

## Advanced Sample Introduction Systems For Thermo Scientific XSERIES 2 ICPMS



Elemental Scientific



# Elemental Scientific



Elemental Scientific designs and produces a range of sample introduction systems for the determination of trace element concentrations and isotope ratios in liquid samples when using inductively coupled plasma instrumentation. Our extensive product line contains sample introduction devices for all models of ICPMS and ICPAES instruments, including:

- Innovative SC-Series Clean Intelligent Autosamplers.
- Inert MicroFlow and PolyPro Nebulizers.
- Inert autosampler and manual sampling probes.
- Precision Micro Peristaltic pumps.
- Inert, chemically resistant spray chambers and end caps.
- Demountable o-ring-free injectors made from platinum, sapphire, or quartz.
- Precision and standard quartz ICP torches.
- Apex family of high sensitivity, low contamination sample inlet systems.
- PC<sup>3</sup> Peltier-cooled cyclonic spray chambers.



**ESI Headquarters  
Omaha, Nebraska - USA**

Contact us by phone at 402.991.7800 or by e-mail at [esi@icpms.com](mailto:esi@icpms.com). Our years of experience in the laboratory and in the field are at your disposal to help answer your questions related to elemental analysis. We are pleased to provide our customers complimentary analytical advice from our on-staff chemists.

## Ordering Information:

You may contact us via phone, fax, e-mail, or through our website.

### U.S. Business Hours:

Central Time Zone  
Monday through Friday  
8:00am to 6:00 pm

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Omaha, NE 68110

### Website:

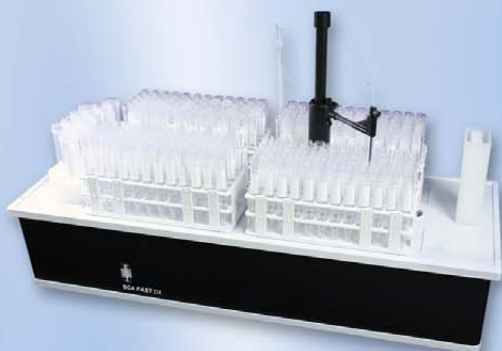
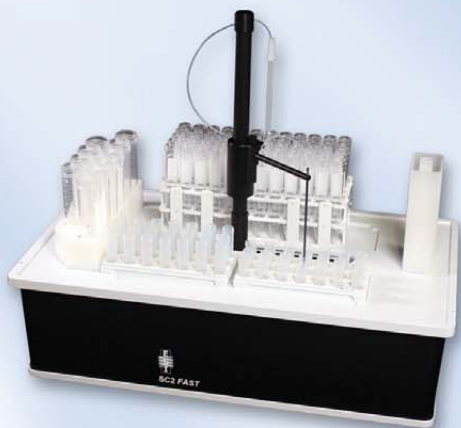
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## SC-DX APPLICATION SOLUTIONS

### Thermo Scientific XSERIES 2 ICPMS

#### **SC-FAST**

A reliable, high throughput system for high matrix samples that dramatically increases throughput and decreases instrument maintenance without compromising analytical quality.

#### **geoFAST**

For high throughput and fast washout of highly acidified samples with online sample dilution for multi-element geochemical analysis.

#### **seaFAST**

A completely automated sample introduction system for multi-mode determination of ultra-trace metals in undiluted seawater. The *seaFAST* lowers procedural blanks and improves detection limits for a variety of elements through advanced, online sample preparation such as preconcentration, matrix elimination, online dilution, and hydride generation.

#### **TRUFAST**

Measure low-ppq level Ra in natural waters using an automated SC-FAST system. Polyatomic interferences arising from Ba and Sr are automatically removed online using ion exchange techniques, providing extremely low background levels and superb detection limits. Alternate chemistries are available for other radionuclides such as Th and U.

#### **microFAST**

Automate delivery and analysis of micro volume samples. The *microFAST* system enables the direct analysis of ultra-low volume samples without waste using both syringe and micro peristaltic pumps.

#### **DINFAST**

Achieve fast washout, signal stability, uniform analyte response and full automation for the analysis of memory-prone elements. The *DINFAST* uses a thermally conductive Pt Direct Injection Nebulizer (DIN) inside an ICP torch. Optimum analytes include Hg, B and Os.

#### **scout<sub>dx</sub>**

A custom solution for temporary or permanent online monitoring and high efficiency sample transport from remote liquid streams or chemical baths. Ten or more process streams may be monitored within several hundred meters of a centrally located ICPMS.

#### **chromFAST**

Online, low pressure chromatographic speciation systems for Cr, As, Se or Hg using the SC-FAST.

#### **apexFAST**

Increase sensitivity 10x or more with a desolvating nebulizer achieving high sample transport efficiency.

# APPLICATIONS



## Environmental

Drinking water, waste water, seawater, soils and other environmental samples

**SC-FAST**      **apexFAST**      TRU**FAST**  
**seaFAST**      **chromFAST**



## Functions

- FAST**
- Low Sample Consumption
- Low Detection Limits
- HF Resistant
- High Throughput
- High Precision/ Isotope Ratio
- Micro Samples
- Preconcentration
- Speciation



## Geochemistry

Highly acidified mining samples for transition metals and platinum group elements

**geoFAST**      **SC-FAST**



## Nuclear

Samples containing Th, U, Pu or other actinides requiring small volumes and careful handling

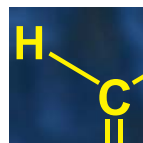
**SC-FAST**      **apexFAST**  
 TRU**FAST**      **microFAST**



## Clinical

Small volume and high matrix samples such as blood, urine and serum

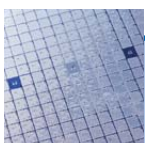
**SC-FAST**      TRU**FAST**  
**microFAST**



## Organic Solvents

Sample introduction for wear oils and volatile organic samples for petrochemical applications

**microFAST**      **DINFAST**



## Semiconductor

Ultra-trace analysis of high matrix samples in clean room environments

**microFAST**      TRU**FAST**  
**microFAST<sub>HF</sub>**



## Remote Monitoring

Custom online monitoring and high efficiency sample transport for remote chemical baths

**scout<sub>Dx</sub>**



The SC-DX improves resistance to damaging chemicals. All components are resistant to acids extending the component life by a factor of 10. Dual X-rails and large diameter Z-rail provide precise sampling, virtually eliminating missed samples—even on microtiter plates.

## Autosamplers without FAST

### SC-Micro



The SC-Micro is a small-footprint, low-cost autosampler with dual flowing rinse stations that holds 2 microtiter plates or 2 micro racks and 10 standard vials. The control electronics are external to the autosampler unit, making it ideal for customized glovebox applications.

**Includes:** 2 Sample Probes Standards Rack (10 positions)  
 20 mL PFA Standards Vials (10 ea) 3 Microtiter Plates (24, 48, 96 positions)  
 2 mL PFA Sample Vials (10 ea) 3 Micro Racks (21, 40, 90 positions)

Part Number	Description
SC-8106-9000	Micro-autosampler with dual flowing rinse

\*Contact your sales representative to discuss customizing the SC-Micro for glovebox applications



### SC-2 DX



The SC-2 DX is a compact autosampler with dual flowing rinse stations that holds 2 large racks or 4 micro racks.

**Includes:** 2 Sample Probes Standards Rack (10 positions)  
 50 mL Standards Vials (10 ea) 4 Large Racks (21, 40, 60, 90 positions)  
 15 mL Sample Vials (60 ea)

Part Number	Description
2DX	SC-2 DX with dual flowing rinse

See page 52 for SC-2 DX dimensions



### SC-2 DX Semiconductor



The SC-2 DX Semiconductor is an autosampler designed for ultrapure semiconductor applications where the lowest possible background levels are required. It has a PTFE autosampler deck and two independent rinse control valves.

**Includes:** 2 Ultem Sample Probes Standards Rack (10 positions)  
 2 PTFE Sample Probes 4 Large Racks (21, 40, 60, 90 positions)  
 50 mL Standards Vials (10 ea) 1 Micro Rack (21 positions)  
 15 mL Sample Vials (60 ea) High purity PFA dual rinse kit  
 2 mL PFA Sample Vials (30 ea)

Part Number	Description
2DX-SEMI	SC-2 DX Semiconductor with dual flowing rinse



### SC-4 DX

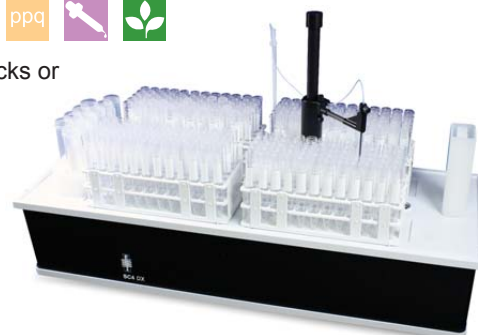


The SC-4 DX is an autosampler with dual flowing rinse stations that holds 4 large racks or 6 micro racks. It is ideal for labs with moderate sample throughput needs.

**Includes:** 2 Sample Probes Standards Rack (10 positions)  
 50 mL Standards Vials (10 ea) 4 Large Racks (21, 40, 60, 90 positions)  
 15 mL Sample Vials (60 ea)










Part Number	Description
4DX	SC-4 DX with dual flowing rinse

See page 52 for SC-4 DX dimensions










# High Capacity DX Autosamplers

## Function

-  FAST
-  Low Sample Consumption
-  Low Detection Limits
-  HF Resistant
-  High Throughput
-  High Precision/Isotope Ratio
-  Micro Samples
-  Preconcentration
-  Speciation

## Application

-  Clinical
-  Environmental
-  Geochemistry
-  Nuclear
-  Organic Solvents
-  Remote Monitoring
-  Semiconductor

### SC-8 DX



The SC-8 DX is an autosampler with dual flowing rinse stations that holds 8 large racks. It is ideal for labs with high sample throughput needs.

- Smallest footprint of any 8 rack autosampler
- Up to 40 Standards/QC solutions (50 mL vials)

- Includes:**
- 2 Sample Probes
  - 50 mL Standards Vials (40 ea)
  - 15 mL Sample Vials (60 ea)
  - 4 Standards Racks (10 positions)
  - 4 Large Racks (21, 40, 60, 90 positions)



Part Number	Description
8DX	SC-8 DX with dual flowing rinse

See page 53 for SC-8 DX dimensions

### SC-14 DX



The SC-14 DX is an autosampler with dual flowing rinse stations that holds 14 large racks. It is ideal for labs with the highest sample throughput needs.

- Includes:**
- 2 Sample Probes
  - 50 mL Standards Vials (40 ea)
  - 15 mL Sample Vials (60 ea)
  - Standards Rack (10 positions)
  - 4 Large Racks (21, 40, 60, 90 positions)



Part Number	Description
14DX	SC-14 DX with dual flowing rinse

See page 53 for SC-14 DX dimensions

### Sample Capacity

System	50 mL	15 mL	8 mL	Microtiter-96 (2 mL)
SC-2 DX (Super rack)	52 (64)	120 (160)	180 (240)	384
SC-4 DX	94	240	360	576
SC-8 DX	208	480	720	N/A
SC-14 DX	304	840	1260	2880*

\*Special version SC-14 for microtiter plates



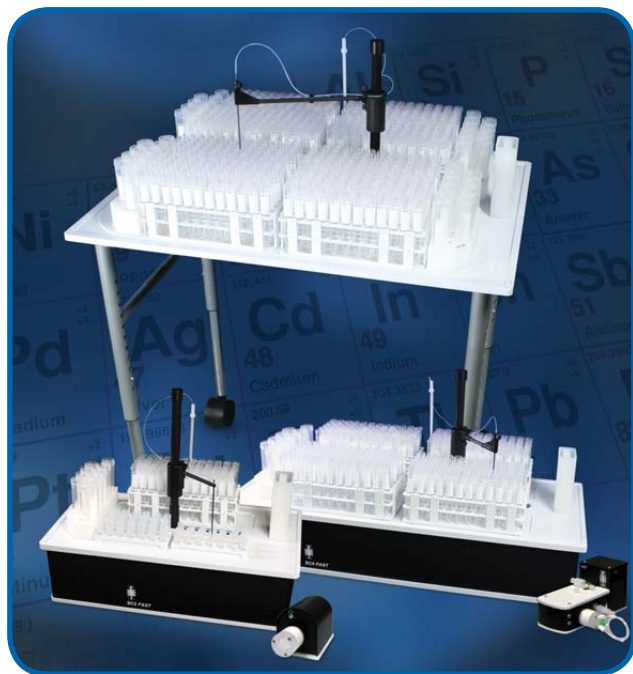
## SC-FAST Automated Sample Introduction System

The SC-FAST is a reliable, integrated, high-throughput, high-matrix automated sample introduction system for the Thermo Scientific XSERIES 2 ICPMS. The combination of SC-FAST with XSERIES 2 provides the perfect platform to introduce the most demanding high matrix samples for analysis. All XSERIES 2 SC-FAST systems include the XSERIES 2 module with integrated MP<sup>2</sup> precision low-flow peristaltic pump. A high-purity injection valve is mounted on the PC<sup>3</sup> near the nebulizer.

- High Productivity
- Long Analytical Runs
- High Matrix/High TDS Sample Analysis
- Low Sample Consumption
- Reduced Operating Costs
- Online Dilution
- Low sample flow rates with high speed analysis

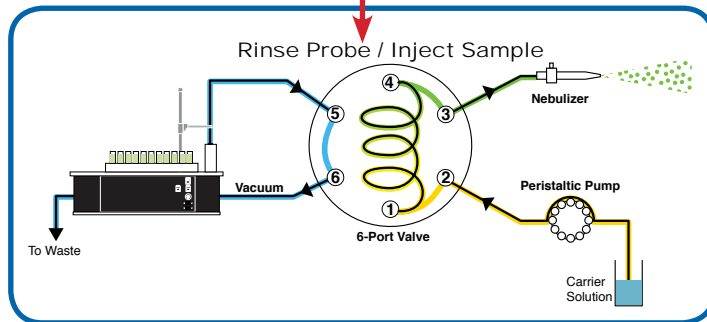
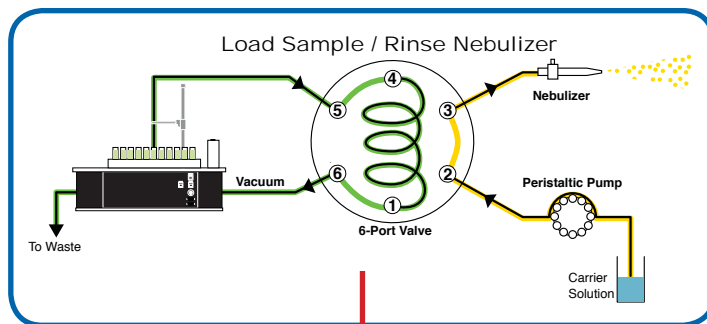


PC<sup>3</sup> FAST Peltier cooler for Thermo Scientific XSERIES 2 ICPMS



SC-DX FAST is available in four autosampler sizes, holding up to fourteen large sample racks.

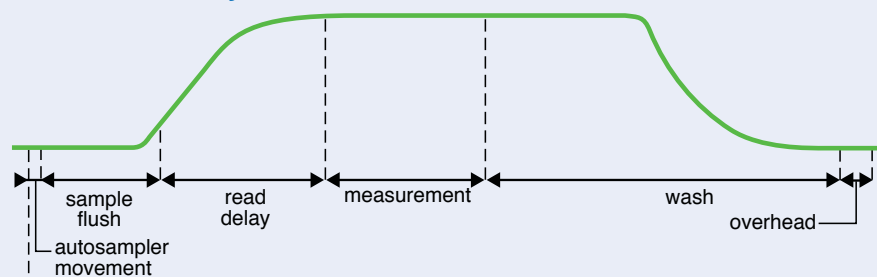
The SC-FAST loads the sample loop as the nebulizer and tubing are cleaned.



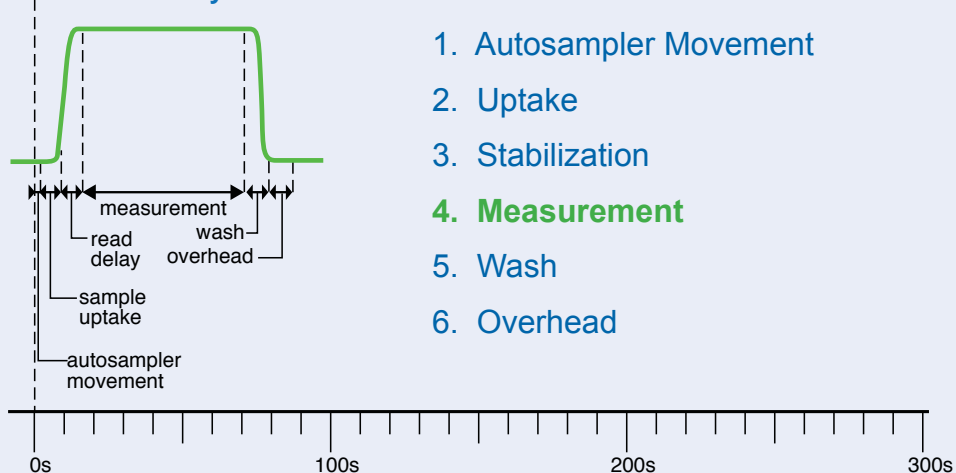
The autosampler probe and tubing are rinsed while the sample is analyzed.



## Normal Analysis



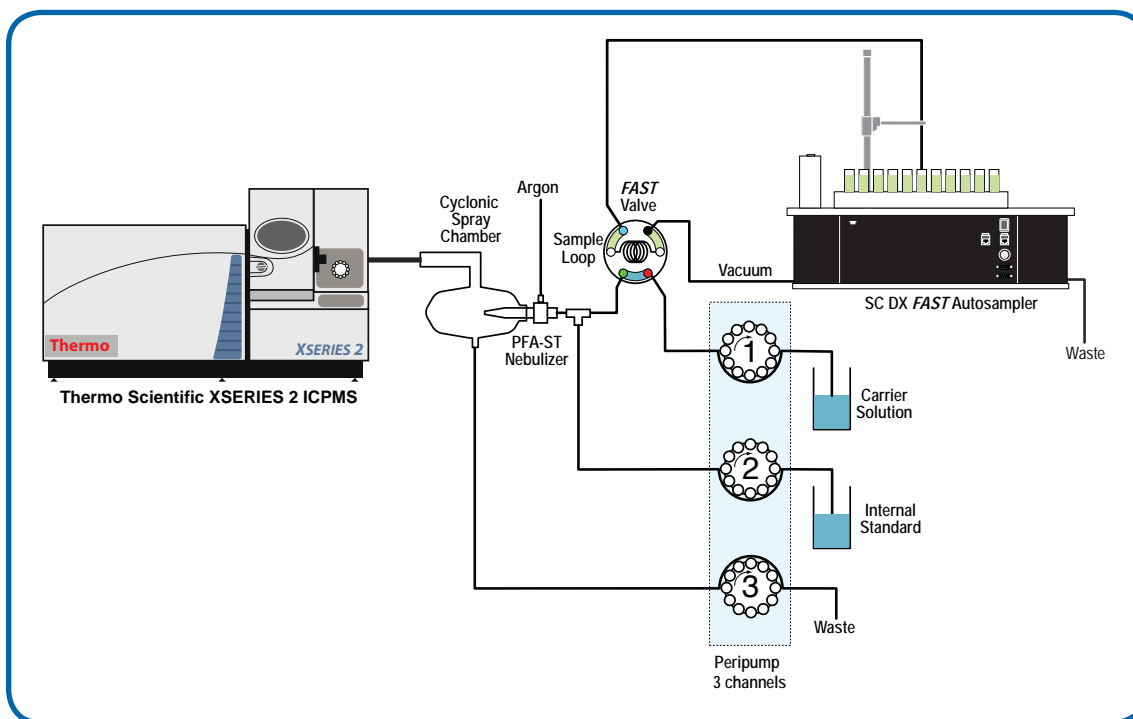
## FAST Analysis



### Six Steps in a Standard Analysis

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

The SC-FAST system causes signal to stabilize quickly and rinse out more completely than any other sample introduction system, reduces uptake and wash time, and increases sample throughput.



XSERIES 2 ICPMS with SC-FAST System Diagram

## SC-DX FAST Systems for Thermo Scientific XSERIES 2 ICPMS

The SC-DX FAST for the XSERIES 2 ICPMS is a fully integrated automation system for a number of diverse high throughput applications. Software and hardware are fully-integrated in one platform—Autosampler, FAST valves, syringe pumps, peristaltic pumps and multi-application software control. The rack configurations allow large and small sample volumes to be analyzed in a single run. A wide variety of probe designs, standard racks and custom racks are available.

### SC-2 DX FAST



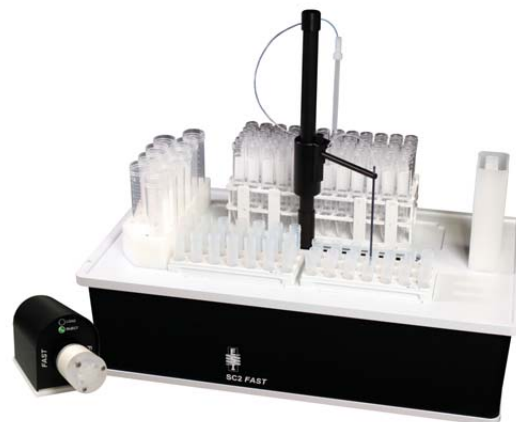
The SC-2 DX FAST is a compact autosampler with dual flowing rinse stations that holds 2 large racks or 4 micro racks.

**Includes:** FAST Valve Standards Rack (10 positions)  
 PFA-ST MicroFlow Nebulizer 4 Large Racks (21, 40, 60, 90 positions)  
 2 Sample Probes 50 mL Standards Vials (10 ea)  
 15 mL Sample Vials (60 ea)

PC<sup>3</sup> Peltier cooled cyclonic chamber, demountable quartz torch and sapphire injector (*Complete System Only*)

Part Number	Description
2DXF-60C	SC-2 DX FAST PC <sup>3</sup> Complete for XSERIES 2
2DXF-A	SC-2 DX FAST Basic system for XSERIES 2 (without PC <sup>3</sup> ) Uses XSERIES 2 spray chamber and injector

See page 52 for SC-2 DX dimensions



### SC-4 DX FAST



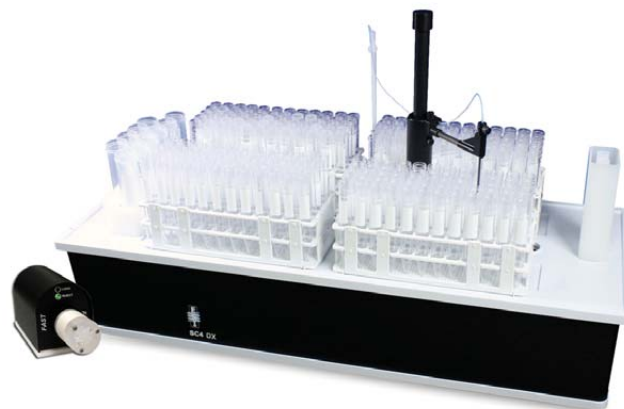
The SC-4 DX FAST is an autosampler with dual flowing rinse stations that holds 4 large racks or 6 micro racks. It is ideal for labs with moderate sample throughput needs.

**Includes:** FAST Valve Standards Rack (10 positions)  
 PFA-ST MicroFlow Nebulizer 4 Large Racks (21, 40, 60, 90 positions)  
 2 Sample Probes 50 mL Standards Vials (10 ea)  
 15 mL Sample Vials (60 ea)

PC<sup>3</sup> Peltier cooled cyclonic chamber, demountable quartz torch and sapphire injector (*Complete System Only*)

Part Number	Description
4DXF-60C	SC-4 DX FAST PC <sup>3</sup> Complete for XSERIES 2
4DXF-A	SC-4 DX FAST Basic system for XSERIES 2 (without PC <sup>3</sup> ) Uses XSERIES 2 spray chamber and injector

See page 52 for SC-4 DX dimensions



# High Capacity SC-DX FAST Autosamplers

## Function

FAST	High Precision/Isotope Ratio
Low Sample Consumption	Micro Samples
Low Detection Limits	Preconcentration
HF Resistant	Speciation
High Throughput	

## Application

Clinical	Organic Solvents
Environmental	Remote Monitoring
Geochemistry	Semiconductor
Nuclear	

### SC-8 DX FAST



The SC-8 DX FAST is an autosampler with dual flowing rinse stations that holds 8 large racks. It is ideal for labs with high sample throughput needs.

- Smallest footprint of any 8 rack autosampler
- Up to 40 Standards/QC solutions (50 mL vials)

<b>Includes:</b> FAST Valve	4 Standards Rack (10 positions)
PFA-ST MicroFlow Nebulizer	4 Large Racks (21, 40, 60, 90 positions)
2 Sample Probes	50 mL Standards Vials (40 ea)
	15 mL Sample Vials (60 ea)

PC<sup>3</sup> Peltier cooled cyclonic chamber, demountable quartz torch and sapphire injector (*Complete System Only*)



Part Number	Description
8DXF-60C	SC-8 DX FAST PC <sup>3</sup> Complete for XSERIES 2
8DXF-A	SC-8 DX FAST Basic system for XSERIES 2 (without PC <sup>3</sup> ) Uses XSERIES 2 spray chamber and injector

See page 53 for SC-8 DX dimensions

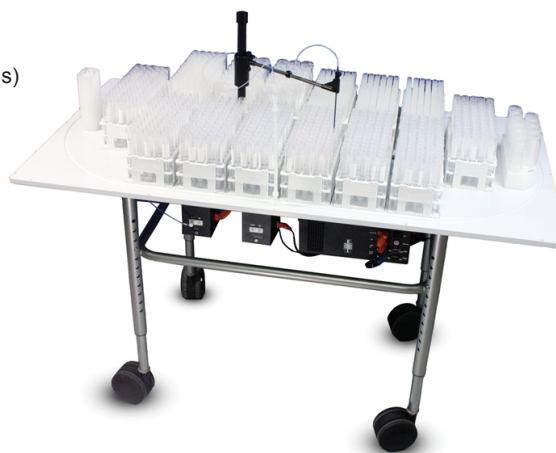
### SC-14 DX FAST



The SC-14 DX FAST is an autosampler with dual flowing rinse stations that holds 14 large racks. It is ideal for labs with the highest sample throughput needs.

<b>Includes:</b> FAST Valve	Standards Rack (10 positions)
PFA-ST MicroFlow Nebulizer	4 Large Racks (21, 40, 60, 90 positions)
2 Sample Probes	50 mL Standards Vials (40 ea)
	15 mL Sample Vials (60 ea)

PC<sup>3</sup> Peltier cooled cyclonic chamber, demountable quartz torch and sapphire injector (*Complete System Only*)



Part Number	Description
14DXF-60C	SC-14 DX FAST PC <sup>3</sup> Complete for XSERIES 2
14DXF-A	SC-14 DX FAST Basic system for XSERIES 2 (without PC <sup>3</sup> ) Uses XSERIES 2 spray chamber and injector

See page 53 for SC-14 DX dimensions

## Sample Capacity

System	50 mL	15 mL	8 mL	Microtiter-96 (2 mL)
SC-2 DX (Super rack)	52 (64)	120 (160)	180 (240)	384
SC-4 DX	94	240	360	576
SC-8 DX	208	480	720	N/A
SC-14 DX	304	840	1260	2880

## SC-DX Enclosures

### SC-Enclosures

ppq

Enclosures protect samples and standards from airborne contamination. An exhaust port (50 mm, included) may be connected to the laboratory ventilation system to exhaust acid fumes and protect the laboratory environment and equipment.



Autosampler Model	Enclosure	Enclosure with ULPA Filter
Enclosure for SC- $\mu$	SC-8106	
Enclosure for SC-2 DX	SC-1207-DX	SC-1207-DX-1200
Enclosure for SC-4 DX	SC-1407-DX	SC-1407-DX-1200
Enclosure for SC-8 DX	SC-1807-DX	SC-1807-DX-1000
Enclosure for SC-14 DX	SC-1107-DX	SC-1107-DX-1030

### Ultra-Low Particulate Air Filter

ppq

The ULPA-filter creates a clean, positive pressure environment for samples and standards and prevents airborne contamination. The ULPA (Ultra-Low Particle Arrester) filter removes 99.999% of 0.12 micron particles.

#### ULPA Filter Specifications

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

Part Number	Description
SC-0602	ULPA Filter for ESI enclosures.



# SC-DX MOBILE STANDS

## Mobile Stands for SC-2 and SC-4 DX Autosampler

The mobile stand positions the autosampler close to the XSERIES 2 ICPMS and offers the following benefits:

- **Convenience** – Autosampler, pumps, rinse and waste bottles contained in a single unit
- **Compact** – Footprint only slightly larger than autosampler itself, saving valuable lab space and maintaining accessibility to sample racks
- **Mobile** – Locking wheels easily unlatch to move autosampler for instrument maintenance
- Eliminates unnecessary external connections to rinse solution and waste reservoirs
- The intermediate shelf houses automation options such as syringe pumps or provides storage of optimization solutions.
- The lower shelf holds rinse solution and waste bottles and allows the rinse container to be refilled in place.



SC-4 DX on Mobile Stand (SC-1410-DX)



SC-2 DX on Mobile Stand (SC-1210-DX)



Storage space for racks, solutions and accessories



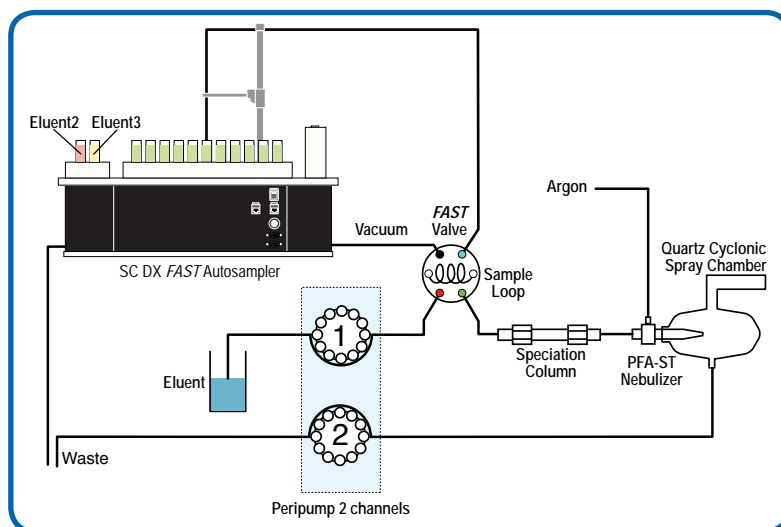
Accessible rinse bottle can be refilled in place

Part Number	Description
SC-1210-DX	Mobile stand for SC-2 DX
SC-1410-DX	Mobile stand for SC-4 DX

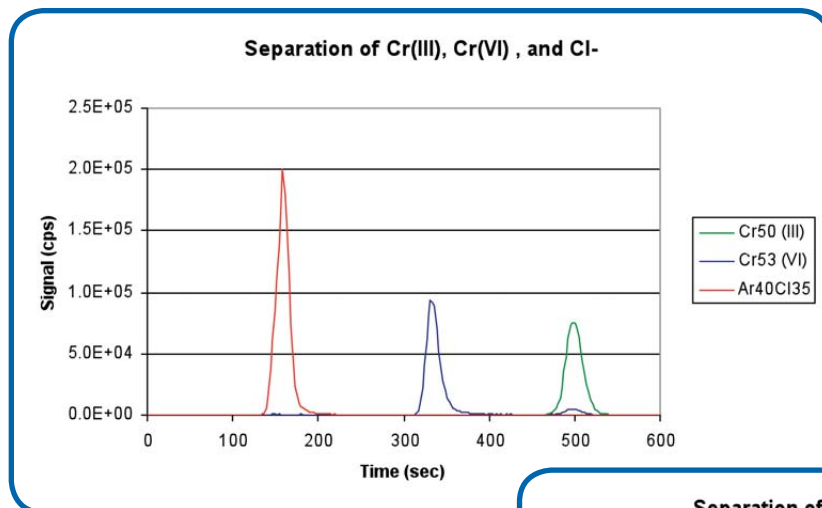
# chromFAST™

## Advantages of SC-FAST for Elemental Speciation

- Eluent delivered using an MP<sup>2</sup> micro peripump or standard instrument peripump.
- Isocratic or step-gradient chromatographic FAST methods.
- A variety of anion exchange and reverse phase columns available.
- Timing of chromatographic injection controlled from ICPMS software.
- Chromatographic method optimization for specialized separations is faster when using peripump-delivered eluents.
- Easy switching between total element and speciation determinations.

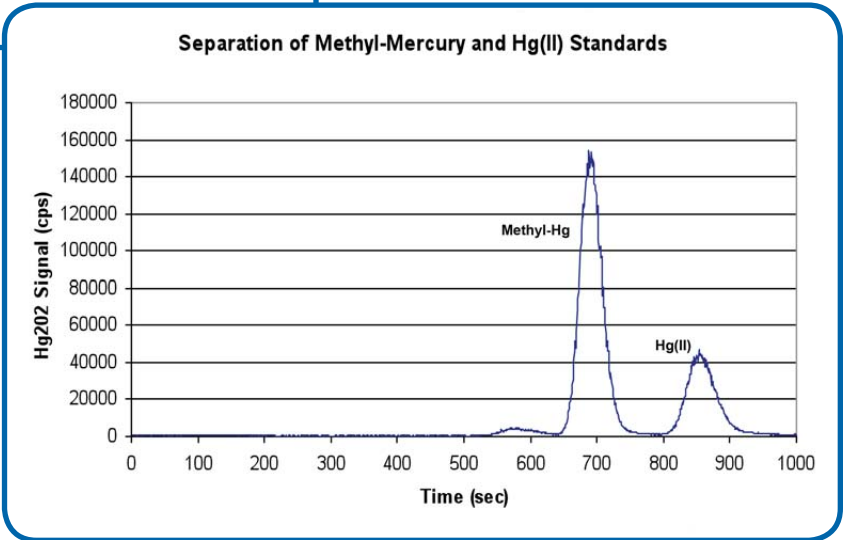


chromFAST System Diagram



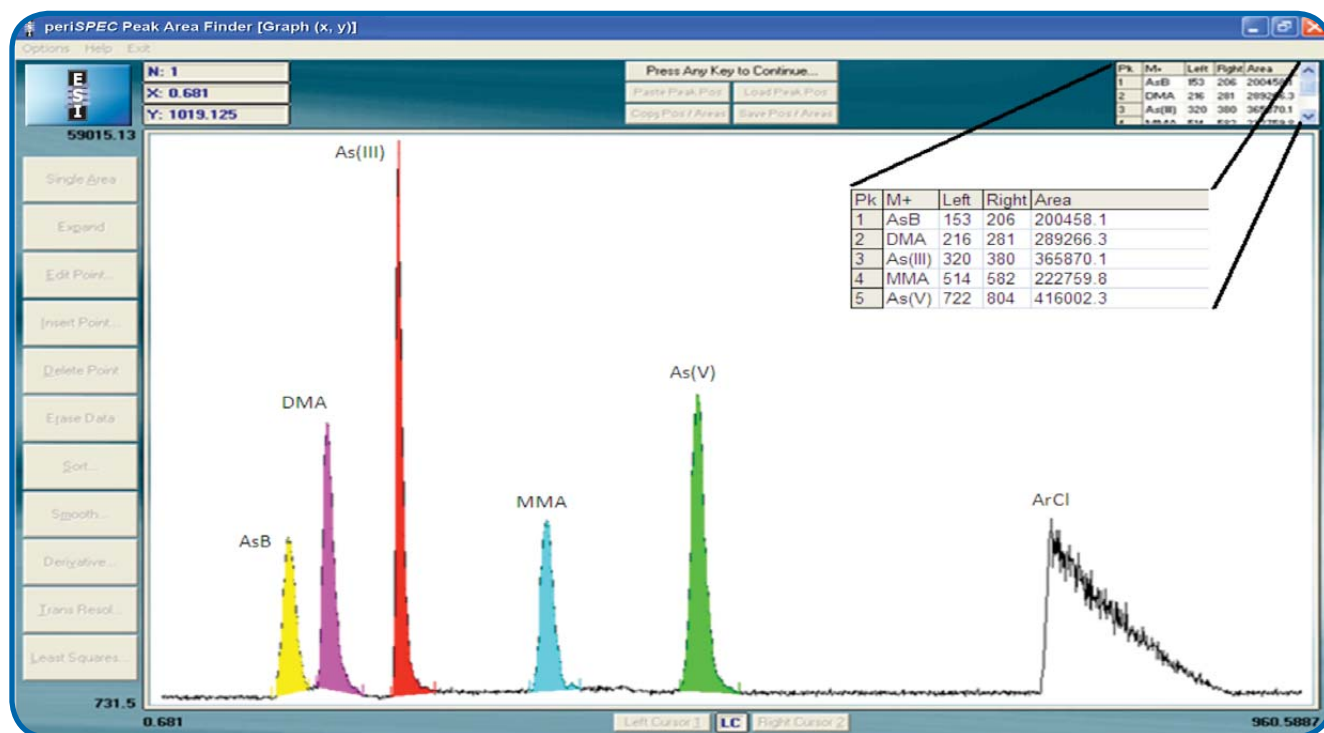
Separation of isotopically enriched Cr (III) and Cr (VI)

Low pressure separation of MeHg and Hg



## Automated, Low-Pressure LC-ICPMS

Low-pressure chromatographic speciation kits and the SC-FAST system coupled to the XSERIES 2 ICPMS can separate and detect inorganic and organic species of many elements, including As, Se, Cr, and Hg. Even in a high mineral content groundwater samples, the separation is not negatively impacted by the matrix components. Detection limits of a few ppt or lower and excellent spike recoveries, make this approach a viable and economical alternative to the more expensive and labor-intensive HPLC technology. In addition, the faster separation capability of this low pressure approach makes it ideally-suited to the demands of a high sample throughput environment.



ESI's periSPEC software is a convenient way to detect LC-ICPMS peaks. Here five arsenic species separated from  $\text{ArCl}^+$  using low pressure LC-ICPMS are detected and integrated.

Speciation Kits for chromFAST	
Part Number	Description
CF-KIT-Cr36	Chromium 3/6 speciation kit for FAST
CF-KIT-Se46	Selenium 4/6 speciation kit for FAST
CF-KIT-As35	Arsenic 3/5 speciation kit for FAST
CF-KIT-MeHg	Methyl Mercury speciation kit for FAST
periSPEC Chromatography Software	
ES-2999-4001	periSPEC chromatography peak area finder software

A completely automated sample introduction system for multi-mode determination of ultra-trace metals in undiluted seawater. The seaFAST lowers procedural blanks and improves detection limits for a variety of elements through advanced, online sample preparation such as preconcentration, matrix elimination, online dilution, and hydride generation.

## Features:

- Automated preconcentration and matrix elimination
- Simple, external calibration with acid standards
- Ppt to ppq detection limits in undiluted seawater
- Eliminate manual sample preparation
- Reduced procedural blanks
- Up to 3 modes of operation available

## All seaFAST systems include:

- SC Autosampler with FAST PC<sup>3</sup> Complete
- 6 channel precision MP<sup>2</sup> micro peristaltic pump
- High-purity fluoropolymer injection valves and all connections
- seaFAST column with all PFA construction and PTFE frits
- Trace metals cleanup column (2 ea)
- Suggested methods

## seaFAST 1

**Preconcentration Mode:** A chelation column binds transition metals and rare earth elements but allows matrix Na<sup>+</sup>, Cl<sup>-</sup>, Ca<sup>2+</sup>, and Mg<sup>2+</sup> ions to be rinsed out. After the preconcentration step, analytes are eluted and detected by ICPMS. (2 valves)

## seaFAST 2

**Preconcentration and Direct Modes:** The capabilities of seaFAST 1, plus online dilution with internal standard during the same analytical run. (3 valves)

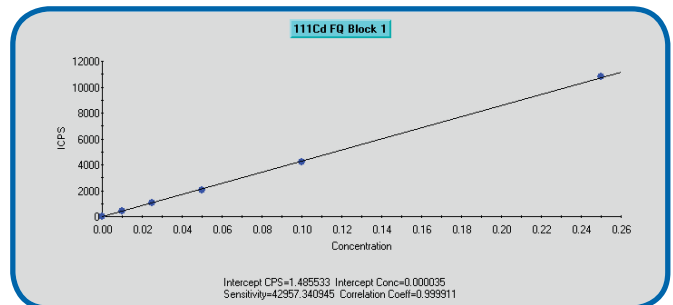
## seaFAST 3

**Preconcentration, Direct and Hydride Modes:** The capabilities of seaFAST 2, plus simultaneous batch-modes hydride generation for As, Se and other hydride forming elements. (5 valves, 2 syringes)

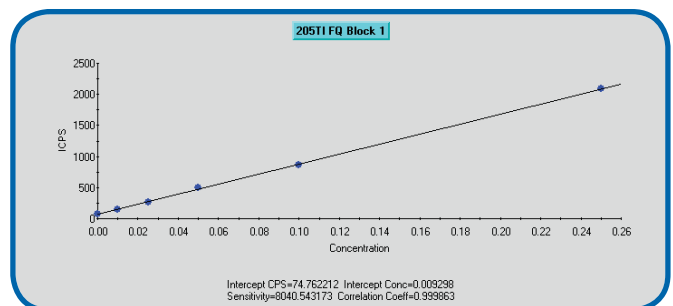
All seaFAST systems may be configured to operate as high throughput SC-FAST systems for direct sample analysis.



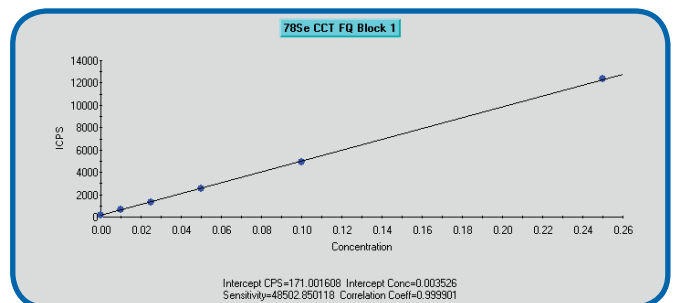
SC-4 DX seaFAST system for Thermo Scientific XSERIES 2 ICPMS



Preconcentration mode calibration curve for <sup>111</sup>Cd using seaFAST 1 / XSERIES 2

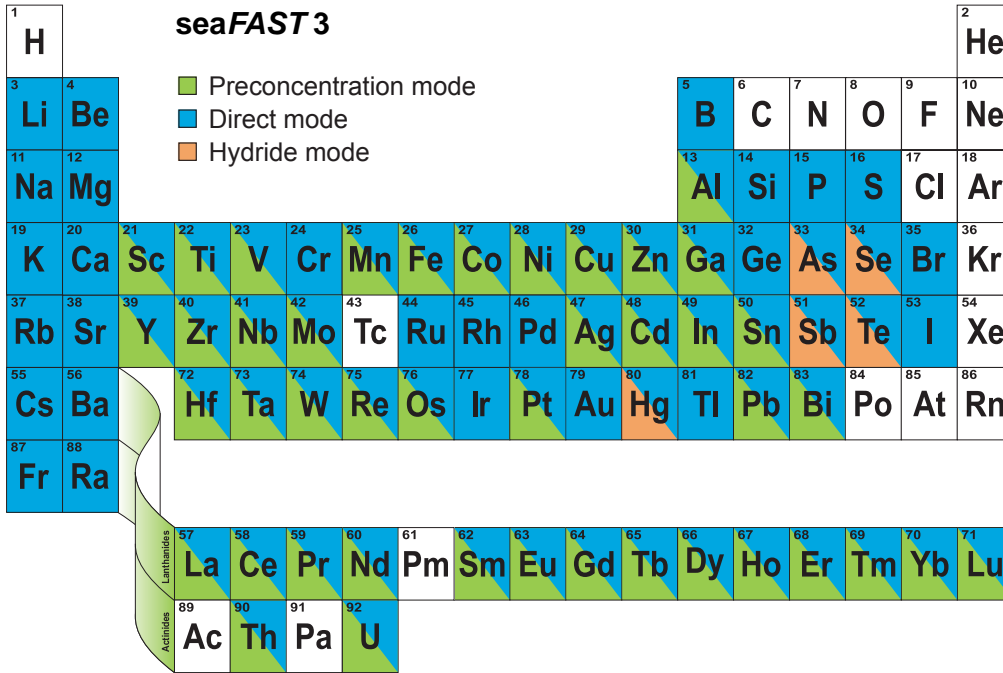


Direct mode calibration curve for <sup>205</sup>Tl using seaFAST 2 / XSERIES 2 at 10µL/min flow-rate. Micro-flow rates reduce solids deposition on the ICPMS cones when high matrix samples are analyzed.



Hydride mode calibration curve for <sup>78</sup>Se using seaFAST 3 / XSERIES 2



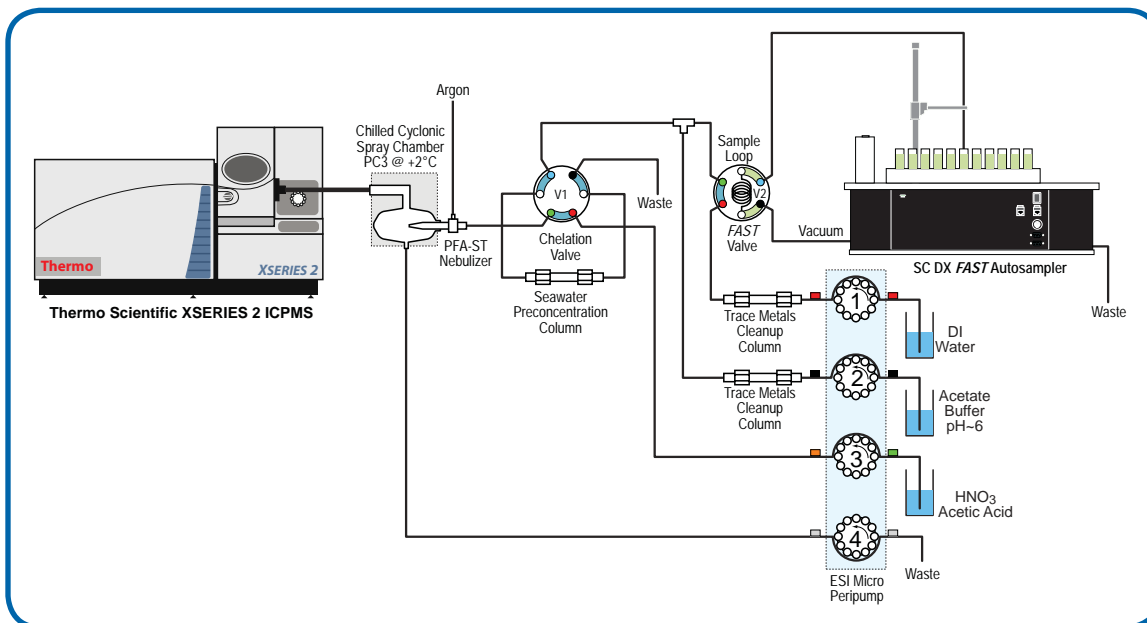


**seaFAST  
Preconcentration  
Column**



seaFAST System Part Numbers for the XSERIES 2		
Description	SC-2 DX	SC-4 DX
seaFAST 1 system	2SF-1-60C	4SF-1-60C
seaFAST 2 system	2SF-2-60C	4SF-2-60C
seaFAST 3 system	2SF-3-60C	4SF-3-60C

Part Number	Description
CF-N-0200	Spare seaFAST preconcentration column
CF-IDA	Spare seaFAST trace metal cleanup column



seaFAST 1 System Diagram

# microFAST™

The microFAST automates delivery and analysis of micro-volume samples by ICPMS, making it possible to achieve the maximum amount of analytical data from a minimal amount of sample.

A Syrix syringe pump is used to accurately place micro volume samples into a FAST loop. The sample is then delivered to the plasma using either an MP<sup>2</sup> peristaltic pump or continuum syringe pump, depending on microFAST system, at low flow rates with excellent precision.

HF resistant versions of microFAST 1 (microFAST HF1) and microFAST 2 (microFAST HF2) are available with all fluoropolymer wetted parts, including syringe barrels and spray chambers.



SC-4 DX microFAST 1 system for Thermo Scientific XSERIES 2 ICPMS

## microFAST 1 and microFAST HF1 Includes:

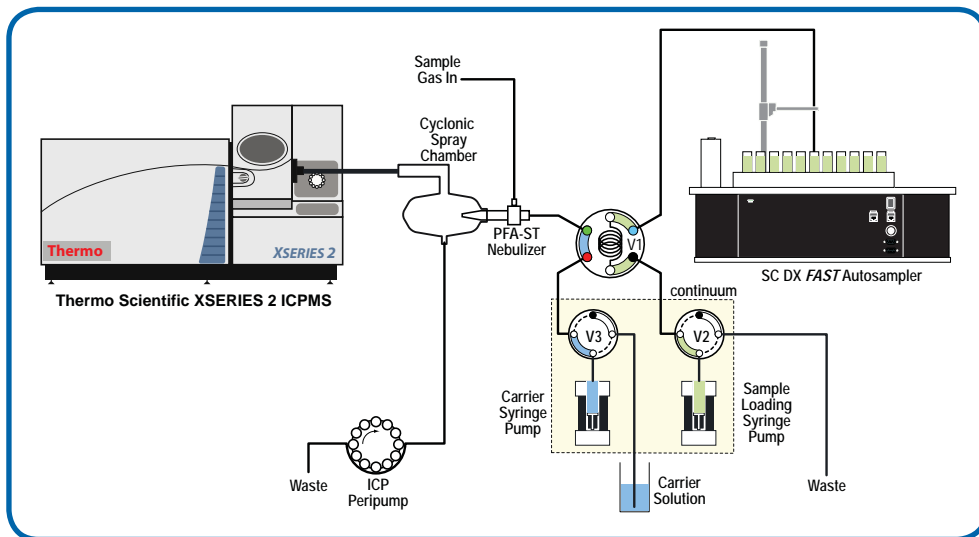
- SC Autosampler with FAST PC<sup>3</sup> Complete
- Two High-purity fluoropolymer injection valves and all connections
- Integrated precision FAST micro peristaltic pump
- Syrix high-purity syringe pump
  - 3 mL quartz/PTFE syringes for microFAST 1
  - 3 mL PFA/PTFE syringes for microFAST HF1

## microFAST 2 and microFAST HF2 Includes:

- SC Autosampler with FAST PC<sup>3</sup> Complete
- High-purity fluoropolymer injection valve and all connections
- Continuum dual syringe pump system
  - 3 mL quartz/PTFE syringe for microFAST 2
  - 3 mL PFA/PTFE syringe for microFAST HF 2
  - 300 µL quartz/PTFE syringe for microFAST 2
  - 300 µL PFA/PTFE syringe for microFAST HF 2



Continuum system for microFAST 2



microFAST 2 System Diagram



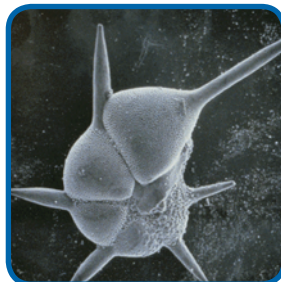
### Ultra-low total volume (tens of microliters) samples

- Controlled uptake and delivery of micro-samples
- Measure up to 100% of sample with high sensitivity
- Flow rates as low as 1-5  $\mu\text{L}/\text{min}$
- Perform repeat multi-element analysis or precise isotope ratio measurements on a single sample as small as 50  $\mu\text{L}$
- Ideal for nuclear applications to minimize sample prep volume and waste



### Volatile high-purity organic solvents

- Reliable sample introduction at 5 and 10  $\mu\text{L}$  per minute allows samples to be analyzed using conditions similar to those used for water
- Reduced instrument drift, improved stability, and lower instrument maintenance
- SC Autosamplers offer an optional metal free piercing probe for samples that are covered to reduce contamination and evaporation
- Optional continuum pump eliminates pump tubing
- Requires platinum cones and oxygen addition gas



### Climate research applications

- Particulates in seawater, starting with as little as 10 L of seawater
- Elemental and isotopic ratio analysis of a single planktonic foraminifera
- Micrometeorite multi-element analysis



### Clinical micro samples

- Elemental analysis of limited volume cell samples
- Metal uptake in living tissue
- Elemental analysis of premature infant blood



### High TDS and high purity metals

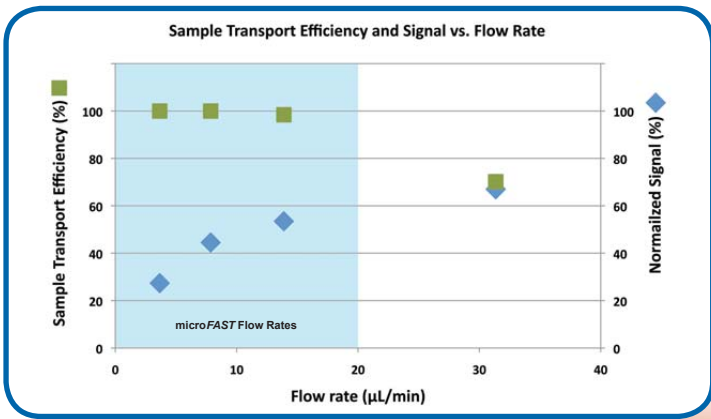
- Measure high TDS or high purity metal solutions without dilution
- Reduced matrix effects
- Prevent cone clogging
- Reduce amount of matrix reaching the ICPMS, reducing carryover and instrument contamination from matrix elements



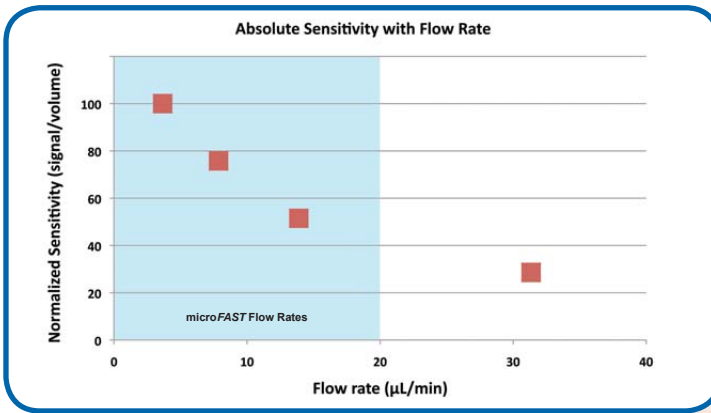
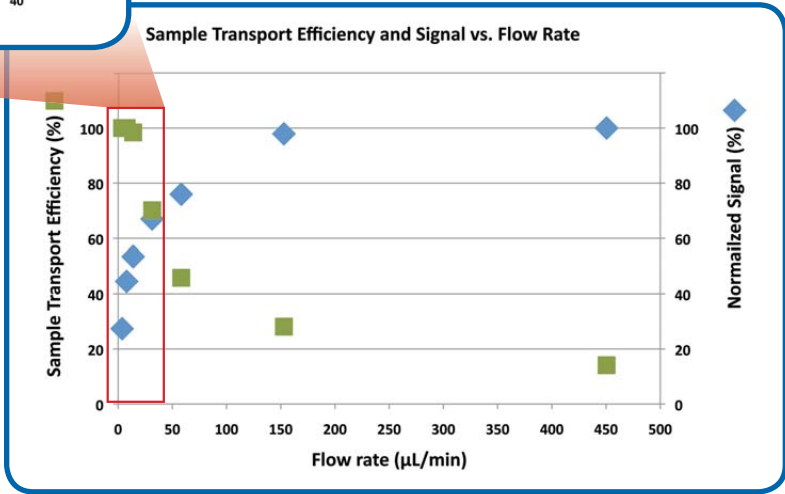
### High precision isotope ratios with maximum absolute sensitivity

- Sample transport efficiency nears 100% at flow rates < 20  $\mu\text{L}/\text{min}$
- Measure 100  $\mu\text{L}$  or smaller samples with high precision
- Highest sensitivity per unit volume for best precision

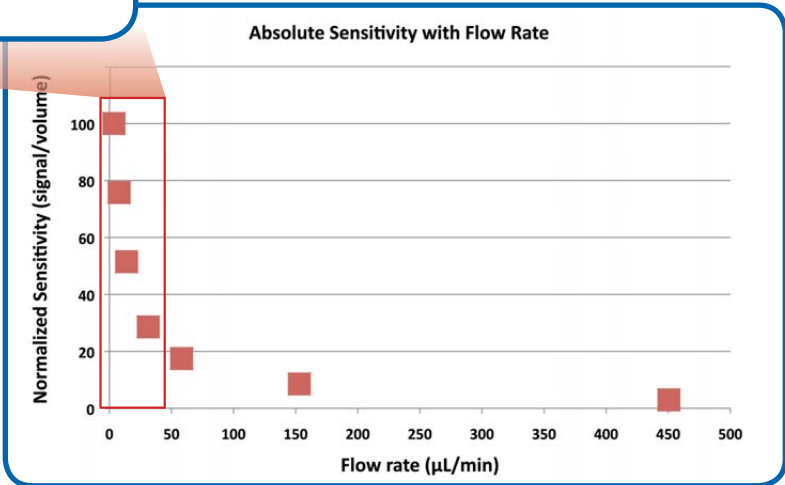
# microFAST™

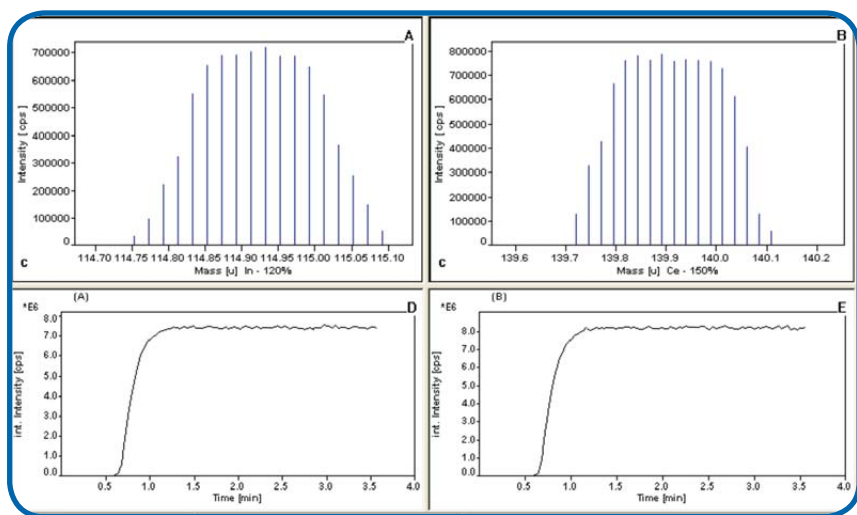


Sample transport efficiencies near 100% are obtained at flow rates below 20 μL/min.



Absolute sensitivity, signal per unit volume, is highest at low flow rates. The microFAST provides better absolute sensitivity than standard sample introduction techniques.

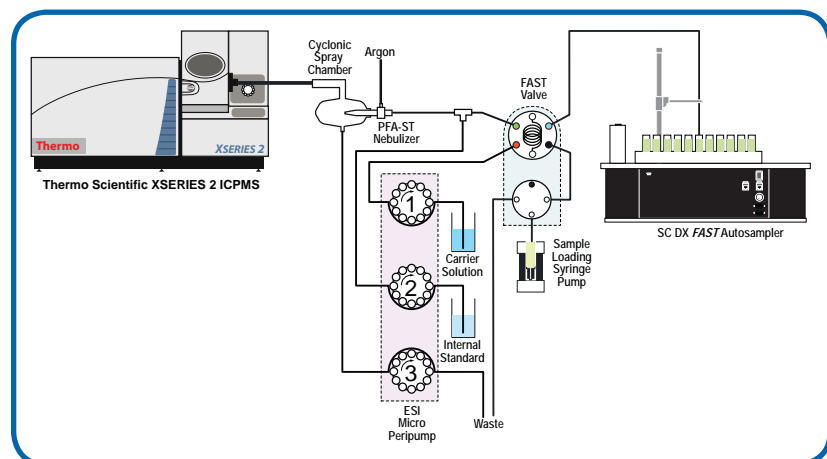




Time [min]	A	B
3.3688	7667939	8558145
3.4021	7690857	8341377
3.4354	7669419	8448720
3.4688	7601851	8328995
3.5021	7721991	8447726
3.5354	7721979	8486359
3.5687	7641920	8538104
Average(12)	7671196	8458803
RSD(12)	0.5840	0.9537

Stability at 10  $\mu$ L/min

Less than 50  $\mu$ L of 1 ppb tune solution at 10  $\mu$ L/min with the microFAST 1 and Apex



microFAST 1 System Diagram



**Typical % RSD, n = 5 at 10  $\mu$ L/min with cyclonic spray chamber**

Element	Mg	Y	In	U
microFAST 1 (MP <sup>2</sup> )	1.3	0.9	0.9	1.2
microFAST 2 (Syringe)	1.2	1.0	0.9	1.2

Both the MP<sup>2</sup> and syringe show good stability at low flow rates, but the syringe offers exact day-to-day flow rate reproducibility with the convenience of not having to change peristaltic pump tubing.

microFAST System Part Numbers for the XSERIES 2		
Description	SC-2 DX	SC-4 DX
microFAST 1 System	2MF2-60C	4MF2-60C
microFAST 2 System	2MF3-2-60C	4MF3-2-60C
microFAST HF1 System	HF 2MF2-HF-60C	4MF2-HF-60C
microFAST HF2 System	HF 2MF3-2-HF-60C	4MF3-2-HF-60C

System	Part Number	Description
Upgrade to microFAST 2	SC-0700-DX	Continuum System Upgrade for microFAST 1/HF1 or FAST System. Converts system to microFAST 2/HF2. A dual syringe pump system eliminates contact between the carrier liquid and peristaltic pump tubing. Pump volatile solvents or aggressive carrier liquids. Obtain exactly the same flow rate with day-to-day usage without changing peristaltic pump tubing.
Upgrade to microFAST HF2	SC-0700-DX-HF	

The TRUFAST automatically performs online preconcentration of specific radionuclides to reduce matrix-related interferences and enhance sensitivity by an order of magnitude or more. TRUFAST can eliminate lengthy off-line sample preparation, speed analytical results, better control blanks, and improve detection limits for radioisotopes by ICPMS.

**All TRUFAST systems include:**

- SC Autosampler with FAST PC<sup>3</sup> Complete system
- Integrated precision MP<sup>2</sup> micro peristaltic pump
- Two high-purity fluoropolymer injection valves and all connections
- Chelation column(s)
- Suggested methods



SC-4 DX TRUFAST system for Thermo Scientific XSERIES 2 ICPMS

Various applications are available, including:

• **Ra**

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

*(Cation exchange column, Sr preconcentration column)*

• **Th, U**

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

*(Th/U preconcentration column)*

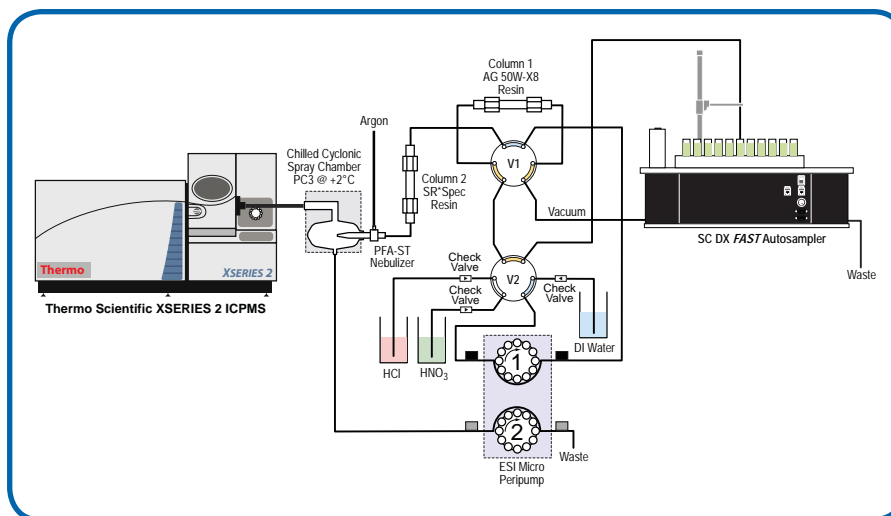
Th and U may also be determined in high saline matrices using the seaFAST system.

For even greater sensitivity, add the Apex Q to the TRUFAST.



Part Number	Description
CF-CX-2000-AG	Spare Cation exchange column
CF-Sr-0200	Spare Sr preconcentration column
CF-ThU-0200	Spare Th/U preconcentration column

TRUFAST System Part Numbers for the XSERIES 2		
Description	SC-2 DX	SC-4 DX
TRUFAST Radium System	2TF-Ra-60C	4TF-Ra-60C
TRUFAST Th/U System	2TF-ThU-60C	4TF-ThU-60C



TRUFAST configured for Radium preconcentration.

# INSTALLATION & TRAINING

## Silver Level ESI Installation & Training

- Includes:** Hardware installation  
 Basic system familiarization  
 Travel time & expenses for ESI employee or contractor  
 SC-FAST basic spares kit

Part Number	Description
FI-SC-01	On-site installation (1 day) and method development for SC-FAST or oneFAST on ICP/ICPMS in US, Canada, or Western Europe.

**Elemental Scientific, Inc.**  
 Certificate for ESI On-Site Installation and Training

**CERTIFICATE #**

Thank you for your purchase of an ESI product. Use this certificate to call **402.991.7800** or email [install@icpms.com](mailto:install@icpms.com) to schedule your 1 day on-site installation and training with the product you have received.

**Installation and Training includes:**  
 Hardware installation, and method optimization for environmental sample analysis. Manual and software files for SC-FAST™ or oneFAST™ and ICP or ICPMS methods included. Includes travel time and expenses for ESI employee or contractor. If you have any questions or concerns, please do not hesitate to call our staff for assistance.

Elemental Scientific, Inc. | 2440 Cuming St. | Omaha, NE 68131 USA  
 Phone: 402.991.7800 | Fax: 402.991.7799 | Email: [esi@icpms.com](mailto:esi@icpms.com) | Web: [www.icpms.com](http://www.icpms.com)

## Gold Level ESI Installation & Training

- Includes:** Hardware installation  
 Basic system familiarization  
 Travel time & expenses for ESI employee or contractor  
 SC-FAST complete spares kit

Part Number	Description
FI-SC-02	On-site installation (2½ day) and method development for SC-FAST or oneFAST on ICP/ICPMS in US, Canada, or Western Europe.

**Elemental Scientific, Inc.**  
 Certificate for ESI On-Site Installation and Training

**CERTIFICATE #**

Thank you for your purchase of an ESI product. Use this certificate to call **402.991.7800** or email [install@icpms.com](mailto:install@icpms.com) to schedule your 2½ day on-site installation and training with the product you have received.

**Installation and Training includes:**  
 Hardware installation, and method optimization for environmental sample analysis. Manual and software files for SC-FAST™ or oneFAST™ and ICP or ICPMS methods included. Includes travel time and expenses for ESI employee or contractor. If you have any questions or concerns, please do not hesitate to call our staff for assistance.

Elemental Scientific, Inc. | 2440 Cuming St. | Omaha, NE 68131 USA  
 Phone: 402.991.7800 | Fax: 402.991.7799 | Email: [esi@icpms.com](mailto:esi@icpms.com) | Web: [www.icpms.com](http://www.icpms.com)



The SC-FAST & oneFAST Consumables/Spares Kit is a great value at no extra expense with the Gold Installation & Training.



## oneFAST - Universal, High-Throughput Sample Introduction System

The oneFAST brings the field-proven capabilities of the SC-FAST to other non-ESI autosamplers. The oneFAST hardware and software has been optimized and integrated with the XSERIES 2 ICPMS to immediately increase throughput by speeding stabilization time and rinseout. The oneFAST reduces instrument matrix exposure, maintenance and improves long-term performance. The oneFAST is available in two versions: Basic system and Complete system.

### oneFAST for the Thermo Scientific XSERIES 2 ICPMS

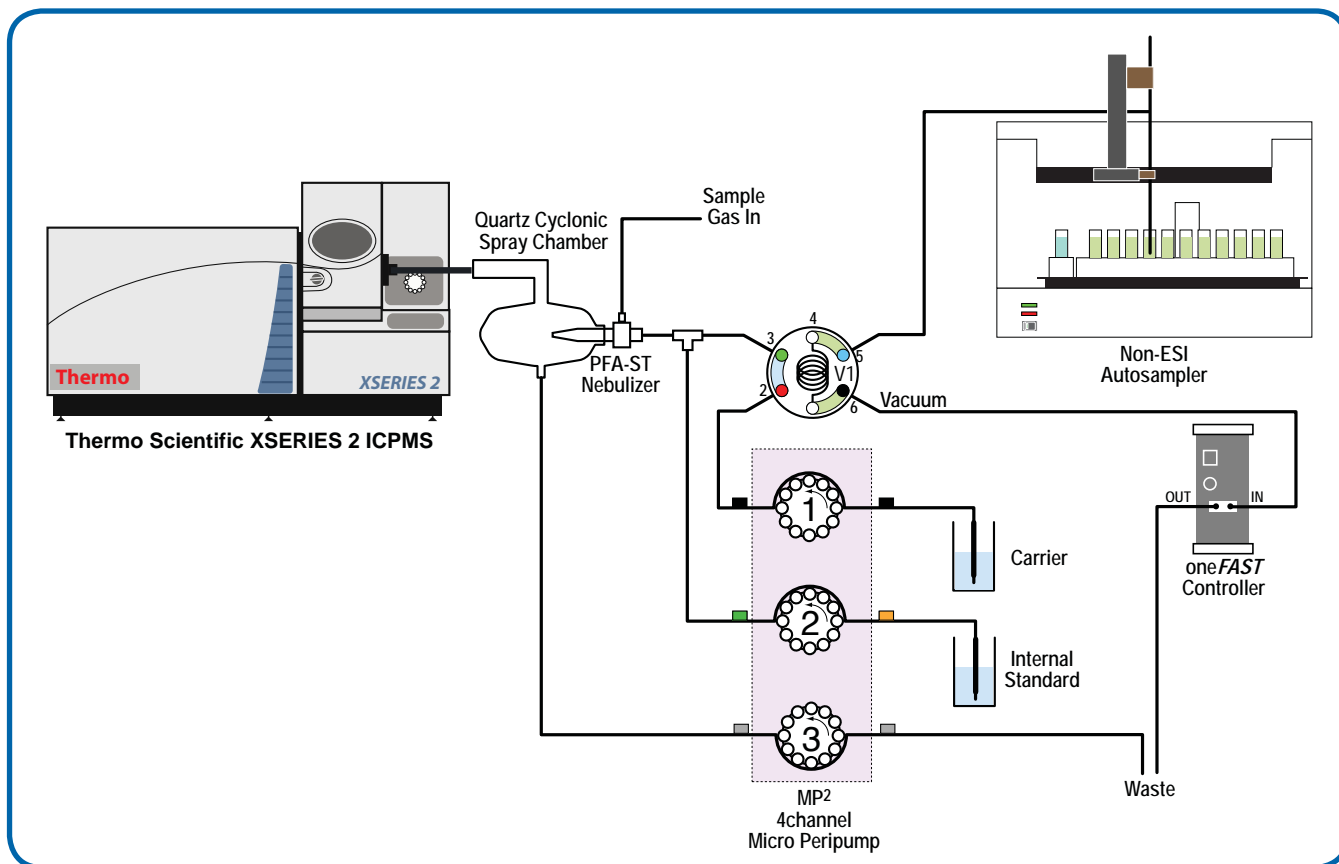


The oneFAST Complete increases throughput with non-ESI autosamplers.

**Includes:** FAST Valve                      Probes-Teflon/Carbon Fiber  
 oneFAST controller                  All required tubing  
 PFA-ST Nebulizer

Spray Chamber and Sapphire Injector (*Complete System Only*)










Part Number	Description
SC-0460	oneFAST Complete system for XSERIES 2
SC-0400	oneFAST Basic system for XSERIES 2










oneFAST Complete for Thermo Scientific XSERIES 2 ICPMS



**Function**

-  FAST
-  Low Sample Consumption
-  ppq Low Detection Limits
-  HF Resistant
-  High Throughput
-  High Precision/Isotope Ratio
-  Micro Samples
-  Preconcentration
-  Speciation

**Application**

-  Clinical
-  Organic Solvents
-  Environmental
-  Remote Monitoring
-  Geochemistry
-  Semiconductor
-  Nuclear

**PC<sup>3</sup> Peltier Coolers**



The PC<sup>3</sup> is a small and robust Peltier cooler for ICPMS cyclonic spray chambers. The cyclonic spray chamber offers the advantages of low-memory effects, fast rinse-out and high sample transport efficiency. The PC<sup>3</sup> cools the outer walls of the cyclonic spray chamber to a constant temperature, enhancing long-term signal stability, reducing polyatomic interferences such as oxides, and reducing solvent loading when volatile organic solvents are analyzed.

**PC<sup>3</sup> / PC<sup>3</sup>-LT**



The PC<sup>3</sup> has 2 preset temperatures +2°C / -5°C and is ideal for analysis of aqueous or aqueous/organic mixtures.

The PC<sup>3</sup>-LT operates at -20°C to reduce the solvent load on the plasma for analysis of 100% volatile organic solvents.

Part Number	Description	Temperature	Spray Chamber	Additional Gas Port
ES-4190-60-29	PC <sup>3</sup> organic sample introduction kit - Peltier cooler for XSERIES 2	+2°C / -5°C	Quartz (PFA option)	Yes
ES-9190-60-29	PC <sup>3</sup> -LT organic sample introduction kit - Peltier cooler for XSERIES 2	+2°C / -20°C	Quartz (PFA option)	Yes



**Additional Spray Chambers Available for the PC<sup>3</sup>**



Part Number	Description
ES-3160-1111-23	O-ring-free, baffled quartz cyclonic spray chamber with 1/4-28 threaded auxiliary gas port.



HF

Part Number	Description
ES-3160-3111-21	O-ring-free, baffled PFA cyclonic spray chamber with 1/4-28 threaded auxiliary gas port.

## SSI Spray Chamber

The Stable Sample Introduction (SSI) spray chamber is an all quartz, o-ring-free spray chamber with an additional mixing chamber to homogenize sample aerosol prior to introduction to the ICPMS. The SSI chamber improves short-term stability for isotope ratio measurements.

The spray chamber may be combined with PC<sup>3</sup> to enhance long-term stability. The SSI or PC<sup>3</sup>-SSI not only improves isotope ratio precision, but is useful for any analysis where better short- and/or long-term signal stability is desired.

### Benefits of SSI

- Improves signal stability up to 2x to 3x
- Improves isotope ratio precision up to 5x
- Reduces cone deposition and improves rinse-out time

### Dimensions

SSI Chamber 14cm x 5cm x 14cm (LxWxH)

Part Number	Description
ES-3260-1111-23	SSI dual cyclonic spray chamber for XSERIES 2 ICPMS, quartz, additional gas port, o-ring-free
ES-3260-3111	SSI dual cyclonic double pass PFA spray chamber for XSERIES 2



## PC<sup>3</sup> with SSI Spray Chamber

### Benefits of SSI with PC<sup>3</sup>

- Thermal stabilization of spray chamber improves long-term stability
- Reduces oxides, interferences
- No separate chiller required
  - No antifreeze required
  - No algae growth
  - No water lines
- Robust, with very little maintenance, reducing the chance of accidental breakage
- Long lifetime
- Very low maintenance

### Dimensions

PC<sup>3</sup> with SSI 14cm x 13cm x 14cm (LxWxH)

Part Number	Description
ES-4260-1111	PC <sup>3</sup> Peltier Cooler and quartz dual cyclonic spray chamber with ESI injector connection



Function		Application	
FAST	High Precision/Isotope Ratio	Clinical	Organic Solvents
Low Sample Consumption	Micro Samples	Environmental	Remote Monitoring
ppq	Preconcentration	Geochemistry	Semiconductor
HF Resistant	Speciation	Nuclear	
High Throughput			

### PC<sup>3</sup> FAST with SSI Spray Chamber

Combine the benefits of the PC<sup>3</sup> SSI spray chamber, and the throughput and/or advanced automation capabilities of the FAST system into a single unit.

Part Number	Description
SC-4199-1210-60-SSI	PC <sup>3</sup> -SSI FAST Peltier-cooler for XSERIES 2 ICPMS.



The PC<sup>3</sup>-SSI incorporates a dual spray chamber which further homogenizes the sample aerosol stream giving improved stability. Ideal for high precision isotope ratio analysis.

**Short-Term (20 min) Signal Stability  
Scott vs PC<sup>3</sup> vs PC<sup>3</sup>-SSI**

Isotope	Standard Inlet	PC <sup>3</sup>	PC <sup>3</sup> -SSI
Co-59	1.03%	0.92%	0.53%
In-115	1.32%	1.08%	0.40%
Ba-138	0.96%	0.90%	0.48%
U-238	1.16%	0.93%	0.34%

n=10, 1 min read, 1 min delay, LR 10% mass window



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

Micro peristaltic pumps offer advantages over standard peristaltic pumps due to precision machining and a roller configuration that minimizes the gaps between rollers, resulting in more even pressure points along the pump tubing.

The MP<sup>2</sup> offers less pulsation in sample delivery, smaller relative standard deviations in signal, and consequently, improved detection limits. Also, the pump offers improved mixing of internal standards or diluents in online mixing tees.

### BENEFITS:

- Low pulsation
  - Better precision for addition of internal standard at low-flow rates
  - Shorter analysis time without sacrificing precision
- Wide dynamic range of flow rates
- Optimized for low-flow rates
- Improved online mixing / dilution
- Easy to use
  - Aligned pressure shoes
  - Easy tube replacement
- Highly customizable

### SPECIFICATIONS:

#### Motor:

MP<sup>2</sup> - Uses a NEMA 17 motor, 1.8A, 5.4V

#### Channels:

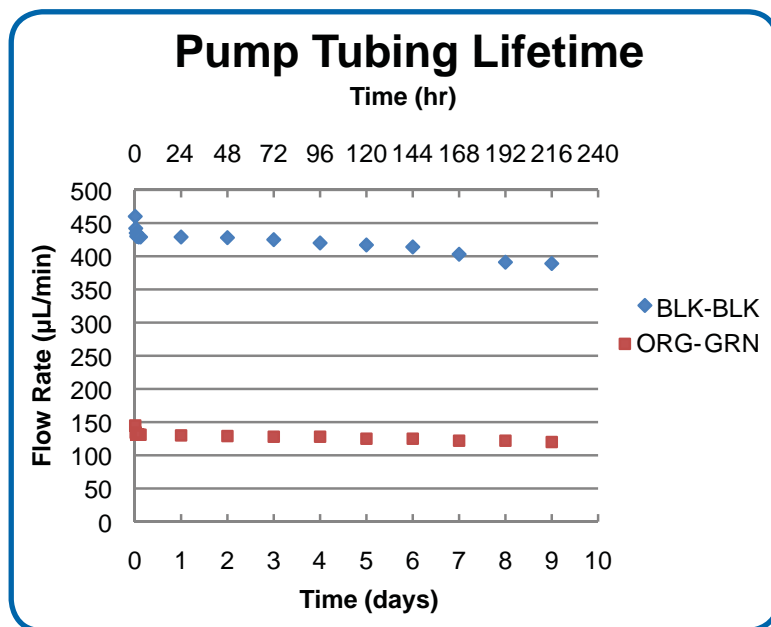
1-6 Channels (MP<sup>2</sup>)

#### Flow Rates:

MP<sup>2</sup> - 0.2  $\mu$ L/min to 10 mL/min per channel

#### Tubing:

0.13 mm i.d. to 3.17 mm i.d.












Pump tubing flow rates measured over 9 days of continuously pumping

Part Number	Description
MP2-3-60	MP <sup>2</sup> integrated three channel precision micro peristaltic pump
MP2-4-60	MP <sup>2</sup> integrated four channel precision micro peristaltic pump
MP2-6-60	MP <sup>2</sup> integrated six channel precision micro peristaltic pump

# MP<sup>2</sup> PRECISION MICRO PERISTALTIC PUMPS

## Function

-  FAST
-  Low Sample Consumption
-  Low Detection Limits
-  HF Resistant
-  High Throughput
-  High Precision/Isotope Ratio
-  Micro Samples
-  Preconcentration
-  Speciation

## Application

-  Clinical
-  Environmental
-  Geochemistry
-  Nuclear
-  Organic Solvents
-  Remote Monitoring
-  Semiconductor

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



The MP<sup>2</sup> precision standalone micro-peripump has very low pulsation, a wide dynamic range (< 1µL/min - > 10 mL/min), is available with one to six channels and is optimized for low-flow rates. The MP<sup>2</sup> uses either MPP tubing or standard 3-stop pump tubing.

### Interchannel Reproducibility at 125 nL/min

RPM	Ch. 1	Ch. 2	Ch. 3	Ch. 4
0.2	126	124	128	124
RSD	1.26 %			



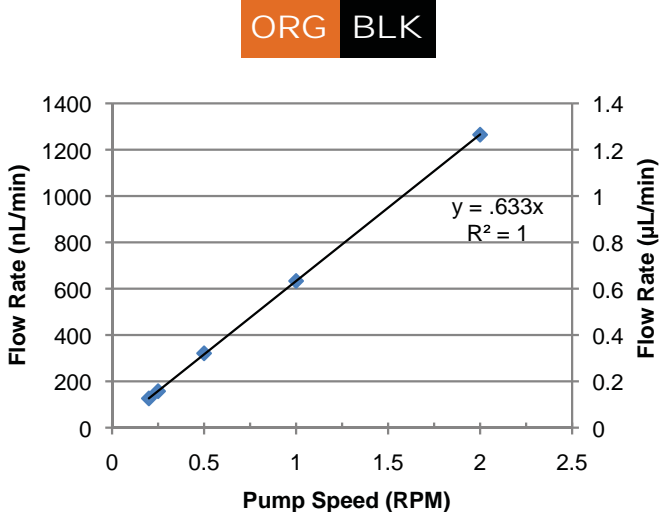
### CONTROLLED BY THE INSTRUMENT PC USB PORT

Part Number	Number of Channels
MP2-1-PC	One channel MP <sup>2</sup> precision micro peristaltic pump
MP2-2-PC	Two channel MP <sup>2</sup> precision micro peristaltic pump
MP2-3-PC	Three channel MP <sup>2</sup> precision micro peristaltic pump
MP2-4-PC	Four channel MP <sup>2</sup> precision micro peristaltic pump
MP2-6-PC	Six channel MP <sup>2</sup> precision micro peristaltic pump

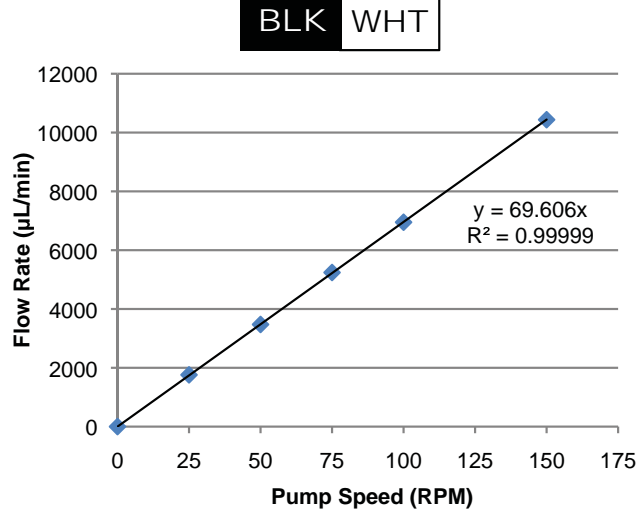
Includes: Cable to control with DX Autosampler

### CTFE PERIPUMP FITTINGS

Part Number	Qty	Size
ES-2501-PPF1	1 ea.	Female (small)
ES-2501-PPM1	1 ea.	Male (small)



MP<sup>2</sup> pump linearity < 1 µL/min



MP<sup>2</sup> pump linearity up to 10 mL/min



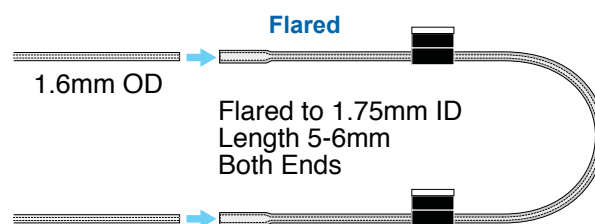
# MP<sup>2</sup> PERIPUMP TUBING



Tubing for MP<sup>2</sup> Micro Peristaltic Pumps (Packs of 12) 

i.d.	Stop Colors		Calibration Slope ( $\mu\text{L}/\text{min}$ per RPM)	Non-Flared			Flared*	
				PVC 2-stop	Santoprene 2-stop	Solva 2-stop	PVC 2-stop	SOLVA 2-stop
0.13 mm	Orange	Black	0.6	MPP-013-PVC			MPP-013-F-PVC	MPP-013-F-S
0.19 mm	Orange	Red	1.3	MPP-019-PVC			MPP-019-F-PVC	MPP-019-F-S
0.27 mm	Orange	Blue	2.7	MPP-027-PVC			MPP-027-F-PVC	MPP-027-F-S
0.38 mm	Orange	Green	4.7	MPP-038-PVC	MPP-038-PHR		MPP-038-F-PVC	MPP-038-F-S
0.44 mm	Green	Yellow	7.6	MPP-044-PVC			MPP-044-F-PVC	MPP-044-F-S
0.51 mm	Orange	Yellow	9.5	MPP-051-PVC			MPP-051-F-PVC	MPP-051-F-S
0.57 mm	White	Yellow	11	MPP-057-PVC			MPP-057-F-PVC	MPP-057-F-S
0.64 mm	Orange	White	14	MPP-064-PVC			MPP-064-F-PVC	MPP-064-F-S
0.76 mm	Black	Black	19	MPP-076-PVC	MPP-076-PHR	MPP-076-S	MPP-076-F-PVC	MPP-076-F-S
0.89 mm	Orange	Orange	24	MPP-089-PVC		MPP-089-S	MPP-089-F-PVC	MPP-089-F-S
0.95 mm	White	Black	28	MPP-095-PVC		MPP-095-S	MPP-095-F-PVC	MPP-095-F-S
1.02 mm	White	White	31	MPP-102-PVC		MPP-102-S	MPP-102-F-PVC	MPP-102-F-S
1.09 mm	White	Red	33	MPP-109-PVC		MPP-109-S	MPP-109-F-PVC	MPP-109-F-S
1.14 mm	Red	Red	35	MPP-114-PVC		MPP-114-S	MPP-114-F-PVC	
1.22 mm	Red	Grey	46	MPP-122-PVC		MPP-122-S		
1.30 mm	Grey	Grey	47	MPP-130-PVC	MPP-130-PHR	MPP-130-S		
1.42 mm	Yellow	Yellow	50	MPP-142-PVC		MPP-142-S		
1.52 mm	Yellow	Blue	51	MPP-152-PVC	MPP-152-PHR	MPP-152-S		
1.65 mm	Blue	Blue	55	MPP-165-PVC		MPP-165-S		
1.75 mm	Blue	Green	58	MPP-175-PVC		MPP-175-S		
1.85 mm	Green	Green	61	MPP-185-PVC		MPP-185-S		
2.06 mm	Purple	Purple	64	MPP-206-PVC		MPP-206-S		
2.20 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		
<b>Bridge Length</b>				72 mm	72 mm	72 mm	72 mm	72 mm

\*For easy insertion of Teflon® capillaries **MPP-idd** **idd = internal diameter**



MP <sup>2</sup> PUMP TUBING STARTER KIT	
Part Number	Description
MPP-K-1	MP <sup>2</sup> Pump Tubing Starter Kit comprising 34 packs of 12 tubes, one package of each light-blue highlighted part number in the table above. <b>Includes:</b> 26 packs of PVC tubing (0.13 to 3.17 mm i.d.) 3 packs of Santoprene tubing and 5 packs of Solva tubing. <b>Kit also includes:</b> 20 CTFE Fluoropolymer Peripump Fittings (5 each ES-2501-PPF1, 5 each ES-2501-PPM1, 5 each ES-2501-PPF5 and 5 each ES-2501-PPM5).

**NEW!**

# SYRINGE PUMPS

## SYRIX Syringe Pump

The SYRIX features an innovative drive mechanism for the precise control of liquid samples and reagents. Wetted parts are o-ring-free and offer the highest chemical resistance.

The SYRIX is highly configurable for a wide range of applications such as micro sample loading and remote monitoring.

### Features:

- Wide flow rate range
  - < 10  $\mu\text{L}/\text{min}$  to > 100 mL/min
- A variety of syringe sizes
  - 0.3 mL to 10 mL
- O-ring-free
- Syringe material
  - PTFE/Quartz
  - PTFE/PFA
- Optional integrated switching valve
- Convenient software control interface
- Connects directly to SC-DX autosampler



SYRIX syringe pump with valve  
(SX-6503-1030-DX)



SYRIX syringe pump  
(SX-6500-1030-DX)

SYRINGE PUMPS		
Part Number	Description	Application
SX-6500-1030-DX	SYRIX precision O-ring-free programmable syringe pump system without integrated 3 port valve. Controlled by the SC-2/SC-4 DX.	Precise, controlled delivery of sample to the XSERIES 2. Useful for volatile / viscous samples and for accurate online continuous dilution.
SX-6503-1030-DX	SYRIX precision O-ring-free programmable syringe pump system with integrated 3 port valve. Controlled by the SC-2/SC-4 DX.	Accurately delivers micro volume samples to the FAST loop.



With additional options, two syringe barrels may be operated with a single SYRIX drive mechanism for applications such as continuous dilution.


SYRINGE PUMP SPARES	
Part Number	Description
SX-0599-1003	0.3 mL quartz syringe
SX-0599-1030	3 mL quartz syringe
SX-0599-1100	10 mL quartz syringe
SX-0599-3003	0.3 mL PFA syringe
SX-0599-3030	3 mL PFA syringe
SX-0599-3100	10 mL PFA syringe
SX-A-33	PTFE adapter to mount both 0.3 mL and 3 mL syringe barrels on Syrix







3.0 mL quartz syringe  
(SX-0599-1030)

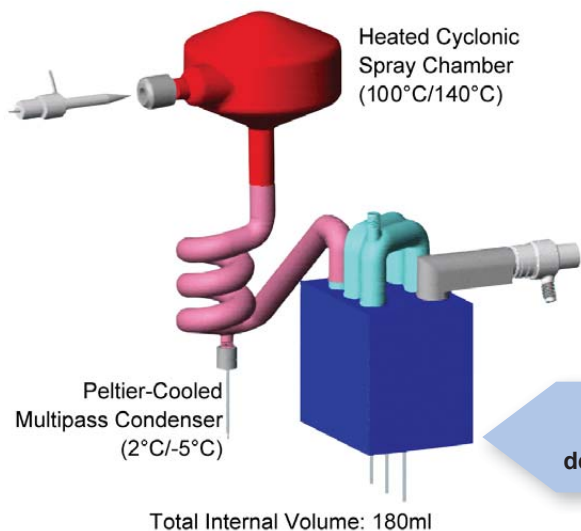
0.3 mL PFA syringe  
(SX-0599-3003)

## High Sensitivity Desolvation Nebulizers

**Apex Q - Quartz Inlet System.** Features an o-ring-free Quartz flow path for high sensitivity and low background for samples that do not contain hydrofluoric acid. The Apex Q sample path design ensures rapid rinse-out of any high sensitivity ICP introduction system. 

**Apex IR for Isotope Ratio Analysis.** Developed for Isotope Ratio analysis, the Apex IR has a quartz flow path and includes an additional mixing chamber that further homogenizes and stabilizes the sample aerosol stream, resulting in a more stable signal from the ICPMS.  

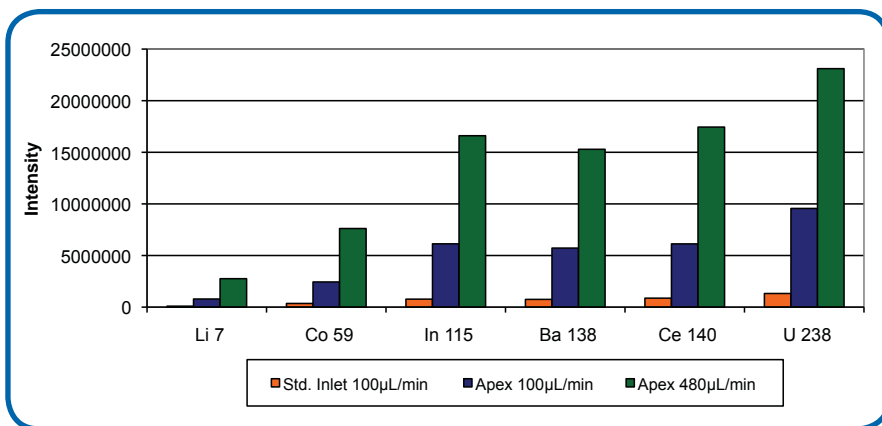
**Apex HF for Hydrofluoric Acid Resistance.** Uses a high-purity o-ring-free PFA Teflon® flow path to provide resistance to Hydrofluoric acid. The Apex HF is recommended for many geochemistry and semiconductor applications where samples containing HF are analyzed.  



Preset dual temperature settings for heater and cooler. Patented flow path design ensures rapid wash-in / washout.



Part Number	Description
ES-2999-6021	R2 Apex Stand for XSERIES 2























Combination of Apex inlet system with FAST injection valve

## Function

-  FAST
-  Low Sample Consumption
-  Low Detection Limits
-  HF Resistant
-  High Throughput
-  High Precision/Isotope Ratio
-  Micro Samples
-  Preconcentration
-  Speciation

## Application

-  Clinical
-  Organic Solvents
-  Environmental
-  Remote Monitoring
-  Geochemistry
-  Semiconductor
-  Nuclear

## FAST High Sensitivity Desolvating Nebulizers

The apex FAST is a compact, high performance sample introduction system for ICPMS. The apex FAST is available in Q, HF and IR options. It can be controlled via any SC-Autosampler or one FAST unit making it fully automated and integrated to any ICP or ICPMS.

Requires FAST-enabled autosampler.



	Part Number	HF-Resistant	Integrated Valve	High Sensitivity	O-ring-free	Dual Temperature	Mixing Chamber for Isotope Ratios
Apex Q	ES-4360-1000-21			✓	✓	✓	
Apex IR	ES-4560-1000-21			✓	✓	✓	✓
Apex HF	ES-4460-1000-21	✓		✓	✓	✓	
Apex Q FAST	ES-43FH-21-60		✓	✓	✓		
Apex IR FAST	ES-45FH-21-60		✓	✓	✓		✓
Apex HF FAST	ES-44FH-21-60	✓	✓	✓	✓		

## Spiro TMD Heated Membrane Desolvator

The Spiro TMD is a heated macro-porous PTFE Teflon® membrane desolvation module that reduces solvent derived polyatomic interferences in ICPMS. Both aqueous and organic solutions can be desolvated, making the Spiro ideal for HPLC applications.

- Heated Macro-Porous PTFE Teflon® membrane
- Desolvation of Aqueous & Organic Solutions
- Reduces solvent derived oxide, hydride and carbide polyatomic interferences
- Suitable for sample flow rates < 400µL/min through Apex
- Removes volatile acid matrix, i.e. HCl, HF
- Fast rinse out
- Resistant to clogging, run samples with high TDS
- Can be used with or without the Apex
- Add membrane desolvation to standard introduction systems
- Easy to maintain and clean. User replaceable membrane sheets
- CeO<sup>+</sup>:Ce<sup>+</sup> ratio approximately 0.03%



Spiro TMD heated membrane desolvation module

Part Number	Description
ES-4599-3000	Spiro TMD heated membrane desolvation module.



## High Efficiency MicroFlow Nebulizers



MicroFlow nebulizers are constructed entirely from chemically resistant fluoropolymers, ideal for strong acids, alkalis, organics, high salt solutions and high solid concentrations. They are resistant to clogging, are reliably self-aspirated or pumped and produce a fine aerosol for high transport efficiency and high sensitivity.

### PFA-ST Nebulizer



The PFA-ST Nebulizer features the same high purity, HF resistance, and high performance of the PFA MicroFlow nebulizers, along with an exchangeable external sample uptake capillary. The sample uptake rate is controlled by the diameter of the external capillary or probe.

- Exchangeable uptake capillaries allow one nebulizer to be used at different self-aspiration rates from 20 $\mu$ L/min to 700 $\mu$ L/min.
- All Teflon<sup>®</sup> construction.
- Chemically resistant - ideal for strong acids, alkalis, organics.
- Can be pumped from < 0.1 mL/min to 3.0 mL/min.
- Direct analysis of volatile and non-volatile organic solvents.
- Longer lifetime than glass or quartz nebulizers.



Part Number	Description
ES-2040	Self-aspirating nebulizer with detachable sample capillary

### PolyPro-ST Nebulizer



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

Part Number	Description
ES-4040	Self-aspirating nebulizer with external threaded connector



### PFA-ST3 MicroFlow Nebulizer



The PFA-ST3 MicroFlow Nebulizer is designed for superior clog resistance and higher sensitivity compared to the standard PFA nebulizer.

Part Number	Description
ST3-70	PFA-ST3 MicroFlow nebulizer with external threaded connector. High performance, clog resistant and chemically inert nebulizer for ICP and ICPMS.

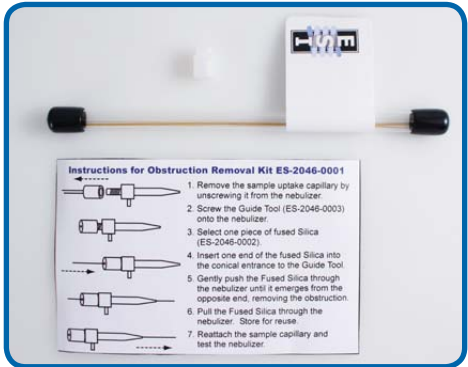


Function		Application	
FAST	High Precision/Isotope Ratio	Clinical	Organic Solvents
Low Sample Consumption	Micro Samples	Environmental	Remote Monitoring
Low Detection Limits	Preconcentration	Geochemistry	Semiconductor
HF Resistant	Speciation	Nuclear	
High Throughput			

## Nebulizer Obstruction Removal Kit

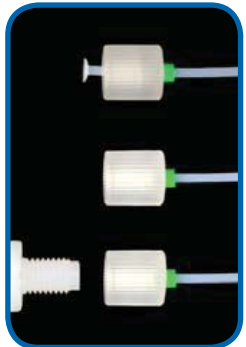
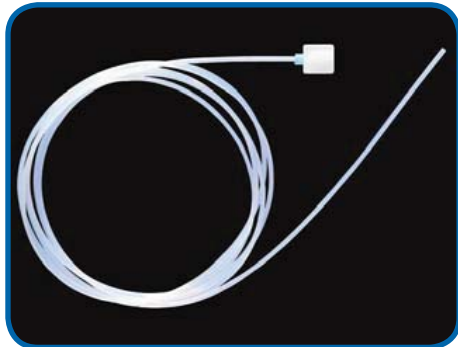
While naturally resistant to obstructions, PFA nebulizers may occasionally require maintenance. Use this kit to safely remove obstructions in all PFA-ST nebulizers for long-term high performance. Never back-flush a PFA-ST nebulizer.

Part Number	Description
ES-2046-0001	Obstruction Removal Kit for ST nebulizers



## Sample Capillaries for ST Nebulizers

I.D.	Self-aspiration rate (@1L/m Ar)	ESI SC
0.15 mm	20 µL/min <span style="color:red">■</span> (red)	ES-2045
0.2 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
0.3 mm	200 µL/min <span style="color:yellow">■</span> (yellow)	ES-2047
0.5 mm	400 µL/min <span style="color:orange">■</span> (orange)	ES-2041
0.8 mm	700 µL/min <span style="color:blue">■</span> (blue)	ES-2044
1.0 mm	1 mL/min <span style="color:gray">■</span> (gray)	ES-2049



## Carbon Fiber Supported Autosampler Probes for ST Nebulizers

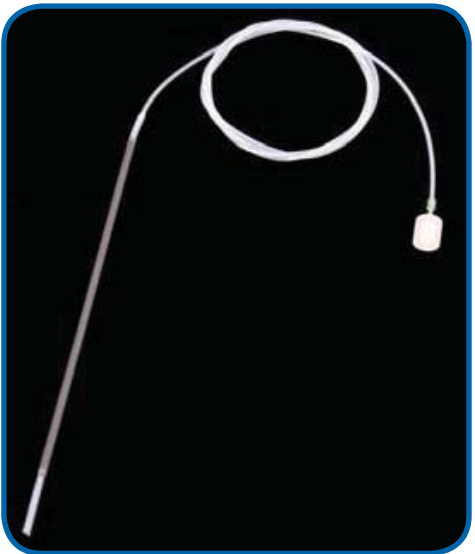
ST Nebulizer probes connect directly to any ST-type nebulizer. The 1/4-28 threaded fitting provides a secure, zero-dead-volume connection with no additional fittings required.

**Probes can be custom-made to your specifications of length and materials at no extra charge.**

### Self-aspirating Probes with Carbon Fiber Support

Probe I.D.	Self-aspiration rate (@1L/m Ar)	ESI SC	ASX-500 / 520
0.25 mm	100 µL/min	ES-5037-3255-150	ES-5037-0250-100
0.50 mm	400 µL/min	ES-5037-3505-150	ES-5037-0500-100

Also available with Ultem support



## MicroFlow PFA Self-Aspirating Nebulizers

### PFA Nebulizers with Integrated Capillaries



An integrated capillary PFA nebulizer for self aspiration. PFA MicroFlow nebulizers are constructed entirely from chemically resistant fluoropolymers, ideal for strong acids, alkalis, organics and high salt solutions. They are resistant to clogging, and produce a fine aerosol for high transport efficiency and high sensitivity.

- Integrated capillary for self aspiration, ideal for low-flow, clean applications
- All Teflon® construction
- Chemically resistant - ideal for strong acids, alkalis, organics
- Low, spike free background for important elements such as Fe and Ca
- Produces a fine aerosol for high transport efficiency and high sensitivity
- Direct analysis of volatile and non-volatile organic solvents



### PFA Nebulizers with Integrated Fluoropolymer Capillaries

Model	Part Number	Measured self-aspiration rate (@1L/m Ar)
PFA-20	ES-2020-0002	20 µL/min
PFA-50	ES-2000-0002	50 µL/min
PFA-100	ES-2002-0002	100 µL/min
PFA-200	ES-2003-0002	200 µL/min
PFA-400	ES-2005-0002	400 µL/min

Other flow rates made to order

### Apex MicroFlow PFA Self-Aspirating Nebulizers



Part Number	Description	Application
ES-2040-7000	Apex-ST PFA MicroFlow Nebulizer with external 1/4-28 threaded connector	High temperature PFA-ST nebulizer recommended for use with Apex high sensitivity desolvation system.
ES-2002-7000	Apex-100 PFA Nebulizer	High temperature PFA-100 nebulizer with integrated 100 µL/min self aspiration capillary. Recommended for Apex high sensitivity desolvation system.



# MICROFLOW PFA NEBULIZERS WITH INTEGRATED PROBES

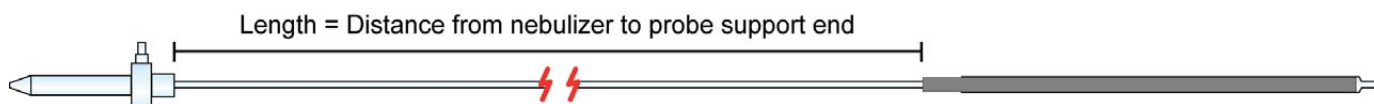
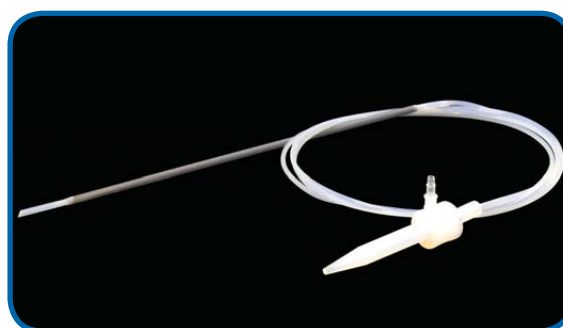
Function		Application	
FAST	High Precision/Isotope Ratio	Clinical	Organic Solvents
Low Sample Consumption	Micro Samples	Environmental	Remote Monitoring
ppq Low Detection Limits	Preconcentration	Geochemistry	Semiconductor
HF Resistant	Speciation	Nuclear	
High Throughput			

## High Efficiency MicroFlow PFA Nebulizers

### Self-Aspirating PFA Nebulizers with Integrated Probes

These nebulizers allow self-aspiration at low sample consumption rates with any autosampler while providing the same benefits of the PFA MicroFlow nebulizer. The integrated sampling probe is constructed by encapsulating a rigid support material between layers of Teflon® to provide a chemically resistant probe that is mechanically stable and resilient.

Probes can be custom-made to your specifications of length and materials at no extra charge.



#### PFA MicroFlow Nebulizer with Integrated Autosampler Probe (Carbon Fiber support) (Environmental/Clinical Applications)

Model	Self-aspiration rate (@1L/m Ar)	For SC Autosampler
PFA-20	20 µL/min	ES-2020-3503-150
PFA-50	50 µL/min	ES-2000-3503-150
PFA-100	100 µL/min	ES-2002-3503-150
PFA-200	200 µL/min	ES-2003-3503-150
PFA-400	400 µL/min	ES-2005-3503-150



#### PFA MicroFlow Nebulizer with Integrated Autosampler Probe (Ultem support) (High Purity Semiconductor Applications)

Model	Self-aspiration rate (@1L/m Ar)	For SC Autosampler
PFA-20	20 µL/min	ES-2020-3505-150
PFA-50	50 µL/min	ES-2000-3505-150
PFA-100	100 µL/min	ES-2002-3505-150
PFA-200	200 µL/min	ES-2003-3505-150
PFA-400	400 µL/min	ES-2005-3505-150



Also available with PEEK support and for ASX 500 / 520 Autosampler

## PFA Sample Introduction Kits for XSERIES 2 ICPMS



A reliable, ultrapure sample introduction kit to complement the Thermo Scientific XSERIES 2 ICPMS.

- Easy installation on the XSERIES 2 ICPMS.
- Clean Teflon® PFA components for lower background equivalent concentration (BEC) and detection limits
- Chemically resistant—suitable for nearly all samples, including strong acids, alkalis and organic solvents
- Sapphire or platinum injector
- Self-aspirated or pumped PFA nebulizers included
- Low sample consumption—ideal for VPD and pre-concentrated samples



PFA-Sapphire HF Resistant Sample Introduction Kit

Part Number	Description
ES-2190-1470-29	Complete HF resistant sample introduction system for XSERIES 2. All wetted surfaces are Teflon® and Sapphire. Provides a chemically inert and clean introduction system. Includes a PFA-ST Nebulizer, PureCap PFA endcap with additional gas port, PFA spray chamber, Sapphire injector, Pt Shield and quartz torch.
ES-2191-1470-19	Complete high purity sample introduction system for XSERIES 2. All wetted surfaces are Teflon® and Pt. Used by a majority of semiconductor labs worldwide for the analysis of semiconductor grade chemicals and Si wafer samples. Includes 2 PFA MicroFlow Nebulizers, PureCap PFA endcap with additional gas port, PFA spray chamber, Pt injector, Pt Shield and quartz torch.



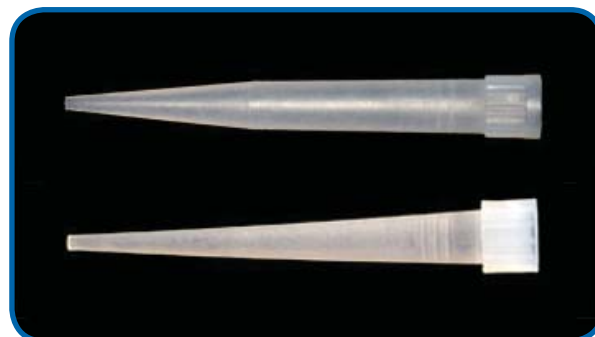
PFA-Platinum HF Resistant Sample Introduction Kit

## High Purity PFA Pipette Tips



High Purity PFA Pipette Tips are used to minimize contamination of semiconductor and biological samples.

Part Number	Volume	Qty	Description
ES-7000-0101	100µL	10 pk	Pre-cleaned PFA Pure Tip pipette tips 100µL
ES-7000-1001	1000µL	10 pk	Pre-cleaned PFA Pure Tip pipette tips 1000µL



# XSERIES 2 ICPMS SPRAY CHAMBERS

## Spray Chambers

ESI cyclonic chambers feature o-ring-free connections to the nebulizer and torch injector, secure, leak-free threaded drain port, internal baffle and threaded auxiliary port for addition gas.

Part Number	Description
ES-3160-1111-23	O-ring-free, baffled quartz cyclonic spray chamber with 1/4-28 threaded auxiliary gas port.



Part Number	Description
ES-3160-3111-21	O-ring-free, baffled PFA cyclonic spray chamber with 1/4-28 threaded auxiliary gas port.



Part Number	Description
ES-3460-1018-11	Quartz micro cyclonic spray chamber with baffle. Includes quartz 12/5 angled socket adapter for use with standard Thermo ball joint torch.



See page 26 for information on the SSI dual cyclonic spray chamber

Part Number	Description
ES-3460-1111-15	Quartz micro cyclonic spray chamber with baffle.



Part Number	Description
ES-2124-5471	The 47 mm PureChamber and PureCap offers a spray chamber with high aerosol transmission with excellent short-term and long-term stability. Constructed from PFA Teflon® for low contamination and long lifetime, the o-ring-free seal reduces contamination and provides an easy to clean, low maintenance system.



## PFA-Quartz Ball Joint Socket Adapter



Part Number	Description	Application
ES-5510	Adapter, PFA/quartz. 12/5 ball joint to ESI Spray Chambers	Connects ESI spray chambers to standard XSERIES 2 injector with glass ball joint inlet.



# INJECTORS FOR O-RING-FREE TORCH

## O-Ring-Free Platinum Injectors for XSERIES 2 Torch



Part Number	Size	Description
ES-1213-3100 	1 mm	Platinum injector, 1 mm, o-ring-free injector. For introducing volatile organic solvents containing HF. Used for semiconductor and other applications. [Pt cones recommended]
ES-1213-3150	1.5 mm	Platinum injector, 1.5 mm, o-ring-free injector. For solvents and HF-containing semiconductor-grade chemicals
ES-1213-3200 	2 mm	Platinum injector, 2 mm, o-ring-free injector. For semiconductor HF applications and low-ppt Al determinations.



## O-Ring-Free Sapphire Injectors for XSERIES 2 Torch





Part Number	Size	Description
ES-1203-3180	1.8 mm	Sapphire injector, 1.8 mm, o-ring-free injector. HF-resistant. For geochemistry and HF applications where low-ppt Al is not required.
ES-1203-3200	2 mm	Sapphire injector, 2 mm, o-ring-free injector. HF-resistant. For high matrix geochemistry and HF applications. [For low-ppt Al detection a Pt injector is recommended.]



## O-Ring-Free Quartz Injectors for XSERIES 2 Torch



Part Number	Size	Description
ES-1233-3100 	1 mm	Quartz injector, 1 mm, o-ring-free injector. For volatile organic solvent introduction.
ES-1233-3150	1.5 mm	Quartz injector, 1.5 mm, o-ring-free injector.
ES-1233-3200	2 mm	Quartz injector, 2 mm, o-ring-free injector. Recommended for a wide range of non-HF applications.
ES-1233-3250 	2.5 mm	Quartz injector, 2.5 mm, o-ring-free injector. Improved stability for high matrix/high TDS environmental samples.



## O-Ring-Free Shield Disc for a PFA Injector Base

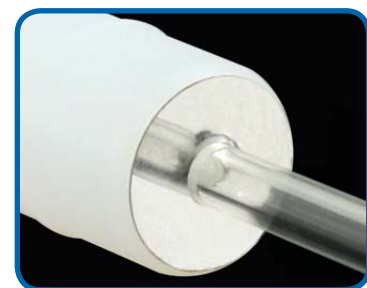


- Protects PFA Teflon® injector base from damage caused by heat and light from the instrument.
- Extends injector lifetime.
- Improves long-term instrument stability.

Part Number	Description
ES-1101-3107	Platinum Shield Disc for o-ring-free torch, XSERIES 2

For Platinum & Sapphire Injectors Only

Platinum Shield Disc Installed





# MICROTITER PLATES / COVERS

## Microtiter Plates

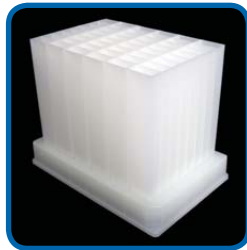
Part Number	Description
MT24-10ML-02	24 well, 10 mL microtiter plate, square well, pyramid bottom



Part Number	Description
MT48-7.5ML-02	48 well, 7.5 mL microtiter plate, square well, pyramid bottom, 3 Pk



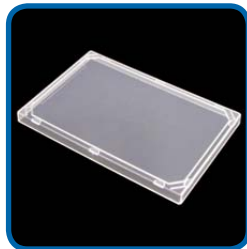
Part Number	Description
MT48-10ML-02	48 well, 10 mL microtiter plate, square well, pyramid bottom



Part Number	Description
MT48-5ML-02	48 well, 5 mL microtiter plate, square well, pyramid bottom, 5 Pk



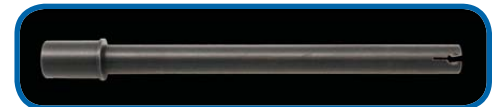
Part Number	Description
MT-00-02ML	Cover for microtiter plates (5 Pack)



Part Number	Description
MT96-2ML-02	96 well, 2 mL microtiter plate, square well, pyramid bottom, 5 Pk



Part Number	Description
MT-96-500-V	500µL, 96 well microtiter plate. Qty 5



Part Number	Description
MT-96-XP	X Piercing cover for 96 well microtiter plate, prevents sample evaporation, Qty 50

Part Number	Description
SC-0105-DX-XP	XP Probe Arm for SC-2 DX and SC-4 DX autosamplers. Must be used in place of reset probe when X-Piercing cover is applied to microtiter plates.



Remove X Piercing cover from it's backing and place on the microtiter plate



X Pierce cover helps prevent contamination during sampling

# RACKS / VIALS

## Standards Racks

Part Number	Description
ST10-28	Standards Rack 10 position 28 mm o.d.



Part Number	Description
ST10-31	Standards Rack 10 position 31 mm o.d.



## Standards Vials

Part Number	Qty	Description
V-28-0260-L	50	50 mL polypropylene vial with screw cap
V-28-0260-D	500	



Part Number	Qty	Description
V-31-15-X	10	15 mL PFA sample vial
V-31-30-X	10	30 mL PFA sample vial
V-31-60-X	10	60 mL PFA sample vial
V-31-SC-X	10	Screwcap for PFA sample vials



## Micro Racks

Part Number	Description
MR-21-14	Micro Rack 21 position 14 mm o.d.



Part Number	Description
MR-21-14-08	Micro Rack 21 position 14 mm o.d. PTFE



Part Number	Description
MR-40-14	Micro Rack 40 position 14 mm o.d.



## PFA Vials for Micro Racks



Part Number	Qty	Description
V-14-0311CG-X	10	1 mL PFA vial



Part Number	Qty	Description
V-14-0312CG-X	10	2 mL PFA vial



Part Number	Qty	Description
V-14-0314CG-X	10	4 mL PFA vial



All three of the above vials fit into the following micro racks:

- MR-21-14
- MR-21-14-08
- MR-40-14

Part Number	Qty	Description
V-15-0301-X	10	PFA cap for 15mm graduated vials
ES-7225-0001	1	ETFE Tweezers for dust cap removal



## Super Racks

## Super Rack Vials & Bottles

Part Number	Description
SR2-10-61	Super Rack 10 position 60 mm diameter



Part Number	Qty	Description
V-61-0660-XII	12	250 mL narrow mouth bottle, polyethylene



Part Number	Description
SR2-12-50	Super Rack 12 position 50 mm diameter



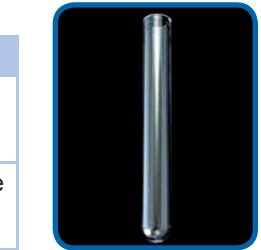
Part Number	Qty	Description
V-50-0360	1	125 mL PFA bottle and cap with TFM insert



Part Number	Description
SR2-120-13	Super Rack 120 position 13 mm diameter



Part Number	Qty	Description
V-13-0500-R-D	500	8 mL polystyrene tube with rounded bottom
V-13-0200-R-D	500	8 mL polypropylene tube with rounded bottom



Part Number	Description
SR2-27-31	Super Rack 27 position 31 mm diameter



Part Number	Qty	Description
V-31-15-X	10	15 mL PFA sample vial
V-31-30-X	10	30 mL PFA sample vial
V-31-60-X	10	60 mL PFA sample vial



Part Number	Description
SR2-27-28	Super Rack 27 position 28 mm diameter



Part Number	Qty	Description
V-28-0360-V	5	20 mL PFA bottle and cap



Part Number	Description
SR2-80-16	Super Rack 80 position 16 mm diameter



Part Number	Qty	Description
V-16-0225-L	50	15 mL polypropylene vial with screw cap
V-16-0225-D	500	15 mL polypropylene vial with screw cap



# RACKS / VIALS

Plastic large racks are recommended for aqueous samples. Metal racks offer greater resistance to organic solvents. Corresponding vials for each rack are found at the far right of the opposing page.

## Large Racks

## Metal Large Racks

Part Number	Description
LR-21-30	Large Rack 21 position 30 mm o.d.



Part Number	Description
LRM-21-30-R	Metal Large Rack, 21 position, 30mm o.d.



Part Number	Description
LR-40-20	Large Rack 40 position 20 mm o.d.



Part Number	Description
LR-60-16	Large Rack 60 position 16 mm o.d.



Part Number	Description
LRM-60-16-R	Metal Large Rack, 60 position, 16mm o.d.



Part Number	Description
LR-90-13-R	Large Rack 90 position 13 mm o.d.



Part Number	Description
LRM-90-13-R	Metal Large Rack, 90 position, 13mm o.d.



Part Number	Description
LRM-90-13-R-3T	3 Tier Metal Large Rack, 90 position, 13mm o.d.

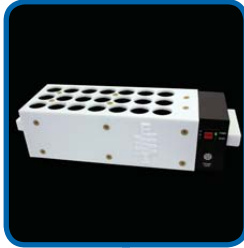


## Heated Large Racks

## Large Vials

Part Number	Description
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HR-21-30	Heated Rack 21 position 30 mm o.d.
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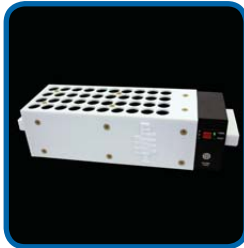
Part Number	Qty	Description
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V-28-0260-L	50	50 mL polypropylene vial with screw cap
V-28-0260-D	500	



Part Number	Description
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HR-40-20	Heated Rack 40 position 20 mm o.d.
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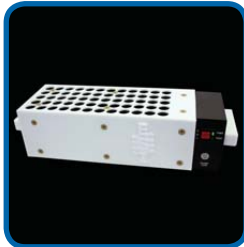
Part Number	Qty	Description
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V-20-0290-L	50	20 mL polypropylene vial with screw cap
V-20-0290-D	500	



Part Number	Description
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HR-60-16	Heated Rack 60 position 16 mm o.d.
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Part Number	Qty	Description
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V-16-0225-L	50	15 mL polypropylene vial with screw cap
V-16-0225-D	500	



Part Number	Description
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HR-1207	Heated Rack Enclosure
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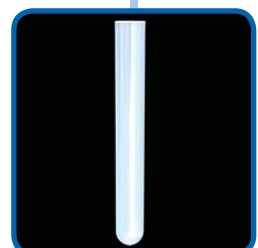
Part Number	Qty	Description
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V-13-0500-R-D	500	8 mL polystyrene tube with rounded bottom
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Part Number	Qty	Description
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V-13-0200-R-D	500	8 mL polypropylene tube with rounded bottom
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# HIGH-PURITY VALVES

High-purity valve stators and rotors provide a liquid path with low contamination and low carryover for the best ICPMS results. PTFE rotors offer the cleanest, most chemically resistant flow path. PEEK/PTFE composite rotors offer excellent chemical resistance and longer lifetimes than PTFE rotors.

## High-Flow Valves



**4 Port Valve** P/N: SC-0599-1015

**Description:** CTFE High-flow 4 port valve head for SC-FAST  
**Specifications:** CTFE Stator, PTFE Rotor, 0.8 mm  
**Applications:** microFAST selection valve, oilFAST



**6 Port Valve** P/N: SC-0599-1010 (PTFE Rotor)  
 SC-0599-1011 (PEEK Composite Rotor)

**Description:** CTFE High-flow 6 port valve head for SC-FAST  
**Specifications:** CTFE Stator, PTFE or Composite Rotor, 0.8 mm  
**Applications:** Standard FAST, seaFAST, TRUFAST, chromFAST, apexFAST



**6 Port Valve** P/N: SC-0599-1026

**Description:** CTFE High-flow 6 port valve head for SC-FAST  
**Specifications:** CTFE Stator, Composite Rotor, 1 mm  
**Applications:** Standard FAST, TRUFAST



**6 Port Valve - FS** P/N: SC-0599-1025

**Description:** CTFE High-flow 6 port FS valve head for SC-FAST  
**Specifications:** CTFE Stator, Composite Rotor, proprietary valve combines benefits of high-flow with fast stabilization times.  
**Applications:** Standard FAST, geoFAST, soilFAST



The new FS valve has the fastest stabilization and rinseout (<5 s)



**8 Port Valve** P/N: SC-0599-1013

**Description:** CTFE High-flow 8 port valve head for SC-FAST  
**Specifications:** CTFE Stator, PTFE Rotor, 0.8 mm  
**Applications:** DINFAST, GDP, sample pre-loading



**10 Port Valve** P/N: SC-0599-1012

**Description:** CTFE High-flow 10 port valve head for SC-FAST  
**Specifications:** CTFE Stator, PTFE Rotor, 0.8 mm  
**Applications:** Dual loop/dual carrier injection



## Low-Flow Valves



**4 Port Valve** P/N: SC-0599-1022

**Description:** Low-flow 4 port valve head for SC-FAST  
**Specifications:** PEEK Stator, Composite Rotor, 0.4 mm  
**Applications:** microFAST



**6 Port Valve** P/N: SC-0599-1008

**Description:** Low-flow 6 port valve head for SC-FAST  
**Specifications:** CTFE Stator, PTFE Rotor, 0.4 mm  
**Applications:** microFAST, DINFEST



**6 Port Valve** P/N: SC-0599-1009

**Description:** Low-flow 6 port valve head for SC-FAST  
**Specifications:** PEEK Stator, Composite Rotor, 0.8 mm  
**Applications:** Low-flow



## Spare Rotors and Stators for FAST Valves

### HIGH-FLOW VALVE WITH REPLACEMENT STATORS AND ROTORS

P/N Complete Valve	# of Ports	Bore Size	Stator Material	P/N Stator	Rotor Material	P/N Rotor
SC-0599-1015	4	0.8 mm	CTFE	SC-0599-1015-01	PTFE	SC-0599-1015-02
SC-0599-1010	6	0.8 mm	CTFE	SC-0599-1010-01	PTFE	SC-0599-1010-02
SC-0599-1011	6	0.8 mm	CTFE	SC-0599-1010-01	Composite (PEEK/PTFE)	SC-0599-1010-05
SC-0599-1026	6	1 mm	CTFE	SC-0599-1026-01	Composite (PEEK/PTFE)	SC-0599-1026-05
SC-0599-1025	6 - FS	FS	CTFE	SC-0599-1025-01	Composite (PEEK/PTFE)	SC-0599-1025-05
SC-0599-1013	8	0.8 mm	CTFE	SC-0599-1013-01	PTFE	SC-0599-1013-02
SC-0599-1027	8	1 mm	CTFE	SC-0599-1027-01	Composite (PEEK/PTFE)	SC-0599-1027-05
SC-0599-1012	10	0.8 mm	CTFE	SC-0599-1012-01	PTFE	SC-0599-1012-02

### LOW-FLOW VALVE WITH REPLACEMENT STATORS AND ROTORS


P/N Complete Valve	# of Ports	Bore Size	Stator Material	P/N Stator	Rotor Material	P/N Rotor
SC-0599-1022	4	0.4 mm	PEEK	SC-0599-1022-01	Composite (PEEK/PTFE)	SC-0599-1022-05
SC-0599-1008	6	0.4 mm	CTFE	SC-0599-1008-01	PTFE	SC-0599-1008-02
SC-0599-1009	6	0.8 mm	PEEK	SC-0599-1009-01	Composite (PEEK/PTFE)	SC-0599-1009-05

Other rotor and stator sizes available upon request



**Part Number**  
SC-0599-1010-01

**Description**  
CTFE replacement stator for high-flow valve



**Part Number**  
SC-0599-1010-02

**Description**  
PTFE rotor for high-flow valve

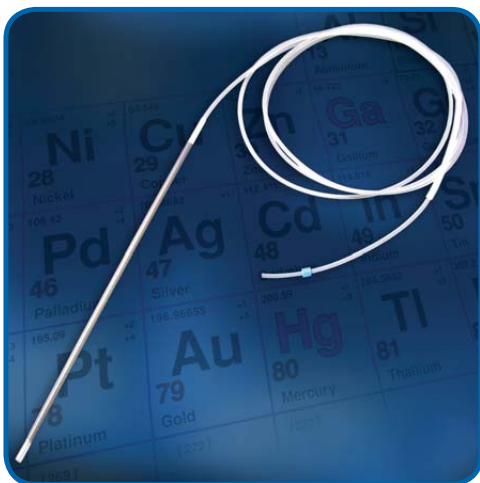


**Part Number**  
SC-0599-1010-05

**Description**  
Composite rotor for high-flow valve

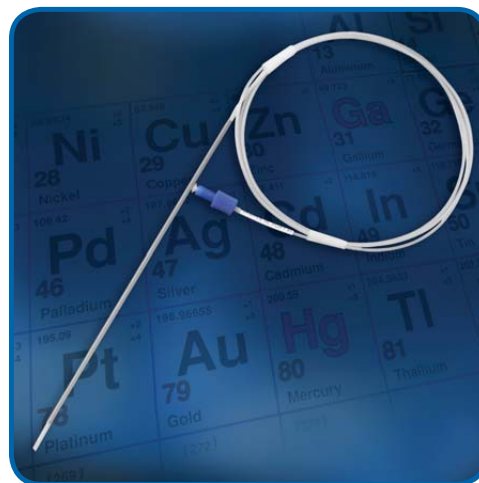
## FAST Probes

### CARRIER/INTERNAL STANDARD



Part Number	Size	Description
SC-5037-3501	0.5 mm i.d. 150 cm long	For high-flow SC-FAST valve

### FAST SAMPLE PROBE



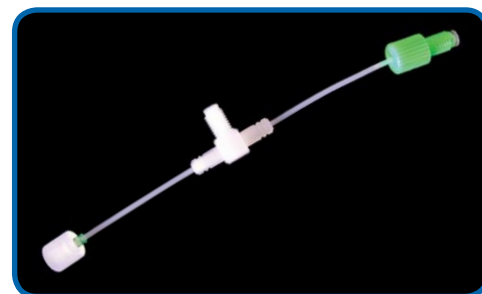
Part Number	Size	Description
SC-5037-3751-100	0.80 mm i.d., 100 cm, blue marker	Carbon fiber support Teflon® SC autosampler probes for high-flow SC-FAST valve
SC-5037-3991-100	1.0 mm i.d., 100 cm, gray marker	
SC-5037-3755-150	0.8 mm i.d., 150 cm, blue marker	
SC-5037-3995-150	1.0 mm i.d., 150 cm, gray marker	



## Low Volume Internal Standard Addition Tee

Specially designed mixing tee is perfect for online addition of internal standard or online dilution. Achieves excellent mixing with minimal dead volume. 0.5 mm i.d. capillary is recommended for applications with flow rates > 0.3 mL/min.

Part Number	Description
SC-0317-1250	0.25 i.d. (Green)
SC-0317-1500	0.5 i.d. (Orange)



## Low Volume FAST Valve Connecting Line

Connects the FAST valve to an ST nebulizer to achieve fast signal stabilization time and short wash times.






Part Number	Description
SC-0317-0250	0.25 i.d. (Green)
SC-0317-0500	0.5 i.d. (Orange)





# FITTINGS AND PFA TUBING

Easy to use, ultra-clean fittings and PFA tubing are ideal for all trace metal analysis applications. For high-flow applications, ferrules install quickly and easily. Low-flow valve fittings quickly create low dead-volume, leak-free connections without ferrules.

Part Number	Description	Suggested Use	
SC-0599-0116-K	Black, high-flow nut (1/4-28) for FAST valve and 1/16" (1.6 mm) ferrule (10 ea)	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-0599-0108-W	White, high-flow nut (1/4-28) for FAST valve and 1/8" (3.2 mm) ferrule (10 ea)	Use with 1/8" (3.2 mm) O.D. PFA tubing for high-flow rates and vacuum applications (> 2 mL/min)	
SC-0599-F16	1/16" Ferrule for high-flow fitting (1/4-28) (10 ea)	Use with 1/16" (1.6 mm) O.D. PFA tubing	
SC-0599-F08	1/8" Ferrule for high-flow fitting (1/4-28) (10 ea)	Use with 1/8" (3.2 mm) O.D. PFA tubing	
SC-0599-0001	Black, low-flow nut (10-32/M5) for FAST valve (10 ea)	Use with 1/16" (1.6 mm) O.D. PFA tubing for low-flow rates (<0.1 mL/min)	

**HF**

High-Purity PFA Tubing (5 m coil)			
Part Number	I.D.	O.D.	Color Code
5MT-015	0.006" (0.15 mm)	1/16" (1.6 mm)	■ (red)
5MT-02	0.008" (0.2 mm)	1/16" (1.6 mm)	■ (purple)
5MT-025	0.010" (0.25 mm)	1/16" (1.6 mm)	■ (green)
5MT-03	0.014" (0.3 mm)	1/16" (1.6 mm)	■ (yellow)
5MT-05	0.019" (0.5 mm)	1/16" (1.6 mm)	■ (orange)
5MT-08	0.031" (0.8 mm)	1/16" (1.6 mm)	■ (blue)
5MT-1	0.039" (1.0 mm)	1/16" (1.6 mm)	■ (gray)
5MT-16	0.063" (1.6 mm)	1/8" (3.2 mm)	



SC-FAST Spares Kits	
Part Number	Description
SC-0370	SC-FAST Complete Spares Kit - Assorted fittings and tubing for FAST systems. Includes a PFA-ST nebulizer, spare FAST valve and internal standard tee.
SC-0380	SC-FAST Basic Spares Kit - Assorted fittings and tubing for FAST systems.



# SAMPLE LOOPS

Elemental Scientific's SC-FAST loops are all Teflon® with crimp-free loops that provide low resistance for fast loading and rinse out.

## SC-FAST High-Flow Sample Loops

Part Number	Size	Description
SC-0319-01	100 µL loop (0.8 mm ID)	Multipurpose <i>FAST</i> loops for high flow valves. Recommended for use with 0.8 mm ID (blue) probe.
SC-0319-02	200 µL loop (0.8 mm ID)	
SC-0319-03	300 µL loop (0.8 mm ID)	
SC-0319-05	500 µL loop (0.8 mm ID)	
SC-0319-10	1 mL loop (0.8 mm ID)	
SC-0319-15	1.5 mL loop (0.8 mm ID)	
SC-0319-20	2 mL loop (0.8 mm ID)	
SC-0319-25	2.5 mL loop (0.8 mm ID)	
SC-0319-30	3 mL loop (0.8 mm ID)	
SC-0319-40	4 mL loop (0.8 mm ID)	

### 0.8 mm I.D. x 1.6 mm O.D. Sample Loops (Teflon tubing and ¼-28 fittings)



Part Number	Size	Description
SC-0318-03	300 µL loop (1 mm ID)	Multipurpose <i>FAST</i> loops for high flow valves. Recommended for use with 1.0 mm ID (gray) probe.
SC-0318-05	500 µL loop (1 mm ID)	
SC-0318-10	1 mL loop (1 mm ID)	
SC-0318-15	1.5 mL loop (1 mm ID)	
SC-0318-20	2 mL loop (1 mm ID)	
SC-0318-25	2.5 mL loop (1 mm ID)	
SC-0318-30	3 mL loop (1 mm ID)	
SC-0318-40	4 mL loop (1 mm ID)	

### 1.0 mm I.D. x 1.6 mm O.D. Sample Loops (Teflon tubing and ¼-28 fittings)



Part Number	Size	Description
SC-0315-025	250 µL loop (1.6 mm ID)	High volume and flow, fast loading <i>FAST</i> loops for high flow valves with 1 mm rotor. Recommended for use with 1.0 mm ID (gray) probes and applications requiring larger sample volumes or high flow rates.
SC-0315-05	500 µL loop (1.6 mm ID)	
SC-0315-10	1 mL loop (1.6 mm ID)	
SC-0315-20	2 mL loop (1.6 mm ID)	
SC-0315-30	3 mL loop (1.6 mm ID)	
SC-0315-40	4 mL loop (1.6 mm ID)	
SC-0315-60	6 mL loop (1.6 mm ID)	
SC-0315-80	8 mL loop (1.6 mm ID)	

### 1.6 mm I.D. x 3.2 mm O.D. Sample Loops (Teflon tubing and ¼-28 fittings)



## SC-FAST Low-Flow Sample Loops

Part Number	Size	Description
SC-0312-01	100 µL loop (0.8 mm ID)	Low volume, low flow <i>FAST</i> loops for low flow valves. Recommended for use with 0.8 mm ID (blue) or smaller probe.
SC-0312-02	200 µL loop (0.8 mm ID)	
SC-0312-03	300 µL loop (0.8 mm ID)	
SC-0312-05	500 µL loop (0.8 mm ID)	
SC-0312-10	1 mL loop (0.8 mm ID)	
SC-0312-20	2 mL loop (0.8 mm ID)	

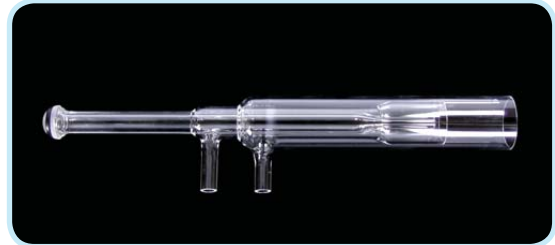
### 0.8 mm I.D. x 1.6 mm O.D. Sample Loops (Teflon tubing and M5/10-32 fittings)



# TORCHES / CONES

## One-piece Torches

Part Number	Description
ES-1203-0010	One-piece Quartz Torch with 1.0mm injector for XSERIES 2
ES-1203-0015	One-piece Quartz Torch with 1.5mm injector for XSERIES 2
ES-1203-0020	One-piece Quartz Torch with 2.0mm injector for XSERIES 2

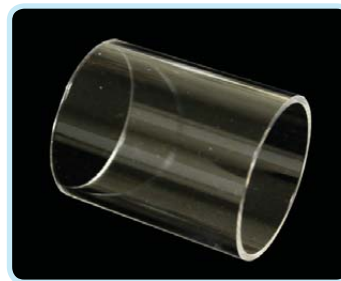


## XSERIES 2 Standard O-Ring-Free Quartz Torch



Part Number	Description
ES-1202-0301	O-ring-free demountable quartz torch for XSERIES 2. Use o-ring-free injectors with this torch.

## Quartz Insulator Ring



Part Number	Description
ES-1202-9001	Quartz insulator ring for XSERIES 2 torch shield

## Nickel / Platinum Sampler and Skimmers

Aluminum cones are recommended when measuring very low levels of Ni. Special precautions should be used when mounting or dismounting Al cones with the magnetic tool for the XSERIES 2 ICPMS because Al is not magnetic. Polyatomic interferences may be slightly higher with Al cones compared to Ni and Pt cones.

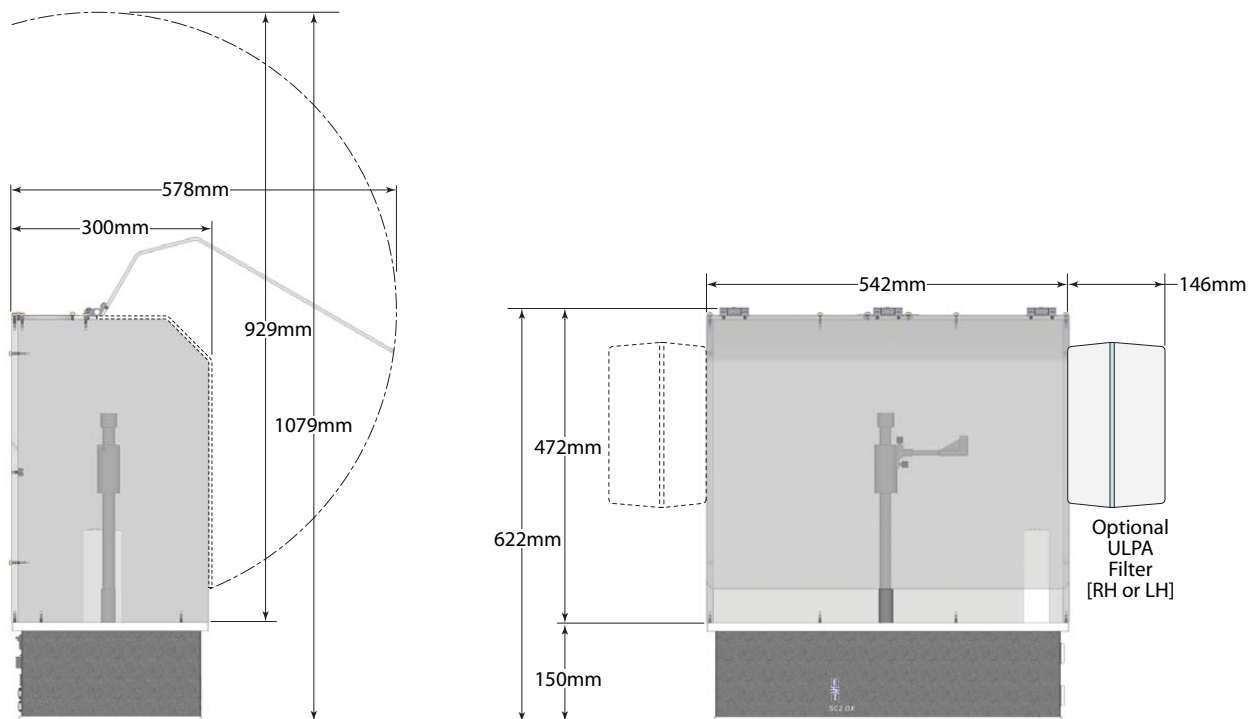


Part Number	Description
ES-3000-1221	Nickel sampler Cone for XSERIES 2
ES-3000-1226	Platinum sampler Cone for XSERIES 2

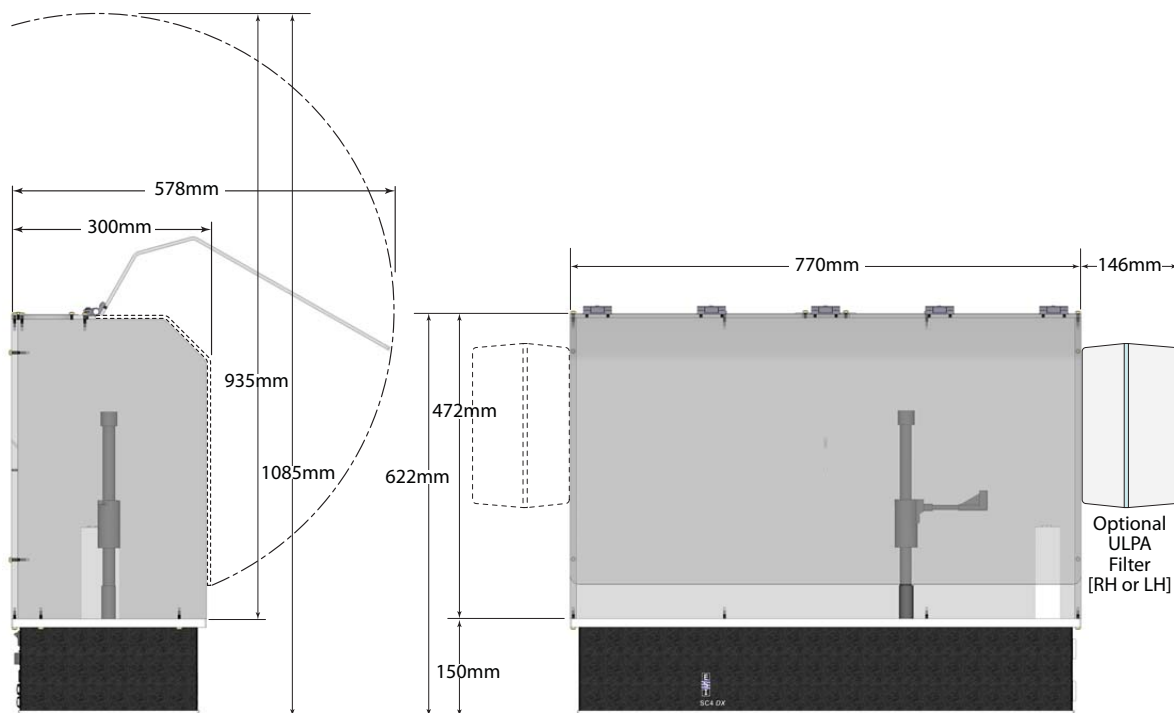
Part Number	Description
ES-3000-1222	Nickel skimmer Cone for XSERIES 2
ES-3000-1228	Platinum skimmer Cone for XSERIES 2

# SC-DX AUTOSAMPLER DIMENSIONS

## SC-2 DX Autosampler with Enclosure and ULPA Filter Dimensions

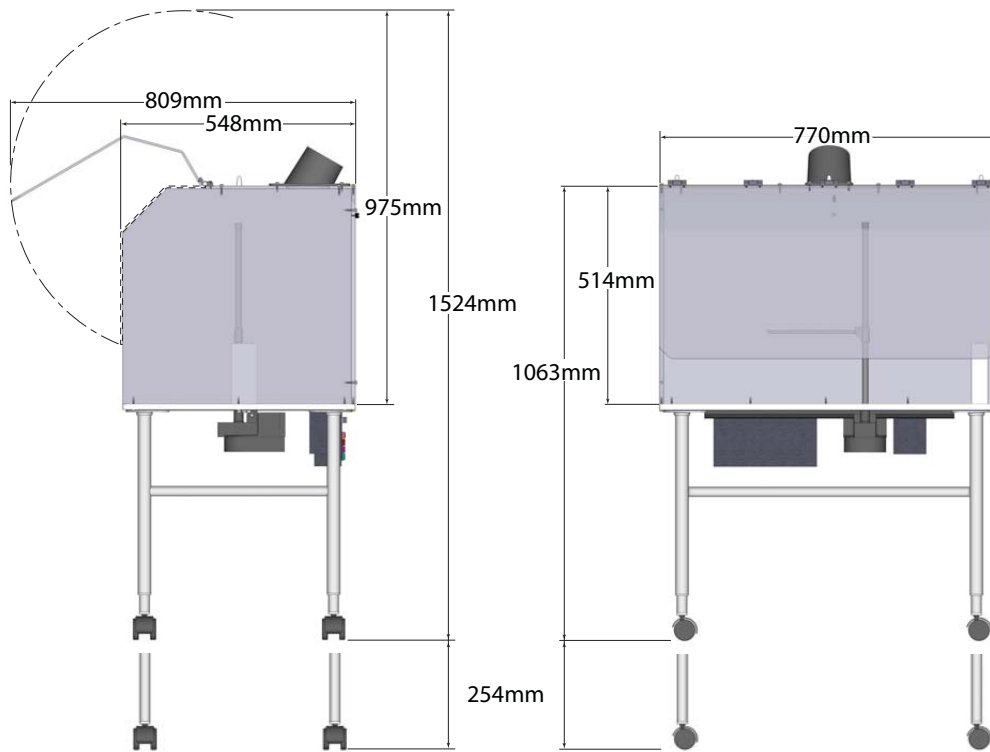


## SC-4 DX Autosampler with Enclosure and ULPA Filter Dimensions

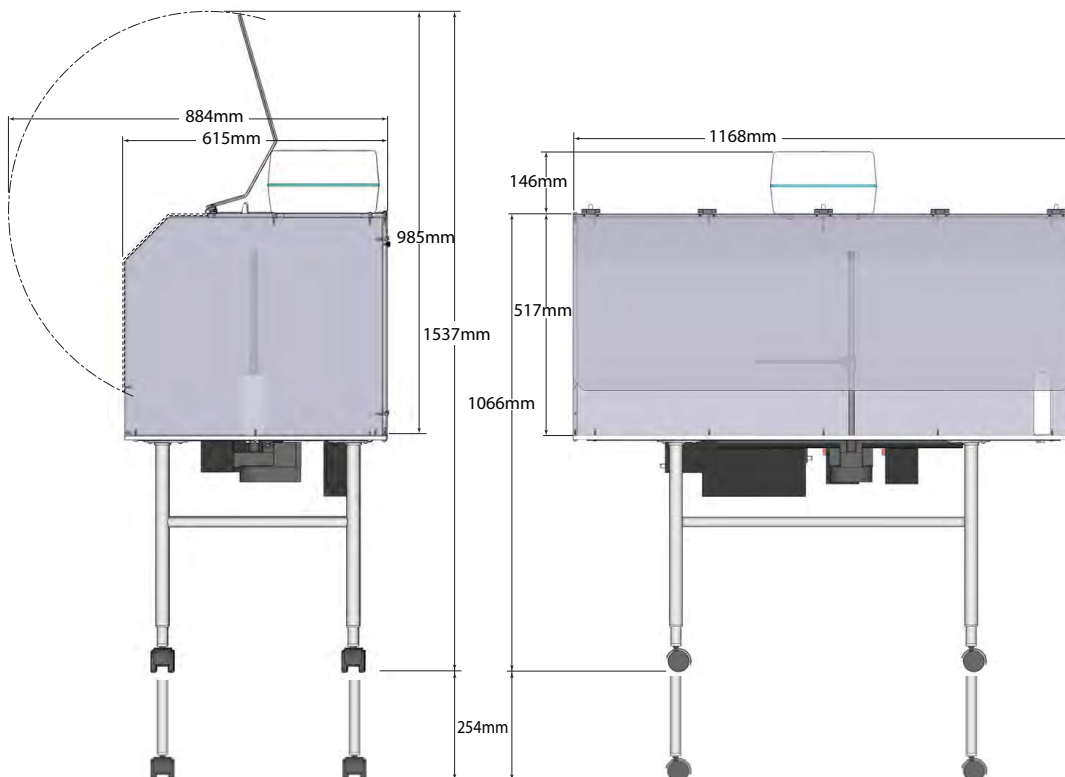


# SC-DX AUTOSAMPLER DIMENSIONS

## SC-8 DX Autosampler with Enclosure Dimensions



## SC-14 DX Autosampler with Enclosure and ULPA Filter Dimensions



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2TF-Ra-60C	22	ES-2124-5471	39	MPP-044-PVC	30	SC-0312-03	50	SC-0602	12
2TF-ThU-60C	22	ES-2190-1470-29	38	MPP-051-F-PVC	30	SC-0312-05	50	SC-0700-DX	21
4DX	6	ES-2191-1470-19	38	MPP-051-F-S	30	SC-0312-10	50	SC-0700-DX-HF	21
4DXF-60C	10	ES-2501-PPF1	29	MPP-051-PVC	30	SC-0312-20	50	SC-1107-DX	12
4DXF-A	10	ES-2501-PPM1	29	MPP-057-F-PVC	30	SC-0315-03	50	SC-1107-DX-1030	12
4MF2-60C	21	ES-2999-4001	15	MPP-057-F-S	30	SC-0315-05	50	SC-1207-DX	12
4MF2-HF-60C	21	ES-2999-6021	32	MPP-057-PVC	30	SC-0315-10	50	SC-1207-DX-1200	12
4MF3-2-60C	21	ES-3000-1221	51	MPP-064-F-PVC	30	SC-0315-20	50	SC-1210-DX	13
4MF3-2-HF-60C	21	ES-3000-1222	51	MPP-064-F-S	30	SC-0315-30	50	SC-1407-DX	12
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