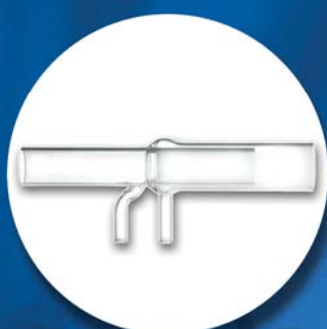


**Advanced Sample Introduction  
Systems For PerkinElmer ELAN ICP-MS**



# 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  
8:00 am to 6:00 pm

### **E-Mail:**

[esi@icpms.com](mailto:esi@icpms.com)

### **Address:**

1500 North 24th Street  
Omaha, NE 68110

### **Website:**

[www.icpms.com](http://www.icpms.com)

### **Phone:**

402.991.7800

### **Fax:**

402.991.7799





## TABLE OF CONTENTS

<b>Glossary</b> .....	4-5
<b>Application Systems</b>	
hydrideICP .....	6-7
seaFAST .....	8-9
microFAST .....	10-11
<b>Automation</b>	
SC-DX autosamplers .....	12-13
Introduction to the SC-FAST system .....	14
SC-DX FAST systems with dual flowing rinse stations....	15-16
SC-DX FAST systems with independent dual flowing rinse stations .....	17
Introduction to the FAST DXi integrated system.....	18
<b>Complete Systems</b>	
FAST DXi PC <sup>3</sup> complete systems .....	20-21
<b>High Performance Sample Introduction</b>	
apex high sensitivity desolvation nebulizers .....	22-23
PC <sup>3</sup> Peltier coolers.....	24
HF-resistant sample introduction kits .....	25
<b>oneFAST</b>	
oneFAST universal, high-throughput sample introduction systems.....	26-27
<b>Standard Sample Introduction</b>	
PFA and polypropylene MicroFlow nebulizers .....	28-29
PFA MicroFlow self-aspirating nebulizers .....	30-31
Glass and quartz high purity nebulizers .....	32-35
Spray chambers / ball joint adapter .....	37
Torches / injectors / shield discs / convertible adapter ....	38-40
<b>Pumps</b>	
MP <sup>2</sup> precision micro peristaltic pumps .....	41-42
MP <sup>2</sup> pump tubing .....	43
SYRIX syringe pump .....	44
<b>Autosampler Accessories</b>	
Autosampler enclosures / ULPA filtered environments / GPIB kit .....	46
Mobile stands for SC-2 and SC-4 DX autosamplers .....	47
Sample vessels and racks .....	48-56
<b>Consumables</b>	
High purity valves .....	58-59
FAST probes / tees / lines .....	60-61
Fittings / PFA tubing.....	62
Sample loops.....	63
<b>Installation and Training</b> .....	64
<b>SC-DX Autosampler Dimensions</b> .....	65-66

## Application



### Clinical

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



### Environmental

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



### Geochemistry

Highly acidified mining samples for transition metals and platinum group elements.



### Nuclear

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



### Organic Solvents

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



### Remote Monitoring

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



### Semiconductor

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

## Application Systems

### hydrideICP

hydrideICP utilizes an integrated precision micro peristaltic pump to improve ICPMS detection limits for sub-ppt detection capabilities for hydride elements such as As, Se and Sb. (Pg 6)

### seaFAST

A completely automated sample introduction system for multi-mode determination of ultra-trace metals in undiluted seawater. 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. (Pg 8)

### 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 syringes and micro peristaltic pumps. (Pg 10)

## Function



### FAST



### Low Sample Consumption



### Low Detection Limits



### HF Resistant



### High Precision / Isotope Ratio



### Micro Samples



### Preconcentration



### High Throughput

## Materials

### CTFE

Ethylene chlorotrifluoroethylene is a fluorocarbon-based polymer, a kind of plastic. ECTFE is used to minimize wear in high-friction applications.

### PTFE

Polytetrafluoroethylene is a synthetic fluoropolymer of tetrafluoroethylene. PTFE is hydrophobic: neither water nor water-containing substances wet PTFE.

### PEEK/PTFE Composite

Polyether ether ketone is a colorless organic polymer thermoplastic used in engineering applications. Because of its robustness, PEEK is used to fabricate items used in demanding applications, including bearings, piston parts, and pumps.

### PFA

Perfluoroalkoxy is a type of fluoropolymer with properties similar to PTFE. Due to its flexibility, extreme resistance to chemical attack and optical transparency, this material is used for plastic labware that involves critical or highly corrosive processes.

### Polyethylene

Polyethylene is a thermoplastic polymer consisting of long chains produced by combing the ingredient monomer ethylene. Polyethylene is a class of thermoplastics practically ubiquitous in consumer products.

### Polypropylene

Polypropylene (PP) is a thermoplastic polymer used in a wide variety of applications. This material is often chosen for its resistance to corrosion, heat and chemical leaching, and its resilience against most forms of physical damage, including impact and freezing.

### Polystyrene

Polystyrene is an aromatic polymer made from the monomer styrene, a liquid hydrocarbon that is manufactured from petroleum by the chemical industry. Polystyrene is one of the most widely used plastics.

## Terminology

**DXi** - An integrated ESI precision micro peristaltic pump and *FAST* valve module.

**FAST** - A valve and loop combination that rapidly loads and injects the sample.


**MP<sup>2</sup>** - A precision micro peristaltic pump.

**PC<sup>3</sup>** - A Peltier cooled cyclonic spray chamber.

**SC-DX** - An inert chemically resistant autosampler constructed with dual x-rails, large diameter Z-rail and C6 carriage.

**SYRIX** - A compact, low-profile, high-precision laboratory syringe pump.

## Tubing Sizes

 **Red** - 0.15 mm i.d.


 **Yellow** - 0.30 mm i.d.

 **Gray** - 1.00 mm i.d.

 **Purple** - 0.20 mm i.d.

 **Orange** - 0.50 mm i.d.

 **Green** - 0.25 mm i.d.

 **Blue** - 0.80 mm i.d.



# hydrideICP™

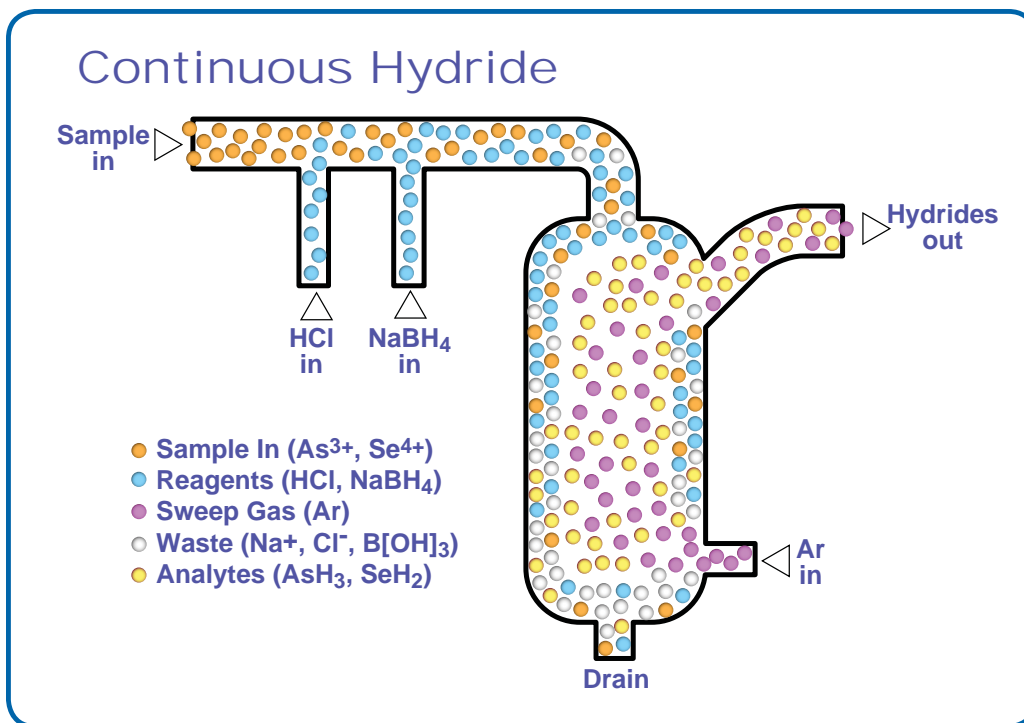
## A New Compact Hydride Generation System for ICPMS with Improved Stability and Performance

The new hydrideICP, a hydride generation system with integrated precision micro peristaltic pump, improves ICPMS detection limits for hydride-forming elements such as As, Se, and Sb. Sub-ppb levels of such elements are often difficult to detect with ICPMS, but hydrideICP converts hydride-forming elements to gas, increasing signal intensity.

In a low-volume quartz gas-liquid separator (GLS), hydrides are first separated from liquid waste then carried to the ICPMS injector. The hydrideICP system can increase ICPMS sensitivity by an order of magnitude or more over a nebulizer-only system for hydride forming elements.



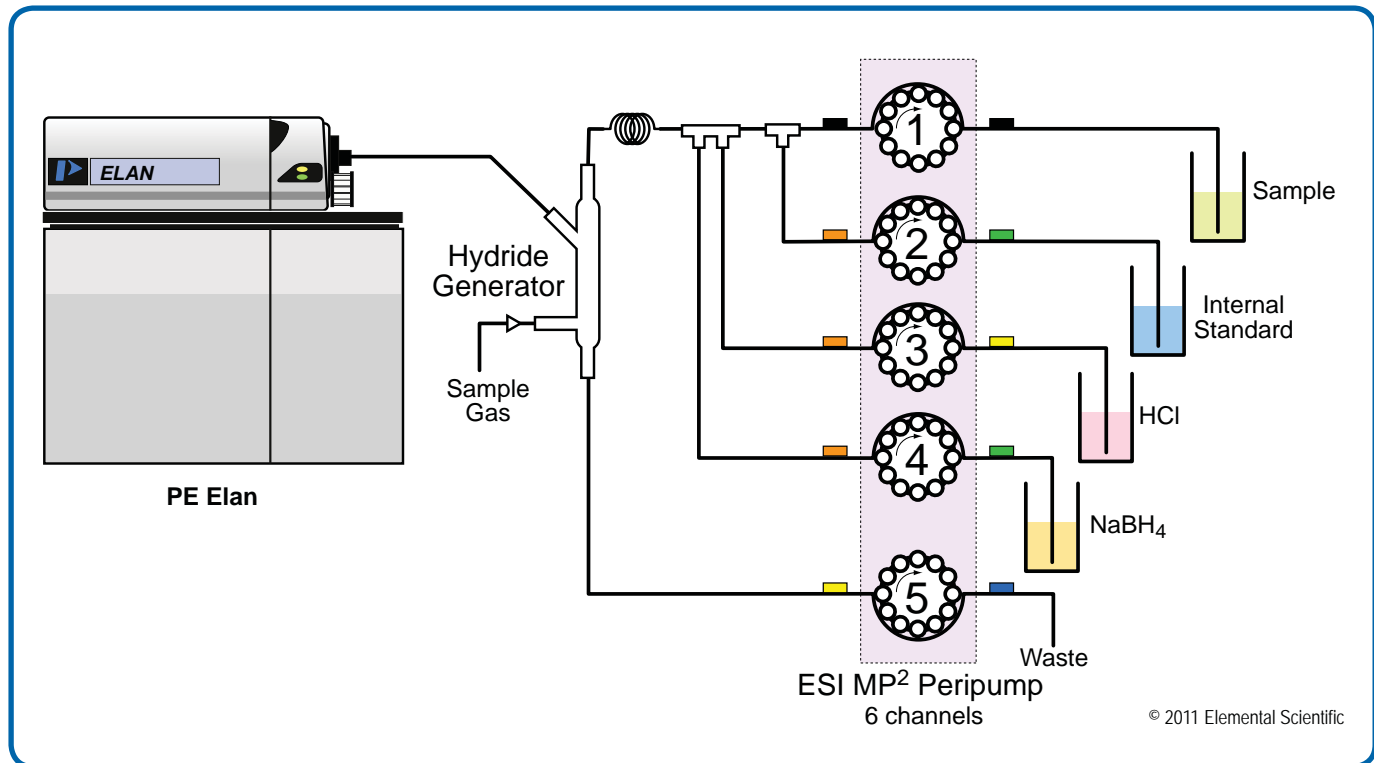
hydrideICP generation system for PerkinElmer ELAN



ESI developed the smallest, highest-performance and most stable gas liquid separator. The design promotes rapid mixing of sample and reagents, resulting in an efficient reaction and separation of hydride gases from sample liquids in a small volume.

## BENEFITS:

- **Improved detection limits for As, Hg, Se, Sb and other hydride-forming elements.**
- **Improved stability**
  - MP<sup>2</sup> micro peripump 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 peripump with ceramic pins, a PFA mixing block and Quartz GLS.
- **Convenient**
  - hydrideICP includes a PFA mixing block, which is completely integrated into the MP<sup>2</sup> pump.



hydrideICP System Diagram

Part Number	Description
HG-MP2-6-A	Hydride ICP Generation System. Includes six channel precision micro peripump with HydrideICP Generator Kit (hydride quartz gas-liquid separator, four way tee, and mounting plate).



A completely automated sample introduction system for multi-mode determination of ultra-trace metals in undiluted seawater. 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:

- 1 SC-2 DX or SC-4 DX FAST autosampler
- 1 PC<sup>3</sup> Peltier cooled cyclonic spray chamber
- 1 FAST DXi dual valve module
- 1 seaFAST column with all PFA construction and PTFE frits
- 2 Trace metals cleanup column
- 1 Convertible sapphire injector (cassette/bayonet)
- 1 method guide

### 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, all ELAN models)

### seaFAST 2

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

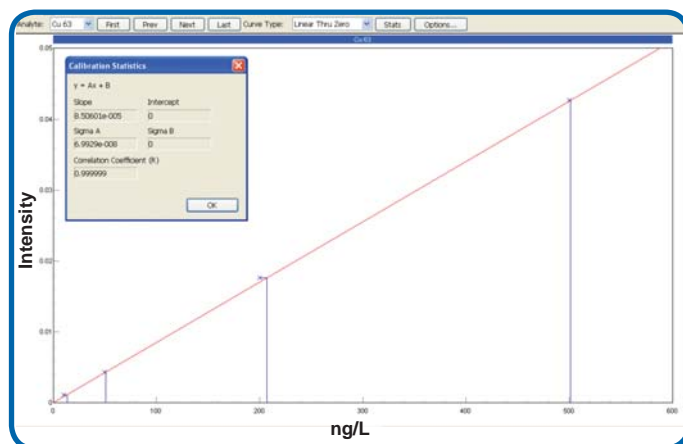
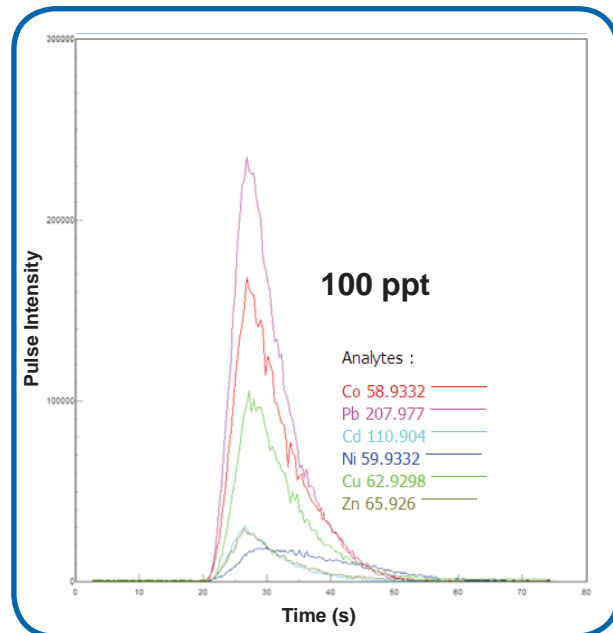
### seaFAST 3

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

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

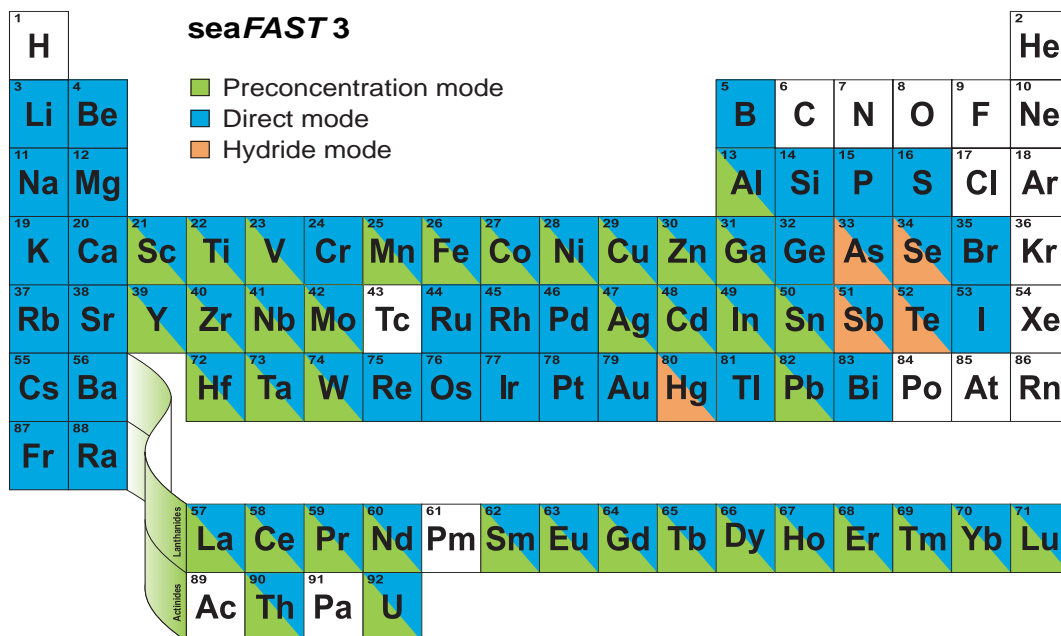


SC-4 DX seaFAST system for PerkinElmer ELAN



Calibration of <sup>63</sup>Cu<sup>+</sup> in Undiluted Seawater. Calibration spikes are 10, 50, 200 and 500. Without matrix removal, a large <sup>40</sup>Ar <sup>23</sup>Na<sup>+</sup> interference would be present.

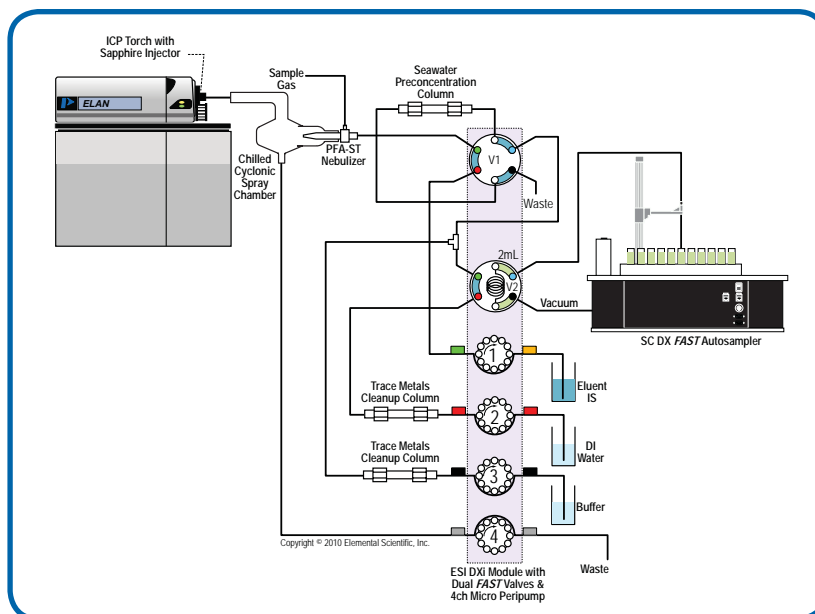




**seaFAST  
Preconcentration  
Column**

Part Number	Description
2SF-1-5494	seaFAST 1 system SC-2 DXi, Cassette / Bayonet
4SF-1-5494	seaFAST 1 system SC-4 DXi, Cassette / Bayonet
* 2SF-2-5494	seaFAST 2 system SC-2 DXi, Cassette / Bayonet
* 4SF-2-5494	seaFAST 2 system SC-4 DXi, Cassette / Bayonet
* 2SF-3-5494	seaFAST 3 system SC-2 DXi, Cassette / Bayonet
* 4SF-3-5494	seaFAST 3 system SC-4 DXi, Cassette / Bayonet
CF-N-0200	Spare seaFAST preconcentration column
CF-IDA	Spare seaFAST trace metal cleanup column

\* PerkinElmer ELAN DRC required.



**seaFAST 1 System Diagram**

# microFAST™

The microFAST automates delivery of micro-volume samples for analysis by ICPMS. Optimizing the amount of analytical data per volume of sample.

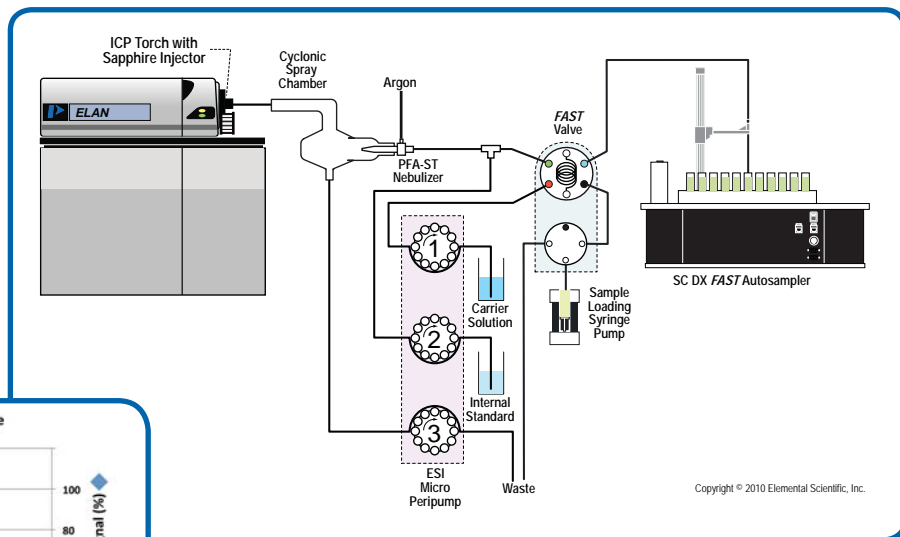
A SYRIX syringe pump accurately loads micro-volume samples into a FAST loop. The sample is then delivered to the plasma with excellent precision using an MP<sup>2</sup> peristaltic pump at low flow rates.

### All microFAST 1 Systems Include:

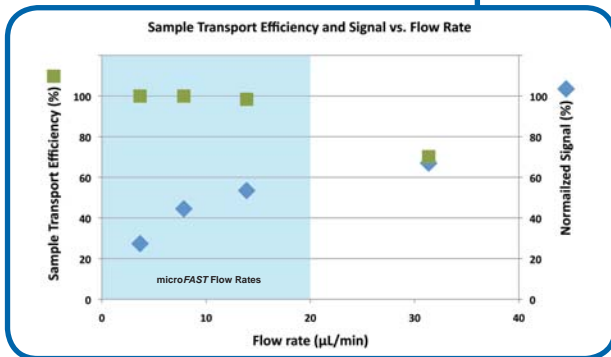
- 1 SC-2 DX or SC-4 DX FAST autosampler
- 1 FAST DXi dual valve module
- 1 SYRIX high purity syringe pump  
- 3 mL quartz/PTFE syringes for microFAST 1
- 1 Convertible sapphire injector for cassette/bayonet



SC-4 DX microFAST 1 system for PerkinElmer ELAN



microFAST 1 System Diagram



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

microFAST Systems	
Cassette	Description
2MF2-1-5494C	microFAST 1 system SC-2 DXi, Cassette / Bayonet
4MF2-1-5494C	microFAST 1 system SC-4 DXi, Cassette / Bayonet

System	Part Number	Description
Continuum System Upgrade	SC-0700-DX	Continuum sampling and solvent delivery upgrade for microFAST 1 or FAST system. Converts FAST or microFAST 1 to microFAST 2. Pumps volatile solvents or aggressive carrier liquids. Replaces the MP <sup>2</sup> thereby eliminating peripump tubing wear, contamination and pulsation. Syringe delivery is accurate, precise and clean.



## microFAST Applications



### 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 few 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
- Prevents 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



## SC-DX Autosamplers

**NOTE:** (SC-0901-14) GPIB to RS-232 Converter Kit (Address 14) required but not included with the SC-DX sample introduction systems.

All SC-DX autosampler components are composed of inert chemically resistant materials for extended lifespan. Dual X-rails and large diameter Z-rail provide precise sampling, virtually eliminating missed samples—even on microtiter plates.

### SC-Micro DX



The SC-Micro DX is a small-footprint, low-cost autosampler with instrument pumped dual flowing rinse stations. It holds 2 microtiter plates or 2 micro racks and 10 standards vials.

- Includes:** 2 Sample Probes 1 Standards Rack (10 positions)  
 1 Pk (10 ea) 20 mL PFA Standards Vials 3 Microtiter Plates (24, 48, 96 positions)  
 1 Pk (10 ea) 2 mL PFA Sample Vials 3 Micro Racks (21, 40, 90 positions)



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

Contact your sales representative to discuss customizing the SC-Micro DX with an optional diaphragm rinse pump or 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 1 Standards Rack (10 positions)  
 1 Pk (10 ea) 50 mL Standards Vials 4 Large Racks (21, 40, 60, 90 positions)  
 1 Pk (60 ea) 15 mL Sample Vials



Part Number	Description
SC-8102-PE00	SC-2 DX autosampler with dual flowing rinse

See page 65 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 2 independent rinse control valves.

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



Part Number	Description
SC-8102-3077	SC-2 DX Semiconductor autosampler with dual flowing rinse

See page 65 for SC-2 DX dimensions.

### SC-4 DX



The SC-4 DX is an autosampler with dual flowing rinse stations that holds 4 large racks or 8 micro racks. It is ideal for labs with moderate sample throughput needs.

- Includes:** 2 Sample Probes 1 Standards Rack (10 positions)  
 1 Pk (10 ea) 50 mL Standards Vials 4 Large Racks (21, 40, 60, 90 positions)  
 1 Pk (60 ea) 15 mL Sample Vials



Part Number	Description
SC-8104-PE00	SC-4 DX autosampler with dual flowing rinse

See page 65 for SC-4 DX dimensions.

## SC-8 DXS High Capacity



The SC-8 DXS 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
- Holds up to 40 standards/QC solutions (50 mL vials)

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



Part Number	Description
SC-8108-PE00	SC-8 DXS autosampler with dual flowing rinse

See page 66 for SC-8 DXS dimensions.

## SC-14 DXS High Capacity



The SC-14 DXS 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  
 1 Pk (10 ea) 50 mL Standards Vials  
 1 Pk (60 ea) 15 mL Sample Vials  
 1 Standards Rack (10 positions)  
 4 Large Racks (21, 40, 60, 90 positions)



Part Number	Description
SC-8314-PE00	SC-14 DXS autosampler with dual flowing rinse

See page 66 for SC-14 DXS dimensions.

### Sample Capacity

System	50 mL	15 mL	8 mL	Microtiter-96 (2 mL)
SC-2 DX (Super rack)	52 (64)	120 (160)	180	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

## Introduction to the SC-FAST system

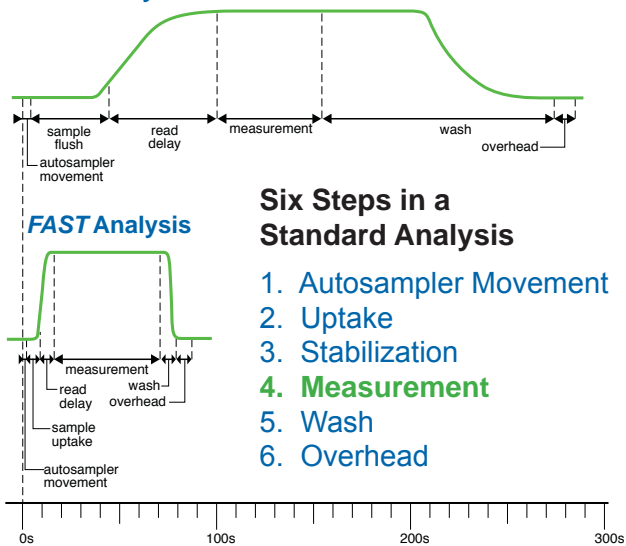
The SC-FAST is a reliable, high-throughput, high-matrix automated sample introduction system for the ELAN ICPMS. The combination of the SC-DX FAST autosampler with the ELAN ICPMS provides the perfect platform to introduce the most demanding high matrix samples for analysis.

- Adds a valve in the uptake line between the autosampler and the ELAN
- Rapid vacuum loading ( $0.5 \text{ mL sec}^{-1}$ ) of a 1 mL loop
- Switching the valve allows the sample to be pushed (MP<sup>2</sup> micro peripump) through the low dead volume tube, nebulizer and spray chamber (5 sec)
- Rapid uptake and stabilization of sample signal (10 sec)
- During sample analysis, the probe arm travels to the rinse station and washes the uptake probe and tubing



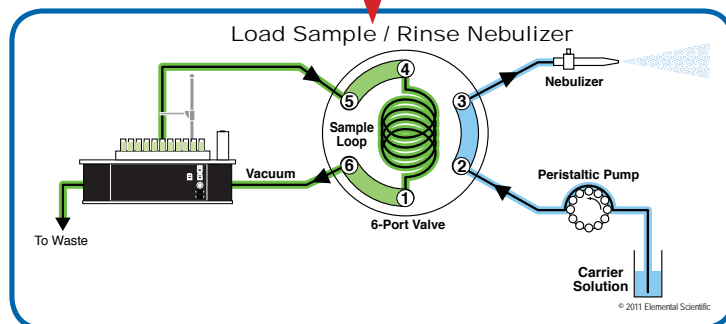
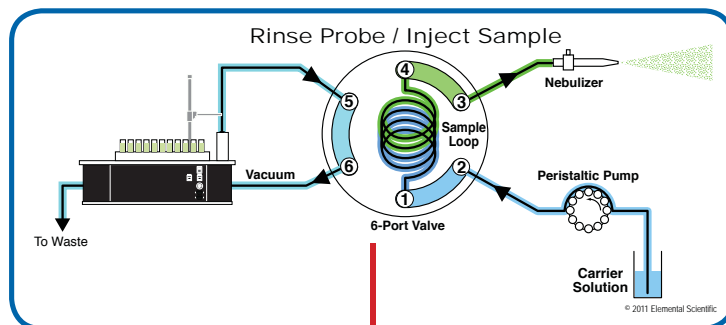
SC-DX FAST is available in four autosampler sizes, holding up to fourteen large sample racks.

### Normal Analysis



The SC-FAST system has the quickest signal stabilization and most complete rinse-out of any sample introduction system, reducing uptake and wash times while increasing sample throughput.

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



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



# SC-DX FAST Systems with dual flowing rinse stations

**NOTE:** (SC-0901-14) GPIB to RS-232 Converter Kit (Address 14) required but not included with the SC-DX FAST sample introduction systems.

The SC-DX FAST is a flexible high throughput autosampler with dual flowing rinse stations. Constructed with inert materials, the SC-DX FAST is chemically resistant to inorganic solvents and mineral acids. Dual X-rails and a large diameter Z-rail provide precise and accurate sampling, virtually eliminating missed samples—even on microtiter plates.

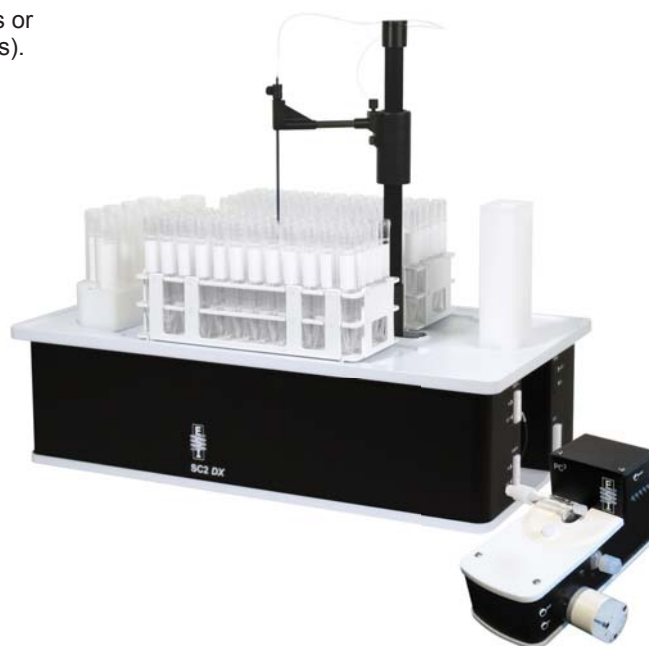
## SC-2 DX FAST



The variable capacity SC-2 DX FAST holds either 2 large sample racks or 4 micro sample racks and up to 10 standards/QC solutions (50 mL vials).

### SC-2 DX FAST System Includes:

- 1 FAST Valve
- 1 PFA-ST MicroFlow Nebulizer
- 1 PC<sup>3</sup> Peltier Cooled Cyclonic Spray Chamber
- 1 Sapphire Injector
- 2 Sample Probes
- 1 Standards Rack (10 positions)
- 4 Large Racks (21, 40, 60, 90 positions)
- 1 Pk (10 ea) 50 mL Standards Vials
- 1 Pk (60 ea) 5 mL Sample Vials



Part Number	Description
SC-8102-PE02-54	SC-2 DX FAST system 200.8, bayonet
SC-8102-PE02-94	SC-2 DX FAST system 200.8, cassette

See page 65 for SC-2 DX dimensions.

## SC-4 DX FAST



The variable capacity SC-4 DX FAST holds either 4 large sample racks or 6 micro sample racks and up to 10 standards/QC solutions (50 mL vials).

### SC-4 DX FAST System Includes:

- 1 FAST Valve
- 1 PFA-ST MicroFlow Nebulizer
- 1 PC<sup>3</sup> Peltier Cooled Cyclonic Spray Chamber
- 1 Sapphire Injector
- 2 Sample Probes
- 1 Standards Rack (10 positions)
- 4 Large Racks (21, 40, 60, 90 positions)
- 1 Pk (10 ea) 50 mL Standards Vials
- 1 Pk (60 ea) 15 mL Sample Vials



Part Number	Description
SC-8104-PE02-54	SC-4 DX FAST system 200.8, bayonet
SC-8104-PE02-94	SC-4 DX FAST system 200.8, cassette

See page 65 for SC-4 DX dimensions.

## SC-8 DXS FAST High Capacity



The high capacity SC-8 DXS *FAST* holds 8 large sample racks and up to 40 standards/QC solutions (50 mL vials).

### SC-8 DXS *FAST* System Includes:

- 1 *FAST* Valve
- 1 PFA-ST MicroFlow Nebulizer
- 1 PC<sup>3</sup> Peltier Cooled Cyclonic Spray Chamber
- 1 Sapphire Injector
- 2 Sample Probes
- 1 Standards Rack (10 positions)
- 4 Large Racks (21, 40, 60, 90 positions)
- 1 Pk (10 ea) 50 mL Standards Vials
- 1 Pk (60 ea) 15 mL Sample Vials



Part Number	Description
SC-8108-PE02-54	SC-8 DXS <i>FAST</i> system 200.8, bayonet
SC-8108-PE02-94	SC-8 DXS <i>FAST</i> system 200.8, cassette

See page 66 for SC-8 DXS dimensions.

## SC-14 DXS FAST High Capacity



The high capacity SC-14 DXS *FAST* holds 14 large sample racks and up to 10 standards/QC solutions (50 mL vials).

### SC-14 DXS *FAST* System Includes:

- 1 *FAST* Valve
- 1 PFA-ST MicroFlow Nebulizer
- 1 PC<sup>3</sup> Peltier Cooled Cyclonic Spray Chamber
- 1 Sapphire Injector
- 2 Sample Probes
- 1 Standards Rack (10 positions)
- 4 Large Racks (21, 40, 60, 90 positions)
- 1 Pk (10 ea) 50 mL Standards Vials
- 1 Pk (60 ea) 15 mL Sample Vials



Part Number	Description
SC-8314-PE02-54	SC-14 DXS <i>FAST</i> system 200.8, bayonet
SC-8314-PE02-94	SC-14 DXS <i>FAST</i> system 200.8, cassette

See page 66 for SC-14 DXS dimensions.

# SC-DX FAST Systems

## with dual flowing independently pumped rinse stations

The SC-DX FAST is a flexible high throughput autosampler with independently pumped dual flowing rinse stations. The ability to use two different rinse solutions makes it ideal for clinical applications, such as urine or blood testing. Constructed with inert materials, the SC-DX FAST is chemically resistant to inorganic solvents and mineral acids.

### SC-2 DX FAST



The variable capacity SC-2 DX FAST holds either 2 large sample racks or 4 micro sample racks and up to 10 standards/QC solutions (50 mL vials).

#### SC-2 DX FAST System Includes:

- 1 FAST Valve
- 1 Dual Independent Pumped Rinse
- 1 PFA-ST MicroFlow Nebulizer
- 1 Quartz Cyclonic Spray Chamber
- 1 Sapphire Injector
- 2 Sample Probes
- 1 Standards Rack (10 positions)
- 4 Large Racks (21, 40, 60, 90 positions)
- 1 Pk (10 ea) 50 mL Standards Vials
- 1 Pk (60 ea) 15 mL Sample Vials

Part Number	Description
SC-8102-PE05-54	SC-2 DX FAST system clinical, bayonet
SC-8102-PE05-94	SC-2 DX FAST system clinical, cassette

See page 65 for SC-2 DX dimensions.



### SC-4 DX FAST



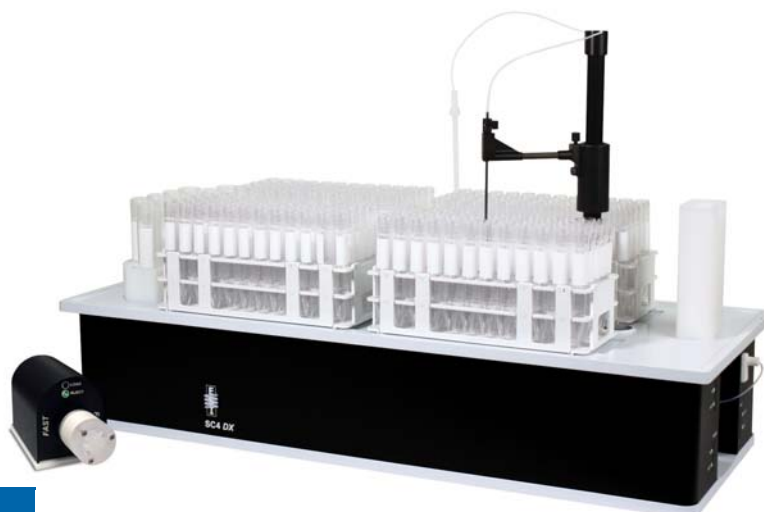
The variable capacity SC-4 DX FAST holds either 4 large sample racks or 6 micro sample racks and up to 10 standards/QC solutions (50 mL vials).

#### SC-4 DX FAST System Includes:

- 1 FAST Valve
- 1 Dual Independent Pumped Rinse
- 1 PFA-ST MicroFlow Nebulizer
- 1 Quartz Cyclonic Spray Chamber
- 1 Sapphire Injector
- 2 Sample Probes
- 1 Standards Rack (10 positions)
- 4 Large Racks (21, 40, 60, 90 positions)
- 1 Pk (10 ea) 50 mL Standards Vials (10 ea)
- 1 Pk (60 ea) 15 mL Sample Vials (60 ea)

Part Number	Description
SC-8104-PE05-54	SC-4 DX FAST system clinical, bayonet
SC-8104-PE05-94	SC-4 DX FAST system clinical, cassette

See page 65 for SC-4 DX dimensions.





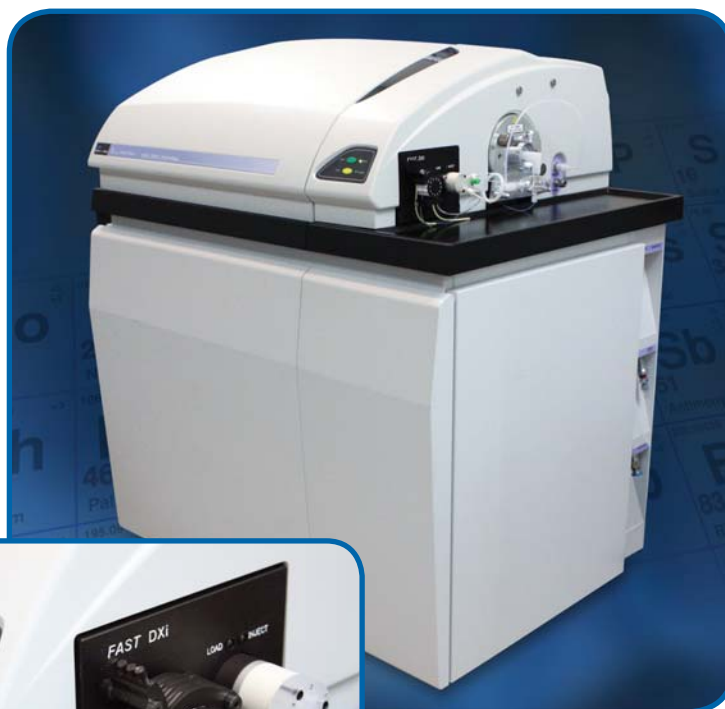
## Introduction to the *FAST* DXi Integrated System

The *FAST* DXi offers the same advantages of the SC-DX *FAST* system, but integrates directly into the ELAN instrument. The *FAST* DXi combines the MP<sup>2</sup> precision low-flow peristaltic pump and the high purity *FAST* injection valve adjacent to the nebulizer.

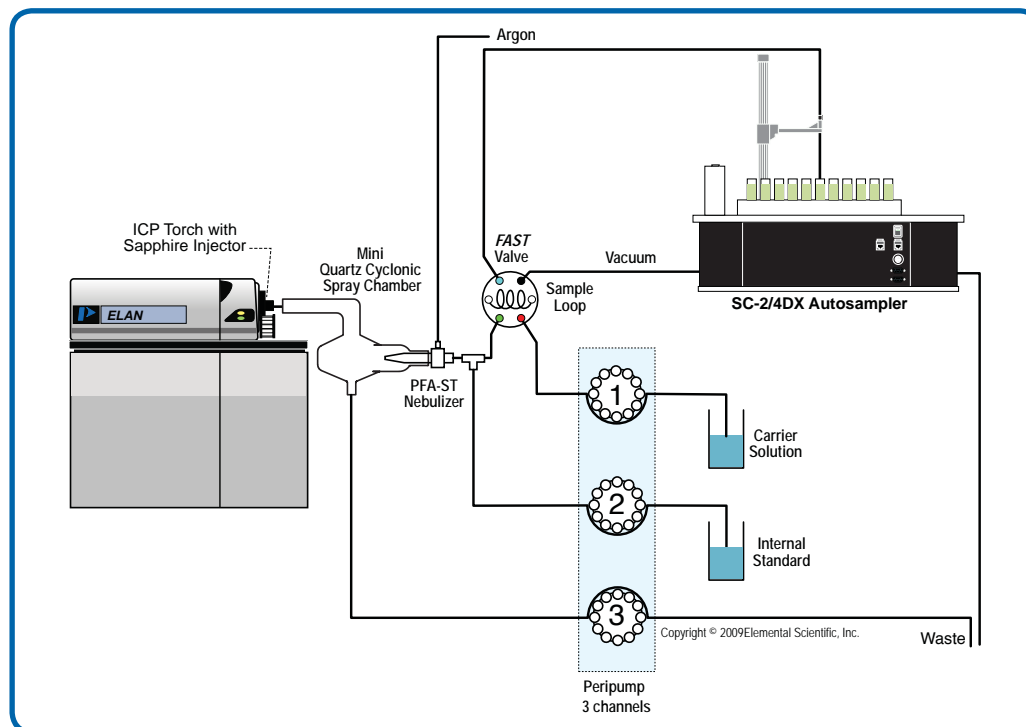
- Directly integrates with ELAN instrument
- Faster analysis with MP<sup>2</sup> peripump
- 12 closely-spaced rollers maintain consistent flow rate (nL/min to 10 mL/min)
- Chemically-resistant ceramic pins and PTFE-coated metal components
- 1, 2, 3, 4 and 6 Channels
- ELAN or ESI SC software control

**NOTE:** The *FAST* DXi and MP<sup>2</sup> modules are not compatible with ELAN instruments that don't have a built in peristaltic pump, i.e. the ELAN 6000.

PerkinElmer ELAN with *FAST* DXi



*FAST* DXi integrated into PE ELAN showing 4 channel precision peripump and *FAST* valve.



ELAN with *FAST* DXi System Diagram

# SC-DX FAST Complete



## *The Ultimate Sample Introduction System!*

- High Throughput Autosampler
- FAST Sample Delivery
- MP<sup>2</sup> Precision Micro Peristaltic Pump
- PC<sup>3</sup> Peltier Cooled Cyclonic Spray Chamber

See page 25 for more information.

**Your Complete Source  
For Sample Introduction**

  
**PerkinElmer**<sup>®</sup>  
*For the Better*

## FAST DXi PC<sup>3</sup> Complete Systems

**NOTE:** (SC-0901-14) GPIB to RS-232 Converter Kit (Address 14) required but not included with the SC-DX FAST DXi PC<sup>3</sup> Complete sample introduction systems.

The FAST DXi PC<sup>3</sup> complete system is the SC-DX FAST system with the added benefit of an ESI integrated MP<sup>2</sup> precision micro peristaltic pump, FAST valve module and PC<sup>3</sup> Peltier cooled cyclonic spray chamber. The FAST DXi offers enhanced precision and the ability to add internal standard online at lower dilution factors. The PC<sup>3</sup> offers the advantages of low memory effects, constant temperature, fast rinse-out and high sample transport efficiency.

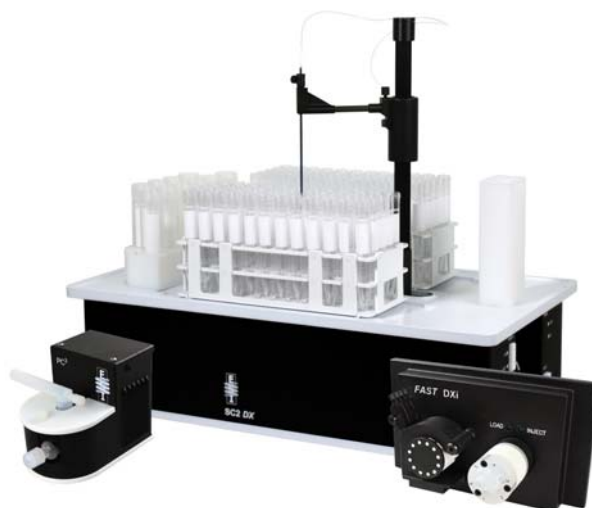
### SC-2 FAST DXi PC<sup>3</sup> Complete



The SC-2 FAST DXi PC<sup>3</sup> complete is a compact autosampler with dual flowing rinse stations that holds 2 large racks or 4 micro racks.

#### SC-2 FAST DXi PC<sup>3</sup> Complete System Includes:

- 1 FAST Valve
- 1 Integrated MP<sup>2</sup> Precision Micro Peristaltic Pump
- 1 PC<sup>3</sup> Peltier Cooled Cyclonic Spray Chamber
- 1 PFA-ST MicroFlow Nebulizer
- 1 Convertible Sapphire Injector (Cassette/Bayonet)
- 2 Sample Probes
- 1 Standards Rack (10 positions)
- 4 Large Racks (21, 40, 60, 90 positions)
- 1 Pk (10 ea) 50 mL Standards Vials (10 ea)
- 1 Pk (60 ea) 15 mL Sample Vials (60 ea)



Part Number	Description
2DXFi-5494C	SC-2 FAST DXi PC <sup>3</sup> complete system with integrated MP <sup>2</sup> precision micro peripump (Cassette/Bayonet)

See page 65 for SC-2 DX dimensions.

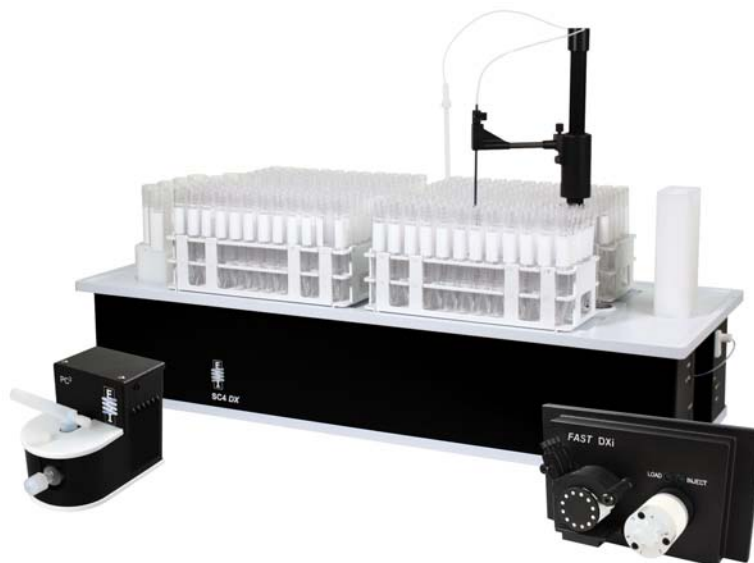
### SC-4 FAST DXi PC<sup>3</sup> Complete



The SC-4 FAST DXi PC<sup>3</sup> complete 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.

#### SC-4 FAST DXi PC<sup>3</sup> Complete System Includes:

- 1 FAST Valve
- 1 Integrated MP<sup>2</sup> Precision Micro Peristaltic Pump
- 1 PC<sup>3</sup> Peltier Cooled Cyclonic Spray Chamber
- 1 PFA-ST MicroFlow Nebulizer
- 1 Convertible Sapphire Injector (Cassette/Bayonet)
- 2 Sample Probes
- 1 Standards Rack (10 positions)
- 4 Large Racks (21, 40, 60, 90 positions)
- 1 Pk (10 ea) 50 mL Standards Vials (10 ea)
- 1 Pk (60 ea) 15 mL Sample Vials (60 ea)



Part Number	Description
4DXFi-5494C	SC-4 FAST DXi PC <sup>3</sup> complete system with integrated MP <sup>2</sup> precision micro peripump (Cassette/Bayonet)

See page 65 for SC-4 DX dimensions.



## SC-8 FAST DXi PC<sup>3</sup> Complete



The SC-8 FAST DXi PC<sup>3</sup> complete 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
- Hold up to 40 Standards/QC solutions (50 mL vials)

### SC-8 FAST DXi PC<sup>3</sup> Complete System Includes:

- 1 FAST Valve
- 1 Integrated MP<sup>2</sup> Precision Micro Peristaltic Pump
- 1 PC<sup>3</sup> Peltier Cooled Cyclonic Spray Chamber
- 1 PFA-ST MicroFlow Nebulizer
- 1 Convertible Sapphire Injector (Cassette/Bayonet)
- 2 Sample Probes
- 1 Standards Rack (10 positions)
- 4 Large Racks (21, 40, 60, 90 positions)
- 1 Pk (10 ea) 50 mL Standards Vials (10 ea)
- 1 Pk (60 ea) 15 mL Sample Vials (60 ea)



Part Number	Description
8DXFi-5494C	SC-8 FAST DXi PC <sup>3</sup> complete system with integrated MP <sup>2</sup> precision micro peripump, Cassette/Bayonet

See page 66 for SC-8 DX dimensions.

## SC-14 FAST DXi PC<sup>3</sup> Complete



The SC-14 FAST DXi PC<sup>3</sup> complete is an autosampler with dual flowing rinse stations that holds 14 large racks. It is ideal for labs with the highest sample throughput needs.

### SC-14 FAST DXi PC<sup>3</sup> Complete System Includes:


- 1 FAST Valve
- 1 Integrated MP<sup>2</sup> Precision Micro Peristaltic Pump
- 1 PC<sup>3</sup> Peltier Cooled Cyclonic Spray Chamber
- 1 PFA-ST MicroFlow Nebulizer
- 1 Convertible Sapphire Injector (Cassette/Bayonet)
- 2 Sample Probes
- 1 Standards Rack (10 positions)
- 4 Large Racks (21, 40, 60, 90 positions)
- 1 Pk (10 ea) 50 mL Standards Vials (10 ea)
- 1 Pk (60 ea) 15 mL Sample Vials (60 ea)







Part Number	Description
14DXFi-5494C	SC-14 FAST DXi PC <sup>3</sup> complete system with integrated MP <sup>2</sup> precision micro peripump, Cassette/Bayonet

See page 66 for SC-14 DX dimensions.

## apex - High Sensitivity Desolvating Systems

**apex Q - Quartz Inlet System.** Features an o-ring-free quartz flow path for high sensitivity, low background and rapid rinse-out of samples that do not contain hydrofluoric acid. 

**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.  

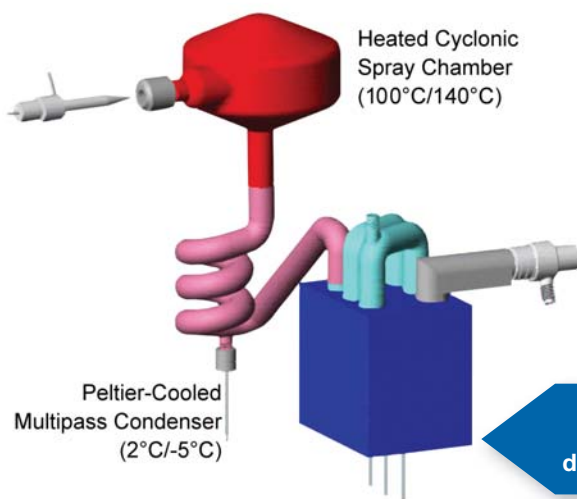
**apex HF for Hydrofluoric Acid Resistance.** Uses a high purity o-ring-free PFA flow path for the introduction of samples containing hydrofluoric acid. The apex HF is recommended for many geochemical and semiconductor applications.  



ES-4594-1000-21  
apex IR



ES-4394-1000-21  
apex Q

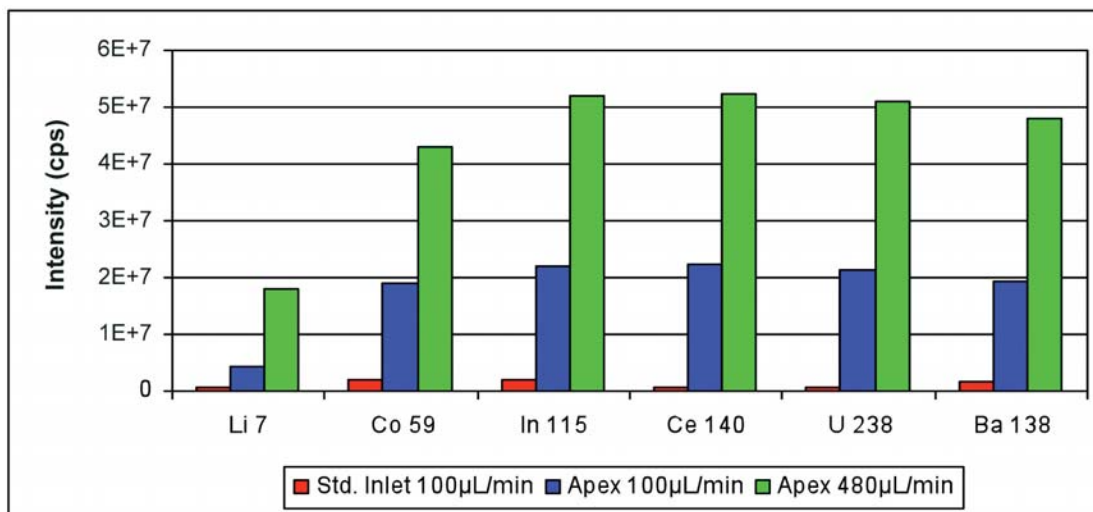


Total Internal Volume: 180mL

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



See Page 30 for information on the Apex-100 PFA Nebulizer



## apex FAST High Sensitivity Desolvating Systems

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

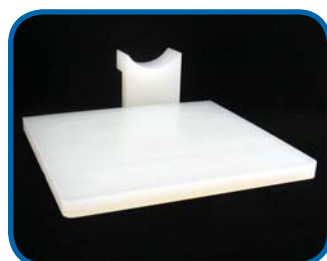
Requires FAST-enabled autosampler.



apex FAST  
with injection valve  
adjacent to nebulizer  
ES-43FH-21-94



	Part Number	HF-Resistant	Integrated Valve	High Sensitivity	O-ring-free	Dual Temperature	Mixing Chamber for Isotope Ratios
apex Q	ES-4394-1000-21			✓	✓	✓	
apex IR	ES-4594-1000-21			✓	✓	✓	✓
apex HF	ES-4494-1000-21	✓		✓	✓	✓	
apex Q FAST	ES-43FH-21-94		✓	✓	✓		
apex IR FAST	ES-45FH-21-94		✓	✓	✓		✓
apex HF FAST	ES-44FH-21-94	✓	✓	✓	✓		



Part Number	Description
ES-2999-5431	Mounting shelf for apex / PC <sup>3</sup> -LT (bayonet)



Part Number	Description
ES-2999-5421	Mounting shelf for apex / PC <sup>3</sup> -LT (cassette)

## spiro TMD Heated Membrane Desolvator

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

- Heated macro-porous PTFE membrane
- Desolvation of aqueous & organic solutions
- Reduces solvent derived oxide, hydride and carbide polyatomic interferences
- Suitable for sample flow rates < 400 µL/min through apex
- Removes volatile acid matrix, i.e. HCl, HF
- Fast rinse-out
- Resistant to clogging
- 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%



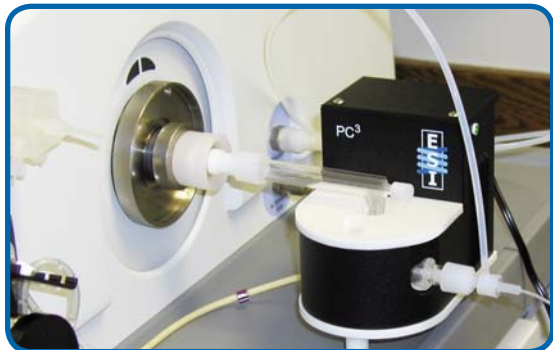
ES-4599-3000 spiro TMD heated membrane desolvation module

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





## PC<sup>3</sup> Peltier Cooler



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

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



The PC<sup>3</sup> has two 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 +2°C / -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-4190-54-29 (Bayonet)	PC <sup>3</sup> organic sample introduction kit - Peltier cooler	+2°C / -5°C	Quartz (PFA option)	Yes
ES-4190-90-29 (Cassette)	PC <sup>3</sup> organic sample introduction kit - Peltier cooler	+2°C / -5°C	Quartz (PFA option)	Yes
ES-9190-5494-29 (Cassette/Bayonet)	PC <sup>3</sup> -LT organic sample introduction kit - Peltier cooler	+2°C / -20°C	Quartz (PFA option)	Yes



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

#### Part Number

ES-3154-1111-16

#### Description

Quartz (7 mm baffle) cyclonic spray chamber with auxiliary gas port. Drain line included.



#### Part Number

ES-3154-3111-16

#### Description

PFA (7 mm baffle) cyclonic spray chamber with auxiliary gas port. Drain line included.



#### Part Number

ES-3154-1011-16

#### Description

Quartz (7 mm baffle) cyclonic spray chamber without auxiliary gas port. Drain line included.



All chambers shown fit the ELAN PC<sup>3</sup>.

See page 37 for additional information on spray chambers.

# HF-Resistant Sample Introduction Kits

## PFA Sample Introduction Kits for PE ELAN



The PFA kit is a reliable, ultra-pure, chemically inert and clean sample introduction system. All wetted surfaces are PFA and sapphire. It is used by a majority of semiconductor labs worldwide for the analysis of semiconductor-grade chemicals and Si wafer samples.

- Easy installation
- Clean PFA components for lower background equivalent concentration (BEC) and detection limits
- O-ring free connections—ensures lowest BEC's, highest chemical resistance and easy cleaning
- Chemically resistant—suitable for nearly all samples, including strong acids, alkalis and organic solvents
- Low sample consumption—ideal for VPD and pre-concentrated samples



PFA-Sapphire HF Resistant Sample Introduction Kit (bayonet injector)



PFA-Platinum HF Resistant Sample Introduction Kit (cassette injector)

Part Number	Bayonet Torch	Description
ES-2170-0472-19	PFA Sapphire	Includes two PFA-100 Nebulizers, PureCap PFA endcap with additional gas port, 47 mm PFA spray chamber, 1.8 mm sapphire injector and quartz torch.
ES-2171-0472-19	PFA Platinum	Includes two PFA-100 Nebulizers, PureCap PFA endcap with additional gas port, 47 mm PFA spray chamber, 2.0 mm platinum injector and quartz torch.
Part Number	Cassette Torch	Description
ES-2170-90-19	PFA Sapphire	Includes two PFA-100 Nebulizers, PureCap PFA endcap with additional gas port, 47 mm PFA spray chamber, 1.8 mm sapphire injector and quartz torch.
ES-2141-90-19	PFA Platinum	Includes two PFA-100 Nebulizers, PureCap PFA endcap with additional gas port, 47 mm PFA spray chamber, 2.0 mm platinum injector and quartz torch.

## 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
ES-7000-1001	1000µL	10 pk	Pre-cleaned PFA Pure Tip pipette tips



## oneFAST Systems

### 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 ELAN to immediately increase throughput by speeding stabilization time and rinse-out. The oneFAST reduces instrument matrix exposure, maintenance and improves long-term performance.

**NOTE:** (SC-0901-14) GPIB to RS-232 Converter Kit (Address 14) required but not included with all oneFAST systems.

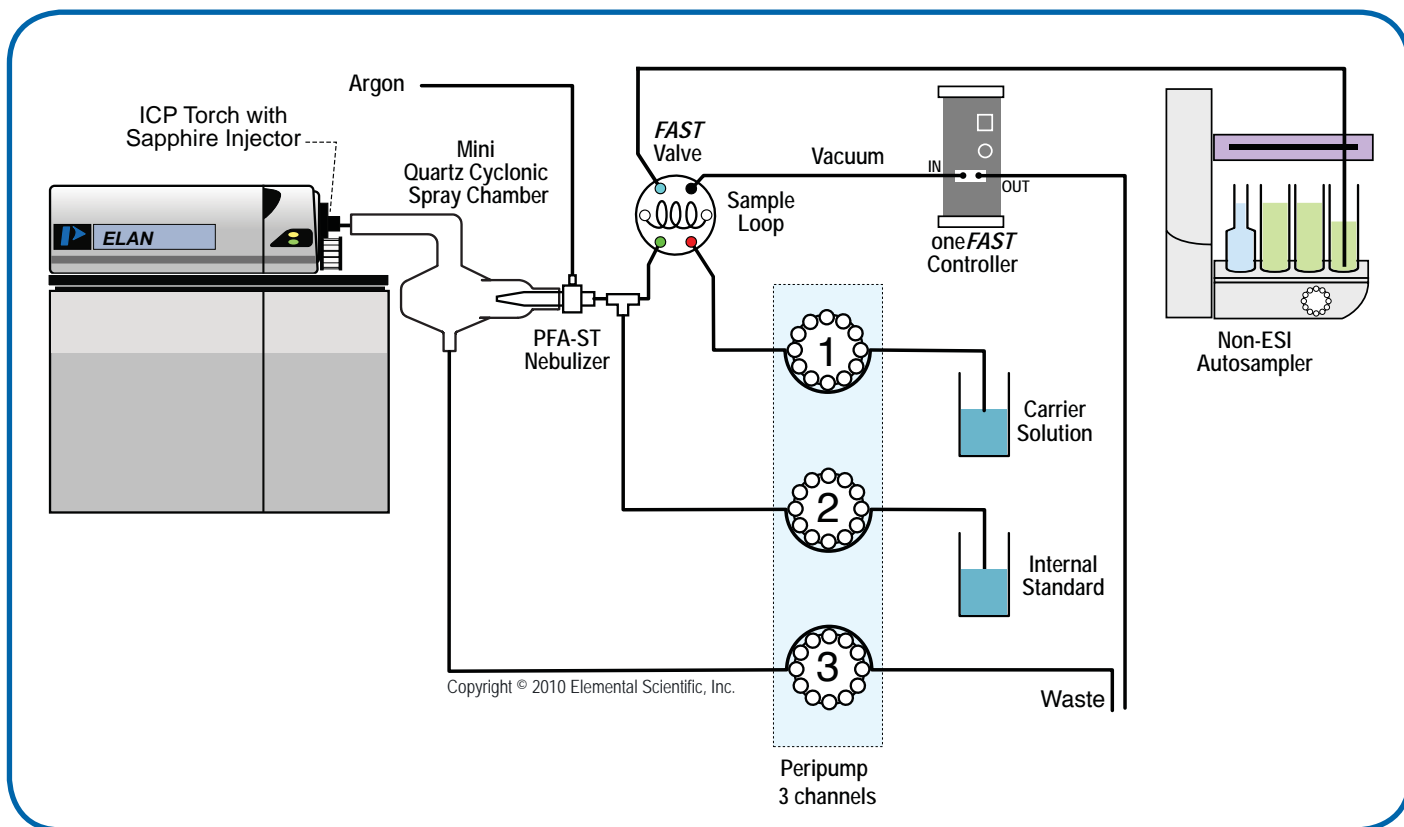
### oneFAST Basic

The oneFAST increases throughput with non-ESI autosamplers.

**Includes:** 1 FAST Valve                      2 Probes-PFA/Carbon Fiber  
1 oneFAST Controller              All Required Tubing



Part Number	Description
SC-0400	oneFAST basic system



ELAN and PE S10 autosampler with oneFAST Complete



# oneFAST Complete Systems

## oneFAST Complete



The oneFAST complete without Peltier cooling includes an injector and spray chamber, making any non-ESI autosampler ready for increased throughput needs.

- Includes:**
- |                             |                                 |
|-----------------------------|---------------------------------|
| 1 FAST Valve                | 1 Quartz Cyclonic Spray Chamber |
| 1 oneFAST Controller        | 1 Sapphire Injector             |
| 1 PFA-ST Nebulizer          | All Required Tubing             |
| 2 Probes - PFA/Carbon Fiber |                                 |

Part Number	Description
SC-0494	oneFAST complete system (cassette)
SC-0454	oneFAST complete system (bayonet)



## oneFAST PC<sup>3</sup> Complete



The oneFAST PC<sup>3</sup> complete with Peltier cooling increases throughput with non-ESI autosamplers. The addition of the PC<sup>3</sup> reduces solvent load and keeps the spray chamber thermally stable, improving signal stability and performance.

- Includes:**
- |   |                             |
|---|-----------------------------|
| 1 FAST Valve  | 2 Probes - PFA/Carbon Fiber |
| 1 oneFAST Controller                                    | 1 Sapphire Injector         |
| 1 PFA-ST Nebulizer                                      | All Required Tubing         |
| 1 PC <sup>3</sup> Peltier Cooled Cyclonic Spray Chamber |                             |

Part Number	Description
SC-0494-41	oneFAST PC <sup>3</sup> complete system with Peltier cooled cyclonic spray chamber (cassette)
SC-0454-41	oneFAST PC <sup>3</sup> complete system with Peltier cooled cyclonic spray chamber (bayonet)



## oneFAST DXi Complete



The oneFAST DXi complete without Peltier cooling includes a micro peristaltic pump, injector and spray chamber, making any non-ESI autosampler ready for increased throughput needs.

- Includes:**
- |  |                          |
|--|--------------------------|
| 1 FAST Valve   | 1 oneFAST Controller     |
| 2 Probes - PFA/Carbon Fiber                          | 1 Micro Peristaltic Pump |
| 1 Quartz Cyclonic Spray Chamber                      | 1 PFA-ST Nebulizer       |
| 1 Convertible Sapphire Injector for Cassette/Bayonet | All Required Tubing      |

Part Number	Description
SC-0400-5494-DXi	oneFAST DXi complete system (cassette/bayonet)



# STANDARD SAMPLE INTRODUCTION



## PFA and Polypropylene High-Efficiency MicroFlow Nebulizers

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

### PFA-ST Nebulizers



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.

- All PFA construction
- Exchangeable uptake capillaries allow one nebulizer to be used at different self-aspiration rates from 20 $\mu$ L/min to 700 $\mu$ L/min
- Chemically resistant—ideal for strong acids, alkalis and 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	PFA-ST self-aspirating nebulizer with external 1/4-28 threaded connector.



Part Number	Description
ES-2030-54	PFA MicroFlow high solids large bore nebulizer with external 1/4-28 threaded connector. Ideal for strong acids, high solids, alkalis, organic solvents, soils and high salt solutions.



Part Number	Description
ST3-84	PFA-ST3 MicroFlow nebulizer with external 1/4-28 threaded connector. Designed for superior clog resistance and higher sensitivity compared to the standard PFA nebulizer.

### PolyPro-ST Nebulizer

The PolyPro-ST nebulizer is a low cost HF resistant alternative to the PFA nebulizers. The PolyPro nebulizer has a 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 can be used with a peristaltic pump.

Part Number	Description
ES-4040-54	Poly-pro self-aspirating nebulizer with external 1/4-28 threaded connector



### Syringe Flush Kit

Use syringe and white adapter to back-flush the carrier line or tee-line. Use syringe and red adapter to forward flush the carrier line, the side port of the tee-line, and to forward flush the PFA nebulizer.

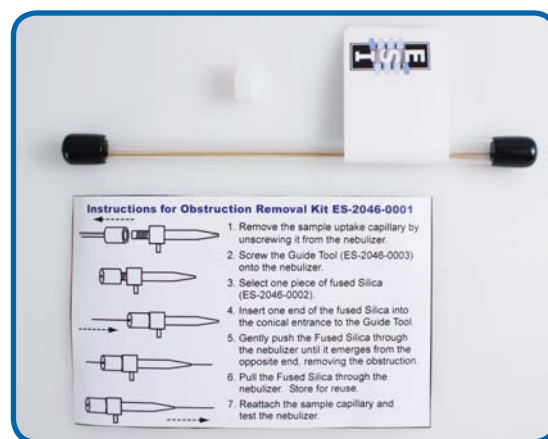
Part Number	Description
SC-0599-0109	Syringe flush kit. Includes 3 mL syringe, two luer to 1/4-28 adapters.



## Nebulizer Obstruction Removal Kit

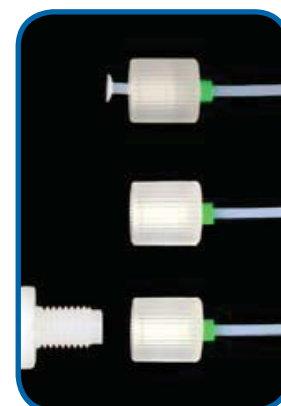
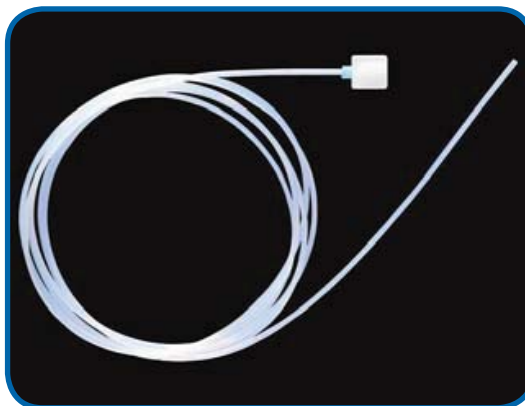
While naturally resistant to obstructions, PFA nebulizers may occasionally require maintenance. Use this kit to safely remove obstructions in all PFA-ST nebulizers for long-term high performance. Never back-flush a PFA-ST nebulizer.

Part Number	Description
ES-2046-0001	Fused silica obstruction removal kit for ST type nebulizers. Includes one guide, 10 pieces of fused silica and instructions.



## PFA Sample Capillaries for ST Nebulizers

I.D.	Self-aspiration rate (@1L/m Ar)	ESI SC
0.15 mm	20 $\mu$ L/min <span style="color:red">■</span> (red)	ES-2045
0.20 mm	50 $\mu$ L/min <span style="color:purple">■</span> (purple)	ES-2043
0.25 mm	100 $\mu$ L/min <span style="color:green">■</span> (green)	ES-2042
0.30 mm	200 $\mu$ L/min <span style="color:yellow">■</span> (yellow)	ES-2047
0.50 mm	400 $\mu$ L/min <span style="color:orange">■</span> (orange)	ES-2041
0.80 mm	700 $\mu$ L/min <span style="color:blue">■</span> (blue)	ES-2044
1.00 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 specific lengths and materials at no extra charge.

Probe i.d.	Self-aspiration rate (@1L/m Ar)	ESI SC	PE S10
0.25 mm	100 $\mu$ L/min	ES-5037-3250-080	ES-5037-9250-100
0.50 mm	400 $\mu$ L/min	ES-5037-3500-080	ES-5037-9500-100

Also available with Ultem support





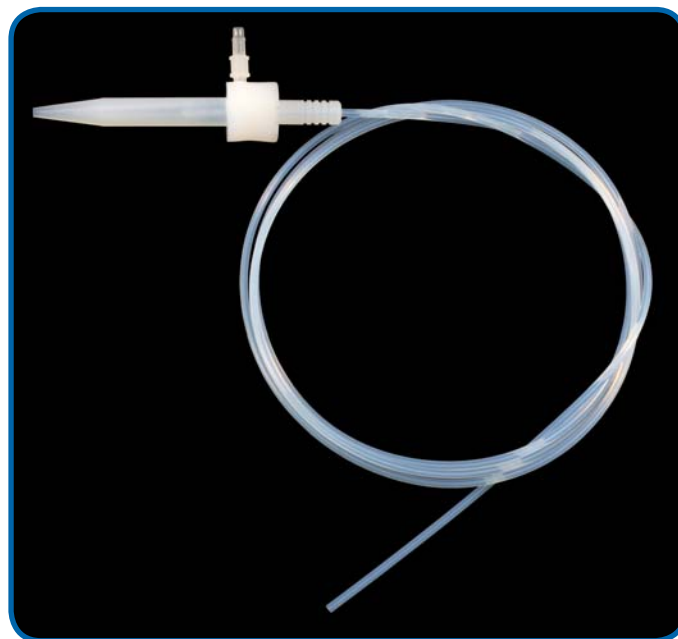
## PFA MicroFlow Self-Aspirating Nebulizers

### 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 PFA 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 $\mu\text{L}/\text{min}$
PFA-50	ES-2000-0002	50 $\mu\text{L}/\text{min}$
PFA-100	ES-2002-0002	100 $\mu\text{L}/\text{min}$
PFA-200	ES-2003-0002	200 $\mu\text{L}/\text{min}$
PFA-400	ES-2005-0002	400 $\mu\text{L}/\text{min}$

Other flow rates made to order

### apex MicroFlow PFA Self-Aspirating Nebulizers



These nebulizers allow self-aspiration at low sample consumption rates with the apex high sensitivity desolvation system.

Part Number	Description
ES-2040-7000	High temperature apex-ST PFA MicroFlow nebulizer with external 1/4-28 threaded connector
ES-2002-7000	High temperature Apex-100 PFA nebulizer with integrated 90-150 $\mu\text{L}/\text{min}$ self-aspiration capillary.

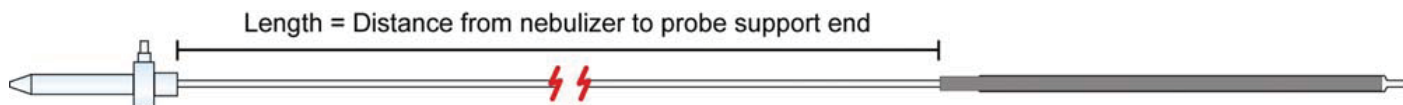
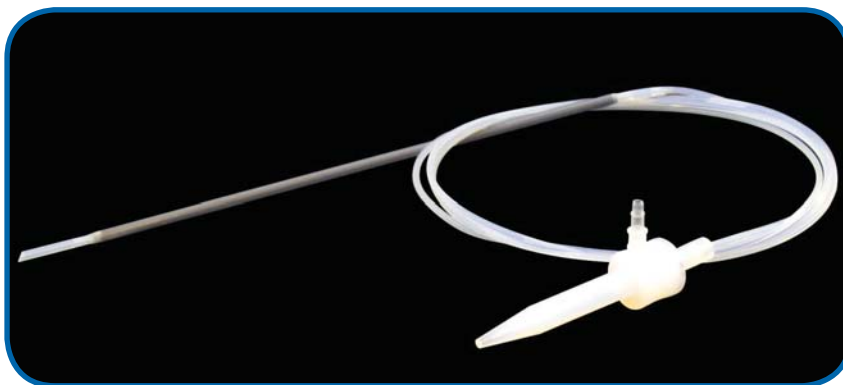


# PFA High-Efficiency MicroFlow Self-Aspirating Nebulizers

## Self-Aspirating PFA Nebulizers with Integrated Probes

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

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



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

Model	Self-aspiration rate (@1L/m Ar)	Length	For SC Autosampler
PFA-20	20 $\mu\text{L}/\text{min}$	80 cm	ES-2020-3503-080
PFA-50	50 $\mu\text{L}/\text{min}$	80 cm	ES-2000-3503-080
PFA-100	100 $\mu\text{L}/\text{min}$	80 cm	ES-2002-3503-080
PFA-200	200 $\mu\text{L}/\text{min}$	80 cm	ES-2003-3503-080
PFA-400	400 $\mu\text{L}/\text{min}$	80 cm	ES-2005-3503-080



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

Model	Self-aspiration rate (@1L/m Ar)	Length	For SC Autosampler
PFA-20	20 $\mu\text{L}/\text{min}$	100 cm	ES-2020-3505-100
PFA-50	50 $\mu\text{L}/\text{min}$	100 cm	ES-2000-3505-100
PFA-100	100 $\mu\text{L}/\text{min}$	100 cm	ES-2002-3505-100
PFA-200	200 $\mu\text{L}/\text{min}$	100 cm	ES-2003-3505-100
PFA-400	400 $\mu\text{L}/\text{min}$	100 cm	ES-2005-3505-100



Also available with PEEK support and for S10 Autosampler

## Glass and Quartz High Purity Nebulizers

### NEW SiIQ+ High Purity Quartz Nebulizer

The SiIQ+ nebulizer by MEINHARD® is perfect for applications requiring high sensitivity. Made from the highest purity synthetic quartz, the SiIQ+ nebulizer has low levels of trace elemental impurities, reducing the risk of sample contamination. SiIQ+ nebulizers improve wash-out rates and generate low, stable blanks that can enhance ICPMS detection limits.

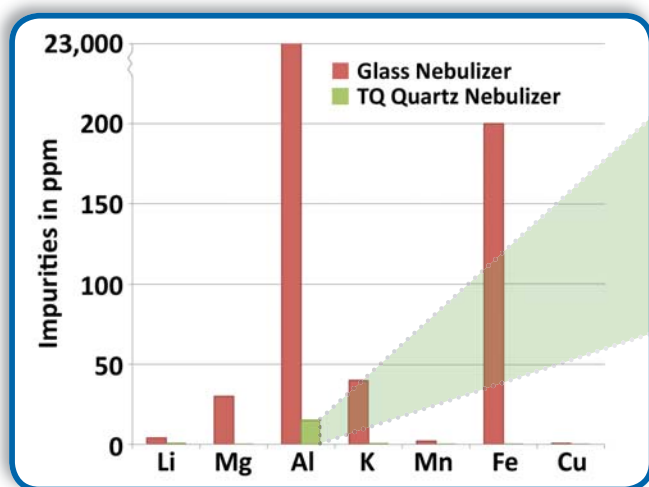
SiIQ+ comes equipped with PFA FitKit gas and sample quick connect fittings that eliminate contaminants from conventional connectors commonly used on other nebulizers. The fittings can be rapidly attached and removed. The gas quick connect creates a snug seal around the maria on the SiIQ+ sidearm.

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

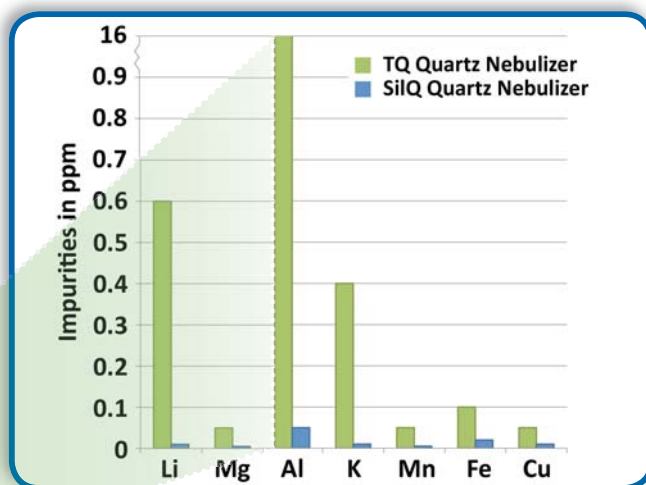


MEINHARD® SiIQ+ high purity nebulizer with PFA FitKit

### Potential Blank from Nebulizer



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



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

# MEINHARD®

## Concentric Nebulizers for ICPMS / ICPOES

### Quartz Nebulizers

#### NEW SilQ+ Ultra High Purity Quartz Nebulizer (Low Internal Volume)

SilQ+ Ultra High Purity Quartz Nebulizer, low internal volume inlet. Self aspiration rate 0.5 mL/min with argon flow 1 L/min at 50 PSI (3.4 bar/345 kPa). Peristaltic pumped rate 0.3 mL/min to 3.0 mL/min. Includes FG Gas Quick Connect (PFA) and F2 Quick Connect with 0.5 mm i.d.

■ (orange marker) capillary 70 cm length.



Part Number	Application
SILQ-50	For use with all standard non-HF applications

#### NEW TQ+ Quartz Nebulizer (Low Internal Volume)

TQ+ Quartz High Performance A-type Nebulizer, low internal volume inlet. Self aspiration rate 0.5 mL/min with argon flow 1 L/min at 50 PSI (3.4 bar/345 kPa). Peristaltic pumped rate 0.3 mL/min to 3.0 mL/min. Includes FG Gas Quick Connect (PFA) and F2 Quick Connect with 0.5 mm i.d.

■ (orange marker) capillary 70 cm length.



Part Number	Application
TQP-50	For use with all standard non-HF applications

#### Type A Quartz Nebulizer (Standard)

Lapped flush nozzle, quartz, low background, general purpose, 3 mL/min and 1 L/min @ 30 PSI. Includes gas connection and F5 FitKit with 0.5 mm i.d. ■ (orange marker) standard integrated capillary 70 cm length.



Part Number	Application
TQ-30-A3	For use with all standard non-HF applications

### Glass Nebulizer

#### NEW TR+ Glass Nebulizer (Low Internal Volume)

TR+ Glass High Sensitivity Nebulizer, low internal volume inlet. Self aspiration rate 0.5 mL/min with argon flow 1 L/min at 50 PSI (3.4 bar/345 kPa). Peristaltic pumped rate 0.3 mL/min to 3.0 mL/min. Includes FG Quick Connect (PFA) and F2 Quick Connect with 0.5 mm i.d.

■ (orange marker) capillary 70 cm length.



Part Number	Application
TRP-50	For use with all standard non-HF applications



## NEW Plus Nebulizer PFA FitKit Quick Connects

### FG Gas Quick Connect for MEINHARD® Nebulizers

FG Gas Quick Connect for MEINHARD® nebulizers with maria for both small bore and standard bore nebulizers.



FG Gas Quick Connect with connector for PFA tubing

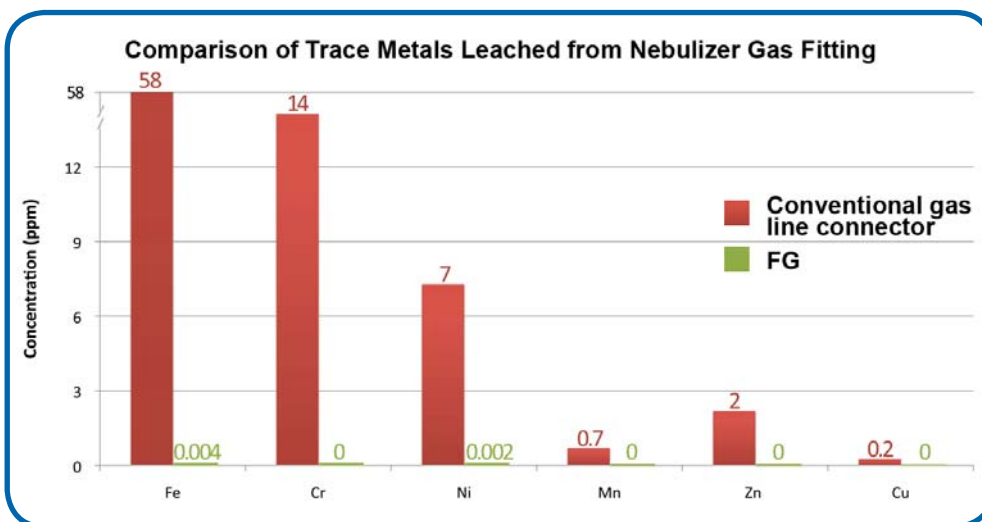
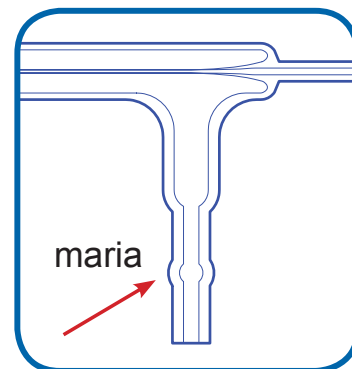
Part Number	Application
FG	For use with all MEINHARD® nebulizers

Elemental Scientific introduces the PFA FitKit Quick Connects, a revolutionary new gas and sample fitting system for MEINHARD® Plus nebulizers. The kit includes a gas connection (FG), standard integrated capillary sample connection (F2) and two other sample connection (F1 and F0) options to choose from.

**FG gas connection forms a tight seal over the maria on the sidearm of the MEINHARD® nebulizers.** FG offers the benefits of an easy-to-use quick connect while maintaining high purity for sensitive ICP and ICPMS applications. In a test that simulated a backflow event, FG produced concentrations of elements like Fe and Cr that were four orders of magnitude lower than concentrations leached from a conventional fitting (Figure 1).

#### Benefits include:

- High purity PFA fluoropolymer construction
- Easy to connect and disconnect
- One connection fits any MEINHARD® nebulizer



Conventional gas line connector



PFA FG quick connect gas line

**Figure 1.** Leach test of a conventional gas line connector and PFA FG

# Sample Tubing Options

The sample connector is a low dead-volume quick connect for MEINHARD® Plus nebulizers. It offers a fast stabilization time and a reliable seal with chemically resistant PFA. Three versions are available in a variety of flow rates for different ICP and ICPMS applications.

**Benefits include:**

- Fast stabilization time and ultra-low dead-volume
- High purity PFA fluoropolymer construction
- Easy to connect and disconnect

**Sample connectors available:**

- F2:** Standard integrated capillary for self-aspiration or pumping. Standard with all nebulizers.
- F0:** Encapsulated micro tubing for microflow rates with the lowest internal volume of any nebulizer.
- F1:** Detachable capillary for a wide range of applications.

## F2 Standard Integrated Capillary

F2 Standard integrated capillary for self-aspiration or pumping. Includes 0.5 mm i.d. ■ (orange marker) 70 cm long capillary.

Part Number	Application
F2-50	Compatible with all MEINHARD® Plus nebulizers.



## F0 Encapsulated Micro Tubing

F0 Encapsulated micro tubing for microflow rates with the lowest internal volume of any nebulizer. Includes 0.25 mm i.d. ■ (green marker) 70 cm long micro capillary.

Part Number	Application
F0-25	Compatible with all MEINHARD® Plus nebulizers.



## F1 Detachable Capillary

F1 Detachable capillary for a wide range of applications. Includes 0.80 mm i.d. ■ (blue marker) 70 cm long capillary.

Part Number	Application
F1-80	Compatible with all MEINHARD® Plus nebulizers.



# prepFAST

*The Next Stage of Automation*

- **FAST Inline Auto Dilution**
- **Auto Calibration**
- **Over Range Sample Auto Dilution and Reanalysis**
- **Priority Sample Auto Dilution**
- **Automated Standard Additions**
- **Automated Isotope Dilution Spiking**



PerkinElmer  
ELAN ICPMS



# STANDARD SAMPLE INTRODUCTION

## Spray Chambers/Ball Joint Adapter

### Spray Chambers

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

Part Number	Description	Application
ES-3154-1111-16	Quartz (7 mm baffle) cyclonic spray chamber with auxiliary gas port, drain line included	All-purpose for non-HF samples. Provides excellent sensitivity and stability with low background.



Part Number	Description	Application
ES-3154-1011-16	Quartz (7 mm baffle) cyclonic spray chamber (no auxiliary gas port), drain line included	All-purpose for non-HF samples. Provides excellent sensitivity and stability with low background.



Part Number	Description	Application
ES-3484-1111-21	Quartz (7 mm baffle) micro cyclonic spray chamber with auxiliary gas port	Fastest washout for concentrated samples or carryover-prone analytes in non-HF samples



Part Number	Description	Application
ES-3154-3111-16	PFA (7 mm baffle) cyclonic spray chamber with auxiliary gas port	All-purpose, offers resistance to hydrofluoric acid while maintaining the benefits of cyclonic spray chambers.



Part Number	Description	Application
ES-2100-0472	PFA 47 mm PureChamber	High aerosol transmission, and excellent short/long-term stability. Semiconductor, high-precision and HF samples.
ES-5010-0470	PFA 47 mm PureCap Endcap	



### 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 ELAN injector with glass ball joint inlet.



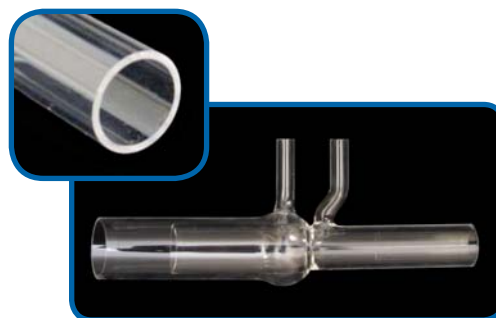


## Cassette Injectors for Standard Torch

### ELAN Standard Quartz Torch

The standard quartz torch allows the use of different injectors depending on the application.



Part Number	Description
ES-1102	Standard demountable quartz torch. Use o-ring injectors with this torch. [The o-ring is not wetted by the sample.]

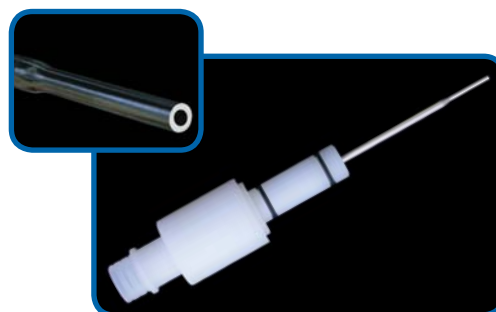


### Platinum Injectors for Standard ELAN Torch



Platinum injectors are used for introducing volatile organic solvents and HF-containing semiconductor-grade chemicals.

Part Number	Size	Description
ES-1113-3100 	1.0 mm	Platinum injector, cassette mount. [Pt cones recommended]
ES-1113-3150	1.5 mm	Platinum injector, cassette mount.
ES-1113-3200 	2.0 mm	Standard platinum injector, cassette mount. For low-ppt Al determinations.



### Sapphire Injectors for Standard ELAN Torch



Sapphire injectors are used for geochemistry and HF applications where low ppt Al is not required.



Part Number	Size	Description
ES-1103-3160	1.5 mm	Sapphire injector, cassette mount. HF-resistant.
ES-1103-3180	1.8 mm	Sapphire injector, cassette mount. HF-resistant. For high matrix geochemistry.



### Quartz Injectors for Standard ELAN Torch



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

Part Number	Size	Description
ES-1124-3100 	1.0 mm	Quartz injector, cassette mount.
ES-1124-3150	1.5 mm	Quartz injector, cassette mount.
ES-1124-3200	2.0 mm	Quartz injector, cassette mount.
ES-1124-3250 	2.5 mm	Quartz injector, cassette mount. Improved stability for high matrix/high TDS environmental samples.



# Cassette Injectors for O-Ring-Free Torch

## ELAN Standard O-Ring-Free Quartz Torch

ppq

The reinforced base of the torch reduces the chance of accidental breakage and allows for the precision alignment of the o-ring-free injector.



Part Number	Description
ES-1102-1000	O-ring-free demountable quartz torch. Use with ESI o-ring-free injectors.

## O-Ring-Free Platinum Injectors for ELAN Torch

ppq

HF

Platinum injectors are used for introducing volatile organic solvents and HF-containing semiconductor-grade chemicals.

Part Number	Size	Description
ES-1113-2100	1.0 mm	Platinum injector, o-ring-free cassette mount. [Pt cones recommended]
ES-1113-2150	1.5 mm	Platinum injector, o-ring-free cassette mount.
ES-1113-2200	2.0 mm	Platinum injector, o-ring-free cassette mount. For semiconductor HF applications.



## O-Ring-Free Sapphire Injectors for ELAN Torch

ppq

HF

Sapphire injectors are used for geochemistry and HF applications where low ppt Al is not required.

Part Number	Size	Description
ES-1103-2160	1.5 mm	Sapphire injector, o-ring-free cassette mount. HF-resistant.
ES-1103-2180	1.8 mm	Sapphire injector, o-ring-free cassette mount. HF-resistant. For high matrix geochemistry.



## O-Ring-Free Quartz Injectors for ELAN Torch

+

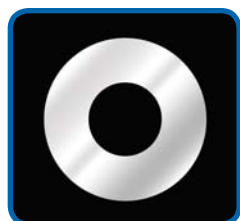
HF

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

Part Number	Size	Description
ES-1124-2100	1.0 mm	Quartz injector, o-ring-free cassette mount.
ES-1124-2150	1.5 mm	Quartz injector, o-ring-free cassette mount.
ES-1124-2200	2.0 mm	Quartz injector, o-ring-free cassette mount.
ES-1124-2250	2.5 mm	Quartz injector, o-ring-free cassette mount. Improved stability for high matrix/high TDS environmental samples.



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



- Protects PFA 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 ESI o-ring-free injectors

For platinum & sapphire injectors only

Platinum Shield Disc Installed



## Bayonet Injectors for Standard Torch

### Platinum Injectors for Standard ELAN Torch

Platinum injectors are used for introducing volatile organic solvents and HF-containing semiconductor-grade chemicals.



Part Number	Size	Description
ES-1113-0200	2.0 mm	Platinum injector, bayonet mount. For low-ppt Al determinations.

### Sapphire Injectors for Standard ELAN Torch

Used for high matrix geochemistry and HF applications where low ppt Al is not required.



Part Number	Size	Description
ES-1103-0180	1.8 mm	Sapphire injector, bayonet mount. HF-resistant.

### Quartz Injectors for Standard ELAN Torch

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



Part Number	Size	Description
ES-1124-0150	1.5 mm	Quartz injector, bayonet mount.
ES-1124-0200	2.0 mm	Quartz injector, bayonet mount.

### Shield Disc for a PFA Injector Base



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

Part Number	Description
ES-1101-0107	Platinum Shield Disc for ESI injectors

For platinum & sapphire injectors only.

Platinum Shield Disc Installed



### \*Convertible Injector Adapter

ppq

The convertible injector adapter converts the bayonet mount injector into a cassette mount injector.

\*Adapter will only work with ESI bayonet mount injector base P/N: ES-1103-4180

Part Number	Description
ES-5103-5494	Replacement convertible adapter for ESI ELAN injector.



## Integrated MP<sup>2</sup> Precision Micro Peristaltic Pumps for the PerkinElmer ELAN

The MP<sup>2</sup> (Micro Peristaltic Pump) provides better stability than standard peristaltic pumps. Roller configuration and precision machining minimizes gaps between rollers, resulting in even pressure points along the pump tubing. Reduced pump pulsation improves signal stability, data quality and detection limits.



### BENEFITS:

- Pump Design Extends Tubing Lifetime
- Stand Alone and Integrated Versions
- High Chemical Resistance
- Pump Network Software Control
- Precision
- Low Pulsation
  - 12 closely-spaced rollers improve signal stability
- Chemically Resistant
  - Ceramic pins and PTFE-coated metal components are resistant to acids and organic solvents
- Optimized for Low Flow Rates
  - Accurate pumping across a wide range of rates from low nL/min to 10 mL/min
- 1, 2, 3, 4 and 6 Channels



### MP<sup>2</sup> ELAN SPECIFICATIONS:

#### Channels:

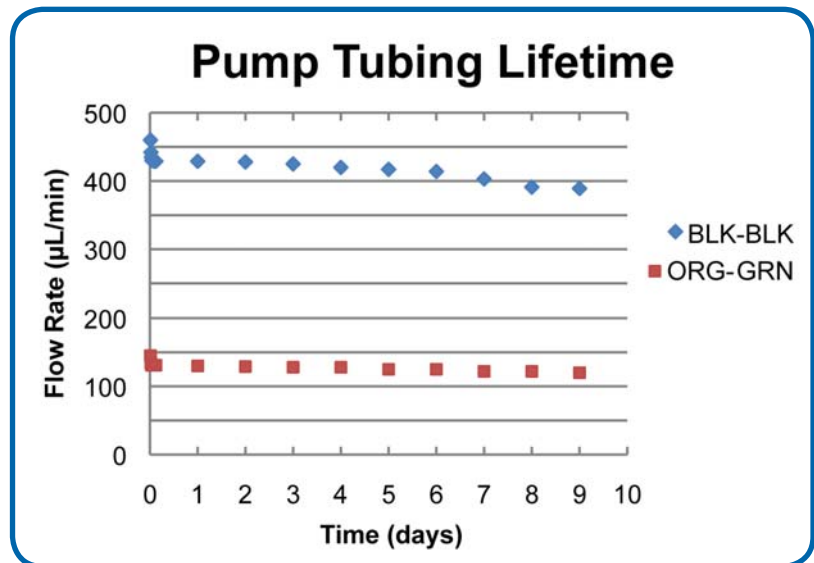
1-6 Channels

#### Flow Rates:

0.20 µL/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. Stable flow after 1 hour "break-in" time.

**NOTE:** The DXi FAST and MP<sup>2</sup> modules are not compatible with ELAN instruments that don't have a built in peristaltic pump, i.e. the ELAN 6000.

Part Number	Description
MP2-3-54	MP <sup>2</sup> integrated 3 channel precision micro peristaltic pump
MP2-4-54	MP <sup>2</sup> integrated 4 channel precision micro peristaltic pump
MP2-6-54	MP <sup>2</sup> integrated 6 channel precision micro peristaltic pump





## 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 peripump with a flow rate range from 1µL/min to 10 mL/min and is available with one to six channels. Optimized for low flow rates, the MP<sup>2</sup> uses either MPP tubing or standard 3-stop pump tubing.



#### CONTROLLED BY THE INSTRUMENT PC USB PORT

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

**Includes:** Cable to control with DX Autosampler

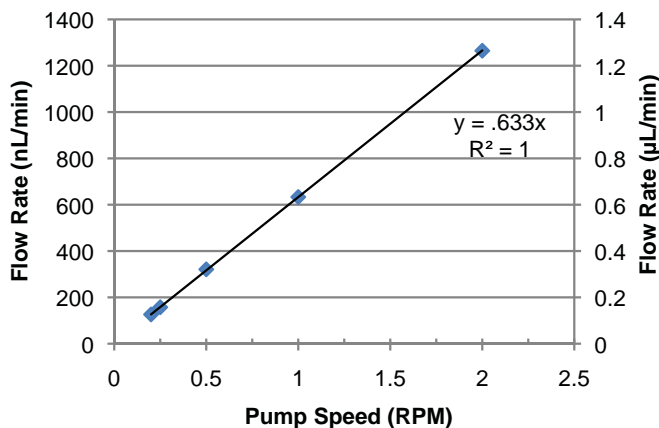
#### CTFE PERIPUMP FITTINGS (Non-barbed)

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

#### Interchannel Reproducibility at 125 nL/min

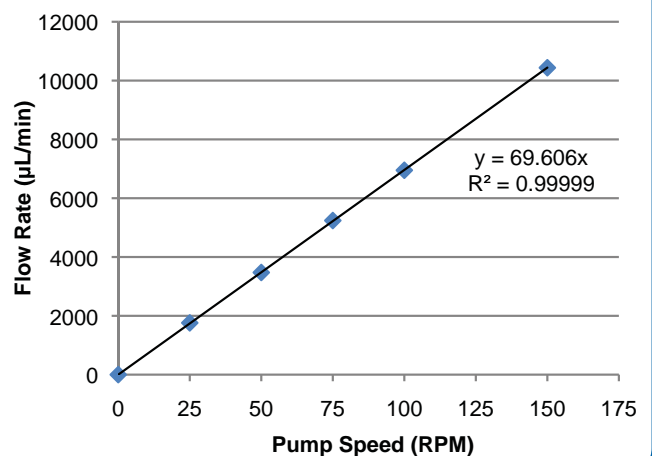
RPM	Ch. 1	Ch. 2	Ch.3	Ch. 4
0.2	126	124	128	124
RSD	1.26 %			

ORG BLK



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

BLK WHT



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

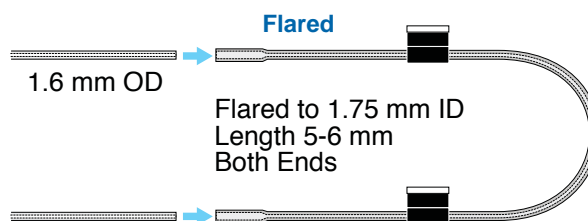
# MP<sup>2</sup> Pump Tubing



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 PFA capillaries      i.d. = 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. 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 Peripump 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).



## SYRIX Syringe Pump

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.

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

### Features:

- Wide flow rate range
  - < 10  $\mu$ L/min to > 100 mL/min
- A variety of syringe sizes
  - 0.3 mL to 10.0 mL
- O-ring-free
- Syringe material
  - PTFE/Quartz
  - Fluoropolymer
- Optional integrated switching valve
- Convenient software control interface
- Connects directly to SC-DX autosampler



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



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



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



SYRIX SYRINGE PUMPS		
Part Number	Description	Application
PF-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 ELAN. Useful for volatile / viscous samples and for accurate online continuous dilution.
PF-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.



3.0 mL quartz syringe (PF-0599-1030)



0.3 mL PFA syringe (PF-0599-3003)

SYRIX SYRINGE PUMP SPARES	
Part Number	Description
PF-0599-1003	0.3 mL quartz syringe
PF-0599-1030	3.0 mL quartz syringe
PF-0599-1100	10.0 mL quartz syringe
PF-0599-3003	0.3 mL HF resistant syringe
PF-0599-3030	3.0 mL HF resistant syringe
PF-0599-3100	10.0 mL HF resistant syringe
PF-A-33	PTFE adapter to mount both 0.3 mL and 3 mL syringe barrels on SYRIX

# MEINHARD®

## NEW PLUS NEBULIZERS with PFA FitKit Quick Connects



MEINHARD® SiIQ+ high purity nebulizer  
with PFA FitKit

### *NEW Quartz and Glass Nebulizers with PFA FitKit*

- SiIQ+ High Purity Quartz Nebulizer
- TQ+ Quartz Nebulizer
- TR+ Glass Nebulizer

See page 32 for more information.



**Enhance Your Detection Limits,  
Reduce Sample Contamination**



**PerkinElmer®**  
For the Better



# AUTOSAMPLER ACCESSORIES

## Autosampler Enclosures / ULPA Filtered Environments / GPIB Kit

### Ultra-Low Particulate Arrester Air Filter

ppq

The ULPA (Ultra-Low Particle Arrester) 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

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



### Autosampler 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-Micro	SC-1607	
Enclosure for SC-2 DX	SC-1207	SC-1207-1000
Enclosure for SC-4 DX	SC-1407	SC-1407-1000
Enclosure for SC-8 DX	SC-1807	SC-1807-1000
Enclosure for SC-14 DX	SC-1107-0030	SC-1107-1030

### GPIB to RS-232 Convert Kit (Address 14)

The GPIB allows direct control of an ESI autosampler via the ELAN software. The interface seamlessly captures and converts commands sent from the ELAN into commands the ESI autosampler can execute.

Part Number	Suggested Use
SC-0901-14	Used to capture and convert autosampler commands from non-ESI software

Includes power adapter for GPIB to RS232 converter.



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

## SC-2 DX Mobile Stand



## SC-4 DX Mobile Stand



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

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

The mobile stand positions the autosampler close to the ELAN 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.



Accessible rinse bottle can be refilled in place



# SAMPLE VESSELS AND RACKS


## PFA Sample Vessels

### PFA Vials

PFA vials are ideal for applications that require the highest sensitivity. Made of ultra-pure, 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-14-0311-CG-X	SR4-60-14 (pg 56), MR-21-14 (pg 54), MR-40-14 (pg 54)
V-14-0312-CG-X	
V-14-0314-CG-X	



Part Number	Qty
V-14-0311-CG-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 tall cap for 14 mm micro vials




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



Part Number	Qty
V-14-0300-X	10
Description	PFA snap-on cap for 14 mm graduated PFA micro vials



Part Number	Qty
V-14-0314-CG-X	10
Description	Volume
14 mm o.d. graduated PFA micro vial	4 mL Brim full 4.5 mL



Part Number	Qty
V-14-0301-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	MR-10-30 (pg 54), SR2-21-30 (pg 55)
V-31-30-X	MR-10-30 (pg 54), SR2-27-31 (pg 55), ST10-31 (pg 56)
V-31-60-X	LRM-21-30-R (pg 53), LR-21-30 (pg 53), HR-21-30 (pg 54), SR2-27-31 (pg 55), ST10-31 (pg 56)
V-28-0360-V	SR2-27-28 (pg 55), ST10-28 (pg 56)
V-50-0360	SR2-12-50 (pg 55)

PFA vials for semiconductor, high purity, and aggressive chemicals applications. The most translucent PFA vials available. Low adsorption of biological materials for many research applications.

	<b>Part Number</b>	<b>Qty</b>
	V-31-15-X	10
	<b>Description</b>	<b>Volume</b>
	30 mm o.d. graduated PFA vial	15 mL

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

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

	<b>Part Number</b>	<b>Qty</b>
	V-50-0360	1
	<b>Description</b>	<b>Volume</b>
	50 mm o.d. PFA bottle and cap with TFM insert	125 mL

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




# SAMPLE VESSELS AND RACKS

## 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 concerns.


Vials	Fits Racks
V-13-0200-R-XC	LRM-90-13-R (pg 53), LRM-90-13-R-3T (pg 53), LR-90-13-R (pg 53)
V-16-0225	LRM-60-16-R (pg 53), LR-60-16 (pg 53), SR2-80-16 (pg 55), HR-60-16 (pg 54)
V-20-0290-XL	LR-40-20 (pg 53)
V-28-0260-L	SR2-27-28 (pg 55), ST10-28 (pg 56)
V-8-0505-C	MR-60-08 (pg 54), MR-90-08 (pg 54)
V-61-0660-XII	ST7-60 (pg 56)




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




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




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



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



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



Part Number	Qty
V-61-0660-XII	12
Description	Volume
61 mm o.d. polyethylene narrow mouth bottle	250 mL

# Microtiter Plates/Covers/XP Probe Arm

## Microtiter Plates

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

**All microtiter plates can be used on the following Elemental Scientific autosamplers:**

SC-2, SC-4, SC-2 DX, SC-4 DX, SC-Micro



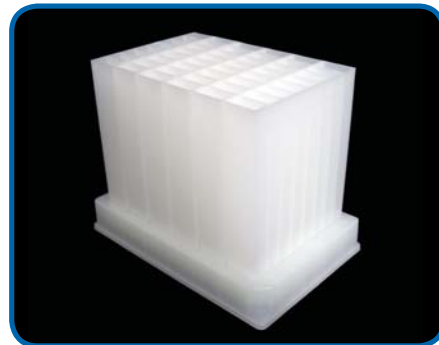
Part Number	Description
MT-24-10ML-02	1 Pk (5 ea) 24 well, 10 mL microtiter plate, square well, pyramid bottom



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



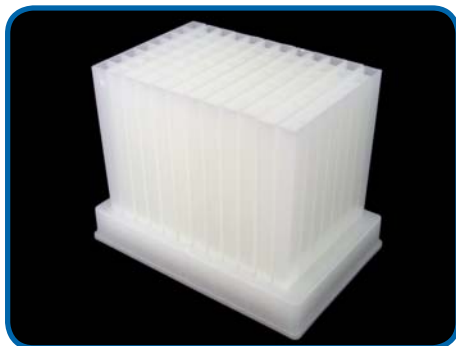
Part Number	Description
MT-48-7.5ML-02	1 Pk (3 ea) 48 well, 7.5 mL microtiter plate, square well, pyramid bottom



Part Number	Description
MT-48-10ML-02	1 Pk (1 ea) 48 well, 10 mL microtiter plate, square well, pyramid bottom



Part Number	Description
MT-96-2ML-02	1 Pk (5 ea) 96 well, 2 mL microtiter plate, square well, pyramid bottom



Part Number	Description
MT-96-4mL-02	1 Pk (1 ea) 96 well, 4 mL microtiter plate, square well, polypropylene

# SAMPLE VESSELS AND RACKS

## Microtiter Plate Covers and XP Probe Arm

### X-Piercing Microtiter Plate Cover

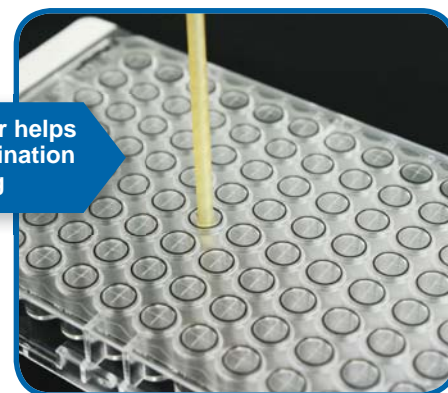
The X-piercing cover minimizes evaporation of micro samples awaiting analysis and protects against environmental contamination.



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



X-Piercing cover helps prevent contamination during sampling

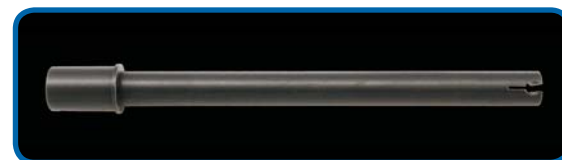


Part Number	Qty	Suggested Use
MT-96-XP	25	X-Piercing film cover for 96 well microtiter plate

### 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 microtiter plate.

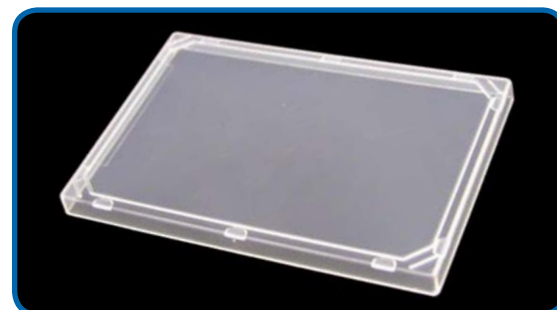
Part Number	Suggested Use
SC-0105-DX-XP	XP Probe arm for SC-2 DX / SC-4 DX Autosampler



### Microtiter Plate Cover

This rigid plastic microtiter plate cover is primarily used to protect against environmental contamination.

Part Number	Qty	Suggested Use
MT-00-02	5	Cover for microtiter plates



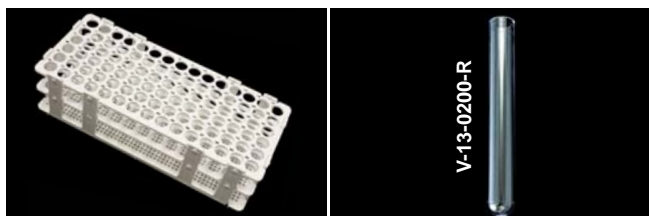
# SC-Autosampler Racks

## SC-Autosampler Racks (LR Size)

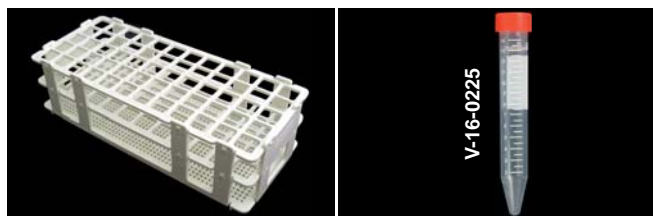
Plastic large racks are recommended for aqueous samples.

**All LR racks can be used on the following ESI autosamplers:**

SC-2, SC-4, SC-8, SC-14, SC-2 DX, SC-4 DX, SC-8 DX, SC-14 DX



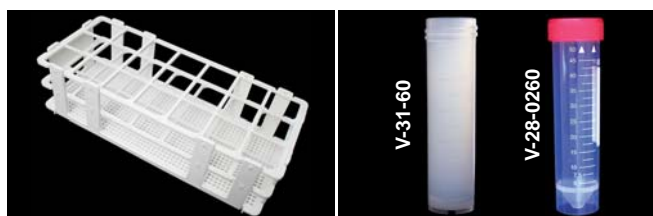
Part #	Diam.	Description
LR-90-13-R	13 mm	90 position large sample rack for 8 mL tubes



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



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



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

## SC-Autosampler Coated Metal Racks (LR Size)

Metal racks are coated with an epoxy paint that forms a protective barrier over the rack material. These racks are designed for organic solvents or oil samples which can dissolve plastic racks.

**All coated metal racks can be used on the following ESI autosamplers:**

SC-2, SC-4, SC-8, SC-14, SC-2 DX, SC-4 DX, SC-8 DX, SC-14 DX



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



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



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



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





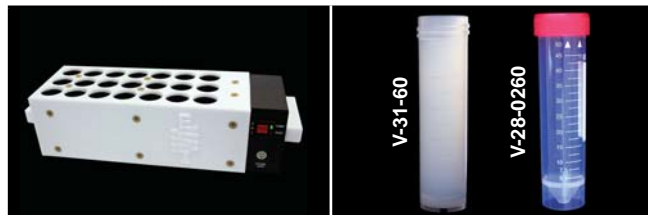
# SAMPLE VESSELS AND RACKS

## SC-Autosampler Heated Racks (LR Size)

All heated racks can be used on the following Elemental Scientific autosamplers:  
SC-2, SC-4, SC-8, SC-14, SC-2 DX, SC-4 DX, SC-8 DX, SC-14 DX



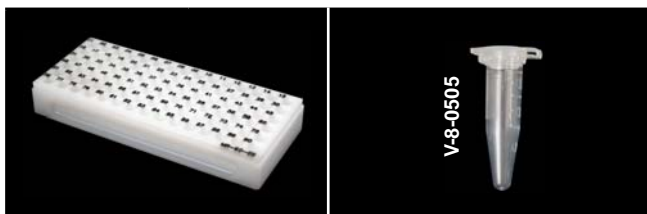
Part #	Diam.	Description
HR-60-16	16 mm	60 position heated large sample rack for 15 mL tubes



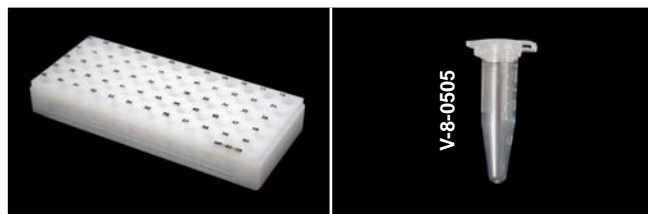
Part #	Diam.	Description
HR-21-30	30 mm	21 position heated large sample rack for 50 mL and 60 mL tubes

## SC-Autosampler Racks (MR Size)

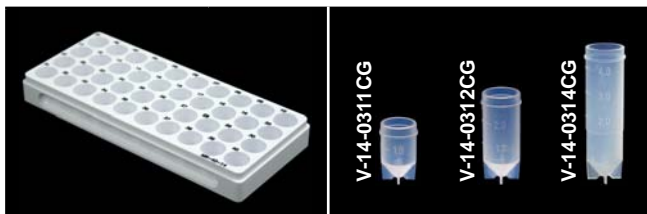
All MR racks can be used on the following Elemental Scientific autosamplers: SC-2, SC-4, SC-2 DX, SC-4 DX, SC-Micro



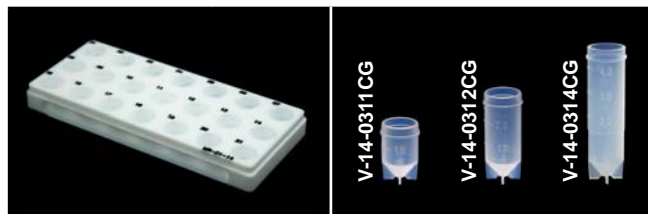
Part #	Diam.	Description
MR-90-08	8 mm	90 position CPVC micro sample rack for 0.5 mL tubes



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



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



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



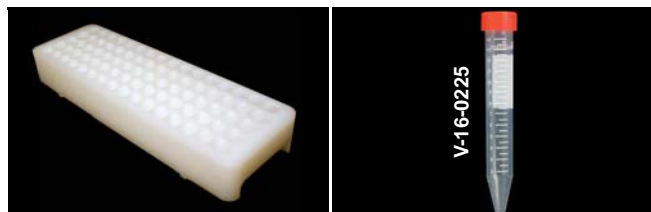
Part #	Diam.	Description
MR-10-30	30 mm	10 position micro sample rack for 15 mL and 30 mL tubes



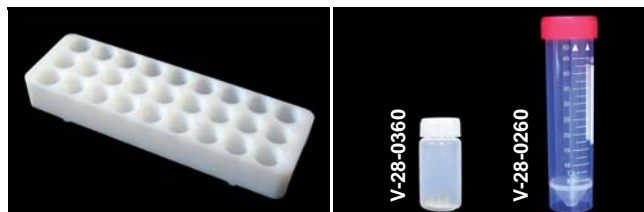
Part #	Description
MR-00-01	Cover for SC-micro racks

## SC-Autosampler Racks (SR2 Size)

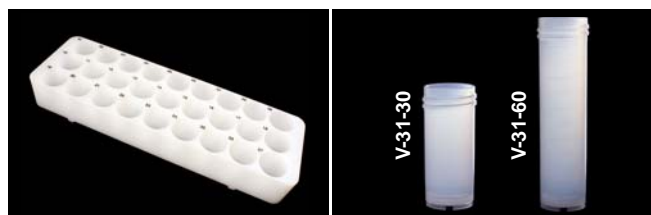
All SR2 racks can be used on the following ESI autosamplers: SC-2, SC-2 DX



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



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



Part #	Diam.	Description
SR2-27-31	31 mm	27 position super sample rack for 30 mL and 60 mL tubes



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



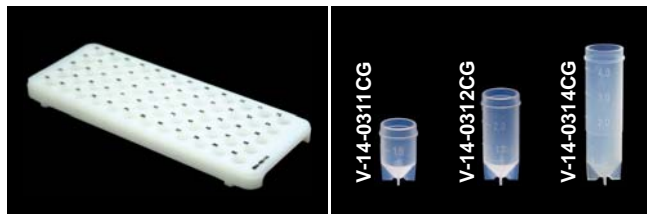
Part #	Diam.	Description
SR2-12-50	50 mm	12 position super sample rack for 125 mL bottles

# SAMPLE VESSELS AND RACKS

## SC-Autosampler Racks (SR4 Size)

All SR4 racks can be used on the following Elemental Scientific autosamplers:

SC-2, SC-4, SC-2 DX, SC-4 DX, SC-E2, SC-E4, SC-E2 DX, SC-E4 DX



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



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

## SC-Autosampler Racks (ST Size, Type 1)

All ST type 1 racks can be used on the following Elemental Scientific autosamplers:

SC-2, SC-4, SC-8, SC-14, SC-2 DX, SC-4 DX, SC-8 DX, SC-14 DX



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



Part #	Diam.	Description
ST10-31	31 mm	10 position standards rack for 30 mL and 60 mL tubes

## SC-Autosampler Racks (ST Size, Type 2)

The ST type 2 rack can be used on the following Elemental Scientific autosamplers:

SC-4 DX, SC-14, SC-14 DX

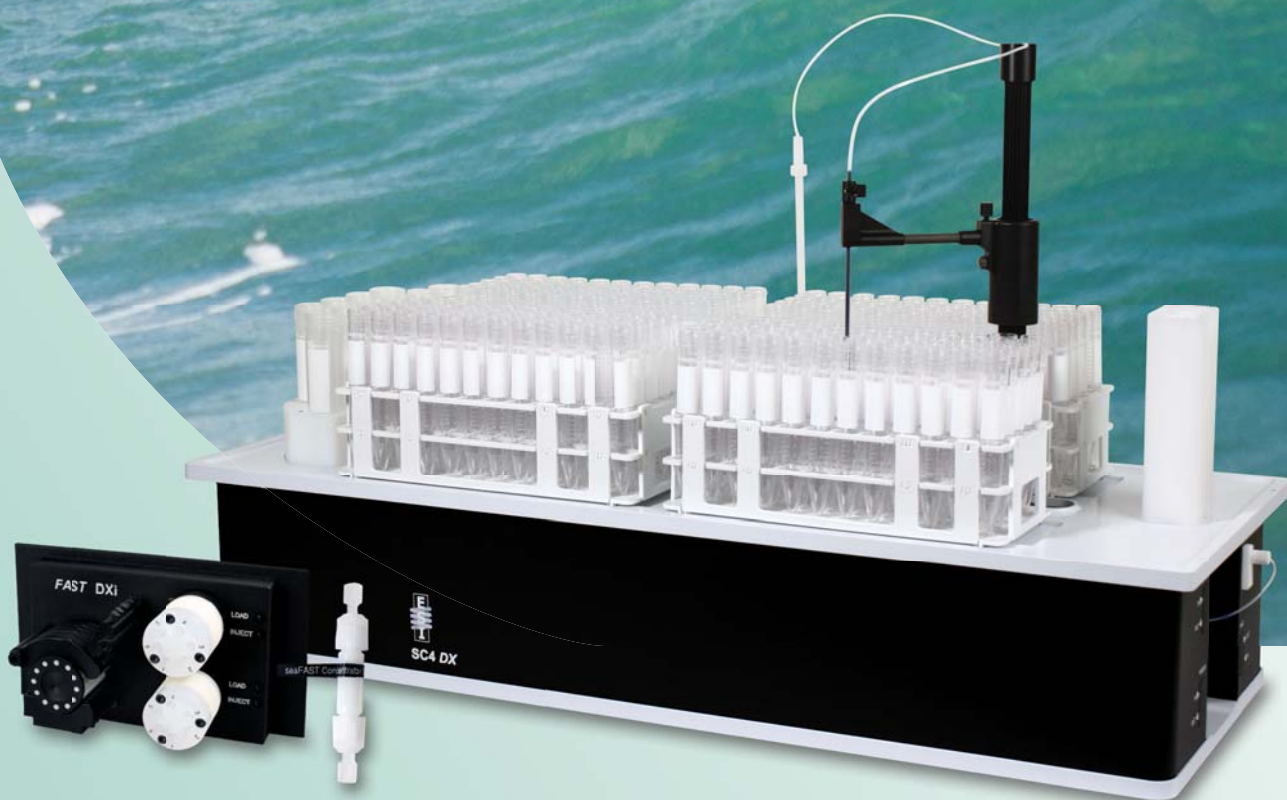


Part #	Diam.	Description
ST7-60	60 mm	7 position standards rack for 250 mL bottles



# seaFAST™

**Automated Preconcentration  
and Matrix Elimination**



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

See page 8 for more information.

  
**PerkinElmer®**  
*For the Better*



## 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. CTFE stators offer high impact strength, chemical and corrosion resistance over a wide temperature range — typically -76°C to +150°C (-105°F to +300°F).

### 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, apex FAST



#### 6 Port Valve P/N: SC-0599-1026 (PEEK Composite Rotor)

**Description:** CTFE High-flow 6 port valve head for SC-FAST  
**Specifications:** CTFE Stator, PTFE or 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 rinse-out (<5 s)

#### 7 Port Valve P/N: SC-0599-1024 (PTFE Rotor) SC-0599-1033 (PEEK Composite Rotor)

**Description:** CTFE High-flow 7 port valve head for SC-FAST  
**Specifications:** CTFE Stator, PTFE or Composite Rotor proprietary valve combines benefits of high-flow and fast stabilization times with internal standard mixing  
**Applications:** Standard FAST, seaFAST



**NEW!**  
F7 FAST valve

#### 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, DINFAST



**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

## Examples of Materials



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



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



**Description**  
 Composite (PEEK/PTFE) rotor for high-flow valve

## Spare Rotors and Stators for FAST Valves

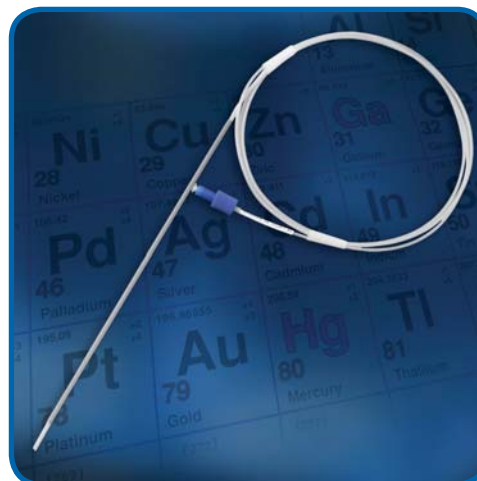
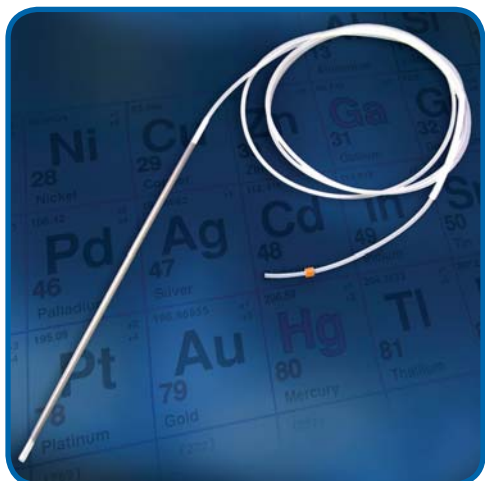
HIGH-FLOW VALVE WITH REPLACEMENT STATORS AND ROTORS						
# of Ports	Bore Size	Stator Material	Rotor Material	P/N Complete Valve	P/N Stator	P/N Rotor
4	0.8 mm	CTFE	PTFE	SC-0599-1015	SC-0599-1015-01	SC-0599-1015-02
6	0.8 mm	CTFE	PTFE	SC-0599-1010	SC-0599-1010-01	SC-0599-1010-02
6	1.0 mm	CTFE	PTFE	SC-0599-1028	SC-0599-1026-01	SC-0599-1026-02
6	0.8 mm	CTFE	Composite (PEEK/PTFE)	SC-0599-1011	SC-0599-1010-01	SC-0599-1010-05
6	1.0 mm	CTFE	Composite (PEEK/PTFE)	SC-0599-1026	SC-0599-1026-01	SC-0599-1026-05
6 - FS	FS	CTFE	Composite (PEEK/PTFE)	SC-0599-1025	SC-0599-1025-01	SC-0599-1025-05
6	1.6 mm	PPS	Composite (PEEK/PTFE)	SC-0599-1032	SC-0599-1032-01	SC-0599-1032-05
7 - F7	F7	CTFE	PTFE	SC-0599-1024	SC-0599-1024-01	SC-0599-1010-02
7 - FS7	FS7	CTFE	PTFE	SC-0599-1034	SC-0599-1024-01	SC-0599-1025-02
7 - F7	F7	CTFE	Composite (PEEK/PTFE)	SC-0599-1033	SC-0599-1024-01	SC-0599-1010-05
8	0.8 mm	CTFE	PTFE	SC-0599-1013	SC-0599-1013-01	SC-0599-1013-02
8	1.0 mm	CTFE	Composite (PEEK/PTFE)	SC-0599-1027	SC-0599-1027-01	SC-0599-1027-05
9 - F9	0.8 mm	CTFE	PTFE	SC-0599-1029	SC-0599-1029-01	SC-0599-1013-02
10	0.8 mm	CTFE	PTFE	SC-0599-1012	SC-0599-1012-01	SC-0599-1012-02
LOW-FLOW VALVE WITH REPLACEMENT STATORS AND ROTORS						
# of Ports	Bore Size	Stator Material	Rotor Material	P/N Complete Valve	P/N Stator	P/N Rotor
4	0.4 mm	PEEK	Composite (PEEK/PTFE)	SC-0599-1022	SC-0599-1022-01	SC-0599-1022-05
6	0.4 mm	CTFE	PTFE	SC-0599-1008	SC-0599-1008-01	SC-0599-1008-02
6	0.8 mm	PEEK	Composite (PEEK/PTFE)	SC-0599-1009	SC-0599-1009-01	SC-0599-1009-05




## FAST Probes / Tees / Lines

### FAST Probes

FAST probes offer high chemical resistance for applications involving strong acids, alkalis and organics. A contoured design reduces carry over, while an all PFA wetted sample flow path reduces contamination.



Part Number	Size	Description
SC-5037-3501	0.50 mm i.d. ■ (orange), 150 cm	PFA carrier / internal standard probe for SC-FAST valve

Part Number	Size	Description
SC-5037-3751	0.80 mm i.d. ■ (blue), 100 cm	PFA FAST sample probe for high-flow SC-FAST valve, carbon fiber supported 
SC-5037-3991	1.00 mm i.d. ■ (gray), 100 cm	
SC-5037-3751-150	0.80 mm i.d. ■ (blue), 150 cm	
SC-5037-3995-150	1.00 mm i.d. ■ (gray), 150 cm	

### Low Volume FAST Valve Connecting Line for ESI ST-Nebulizer

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

Part Number (14 cm)	DXi Part Number (25 cm)	Description
SC-0317-0250	SC-0317-0250-25	0.25 mm i.d. ■ (green) Attaches to port #3 of the FAST valve.
SC-0317-0500	SC-0317-0500-25	0.50 mm i.d. ■ (orange) Attaches to port #3 of the FAST valve.



ESI PFA-ST Nebulizer (ES-2040)

### Low Volume Internal Standard Addition Tee for ESI ST-Nebulizer

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 (14 cm)	DXi Part Number (25 cm)	Description
SC-0317-1250	SC-0317-1250-25	0.25 mm i.d. ■ (green) Attaches to port #3
SC-0317-1500	SC-0317-1500-25	0.50 mm i.d. ■ (orange) Attaches to port #3



ESI PFA-ST Nebulizer (ES-2040)

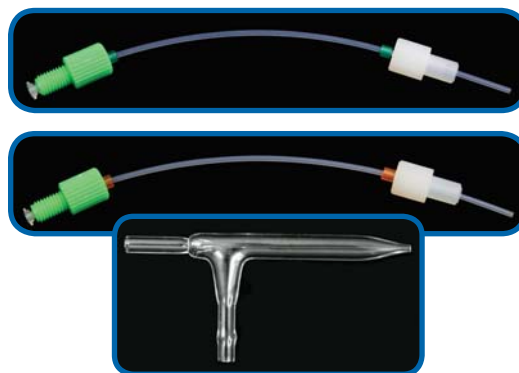
## SC-FAST Connecting Lines

Elemental Scientific recommends using its PFA-ST or MEINHARD® nebulizer with the SC-FAST system for optimum throughput and performance. ESI offers connecting lines for most nebulizers that laboratories may already have.

### FAST Valve Connecting Line for MEINHARD® Nebulizer

PTFE FAST valve line that connects the FAST valve (port #3) to a MEINHARD® nebulizer to achieve fast signal stabilization time and short wash times.

Part Number	Description
SC-0317-0250-MH	0.25 mm i.d. ■ (green), 14 cm. Attaches to port #3 of the FAST valve.
SC-3017-0500-MH	0.50 mm i.d. ■ (orange), 14 cm. Attaches to port #3 of the FAST valve.

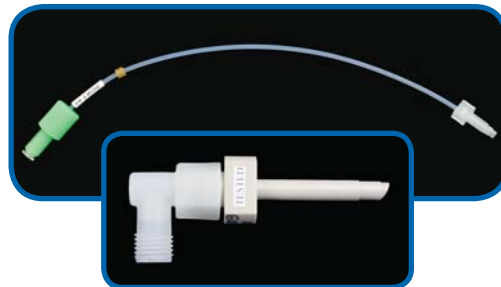


MEINHARD® Glass Nebulizer (TQ-30-A3 Pg 33)

### FAST Valve Connecting Line for PerkinElmer Gem Cone Nebulizer

PTFE FAST valve line that connects the FAST valve (port #3) to a PerkinElmer Gem Cone nebulizer to achieve fast signal stabilization time and short wash times.

Part Number	Description
SC-0317-0500-GC	0.50 mm i.d. ■ (orange), 14 cm. Attaches to port #3 of the FAST valve.
SC-0317-0990-GC	1.00 mm i.d. ■ (gray), 14 cm. Attaches to port #3 of the FAST valve.

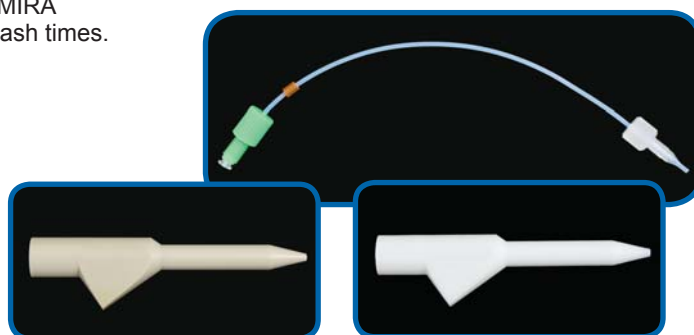


PerkinElmer Gem Cone Low-flow Nebulizer

### FAST Valve Connecting Line for MIRA MIST Nebulizer

PTFE FAST valve line that connects the FAST valve (port #3) to a MIRA MIST nebulizer to achieve fast signal stabilization time and short wash times.

Part Number	Description
SC-0317-0500-BG	0.50 mm i.d. ■ (orange), 17 cm. Attaches to port #3 of the FAST valve.
SC-0317-0990-BG	1.00 mm i.d. ■ (gray), 17 cm. Attaches to port #3 of the FAST valve.








MIRA MIST  
PEEK Nebulizer

MIRA MIST  
PTFE Nebulizer



## Fittings / PFA Tubing

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.

Part Number	Description	Quantity	Suggested Use	
SC-0599-0116-K	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-0599-0108-W	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-F16	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-F08	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-0599-0001	Black, low-flow nut (M5/10-32) for FAST valve	10	Use with 1/16" (1.6 mm) o.d. PFA tubing for low-flow rates (<0.1 mL/min)	

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



SC-FAST Standard Spares Kit	
Part Number	Description
SC-0380	Assorted fittings and tubing for FAST systems.

SC-FAST Deluxe Spares Kit	
Part Number	Description
SC-0370	Includes all of the assorted fittings and tubing in the Standard Spares Kit with the addition of a PFA-ST nebulizer, spare FAST valve and internal standard tee.



## Sample Loops

PFA crimp free SC-FAST loops provide low resistance for fast loading and rinse out.

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

Part Number	Size	Description
SC-0319-01	100 µL loop	Multipurpose PFA FAST loops for high-flow valves. Recommended for use with 0.8 mm i.d. ■ (blue) probe. 1.6 mm o.d., 1/4-28 fittings.
SC-0319-02	200 µL loop	
SC-0319-03	300 µL loop	
SC-0319-05	500 µL loop	
SC-0319-10	1.0 mL loop	
SC-0319-15	1.5 mL loop	
SC-0319-20	2.0 mL loop	
SC-0319-25	2.5 mL loop	
SC-0319-30	3.0 mL loop	
SC-0319-40	4.0 mL loop	



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

Part Number	Size	Description
SC-0318-03	300 µL loop	Multipurpose PFA FAST loops for high-flow valves. Recommended for use with 1.0 mm i.d. ■ (gray) probe. 1.6 mm o.d., 1/4-28 fittings.
SC-0318-05	500 µL loop	
SC-0318-10	1.0 mL loop	
SC-0318-15	1.5 mL loop	
SC-0318-20	2.0 mL loop	
SC-0318-25	2.5 mL loop	
SC-0318-30	3.0 mL loop	
SC-0318-40	4.0 mL loop	



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

Part Number	Size	Description
SC-0315-025	250 µL loop	High volume and flow, fast-loading PFA FAST loops for high-flow valves. 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.
SC-0319-10	1.0 mL loop	
SC-0315-20	2.0 mL loop	
SC-0315-30	3.0 mL loop	
SC-0315-40	4.0 mL loop	
SC-0315-60	6.0 mL loop	
SC-0315-80	8.0 mL loop	



### 0.8 mm i.d. SC-FAST Low-Flow Sample Loops

Part Number	Size	Description
SC-0312-01	100 µL loop	Low volume, low-flow PFA FAST loops for low-flow valves. Recommended for use with 0.8 mm i.d. ■ (blue) or smaller probe. 1.6 mm o.d., M5/10-32 fittings.
SC-0312-02	200 µL loop	
SC-0312-03	300 µL loop	
SC-0312-05	500 µL loop	
SC-0312-10	1.0 mL loop	
SC-0312-20	2.0 mL loop	



# INSTALLATION & TRAINING

## Silver Level ESI Installation & Training

The silver level installation and training package is a 1 day on-site installation and method development for SC-FAST or oneFAST on ICP/ICPMS in US, Canada, or Western Europe.

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

Part Number	Description
FI-SC-01	On-site 1 day installation for SC-FAST high throughput system

**Elemental Scientific**  
 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

The gold level installation and training package is a 2½ day on-site installation and method development for the SC-FAST or oneFAST on ICP/ICPMS in US, Canada, or Western Europe.

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

Part Number	Description
FI-SC-02	On-site 2½ day installation for SC-FAST high throughput system

**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.

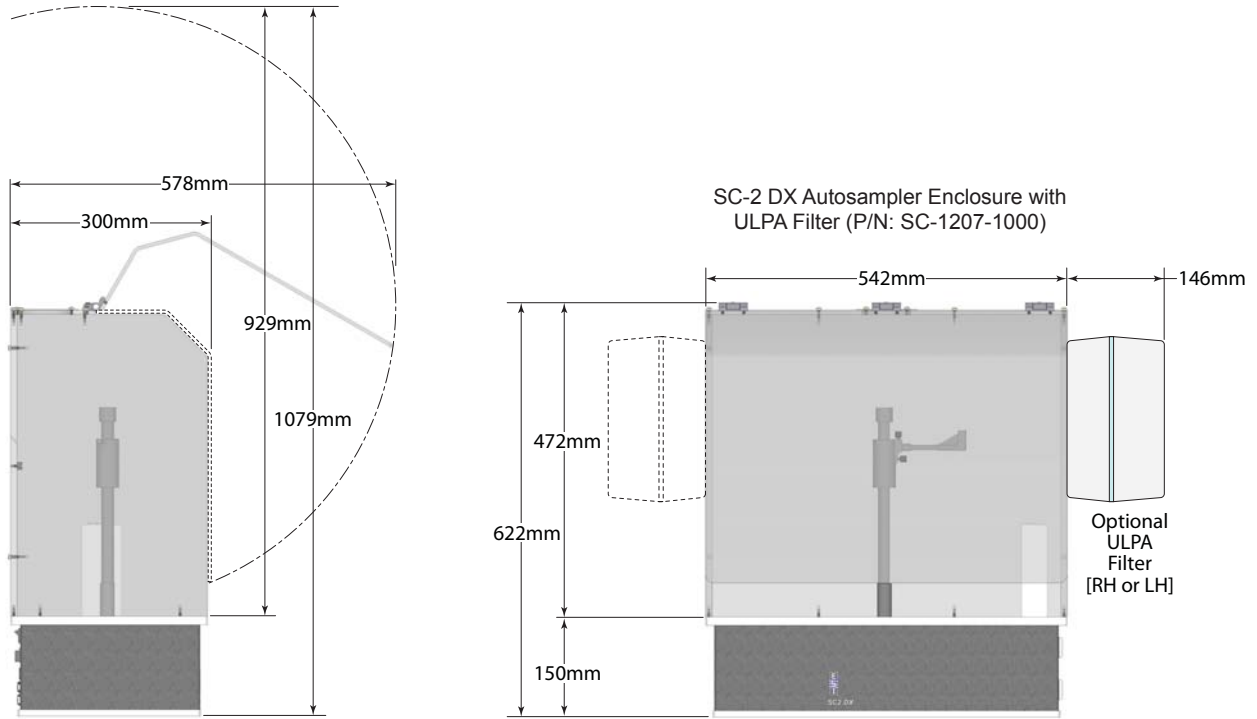
Elemental Scientific, Inc. | 2440 Cuming St. | Omaha, NE 68131 USA  
 Phone: 402.991.7800 | Fax: 402.991.7799 | Email: [esi@icpms.com](mailto:esi@icpms.com) | Web: [www.icpms.com](http://www.icpms.com)

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

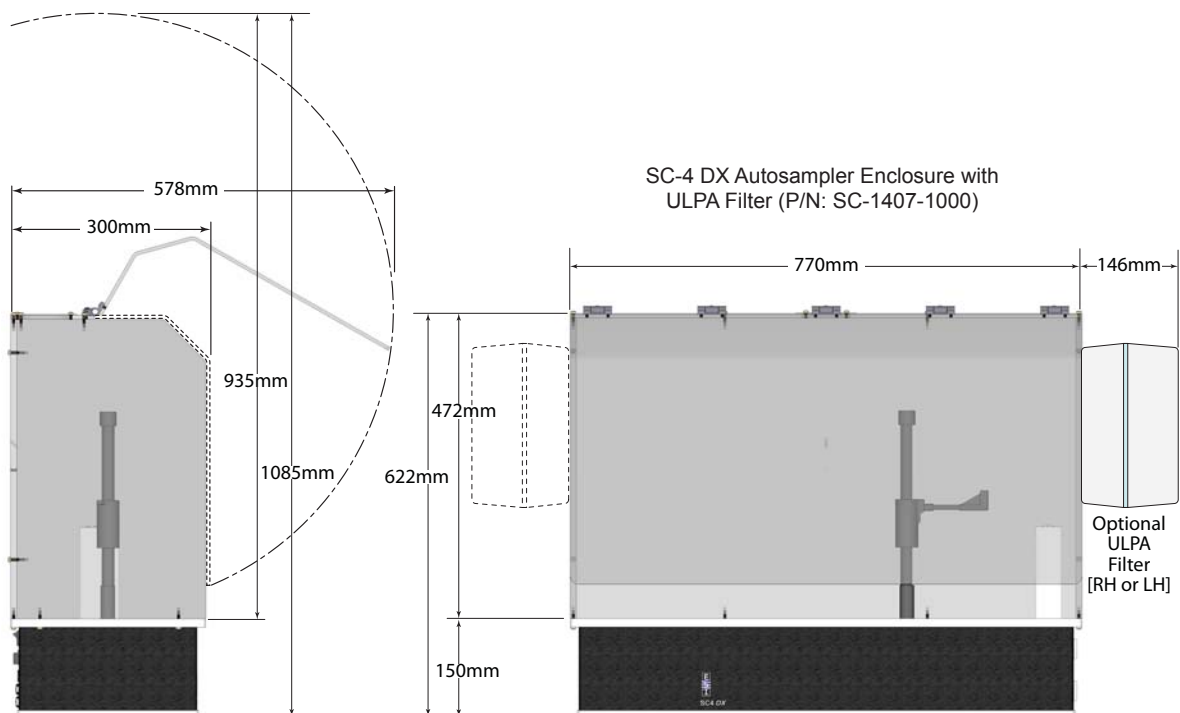


# SC-DX Autosampler Dimensions

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

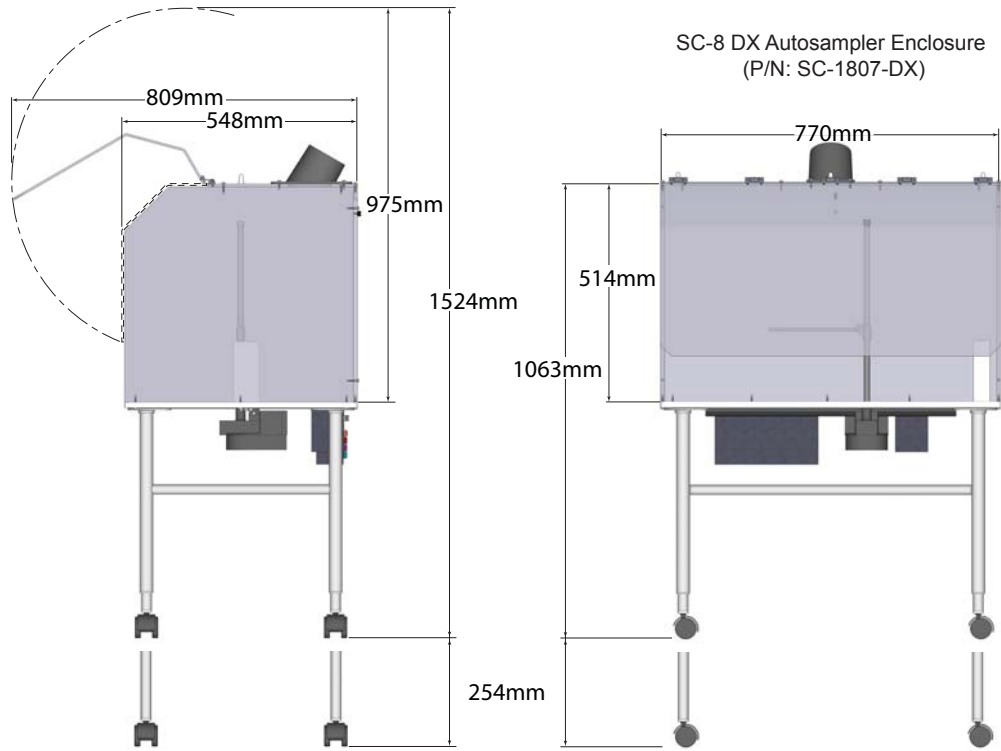


## SC-4 DX Autosampler with Enclosure and ULPA Filter Dimensions

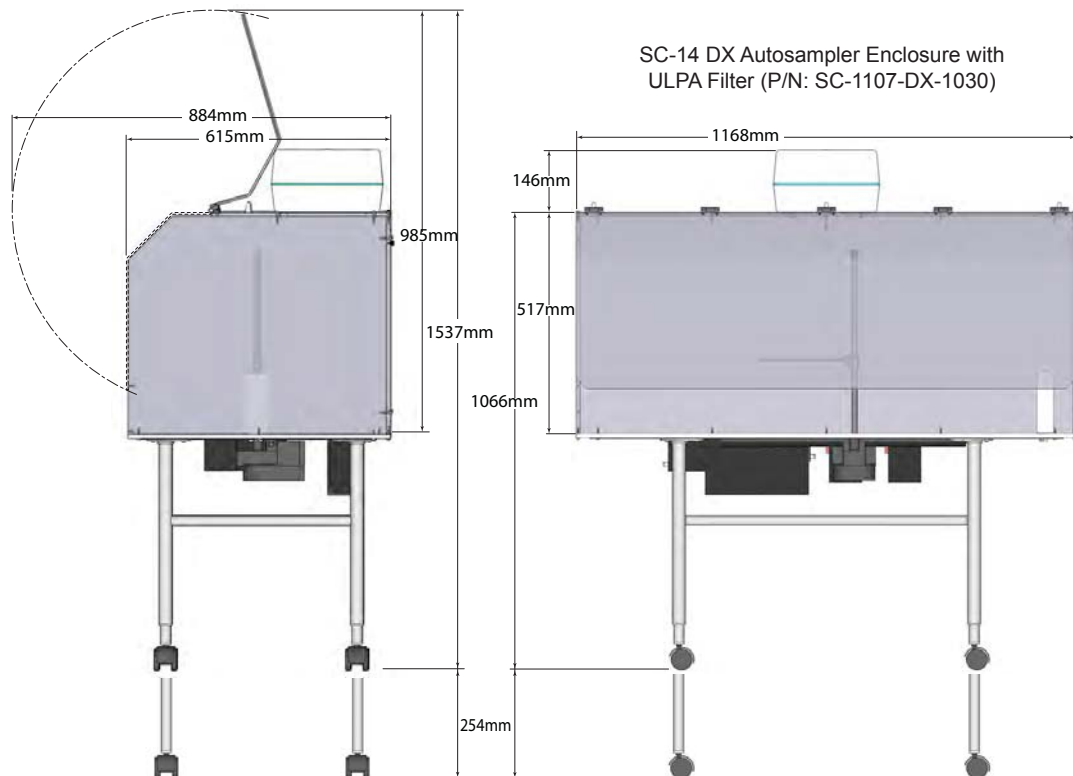




## SC-8 DXS Autosampler with Enclosure Dimensions



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



Item # .....	Page	Item # .....	Page	Item # .....	Page	Item # .....	Page	Item # .....	Page	Item # .....	Page
2DXFI-5494C	20	ES-2040	28	MPP-013-PVC	43	MPP-254-S	43	SC-0319-10	63	SC-1107-1030	46
2MF2-1-5494C	10	ES-2040-7000	30	MPP-019-F-PVC	43	MPP-279-PVC	43	SC-0319-15	63	SC-1207	46
2SF-1-5494	9	ES-2041	29	MPP-019-F-S	43	MPP-279-S	43	SC-0319-20	63	SC-1207-1000	46
2SF-2-5494	9	ES-2042	29	MPP-019-PVC	43	MPP-317-PHR	43	SC-0319-25	63	SC-1210-0002	47
2SF-3-5494	9	ES-2043	29	MPP-027-F-PVC	43	MPP-317-PVC	43	SC-0319-30	63	SC-1407	46
4DXFI-5494C	20	ES-2044	29	MPP-027-F-S	43	MPP-317-S	43	SC-0319-40	63	SC-1407-1000	46
4MF2-1-5494C	10	ES-2045	29	MPP-027-PVC	43	MPP-K-1	43	SC-0370	62	SC-1410-0002	47
4SF-1-5494	9	ES-2046-0001	29	MPP-038-F-PVC	43	MR-00-01	54	SC-0380	62	SC-1607	46
4SF-2-5494	9	ES-2047	29	MPP-038-F-S	43	MR-10-30	54	SC-0400	26	SC-1807	46
4SF-3-5494	9	ES-2049	29	MPP-038-PHR	43	MR-21-14	54	SC-0400-5494-DXi	27	SC-1807-1000	46
5MT-1	62	ES-2100-0472	37	MPP-038-PVC	43	MR-40-14	54	SC-0454	27	SC-3017-0500-MH	61
5MT-02	62	ES-2141-90-19	25	MPP-044-F-PVC	43	MR-60-08	54	SC-0454-41	27	SC-5037-3501	60
5MT-03	62	ES-2170-90-19	25	MPP-044-F-S	43	MR-90-08	54	SC-0494	27	SC-5037-3751	60
5MT-05	62	ES-2170-0472-19	25	MPP-044-PVC	43	MT-00-02	52	SC-0494-41	27	SC-5037-3751-150	60
5MT-08	62	ES-2171-0472-19	25	MPP-051-F-PVC	43	MT-24-10ML-02	51	SC-0599-0001	62	SC-5037-3991	60
5MT-015	62	ES-2501-PPF1	42	MPP-051-F-S	43	MT-48-5ML-02	51	SC-0599-0108	62	SC-5037-3995-150	60
5MT-16	62	ES-2501-PPM1	42	MPP-051-PVC	43	MT-48-7.5ML-02	51	SC-0599-0109	28	SC-8102-3077	12
5MT-025	62	ES-2999-5421	23	MPP-057-F-PVC	43	MT-48-10ML-02	51	SC-0599-0116	62	SC-8102-PE00	12
8DXFI-5494C	21	ES-2999-5431	23	MPP-057-F-S	43	MT-96-2ML-02	51	SC-0599-1008	59	SC-8102-PE02-54	15
14DXFI-5494C	21	ES-3154-1011-16	24, 37	MPP-057-PVC	43	MT-96-4mL-02	51	SC-0599-1008-01	59	SC-8102-PE02-94	15
CF-IDA	9	ES-3154-1111-16	24, 37	MPP-064-F-PVC	43	MT-96-XP	52	SC-0599-1008-02	59	SC-8102-PE05-54	17
CF-N-0200	9	ES-3154-3111-16	24, 37	MPP-064-F-S	43	PF-0599-1003	44	SC-0599-1009	59	SC-8102-PE05-94	17
ES-43FH-21-94	23	ES-3484-1111-21	37	MPP-064-PVC	43	PF-0599-1030	44	SC-0599-1009-01	59	SC-8104-PE00	12
ES-44FH-21-94	23	ES-4040-54	28	MPP-076-F-PVC	43	PF-0599-1100	44	SC-0599-1009-05	59	SC-8104-PE02-54	15
ES-45FH-21-94	23	ES-4190-54-29	24	MPP-076-F-S	43	PF-0599-3003	44	SC-0599-1010	58, 59	SC-8104-PE02-94	15
ES-1101-0107	40	ES-4190-90-29	24	MPP-076-PHR	43	PF-0599-3030	44	SC-0599-1010-01	59	SC-8104-PE05-54	17
ES-1101-3107	39	ES-4394-1000-21	23	MPP-076-PVC	43	PF-0599-3100	44	SC-0599-1010-02	59	SC-8104-PE05-94	17
ES-1102	38	ES-4494-1000-21	23	MPP-076-S	43	PF-6500-1030-DX	44	SC-0599-1010-05	59	SC-8106-9000	12
ES-1102-1000	39	ES-4594-1000-21	23	MPP-089-F-PVC	43	PF-6503-1030-DX	44	SC-0599-1011	58, 59	SC-8108-PE00	13
ES-1103-0180	40	ES-4599-3000	23	MPP-089-F-S	43	PF-A-33	44	SC-0599-1012	58, 59	SC-8108-PE02-54	16
ES-1103-2160	39	ES-5010-0470	37	MPP-089-PVC	43	SC-0105-DX-XP	52	SC-0599-1012-01	59	SC-8108-PE02-94	16
ES-1103-2180	39	ES-5037-3250-080	29	MPP-089-S	43	SC-0312-01	63	SC-0599-1012-02	59	SC-8314-PE00	13
ES-1103-3160	38	ES-5037-3500-080	29	MPP-095-F-PVC	43	SC-0312-02	63	SC-0599-1013	58, 59	SC-8314-PE02-54	16
ES-1103-3180	38	ES-5037-9250-100	29	MPP-095-F-S	43	SC-0312-03	63	SC-0599-1013-01	59	SC-8314-PE02-94	16
ES-1113-0200	40	ES-5037-9500-100	29	MPP-095-PVC	43	SC-0312-05	63	SC-0599-1013-02	59	SILQ-50	33
ES-1113-2100	39	ES-5103-5494	40	MPP-095-S	43	SC-0312-10	63	SC-0599-1015	58, 59	SR2-12-50	55
ES-1113-2150	39	ES-5510	37	MPP-102-F-PVC	43	SC-0312-20	63	SC-0599-1015-01	59	SR2-21-30	55
ES-1113-2200	39	ES-7000-0101	25	MPP-102-F-S	43	SC-0315-03	63	SC-0599-1015-02	59	SR2-27-28	55
ES-1113-3100	38	ES-7000-1001	25	MPP-102-PVC	43	SC-0315-20	63	SC-0599-1022	59	SR2-27-31	55
ES-1113-3150	38	ES-7225-0001	48	MPP-102-S	43	SC-0315-30	63	SC-0599-1022-01	59	SR2-80-16	55
ES-1113-3200	38	ES-9190-5494-29	24	MPP-109-F-PVC	43	SC-0315-40	63	SC-0599-1022-05	59	SR4-00-01	56
ES-1124-0150	40	F0-25	35	MPP-109-F-S	43	SC-0315-60	63	SC-0599-1024	58, 59	SR4-60-14	56
ES-1124-0200	40	F1-80	35	MPP-109-PVC	43	SC-0315-80	63	SC-0599-1024-01	59	ST3-84	28
ES-1124-2100	39	F2-50	35	MPP-109-S	43	SC-0317-0250	60	SC-0599-1025	58, 59	ST7-60	56
ES-1124-2150	39	FGP	34	MPP-114-F-PVC	43	SC-0317-0250-25	60	SC-0599-1025-01	59	ST10-28	56
ES-1124-2200	39	FI-SC-01	64	MPP-114-PVC	43	SC-0317-0250-MH	61	SC-0599-1025-02	59	ST10-31	56
ES-1124-2250	39	FI-SC-02	64	MPP-114-S	43	SC-0317-0500	60	SC-0599-1025-05	59	TQ-30-A3	33
ES-1124-3100	38	HG-MP2-6-A	7	MPP-122-PVC	43	SC-0317-0500-25	60	SC-0599-1026	58, 59	TQP-50	33
ES-1124-3150	38	HR-21-30	54	MPP-122-S	43	SC-0317-0500-BG	61	SC-0599-1026-01	59	TRP-50	33
ES-1124-3200	38	HR-60-16	54	MPP-130-PHR	43	SC-0317-0500-GC	61	SC-0599-1026-02	59	V-8-0505-C	50
ES-1124-3250	38	LR-21-30	53	MPP-130-PVC	43	SC-0317-0990-BG	61	SC-0599-1026-05	59	V-13-0200-R-XC	50
ES-2000-0002	30	LR-40-20	53	MPP-130-S	43	SC-0317-0990-GC	61	SC-0599-1027	59	V-14-0300	48
ES-2000-3503-080	31	LR-60-16	53	MPP-142-PVC	43	SC-0317-1250	60	SC-0599-1027-01	59	V-14-0301	48
ES-2000-3505-150	31	LR-90-13-R	53	MPP-142-S	43	SC-0317-1250-25	60	SC-0599-1027-05	59	V-14-0309	48
ES-2002-0002	30	LRM-21-30-R	53	MPP-152-PHR	43	SC-0317-1500	60	SC-0599-1028	59	V-14-0311-CG-X	48
ES-2002-3503-080	31	LRM-60-16-R	53	MPP-152-PVC	43	SC-0317-1500-25	60	SC-0599-1029	59	V-14-0312-CG-X	48
ES-2002-3505-150	31	LRM-90-13-R	53	MPP-152-S	43	SC-0318-03	63	SC-0599-1029-01	59	V-14-0314-CG-X	48
ES-2002-7000	30	LRM-90-13-R-3T	53	MPP-165-PVC	43	SC-0318-05	63	SC-0599-1032	59	V-16-0225	50
ES-2003-0002	30	MP2-1-PC	42	MPP-165-S	43	SC-0318-10	63	SC-0599-1032-01	59	V-20-0290-XL	50
ES-2003-3503-080	31	MP2-2-PC	42	MPP-175-PVC	43	SC-0318-15	63	SC-0599-1032-05	59	V-28-0260-L	50
ES-2003-3505-150	31	MP2-3-57	41	MPP-175-S	43	SC-0318-20	63	SC-0599-1033	58, 59	V-28-0360-V	49
ES-2005-0002	30	MP2-3-PC	42	MPP-185-PVC	43	SC-0318-25	63	SC-0599-1034	59	V-31-15-X	49
ES-2005-3503-080	31	MP2-4-57	41	MPP-185-S	43	SC-0318-30	63	SC-0599-F08	62	V-31-30-X	49
ES-2005-3505-150	31	MP2-4-PC	42	MPP-206-PVC	43	SC-0318-40	63	SC-0599-F16	62	V-31-60-X	49
ES-2020-0002	30	MP2-6-57	41	MPP-206-S	43	SC-0319-01	63	SC-0602	46	V-50-0360	49
ES-2020-3503-080	31	MP2-6-PC	42	MPP-220-PVC	43	SC-0319-02	63	SC-0700-DX	10	V-61-0660-XII	50
ES-2020-3505-150	31	MPP-013-F-PVC	43	MPP-220-S	43	SC-0319-03	63	SC-0901-14	46		
ES-2030-54	28	MPP-013-F-S	43	MPP-254-PVC	43	SC-0319-05	63	SC-1107-0030	46		





27 Co Cobalt 102.90550	28 Ni Nickel 106.42	29 Cu Copper 107.8562	30 Zn Zinc 112.411	31 Ga Gallium 114.818	32 Ge Germanium 118.710	33 As Arsenic 119.75	34 Se Selenium 127.6	35 Br Bromine 159.808
45 Rh Rhodium 192.22	46 Pd Palladium 106.39	47 Ag Silver 196.96655	48 Cd Cadmium 200.89	49 In Indium 204.3833	50 Sn Tin 207.2	51 Sb Antimony 121.757	52 Te Tellurium 127.6	53 I Iodine 126.90547
77 Ir Iridium (209)	78 Pt Platinum (209)	79 Au Gold (209)	80 Hg Mercury (209)	81 Tl Thallium (209)	82 Pb Lead (209)	83 Bi Bismuth (209)	84 Po Polonium (209)	85 At Astatine (209)

27 Co Cobalt 102.90550	28 Ni Nickel 106.42	29 Cu Copper 107.8562	30 Zn Zinc 112.411	31 Ga Gallium 114.818	32 Ge Germanium 118.710	33 As Arsenic 119.75	34 Se Selenium 127.6	35 Br Bromine 159.808
45 Rh Rhodium 192.22	46 Pd Palladium 106.39	47 Ag Silver 196.96655	48 Cd Cadmium 200.89	49 In Indium 204.3833	50 Sn Tin 207.2	51 Sb Antimony 121.757	52 Te Tellurium 127.6	53 I Iodine 126.90547
77 Ir Iridium (209)	78 Pt Platinum (209)	79 Au Gold (209)	80 Hg Mercury (209)	81 Tl Thallium (209)	82 Pb Lead (209)	83 Bi Bismuth (209)	84 Po Polonium (209)	85 At Astatine (209)