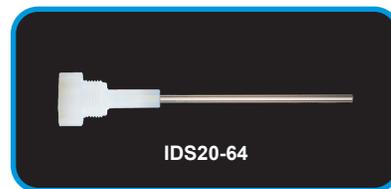
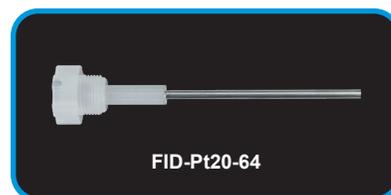


Fluorospray Sample Introduction Kits for NexION 1000/2000/5000 ICPMS			
Type	Description	Application	Part Number
Semiconductor	Fluorospray Platinum Ultrapure Volatile Sample Introduction Kit for NexION 1000/2000/5000. Includes 1.5 mm Fluorobore Pt injector & MicroFlow PFA-ICN nebulizer.	Ultrapure semi-volatile and aqueous chemicals	FS-2364-Pt15
Semiconductor	Fluorospray Platinum Ultrapure Non-Volatile Chemicals Sample Introduction Kit for NexION 1000/2000/5000. Includes 2 mm Fluorobore Pt injector & MicroFlow PFA-ICN nebulizer.	Ultrapure non-volatile chemicals	FS-2364-Pt20
Semiconductor	Fluorospray Platinum Ultrapure High Matrix Chemicals Sample Introduction Kit for NexION 1000/2000/5000 Includes 2.5 mm Fluorobore Pt injector & MicroFlow PFA-ICN nebulizer.	Ultrapure high-matrix chemicals	FS-2364-Pt25
Geochemical	Fluorospray Sapphire Volatile Chemicals Sample Introduction Kit for NexION 1000/2000/5000. Includes 1.5 mm sapphire injector & MicroFlow PFA-ICN nebulizer.	HF-containing, semi-volatile and aqueous chemicals	FS-2364-S15
Geochemical	Fluorospray Sapphire Non-Volatile Chemicals Sample Introduction Kit for NexION 1000/2000/5000. Includes 2 mm sapphire injector & MicroFlow PFA-ICN nebulizer.	HF-containing, non-volatile chemicals	FS-2364-S20
Geochemical	Fluorospray Sapphire High Matrix Chemicals Sample Introduction Kit for NexION 1000/2000/5000. Includes 2.5 mm sapphire injector & MicroFlow PFA-ICN nebulizer.	HF-containing, high-matrix chemicals	FS-2364-S25

Fluorospray Sample Introduction Components for NexION 1000/2000/5000

Fluorospray Sample Introduction components are designed to be extremely stable and provide the highest performance for semiconductor grade ultrapure chemical and geochemical sample analysis. They provide high sensitivity performance and are chemically resistant. All components are precleaned.

Type	Description	Part Number
Spray Chamber	Fluorospray PFA spray chamber with drain line, addition gas port and PFA endcap with make-up gas port	FS-2164
Pt Injector	Fluorobore 1.5 mm ID Pt straight-bore injector with Pt Shield Disc	FID-Pt15-64
Pt Injector	Fluorobore 2 mm ID Pt straight-bore injector with Pt Shield Disc	FID-Pt20-64
Pt Injector	Fluorobore 2.5 mm ID Pt straight-bore injector with Pt Shield Disc	FID-Pt25-64
Sapphire Injector	Fluorobore 1.5 mm ID Sapphire straight-bore injector with Pt Shield Disc	IDS15-64
Sapphire Injector	Fluorobore 2.0 mm ID Sapphire straight-bore injector with Pt Shield Disc	IDS20-64
Sapphire Injector	Fluorobore 2.5 mm ID Sapphire straight-bore injector with Pt Shield Disc	IDS25-64
Shield Disc	Pt Shield Disc for Fluorobore injectors (10 mm OD)	FSX-PTSD-10
Gas Line	Nebulizer gas line for NexION 1000/2000/5000, OneTouch gas connector	S033144-64
Gas Line	Addition Gas Line for NexION 1000/2000/5000 Fluorospray spray chamber, OneTouch connector	S033269
Gas Line	AMS Gas Line for NexION 1000/2000/5000 Fluorospray spray chamber, OneTouch connector	S250615
Drain Line	Drain Line for NexION 1000/2000/5000 Fluorospray spray chamber	S250734
Nebulizer	Microflow PFA-ICN nebulizer for NexION 1000/2000/5000	ICN30-64



Direct ICPMS Analysis of Solid Samples

Laser Ablation (LA) is a solid sample introduction technique for ICPMS/ICP and LIBS. Used to directly analyze solid samples, which are placed inside a sample cell and ablated by high power laser pulses. With a beam size ranging from a few microns to hundreds of microns in diameter, spatial imaging or bulk analysis can be performed. The aerosol generated is swept into the ICP/ICPMS via a simple transport line for analysis.

ESL offers a complete range of innovative laser ablation systems and accessories for diverse applications including:

imageBIO266: A purpose-built laser system dedicated to high-speed elemental imaging of biological samples, designed to minimize contamination from the substrate common when using glass microscope slides.

imageGEO193: A purpose-built laser system for high-speed and high-resolution elemental imaging of challenging geological matrices that require high energy.

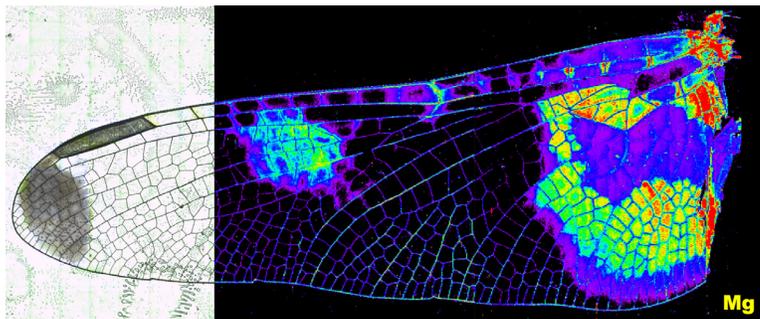
ESL193/ESL213: Reliable laser systems for routine applications in UV/near-UV

Laser SC/LaserTRAX: The only fully automated autosampling systems for laser ablation in high production environments in mining, metallurgy and materials.

TwoVol3: The *FASTEST* ablation chamber offering ultra-short sample transfer/washout required for imaging applications. It is also convertible for conventional quantitative analysis and upgradable to ES Lumen for LIBS data acquisition.

ES Lumen: A LIBS spectrometer that uses light emitted from the laser hitting the samples to capture additional spectral information – for elements not measured by ICPMS such as Fluorine.

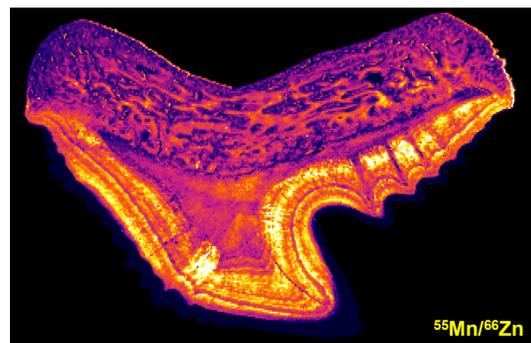
iolite 4: A comprehensive data processing software and reporting tool for quantitative measurements, imaging, and isotopic abundance calculations.



Dragonfly Wing; imageBIO266



INNOVATION to ILLUMINATE



Tiger Shark Tooth; imageGEO193^{LIBS}

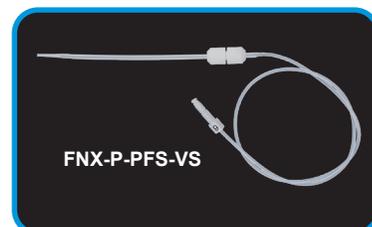
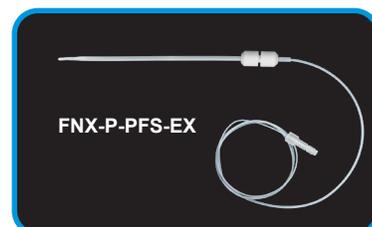
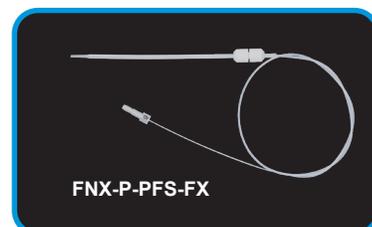
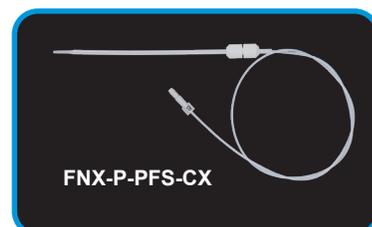
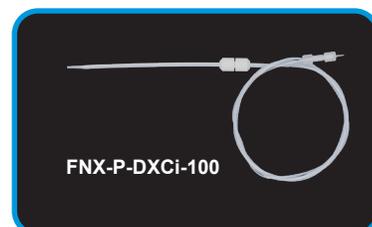
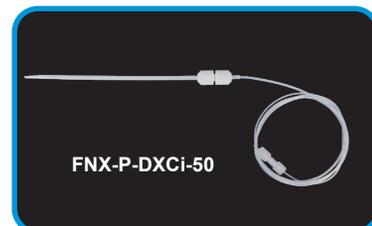


Autosampler Probes

Fluorall High Purity PFA Sampling Probes

Fluorall PFA probes are designed for use in ultra-trace determinations. They are constructed with 100% fluoropolymer materials to eliminate potential contamination. Various probe models are available for a variety of applications and automation systems, including Fluoronetic Autosamplers and prepFAST S.

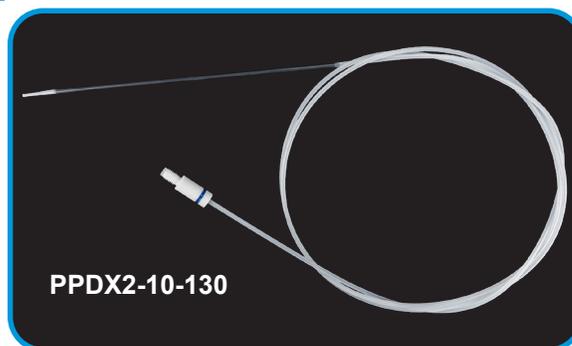
Description	Probe Application	Part Number
Fluorall Probe for Fluoronetic Autosamplers. Equipped with 150 cm capillary length with 0.5 mm ID. Supplied with fitting with peristaltic pump tubing barb.	Fluoronetic Autosampler, connection to peristaltic pump tubing	FNX-P-DXCI-50
Fluorall Probe for Fluoronetic Autosamplers with FAST valve. Equipped with 150 cm capillary length with 1 mm ID and fitting to connect into FAST valves. Also supplied with fitting with peristaltic pump tubing barb.	Fluoronetic Autosampler, Connection to FAST valves & peristaltic pump tubing	FNX-P-DXCI-100
Fluorall Probe for prepFAST S. Equipped with 70 cm capillary length with 1 mm ID and fitting to connect with valve in prepFAST S	prepFAST S CX cart	FNX-P-PFS-CX
Fluorall Probe for prepFAST S. Equipped with 70 cm capillary length with 1 mm ID and fitting to connect to prepFAST S valve	prepFAST S FX cart	FNX-P-PFS-FX
Fluorall Probe for prepFAST S. Equipped with 50 cm capillary length with 1 mm ID and fitting to connect to prepFAST S valve	prepFAST S EX cart	FNX-P-PFS-EX
Fluorall Probe for viscous samples on prepFAST S. Equipped with 60 cm capillary length with wide bore 1.6 mm ID for sampling of viscous samples. Fitting to connect to prepFAST S valve	prepFAST S EX cart Viscous samples	FNX-P-PFS-VS



Parabolic Probe for Autocorrecting Autosamplers

Parabolic Probes are heavy-walled, self-supporting autosampler probes with an anti-kinking sample transfer line. These probes are designed specifically for use with the autocorrecting autosamplers, and connect directly to any ESI *FAST* valve with a 1/4-28 threaded male fitting.

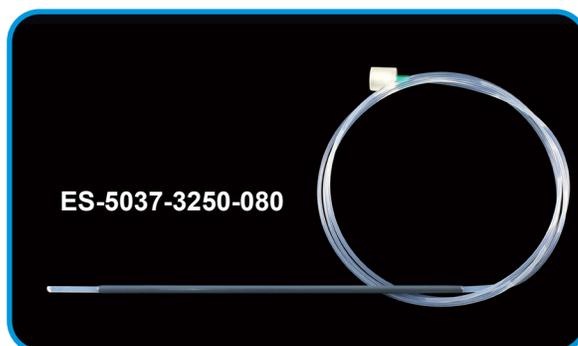
Description	Part Number
Sample Probe: carbon fiber support, 1.0 mm ID (gray marker) 130 cm fully encapsulated capillary with 1/4-28 fitting with tapered tip	PPDX2-10-130



Probes for DXe and DX Autosamplers

Proper autosampler probes are critical for cleanly sampling both standards and samples for transport for ICP or ICPMS. The probes are constructed with a rigid carbon fiber support material encapsulated between layers of fluoropolymer, which provides a chemically-resistant probe that is mechanically stable and resilient. These probes are available in various I.D. sizes to provide several self-aspiration rates.

- Probes for use on 2DX, 4DX, 8DX, and 14DX autosamplers come supplied with 150 cm capillary length
- 80 cm capillary probes utilized on small autosamplers (including MicroDX) to minimize dead volume
- Probes for DXe & DX autosamplers supplied with 1/4-28 threaded fitting to direct connection to PFA-ST nebulizers. Add CTFE peristaltic pump fitting (ES-2501-PPM2) for connection to peristaltic pump tubing
- Probes for DX autosamplers equipped with *FAST* and *prepFAST* come equipped with a fitting to connect directly to the ESI *FAST* valve



Probe I.D. (mm)	Capillary Length (cm)	Self-aspiration rate (@1 L/min Ar)	Autosampler Probes		
			DX Autosamplers Part Number	FAST & prepFAST Autosamplers Part Number	MicroDX Autosamplers Part Number
0.25	80	100 µL/min	ES-5037-3255-080	-	ES-5037-3250-080
0.50	80	400 µL/min	ES-5037-3505-080	-	ES-5037-3500-080
0.80	80	700 µL/min	ES-5037-3755-080	-	ES-5037-3750-080
1.00	80	1 mL/min	ES-5037-3995-080	-	-
0.25	150	100 µL/min	ES-5037-3255-150	SC-5037-3255-150	ES-5037-3250-150
0.50	150	400 µL/min	ES-5037-3505-150	SC-5037-3505-150	ES-5037-3500-150
0.80	150	700 µL/min	ES-5037-3755-150	SC-5037-3755-150	ES-5037-3750-150
1.00	150	1 mL/min	ES-5037-3995-150	SC-5037-3995-150	-

Also available with Ultem support

PFA High-performance MicroFlow OneTouch Nebulizers for NexION 1000/2000/5000 ICPMS

These high-performance PFA nebulizers feature a fluoropolymer fitting on the integrated sample capillary to minimize connections and provide ease-of-use. They are pre-fitted with a OneTouch gas fitting for secure connection to the instrument. Both the liquid line and the gas line are ultraclean, chemically inert and manufactured to the exact length for the NexION 1000/2000/5000 systems. These nebulizers are ready for quick installation and offer high performance with ease-of-use.

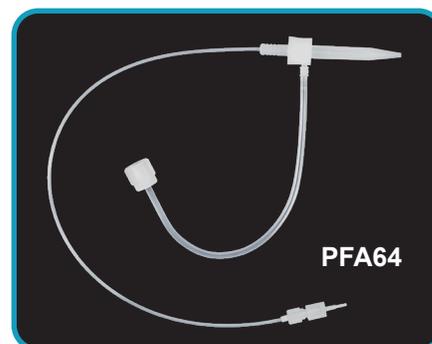
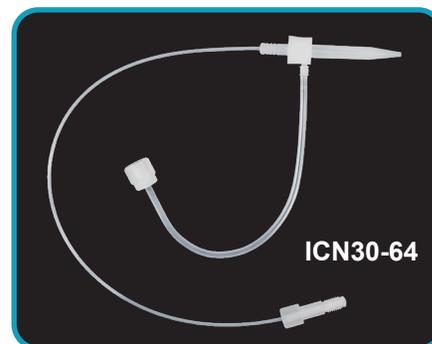
The PFA integrated capillary nebulizers produce a fine aerosol from aggressive acids, alkalis, organics, and high-salt solutions. They are resistant to clogging and produce high sensitivity at a low sample flowrate. They are the ideal nebulizer for *FAST* and *prepFAST* systems as well as for direct connection to peristaltic pump tubing.



Integrated capillary nebulizer and prepFAST with SampleSense on a NexION 2000 ICPMS

Benefits:

- Integrated capillary eliminates additional connection at nebulizer
 - Optimized internal diameter for use with all *FAST* and *prepFAST* valve-equipped systems with coded fitting for proper valve port connection
 - Customized length OneTouch liquid capillary to minimize dead volume and uptake delay
 - Sample particulates collect at the easy-to-clean fitting end of the capillary rather than at the nebulizer tip
 - Models for direct connection to *FAST/prepFAST/prepFAST* IC valves and for direct connection to peristaltic pump tubing
- Equipped with custom-length OneTouch gas line connector for easy installation on NexION ICPMS systems



Model	Part Number
PFA MicroFlow OneTouch nebulizer for <i>FAST</i> & <i>prepFAST</i> with NexION 1000/2000/5000 ICPMS, with OneTouch gas connector and 30 cm liquid capillary	ICN30-64
PFA MicroFlow OneTouch nebulizer for direct connection to peristaltic pump tubing with NexION 1000/2000/5000 ICPMS, with OneTouch gas connector and 30 cm liquid capillary	PFA64

PFA-ST MicroFlow OneTouch Nebulizers

PFA-ST High-Efficiency MicroFlow OneTouch Nebulizers for NexION 1000/2000/5000 ICPMS

PFA-ST nebulizers are resistant to clogging and are reliably self-aspirated or pumped to produce a fine aerosol for high-transport efficiency and high sensitivity. The nebulizers are constructed from high-purity, HF-resistant PFA. Supplied pre-fitted with customized length gas line and OneTouch gas connector for quick and easy installation on NexION 1000/2000/5000 ICPMS systems.

PFA-ST MicroFlow OneTouch nebulizers feature an exchangeable external sample uptake capillary. Sample uptake rate is controlled by the diameter of the external capillary or probe. See page 59 for the selection of sample capillaries.

Benefits:

- Chemically resistant – ideal for strong acids, alkalis and organics
- Can be self-aspirated or pumped from <0.02 to 3.0 mL/min
- Direct analysis of volatile and non-volatile solvents
- Longer lifetime than glass or quartz nebulizers
- Integrated OneTouch gas line with customized length for easy and leak-free installation on all NexION ICPMS systems
- PFA-ST MicroFlow OneTouch nebulizer for prepFAST equipped systems has reduced self-aspiration rate



PFA-ST MicroFlow OneTouch nebulizer with pre-fitted, customized length gas line for quick and secure connection to NexION ICPMS systems

SAMPLE INTRODUCTION

Description	Application	Part Number
PFA-ST MicroFlow OneTouch nebulizer, self-aspirating with external 1/4-28 threaded liquid connector and OneTouch gas line. Includes two sample capillaries (100 & 400 µL/min)	For general high sensitivity and high performance	ST3-64
PFA-ST MicroFlow OneTouch nebulizer for prepFAST equipped systems, with external 1/4-28 threaded liquid connector and OneTouch gas line. Includes two sample capillaries (100 & 400 µL/min)	prepFAST equipped systems	PF-2040-64
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 solid samples	ES-2030-64

PFA-ST MicroFlow Nebulizers for the NexION 1000/2000/5000 ICPMS

Apex PFA MicroFlow 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.

Description	Part Number
High temperature Apex PFA-ST MicroFlow nebulizer with external 1/4-28 threaded connector and gas line.	ES-2040-7000-64
High temperature Apex-100 PFA nebulizer with integrated 90-150 µL/min self-aspiration capillary and gas line.	ES-2002-7000-64

See pages 66-67 for more information on particular systems

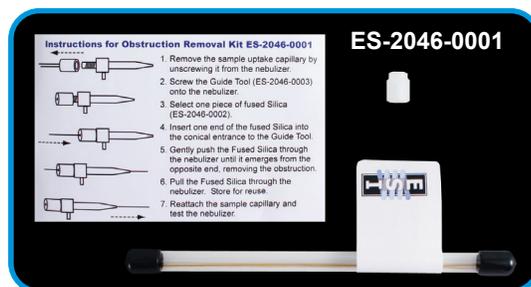


Syringe Flush and Obstruction Removal Kits for Nebulizers

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.

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
Syringe flush kit. Includes 3 mL syringe, two luer to 1/4-28 adapters.	SC-0599-0109
Fused silica obstruction removal kit for ST-type nebulizers. Includes one guide, 10 pieces of fused silica and instructions.	ES-2046-0001



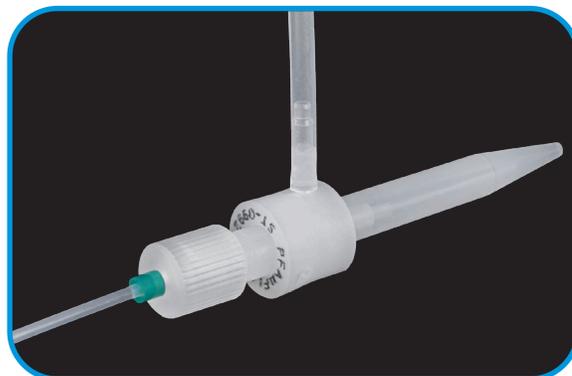
Capillaries for PFA-ST MicroFlow OneTouch Nebulizers

Sample Capillaries for PFA-ST Nebulizers

The sample uptake rate of PFA-ST nebulizers is controlled by the dimension of the external capillary or probe. These exchangeable uptake capillaries allow one nebulizer to be used at different self-aspiration rates, from 20 $\mu\text{L}/\text{min}$ to 700 $\mu\text{L}/\text{min}$.

Benefits:

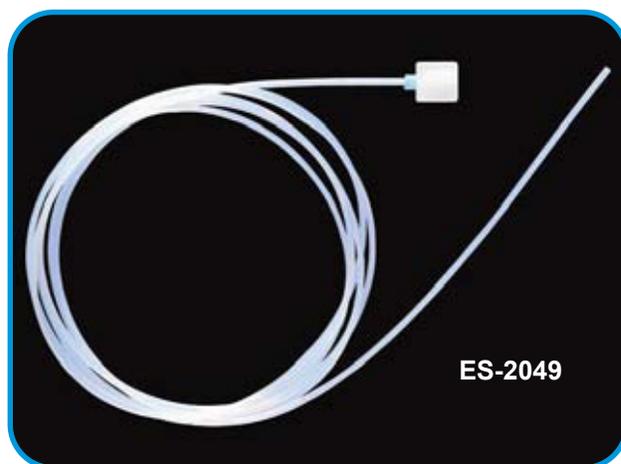
- All PFA construction provides chemical resistance
- Can be peristaltically pumped from 0.1 to 3.0 mL/min
- Supports direct analysis of both volatile and non-volatile solvents



Sample capillary attached to PFA-ST MicroFlow nebulizer



Use one of the sample uptake capillaries or autosampler probes for self-aspiration or directly attach peristaltic pump tubing to the PFA-ST nebulizer



Sample capillary for PFA-ST MicroFlow nebulizer

I.D.	Self-aspiration rate (@1 L/min Ar)	Part Number
0.15 mm	20 $\mu\text{L}/\text{min}$ ■ (red)	ES-2045
0.20 mm	50 $\mu\text{L}/\text{min}$ ■ (purple)	ES-2043
0.25 mm	100 $\mu\text{L}/\text{min}$ ■ (green)	ES-2042
0.30 mm	200 $\mu\text{L}/\text{min}$ ■ (yellow)	ES-2047
0.50 mm	400 $\mu\text{L}/\text{min}$ ■ (orange)	ES-2041
0.80 mm	700 $\mu\text{L}/\text{min}$ ■ (blue)	ES-2044
1.00 mm	1 mL/min ■ (gray)	ES-2049

PFA MicroFlow OneTouch Nebulizers with Integrated Sample Capillaries for NexION 1000/2000/5000 ICPMS

Self-Aspirating PFA MicroFlow OneTouch Nebulizers with Integrated Capillaries

Self-aspirating PFA MicroFlow OneTouch nebulizers are chemically resistant and an essential part of the ICPMS laboratory. PFA nebulizers 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 $\mu\text{L}/\text{min}$
- Chemically-resistant, ideal for strong acids, alkalis and organic solvents
- Produces a fine aerosol for high transport efficiency and high-sensitivity
- Integrated gas line with easy installation on NexION ICPMS systems with OneTouch gas connector



PFA MicroFlow OneTouch Nebulizers with Integrated Fluoropolymer Capillaries		
Model	Measured self-aspiration rate (@1 L/m Ar)	Part Number
PFA-20	20 $\mu\text{L}/\text{min}$	ES-2020-64
PFA-50	50 $\mu\text{L}/\text{min}$	ES-2000-64
PFA-100	100 $\mu\text{L}/\text{min}$	ES-2002-0002-64

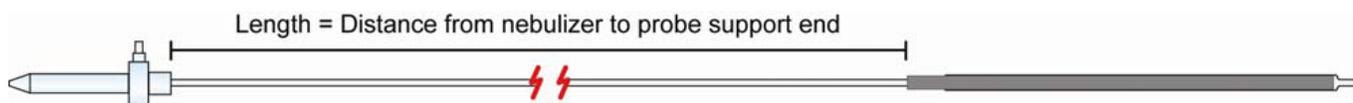
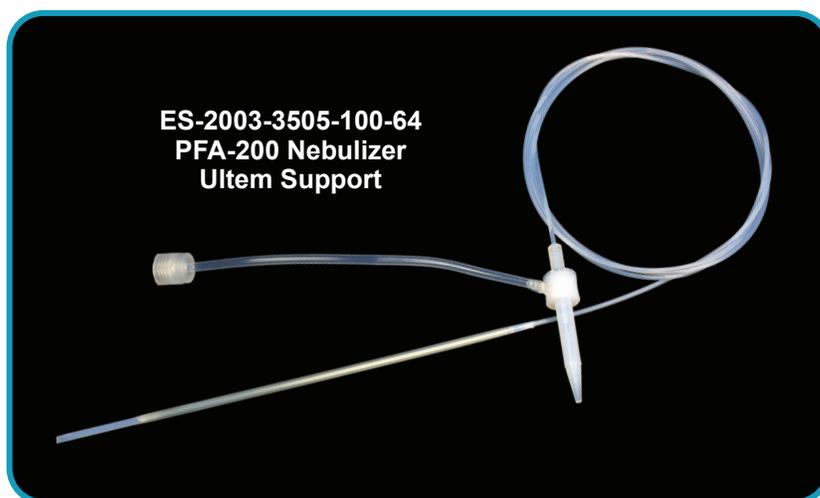
Other flow rates are available for special order

PFA MicroFlow OneTouch Nebulizers with Integrated Self-Aspirating Autosampler Probes For NexION 1000/2000/5000 ICPMS

Self-Aspirating PFA Nebulizers with Integrated Probes

These nebulizers self-aspirate at low flow rates with the same benefits of the PFA MicroFlow OneTouch nebulizer. The integrated sampling probe is constructed by encapsulating a semi-rigid Ultem support material between layers of fluoropolymer to provide a chemically-resistant probe that is mechanically stable and resilient. Equipped with gas line and OneTouch connector for easy installation on NexION ICPMS systems.

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



PFA MicroFlow OneTouch Nebulizers with Integrated Autosampler Probe

Model	Autosampler Type	Self-aspiration rate (@1 L/min Ar)	Support Material	Application	Length (cm)	Part Number
PFA-20	DX	20 μ L/min	Ultem	High Purity/Semiconductor	80	ES-2020-3505-080-64
					100	ES-2020-3505-100-64
PFA-50	DX	50 μ L/min	Ultem	High Purity/Semiconductor	80	ES-2000-3505-080-64
					100	ES-2000-3505-100-64
PFA-100	DX	100 μ L/min	Ultem	High Purity/Semiconductor	80	ES-2002-3505-080-64
					100	ES-2002-3505-100-64
PFA-200	DX	200 μ L/min	Ultem	High Purity/Semiconductor	80	ES-2003-3505-080-64
					100	ES-2003-3505-100-64

Smaller 80 cm long capillary length normally utilized with MicroDX autosampler

MEINHARD® OneTouch Nebulizers

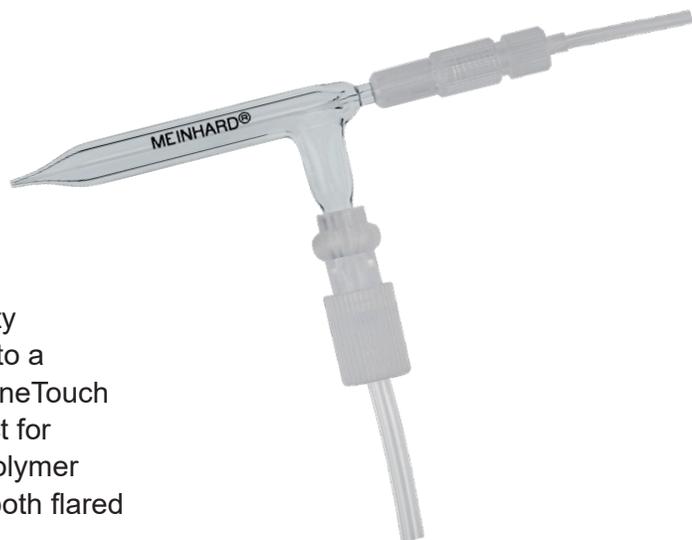
MEINHARD®

OneTouch Nebulizers

Ready to Install. Ready to Perform.

The MEINHARD® OneTouch Nebulizer combines high sensitivity performance with high total dissolved solids (TDS) capability into a single pre-configured ready-to-install nebulizer. MEINHARD® OneTouch includes an integrated fluoropolymer gas line and quick connect for the NexION 1000/2000/5000 ICPMS and an integrated fluoropolymer sample line with barbed fitting for direct no-leak connection to both flared and unflared peristaltic pump tubing.

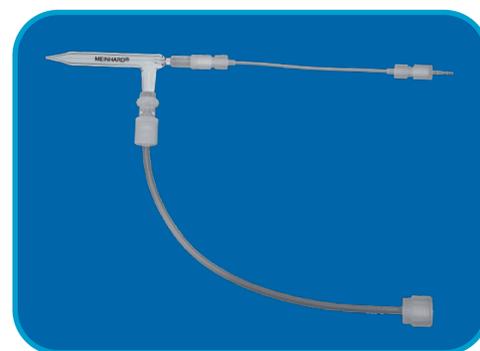
The C64 nebulizer is suitable for almost all non-HF applications and is available in Glass, Quartz and SiIQ Ultra-high Purity Quartz.



MEINHARD® OneTouch C64-SilQ ultra-high purity quartz nebulizer

MEINHARD® OneTouch Nebulizers Provide:

- Quick installation with pre-fitted gas and liquid lines
 - OneTouch nebulizer gas fitting for instrument connection
 - OneTouch liquid fitting for easy connection to peristaltic pump tubing
- Line lengths customized for NexION 1000/2000/5000 ICPMS systems
- Secure fluoropolymer fittings safeguard against gas and sample leaks
- Performance verified with ICPMS test data supplied for each nebulizer
- Peristaltic pumped rates of 0.1 to 3.0 mL/min
- C64 nebulizer for samples containing high solids



MEINHARD® OneTouch C64 quartz nebulizer for NexION ICPMS

MEINHARD® OneTouch Nebulizer Material Options		
Glass	Quartz	SiIQ Ultra-high Purity Quartz
<ul style="list-style-type: none"> • Economical borosilicate glass • High-performance nebulizer 	<ul style="list-style-type: none"> • Low blank levels compared to borosilicate glass nebulizers • High-performance nebulizer 	<ul style="list-style-type: none"> • Provides lowest contamination • On average 60x lower impurities than standard quartz nebulizers • Optimal for non-HF high purity chemical applications • High-performance nebulizer

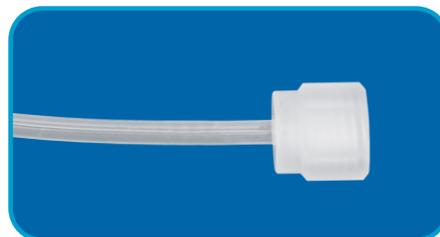
MEINHARD® OneTouch Nebulizers for NexION 1000/2000/5000 ICPMS				
Description	Glass	Quartz	SiIQ Ultra-high Purity Quartz	Similar OEM Part Number (Glass)
MEINHARD® OneTouch C64 high solids nebulizer	C64	C64-Q	C64-SilQ	N8152373 N8152372 N8152384

Designed for Quick and Secure Installation

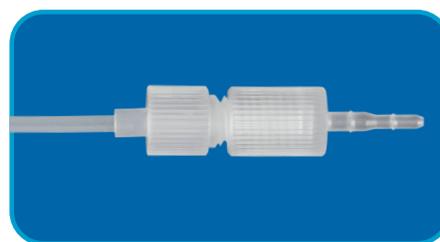
All MEINHARD® OneTouch nebulizers come equipped with customized gas and sample lines to provide quick and secure installation on NexION 1000/2000/5000 ICPMS systems.



MEINHARD® OneTouch nebulizer includes pre-fitted fluoropolymer liquid and gas lines. Shown installed on NexION 2000 with pergo 2000 AMS.



OneTouch nebulizer gas fitting for argon gas supply from instrument



OneTouch sample line with barbed fluoropolymer connector for both flared and unflared peristaltic pump tubing

Pearl Nebulizer Cleaner

The Pearl Nebulizer Cleaner provides an easy and safe procedure for removing blockages that have formed in glass and quartz concentric nebulizers. The device allows a cleaning solution to be pumped manually in reverse direction to remove deposits in both the gas and liquid passages of the nebulizer.



PRL-03

Description	Part Number
Pearl Nebulizer Cleaner, for use on all quartz and glass concentric nebulizers	PRL-03

pergo 2000 Argon Nebulizer Gas Humidifiers

The *pergo* 2000 improves performance of all concentric nebulizers. It maintains nebulizer efficiency – which decreases long before a clogged tip is detected – and improves sensitivity and stability by preventing unnoticed salt crystals from forming in the nebulizer tip.

A water vapor permeable membrane humidifies the ICPMS nebulizer gas stream. By increasing humidity in the argon nebulizer, the *pergo* 2000 prevents salt deposits in the nebulizer, improving short and long-term signal stability. The dual channels provided on the *pergo* 2000 AMS (All Matrix Solution) model also provides humidification to the AMS gas flow, greatly enhancing the AMS performance.

Benefits:

- Dissolves salt crystals in nebulizer tip
- Improves short and long-term stability
- Improves detection limits
- Speeds up washout
- Reduces long-term drift
- Extends the length of productive analytical runs

Features:

- Safe and easy to use with atmospheric pressure water reservoir
- Solid PFA reservoir with friction-fit cap for easy access
- Allows use of high-sensitivity nebulizers for high matrix samples
- Supports both MEINHARD® and PFA MicroFlow nebulizers
- *pergo* 2000 AMS model also enhance AMS performance with a second port that additionally humidifies the AMS argon gas steam



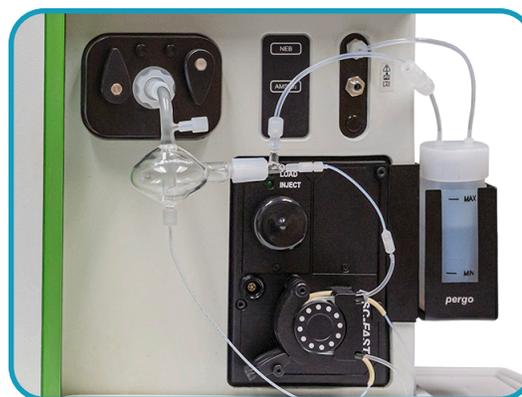
pergo 2000 argon humidifier



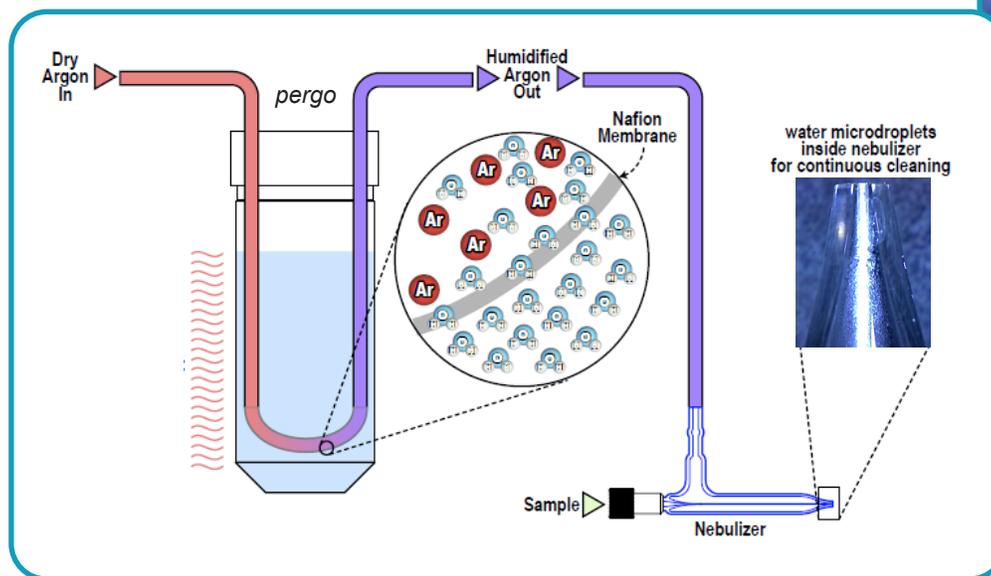
NexION 2000 with the integrated *pergo* 2000



Dual channels on *pergo* 2000 AMS provide humidity to both the nebulizer and AMS matrix gas



pergo 2000 systems mount onto existing NexION 1000/2000/5000 pumps as well as FAST and prepFAST DXi modules



Water microdroplets continuously clean the inside of the nebulizer and prevent salt deposits.

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.

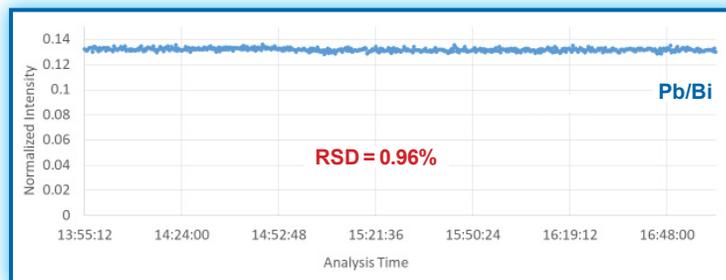
Productivity Enhancement by Maintaining Stability

- Analysis of 50x diluted blood on NexION 2000 ICPMS
- Plots compare analysis of same samples, with and without *pergo* 2000 AMS
- Use of *pergo* 2000 AMS significantly reduces signal drift and delivers excellent long-term stability

Analysis of 550 Blood Samples without AMS and without *pergo* 2000 AMS



Analysis of 550 Blood Samples with AMS and *pergo* 2000 AMS



Description	Part Number
<i>pergo</i> 2000 integrated humidifier for NexION 1000/2000/5000	<i>pergo</i> 2000
<i>pergo</i> 2000 AMS integrated humidifier for NexION 1000/2000/5000	<i>pergo</i> 2000 AMS

Apex Omega and Apex 2 High-sensitivity Sample Introduction Systems

The next generation of the highly successful Apex system features software control of temperatures for the heated spray chamber and Peltier-cooled condenser (and heated membrane for Apex Omega). The software also controls addition gas and sweep gas flows using precise mass flow controllers (MFC).

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.

Apex 2 and Apex Omega:

- 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
 - Micro peristaltic pump drain

Key Benefits:

Apex 2

- Enhanced sensitivity

Apex Omega

- Enhanced sensitivity
- Ultra-low oxides (0.01% CeO⁺/Ce⁺)
- Detection of smaller nanoparticles
- Heated membrane module with integrated software control
- Two stage desolvation (Peltier-cooled and EPTFE membrane) imparts matrix tolerance higher than any membrane desolvator on the market



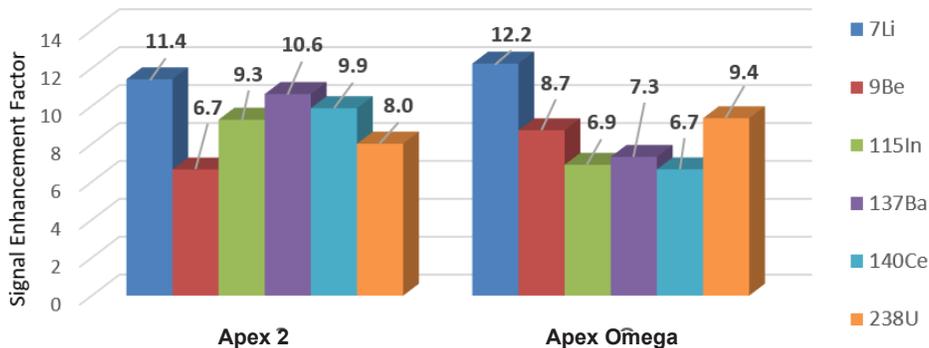
Apex 2 Q



Apex Omega

Model	Description	Part Number
Apex Omega	Apex Omega high-performance membrane desolvation system with quartz spray chamber, Peltier-cooled quartz condenser, and EPTFE membrane desolvator.	APX-O
Apex Omega HF	Apex Omega HF high-performance membrane desolvation system with PFA spray chamber, Peltier-cooled PFA condenser, and EPTFE membrane desolvator.	APX-O-HF
Apex 2 Q	Apex 2 Q desolvation system with quartz spray chamber and Peltier-cooled quartz condenser.	APX-2Q
Apex 2 HF	Apex 2 HF desolvation system with PFA spray chamber and Peltier-cooled PFA condenser.	APX-2HF

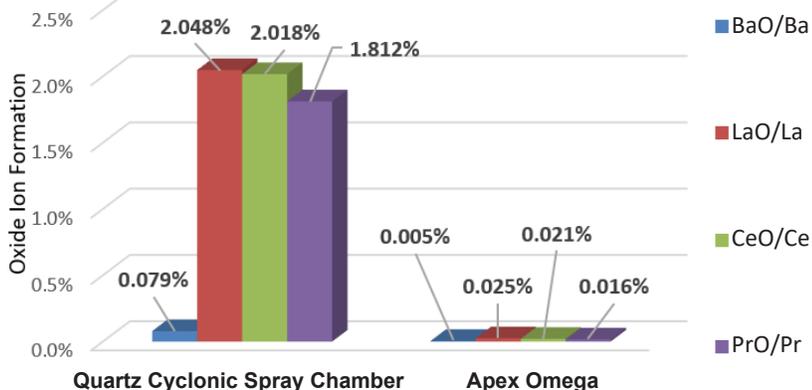
Apex Signal Enhancement from Standard Cyclonic Spray Chamber



Enhanced Sensitivity

- Signal enhancement obtained for Apex 2 and Apex Omega shown for Li, Be, In, Ba, Ce, and U
- Signal enhancements of 6 -10X commonly obtained with NexION 1000/2000/5000

Rare Earth Oxide Levels



Ultra-low Oxide and Hydroxide Interferences

- Apex Omega with its two stage desolvation significantly reduces REE and other oxide hydroxide ion interferences by 50-100%



Enhanced Nanoparticle Detection

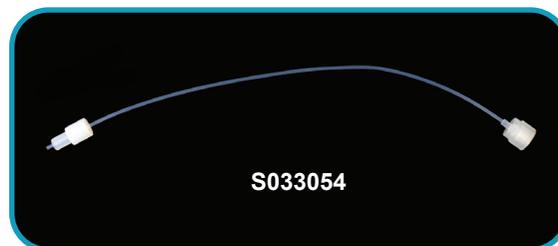
- Dry particles produced by Apex Omega provide higher transport efficiency and produce a narrower distribution of ions in ICP
- Results in narrower and higher signals
- Higher signals above dissolved background improves detectability for smaller nanoparticles
- Fe nanoparticle with most frequent size of 7 nm shown in semiconductor grade IPA

Spray Chambers and Accessories

Cyclonic Spray Chamber Lines for NexION 1000/2000/5000 ICPMS

Matrix Port Gas Line

Description	Part Number
AMS matrix gas line (gas dilution) (0.25 mm i.d.) for cyclonic spray chamber	S033054
Addition gas line (e.g. 20% O ₂ 80% Ar) (0.8 mm i.d.) for cyclonic spray chamber	S033064



Description	Part Number
Spray chamber drain line kit for NexION 1000/2000/5000. 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 1000/2000/5000 spray chamber drain ports.	ES-2044-64



High Performance HF-resistant PFA Spray Chambers

PFA Spray Chambers

This HF-resistant PFA Spray Chamber is designed for use with geological samples containing HF, semiconductor-grade samples and other high-purity applications requiring ultra-clean sample aerosol transport. Directly compatible with the NexION 1000/2000/5000 ICPMS systems.

Description	Application	Part Number
High Performance PFA spray chamber with o-ring-free PFA endcap	HF resistant, high sensitivity PFA spray chamber for semiconductor and other high purity applications.	ES-2164-5472
High Performance PFA spray chamber with o-ring-free PFA endcap		ES-2164-5473-L



PFA spray chamber for PCH Peltier Cooler/Heater
See page 70

Spray Chamber Accessories for NexION 1000/2000/5000 ICPMS

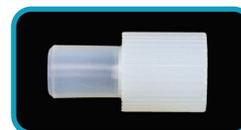
Light Shields

Description	Application	Part Number
Cyclonic spray chamber/cassette light shield	UV shield for cyclonic spray chamber	UVS-64
PC ^{3X} UV shield	UV shield for PC ^{3X} Peltier cooler/heater	PC3-UVS-64



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	S033045
Spray chamber nebulizer port plug	Plugs the nebulizer port to prevent contamination during storage	S032950
Spray chamber outlet plug	Plugs the spray chamber outlet to prevent contamination	S033048



PFA Secure Nut

Description	Application	Part Number
Long (6 mm) PFA spray chamber secure nut	Secures nebulizer to NexION 1000/2000/5000 spray chamber	ES-3199-0003-R



Spray Chamber Adapter

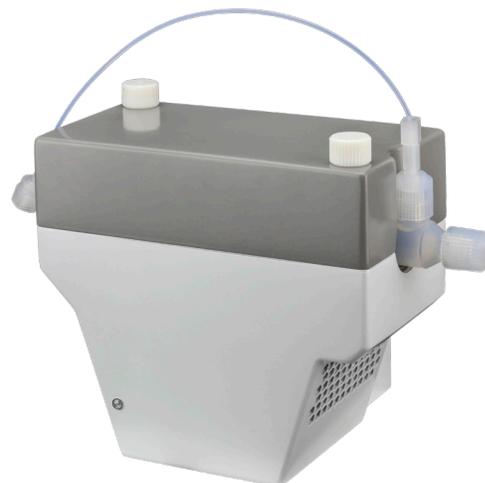
Description	Application	Part Number
NexION 1000/2000/5000 cyclonic spray chamber adapter	Adapts cyclonic spray chamber to NexION 1000/2000/5000 sapphire and platinum injectors	S011361



PCH Peltier Cooler/Heater for NexION 1000/2000/5000 ICPMS

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	✓	✓	✓	PCH-HP-64X-GL
PCH Peltier cooler/heater thermally stabilized inlet system with PFA spray chamber (Nebulizer not included)	✓	✓		PCH-HP-64
PCH Peltier cooler/heater thermally stabilized inlet system for PFA spray chamber (Spray chamber and nebulizer not included)	✓			PCH-HP-64X

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 1000/2000/5000. (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.	ES-2164-5473-L



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	S033269



Addition Gas Line for High Performance PFA Spray Chamber

Interface Cones

Interface Cones for NexION ICPMS Systems

MEINHARD® Cones

MEINHARD® cones for the NexION ICPMS systems are precisely manufactured and have been extensively tested for:

- Long-life
- High Sensitivity
- Low oxide and doubly charged ions
- Nickel and Platinum-tipped cone models



Description	Part Number	Similar to OEM P/N
Nickel Sampler Cone for NexION 1000/2000/5000	MC-33612	W1033612
Nickel Skimmer Cone for NexION 1000/2000	MC-26356	W1026356
Aluminum Hyper Skimmer for NexION 1000/2000	MC-33995	W1033995
Platinum Sampler Cone for NexION 1000/2000/5000	MC-33614	W1033614
Platinum Skimmer Cone for NexION 1000/2000	MC-26907	W1026907

Interface Cone Sets for NexION 1000/2000 ICPMS

MEINHARD® Cone Sets for NexION ICPMS 1000/2000

Description	Part Number
Three Cone Set for PE NexION series, includes: Ni Sampler Cone (MC-33612) Ni Skimmer Cone (MC-26356) Al Hyper Skimmer Cone (MC-33995)	CS-364-Ni
Two Cone Set for PE NexION series, includes: Ni Sampler Cone (MC-33612) Ni Skimmer Cone (MC-26356)	CS-264-Ni



ICPMS Cones Recycling Go Green Trade-In Program

Aluminum Recycling

\$10 credit for each aluminum sampler or skimmer cone returned

Nickel & Copper Recycling

\$10 credit for each nickel or nickel/copper skimmer cone returned

\$20 for each nickel or nickel/copper sampler cone returned

Platinum Recycling

We will accept damaged platinum cones or shields and return credit to you based on the current, average market value of the platinum alloy extracted from the returned cones.

- There is no limit to the number of cones being returned using this program, and the total amount accumulated may be used towards the purchase of any cone that ESI carries up to a maximum of 20% off list price.
- The ICPMS Cones Recycling Program credit cannot be combined with any other discounts or special offers.



FAST DXi™

Upgradable Integrated Precision Micro Peristaltic Pump for NexION 1000/2000/5000

The FAST DXi is a microperistaltic pump integrated to the NexION 1000/2000/5000. 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 DX autosampler
- Compatible with FAST, SampleSense & prepFAST valves
- Integrated to Syngistix™ software control

Precision

- Accurate pumping across a wide range of rates from low 0.20 µL/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



DXi-4-64-FR1
FAST DXi™ populated with a single valve actuator (Valve shown but not included)

FAST DXi's for NexION 1000/2000/5000		
Description	# of Valve Actuators*	Part Number
FAST DXi MP ² Peristaltic pump NexION 1000/2000/5000, 4 ch, with upgrade ports for FAST and prepFAST, including controller	0	MP2-4-64
FAST DXi MP ² Peristaltic pump NexION 1000/2000/5000, 4 ch, with FAST actuator	1	DXi-4-64-FR1
FAST DXi MP ² Peristaltic pump NexION 1000/2000/5000, 4 ch, with two actuators for prepFAST	2	DXi-4-64-FR2

*Valve not included with actuators

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 of 0.20 µL/min to 10 mL/min and is available in multiple channel models. Both computer controlled and manual controlled models of these pumps are available to meet your specific needs. Optimized for low-flow rates, the MP² uses either MP² pump tubing or standard 3-stop pump tubing.

MP ² Precision Micro Peristaltic Pumps		
MP ² Pump Capacity	Computer Controlled Part Number	Manual Controlled Part Number
1 channel	MP2-1-PC	MP2-1-S
2 channel	MP2-2-PC	MP2-2-S
3 channel	MP2-3-PC	MP2-3-S
4 channel	MP2-4-PC	MP2-4-S
6 channel	MP2-6-PC	MP2-6-S
8 channel	MP2-8-PC	MP2-8-S

Computer Controlled model comes equipped with control cable and control software



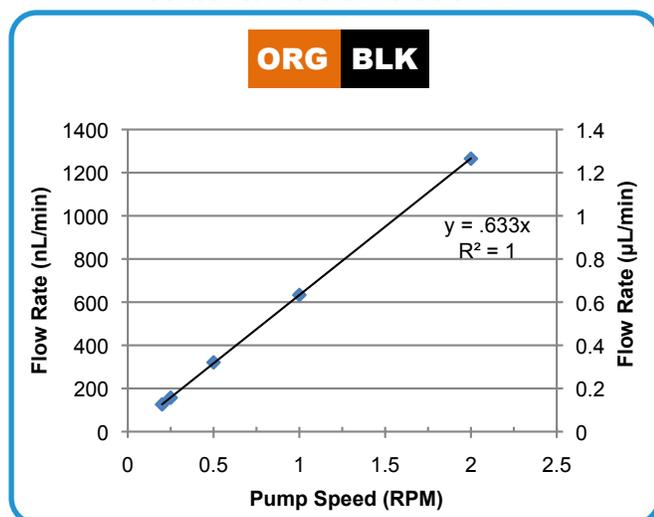
MP2-4-S
Manual controlled stand-alone, precision micro peristaltic pump

MP2-4-PC
Computer controlled stand-alone, precision micro peristaltic pump

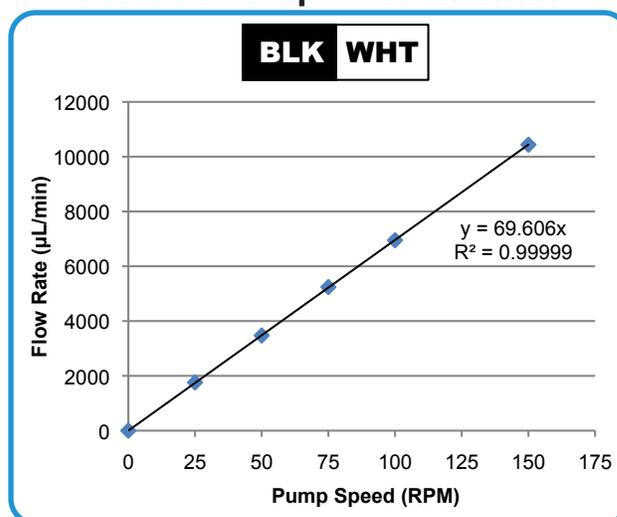
Perilink Fittings (Barbed) Adapts 10/32 to pump tubing

	Qty	Size	Part Number
	5	Female	S032955-V
	5	Male	S032956-V

Nanoliter Flow Rates



Flow rates up to 10 mL/min



MP² pumps can control flow from the nanoliters well into the mL range

MP² Peristaltic Pump Tubing

MP² Pump Tubing

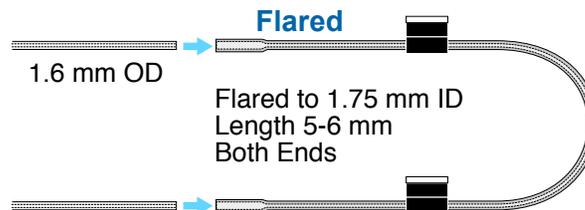


Tubing for MP² Micro Peristaltic Pumps (Packs of 12)

i.d.	Stop Colors		Calibration Slope ($\mu\text{L}/\text{min}$ per RPM)	Non-Flared			Flared*	
				PVC 2-stop	**Santoprene® 2-stop	Solva 2-stop	PVC 2-stop	Solva 2-stop
0.13 mm	Orange	Black	0.6	MPP-013-PVC			MPP-013-F-PVC	MPP-013-F-S
0.19 mm	Orange	Red	1.3	MPP-019-PVC			MPP-019-F-PVC	MPP-019-F-S
0.27 mm	Orange	Blue	2.7	MPP-027-PVC			MPP-027-F-PVC	MPP-027-F-S
0.38 mm	Orange	Green	4.7	MPP-038-PVC	MPP-038-PHR		MPP-038-F-PVC	MPP-038-F-S
0.44 mm	Green	Yellow	7.6	MPP-044-PVC			MPP-044-F-PVC	MPP-044-F-S
0.51 mm	Orange	Yellow	9.5	MPP-051-PVC			MPP-051-F-PVC	MPP-051-F-S
0.57 mm	White	Yellow	11	MPP-057-PVC			MPP-057-F-PVC	MPP-057-F-S
0.64 mm	Orange	White	14	MPP-064-PVC			MPP-064-F-PVC	MPP-064-F-S
0.76 mm	Black	Black	19	MPP-076-PVC	MPP-076-PHR	MPP-076-S	MPP-076-F-PVC	MPP-076-F-S
0.89 mm	Orange	Orange	24	MPP-089-PVC		MPP-089-S	MPP-089-F-PVC	MPP-089-F-S
0.95 mm	White	Black	28	MPP-095-PVC		MPP-095-S	MPP-095-F-PVC	MPP-095-F-S
1.02 mm	White	White	31	MPP-102-PVC		MPP-102-S	MPP-102-F-PVC	MPP-102-F-S
1.09 mm	White	Red	33	MPP-109-PVC		MPP-109-S	MPP-109-F-PVC	MPP-109-F-S
1.14 mm	Red	Red	35	MPP-114-PVC		MPP-114-S	MPP-114-F-PVC	
1.22 mm	Red	Grey	46	MPP-122-PVC		MPP-122-S		
1.30 mm	Grey	Grey	47	MPP-130-PVC	MPP-130-PHR	MPP-130-S		
1.42 mm	Yellow	Yellow	50	MPP-142-PVC		MPP-142-S		
1.52 mm	Yellow	Blue	51	MPP-152-PVC	MPP-152-PHR	MPP-152-S		
1.65 mm	Blue	Blue	55	MPP-165-PVC		MPP-165-S		
1.75 mm	Blue	Green	58	MPP-175-PVC		MPP-175-S		
1.85 mm	Green	Green	61	MPP-185-PVC		MPP-185-S		
2.06 mm	Purple	Purple	64	MPP-206-PVC		MPP-206-S		
2.29 mm	Purple	Black	65	MPP-220-PVC		MPP-220-S		
2.54 mm	Purple	Orange	67	MPP-254-PVC		MPP-254-S		
2.79 mm	Purple	White	69	MPP-279-PVC		MPP-279-S		
3.17 mm	Black	White	70	MPP-317-PVC	MPP-317-PHR	MPP-317-S		
Bridge Length				72 mm	72 mm	72 mm	72 mm	72 mm

*For easy insertion of PFA capillaries

i.d. = internal diameter



MP ² 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 (ES-2501-PPF1), 5 small male (ES-2501-PPM1), 5 medium female (ES-2501-PPF3), 5 medium male (ES-2501-PPFM3), 5 large female (ES-2501-PPF5) and 5 large male (ES-2501-PPM5).	MPP-K-1

**Santoprene® is a product of ExxonMobil

CUSTOM ELEMENT STANDARDS

Elemental Scientific offers single element standards, single element kits, common standard mixes, custom standards as well as organometallic standards. Single and custom element standards are offered from two premier standards manufacturers, providing the ease of purchasing primary and secondary standards with the confidence of two independently-certified sources. Standards are shipped with Certificate of Analysis and MSDS sheets.

Quality Assurance

Our standards have the following accreditations and certifications.

- NIST-traceable to SRM 3100 Series
- ISO 9001 Certified
- ISO 17025 Accredited
- ISO Guide 34 Accredited

All single element standards have a shelf life of 18 months. Standard volumes include 100 mL, 250 mL and 500 mL with special volumes available upon request.



Please visit our
website for more information
on available concentrations, matrixes
and bottles sizes

www.icpms.com



Elemental Scientific

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
- SS-Series** Optical sensing valves
- X-Series** Dual loop dilution valves



8 Port Valve – P7+	Part Number: PF-P7X
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	

6 Port Valve – SS6	Part Number: VSS-6
Description: 6 port SampleSense Valve Specifications: CTFE stator, PFA rotor, 1.00 mm Applications: SampleSense FAST	

12 Port Syringe Valve – V12	Part Number: PF-V12
Description: 12 port syringe loading valve Specifications: CTFE stator, PFA rotor, 1.0 mm Applications: S400V, brineFAST syringe valve	

4 Port Valve – M4	Part Number: PF-M4
Description: M4 CTFE high-flow 4 port stream selector valve Specifications: CTFE stator, PFA rotor Applications: SmartTuner	

11 Port Syringe Valve – S11	Part Number: SDX-S11
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 Stators and Rotors

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	PF-P3	PF-P3S	PF-P3R
4 - P4	1.0 mm	CTFE	PFA	PF-P4	PF-P4S	PF-P4R
6 - P6	1.0 mm	CTFE	PFA	PF-P6	PF-P6S	PF-P6R
6 - P6-8	1.0 mm	PPS	PFA	PF-P6-8	PF-P6S-8	PF-P6R
7 - P7	0.5/1.0 mm	CTFE	PFA	PF-P7	PF-P7S	PF-P6R
7 - P7-8	0.5/1.0 mm	PPS	PFA	PF-P7-8	PF-P7S-8	PF-P6R
8 - P7+	0.5/1.0 mm	CTFE	PFA	PF-P7X	PF-P7XS	PF-F6R
P7+IC	1.0 mm	CTFE	PFA	PF-P7XIC	PF-P7XS	PF-P6R
8 - P8	1.0 mm	CTFE	PFA	PF-P8	PF-P8S	PF-P8R
10 - P10	1.0 mm	CTFE	PFA	PF-P10	PF-P10S	PF-P10R
11-P11	1.0 mm	CTFE	PFA	PF-P11	PF-P11S	PF-P10R
11-A11b	0.5/1.0 mm	CTFE	PFA	PF-A11b	PF-A11bS	PF-A11bR
13 - P13	0.5/1.0 mm	CTFE	PFA	PF-P13	PF-P13S	PF-P13R
5 - A5e	0.5/1.0 mm	CTFE	PFA	PF-A5e	PF-A5eS	PF-F6R
7 - A7e	0.5/1.0 mm	CTFE	PFA	PF-A7e	PF-A7eS	PF-F6R
7 - A7 μ	1.0 mm	CTFE	PFA	PF-A7u	PF-A7uS	PF-A7uR
6 - PM6	0.5 mm	CTFE	PFA	PF-PM6	PF-PM6S	PF-PM6R
7 - PM7	0.5 mm	CTFE	PFA	PF-PM7	PF-PM7S	PF-PM6R
8 - PM7+	0.5 mm	CTFE	PFA	PF-PM7X	PF-PM7XS	PF-PM6R
4 - P4H	1.6 mm	CTFE	PFA	PF-P4H	PF-P4HS	PF-P4HR
5 - P5H	1.6 mm	CTFE	PFA	PF-P5H	PF-P5HS	PF-P4HR
6 - P6H	1.6 mm	CTFE	PFA	PF-P6H	PF-P6HS	PF-P6HR
7 - P7H	1.6 mm	CTFE	PFA	PF-P7H	PF-P7HS	PF-P6HR
7 - P7-8H	1.6 mm	PPS	PFA	PF-P7-8H	PF-P7-8HS	PF-P6HR
7 - P7HP	0.5 mm	CTFE	PEEK/PTFE	PF-P7HP	PF-P7HPS	PF-P6HPR
8 - P7HP	0.5 mm	CTFE	PEEK/PTFE	PF-P7XHP	PF-P7XHPS	PF-P6HPR

SS-SERIES SAMPLESENSE VALVES					
# of Ports	Description	Bore Size	Stator Material	Rotor Material	Part Number Complete Valve
6	SS6 SampleSense <i>FAST</i>	1.0 mm	CTFE	PFA	VSS-6
7	SS7 SampleSense <i>FAST</i> with I/S addition	0.5/1.0 mm	CTFE	PFA	VSS-7
8	SS7+ SampleSense prep <i>FAST</i> with I/S addition	0.5/1.0 mm	CTFE	PFA	VSS-8
13	SS13 SampleSense for prep <i>FAST</i> X	1.0 mm	CTFE	PFA	2SS13-X

High Purity Valves, Stators and Rotors

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	PF-V6	PF-V6S	PF-V6R
6 - V6H	1.6 mm	CTFE	PFA	PF-V6H	PF-V6HS	PF-V6HR
6 - V6HP	0.5 mm	CTFE	PEEK/PTFE	PF-V6HP	PF-V6HPS	PF-V6HPR
9 - V9	1.0 mm	CTFE	PFA	PF-V9	PF-V9S	PF-V9R
10 - V9(cp)	1.0 mm	CTFE	PFA	PF-V9 (cp)	PF-V9S (cp)	PF-V9R (cp)
12 - V12	1.0 mm	CTFE	PFA	PF-V12	PF-V12S	PF-V12R
12 - V12H	1.6 mm	CTFE	PFA	PF-V12H	PF-V12HS	PF-V12HR
13 - V13	1.0 mm	CTFE	PFA	PF-V13	PF-V13S	PF-V13R
18 - V18H	1.6 mm	CTFE	PFA	PF-V18H	PF-V18HS	PF-V18HR
V8C	1.0 mm	CTFE	PFA	PF-V8C	PF-V8CS	PF-V12R
V9H	1.6 mm	CTFE	PFA	PF-V9H	PF-V9HS	PF-V9HR

M-SERIES STREAM SELECTION VALVE

# of Ports	Bore Size	Stator Material	Rotor Material	Part Number Complete Valve	Part Number Stator	Part Number Rotor
3 - M3	1.0 mm	CTFE	PFA	PF-M3	PF-M3S	PF-M3R
3 - M3H	1.6 mm	CTFE	PFA	PF-M3H	PF-M3HS	PF-M3HR
4 - M4	1.0 mm	CTFE	PFA	PF-M4	PF-M4S	PF-M4R
6 - M6	1.0 mm	CTFE	PFA	PF-M6	PF-M6S	PF-M6R
8 - M8	1.0 mm	CTFE	PFA	PF-M8	PF-M8S	PF-M8R
8 - M8H	1.6 mm	CTFE	PFA	PF-M8H	PF-M8HS	PF-M8HR
8 - M8HP	0.5 mm	CTFE	PEEK/PTFE	PF-M8HP	PF-M8HPS	PF-M8HPR
10 - M10	1.0 mm	CTFE	PFA	PF-M10	PF-M10S	PF-M10R

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	0.5/1.0 mm	CTFE	PFA	PF-S4	PF-S4S	PF-S4R
9 - S9	1.0 mm	CTFE	PFA	PF-S9	PF-S9S	PF-S9R
11 - S11	1.0 mm	CTFE	PFA	SDX-S11	PF-S11S	PF-S11R

X-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
11 - X11	1.0 mm	CTFE	PFA	PF-X11	PF-X11S	PF-P10R
13 - X13	1.0 mm	CTFE	PFA	PF-X13	PF-X13S	PF-P13R

Metal Free Syringes

Metal Free 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	PF-S1003
0.3 mL o-ring-free fluoropolymer syringe for prepFAST syringe pump	PF-S3003
0.3 mL quartz syringe, thick walled, for prepFAST X	SPFX-1003



PF-S1003

3 mL Syringes	
Description	Part Number
3 mL quartz syringe	PF-S1030
3 mL quartz syringe, pre-cleaned for prepFAST S	PF-S1030C
3 mL CTFE syringe	PF-S3030
3 mL CTFE syringe, pre-cleaned for prepFAST S	PF-S3030C
3 mL quartz syringe, tall high pressure for prepFAST IC	PF-HS1030
3 mL quartz syringe, thick walled, for prepFAST X	SPFX-1030
3 mL quartz syringe, thick walled, pre-cleaned for prepFAST S	SPFX-1030-C



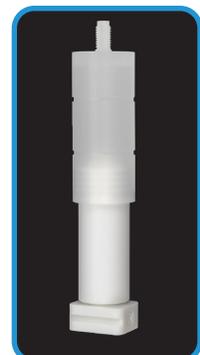
PF-S1030

6 mL Syringes	
Description	Part Number
6 mL quartz syringe for prepFAST e	PF-S1060
6 mL quartz syringe, pre-cleaned for prepFAST S	PF-S1060C
6 mL CTFE syringe	PF-S3060
6 mL CTFE syringe, pre-cleaned for prepFAST S	PF-S3060C
6 mL quartz syringe, tall high pressure for prepFAST IC	PF-HS1060
6 mL quartz syringe, thick walled, for prepFAST X	SPFX-1060



PF-S1060

12 mL Syringes	
Description	Part Number
12 mL quartz syringe	PF-S3120-R2
12 mL quartz syringe, tall high pressure for prepFAST IC	PF-HS1120
12 mL quartz syringe, thick walled, for prepFAST X	SPFX-1120



PF-S3120-R2

Manual Sampling Probes

Probes

These probes were designed for manual sampling when analyzing a small number of samples or when automation is not required. These probes, with their stiffened internal support, ensure the end of the probe stays in the sample – not curling out of the liquid as occurs frequently with simple tubing line. Probes are also useful for sampling from bottles – for the addition of internal standards, rinse solutions, and carrier solutions.

These all fluoropolymer sample flow path probes offer high chemical resistance and reduced contamination for applications involving strong acids, alkalis and organic solvents with their all fluoropolymer sample flow path. They are available with an encapsulated carbon fiber support appropriate for most applications, as well as an Ultem support for high purity semiconductor samples.

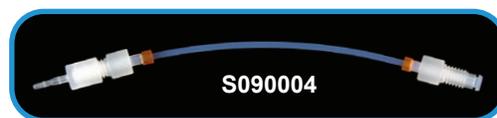


Description	Size	Part Number
Manual sample probe with carbon fiber support. Includes fluoropolymer micro fitting	0.50 mm i.d. ■ (orange), 150 cm length	ES-5036-IS-64
Manual sample probe with Ultem support. Includes fluoropolymer micro fitting	0.50 mm i.d. ■ (orange), 150 cm length	ES-5046-IS

Nebulizer Lines

Low Volume Nebulizer Sample Lines

Description	Part Number
Sample line 0.5 mm i.d. ■ (orange) for PFA-ST nebulizer	SL-50-64
Sample line 0.5 mm i.d. ■ (orange) for MEINHARD® Plus nebulizer	S090004



Nebulizer Gas Lines

Description	Part Number
PFA nebulizer gas line for PFA-ST nebulizer; includes 1/8" Swagelok	S033370

Description	Part Number
6" metal free nebulizer gas line for glass and quartz nebulizers on NexION 1000/2000/5000	S033055-R3



Internal Standard Addition Kits and Tees

Internal Standard Addition Kits

Internal Standards Kits

NexION 1000/2000/5000 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®	SC-0317-64
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	SC-0317-64-ST
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®	SC-0317-64-OS

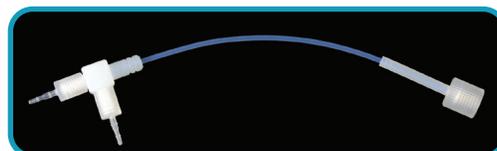
Internal Standard Addition Tees

Internal Standard Addition Tees

NexION 1000/2000/5000 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.	IST-25-64

Description	Part Number
Internal standard addition tee 0.5 mm i.d. ■ (orange) for MEINHARD® Plus nebulizer.	IS-MP-64



Fittings

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	Part Number
	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)	SC-0599-0116-K
	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)	SC-0599-0108-W
	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	SC-0599-F16
	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	SC-0599-F08
	PFA 10/32 Long Ferrule	5	Use with 1/16" tubing for 10/32 fittings	S032958-V
	Long 10-32 Male Barbed Fitting	1	Use for adapting 10/32 fittings to pump tubing	S250633
	Long 10-32 Male Fitting	1	Use for spare 10/32 valve fittings	S250715
	Female Perilink fitting, barbed	1	Adapts 10/32 to pump tubing	S033156
	Male Perilink fitting, barbed	1	Adapts 10/32 to pump tubing and for use with internal standard tee	S032956
	PFA-ST Nebulizer to Micro Fitting Adapter, PFA	1	Adapts 10/32 fitting to liquid sample inlet on PFA-ST nebulizers	S033161
	MEINHARD® Plus Nebulizer to micro fitting adapter	1	Adapts 10/32 fitting to liquid sample inlet on MEINHARD® nebulizers	S033101
	CTFE peristaltic pump fittings, female, barbed	1	For use in high pressure applications	ES-2501-PPF2
	CTFE peristaltic pump fittings, male, barbed	1	For use in high pressure applications	ES-2501-PPM2

PFA Tubing

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)	5MT-015
0.008" (0.20 mm)	1/16" (1.6 mm)	■ (purple)	5MT-02
0.010" (0.25 mm)	1/16" (1.6 mm)	■ (green)	5MT-025
0.014" (0.30 mm)	1/16" (1.6 mm)	■ (yellow)	5MT-03
0.019" (0.50 mm)	1/16" (1.6 mm)	■ (orange)	5MT-05
0.031" (0.80 mm)	1/16" (1.6 mm)	■ (blue)	5MT-08
0.039" (1.00 mm)	1/16" (1.6 mm)	■ (gray)	5MT-1
0.063" (1.60 mm)	1/8" (3.2 mm)		5MT-16



Sample Loops

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

1 mm ID <i>FAST</i> High-Flow Sample Loops, Calibrated Sample Loops		
Description	Size	Part Number
Calibrated Sample Loop, 1.0 mm ID, 2.0 mm OD, 1/4-28 CTFE fittings, labeled for ports 7 & 10. Recommended for use with 1.0 mm ID probe on prep <i>FAST</i> X (SS13) valve	1.0 mL	SC-0345-10-PF
	1.5 mL	SC-0345-15-PF
	2.0 mL	SC-0345-20-PF
	2.5 mL	SC-0345-25-PF
	3.0 mL loop	SC-0345-30-PF
	4.0 mL loop	SC-0345-35-PF
Calibrated Sample Loop, 1.0 mm ID, 2.0 mm OD, 1/4-28 CTFE fittings, labeled for ports 1 & 4. Recommended for use with 1.0 mm ID probe on prep <i>FAST</i> X (SS13) valve	500 µL	SC-0345-05-F
	1.0 mL	SC-0345-10-F
	1.5 mL	SC-0345-15-F
	2.0 mL	SC-0345-20-F
	2.5 mL	SC-0345-25-F
	3.0 mL	SC-0345-30-F



1 mm ID <i>FAST</i> High-Flow Sample Loops - Standard for <i>FAST</i> Systems		
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	SC-0318-03
	500 µL loop	SC-0318-05
	1.0 mL loop	SC-0318-10
	1.5 mL loop	SC-0318-15
	2.0 mL loop	SC-0318-20
Applications <i>FAST</i> , prep <i>FAST</i> , prep <i>FAST</i> M5, brine <i>FAST</i> , sea <i>FAST</i>	2.5 mL loop	SC-0318-25
	3.0 mL loop	SC-0318-30
	4.0 mL loop	SC-0318-40



0.8 mm ID <i>FAST</i> 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	SC-0319-01
	200 µL loop	SC-0319-02
	300 µL loop	SC-0319-03
	500 µL loop	SC-0319-05
	1.0 mL loop	SC-0319-10
	1.5 mL loop	SC-0319-15
Applications Legacy <i>FAST</i> systems, and special applications	2.0 mL loop	SC-0319-20
	2.5 mL loop	SC-0319-25
	3.0 mL loop	SC-0319-30
	4.0 mL loop	SC-0319-40



1.6 mm ID <i>FAST</i> 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	SC-0315-025
	500 µL loop	SC-0315-05
	1.0 mL loop	SC-0315-10
	2.0 mL loop	SC-0315-20
	3.0 mL loop	SC-0315-30
Applications soil <i>FAST</i> , oil <i>FAST</i> , and large volume <i>FAST</i>	4.0 mL loop	SC-0315-40
	6.0 mL loop	SC-0315-60
	8.0 mL loop	SC-0315-80



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
V-14-0311CG-X	MR-21-14 (pg 86), MR-40-14 (pg 86), SR4-60-14 (pg 86)
V-14-0312CG-X	
V-14-0314CG-X	



Part Number	Qty
V-14-0311CG-X	10

Description	Volume
14 mm o.d. graduated PFA micro vial	1 mL Brim full 2 mL



Part Number	Qty
V-14-0309-X	10

Description
PFA cap for 14 mm micro vials



Part Number	Qty
V-14-0312CG-X	10

Description	Volume
14 mm o.d. graduated PFA micro vial	2 mL Brim full 3 mL



Part Number	Qty
V-15-0300-X	10

Description
PFA snap-on cap for 14 mm graduated PFA micro vials



Part Number	Qty
V-14-0314CG-X	10

Description	Volume
14 mm o.d. graduated PFA micro vial	4 mL Brim full 4.5 mL



Part Number	Qty
V-15-0301-X	10

Description
PFA cap with knob for 14 mm graduated PFA micro vials.



Part Number	Qty
ES-7225-0001	1

Description
ETFE tweezers for removal of PFA cap with knob



PFA cap with knob allows for precise removal with the ETFE tweezers

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
V-31-15-X	SR2-21-30 (pg 85), MR-10-30 (pg 85)
V-31-30-X	SR2-27-31 (pg 85), MR-10-30 (pg 85), ST10-31 (pg 85)
V-31-60-X	LR-21-30 (pg 85), LMR-21-30-R (pg 85), SR2-27-31 (pg 85), HR-21-30 (pg 85), ST10-31 (pg 85)
V-28-0360-V	SR2-27-28 (pg 85), ST10-28 (pg 85)
V-50-0360	SR2-12-50 (pg 85), ST2-9-50 (pg 85), ST4-9-50 (pg 85), SR4x-20-50 (pg 85)

	Part Number	Qty
	V-28-0360-V	5
	Description	Volume
	28 mm o.d. PFA bottle and cap	20 mL

	Part Number	Qty
	V-50-0360	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
	V-31-15-X	10
	Description	Volume
	30 mm o.d. graduated PFA vial	15 mL

	Part Number	Qty
	V-31-30-X	10
	Description	Volume
	30 mm o.d. graduated PFA vial	30 mL

	Part Number	Qty
	V-31-60-X	10
	Description	Volume
	30 mm o.d. graduated PFA vial	60 mL

	Part Number	Qty
	PFA-K29-X	10
	Description	Volume
	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



V-14-0712-X
2 mL PVDF
autosampler vial



V-14-0712-X
2 mL PVDF autosampler
vial with PFA cap

PVDF Vials and PFA Caps

Description	Qty	Part Number
PVDF vial, 2 mL	10	V-14-0712-X
PVDF vial, 2 mL	100	V-14-0712-C
PVDF vial, 2 mL	1000	V-14-0712-M
PFA cap for V-14 vial	10	V-14-0309-X
PFA cap for V-14 vial	100	V-14-0309-C

Pre-cleaned PVDF Vials and Caps

Description	Qty	Part Number
Pre-cleaned PVDF vial, 2 mL	100	V-14-0712-C
Pre-cleaned PFA cap for V-14 vial	100	VPC-14-0309-C

Bottles/Vials Fits Racks

Bottles/Vials	Fits Racks
V-14-0712-X	MR-21-14 (pg 86), MR-40-14 (pg 86), SR4-60-14 (pg 86)

Sample Vessels

Non-PFA Sample Vessels

Non-PFA Vials, Tubes and Bottles

Non-PFA sample vessels manufactured from polymers 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
V-8-0505	MR-60-08 (pg 87), MR-90-08 (pg 87)
V-13-0200-R	LR-90-13-R (pg 87), LMR-90-13-R (pg 87), LMR-90-13-R-3T (pg 87), ST-PR-5 (pg 87)
V-20-0290	LR-40-20 (pg 87)
V-16-0225	HR-60-16 (pg 87), LR-60-16 (pg 87), LMR-60-16-R (pg 87), SR2-80-16 (pg 87), ST-PR-5 (pg 87)
V-28-0260	HR-21-30 (pg 85), ST10-28 (pg 85), LR-21-30 (pg 85), LMR-21-30-R (pg 85), SR2-27-28 (pg 85), ST-PR-5 (pg 87), ST-EX-5B (pg 87)
V-50-0460	SR4x-20-50 (pg 85), SR2-12-50 (pg 85), ST-PR-5 (pg 87), ST2-9-50 (pg 85), ST4-9-50 (pg 85)
V-61-0661	SR4x-15-60 (pg 87), ST7-60 (pg 87), ST-PR-5 (pg 87), ST-EX-5B (pg 87)



Part Number	Qty
V-8-0505-C	100
V-8-0505-D	500
Description	Volume
8 mm o.d. centrifuge tube	0.5 mL



Part Number	Qty
V-13-0200-R-XC	90
V-13-0200R-D	500
Description	Volume
13 mm o.d. polypropylene tube with rounded bottom	8 mL



Part Number	Qty
V-16-0225-LX	60
V-16-0225-D	500
Description	Volume
16 mm o.d. polypropylene tube with screw cap	15 mL



Part Number	Qty
V-20-0290-L	50
V-20-0290-D	500
Description	Volume
20 mm o.d. polypropylene tube with screw cap	20 mL



Part Number	Qty
V-28-0260-L	50
V-28-0260-D	500
Description	Volume
28 mm o.d. polypropylene tube with screw cap	50 mL



Part Number	Qty
V-50-0460-XII	12
V-50-0460-XXIV	24
Description	Volume
50 mm o.d. HDPE wide mouth bottle with cap	125 mL



Part Number	Qty
V-61-0661-XII	12
V-61-0661-C	100
Description	Volume
61 mm o.d. polyethylene wide mouth bottle	250 mL

Microplates for DX Series Autosamplers

Microplates

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

All microplates can be used on the following DXe, DX and DXCi autosampler models: 2 and 4



MT-24-10mL-02

Description	Part Number
1 Pk (5 ea) 24 well, 10 mL microplate, square well, pyramid bottom	MT-24-10mL-02



MT-48-5mL-02

Description	Part Number
1 Pk (5 ea) 48 well, 5 mL microplate, square well, pyramid bottom	MT-48-5mL-02



MT-48-7.5mL-02

Description	Part Number
1 Pk (3 ea) 48 well, 7.5 mL microplate, square well, pyramid bottom	MT-48-7.5mL-02



MT-96-2mL-02

Description	Part Number
1 Pk (5 ea) 96 well, 2 mL microplate, square well, pyramid bottom	MT-96-2mL-02
1 Pk (5 ea) 96-well, 500 μ L microplate, polystyrene	MT-96-500-05-V

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.

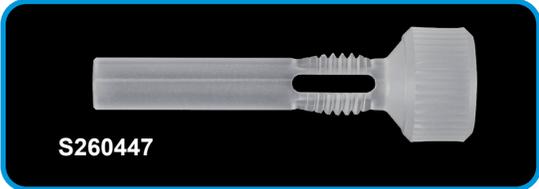


Description	Qty	Part Number
X-Piercing film cover for 96 well microplate	50	MT-96-XP-50

Compression Probe Insert

The Compression Probe Insert must be used with the AutoAlign Arm in place of the reset probe holder when an X-Piercing cover has been applied to a 96 well microplate.

Description	Qty	Part Number
Compression Probe Insert for 2DX/4DX Autosampler	1	S260447



Large Autosampler Racks

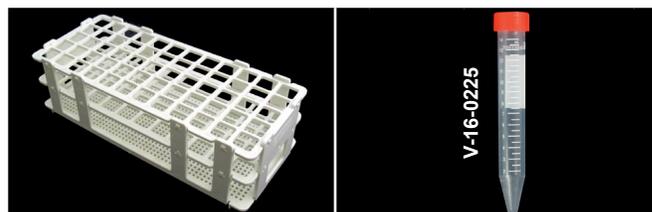
Autosampler Racks (LR Size)

Plastic large racks are recommended for aqueous samples.

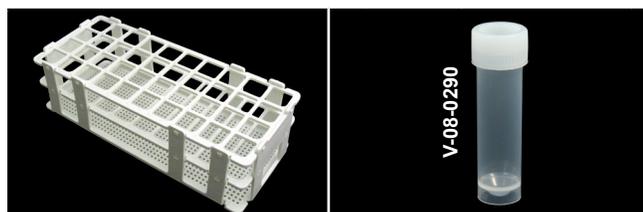
All LR racks can be used on the following DXe, DX and DXCi autosampler models: 2, 4, 8 and 14



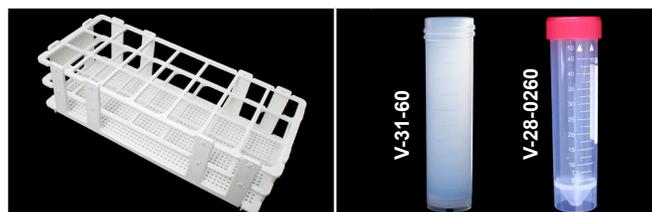
Description	Diam.	Part Number
90 position large polypropylene sample rack for 8 mL tubes	13 mm	LR-90-13-R



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



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



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

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 DXe, DX and DXCi autosampler models: 2, 4, 8 and 14



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



Description	Diam.	Part Number
90 position 3 tier metal large sample rack for 8 mL tubes	13 mm	LMR-90-13-R-3T



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



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

Heated and Micro Autosampler Racks

Autosampler Heated Racks (LR Size)

All heated racks can be used on the following DXe, DX and DXCi autosampler models: 2 and 4



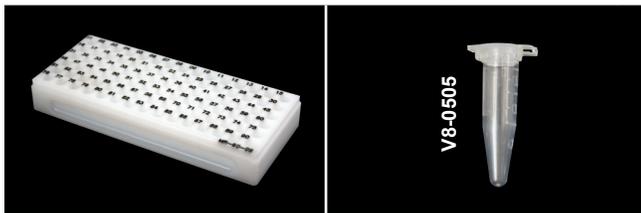
Description	Diam.	Part Number
60 position heated large sample rack for 15 mL tubes	16 mm	HR-60-16



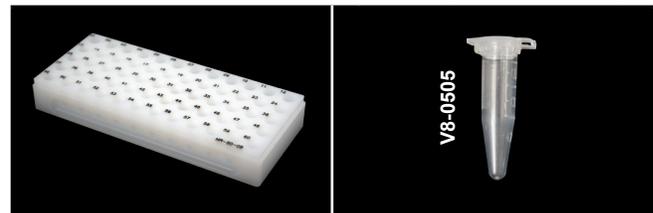
Description	Diam.	Part Number
21 position heated large sample rack for 50 mL and 60 mL tubes	30 mm	HR-21-30

Autosampler Racks (MR Size)

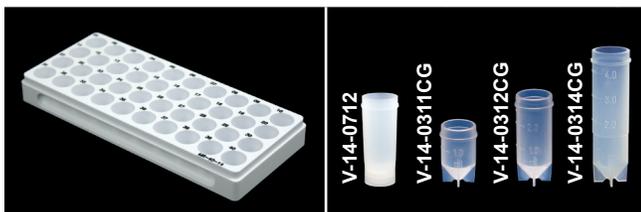
All MR racks can be used on the following DXe, DX and DXCi autosampler models: Micro, 2 and 4



Description	Diam.	Part Number
90 position CPVC micro sample rack for 0.5 mL tubes	8 mm	MR-90-08



Description	Diam.	Part Number
60 position CPVC micro sample rack for 0.5 mL tubes	8 mm	MR-60-08



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



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



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



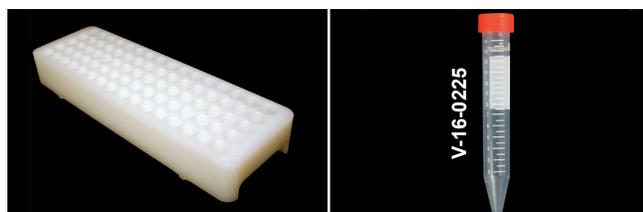
Description	Part Number
PVCC Cover for micro racks	MR-00-01

Super Autosampler Racks

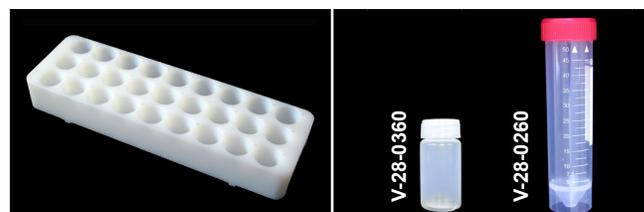
Large-volume samples can be analyzed using NexION super racks without transferring the sample to a smaller tube, reducing prep time and chance of contamination.

Autosampler Racks (SR2 Size)

All SR2 racks can be used on the following DXe, DX and DXCi autosampler model: 2



Description	Diam.	Part Number
80 position HMPE super sample rack for 15 mL tubes	16 mm	SR2-80-16



Description	Diam.	Part Number
27 position HMPE super sample rack for 20 mL and 50 mL tubes	28 mm	SR2-27-28



Description	Diam.	Part Number
27 position HMPE super sample rack for 15 mL, 30 mL and 60 mL tubes	31 mm	SR2-27-31



Description	Diam.	Part Number
21 position HMPE super sample rack for 15 mL tubes	31 mm	SR2-21-30



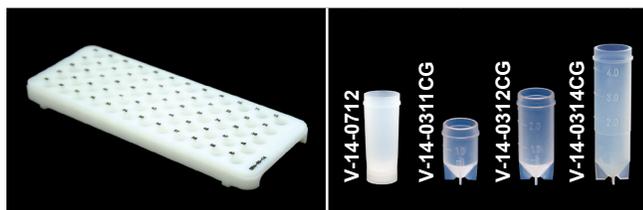
Description	Diam.	Part Number
21 position super sample rack for 125 mL bottles	35 mm	SR2-21-35



Description	Diam.	Part Number
12 position HMPE super sample rack for 125 mL bottles	50 mm	SR2-12-50

Autosampler Racks (SR4 Size, Type 1)

All SR4 type 1 racks can be used on the following DXe, DX and DXCi autosampler models: 2 and 4



Description	Diam.	Part Number
60 position HMPE super sample rack for 1 mL, 2 mL and 4 mL tubes	14 mm	SR4-60-14



Description	Part Number
PP Cover for 60 position SR-4 super rack	SR4-00-01

Autosampler Racks (SR4 Size, Type 2)

All SR4 type 2 racks can be used on the following DXe, DX and DXCi autosampler model: 4



Description	Diam.	Part Number
15 position HMPE super sample rack for 250 mL bottles	61 mm	SR4x-15-60



Description	Diam.	Part Number
20 position HMPE super sample rack for 125 mL bottles	50 mm	SR4x-20-50

The SR4x-15-60 super rack will hold fifteen 100 mL volumetric flasks or 250 mL bottles

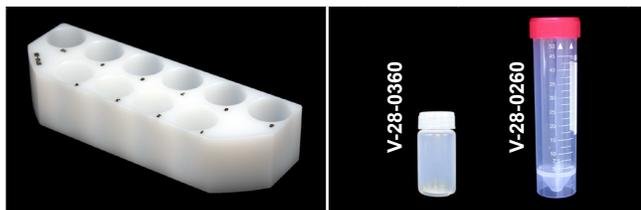


SR4x-15-60 super rack with 100 mL volumetric flasks

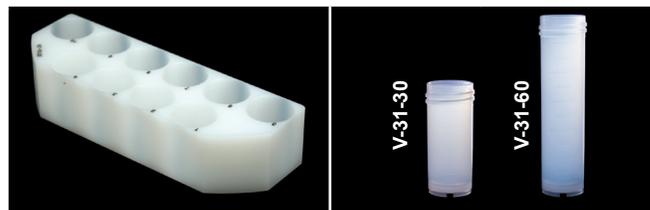
Standards Autosampler Racks

Autosampler Racks (ST Size, Type 1)

All ST type 1 racks can be used on the following DXe, DX and DXCi autosampler models: 2, 4, 8 and 14



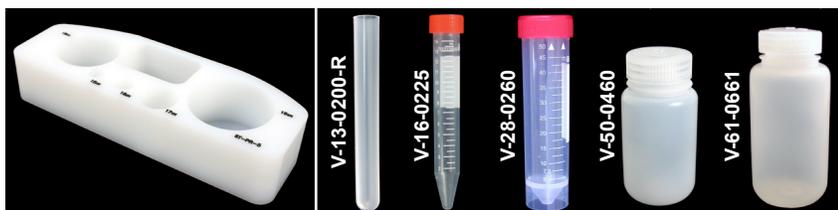
Description	Diam.	Part Number
10 position PVDF standards rack for 20 mL and 50 mL tubes	28 mm	ST10-28



Description	Diam.	Part Number
10 position PP high purity standards rack for 30 mL and 60 mL tubes	30 mm	ST10-31

Static Rinse/Organic Rinse Racks

All static and organic rinse racks can be used on the following DXe, DX and DXCi autosampler models: 2, 4, 8 and 14.



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.	13 mm	ST-PR-5
	16 mm	
	28 mm	
	50 mm	
	60 mm	



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



Extra position can be used for static rinse, organic rinse, or additional sample or tuning locations

Autosampler Racks (ST Size, Type 2)

All ST type 2 racks can be used on the following DXe, DX and DXCi autosampler model: 2



Description	Diam.	Part Number
9 position HMPE standards rack for 125 mL bottles. Recommended for prepFAST with DX. Includes 9, 125 mL HDPE bottles w/cap.	50 mm	ST2-9-50

Autosampler Racks (ST Size, Type 3)

All ST type 3 racks can be used on the following DXe, DX and DXCi autosampler models: 4 and 14



Description	Diam.	Part Number
7 position HMPE standards rack for 250 mL bottles	60 mm	ST7-60



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	ST4-9-50

FAST Spares Kits for NexION 1000/2000/5000 ICPMS

These kits contain all the consumable components to help maintain your ESI FAST valves at their peak operating performance. All of the required fittings and tubing are included in each of the individual kits, organized in a convenient case with individual component information for secure storage and easy reordering. Components included in various kits are:

- Fittings and ferrules
- Tubing flush kit
- Lines and peristaltic pump tubing
- Spare valves and rotors
- Kits with PFA nebulizers include nebulizer obstruction kit



FAST Spares Kits for NexION ICPMS Systems

Description	Major Components	Part Number
FAST Spares Kit	Assorted fittings, ferrules, lines & tubing P6 rotor	SC-0380-R1
FAST Deluxe Spares Kit	Assorted fittings, ferrules, lines & tubing P7 FAST valve with rotor PFA-ST nebulizer	SC-0370-64-D
prepFAST Spares Kit	Assorted fittings, ferrules, lines & tubing P7+ valve with rotor & F6 rotor prepFAST PFA-ST nebulizer	PF-0370-64
SampleSense FAST Spares Kit	Assorted fittings, ferrules, lines & tubing P6 rotor PFA-ICN50 nebulizer	F-0370-SS7-64
SampleSense prepFAST Spares Kit	Assorted fittings, ferrules, lines & tubing P6 valve with rotor & F6 rotor PFA-ICN50 nebulizer	PF-0370-SS8-64
prepFAST IC Spares Kit	Assorted fittings, ferrules, lines & tubing V6 & P7 high pressure valves with rotors 6 mL tall quartz syringe & PFA-ST nebulizer	PFIC-0370-HP-64
seaFAST / brineFAST Spares Kit	Assorted fittings, ferrules, lines & fittings Spare P6, P11, P11b rotors 3 mL quartz syringe & PFA-ST nebulizer	SF-0370-64

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 *FAST*.

- Includes:** Hardware installation
 Software methods
 Basic system familiarization
 Travel time & expenses for ESI employee or contractor
FAST standard spares kit (SC-0370-64)

Description	Part Number
On-site, 1-day installation and application development for <i>SC-FAST</i> high throughput system	FI-SC-01
On-site 1-day installation and implementation for <i>FAST</i> SampleSense	FI-F-SS7
On-site 1-day installation and implementation for <i>FAST</i> SampleSense UHT	FI-F-SS6



Gold Level ESI Installation & Training

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

- 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 96)

Description	Part Number
On-site, 2½-day installation and application development for <i>FAST</i> systems	FI-SC-02-54
On-site, 2½-day installation and application development for prep <i>FAST</i> systems	FI-PF-02
On-site 2½-day installation and application development for prep <i>FAST</i> SampleSense	FI-PF-SS8
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The *FAST* Deluxe, prep*FAST*, or sea*FAST*/brine*FAST* Spares Kit is included with the Gold Installation & Training.

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