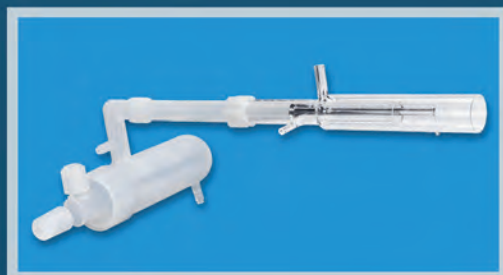
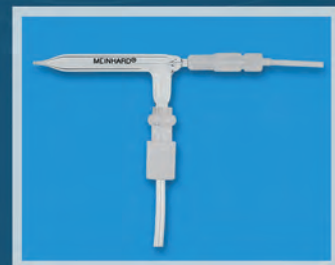


# Advanced Automation and Sample Introduction Systems

for Agilent 7800, 7900 and 8900 ICPMS



2021 Catalog



**Elemental  
Scientific**

## FEATURED PRODUCTS

### DXCi Autocorrecting Autosamplers

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)



### Fluorospray Sample Introduction Kits

Providing the highest performance and extreme stability for semiconductor ultrapure chemical and geochemical sample analysis. They provide high sensitivity, are HF-resistant, and supplied precleaned for the lowest backgrounds. (Pages 48-50)

### prepFAST Autodilution & Autocalibration

Every lab needs to improve productivity and further automate metal analysis. The prepFAST inline autodilution system automatically calibrates the ICPMS, autodilutes samples and autodilutes overrange samples to bring them into range. prepFAST autodilution and autocalibration systems elevate performance of all Agilent ICPMS models. (Pages 16-25)



### Fluoronetic Autosampler Drive

100% fluoropolymer magnetically coupled linear drive provides the highest level of chemical resistance. Recommended for semiconductor, geochemical and other applications where aggressive acids are analyzed and lowest detection limits possible are required. Available in both Fluoronetic Autosamplers (pages 8-9) and prepFAST SF (pages 26-29).



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AUTOMATION

SAMPLE INTRODUCTION

CONSUMABLES



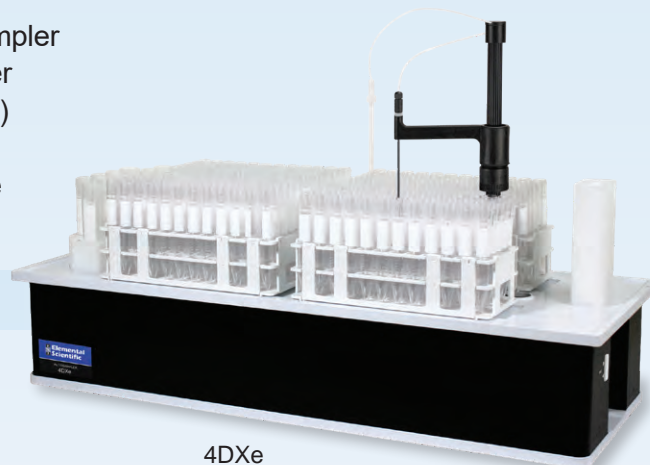
# DX-Series Autosamplers Support and Automate Every Inorganic Application

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

## DXe – Economical

Autosamplers with superior features at a competitive price:

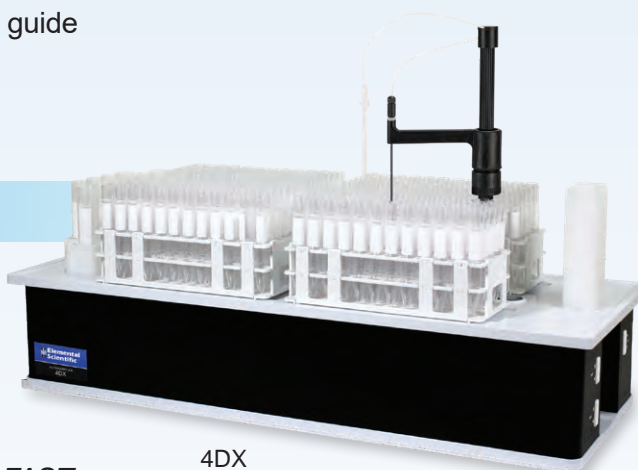
- Durable dual rail system
- Dual flowing rinse stations
- AutoAlign Arm with inert fluoropolymer probe guide
- Reset probe – prevents probe damage
- Flexible rack configurations



## 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:

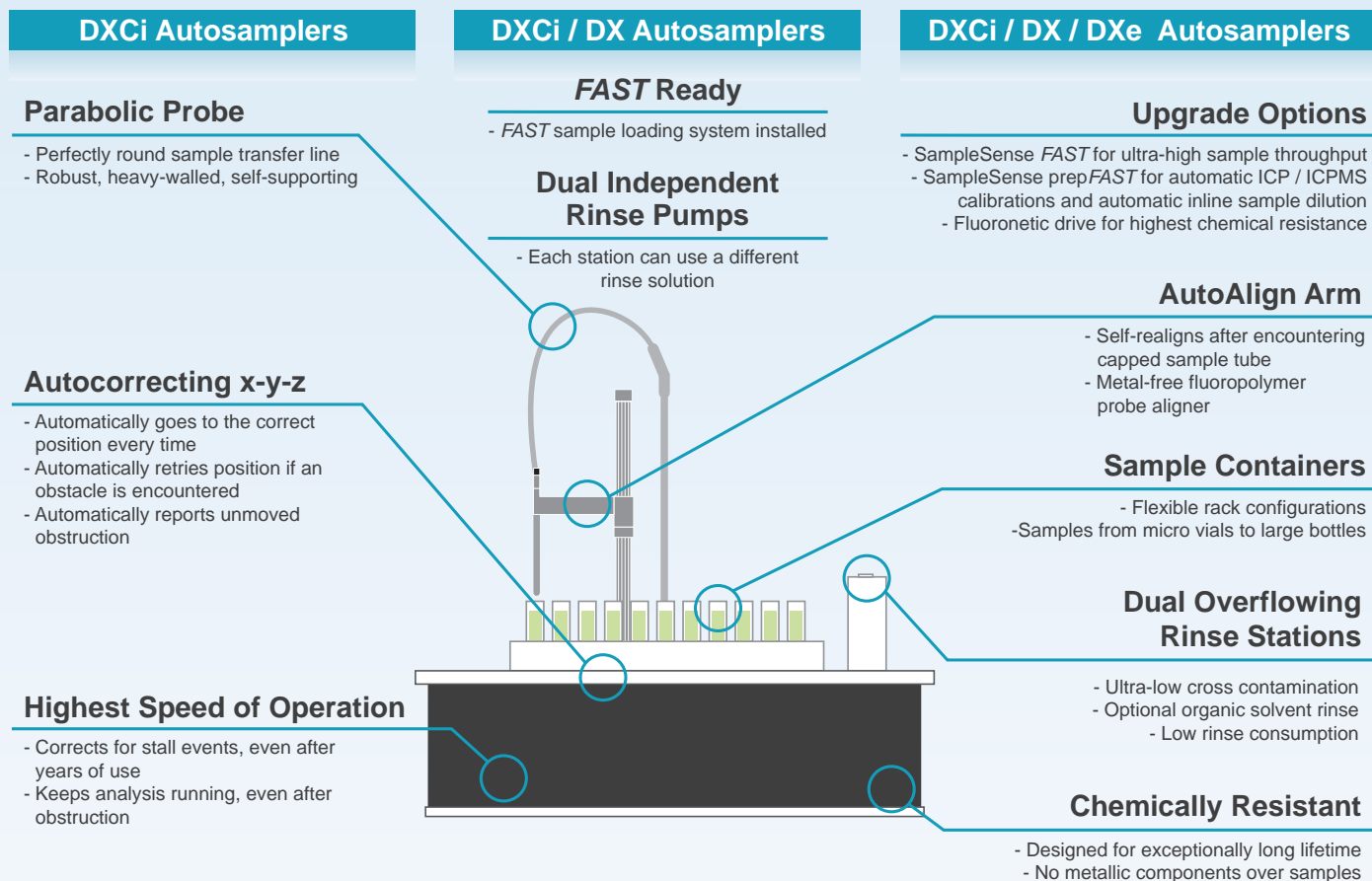
- Intelligently autocorrects position, even if accidentally obstructed
- Ultra high throughput compatible
  - Enhances productivity
- Reports obstructions to instrument software
- Septum piercing option available
- Parabolic probe – Anti-kinking probe
- High accuracy – Optimal for microplates and small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



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



## DX-Autosamplers Features Diagram



AUTOMATION

# DXCi

the **ONLY AUTOSAMPLER**

that automatically

**CORRECTS** the probe

Position

even when **Obstructed!**



See it in  
**Action!**

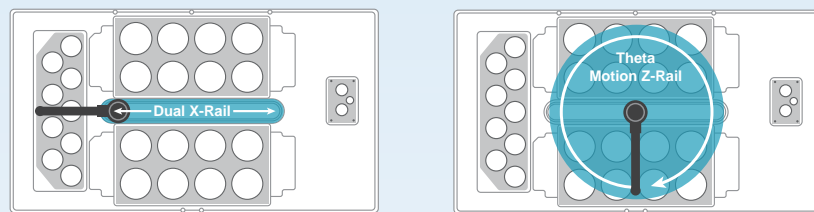
<http://www.icpms.com/products/autosampler-list-dxci.php>

DXe, DX and DXCi Hardware Configurations			
Hardware	DXe	DX	DXCi
Flowing Rinse Stations	2	2	2
Rinse Pumps	1	2	2
FAST Vacuum Pump	-	1	1
AutoAlign Arm	✓	✓	✓
X-Y-Z Autocorrecting	-	-	✓

# 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 and 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.

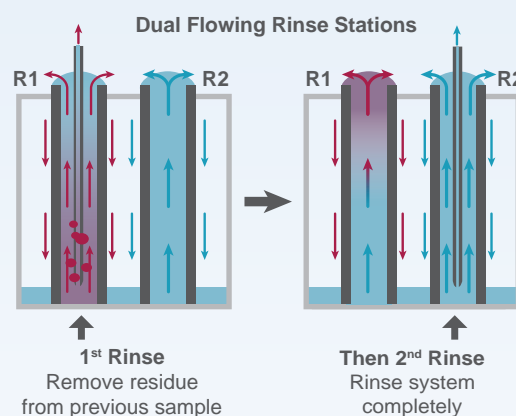


MicroDX autosampler shown

## 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.

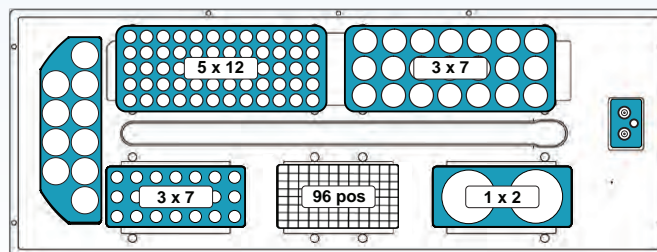


## DX-Autosamplers are Versatile and Upgradeable

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 prep*FAST* 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.

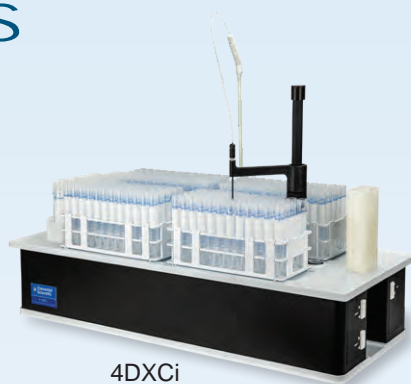


AutoAlign Arm and Parabolic Probe

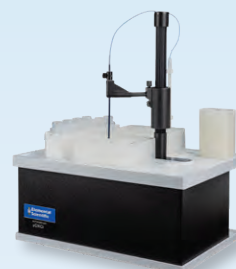
# ESI DX-Autosampler Models

From 2 Micro Racks

UP To  
14 Large Racks



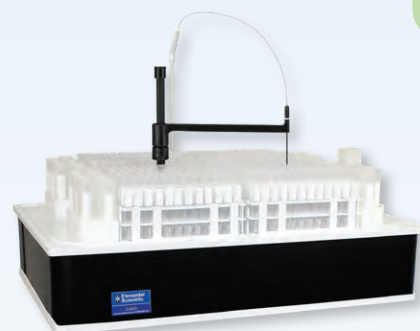
4DXCi



MicroDX



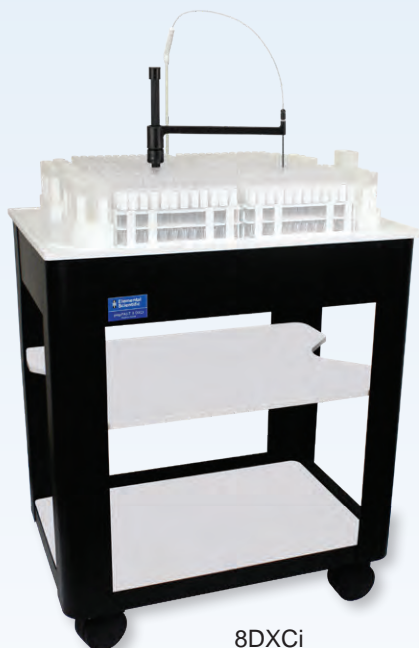
2DXCi



8DXCi  
Benchtop



14DXCi



8DXCi

AUTOMATION

DX-Autosampler Models	Part Number	Mobile Stand	Large Rack Capacity	Microplate/ Micro Rack Capacity	MAXIMUM SAMPLE CAPACITY			
					50mL	15mL	8mL	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						
8DXCi	8DXCi							
14DX	14DX	Included	14	30*	304	840	1260	2880*
14DXCi	14DXCi							

\*Special version 14DX for microplates



# Fluoronetic 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.

### Fluoronetic Autosampler Features:

- Ultra-high chemical resistance
- Long lasting and low maintenance
- Available in two types:
  - Semiconductor ultra-high purity chemicals
  - Highly acidic geological samples
- Autocorrecting x-y-z Autosampler
  - Automatically goes to the correct sample tube position every time
    - ▶ *Even when temporarily obstructed*
  - Highest speed of operation
  - Upgradable to SampleSense FAST / prepFAST



Fluoronetic autosampler configured for semiconductor grade ultra-pure chemical analysis



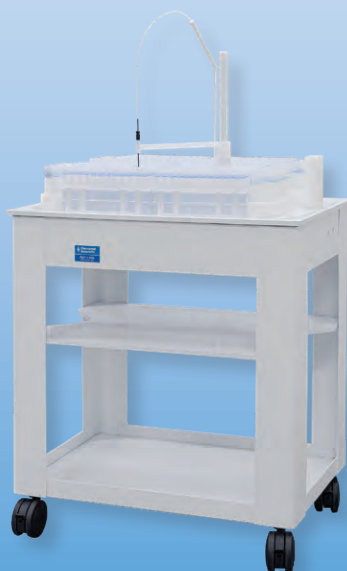
See it in Action!



Fluoronetic 2DXCi



Fluoronetic 4DXCi



Fluoronetic 8DXCi



Fluoronetic 8DXCi Benchtop



Fluoronetic 14DXCi

*Models shown here in Geochem configuration with carbon fiber supported probe.*

# Fluoronetic Autosampler Features Diagram

## Parabolic Probe

- Perfectly round sample transfer line
- Robust, heavy-walled, self-supporting

## AutoAlign Arm

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

## Sample Containers

- < 1 mL up to 500 mL

## Autocorrecting x-y-z

- Automatically goes to the correct position every time
- Automatically retries position if there is an obstacle
- Automatically reports unmoved obstruction

## Highest Speed of Operation

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

## Fluoronetic Z-rail

- True fluoropolymer mechanical action
- Magnetically coupled linear drive
- Long-lived; chemically resistant

## Dual Overflowing Rinse Stations

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

## SampleSense FAST Option

- Ultra-high sample throughput
- Automates and eliminates sample introduction timing variables
- Minimizes sample consumption

## SampleSense prepFAST Option

- Automatic ICP or ICPMS calibration
- Automatic inline sample dilution

## Fluoronetics Drive Delivers



**Superior Chemical/  
Corrosion Resistance**



**Chemically Inert  
Non-contaminating**



**Magnetic Coupling  
Eliminates Metal Components**



**Intelligent Autocorrection  
Always Finds Sample Position**

## Fluoronetics Autosamplers for Agilent 7X00/8X00 Part Numbers

Description	# Rack Positions	Geochem Configuration	Semicon Configuration
Fluoronetic 2DXCi Autosampler	2	2FNX	2FNX-S
Fluoronetic 4DXCi Autosampler	4	4FNX	4FNX-S
Fluoronetic 8DXCi Autosampler	8	8FNX	8FNX-S
Fluoronetic 8DXCi Autosampler Benchtop	8	8FNX-BT	8FNX-BT-S
Fluoronetic 14DXCi Autosampler	14	14FNX	14FNX-S

**Contact ESI to learn about Fluoronetic  
upgrade options for your existing autosampler**

# FAST Automation

for Agilent 7800/7900/8900 ICPMS

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

## High Throughput

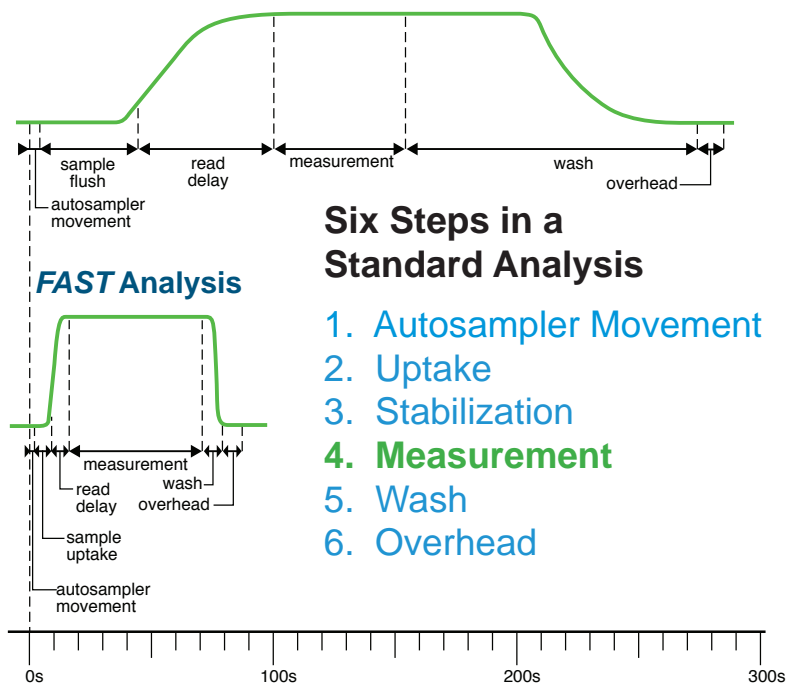
- FAST uptake, stabilization, and washout
- High performance economical P-Series and automatic SampleSense valve option
- Operation with or without segmented air bubbles to optimize every application

## 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 reducing operating costs and shortening analytical runs



### 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)
- DX Autosampler



P-Series *FAST* Valve



## SampleSense Automated Uptake Valve

- *FAST* valve with optical sensors that monitor for sample arrival (patent pending)
- Automated sample loading minimizes sample consumption
- Unsensed samples are reported
- DXCi Autocorrecting Autosampler

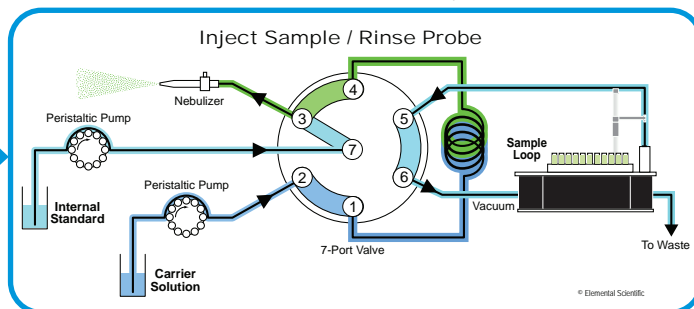
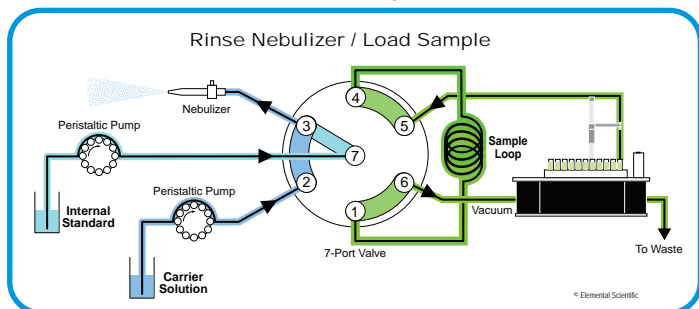


SampleSense *FAST* Valve



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.



# SAMPLESENSE

## Revolutionary New Valve for *FAST* and *prepFAST*

SampleSense (Patent Pending) is a revolutionary valve for *FAST* and *prepFAST* systems that uses optical sensors to automatically sense and inject samples into Agilent 7800/7900/8900 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

### 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



## 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 Agilent 7800/7900/8900 Maximizes Productivity with:

- Optical sensing of sample arrival (patent pending)
- Minimizes sample consumption by stopping sample load after loop is filled
- Unsensed samples (empty or capped tubes, low volume) are reported
- DXCi Autocorrecting Autosampler
- Controlled with ESI SC software

**Sample not present,  
sensors not activated**



**Valve sensors activated,  
sample is sensed**

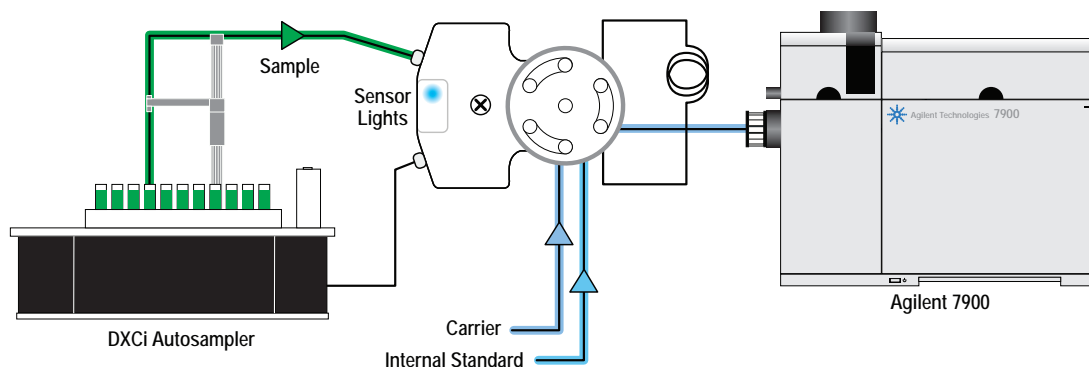


SampleSense prep*FAST* automated sample loading process

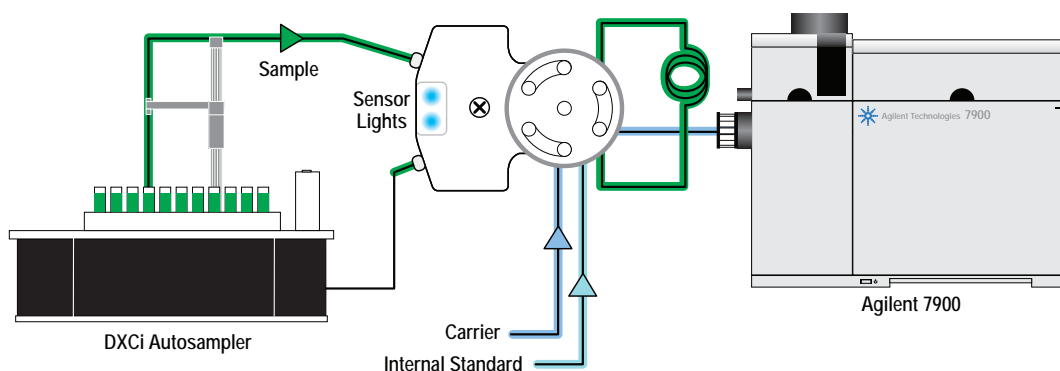


# SAMPLESENSE Automated Loading

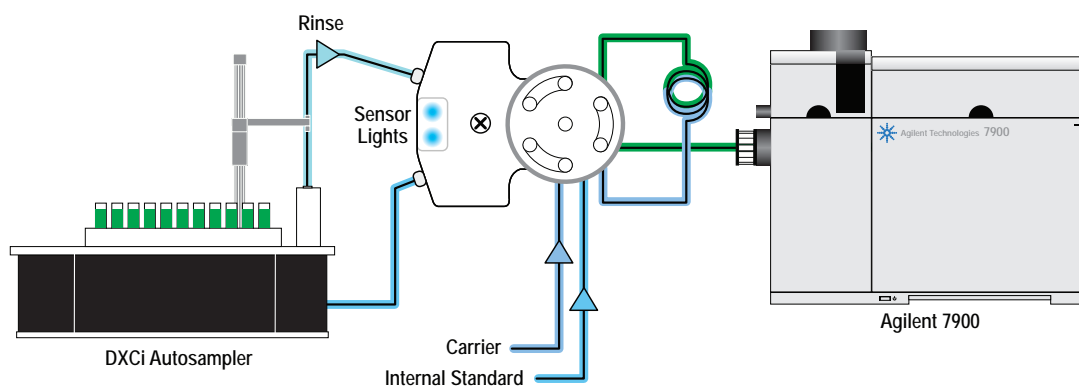
## Start Sample Load / Rinse Nebulizer



## Sample Load Complete / Inject Sample



## Rinse Probe while Sample is Analyzed



SampleSense FAST operation with Agilent 7900 ICPMS

# FAST SYSTEMS *Ordering Information*

AUTOMATION



4DX *FAST* System for Agilent ICPMS  
4DXF-79



4DXCi SampleSense *FAST* System for  
Agilent ICPMS 4F-SS7-79

All SampleSense  
systems  
*include a*  
**DXCi** Autocorrecting  
Autosampler

## FAST Systems For Agilent 7800/7900/8900 ICPMS

Description	Nebulizer	Probe	2DX	4DX	8DX Benchtop	8DX	14DX
<i>FAST</i> System for Agilent ICPMS. Includes DX autosampler	✓	✓	2DXF-79	4DXF-79	8DXF-BT-79	8DXF-79	14DXF-79
SampleSense <i>FAST</i> System for Agilent ICPMS. Includes DXCi autosampler	✓	✓	2F-SS7-79	4F-SS7-79	8F-BT-SS7-79	8F-SS7-79	14F-SS7-79

See pages 4-9 for more information on DX autosampler models

# prepFAST<sup>®</sup> Inline Dilution

## Automated Sample Preparation with Inline Dilution

prepFAST automated inline dilution systems eliminate manual dilution, reduce reagent usage, and improve laboratory productivity. The combination of the DX-Series autosampler, high-throughput FAST technology and a syringe module delivers precise and accurate inline dilutions of standards and samples.

### prepFAST Automates Daily Lab Functions

#### FAST Automated Sample Loading

Available in two automation valve options

- High performance economical P-Series FAST with DX autosampler
- Automatic loading SampleSense FAST with DXCi autosampler
  - Eliminates method timings
  - Loads samples of varying viscosity
  - Triggers sample preparation and analysis
  - Actively detects and reports sample loading issues

#### Autodilution

Samples automatically inline syringe-diluted and prepared for analysis

- User specified dilution factor, on sample-by-sample basis
- Improve precision and accuracy
- Reduce vial and reagent usage
- Improve sample throughput and washout
- Actively detects and reports sample loading issues

#### Autocalibration

Automate inline preparation of ICP calibration standards

- Save time and improves laboratory efficiency
- Improve calibration linearity
- Standards rack holds both calibration and QC standards

#### Overrange Dilution

Automatically dilute and reanalyze samples

- Autodilute samples with concentrations above the calibration range
- Automatically dilute high matrix samples that cause internal standard recoveries to fall outside of acceptable ranges
- Optimize laboratory throughput by generating reportable results from within the initial sample run



2DXCi SampleSense prepFAST



# prepFAST Autodilution

## Rapid, Variable In-Valve Autodilution

### P-Series prepFAST

- High performance
- Economical
- DX Autosampler



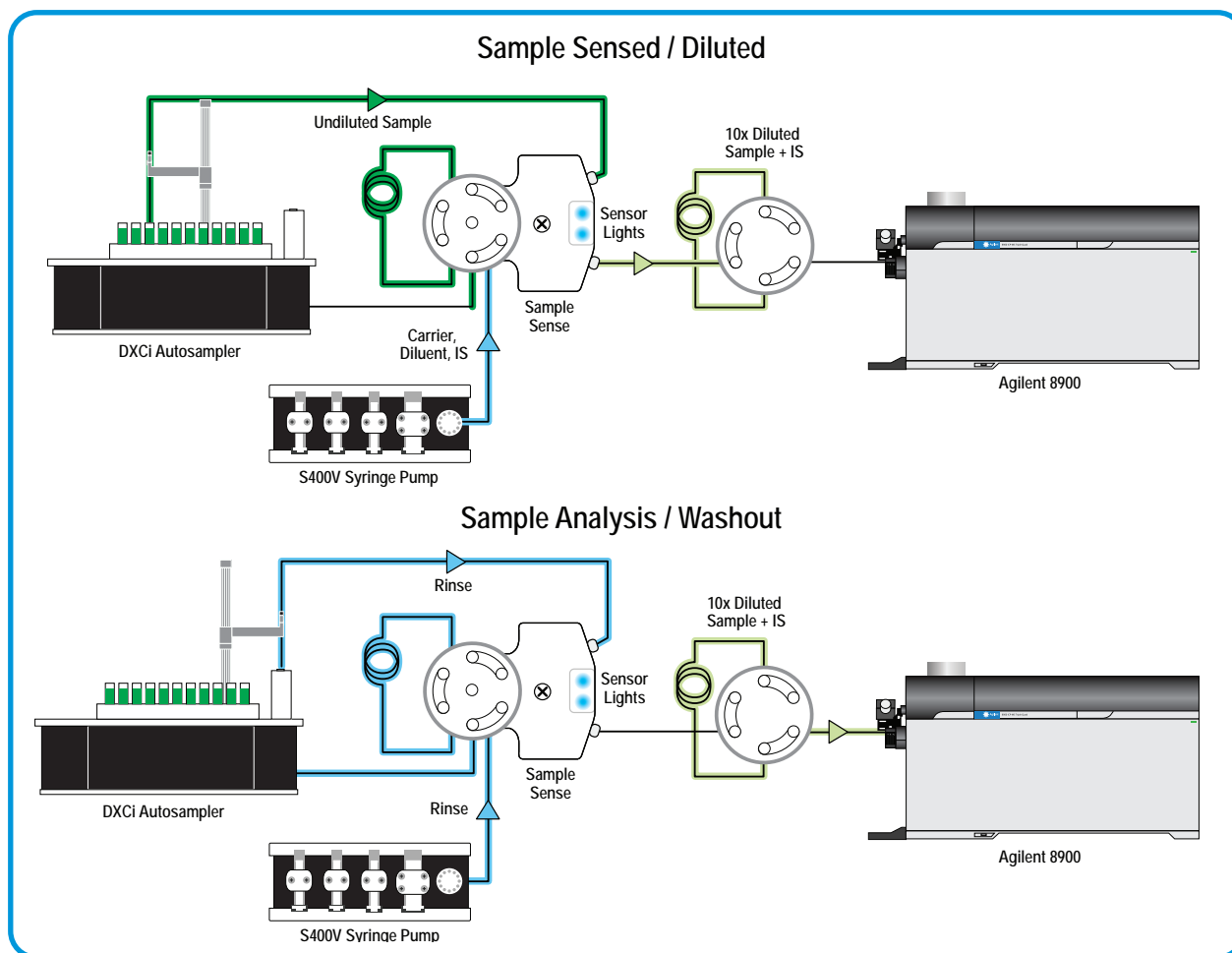
### SampleSense prepFAST

- Optical sensing of sample arrival
- Adjusts to different viscosity samples
- Reports sample loading issues
- DXCi Autocorrecting Autosampler



### prepFAST Autodilution Process

Samples are quickly vacuum-loaded (prepFAST, prepFAST M5 and prepFAST M5X) or precision syringe loaded (prepFAST M5 and prepFAST M5X) into a loop. Loading time is user-defined with P-Series, while SampleSense automatically monitors the sample loading. The sample is then mixed with diluent and internal standard using a patented mixing valve at the dilution factor prescribed by software. The diluted and mixed sample is then introduced into the ICPMS while the sample loop is syringe rinsed and readied for the next Sample. This sampling and dilution process takes place in seconds.



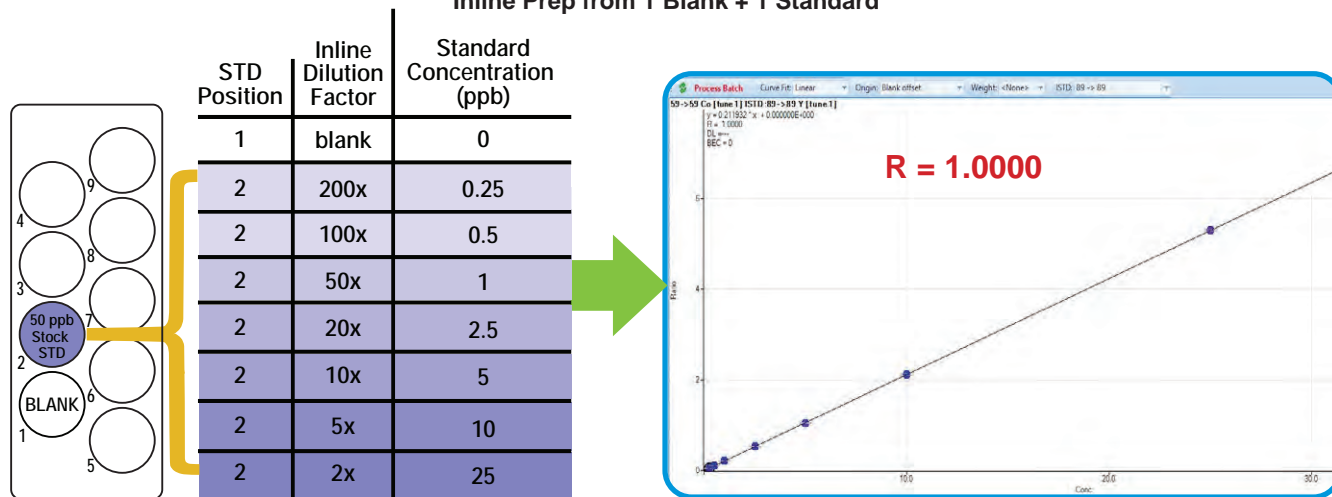
SampleSense prepFAST dilution diagram with Agilent 8900

# prepFAST Autocalibration

## Autocalibration

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

### prepFAST Autocalibration Inline Prep from 1 Blank + 1 Standard



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

## Manual Calibration vs. Autocalibration

30+ MINUTES  
- Manual Labor -



5 MINUTES  
- AUTOMATED -

- High Risk of -  
HUMAN ERROR

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

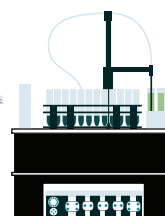
- High use of -  
CONSUMABLES



- Reduced -  
HUMAN ERROR

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

- Reduced use of -  
CONSUMABLES



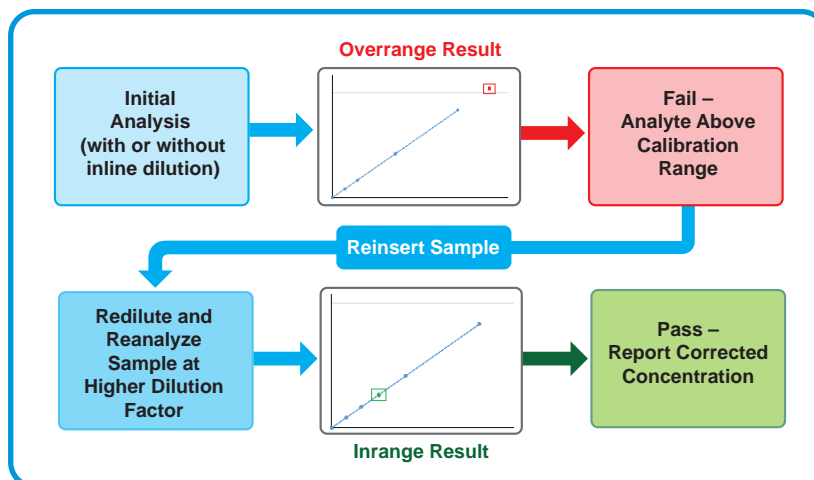
# prepFAST<sup>™</sup> Overrange Dilution

## Overrange Analyte Autodilution

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

### Maximize laboratory throughput by:

- Save operator time with required dilutions automatically identified and performed by prepFAST
- Original samples and required dilutions analyzed within the same analysis run



## Out-of-range Internal Standard Autodilution

Internal standard out-of-range conditions occur when a high matrix present in the sample causes response changes in the ICPMS, which is identified by monitoring internal standard recoveries. Masshunter<sup>™</sup> can easily be configured to automatically detect these limit failures, and instructs the prepFAST to automatically dilute the sample immediately for reanalysis.

### prepFAST Autodilution Process

prepFAST systems are available in three configurations, each with unique performance capabilities for your laboratory requirements. These capabilities are summarized in the table below, and specific on these models are provided in the following pages.

prepFAST Systems Comparison for Agilent 7800/7900/8900 ICPMS									
Model	SampleSense Option	Auto calibration	Autodilution	Auto Overrange Dilution	Syringe-driven Internal Standard	High Speed Rinse Ultimate Washout	Micro Volume Sample Analysis	Volatile Organic Sample Analysis	Dilution Range
prepFAST	✓	✓	✓	✓	✓				1-400x
prepFAST M5	✓	✓	✓	✓	✓	✓	✓	✓	1-400x
prepFAST M5X	✓	✓	✓	✓	✓	✓	✓	✓	1-40,000x

# prepFAST for Agilent 7800/7900/8900 ICPMS

## Fully Automated Inline Dilution

The prepFAST inline dilution system fully automates laboratory dilutions while providing high sample throughput. The prepFAST delivers high-precision autodilution, syringe-driven internal standard addition, and high-speed washout. Capable of dilution factors from 1 to 400. Available in either high performance P-Series or automated SampleSense sample loading configurations. The prepFAST is suggested for labs requiring the highest sample throughput and where the available sample volume is 2 mL or more.

### Features:

- Vacuum sample loading configurations
  - High performance, economical P-Series FAST
  - Automated monitoring SampleSense FAST
- Autocalibration
- Auto QC dilution
- Syringe-driven internal standard
- High-speed washout
- DXCI Autocorrecting Autosampler with SampleSense configuration

### Benefits:

- Customizable sample loading with P-Series FAST
  - Autosampler models 2DX, 4DX, 8DX, 14DX
- Automated sample loading with SampleSense FAST
  - No required method timings
  - Actively monitors and reports sample loading issues
  - Automatically adjusts to different sample viscosities
  - Autosampler models 2DXCi, 4DXCi, 8DXCi, 14DXCi
  - Autocorrecting arm position when probe is accidentally obstructed
- Calibration standards prepared inline
- Automatic sample dilutions
- Reduce laboratory reagent waste



4DXCi SampleSense prepFAST

See pages 12-13 for  
more information  
on SampleSense  
technology



## prepFAST Features Diagram

### SampleSense Unique Features

#### Parabolic Probe

- Perfectly rounded sample transfer line
- Robust, heavy-walled, self-supporting

#### Autocorrecting x-y-z

- DXCi autosampler 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

### prepFAST Valve Options

#### P-Series prepFAST

- High performance sample loading, autodilution and autocalibration

#### SampleSense prepFAST

- Automatic optically-sensed sample loading
- Eliminates method timings
- Actively detects and reports sample loading issues

#### Dilution Range

- 1 to 400x dilution range

### P-Series and SampleSense Features

#### Optional Vented Enclosure

- ULPA filter option

#### AutoAlign Arm

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

#### Sample Containers

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

#### Dual Overflowing Rinse Stations

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

#### Vacuum Pump

- Vacuum loaded sampling
- Rapid rinsing & cleaning

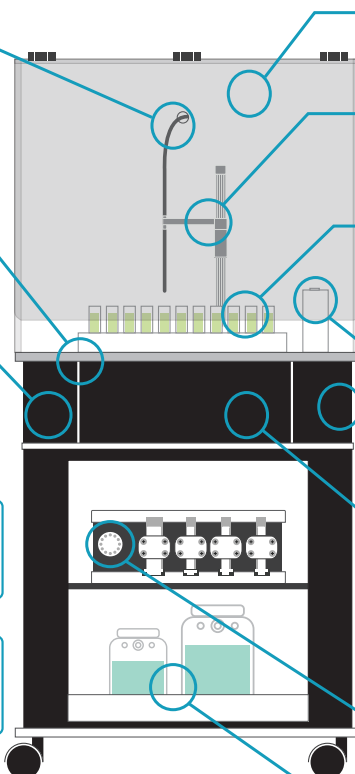
#### Chemically Resistant

- Designed for exceptionally long lifetime
- No metallic components above samples

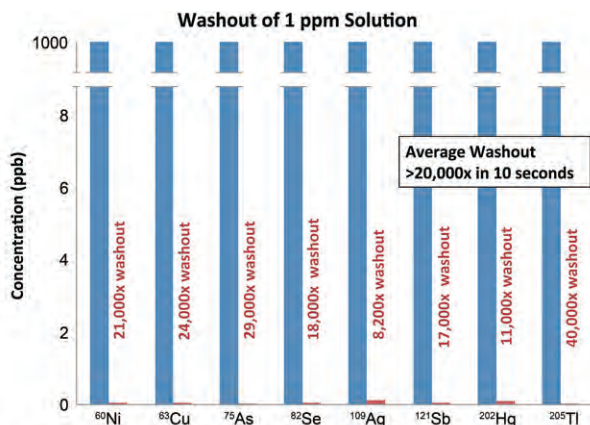
#### Inline Syringe Sample Preparation

- Autocalibration
- Prescribed sample dilution & overage dilution
- Internal standard addition

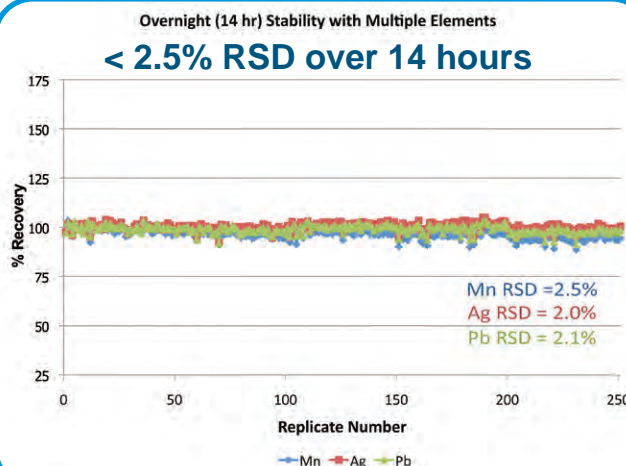
#### Large Volume Reagent Bottles



## prepFAST Performance



FAST washout even for memory-prone elements



Long-term stability

# prepFAST M5 & M5X

for Agilent 7800/7900/8900 ICPMS

## Fully Automated Inline Dilution

The prepFAST M5 inline dilution systems maximize laboratory automation. The prepFAST M5 and M5X provide both precision syringe loading of samples and high-throughput vacuum sample loading. Syringe loading is recommended when sample volumes are limited (0.1 - 3 mL) or when increased sample viscosity becomes an issue. This can include organic solvents, viscous brines or biological sample. Vacuum loading can be used when sample volumes are larger or when sample viscosity is not an issue.

The prepFAST M5 provides dilution factors from 1 to 400x, and the prepFAST M5X delivers additional dilution factors of 1 to 40,000x via dual-stage dilution. Supplied with P-Series or SampleSense FAST sample loading valves.



S500V2 Dilution Module  
for prepFAST M5

## Features

- Precision syringe sample loading
- Two vacuum sample loading options
  - High performance, economical P-Series FAST sample valve with DX Autosampler
  - Fully automated SampleSense FAST sample valve with DXCi Autocorrecting Autosampler
- Autocalibration
- Inline dilution
  - 1 to 400x (M5)
  - 1 to 40,000x (M5X)
- Auto QC dilution
- Syringe-driven internal standard addition
- High-pressure syringe-driven probe rinsing
- High-speed rinse with ultimate washout

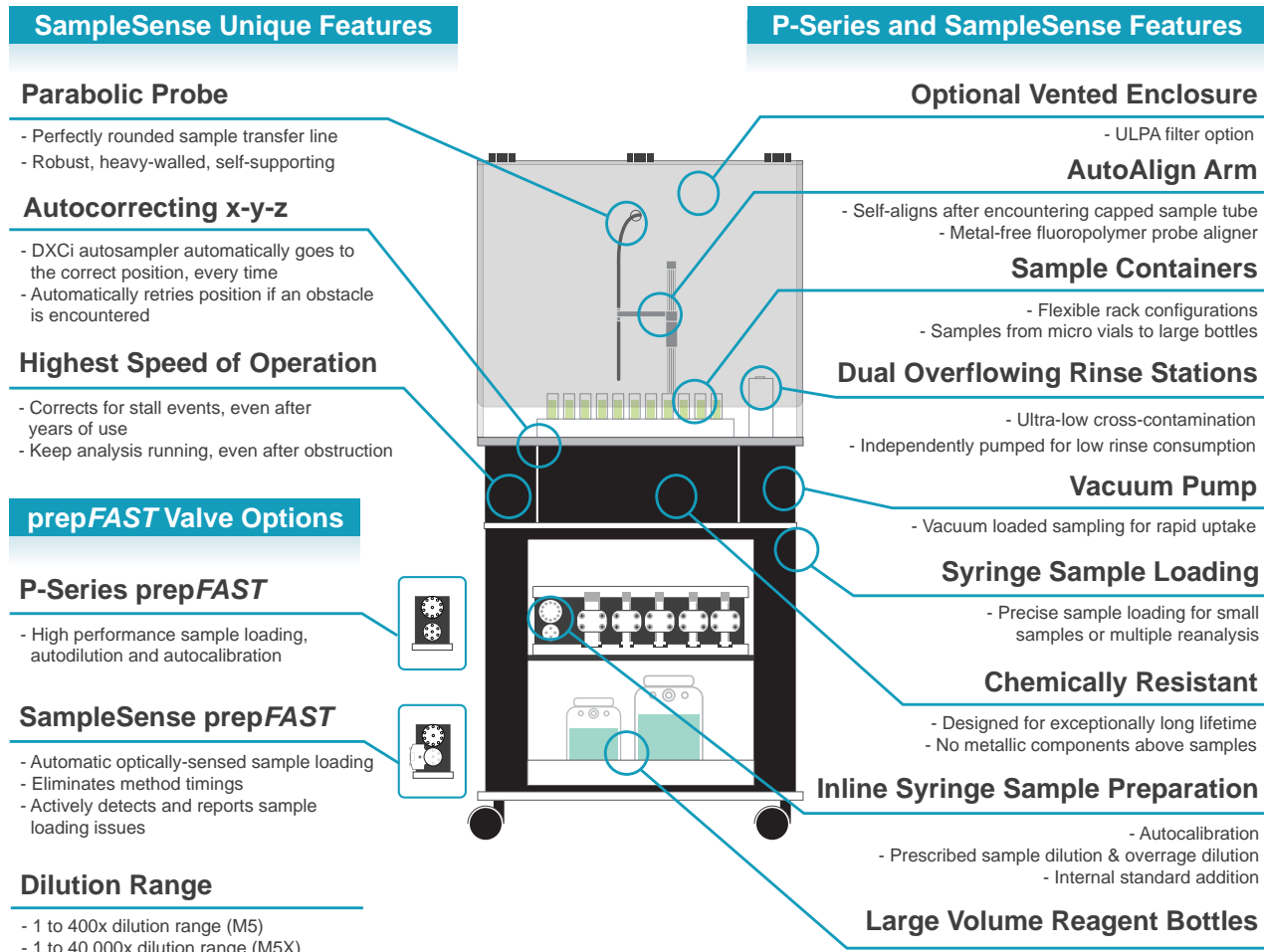
## Benefits

- Automate sample dilutions
- High sample throughput
- Minimize sample usage and reduce laboratory waste
- Best rinse-out performance
- Available in the following models:
  - P-Series FAST: 2DX, 4DX, 8DX, and 14DX
  - SampleSense FAST: 2DXCi, 4DXCi, 8DXCi, 14DXCi

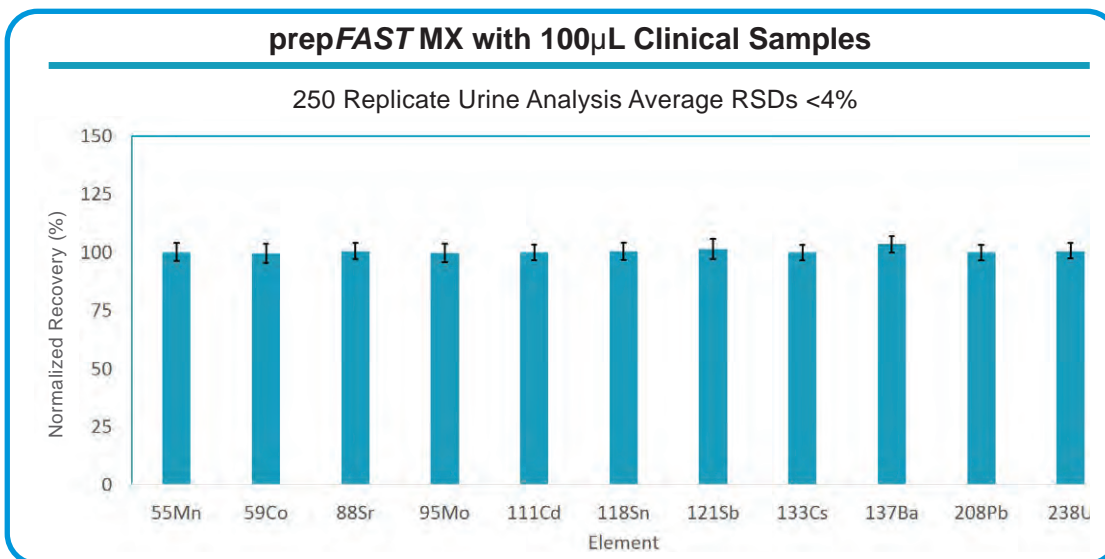


4DX prepFAST M5

## prepFAST M5/M5X Features Diagram



## Automated Micro Sample Analysis in a Difficult Matrix





# prepFAST Systems Ordering Information

## prepFAST Systems Comparison

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



4DX or 4DXCi Autosampler  
with Mobile Station

### prepFAST Provides:

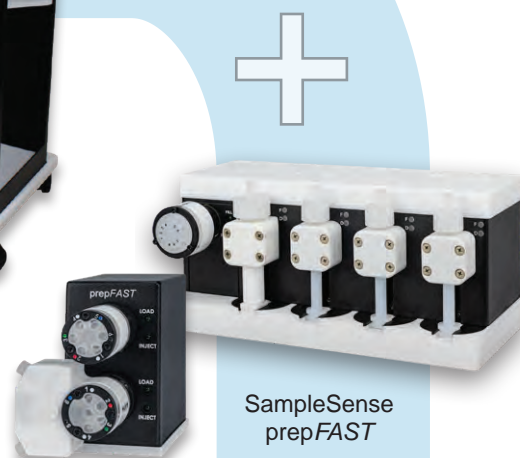
- Autocalibration
- Autodilution
- Auto overrange dilution
- Improved washout and higher throughput
- Syringe-driven internal standard addition
- Dilution range: **1-400x**

### prepFAST M5 Provides:

- Autocalibration
- Autodilution
- Auto overrange dilution
- Precision syringe sample loading for micro or viscous samples
- Enhanced washout performance
- Syringe-driven internal standard addition
- Dilution range: **1-400x**

### prepFAST M5X Provides:

- Autocalibration
- Autodilution
- Auto overrange dilution
- Precision syringe sample loading for micro or viscous samples
- Enhanced washout performance
- Syringe-driven internal standard addition
- Dilution range: **1-40,000x**



SampleSense  
prepFAST



SampleSense  
prepFAST M5



SampleSense  
prepFAST M5X

SampleSense prepFAST systems shown above



## prepFAST Ordering Information

### prepFAST Systems for Agilent 7800/7900/8900 Part Numbers

Autosampler Model	prepFAST	prepFAST M5	prepFAST M5X
2DX prepFAST	2ADF-79	2PF-M5-79	2PF-M5X-79
2DXCi SampleSense prepFAST	2PFSS-79	2PFSS-M5-79	2PFSS-M5X-79
4DX prepFAST	4ADF-79	4PF-M5-79	4PF-M5X-79
4DXCi SampleSense prepFAST	4PFSS-79	4PFSS-M5-79	4PFSS-M5X-79
8DX prepFAST	8ADF-79	8PF-M5-79	8PF-M5X-79
8DXCi SampleSense prepFAST	8PFSS-79	8PFSS-M5-79	8PFSS-M5X-79
14DX prepFAST	14ADF-79	14PF-M5-79	14PF-M5X-79
14DXCi SampleSense prepFAST	14PFSS-79	PFSS-M5-79	PFSS-M5X-79



4DXCi prepFAST



4DXCi prepFAST M5



4DXCi prepFAST M5X

# prepFAST SF™

## Automated Sample Preparation and Introduction System for Semiconductor Applications

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

### prepFAST SF Features:

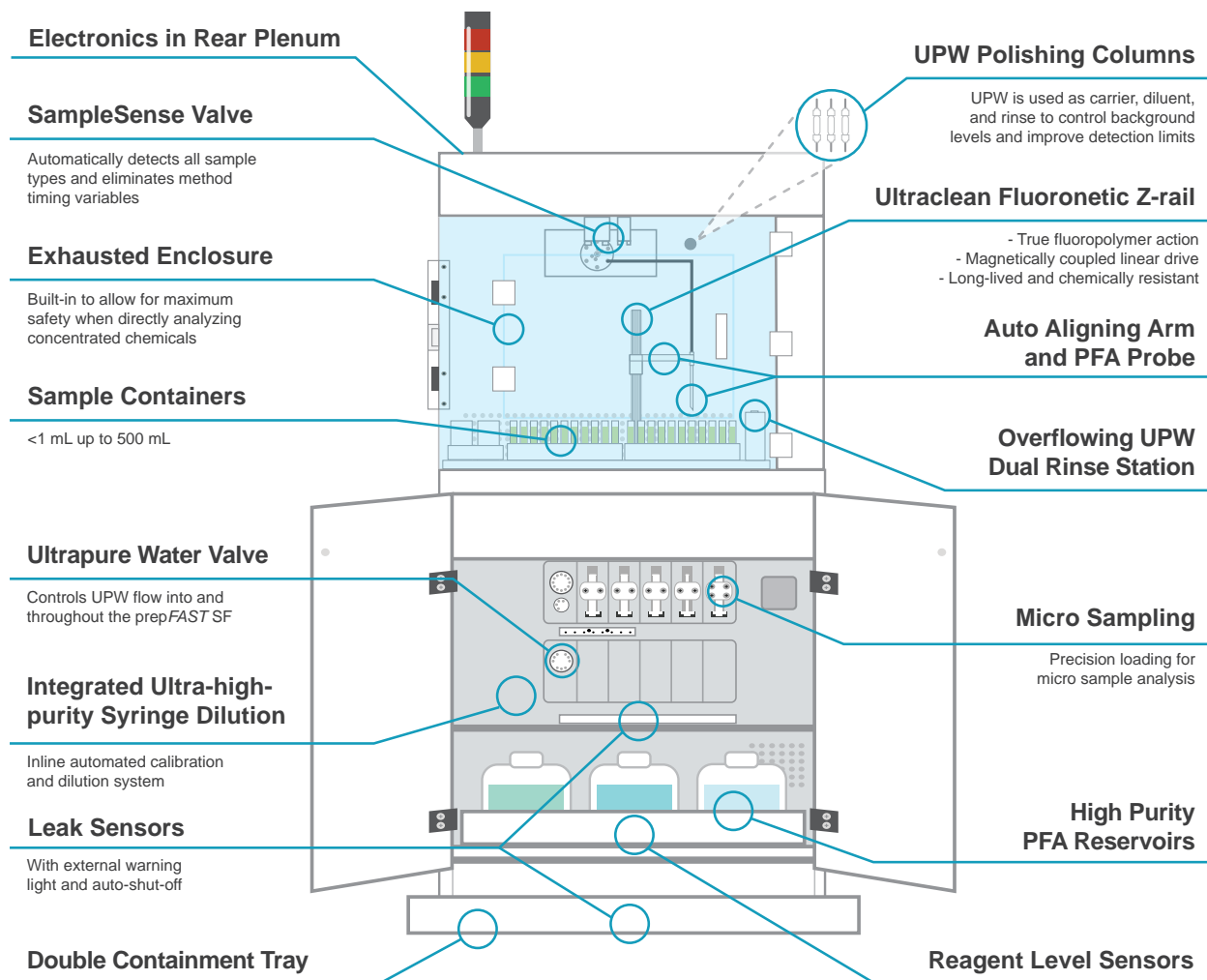
- Ultraclean Fluoronetic Autosampler
- Automated external and MSA calibrations
- Automated ultraclean sample preparation
- Automated acid addition
- Syringe-driven sample introduction
- Automated sample sensing and method adjustment for viscous samples
- Integrated ultraclean sample environment
  - Includes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



prepFAST SF2 System

prepFAST SF System for the Agilent 7800/7900/8900					
System	Integrated Mobile Autosampler & Enclosure	Integrated FAST valve modules	PFA Nebulizer with Integrated Capillary	PFA Sample Probes	Syringe Pump S500V2
prepFAST SF	✓	✓	✓	✓	✓

## prepFAST SF Features Diagram



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

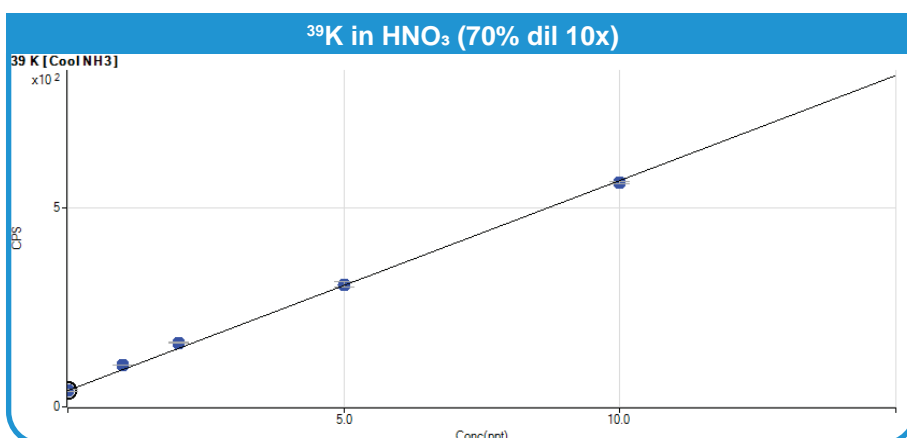
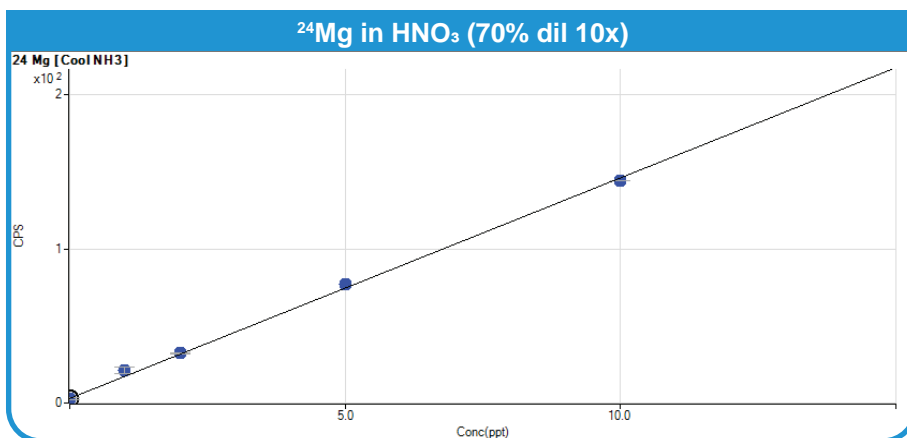
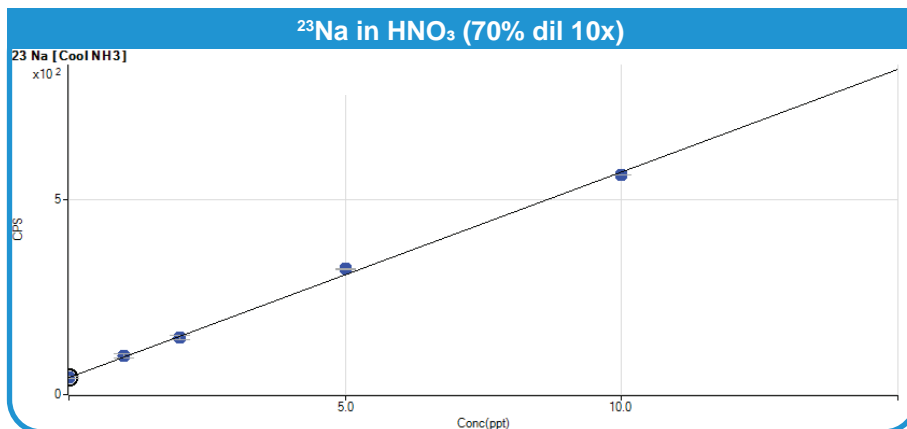
Acids	Bases	Organics	Process Chemicals
98% H <sub>2</sub> SO <sub>4</sub>	22% NH <sub>4</sub> OH	IPA	BOE
89% H <sub>3</sub> PO <sub>4</sub>	2.38% TMAH	PGMEA/PGME	SC-1
70% HNO <sub>3</sub>	25%TMAH	Photoresist	SC-2
49% HF	KOH	NMP	BOE
35% HCl		Butyl Acetate	DSP
30% H <sub>2</sub> O <sub>2</sub>		Cyclohexanone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

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

# prepFAST SF

## prepFAST SF Autocalibration

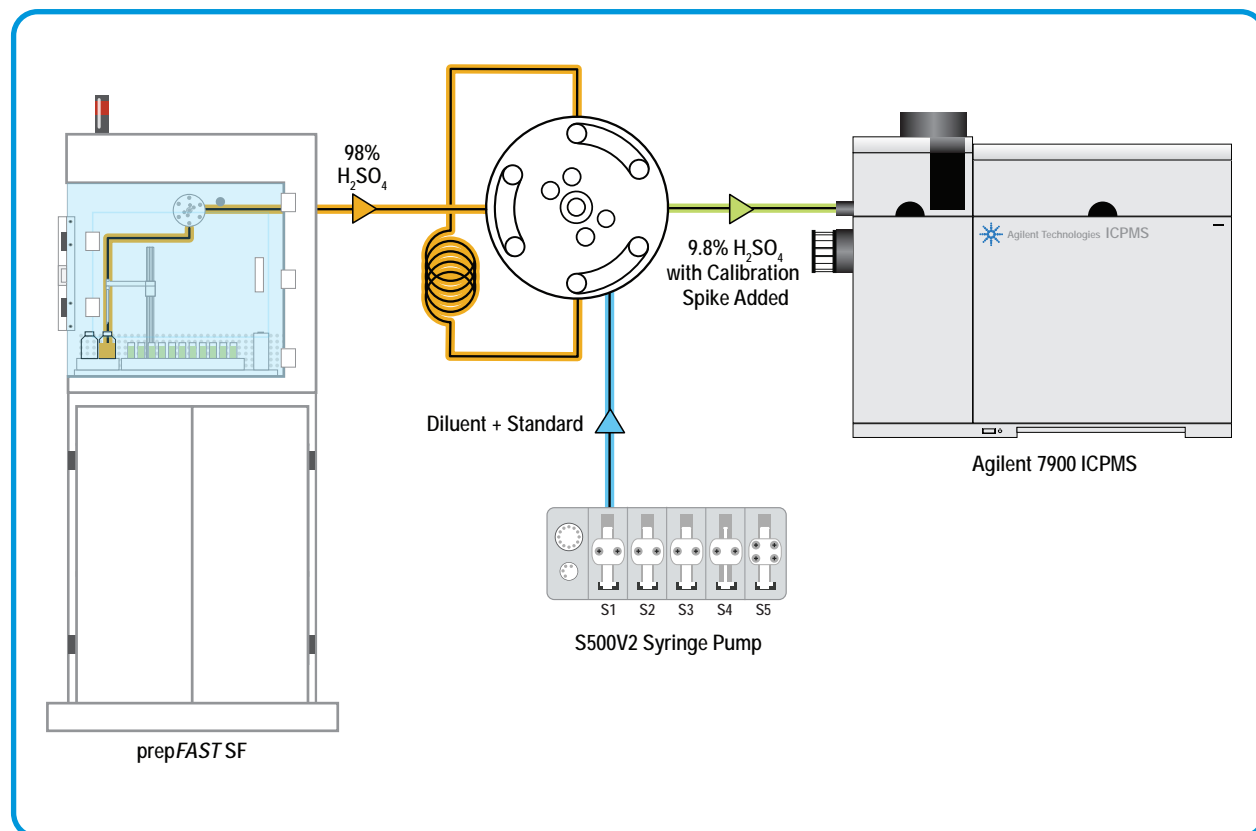
Na, Mg, and K calibrations at 1, 2, 5, and 10 ppt



prepFAST SF 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 SF achieves low to sub-ppt calibrations. Combined with the interference reduction modes provided by the Agilent 7800/7900 and 8900 ICPMS systems, the prepFAST SF delivers ppt/ppq detection of ICPMS accessible elements.



## prepFAST SF Inline Dilution of Semiconductor-grade Chemicals



prepFAST SF 10x inline dilution of concentrated  $\text{H}_2\text{SO}_4$

The prepFAST SF 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 SF Systems for Agilent 7900/8900	
Description	Part Number
prepFAST SF2 system, 2 sample rack capacity	2PF-SF-79
prepFAST SF4 system, 4 sample rack capacity	4PF-SF-79
ULPA (ultrapure air) Filter for 2CX prepFAST SF system	ULPA-2CX
ULPA (ultrapure air) Filter for 4CX prepFAST SF system	ULPA-4CX



Fluorospray  
Semiconductor Kit

See page 48 for the optimal  
Fluorospray Sample Introduction Kit  
for coupling to your **prepFAST** system

# 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 for 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.

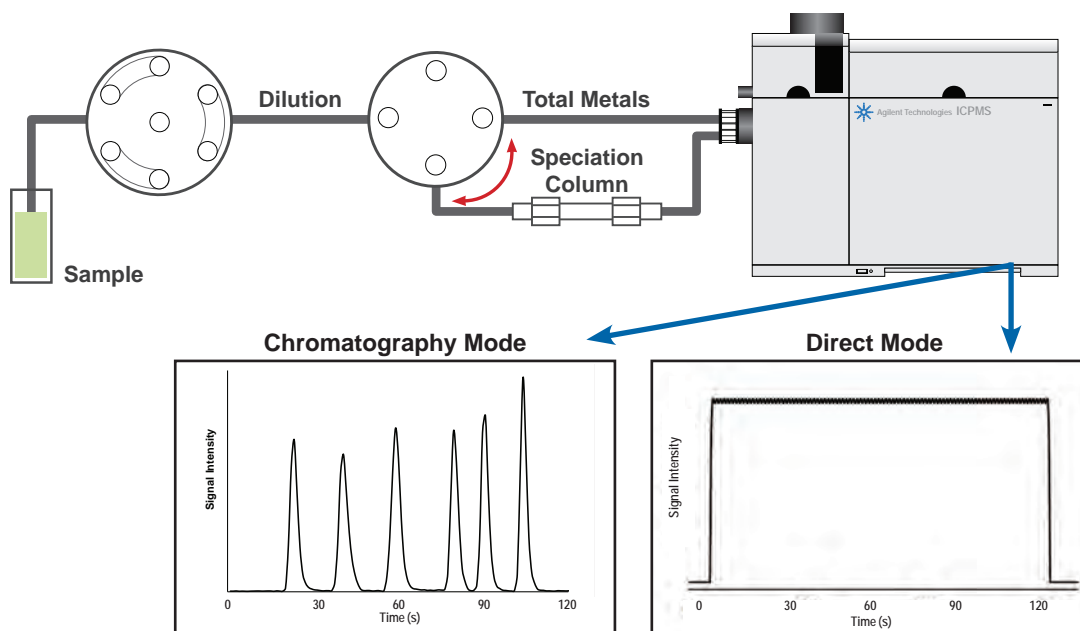
### prepFAST IC Features:

- Automated switching between total metal analysis and speciation analysis modes
- High pressure eluent delivery (HPLC)
- Gradient elution capability
- Automated, in-line sample dilution and syringe-driven sample loading
- 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 data reduction software



prepFAST IC System

## Unique Design Supports Unattended Analysis of Both Trace Metals and Speciation



prepFAST IC Autoselects Chromatography Mode or Direct Mode

## prepFAST IC Features Diagram

Optional ULPA Filter

SampleSense FAST

Autodilution Valves

- Inline automated calibration and dilution system

Sample Containers

- < 1 mL up to 500 mL

Electronics in Rear Plenum

SampleSense FAST/Speciation/  
Total Metals Selection Valves

- Auto switching of SampleSense FAST and prepFAST
- Auto switching of total metals or speciation (chromatography mode)

Exhausted Enclosure

High-precision  
DX Autosampler

Autotuning

Autodilution  
Syringe Module

- Sample autodilution at time of analysis
- Species-specific autocalibration capability
- Micro-volume sample syringe-loading
- Calibration matrix matching
- Inline sample chemical reactions
- Inline sample derivatization

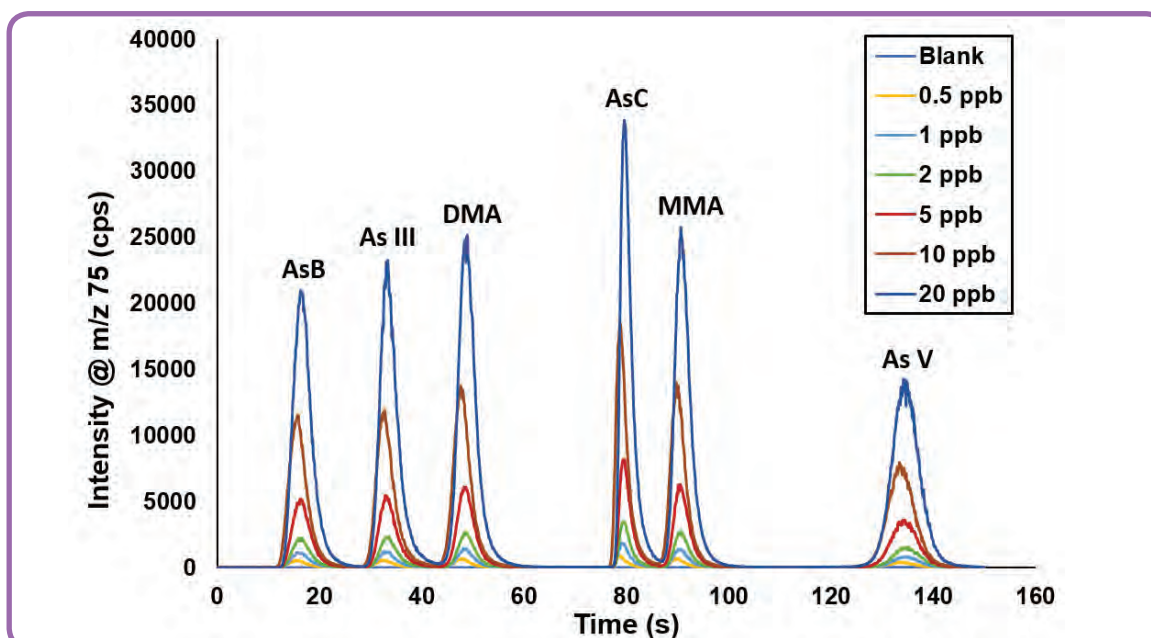
High-pressure  
Speciation Module

- Ultra-high-purity, metal-free pump
- Gradient elution
- Post-column internal standard
- Post-column dilution
- Post-column derivatization

Reagent Reservoirs

- For autodilution and elution reagents

## Species Autocalibration with prepFAST IC



Overlay of arsenic species chromatograms for calibration standard levels shown. The separation of the six different arsenic species is completed in under 2.5 minutes with gradient elution on the prepFAST IC and Agilent 8800 ICPMS.



## Xceleri Software for Automated Speciation Analysis

Xceleri is a simple but powerful tool that makes processing chromatographic data possible for any level of user.

### Data Processing

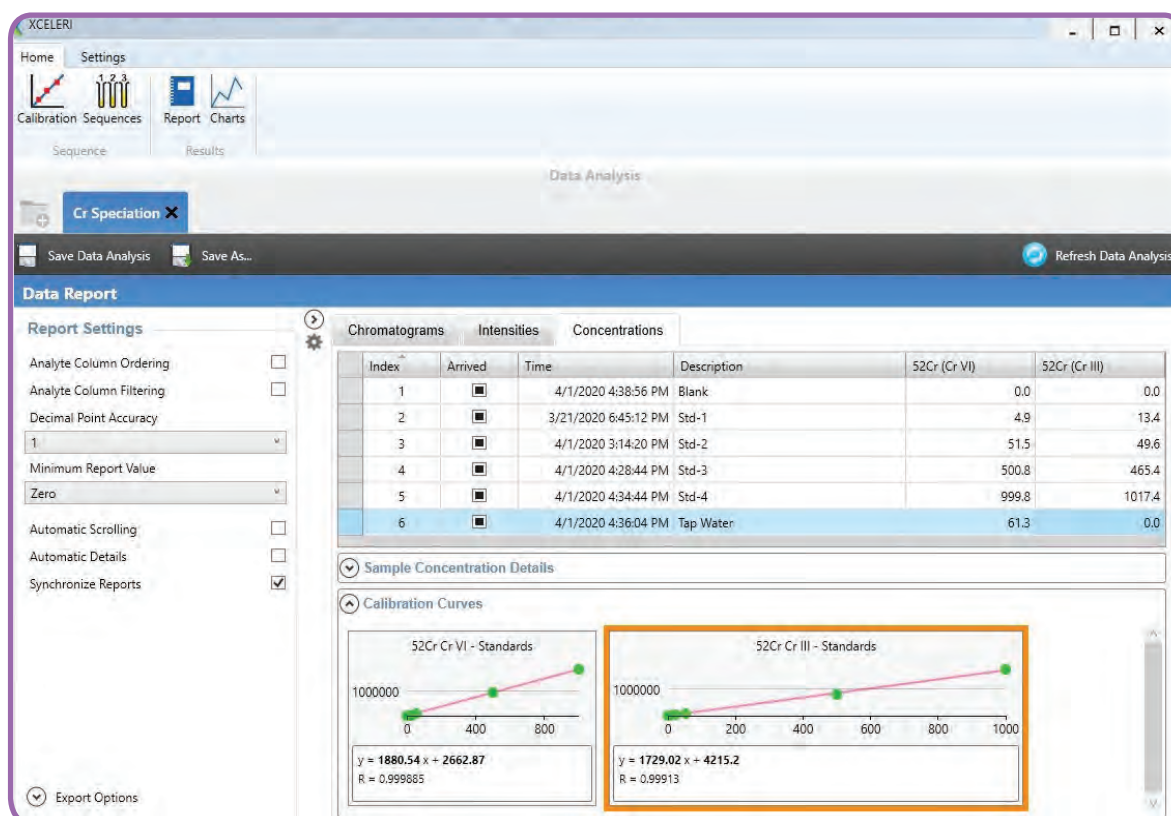
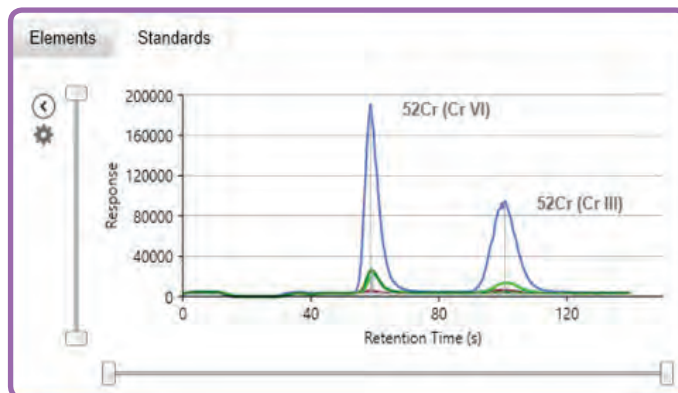
- Transient signal data processing
- Easy to build methods
- Calibration fit tools
- Specifically designed for LC-ICP/ICPMS

### Data Viewing

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

### Advanced Reporting Functions

- Automated read back functions for inline dilutions
- QC exporting to a single Excel file
- Report function offers comprehensive overview of the results including:
  - Calibration curves
  - Raw intensities
  - Calculated concentrations
  - Chromatograms

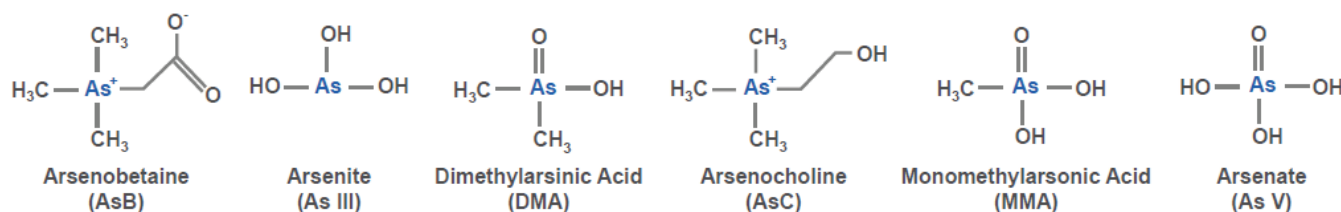




## Arsenic Speciation

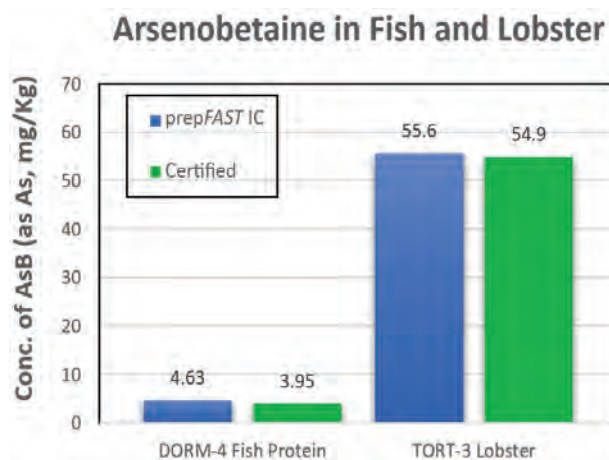
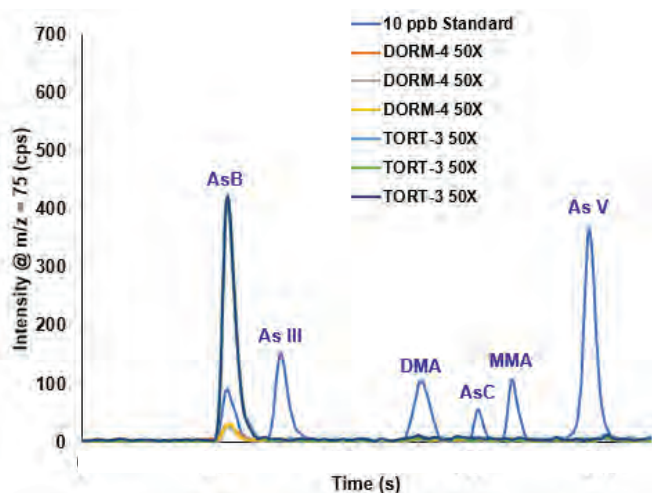
Both forms of inorganic Arsenic [As (III) & As (V)] are considered toxic at low levels, while the organometallic forms are much less toxic. Determination of the chemical form(s) of the total Arsenic present in a sample is often critical in sample determinations. The analysis of both total and speciated 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 requiring 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.



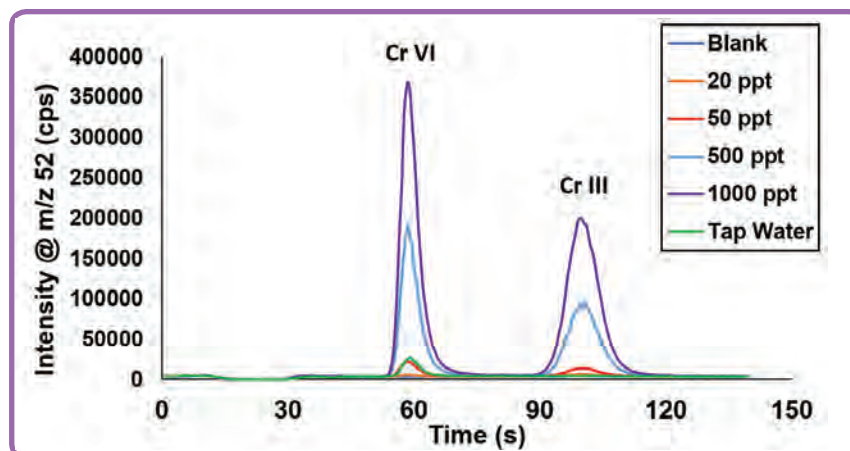
Results of seafood CRM analysis with the prepFAST IC

Overlaid chromatograms of standards and seafood samples

# prepFAST IC

## Chromium Speciation

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 display overlaid calibration standards and a local tap water.



Experimental Results			
Sample Type	Cr VI Conc (ppb)	Cr III Conc (ppb)	Total Cr (ppb)
Well Water	0.21	0.10	0.31
Drinking Water	1.3	0.05	1.35
River Water	0.03	0.04	0.07

### Small Footprint with Mobility



### All-in-One Analytical Station



prepFAST IC Enclosed Mobile Workstation and Integrated Analytical Station configurations for Agilent ICPMS systems

## prepFAST IC Configuration Options

The prepFAST IC is offered in a flexible configuration, with options added to the base system. The system can be configured to include the capabilities needed for your applications.

Description	Part Number
<b>Isocratic Base System (FASTIC).</b> Includes 4-rack autosampler in polypropylene enclosure, PFA-ICN nebulizer, syringe and vacuum sample loading, system pressure readback and FAST total metal sample introduction.	IC-0101
<b>Binary Gradient Elution Option</b> – Binary gradient elution capability for advanced chromatography	IC-0109
<b>Quarternary Gradient Elution Option</b> – Quaternary gradient elution for advanced chromatography	IC-0102
<b>prepFAST Option</b> – Autocalibration and autodilution capabilities	IC-0103
<b>Automated Speciation and Total Metals Option</b> – Automated switching between total metals and speciation	IC-0104
<b>Autotuning Option</b> – Switching valve for introduction of tuning solutions	IC-0105
<b>Post-Column Addition / 3rd Eluent Option</b> – Additional syringe module	IC-0106
<b>SampleSense FAST UHT Option</b> – Adds ultra-high-throughput (UHT) optically-sensed injection valve	IC-0107
<b>pergo Option</b> – Argon humidifier for nebulizer gas accessory	IC-0108
<b>SampleSense Option</b> – Adds SampleSense FAST automated loading and analysis triggering injection valve	IC-0110
<b>Analytical Station Option</b> – prepFAST IC hardware integrated into instrument bench with monitor & storage	IC-0111
<b>Xceleri Chromatographic Software</b> – Chromatographic data processing tools	XCELERI-IC

## prepFAST IC Speciation Kits

Elemental Scientific offers speciation kits for many elements to help laboratories quickly develop and implement methods for many speciation systems.

Kit Name	Description	Part Number
<b>As</b>	<b>Inorganic and Organometallic Arsenic Speciation Kit.</b> 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
<b>Se</b>	<b>Inorganic and Organometallic Selenium Kit.</b> CF-Se-01 column, single species standards for Se IV & Se VI, (1000 µg/mL, 100 mL) and method guide.	ICX-Se46
<b>Cr</b>	<b>Inorganic Chromium Speciation Kit.</b> CF-Cr-01 column, single species standards for Cr III, Cr VI, and Tm (1000 µg/mL, 100 mL), and method guide.	ICX-Cr36
<b>Hg</b>	<b>Inorganic and Organometallic Mercury Speciation Kit.</b> CF-Hg-01 column, single species standards for Hg <sup>+</sup> (1000 µg/mL, 50 mL) and MeHg <sup>+</sup> (1000 µg/mL, 25 mL), and method guide.	ICX-Hg
<b>Gd</b>	<b>Gadolinium Imaging Agents Speciation Kit.</b> CF-Gd-01 column, single species standard for Gd (1000 µg/mL, 100 mL) and method guide. Used for Gd <sup>+3</sup> and Gd-based contrast agents.	ICX-Gd
<b>Cu</b>	<b>Bound and Free Copper Speciation Kit.</b> CF-Cu-01 column and method guide. For determination of bound Cu and free Cu in serum.	ICX-Cu
<b>Fe</b>	<b>Inorganic Iron Speciation Kit.</b> CF-Fe-01 column, single species standards for Fe <sup>+2</sup> and Fe <sup>+3</sup> (1000 µg/mL, 100 mL), and method guide.	ICX-Fe23
<b>U</b>	<b>Trace Elements in Uranium Matrix Kit.</b> 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
<b>Cl</b>	<b>Inorganic Chlorine Speciation Kit.</b> CF-Cl-01 column, single species standards for Cl <sup>-</sup> , ClO <sub>2</sub> <sup>-</sup> , ClO <sub>3</sub> <sup>-</sup> , ClO <sub>4</sub> <sup>-</sup> (1000 µg/L, 100 mL), and method guide.	ICX-CICIO3
<b>Br</b>	<b>Inorganic Bromine Speciation Kit.</b> CF-Br-01 column, single species standards for Br <sup>-</sup> & BrO <sub>3</sub> <sup>-</sup> (1000 µg/mL, 100 mL) and method guide.	ICX-BrBrO3
<b>I</b>	<b>Inorganic Iodine Speciation Kit.</b> CF-I-01 column, single species standards for I <sup>-</sup> & IO <sub>3</sub> <sup>-</sup> (1000 µg/mL, 100 mL) and method guide.	ICX-IIO3
<b>Cl Br I</b>	<b>Inorganic Halogens Speciation Kit.</b> CF-Halogen-01 column, single species standards for Cl <sup>-</sup> , ClO <sub>2</sub> <sup>-</sup> , ClO <sub>3</sub> <sup>-</sup> , ClO <sub>4</sub> <sup>-</sup> , Br <sup>-</sup> , BrO <sub>3</sub> <sup>-</sup> , I <sup>-</sup> , IO <sub>3</sub> <sup>-</sup> (1000 µg/mL, 100 mL), and method guide.	ICX-ClBrI



## Automated Seawater Analysis for the Agilent 7800/7900/8900 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.

### 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 SP3 system

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  $\text{Na}^+$ ,  $\text{Cl}^-$ ,  $\text{Ca}^{2+}$  and  $\text{Mg}^{2+}$  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

H

2

He

3

Li

4

Be

5

B

6

C

7

N

8

O

9

F

10

Ne

11

Na

12

Mg

13

Al

14

Si

15

P

16

S

17

Cl

18

Ar

19

K

20

Ca

21

Sc

22

Ti

23

V

24

Cr

25

Mn

26

Fe

27

Co

28

Ni

29

Cu

30

Zn

31

Ga

32

Ge

33

As

34

Se

35

Br

36

Kr

37

Rb

38

Sr

39

Y

40

Zr

41

Nb

42

Mo

43

Tc

44

Ru

45

Rh

46

Pd

47

Ag

48

Cd

49

In

50

Sn

51

Sb

52

Te

53

I

54

Xe

55

Cs

56

Ba

72

Hf

73

Ta

74

W

75

Re

76

Os

77

Ir

78

Pt

79

Au

80

Hg

81

Tl

82

Pb

83

Bi

84

Po

85

At

86

Rn

87

Fr

88

Ra

57

La

58

Ce

59

Pr

60

Nd

61

Pm

62

Sm

63

Eu

64

Gd

65

Tb

66

Dy

67

Ho

68

Er

69

Tm

70

Yb

71

Lu

89

Ac

90

Th

91

Pa

92

U

Preconcentration or Direct Mode

Direct mode

Hydride or Direct Mode (SP3 only)

## seaFAST Preconcentration and Matrix Removal Process

### Step 1:

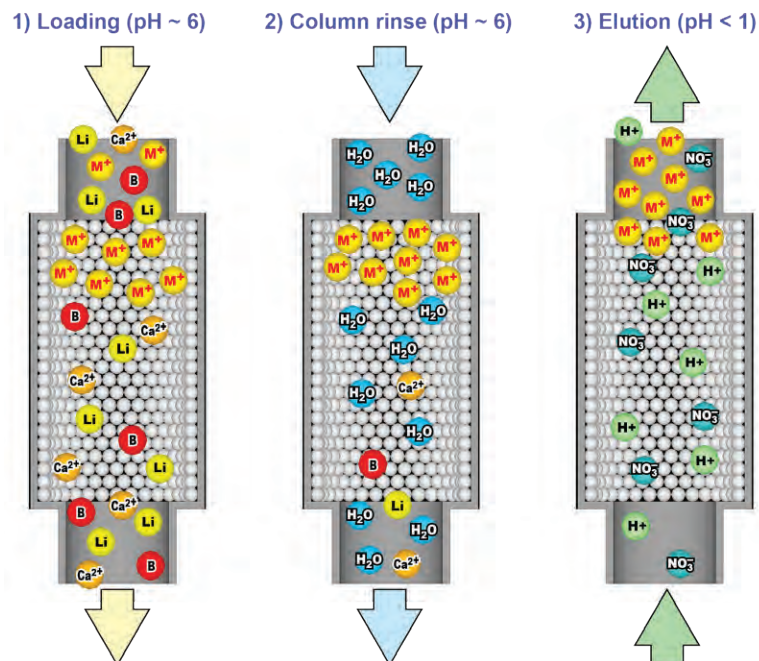
Sample loaded onto complexing column

### Step 2:

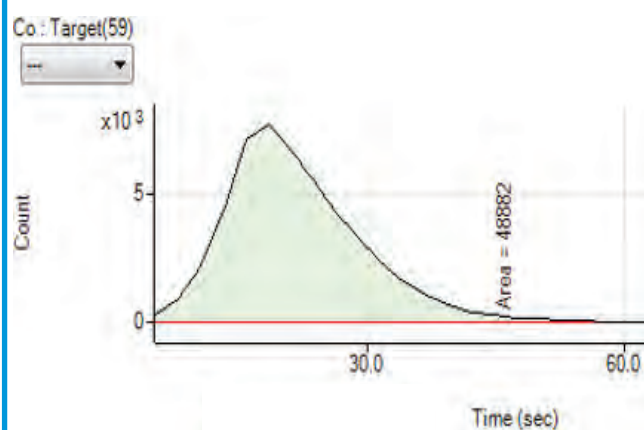
Matrix components washed off column

### Step 3:

Analytes eluted from column for analysis

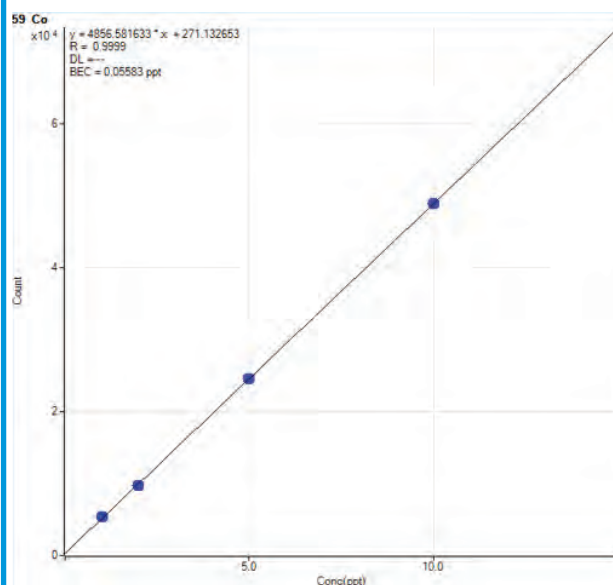


### Preconcentration and Matrix Removal



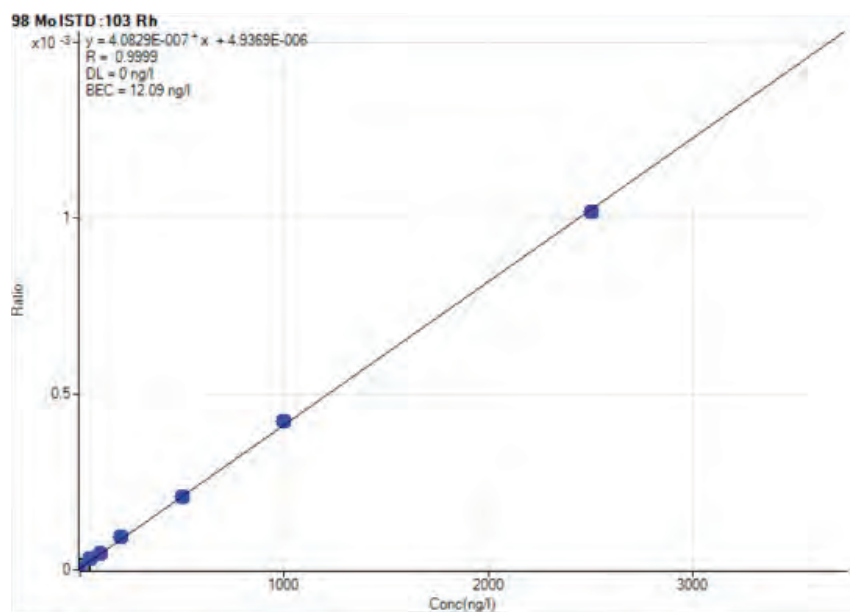
Real-time transient signal (TRA Mode) for inline elution of 10 ppt Co in Preconcentration mode.

### Preconcentration Mode Autocalibration



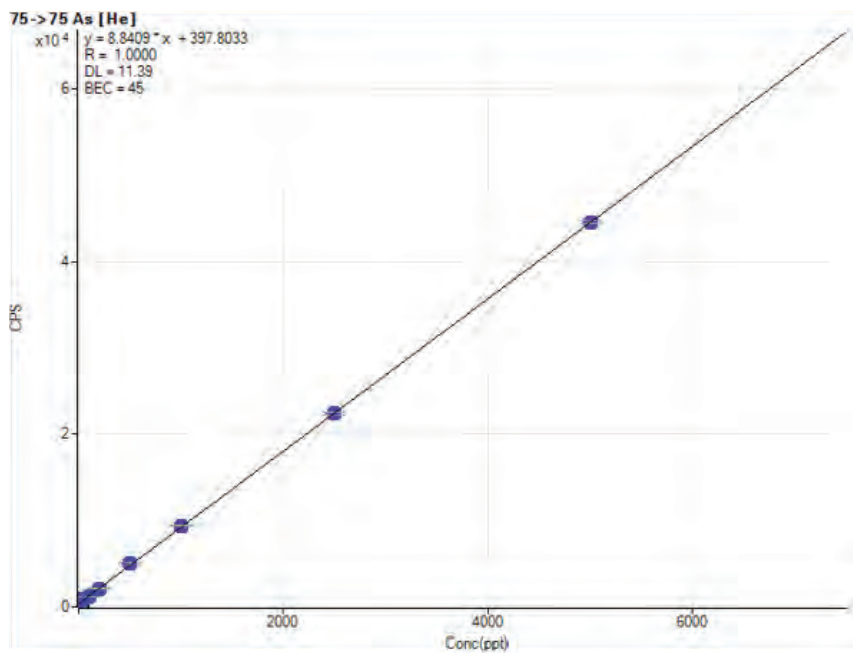
<sup>59</sup>Co+ in Preconcentration mode, autocalibrated from a 10 ppt stock standard using an Agilent 7900 in STD mode.

## Direct Mode Autocalibration



$^{98}\text{Mo}+$  in Direct mode, autocalibrated and matrix-matched with seaBlank from a single, 5000 ppt stock standard using an Agilent 8800 in single quad KED mode.

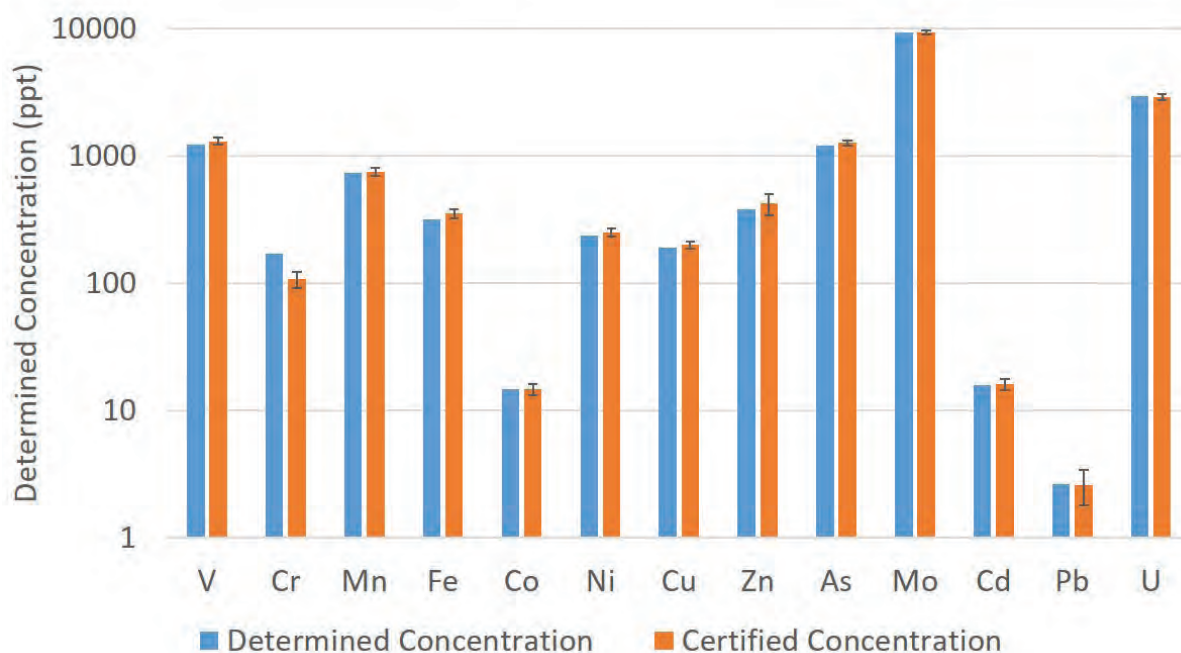
## Hydride Mode Autocalibration



$^{75}\text{As}+$  in Hydride mode, autocalibrated and matrix-matched with seaBlank from a single, 5000 ppt stock standard using an Agilent 8800 in KED mode.



## NASS-7 Determination with seaFAST



Undiluted NASS-7 was analyzed by seaFAST using autocalibration and automatic, inline matrix matching with seaBlank ultrapure sodium chloride solution. Direct mode: Cr, As, Mo, U. All others analyzed in preconcentration mode.

## 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
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	seablink-0500
seaFAST Ultrapure Buffer, 1 L	UPB-4M-1L



# Ultrapure Reagents



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



# hydrideICP™

## Compact Hydride Generation System for Agilent 7800/7900/8900 ICPMS

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

### Benefits:

- Increased sensitivity, up to 100x for hydride-forming elements
- Improved detection limits for As, Hg, Se, Sb, and other hydride-forming elements
- Improved stability
  - MP<sup>2</sup> micro peristaltic pump precisely mixes sample and reagents, producing a stable formation of H<sub>2</sub> gas and hydrides
- Compact
  - hydrideICP is the smallest system of its kind on the market (95 mm x 118 mm x 140 mm)
- Chemically resistant construction
  - MP<sup>2</sup> micro peristaltic pump with ceramic pins, a PFA mixing block and quartz GLS
- Convenient
  - hydrideICP is completely integrated into the MP<sup>2</sup> pump

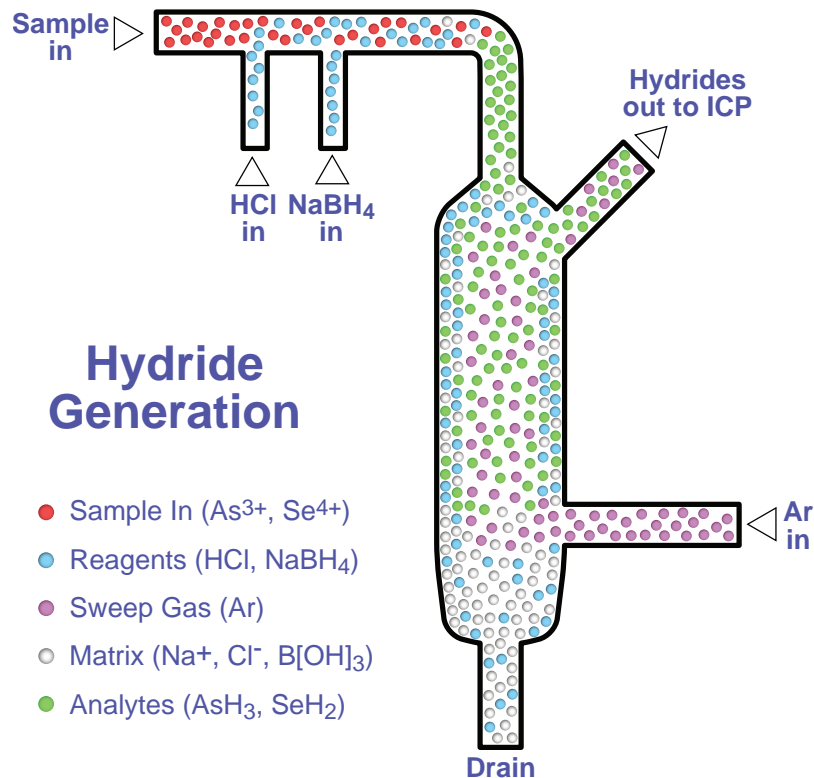


hydrideICP system

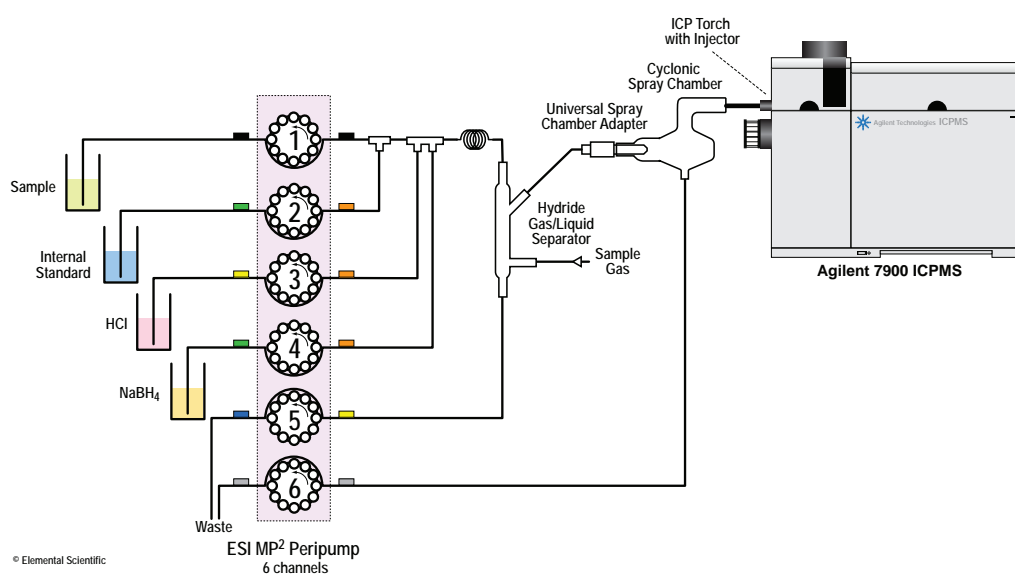


The optional Universal Spray Chamber Adaptor (HG-USCA-01) connects the gas-liquid separator to any 6mm nebulizer port in a spray chamber





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



hydrideICP with internal standard system diagram

Description	Part Number
hydrideICP hydride generation system. hydrideICP Generator Kit (Hydride quartz gas-liquid separator, four way tee, MP <sup>2</sup> precision micro peristaltic pump, universal spray chamber adapter and mounting plate).	HG-MP2-6-A
Universal Spray Chamber Adapter	HG-USCA-01

# TuneSelect

## Automatic daily startup, hardware and auto-tuning without an operator

The TuneSelect system allows for inline introduction of tune solutions from up to 4 dedicated bottles for automated tuning and optimization of the Agilent 7800/7900/8900 ICPMS.

Up to 4 different solutions can be selected. For example: peristaltic pump carrier solution, tune solution, P/A tune solution and spray chamber rinse solution.

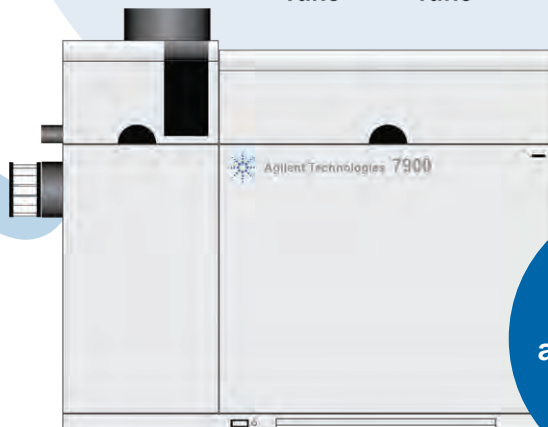
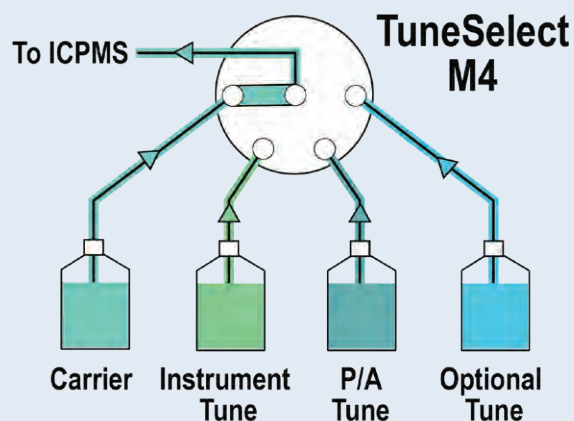
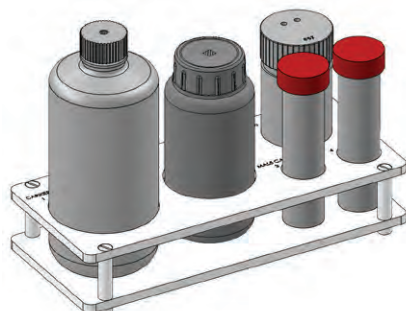
When a hardware, startup or auto-tune is initiated, the TuneSelect will automatically introduce the selected tune solution as selected within the software, allow for prescribed uptake time and even allow for manual tuning within the ESI plugin dropdown menu.

### TuneSelect Automatically Introduces:

- Daily tuning solution
- Dual detector calibration solution
- Rinse or additional tune solution
- Carrier solution



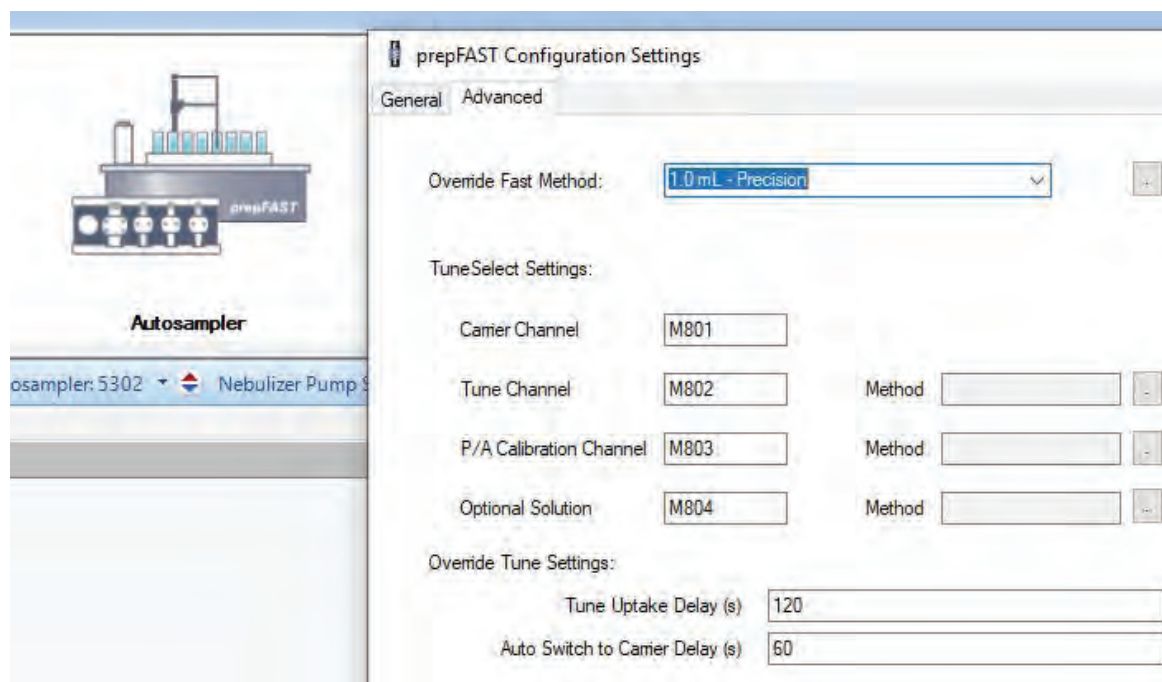
TuneSelect valve and rack support  
- quick and simple operation



**TuneSelect  
Requires a DX  
autosampler for  
operation**



## TuneSelect Settings Interface



prepFAST Configuration Settings

General Advanced

Override Fast Method: 1.0 mL - Precision

TuneSelect Settings:

Carrier Channel M801

Tune Channel M802 Method

P/A Calibration Channel M803 Method

Optional Solution M804 Method

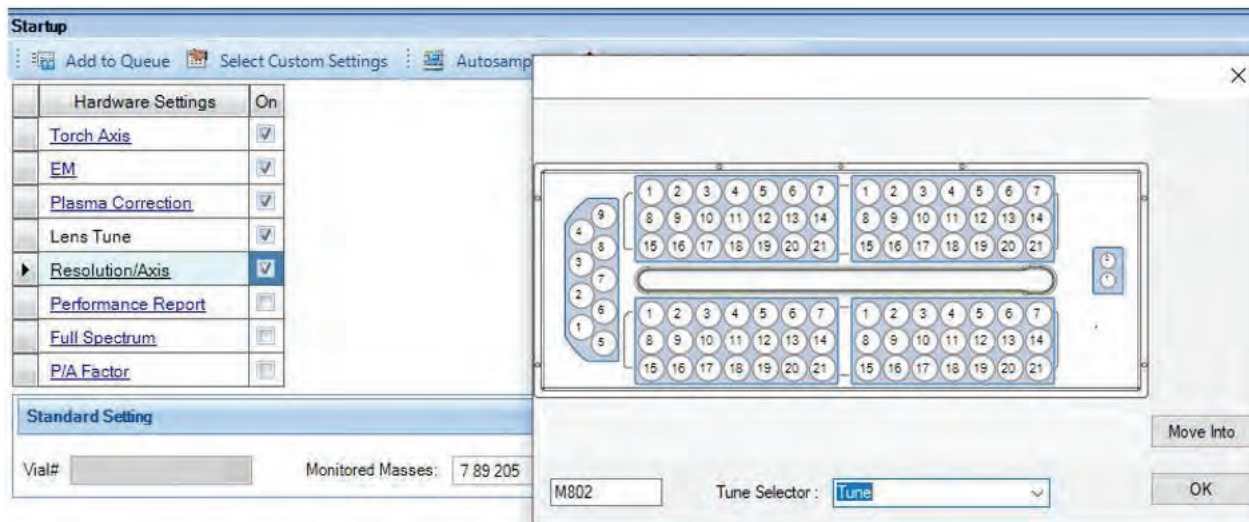
Override Tune Settings:

Tune Uptake Delay (s) 120

Auto Switch to Carrier Delay (s) 60

The settings window in the ESI Plugin for Agilent MassHunter where TuneSelect settings are adjusted.

## Automated Hardware Tuning



Startup

Add to Queue Select Custom Settings Autosamp

Hardware Settings On

Torch Axis ☒

EM ☒

Plasma Correction ☒

Lens Tune ☒

Resolution/Axis ☒

Performance Report ☐

Full Spectrum ☐

P/A Factor ☐

Standard Setting

Vial# Monitored Masses: 7.89 205

M802 Tune Selector: Tune

Move Into OK

Before a hardware or start-up tune begins, the TuneSelect will switch to the tune solution and wait for a prescribed uptake time. The TuneSelect valve can also be manually controlled from a drop-down autosampler interface in multiple pages of the Agilent MassHunter software to enable manual tuning, as well.

Description	Part Number
TuneSelect for Agilent prepFAST. M4 valve with stream-selection valve actuator, communication cable, probes, and bottles. Used for automated tuning and optimization of the Agilent ICPMS using ESI plugins, includes bottles for carrier, tune, P/A calibration, and optional tune solution.	TS-M4-79

## 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.



SC-1207-DX-1200  
Enclosure for 2 DX autosampler with  
ULPA Filter (autosampler not included)

Autosampler Model	Enclosure Only	Enclosure with ULPA Filter
Enclosure for SCMicro DXe, DX & DXCi	SC-1607-DX	SC-1607-DX-1000
Enclosure for 2 DXe, DX & DXCi	SC-1207-DX	SC-1207-DX-1200
Enclosure for 4 DXe, DX & DXCi	SC-1407-DX	SC-1407-DX-1200
Enclosure for 8 DXe, DX & DXCi	SC-1807-DX	SC-1807-DX-1000
Enclosure for 14 DXe, DX & DXCi	SC-1107-DX	SC-1107-DX-1030

See pages 98-99 for dimension specifications

### Ultra-Low Particulate Arrester Air Filter and Mounting Plate

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

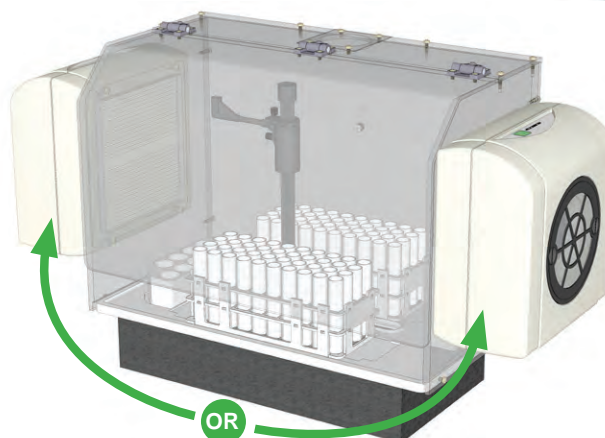
#### ULPA Filter Specifications

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

Description	Part Number
ULPA filter for autosampler enclosure	SC-0602
ULPA filter mounting plate for 2DX or 4DX	SC-1107-0026

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

SC-0602  
ULPA Filter



# Mobile Autosampler Stations

## Mobile Stations for 2DX and 4DX Autosampler

### 2DX and 4DX Mobile Autosampler Stations

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

**Benefits:**

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

AUTOMATION



SC-1210-DX mobile station with 2DX autosampler



SC-1410-DX mobile station with 4DX autosampler

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

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





## Fluorospray Sample Introduction Kits for the Agilent 7900/8900 ICPMS

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:

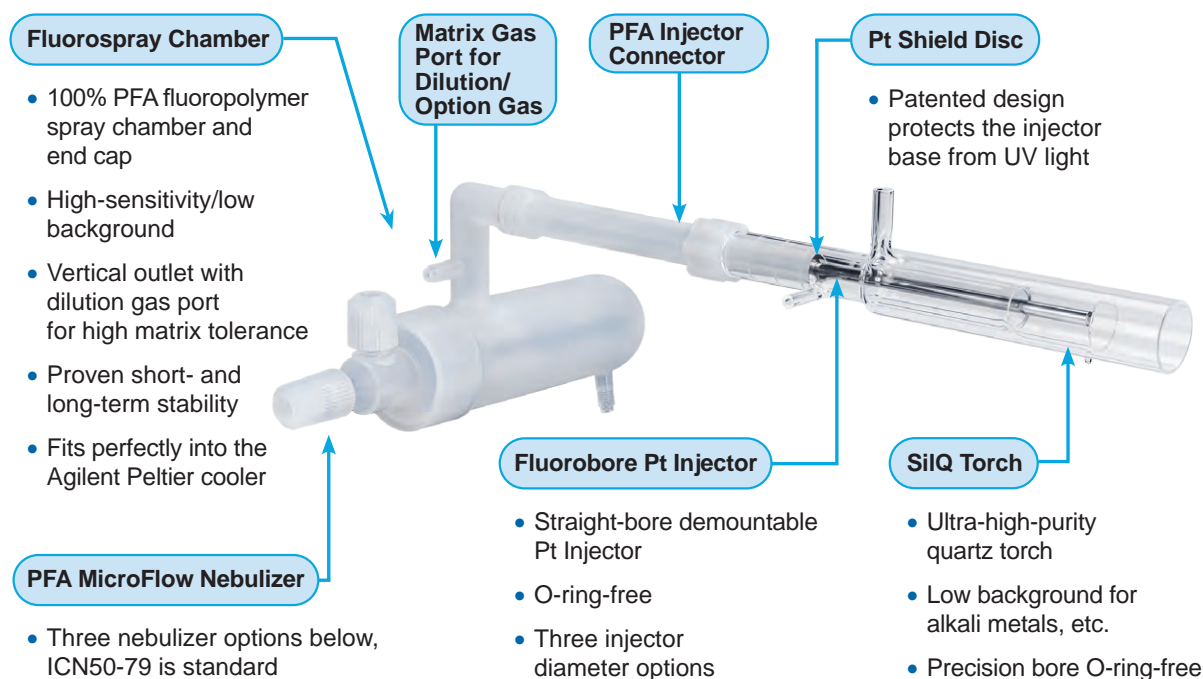
- Fluorospray PFA spray chamber with dilution or option gas port and PFA endcap with make-up gas port
- Fluorobore straight-bore injector with Pt shield disc
  - Platinum injector for ultra-trace chemical analysis
  - Sapphire injector for HF resistance
- O-ring-free torch
  - Quartz with sapphire injector kits
  - SilQ ultra-high-purity quartz with platinum injector kits
- Labeled lines for nebulizer, make-up gas and dilution/option gas
- MicroFlow PFA-ICN Integrated Capillary Nebulizer



Fluorospray Sample Introduction Kit assembled on Agilent 7900 ICPMS



## Fluorospray Platinum Ultrapure Sample Introduction Kit Features Diagram



Type	Description	Application	Part Number
Semiconductor	<b>Fluorospray Platinum Ultrapure Volatile Sample Introduction Kit for Agilent 7900/8900.</b> Includes SilQ torch and 1.5 mm Fluorobore Pt injector.	Ultrapure semi-volatile and aqueous chemicals	FS-2379-Pt15
Semiconductor	<b>Fluorospray Platinum Ultrapure Non-Volatile Chemicals Sample Introduction Kit for Agilent 7900/8900.</b> Includes SilQ torch and 2 mm Fluorobore Pt injector.	Ultrapure non-volatile chemicals	FS-2379-Pt20
Semiconductor	<b>Fluorospray Platinum Ultrapure High Matrix Chemicals Sample Introduction Kit for Agilent 7900/8900.</b> Includes SilQ torch and 2.5 mm Fluorobore Pt injector.	Ultrapure high-matrix chemicals	FS-2379-Pt25
Geochemical	<b>Fluorospray Sapphire Volatile Chemicals Sample Introduction Kit for Agilent 7900/8900.</b> Includes quartz torch and 1.5 mm sapphire injector.	HF-containing, semi-volatile and aqueous chemicals	FS-2379-S15
Geochemical	<b>Fluorospray Sapphire Non-Volatile Chemicals Sample Introduction Kit for Agilent 7900/8900.</b> Includes quartz torch and 2.0 mm sapphire injector.	HF-containing, non-volatile chemicals	FS-2379-S20
Geochemical	<b>Fluorospray Sapphire High Matrix Chemicals Sample Introduction Kit for Agilent 7900/8900.</b> Includes quartz torch and 2.5 mm sapphire injector.	HF-containing, high-matrix chemicals	FS-2379-S25

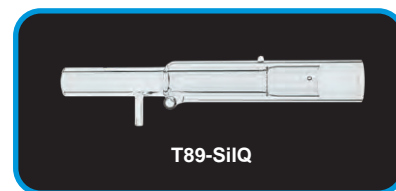
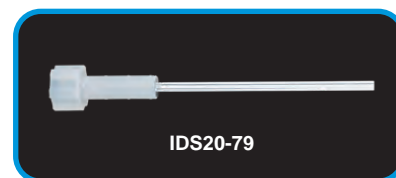
### Recommended with these Nebulizers

Description	Application	Part Number
MicroFlow PFA-ICN Integrated Capillary Nebulizer for Agilent ICPMS	Peristaltic pump, FAST & prepFAST valves	ICN50-79
MicroFlow PFA-ICN Integrated Capillary Nebulizer for prepFAST SF	Semiconductor	ICN100-79
MicroFlow PFA Nebulizer with Integrated Fluorall Probe	Semiconductor	IPN100-79

## Fluorospray Sample Introduction Components for Agilent 7900/8900

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 gas port and PFA endcap with make-up gas port	FS-2179
Connector	PFA injector connector for Fluorospray chamber to Fluorobore injector	FSX-2122-79
Pt Injector	Fluorobore 1.5 mm ID Pt straight-bore injector with Pt Shield Disc	FID-Pt15-79
Pt Injector	Fluorobore 2 mm ID Pt straight-bore injector with Pt Shield Disc	FID-Pt20-79
Pt Injector	Fluorobore 2.5 mm ID Pt straight-bore injector with Pt Shield Disc	FID-Pt25-79
Sapphire Injector	Fluorobore 1.5 mm ID Sapphire straight-bore injector with Pt Shield Disc	IDS15-79
Sapphire Injector	Fluorobore 2.0 mm ID Sapphire straight-bore injector with Pt Shield Disc	IDS20-79
Sapphire Injector	Fluorobore 2.5 mm ID Sapphire straight-bore injector with Pt Shield Disc	IDS25-79
Shield Disc	Pt Shield Disc for Fluorobore injectors (10 mm OD)	FSX-PTSD-10
SilQ Torch	SilQ ultra-high-purity demountable torch for Agilent ICPMS	T89-SilQ
Quartz Torch	Quartz demountable torch for Agilent ICPMS	T89-Q
Gas Line	PFA-ST nebulizer gas line for Agilent ICPMS, OneTouch gas connector	S250548
Gas Line	Make-Up Gas Line for Agilent 7900/8900 Fluorospray spray chamber, OneTouch connector	S250545
Gas Line	Dilution/Option Gas Line for Agilent 7900/8900 Fluorospray spray chamber, OneTouch connector	S250544
Drain Line	Drain Line for Agilent 7900/8900 Fluorospray spray chamber	S250549
Nebulizer	Microflow PFA Nebulizer with Integrated Fluorall Probe	IPN100-79



# Elemental Scientific Laser Ablation Systems

## Direct ICPMS Analysis of Solid Samples

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

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

Elemental Scientific Lasers has a complete product portfolio for:

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

**New Agilent Masshunter™  
plugin for laser ablation systems  
NOW AVAILABLE!**



INNOVATION to ILLUMINATE



193 nm  
Laser System

### Applications Include:

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

### Materials Include:

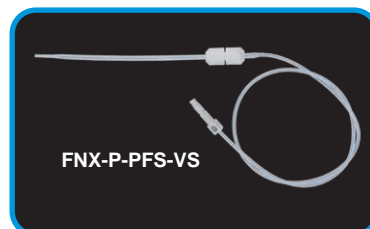
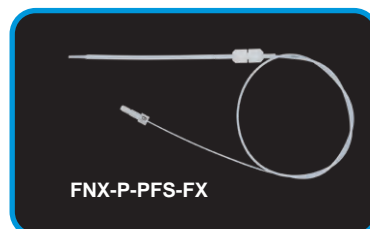
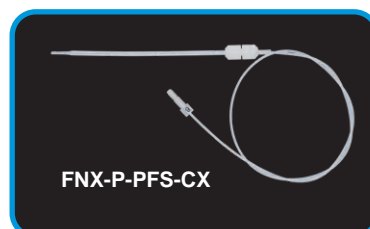
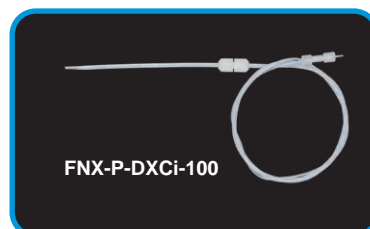
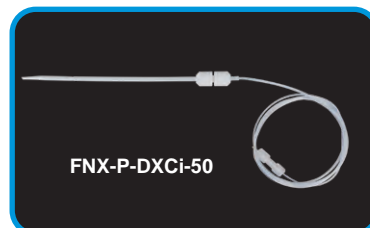
Alloys  
Rocks  
Minerals  
Glasses  
Plastics  
Powders  
Biological  
Thin films  
Ceramics  
Metals

SAMPLE INTRODUCTION

## Fluorall High Purity PFA Sampling Probes

These 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 / SF.

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 SF. Equipped with 70 cm capillary length with 1 mm ID and fitting to connect with valve in prepFAST SF	prepFAST SF 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

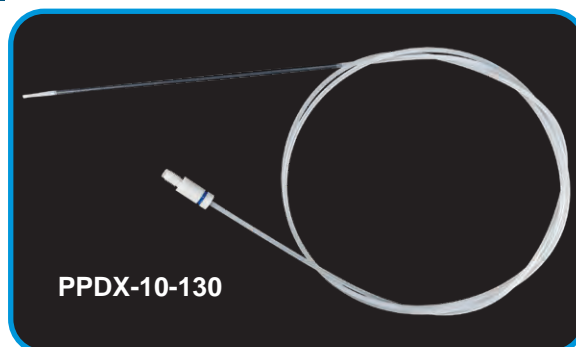




## Parabolic Probe for Autocorrecting Autosamplers

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.

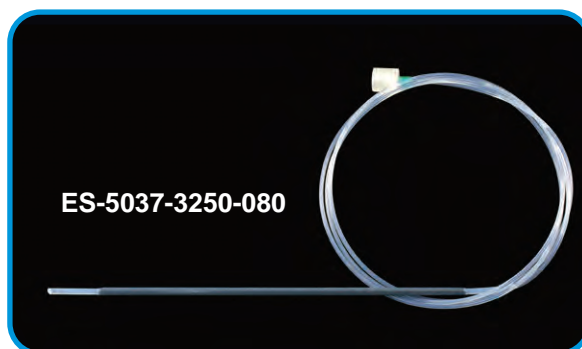
Description	Part Number
Sample Probe: carbon fiber support, 1.0 mm ID (gray marker) 130 cm fully encapsulated capillary with 1/4-28 fitting with tapered tip	PPDX-10-130



## 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 Micro DX) 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



Autosampler Probes					
Probe I.D. (mm)	Capillary Length (cm)	Self-aspiration rate (@1L/min Ar)	DX Autosamplers Part Number	FAST & prepFAST Autosamplers Part Number	Micro DX 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 Agilent ICPMS Systems

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 ultra clean, chemically inert and manufactured to the exact length for the Agilent ICPMS systems. These nebulizers are ready for quick installation and offer high performance with ease-of-use.

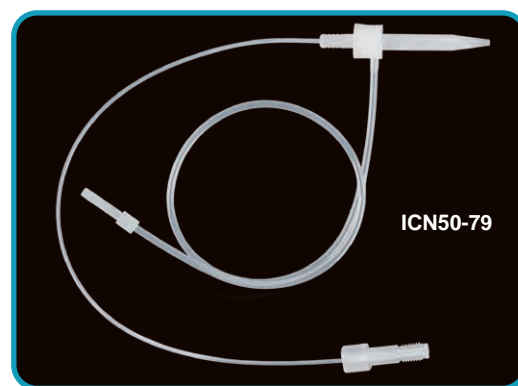
The self-aspirating PFA MicroFlow OneTouch fluoropolymer nebulizers are chemically resistant and an essential part of the ICPMS laboratory. The PFA integrated capillary nebulizers produce a fine aerosol from aggressive acids, alkalis, organics, and high-salt solutions. They are resistant to clogging 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.

### Benefits:

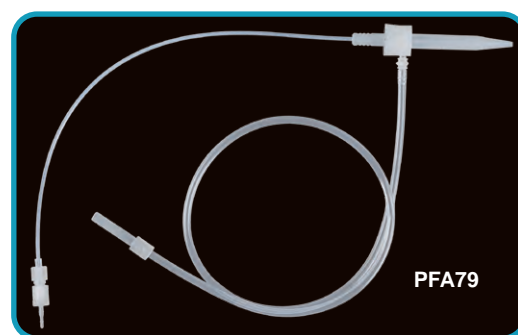
- Integrated capillary eliminates additional connection at nebulizer
  - Optimized internal diameter for use with all *FAST* and *prepFAST* valve-equipped systems with coded fitting for proper valve port connection
  - Customized length OneTouch liquid capillary to minimize dead volume and uptake delay
  - 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 Agilent ICPMS systems



OneTouch gas connector pre-fitted gas line on PFA nebulizers safeguards against leaks while providing quick and easy installation on Agilent ICPMS systems (see page 64).



PFA MicroFlow OneTouch nebulizer for *FAST* and *prepFAST*



PFA MicroFlow OneTouch nebulizer for peristaltic pumping

Model	Part Number
PFA MicroFlow OneTouch nebulizer for <i>FAST</i> and <i>prepFAST</i> for Agilent ICPMS, with OneTouch gas connector and 50 cm liquid capillary	ICN50-79
PFA MicroFlow OneTouch nebulizer for <i>prepFAST</i> IC for Agilent ICPMS, with OneTouch gas connector and 100 cm liquid capillary	ICN100-79
PFA MicroFlow OneTouch nebulizer for direct connection to peristaltic pump tubing for Agilent ICPMS, with OneTouch gas connector and OneTouch liquid capillary (20 cm) with barbed fitting	PFA79

# PFA-ST MicroFlow OneTouch Nebulizers

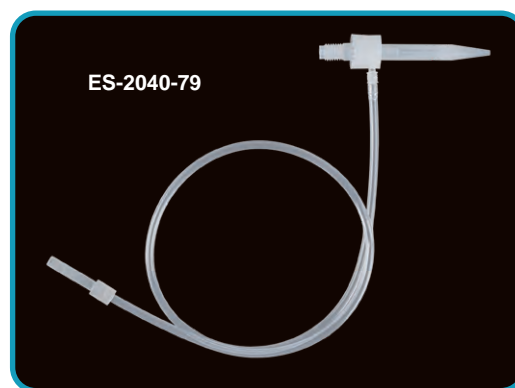
## PFA-ST High-Efficiency MicroFlow OneTouch Nebulizers for Agilent ICPMS Systems

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 Agilent 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 57 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 Agilent 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 Agilent 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 $\mu$ L/min)	For general high sensitivity and high performance	ES-2040-79
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 $\mu$ L/min)	prepFAST equipped systems	PF-2040-79



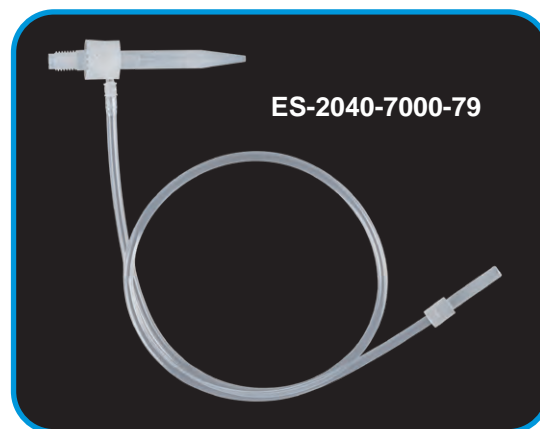
## PFA-ST MicroFlow Nebulizers for the Agilent ICPMS

### 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<sup>3X</sup> or heated PCH Peltier systems.

Description	Part Number
High temperature Apex PFA-ST MicroFlow OneTouch nebulizer with external 1/4-28 threaded connector and gas line with OneTouch connector	ES-2040-7000-79
High temperature Apex 100 PFA MicroFlow nebulizer with integrated 90-150 µL/min self-aspiration capillary and gas line	ES-2002-7000-79

See pages 70-71 for more information on Apex systems

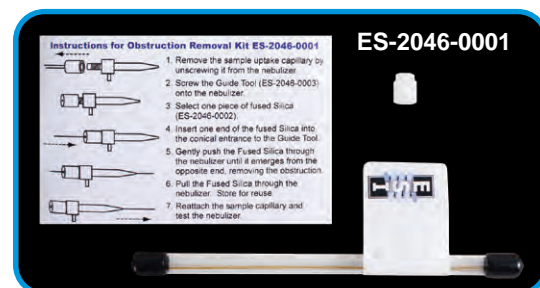


### Syringe Flush and Obstruction Removal Kits for Nebulizers

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



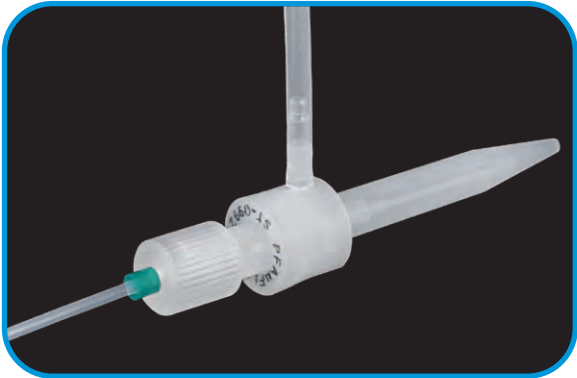
# Capillaries for PFA-ST MicroFlow OneTouch Nebulizers

## 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 µL/min to 700 µL/min.

### Benefits:

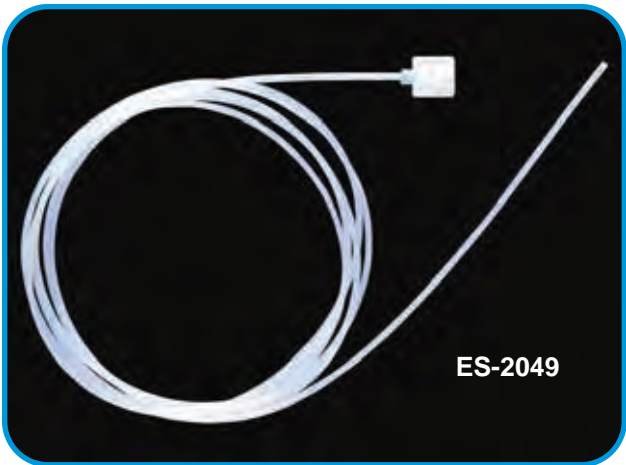
- All PFA construction provides chemical resistance
- Can be peristaltically pumped from 0.1 to 3.0 mL/min
- Supports direct analysis of both volatile and non-volatile solvents



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 (@1L/min Ar)	Part Number
0.15 mm	20 µL/min <span style="color: red;">■</span> (red)	ES-2045
0.20 mm	50 µL/min <span style="color: purple;">■</span> (purple)	ES-2043
0.25 mm	100 µL/min <span style="color: green;">■</span> (green)	ES-2042
0.30 mm	200 µL/min <span style="color: yellow;">■</span> (yellow)	ES-2047
0.50 mm	400 µL/min <span style="color: orange;">■</span> (orange)	ES-2041
0.80 mm	700 µL/min <span style="color: blue;">■</span> (blue)	ES-2044
1.00 mm	1 mL/min <span style="color: gray;">■</span> (gray)	ES-2049

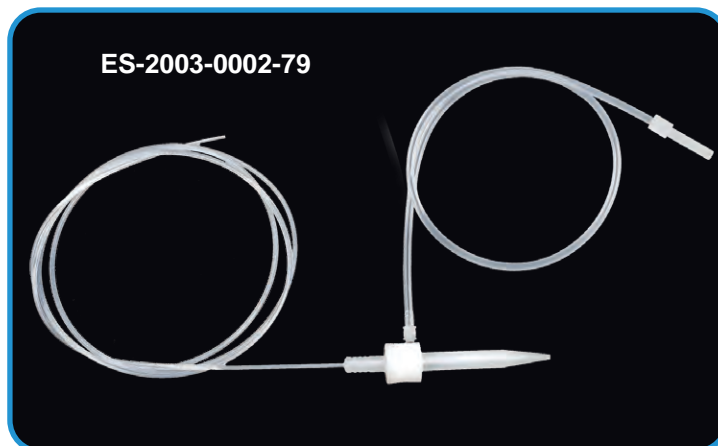
## PFA MicroFlow OneTouch Nebulizers with Integrated Sample Capillaries for Agilent ICPMS Systems

### 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 Agilent ICPMS systems with OneTouch gas connector



PFA MicroFlow OneTouch Nebulizers with Integrated Fluoropolymer Capillaries		
Model	Measured self-aspiration rate (@1L/m Ar)	Part Number
PFA-20	20 $\mu\text{L}/\text{min}$	ES-2020-79
PFA-50	50 $\mu\text{L}/\text{min}$	ES-2000-79
PFA-100	100 $\mu\text{L}/\text{min}$	ES-2002-0002-79

Other flow rates made to order



## PFA MicroFlow OneTouch Nebulizers with Integrated Self-Aspirating Autosampler Probes For Agilent ICPMS Systems

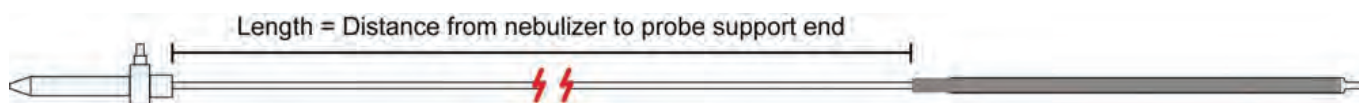
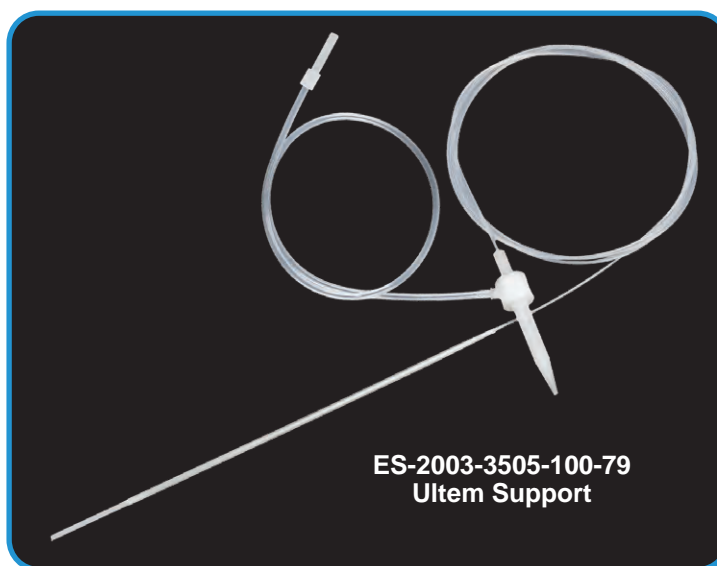
### Self-Aspirating PFA Nebulizers with Integrated Probes

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 Agilent 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 (@1L/min Ar)	Support Material	Application	Length (cm)	Part Number
PFA-20	DX	20 $\mu$ L/min	Ultem	High Purity/Semiconductor	80	ES-2020-3505-080-79
					100	ES-2020-3505-100-79
PFA-50	DX	50 $\mu$ L/min	Ultem	High Purity/Semiconductor	80	ES-2000-3505-080-79
					100	ES-2000-3505-100-79
PFA-100	DX	100 $\mu$ L/min	Ultem	High Purity/Semiconductor	80	ES-2002-3505-080-79
					100	ES-2002-3505-100-79
PFA-200	DX	200 $\mu$ L/min	Ultem	High Purity/Semiconductor	80	ES-2003-3505-080-79
					100	ES-2003-3505-100-79

Smaller 80 cm long capillary length normally utilized with Micro DX autosampler

## 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 Agilent ICPMS and an integrated fluoropolymer sample line with barbed fitting for direct no-leak connection to both flared and unflared peristaltic pump tubing.

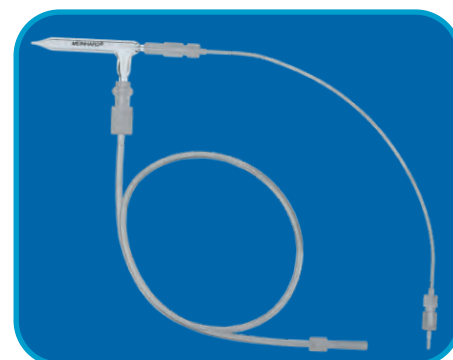
The C79 nebulizer is suitable for almost all non-HF applications and is available in Glass, Quartz and SiIQ Ultra-high Purity Quartz.



MEINHARD® OneTouch C79-SiIQ 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 Agilent 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
- C79 nebulizer for samples containing high solids



MEINHARD® OneTouch C79-Q quartz nebulizer for Agilent ICPMS

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

MEINHARD® OneTouch Nebulizers for Agilent ICPMS				
Description	Glass	Quartz	SiIQ Ultra-high Purity Quartz	Similar OEM Part Number (Glass)
MEINHARD® OneTouch C79 high solids nebulizer	C79	C79-Q	C79-SiIQ	G3266-80004 G3266-80005 G1820-65138

## 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 Agilent ICPMS systems.



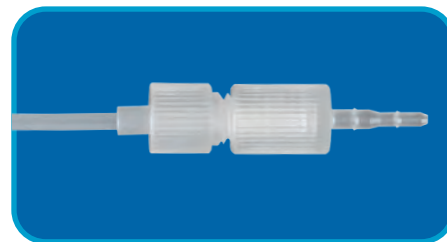
MEINHARD® OneTouch nebulizer includes pre-fitted fluoropolymer liquid and gas lines. Shown installed on Agilent 7900 ICPMS



See page 64 for **OneTouch Gas Connector Lines** for Agilent ICPMS Systems



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

## MEINHARD® OneTouch Liquid Lines for Agilent ICPMS

### OneTouch Internal Standard and Spare Liquid Lines for Peristaltic Pumping

Description	Application	Part Number
Internal standard addition tee with grounding for Agilent ICPMS	For all MEINHARD® glass and quartz nebulizers	IS-MOT-79
MEINHARD® Spare OneTouch nebulizer liquid line for Agilent ICPMS systems. 0.5 mm ID (orange marker) and peristaltic pump barb fitting		S250923



### Pearl Nebulizer Cleaner

Backflushes glass and quartz nebulizers to remove blockages

Description	Part Number
Pearl nebulizer cleaner, for all quartz and glass concentric nebulizers	PRL-03



PRL-03



## pergo 500 High Solids Accessory

The *pergo* 500 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 ICP nebulizer gas stream. By increasing humidity in the argon nebulizer, the *pergo* 500 prevents salt deposits in the nebulizer, improving short and long-term signal stability. The patented design supports either one or two independent gas flows, uniquely and safely humidifying these sample introduction gas flows from one module.

### Benefits:

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

### Features:

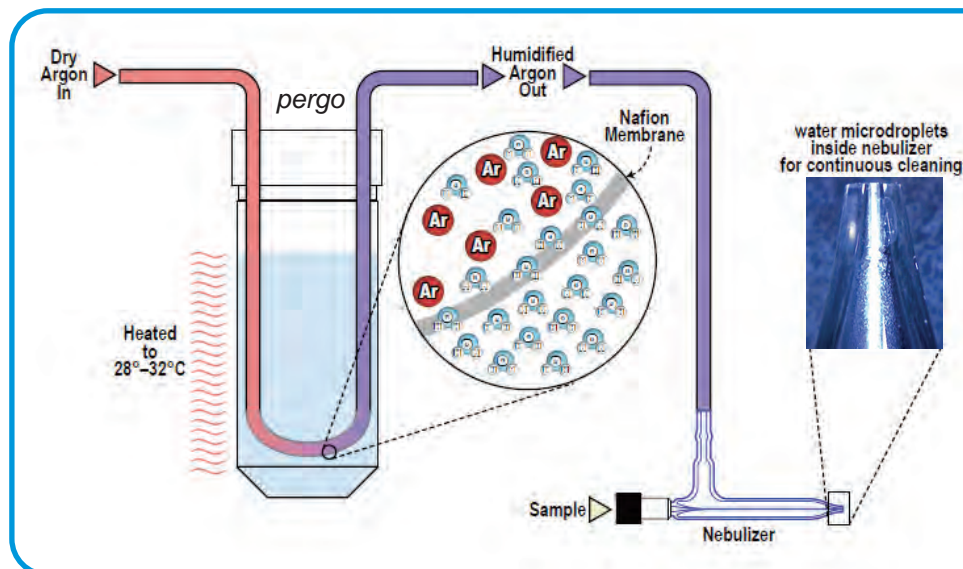
- Safe and easy to use
  - Atmospheric pressure PFA water reservoir
  - Friction-fit PFA cap with quick water refill
  - Max and Min level markers
- Allows use of high-sensitivity nebulizers for high TDS samples without requiring dilution
- Supports both Meinhard™ and PFA MicroFlow nebulizers
- *pergo* 500 Dual model also enhance HMI/UHMI performance with a second channel that humidifies this additional argon gas stream



*pergo* 500 Argon Gas Humidifier



Agilent 7900 with the *pergo* 500 Argon Gas Humidifier



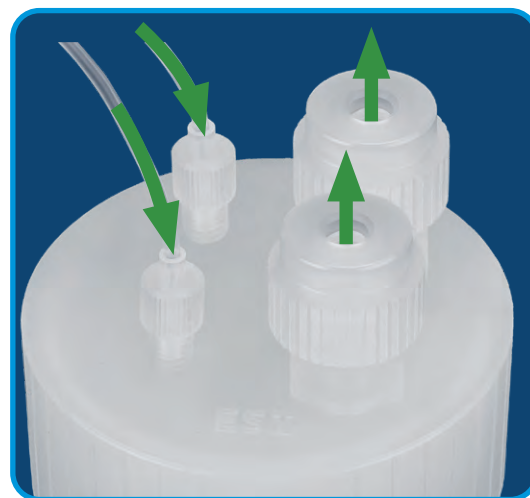
Water microdroplets continuously clean the inside of the nebulizer and prevent salt deposits.

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.

### **pergo 500 Dual Channel**

The patented pergo 500 Dual Channel adds a second channel to humidify the HMI/UHMI gas flow. This enhances performance and long-term stability when high solids samples are analyzed when utilizing HMI/UHMI. With the pergo 2 Dual Channel, both the nebulizer and the HMI/UMHI gas streams are humidified.

Description	Part Number
pergo 500 Argon Nebulizer Gas Humidifier	pergo 500-79
pergo 500 dual channel Argon Nebulizer Gas Humidifier	pergo 500 D-79



pergo 500 Dual Channel humidifies both the nebulizer gas and the HMI/UHMI gas flows

## Double Pass Quartz Spray Chambers and Accessories for the Agilent 7800/7900/8900

Description	Application	Part Number	Similar to OEM P/N
Double pass quartz spray chamber for Agilent 7700/7800/7900/8900	Non HMI/UHMI	ES-2122-1000	G3280-80008
Connector tube between spray chamber and torch, quartz	Non HMI/UHMI	ML190041	G3270-80025
Double pass quartz spray chamber for UHMI, for Agilent 7700/7800/7900/8900	UHMI/HMI	ML190067	G8400-67150
Connector tube between spray chamber and torch, with dilution port for HMI/UHMI, quartz	UHMI/HMI	ML190065	G3270-80024
Endcap for non-HMI/UHMI quartz spray chambers, fluoropolymer	Non HMI/UHMI	MM151030	G3280-6008



## Spray Chamber and Nebulizer Accessories for Agilent ICPMS

OneTouch fluoropolymer gas fittings ensure quick and secure connections

Description	Application	Part Number
PFA MicroFlow OneTouch nebulizer gas line for Agilent ICPMS	For all PFA MicroFlow nebulizers	S250548
MEINHARD OneTouch nebulizer gas line for Agilent ICPMS	For all MEINHARD quartz and glass nebulizers	S250737
Make-up OneTouch gas line for PFA spray chambers on Agilent ICPMS	For all ESI fluoropolymer spray chambers with threaded female gas ports	S250245
Make-up OneTouch gas line for quartz spray chambers on Agilent ICPMS	For fluoropolymer endcap on quartz spraychamber	S251040
Dilution gas Line for Agilent ICPMS, OneTouch gas connector	For all ESI fluoropolymer and quartz cyclonic spray chambers with 1/4-28 threaded gas port	S250544
Drain Line for Agilent ICPMS spray chambers	For all ESI fluoropolymer and quartz cyclonic spray chambers with 1/4-28 threaded drain port	S25049
Addition Gas line kit for Agilent ICPMS	For all spray chambers with 1/4-28 gas fitting	ES-2502-1000
PFA Secure Nut	Secures nebulizer to ESI spray chambers	ES-3199-0003





# CUSTOM ELEMENT STANDARDS

Elemental Scientific offers single element standards, single element kits, common standard mixes, custom standards as well as metal-organic 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](http://WWW.ICPMS.COM)



# Elemental Scientific



## OEM Style Torches for Agilent 7x00/8x00 ICPMS

### One Piece Quartz Torches

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

Description	Application	Part Number	Similar to OEM P/N
One Piece Quartz Torch, 1.0 mm ID injector	Volatile Organic Solvents	ES-1304-7710	G3280-80081
One Piece Quartz Torch, 1.5mm ID injector	Organic Solvents	ES-1304-7715	G3280-80080
One Piece Quartz Torch, 2.5mm ID injector	General Use	ES-1304-7725	G3280-80053



### SilQ Ultra-high Purity Torches

The SilQ torch is made from the highest purity synthetic quartz. They have low levels of Al, Fe, Mg, and other contaminants, generating low, stable blanks that can enhance ICPMS detection limits. Includes integrated SilQ injector.

Description	Application	Part Number	Similar to OEM P/N
One Piece SilQ Quartz Torch, 1.0 mm ID injector	Volatile Organic Solvents	T10-SilQ-79	G3280-80081
One Piece SilQ Quartz Torch, 1.5 mm ID injector	Organic Solvents	T15-SilQ-79	G3280-80080
One Piece SilQ Quartz Torch, 2.5 mm ID injector	General Use	T25-SilQ-79	G3280-80053

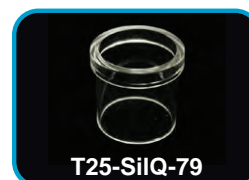


## Torch Accessories

### Torch Shields and Bonnet

Compatible with Agilent ICPMS models: 7x00, 8x00

Description	For Torch Type	Part Number	Similar to OEM P/N
Platinum Shield Plate	All	ES-3000-1661	G1833-65419
Silver Shield Plate	All	ES-3000-1668	G1833-65419
Bonnet, quartz ring for shield torch	All	ES-1320-7501	G1833-65421

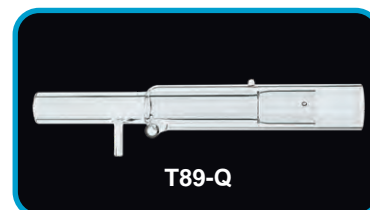


# Demountable Torches and Injectors

## Demountable Torches

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

Description	Application	Part Number
Quartz demountable torch for Agilent 7x00/8x00 Series ICPMS	HF	T89-Q
SilQ ultra-high-purity demountable torch for Agilent 7x00/8x00 ICPMS	HF-containing High purity	T89-SilQ



## Injectors for Demountable ESI Quartz and SilQ Torches for Agilent 7800/7900/8900 ICPMS

### Platinum Injectors

Platinum injectors are used to measure ppq and low ppt levels of trace metals in HF-containing samples such as semiconductor-grade ultrapure chemicals.

Description	ID Size (mm)	Part Number
Platinum Injector for Agilent 7x00/8x00 Series, o-ring free, use with T89-Q and T89-SilQ Demountable Torches	1.5	ES-1313-7150
	2	ES-1313-7200
	2.5	ES-1313-7250



### Sapphire Injectors

Sapphire injectors are for introducing environmental, geochemical, and HF-containing samples.

Description	ID Size (mm)	Part Number
Sapphire Injector for Agilent 7x00/8x00 Series, o-ring free, use with T89-Q and T89-SilQ Demountable Torches	1.5	ES-1303-7150
	2	ES-1303-7200
	2.5	ES-1303-7250



### Quartz Injectors

Quartz injectors are for introducing both organic solvents and wide range of non-HF aqueous applications

Description	ID Size (mm)	Part Number
Quartz Injector for Agilent 7x00/8x00 Series ICPMS, o-ring free, use with T89-Q and T89-SilQ Demountable Torches	1.0	ES-1323-7100
	1.5	ES-1323-7150
	2.0	ES-1323-7200
	2.5	ES-1323-7250



## Thermally Stabilized Inlet System for Agilent 7900/8900

The PC<sup>3X</sup> is a compact Peltier heated and cooled inlet system which incorporates the ESI cyclonic spray chambers. The PC<sup>3X</sup> heats or cools the outer walls of the cyclonic spray chamber, reducing the water or solvent vapor loading on the plasma – resulting in enhanced stability and performance. The spray chamber can incorporate any 6 mm nebulizer but is ideally suited to PFA MicroFlow nebulizers. Installation on Agilent ICPMS systems is quick and easy.

### Design Benefits:

- O-ring free high-purity quartz cyclonic design provides significantly improved analyte washout over standard Scott spray chamber.
- Direct upgrade for Agilent 7900/8900 ICPMS systems with increased sensitivity
- Thermal stabilization of spray chamber improves long-term stability
- Air cooled operation eliminates water lines and connections
- Software temperature control of  $\pm 0.1^{\circ}\text{C}$  from  $-10^{\circ}\text{C}$  to  $+80^{\circ}\text{C}$  with USB or Bluetooth connectivity and temperature logging
- 12/5 socket connection and mounting bracket for coupling to Agilent ICPMS
- SSI hybrid dual cyclonic/Scott quartz spray chamber option improves stability for isotope ratio measurements without compromising sensitivity



PC<sup>3X</sup> for Agilent 7900/8900  
PC3X-79



PC<sup>3X</sup> with SSI hybrid dual cyclonic/Scott  
spray chamber (PC3X-79-SSI)



PC<sup>3X</sup> installed on  
Agilent 7900  
PC3X-79

Description	Spray Chamber	Addition Gas Port	UHMI Port	UV Shield	Part Number
PC <sup>3X</sup> Peltier Cooler for Agilent 7900 / 8900 with quartz cyclonic spray chamber for UHMI, with spray chamber. Supplied with PFA nebulizer and mounting bracket	Quartz	✓	✓	✓	PC3X-79
PC <sup>3X</sup> – SSI Peltier Cooler for Agilent 7900 / 8900 with SSI hybrid dual cyclonic/ Scott spray chamber. Supplied with PFA nebulizer and mounting bracket	Quartz	✓			PC3X-79-SSI

# Quartz Cyclonic Spray Chambers for PC<sup>3X</sup>

## High Purity Quartz Cyclonic Spray Chambers for PC<sup>3X</sup> on Agilent 7900/8900

These cyclonic spray chambers are designed to fit directly into the PC<sup>3X</sup> Peltier Cooler, and deliver significant performance benefits over Scott type spray chambers. All ESI cyclonic spray chambers feature:

- Improved analyte washout over standard Scott spray chamber
- O-ring-free connections to any 6mm nebulizer
- Secure leak-free threaded drain port
- Optional threaded auxiliary port for addition / UHMI gas

The Stable Sample Introduction (SSI) dual quartz chamber adds a second homogenization chamber, which produces a very stable signal that is ideal for isotope ratio analysis.

Description	Application	Part Number
Baffled quartz cyclonic spray chamber for PC <sup>3X</sup> on Agilent 7900/8900. Fits PC <sup>3X</sup> Peltier cooler. Equipped with two threaded ports for make-up and UHMI gas addition. Quartz socket connection, 180° inlet/outlet, includes drain line	Make-up and UHMI gas ports. Use with PC <sup>3X</sup>	ES-3162-1118-26
SSI dual cyclonic-double pass spray chamber for Agilent ICPMS. Fits PC <sup>3X</sup> Peltier cooler. Equipped with threaded port for make-up gas and drain line	Use with PC <sup>3X</sup> , Isotope Ratios	ES-3262-1118



SAMPLE INTRODUCTION



## Apex Omega and Apex 2 High Sensitivity Sample Introduction Systems

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

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

### Apex Systems:

- Are available with quartz or HF-resistant PFA flow path
- Have complete software control of:
  - Heated spray chamber temperature
  - Peltier-cooled condenser temperature
  - N<sub>2</sub> addition gas mass flow controller
  - Ar addition gas mass flow controller
  - Micro peristaltic pump drain

### Key Differences:

#### Apex 2

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

#### Apex Omega

- Significantly reduce oxides and solvent removal (0.01% CeO<sup>+</sup>/Ce<sup>+</sup>)
- Heated membrane module also integrated into software control
- Two stage desolvation (Peltier-cooled and EPTFE membrane) imparts matrix tolerance higher than any membrane desolvator on the market



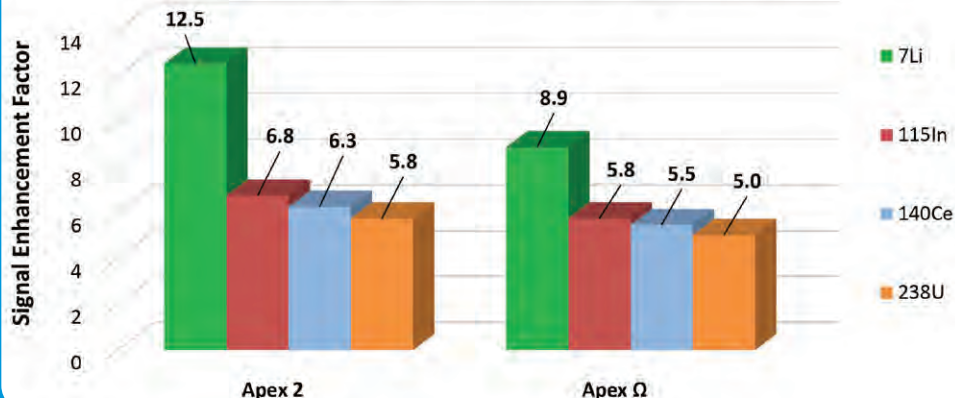
Apex 2 Q



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

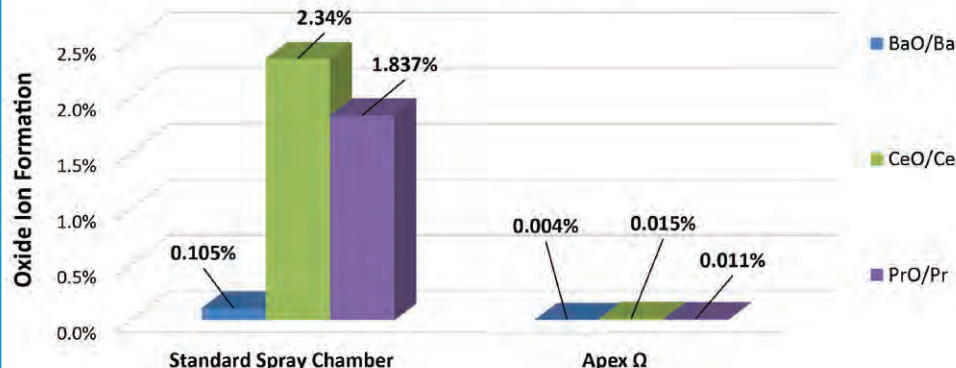
Apex Sensitivity Enhancement vs Standard Spray Chamber



## Enhanced Sensitivity

- Signal enhancements commonly obtained for both Apex 2 and Apex Omega
- Signal enhancement obtained for Apex 2 and Apex Omega shown for Li, In, Ce, and U

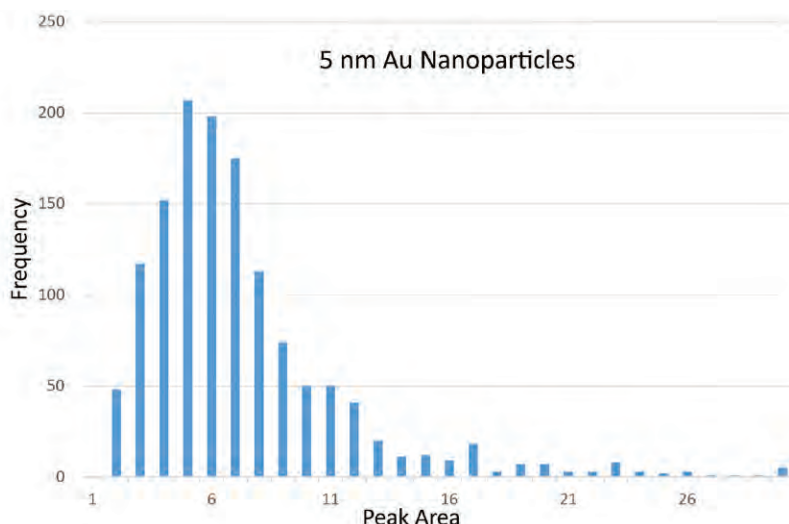
Rare Earth Oxide Levels



## 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%

5 nm Au Nanoparticles



## 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
- Au nanoparticles with most frequent size of 5 nm shown on the left

Classic Apex Systems are still available  
Apex Q, Apex IR and Apex HF

Please contact [ESI\\_sales@icpms.com](mailto:ESI_sales@icpms.com)



## Interface Cones for Agilent ICPMS

### MEINHARD® Cones

MEINHARD® cones for the Agilent 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



			Instrument Model Compatibility					
Description	Part Number	Similar to OEM P/N	7700 x/e	7700 s	7800	7900	8800	8900
<b>Sampling Cones</b>								
Ni plated sampling cone, Cu base	MC-67061	G3289-67061	✓	✓	✓	✓	✓	✓
Ni sampling cone, Cu base	MC-67040	G3280-67040	✓	✓	✓	✓	✓	✓
Pt sampling cone, Cu base	MC-67036	G3280-67036	✓	✓	✓	✓	✓	✓
Pt sampling cone, 18mm insert, Cu base	MC-67056	G3280-67056	✓	✓	✓	✓	✓	✓
Graphite gasket for sampler cone, pkg/3	MC-67009	G3280-67009	✓	✓	✓	✓	✓	✓
<b>Skimmer Cones</b>								
Ni skimmer cone, Ni base (for x-lens)	MC-67041	G3280-67041	✓		✓		✓	
Pt skimmer cone, Cu base	MC-67060	G3280-67060	✓		✓		✓	
Pt skimmer cone, Ni base	MC67063	G3280-67063	✓		✓		✓	
Pt skimmer cone, Cu base (also for 8900 c-lens)	MC-67064	G3280-67064		✓		✓	✓	✓
Pt skimmer cone, Ni base	MC-67065	G3280-67065		✓		✓	✓	
Ni skimmer cone, Ni base	MC-67066	G3280-67066		✓		✓	✓	
Ni skimmer cone, Ni base (for x-lens)	MC-67200	G8400-67200				✓		✓
Pt skimmer cone, Cu base (for x-lens)	MC-67201	G8400-67201				✓		✓
Pt skimmer cone, Ni base (for x-lens)	MC-67202	G8400-67202				✓		✓
Pt skimmer cone, Cu base (for s-lens)	MC-67401	G3666-67401						✓
Pt skimmer cone, Ni base (for s-lens)	MC-67411	G3666-67411						✓
Ni skimmer cone, Ni base (for s-lens)	MC-67421	G3666-67421						✓
Pt skimmer cone, Ni base (for m-lens)	MC-67501	G3666-67501						✓



**Go  
Green**  
with our  
**Trade-in  
Program!**

We've created a recycling program for any ICPMS cones, regardless of manufacturer. There is no limit to the number of cones being returned using this program, and the total amount accumulated maybe used toward the purchase of any cone that ESI carries up to a maximum of 20% off list price.\*



### **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.

Up to 20% may be deducted from the total amount for extraction costs.

\* This program cannot be combined with any other discounts or special offers.

**Please contact our sales staff for more information regarding this program**





# Peristaltic Pumps

## Stand Alone MP<sup>2</sup> Precision Micro Peristaltic Pumps

### MP<sup>2</sup> Precision Micro Peristaltic Pumps

The MP<sup>2</sup> is a compact, precise, stand-alone micro peristaltic pump with a flow rate range of 0.20  $\mu\text{L}/\text{min}$  to 10  $\text{mL}/\text{min}$  and is available with one to eight channels. Both computer controlled and manual controlled models of these pumps are available to meet your specific needs. Optimized for low-flow rates, the MP<sup>2</sup> uses either MP<sup>2</sup> pump tubing or standard 3-stop pump tubing.

MP <sup>2</sup> Precision Micro Peristaltic Pumps		
MP <sup>2</sup> 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
7 channel	MP2-7-PC	MP2-7-S
8 channel	MP2-8-PC	MP2-8-S



Computer Controlled model comes equipped with control cable and control software



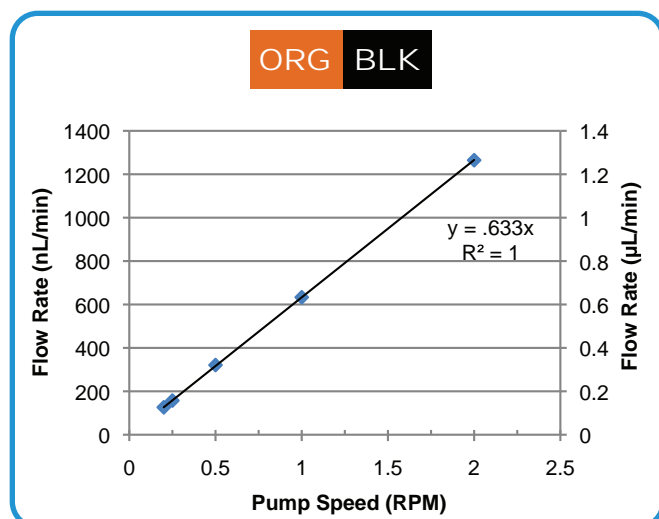
MP2-4-S  
Manual controlled stand-alone, precision micro peristaltic pump

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

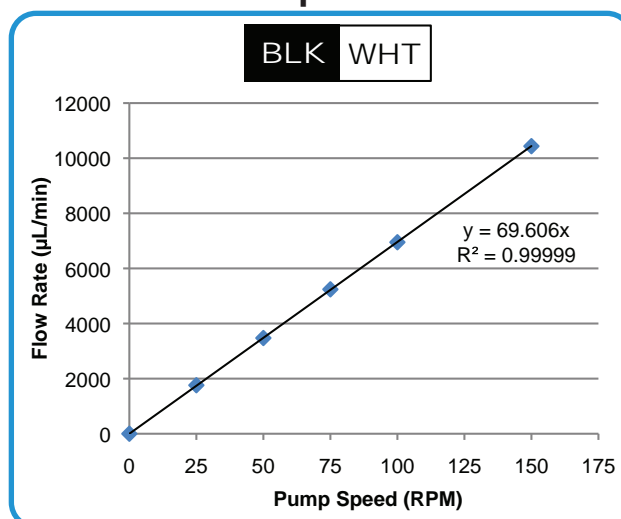
### Perilink Fittings (Barbed) Adapts 10/32 to pump tubing

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

### Nanoliter Flow Rates



### Flow rates up to 10 $\text{mL}/\text{min}$



MP<sup>2</sup> pumps can control flow from the nanoliters well into the mL range

# Peristaltic Pump Tubing

## Pump Tubing for Agilent and ESI MP<sup>2</sup> Peristaltic Pumps



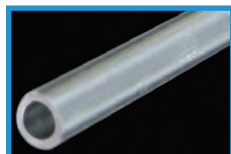
Tubing for Peristaltic Pumps (Packs of 12)

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

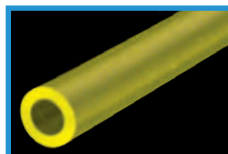
### Non-Flared



PVC

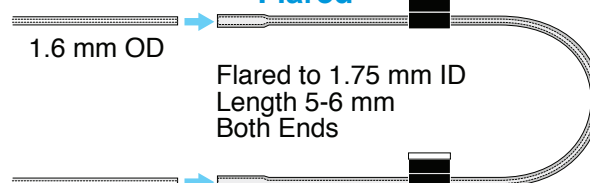


Santoprene®



SOLVA

### Flared



### MP<sup>2</sup> PUMP TUBING KIT

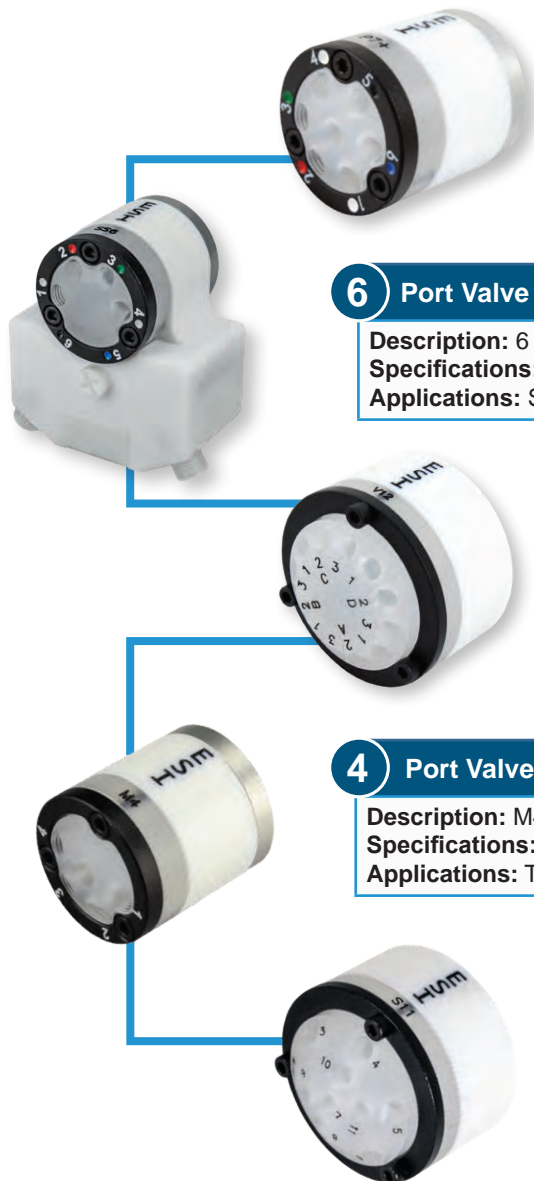
Description	Part Number
MP <sup>2</sup> Pump Tubing Kit comprised of 34 packs of 12 tubes, one package of each blue highlighted part number in the table above. Includes: 26 packs of PVC tubing (0.13 to 3.17 mm i.d.) 3 packs of Santoprene® tubing and 5 packs of Solva tubing. Kit also includes: 30 CTFE 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-PPM3), 5 large female (ES-2501-PPF5) and 5 large male (ES-2501-PPM5).	MPP-K-1

\*\*Santoprene® is a product of ExxonMobil

## 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:** TuneSelect

### 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 - A7μ	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	PVDF	PF-P7HP	PF-P7HPS	PF-P6HPR
8 - P7HP	0.5 mm	CTFE	PVDF	PF-P7XHP	PF-P7XHPS	PF-P6HPR

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	PVDF	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	PVDF	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	PF-TW1003



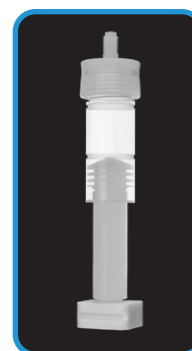
PF-S1003

3 mL Syringes	
Description	Part Number
3 mL quartz syringe	PF-S1030
3 mL quartz syringe, pre-cleaned for prepFAST SF	PF-S1030C
3 mL CTFE syringe	PF-S3030
3 mL CTFE syringe, pre-cleaned for prepFAST SF	PF-S3030C
3 mL quartz syringe, tall high pressure for prepFAST IC	PF-HS1030
3 mL quartz syringe, thick walled, for prepFAST X	PF-TW1030
3 mL quartz syringe, thick walled, pre-cleaned for prepFAST SF	PF-TW1030-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 SF	PF-S1060C
6 mL CTFE syringe	PF-S3060
6 mL CTFE syringe, pre-cleaned for prepFAST SF	PF-S3060C
6 mL quartz syringe, tall high pressure for prepFAST IC	PF-HS1060
6 mL quartz syringe, thick walled, for prepFAST X	PF-TW1060



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	PF-TW1120



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 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. <span style="color: orange;">■</span> (orange), 150 cm length	ES-5036-IS-64
Manual sample probe with Ultem support. Includes fluoropolymer micro fitting	0.50 mm i.d. <span style="color: orange;">■</span> (orange), 150 cm length	ES-5046-IS



## Nebulizer Lines

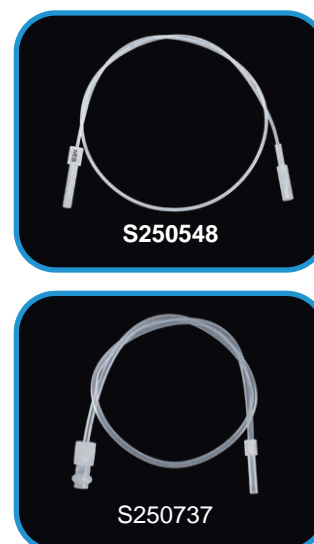
### Low Volume Nebulizer Sample Lines

Description	Part Number
Sample line 0.5 mm i.d. <span style="color: orange;">■</span> (orange) for PFA-ST nebulizer	SL-50-64
Sample line 0.5 mm i.d. <span style="color: orange;">■</span> (orange) for MEINHARD® Plus nebulizer	S090004



### Nebulizer Gas Lines & Fittings

Description	Part Number
PFA MicroFlow nebulizer gas line for Agilent ICPMS, OneTouch gas connector	S250548
MEINHARD® nebulizer gas line for Agilent ICPMS, OneTouch gas connector	S250737
FG Gas Quick Connect for MEINHARD® nebulizers on ICPMS	FG-62



# Internal Standard Addition Kits and Tees

## Internal Standard Addition Kits

### Internal Standards Kits

Agilent 7800/7900/8900 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
- MP<sup>2</sup> 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
- MP<sup>2</sup> peristaltic pump tubing



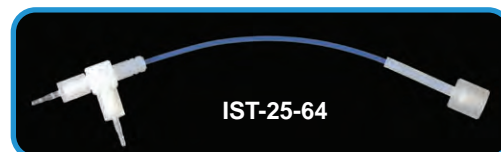
Description	Type	Part Number
Internal Standards Kit for MEINHARD® Nebulizer. Includes PFA tee, fittings, IS probe, SPP Starter Flared Pump Tubing Pack (org/grn, blk/blk, pharmed gry/gry)	MEINHARD®	SC-0317-64
Internal Standards Kit for PFA-ST Nebulizer. Includes PFA tee, fittings, IS probe, SPP Starter 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

Agilent 7800/7900/8900 internal standard mixing tee for online addition of internal standard or online dilution. Achieves excellent mixing with minimal dead volume.











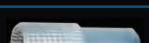


Description	Part Number
Internal standard addition tee 0.5 mm i.d. ■ (orange) for PFA-ST nebulizer.	IST-25-64
Internal standard addition tee 0.5 mm i.d. ■ (orange) for MEINHARD® Plus nebulizer.	IS-MP-64
Internal standard addition tee with grounding for Agilent ICPMS	IS-MOT-79





## 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	P/N
	Black, high-flow nut (1/4-28) for FAST valve and 1/16" (1.6 mm) ferrule	10	Use with 1/16" (1.6 mm) o.d. PFA tubing for low and moderate flow rates (0.1 mL/min - 2 mL/min)	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	10	Use with 1/16" tubing for 10/32 fittings	S032958
	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.

### Standard for *FAST* Systems

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

Description	Size	Part Number
Recommended for use with 1.0 mm i.d. ■ (gray) probe. 1.6 mm o.d., 1/4-28 fittings.	300 µL loop	SC-0318-03
	500 µL loop	SC-0318-05
	1.0 mL loop	SC-0318-10
	1.5 mL loop	SC-0318-15
<b>Applications</b>	2.0 mL loop	SC-0318-20
	2.5 mL loop	SC-0318-25
	3.0 mL loop	SC-0318-30
	4.0 mL loop	SC-0318-40
<i>FAST</i> , prep <i>FAST</i> , prep <i>FAST</i> M5, prep <i>FAST</i> e, brine <i>FAST</i> , sea <i>FAST</i>		



SC-0318-25 2.5 mL sample loop

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

Description	Size	Part Number
Recommended for use with 0.8 mm i.d. ■ (blue) probe. 1.6 mm o.d., 1/4-28 fittings.	100 µL loop	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
<b>Applications</b>	1.5 mL loop	SC-0319-15
	2.0 mL loop	SC-0319-20
	2.5 mL loop	SC-0319-25
	3.0 mL loop	SC-0319-30
Legacy <i>FAST</i> systems, and special applications	4.0 mL loop	SC-0319-40



SC-0319-10 1 mL sample loop

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

Description	Size	Part Number
Recommended for use with 1.0 mm i.d. ■ (gray) probes and applications requiring larger sample volumes or high flow rates. 3.2 mm o.d., 1/4-28 fittings.	250 µL loop	SC-0315-025
	500 µL loop	SC-0315-05
	1.0 mL loop	SC-0315-10
	2.0 mL loop	SC-0315-20
<b>Applications</b>	3.0 mL loop	SC-0315-30
	4.0 mL loop	SC-0315-40
	6.0 mL loop	SC-0315-60
	8.0 mL loop	SC-0315-80
soil <i>FAST</i> , oil <i>FAST</i> , and large volume <i>FAST</i>		



SC-0315-80 8 mL sample loop

## 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 91), MR-40-14 (pg 91), SR4-60-14 (pg 93)
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	

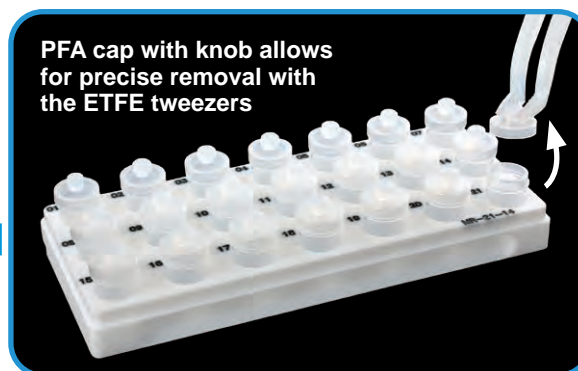
	Part Number	Qty
	V-14-0312CG-X	10
	Description	Volume
	14 mm o.d. graduated PFA micro vial	2 mL Brim full 3 mL

	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 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 92), MR-10-30 (pg 91)
V-31-30-X	SR2-27-31 (pg 92), MR-10-30 (pg 91), ST10-31 (pg 94)
V-31-60-X	LR-21-30 (pg 90), LMR-21-30-R (pg 90), SR2-27-31 (pg 92), HR-21-30 (pg 91), ST10-31 (pg 94)
V-28-0360-V	SR2-27-28 (pg 92), ST10-28 (pg 94)
V-50-0360	SR2-12-50 (pg 92), ST2-9-50 (pg 95), ST4-9-50 (pg 95), SR4x-20-50 (pg 93)


	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	Screw cap for 30 mm o.d. vials



## 2 mL PVDF Autosampler Vial

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

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

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

PVDF Vials and PFA Caps		
Description	Qty	Part Number
PVDF vial, 2 mL	10	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
V-14-0712-X	MR-21-14 (pg 91), MR-40-14 (pg 91), SR4-60-14 (pg 93)



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



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


# Sample Vessels


## Non-PFA Sample Vessels


### Non-PFA Vials, Tubes and Bottles


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


Vials	Fits Racks
V-8-0505	MR-60-08 (pg 91), MR-90-08 (pg 91)
V-13-0200-R	LR-90-13-R (pg 90), LMR-90-13-R (pg 90), LMR-90-13-R-3T (pg 90), ST-PR-5 (pg 90)
V-20-0290	LR-40-20 (pg 90)
V-16-0225	HR-60-16 (pg 91), LR-60-16 (pg 90), LMR-60-16-R (pg 90), SR2-80-16 (pg 92), ST-PR-5 (pg 94)
V-28-0260	HR-21-30 (pg 91), ST10-28 (pg 94), LR-21-30 (pg 94), LMR-21-30-R (pg 90), SR2-27-28 (pg 92), ST-PR-5 (pg 94), ST-EX-5B (pg 94)
V-50-0460	SR4x-20-50 (pg 93), SR2-12-50 (pg 92), ST-PR-5 (pg 90), ST2-9-50 (pg 91), ST4-9-50 (pg 91)
V-61-0661	SR4x-15-60 (pg 93), ST7-60 (pg 95), ST-PR-5 (pg 90), ST-EX-5B (pg 94)


	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, 4 and 14 with special top



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



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



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



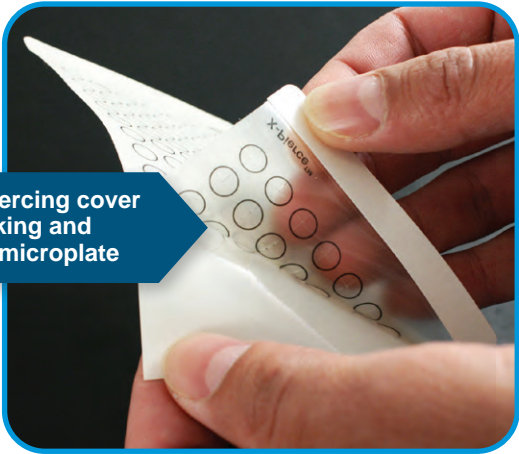
MT-96-2mL-02

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 $\mu$ L microplate, polystyrene	MT-96-500-05-V

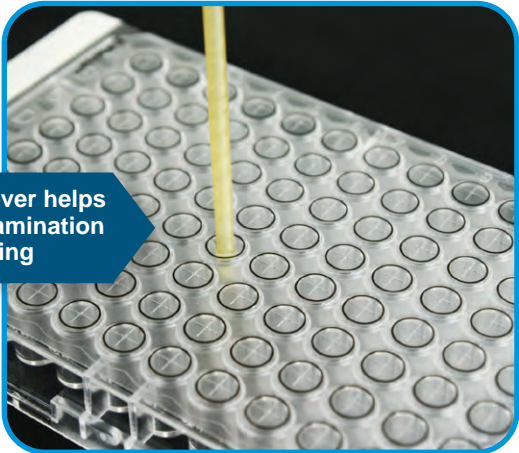
# X-Piercing Film Cover / XP Probe Arm

## X-Piercing Microplate Cover

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



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



X-Piercing cover helps prevent contamination during sampling

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

## XP Probe Arm

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

Description	Qty	Part Number
XP Probe arm for 2DX / 4DX Autosampler	1	SC-0105-DX-XP







# Large Autosampler Racks

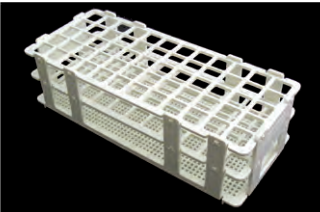

## Autosampler Racks (LR Size)

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**



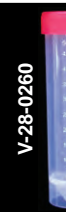
Description	Diam.	Part Number
90 position large polypropylene sample rack for 8 mL tubes	13 mm	LR-90-13-R

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

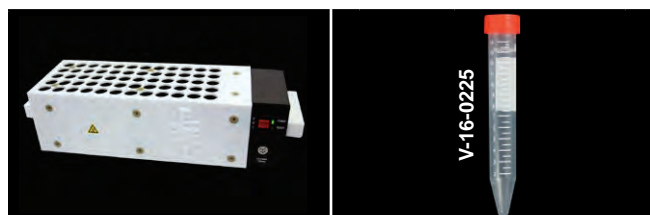




Description	Diam.	Part Number
21 position metal large sample rack for 50 mL and 60 mL tubes	30 mm	LMR-21-30-R

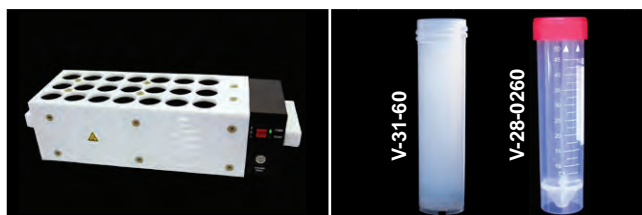
# Heated and Micro Autosampler Racks

## 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



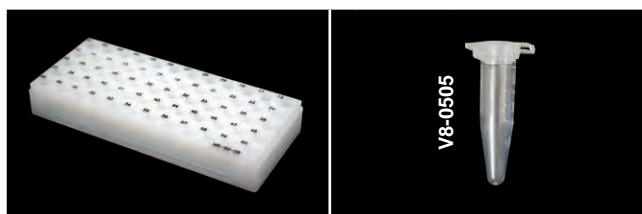
Description	Diam.	Part Number
21 position heated large sample rack for 50 mL and 60 mL tubes	30 mm	HR-21-30

## Autosampler Racks (MR Size)

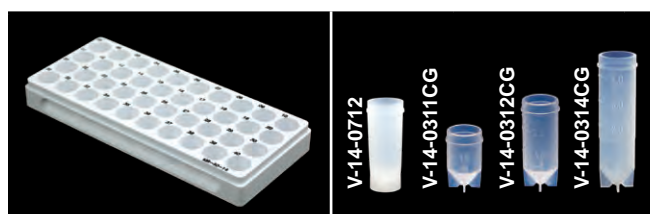
All MR racks can be used on the following DXe, DX and DXCi autosampler models: Micro, 2 and 4



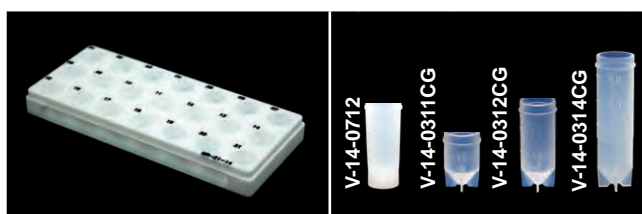
Description	Diam.	Part Number
90 position CPVC micro sample rack for 0.5 mL tubes	8 mm	MR-90-08



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




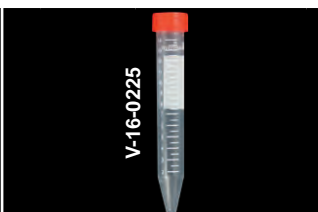
Description	Part Number
PVCC Cover for micro racks	MR-00-01

# Super Autosampler Racks

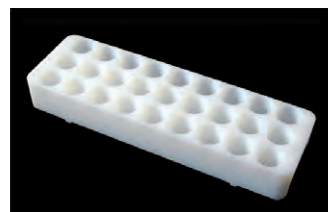


Large-volume samples can be analyzed using Agilent super racks without transferring the sample to a smaller tube, reducing prep time and chance of contamination.

## 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

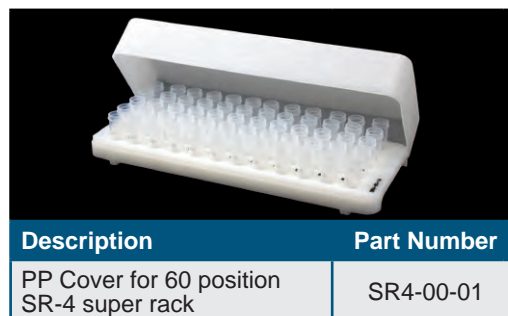
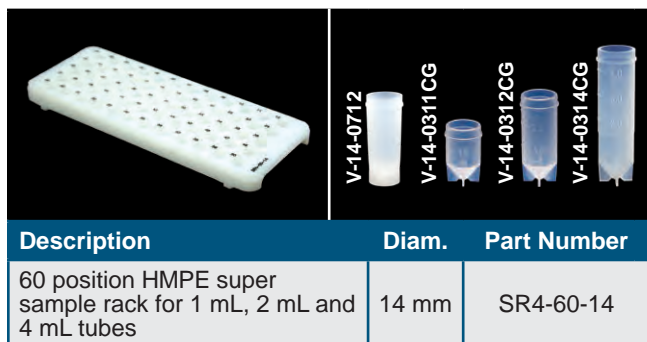
Description	Diam.	Part Number
21 position super sample rack for 125 mL bottles	35 mm	SR2-21-35

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

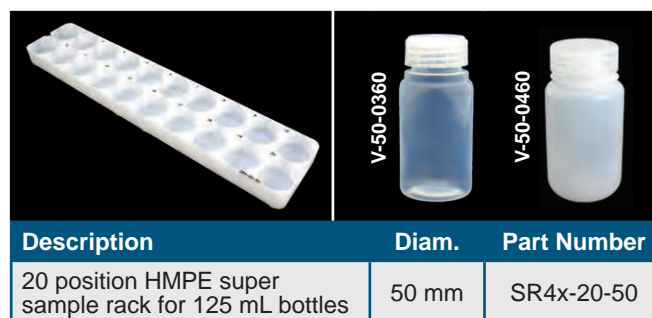
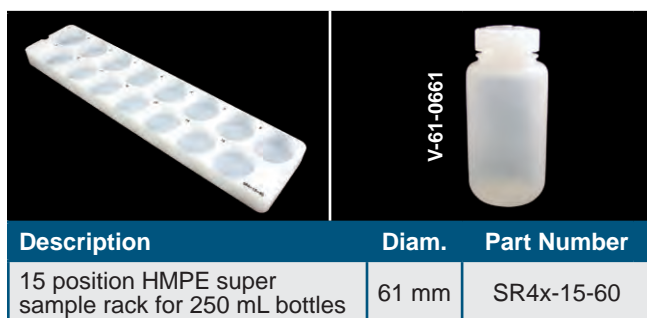
## Autosampler Racks (SR4 Size, Type 1)

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



## Autosampler Racks (SR4 Size, Type 2)

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



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


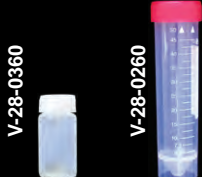




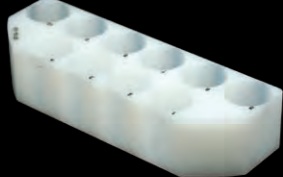

# Standards Autosampler Racks

## 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. Accessible through ESI SC software.

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

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

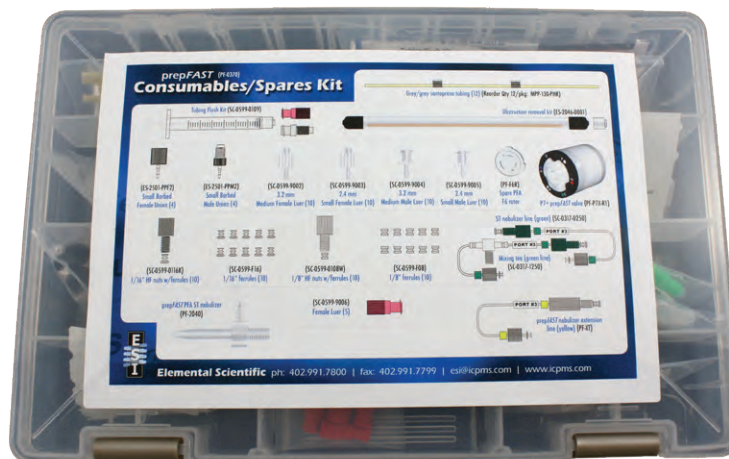
 		
Description	Diam.	Part Number
7 position HMPE standards rack for 250 mL bottles	60 mm	ST7-60

 		
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 Agilent ICPMS Systems

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 Agilent ICPMS Systems

Description	Major Components	Part Number
FAST Spares Kit	Assorted fittings, ferrules, lines & tubing P6 rotor	SC-0380
FAST Deluxe Spares Kit	Assorted fittings, ferrules, lines & tubing P7 FAST valve with rotor PFA-ST nebulizer	SC-0370-D-79
prepFAST Spares Kit	Assorted fittings, ferrules, lines & tubing P7+ valve with rotor & F6 rotor prepFAST PFA-ST nebulizer	PF-0370-79
SampleSense FAST Spares Kit	Assorted fittings, ferrules, lines & tubing P6 rotor PFA-ICN50 nebulizer	F-0370-SS-79
SampleSense prepFAST Spares Kit	Assorted fittings, ferrules, lines & tubing P6 valve with rotor & F6 rotor PFA-ICN50 nebulizer	PF-0370-SS-79
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-79
seaFAST / brineFAST Spares Kit	Assorted fittings, ferrules, lines & fittings Spare P6, P11, P11b rotors 3 mL quartz syringe & PFA-ST nebulizer	SF-0370-79

# 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 SC-FAST high throughput system	F1-SC-01



## 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	F1-SC-02-54
On-site, 2½-day installation and application development for prep <i>FAST</i> systems	F1-PF-02
On-site, 2½-day installation and application development for sea <i>FAST</i> /brine <i>FAST</i> systems	FI-SF-02
On-site, 4-day installation and application development for prep <i>FAST</i> IC systems	FI-PFIC-04



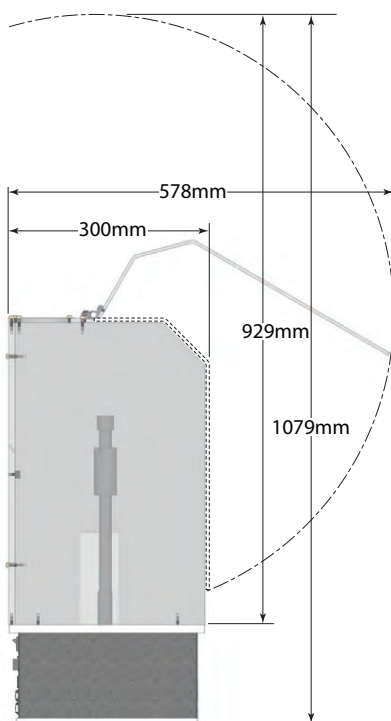
The *FAST* Deluxe, prep*FAST*, or sea*FAST*/brine*FAST* Spares Kit is included with the Gold Installation & Training.



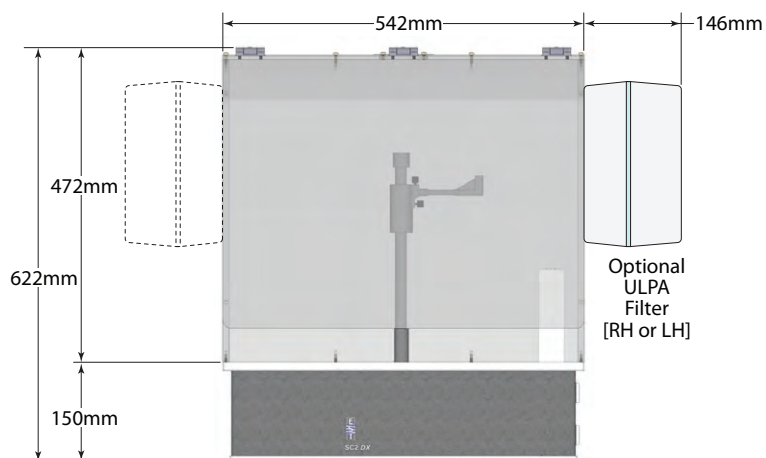


# Autosampler Dimensions

## 2DX Autosampler with Enclosure and ULPA Filter Dimensions

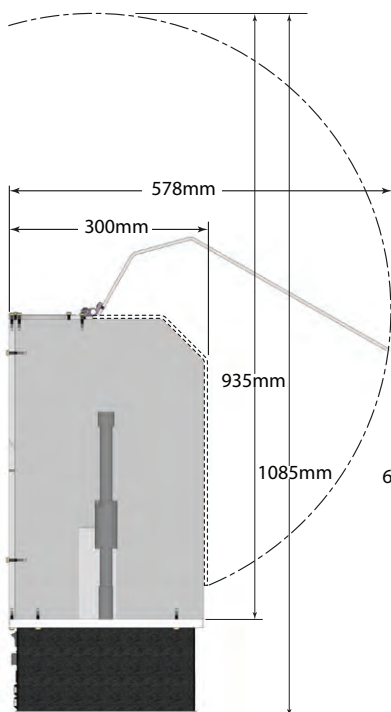


2DX Autosampler Enclosure with  
ULPA Filter (P/N: SC-1207-DX-1200)

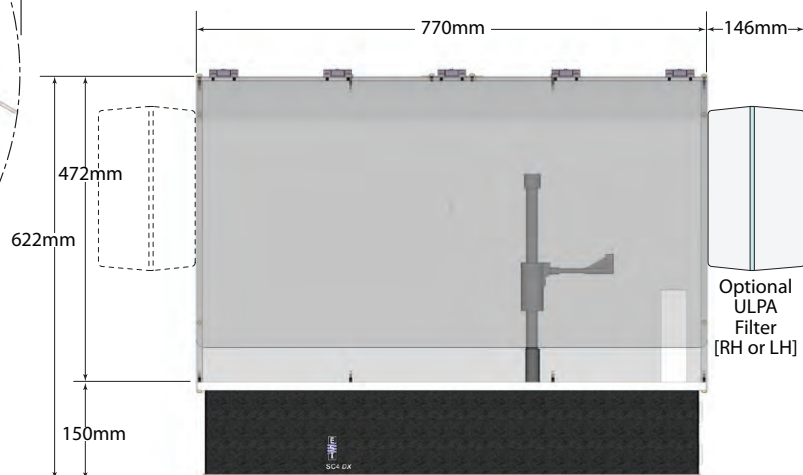


2DX autosampler with mobile stand and enclosure and ULPA Filter, W x D X H: 54.2 x 34.6 x 127.3 cm

## 4DX Autosampler with Enclosure and ULPA Filter Dimensions

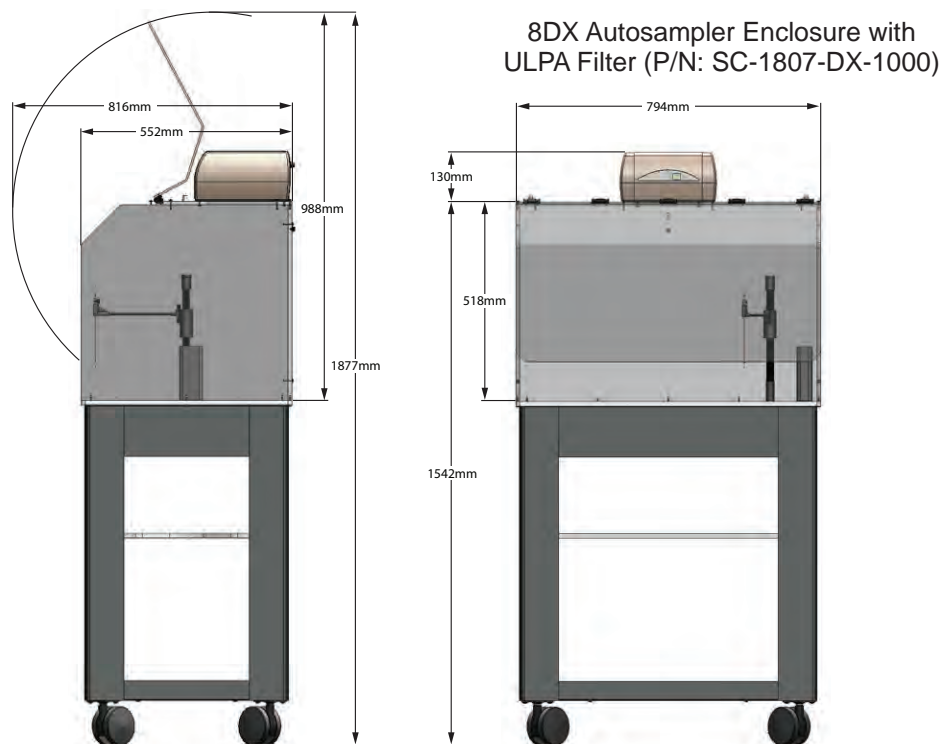


4DX Autosampler Enclosure with  
ULPA Filter (P/N: SC-1407-DX-1200)



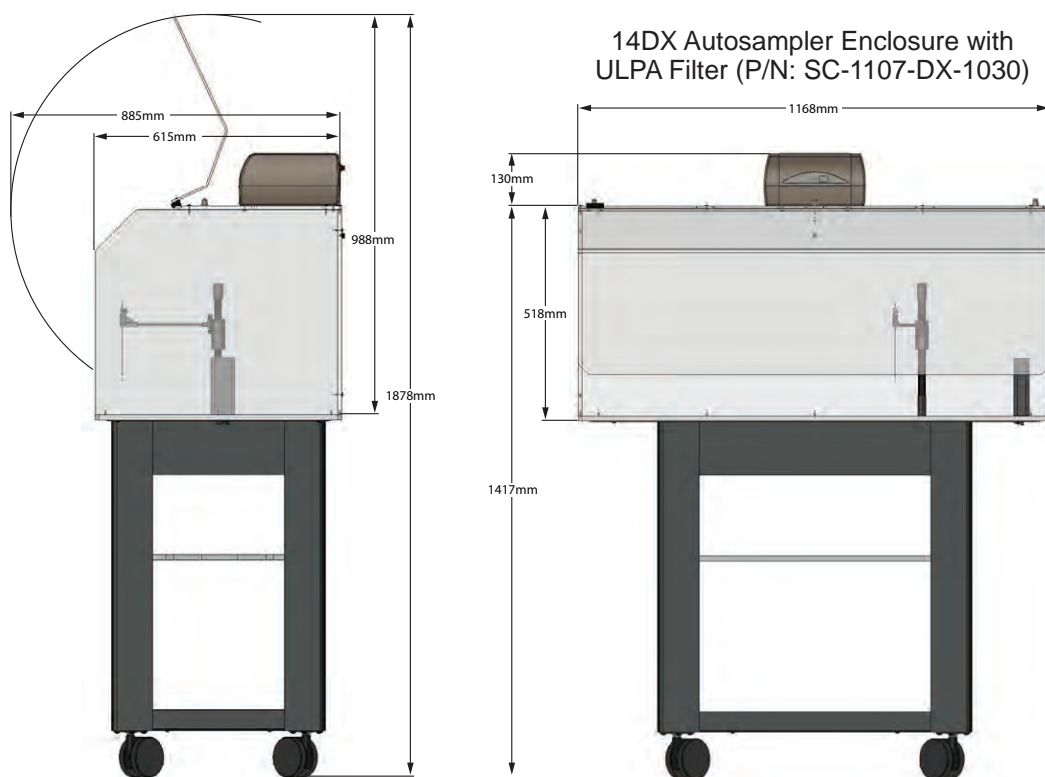
4DX autosampler with mobile stand and enclosure and ULPA filter, W x D X H: 77.0 x 34.6 x 127.3 cm

## 8DX Autosampler with Enclosure and ULPA Filter Dimensions



8DX autosampler and ULPA filter, W x D x H: 79.4 x 55.2 x 154.2 cm

## 14DX Autosampler with Enclosure and ULPA Filter Dimensions



14DX autosampler with mobile stand and enclosure and ULPA filter, W x D X H: 116.8 x 61.5 x 154.7 cm

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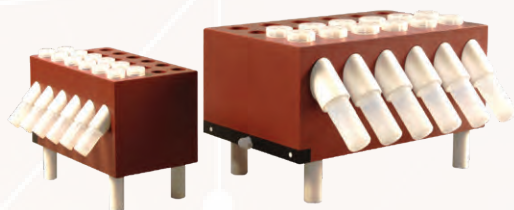
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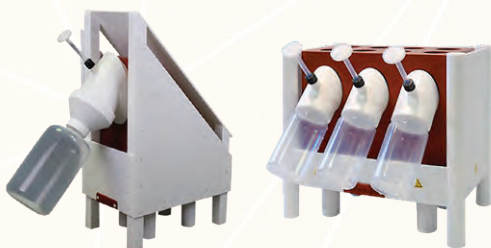
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