



Elemental Scientific

2013-2014 Catalog
ESI Products and Consumables

Automation, Sample Introduction and Consumables for PerkinElmer NexION ICP-MS





Evolution of Automation

ICP | ICP-MS | AA



Elemental Scientific designs and produces a full range of automation and sample introduction systems for the determination of trace element concentrations in liquid samples by inductively coupled plasma instrumentation. Our extensive product line contains sample introduction devices for all models of ICP instruments, including:

- Fully automated inline and offline dilution / standardization / QC systems
- *FAST* systems
- Innovative SC-DX Series clean, intelligent autosamplers
- Inert MicroFlow and PolyPro Nebulizers
- Inert autosampler and manual sampling probes
- Precision micro peristaltic pumps and syringe 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
- PC³ Peltier-cooled cyclonic spray chambers

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.

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AUTOMATION

SAMPLE INTRODUCTION

CONSUMABLES

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

prepFAST

prepFAST is a sample/standard system for FAST inline autodilution, autocalibration, auto QC dilution, priority sample autodilution and auto MSA. (Pg 18)

hydrideICP / hydrideFAST

hydrideICP / hydrideFAST utilizes an integrated hydride generator and precision micro peristaltic pump to obtain sub-ppt detection limits for hydride elements such as As, Se and Sb. (Pg 22 / Pg 24 / Pg 26)

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 28)

microFAST S4

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 30)

TRUFAST

Measure low-ppq level Ra in natural waters using an automated SC-FAST system. Polyatomic interferences arising from Ba and Sr are automatically removed online using ion exchange techniques, providing extremely low background levels and superb detection limits. Alternate chemistries are available for other radionuclides such as Th and U. (Pg 33)

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. 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 (PEEK) is a tan colored organic polymer thermoplastic used to fabricate items for demanding applications, including bearings, piston parts and pumps.

PFA

Perfluoroalkoxy is a superior fluoropolymer that is ultra clean, chemically inert and optically transparent. This material is used for advanced liquid handling, high performance nebulizers and labware.

Polyethylene

Polyethylene is a thermoplastic polymer used for laboratory sample tubes and vessels.

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 used for laboratory sample tubes and vessels.

Terminology

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

FAST - Valve and loop combination that rapidly loads and injects the sample.

MP² - Precision micro peristaltic pump.

PC³ - Peltier cooled cyclonic spray chamber.

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

SYRIX - Compact, low-profile, high-precision laboratory syringe pump.

Tubing Sizes

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

 **Yellow** - 0.3 mm i.d.

 **Gray** - 1.0 mm i.d.

 **Purple** - 0.2 mm i.d.

 **Orange** - 0.5 mm i.d.

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

 **Blue** - 0.8 mm i.d.

prepFAST

The Next Stage of Automation

- **FAST Inline Autodilution**
- **Autocalibration**
- **Over Range Sample Autodilution and Reanalysis**
- **Priority Sample Autodilution**
- **Automated Standard Additions (MSA)**



PerkinElmer NexION
with SC-2 DX and S400V



SC-2 DX
prepFAST with
mobile stand

See page 18 or visit
www.prepFAST.com
for more information



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SC-DX Autosamplers and FAST System

The SC-DX FAST is a reliable, high-throughput, automated sample introduction system for the NexION ICP-MS. The combination of the SC-DX FAST autosampler with the NexION ICP-MS provides the perfect platform to introduce even the most demanding high matrix samples. The SC-DX FAST is available in four autosampler sizes, holding up to fourteen large sample racks.

SC-DX BENEFITS:

- Robust dual rail system
- Dual flowing rinse station
- Precision micro sampling
- Reset probe - prevents probe damage
- Flexible rack configurations
 - micro samples to large bottles
- ULPA filter and cart options

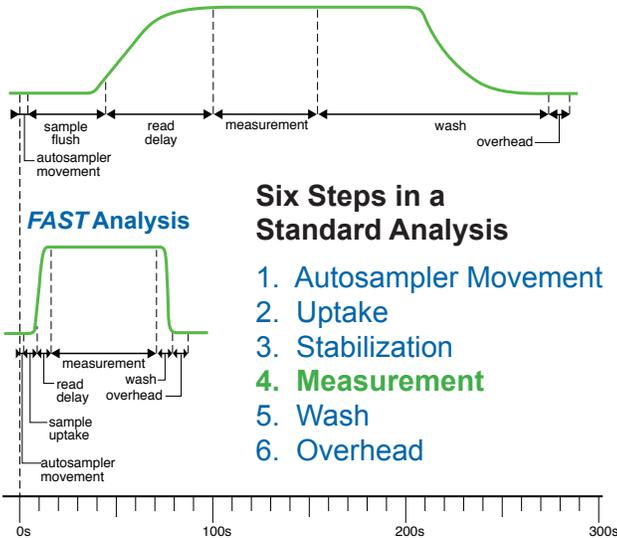
FAST BENEFITS:

- FAST sample loading (0.5 mL sec^{-1})
- FAST stabilization time
- FAST washout
- FAST probe and loop rinsing
- Flexible for all applications



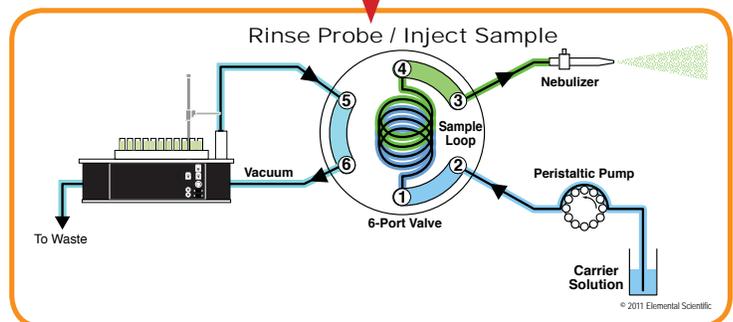
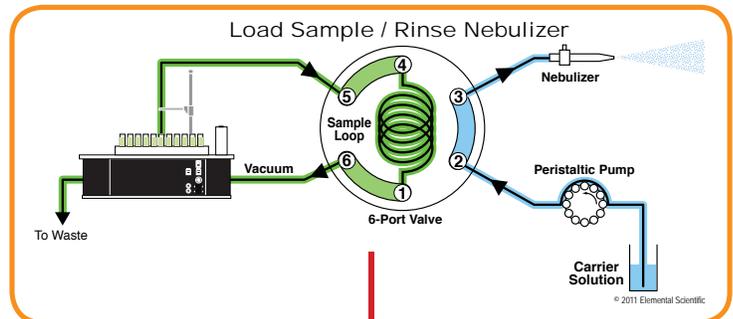
PerkinElmer NexION with SC-2 FAST DXi

Normal Analysis



The SC-FAST system has the fastest 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.

PC³ FAST DXi Integrated System

Improve sensitivity, precision and detection limits while significantly increasing sample throughput with the best performing FAST system for the NexION. The PC³ FAST DXi system combines the benefits of the integrated MP² precision micro peristaltic pump, PC³ Peltier cooled cyclonic spray chamber and the FAST valve.

- DXi fully integrates with the NexION
- MP² peripump improves precision
- Improved detection limits
- PC³
 - Low memory effects
 - Constant temperature
 - Fast rinse-out
 - High sample transport efficiency

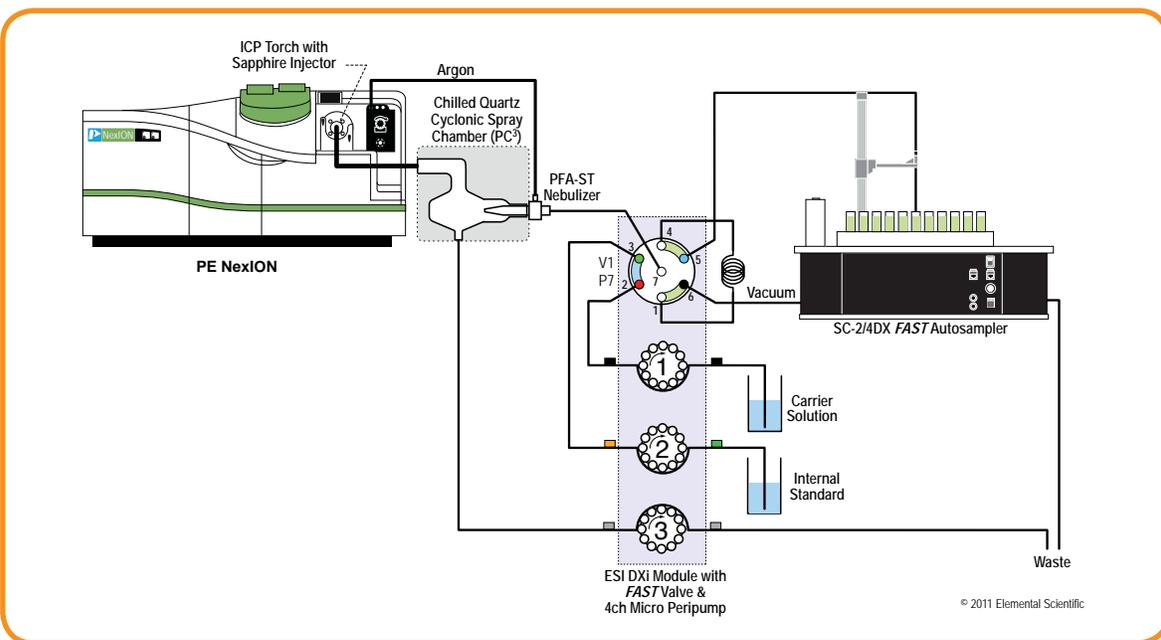
PerkinElmer NexION 300 with integrated FAST DXi and PC³ Peltier cooler



SC-4 FAST DXi System



Integrated PC³ FAST DXi for the NexION 300 showing 4 channel precision peripump, FAST valve and PC³ Peltier cooler.



NexION with PC³ FAST DXi System Diagram

SC-DX Systems for the NexION ICP-MS

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. Reduce uptake and wash times while increasing sample throughput by upgrading the SC-DX autosampler to a FAST system.

The SC-DX FAST DXi system offers enhanced precision and the ability to add internal standard online at lower dilution factors. The design of the MP² minimizes the gaps between rollers, resulting in even pressure points along the tubing, which improves signal stability, data quality and detection limits.



SC-2 DX PC³ FAST DXi System

SC-DX Systems for the PerkinElmer NexION							
System	Description	SC-DX A/S	FAST DXi Peripump & Valve	PC ³ Peltier Cooler	PFA-ST Nebulizer	Quartz Cyclonic Chamber	Sapphire Injector
SC-DX System	SC-DX autosampler with dual flowing rinse	✓					
SC-DX FAST DXi System	SC-DX autosampler and integrated MP ² precision micro peristaltic pump with FAST	✓	✓		✓		
SC-DX PC ³ FAST DXi System	SC-DX autosampler, integrated MP ² precision micro peristaltic pump with FAST and PC ³ Peltier cooled cyclonic spray chamber	✓	✓	✓	✓	✓	✓

SC-DX System Includes:

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



FAST DXi
Integrated MP² micro peristaltic pump with FAST



PC³
Peltier cooled cyclonic spray chamber

Part Number	Description
DXi-84-P4-F6	FAST DXi upgrade for ELAN customer wanting to move a DX autosampler to a NexION

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.

SC-2 DX Systems	Description	Part Number
SC-2 DX	SC-2 DX autosampler with dual flowing rinse	2DX
SC-2 DX FAST DXi	SC-2 DX autosampler and integrated MP ² precision micro peristaltic pump with FAST	2DXF-84A
SC-2 DX PC ³ FAST DXi	SC-2 DX autosampler, integrated MP ² precision micro peristaltic pump with FAST and PC ³ Peltier cooled cyclonic spray chamber	2DXF-84C

See page 81 for SC-2 DX dimensions.



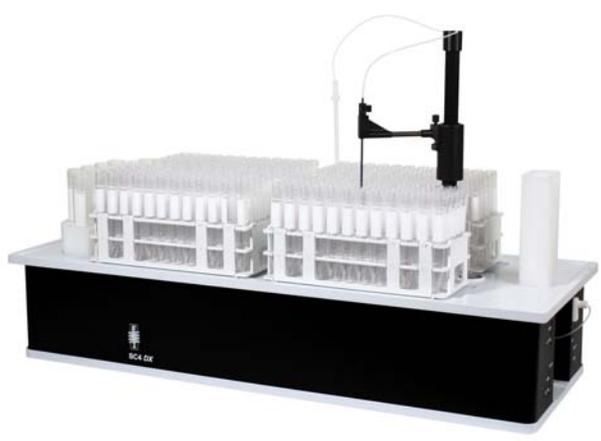
SC-4 DX



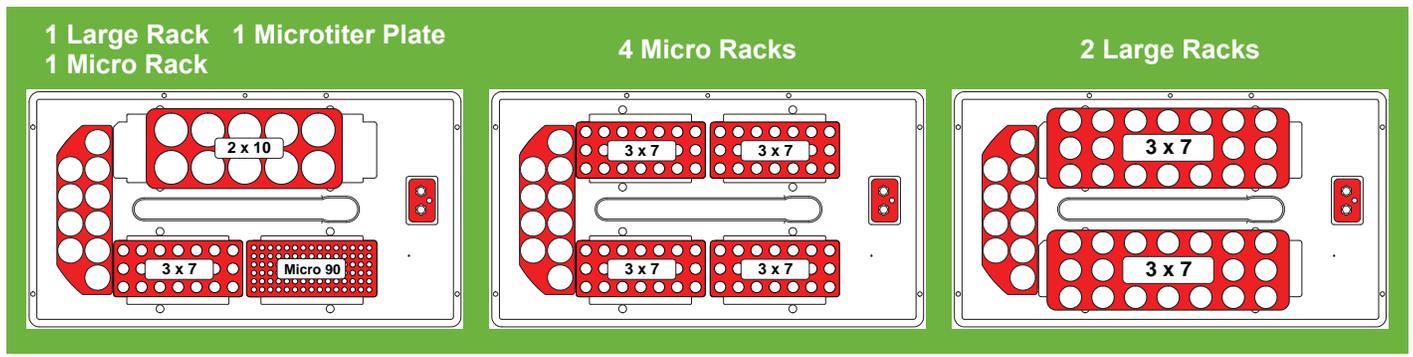
The SC-4 DX is an autosampler with dual flowing rinse stations that holds 4 large racks or 6 micro racks. It is ideal for labs with moderate sample throughput needs.

SC-4 DX Systems	Description	Part Number
SC-4 DX	SC-4 DX autosampler with dual flowing rinse	4DX
SC-4 DX FAST DXi	SC-4 DX autosampler and integrated MP ² precision micro peristaltic pump with FAST	4DXF-84A
SC-4 DX PC ³ FAST DXi	SC-4 DX autosampler, integrated MP ² precision micro peristaltic pump with FAST and PC ³ Peltier cooled cyclonic spray chamber	4DXF-84C

See page 81 for SC-4 DX dimensions.



EXAMPLES OF SC-2 DX RACK CONFIGURATIONS



SC-DX and FAST Systems

SC-8 DXS



The high capacity SC-8 DXS holds 8 large sample racks and up to 40 standards/QC solutions (50 mL vials). It has the smallest footprint of any 8 rack autosampler and is ideal for labs with high sample throughput needs.



SC-8 DXS benchtop version

SC-8 DXS Systems	Description	Cart Version Part Number	Benchtop Version Part Number
SC-8 DXS	SC-8 DXS autosampler with dual flowing rinse	8DX	8DX-BT
SC-8 DXS FAST DXi	SC-8 DXS autosampler and integrated MP ² precision micro peristaltic pump with FAST	8DXF-84A	8DXF-BT-84A
SC-8 DXS PC ³ FAST DXi	SC-8 DXS autosampler, integrated MP ² precision micro peristaltic pump with FAST and PC ³ Peltier cooled cyclonic spray chamber	8DXF-84C	8DXF-BT-84C

See page 82 for SC-8 DX dimensions.

SC-14 DXS



The high capacity SC-14 DXS holds 14 large sample racks and up to 10 standards/QC solutions (50 mL vials). It is ideal for labs with the highest sample throughput needs.



SC-14 DXS Systems	Description	Cart Version Part Number	Benchtop Version Part Number
SC-14 DXS	SC-14 DXS autosampler with dual flowing rinse	14DX	14DX-BT
SC-14 DXS FAST DXi	SC-14 DXS autosampler and integrated MP ² precision micro peristaltic pump with FAST	14DXF-84A	14DXF-BT-84A
SC-14 DXS PC ³ FAST DXi	SC-14 DXS autosampler, integrated MP ² precision micro peristaltic pump with FAST and PC ³ Peltier cooled cyclonic spray chamber	14DXF-84C	14DXF-BT-84C

See page 82 for SC-14 DX dimensions.

Micro Sample and Semiconductor Autosamplers

SC-Micro DX



The SC-Micro DX is a small-footprint (330mm x 223mm), low-cost autosampler with instrument pumped dual flowing rinse stations. It holds 2 microtiter plates or 2 micro racks and 10 standards vials.

SC-Micro DX System Includes:

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



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

Contact a sales representative to discuss customizing the SC-Micro DX with an optional diaphragm rinse pump or for glovebox applications.

SC-2 DX Semiconductor



The SC-2 DX Semiconductor autosampler with a PTFE top is designed for ultrapure semiconductor applications where the lowest possible background levels and chemical resistance are required.

SC-2 DX Semiconductor System Includes:

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



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

PFA and PVDF vials recommended (see page 68-70)

Autosampler Capacity

Autosampler	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

oneFAST

Universal, High-Throughput Sample Introduction System

The oneFAST brings the field-proven capabilities of the SC-FAST to non-ESI autosamplers. The oneFAST hardware and software has been optimized and integrated with the NexION to immediately increase throughput by speeding stabilization time and rinse-out. The oneFAST reduces instrument maintenance and matrix exposure while improving long-term performance.

oneFAST Basic

The oneFAST increases throughput with non-ESI autosamplers.

Includes:

- FAST Valve
- oneFAST Controller
- PFA-ST Nebulizer
- 2 Probes-PFA/Carbon Fiber
- All Required Tubing



Part Number	Description
SC-0400	oneFAST basic system

oneFAST DXi Complete



The oneFAST DXi Complete includes an injector and spray chamber, making any non-ESI autosampler ready for increased throughput needs.

Includes:

- FAST DXi Peripump & Valve
- 2 Probes - PFA/Carbon Fiber
- Quartz Cyclonic Spray Chamber
- All Required Tubing
- oneFAST Controller
- Sapphire Injector
- PFA-ST Nebulizer



Part Number	Description
SC-0484	oneFAST complete system

oneFAST DXi PC³ Complete



The oneFAST DXi PC³ Complete includes a FAST DXi, PC³ Peltier cooled cyclonic spray chamber and injector, making any non-ESI autosampler ready for increased throughput needs.

Includes:

- FAST DXi Peripump & Valve
- 2 Probes - PFA/Carbon Fiber
- PC³ Peltier cooler
- oneFAST Controller
- Sapphire Injector
- PFA-ST Nebulizer
- All Required Tubing



Part Number	Description
SC-0484-41	oneFAST DXi complete system

Enclosures and ULPA Filtered Environments

Autosampler Enclosures and ULPA Filtered Environments

Autosampler Enclosures ppq

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

SC-1807-DX Enclosure with SC-8 DX autosampler



SC-1207-DX-1200 Enclosure with SC-2 DX autosampler

Autosampler Model	Enclosure Only	Enclosure with ULPA Filter
Enclosure for SC-Micro DX	SC-1607-DX	SC-1607-DX-1000
Enclosure for SC-2 DX	SC-1207-DX	SC-1207-DX-1200
Enclosure for SC-4 DX	SC-1407-DX	SC-1407-DX-1200
Enclosure for SC-8 DX	SC-1807-DX	SC-1807-DX-1000
Enclosure for SC-14 DX	SC-1107-DX	SC-1107-DX-1030

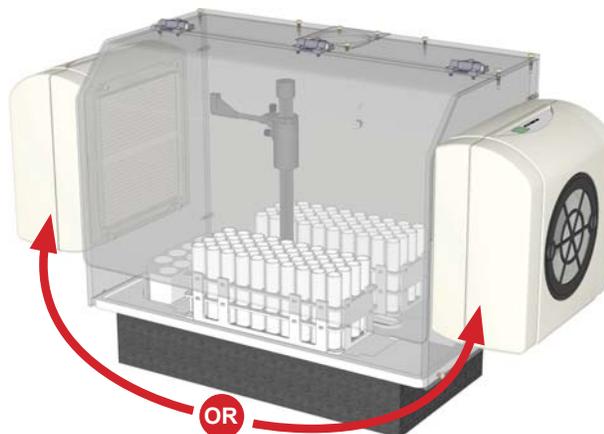
Ultra-Low Particulate Arrester Air Filter and Mounting Plate ppq

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 ³ /min	56 dBA	25W

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

(SC-0602) ULPA Filter



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

Autosampler Stands

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

SC-2 DX and SC-4 DX Mobile Stands

The mobile stand provides a small-footprint platform for the SC-2 DX or SC-4 DX.

Benefits:

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



SC-1210-DX mobile stand with SC-2 DX autosampler



SC-1410-DX mobile stand with SC-4 DX autosampler

Part Number	Description
SC-1410-DX	Mobile stand for SC-2 DX (autosampler not included)

Part Number	Description
SC-1410-DX	Mobile stand for SC-4 DX (autosampler not included)



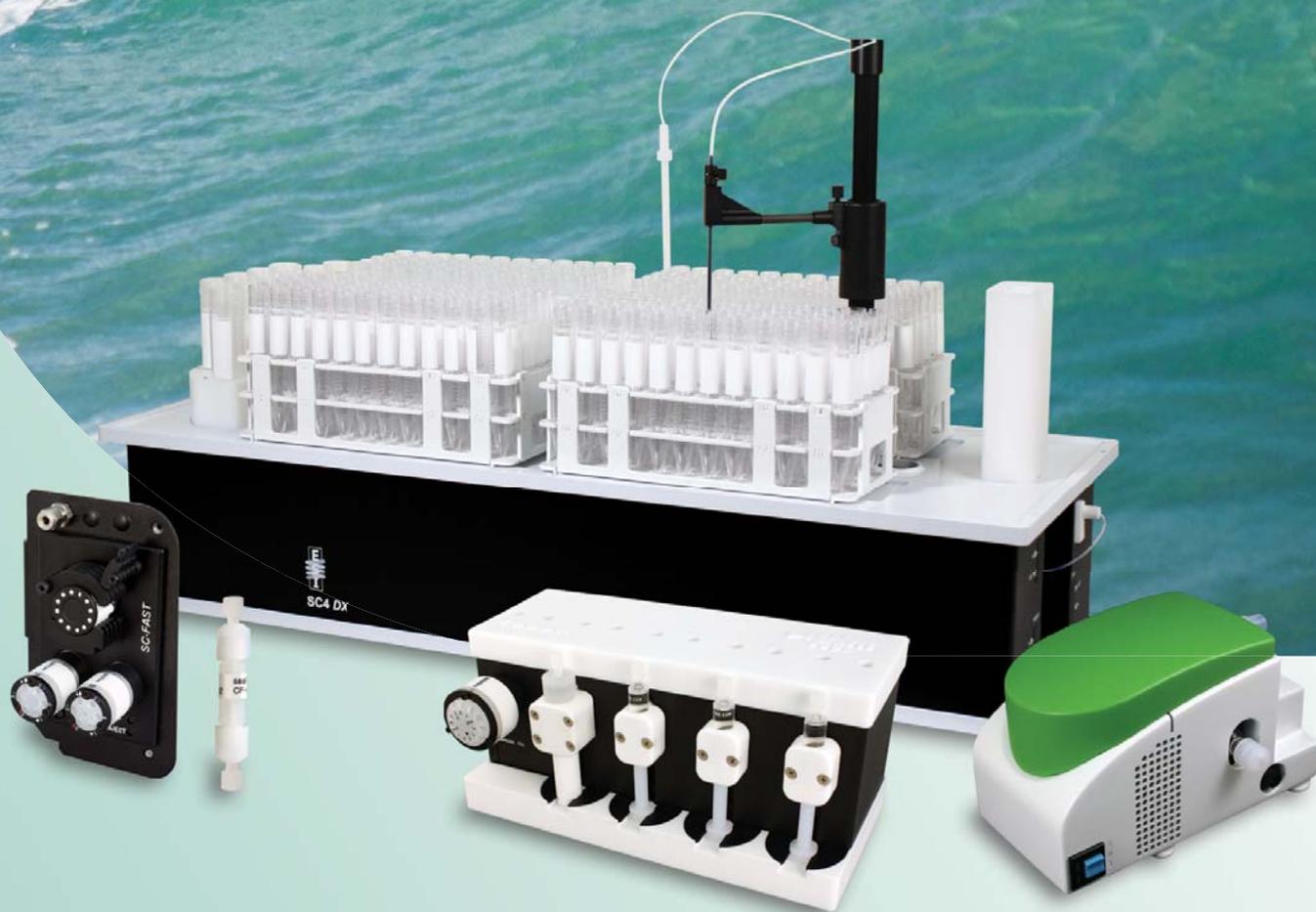
Storage space for racks, solutions and accessories



Accessible rinse bottle can be refilled in place

seaFAST S2™

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 28 for more information.



**Elemental
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prepFAST™

Inline Autocalibration, Variable Autodilution, and Auto QC Dilution

prepFAST is a dilution system that automatically performs precise and accurate inline dilutions for samples and standards.

Benefits of prepFAST

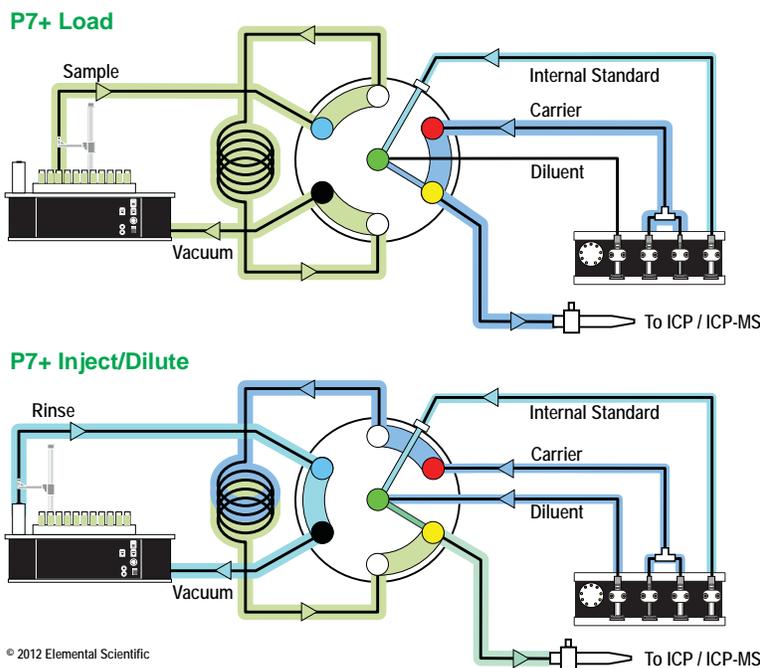
- Autodilution
- Autocalibration
- Auto QC dilution
- Auto MSA
- FAST



Samples are rapidly (0.5 mL/sec) and reproducibly vacuum loaded into a sample loop. Inside the valve, sample is mixed with the diluent and internal standard. The system delivers the diluted and mixed sample to the nebulizer with final dilutions ranging between 1x and 400x.

Central to the system is the S400V syringe pump module. Precise ($<\pm 0.05\%$), accurate ($<\pm 0.2\%$), smooth and balanced delivery of solution over a wide range of flow rates (1 to 1000 $\mu\text{L}/\text{min}$) ensures rapid and reliable inline dilutions.

Capable of up to 400x dilution, the prepFAST is the fastest, simplest way to ensure high quality data in every run.

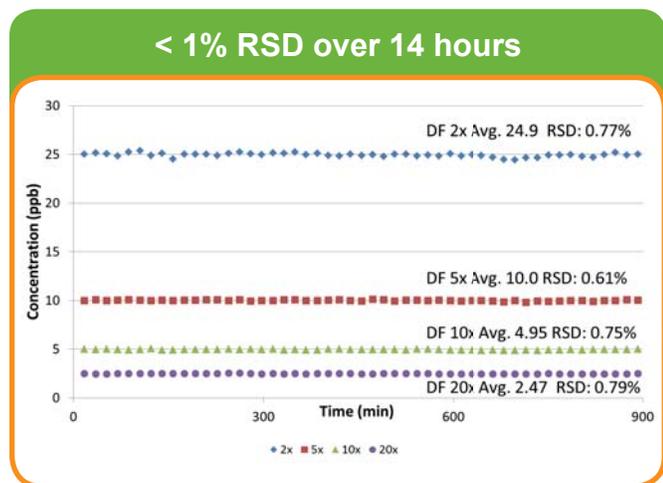


The prepFAST uses FAST vacuum loading to rapidly fill a sample loop. After sample injection, variable syringe-driven carrier, diluent and internal standard flows are mixed using the custom P7+ inline mixing valve. The result is variable, inline dilution with FAST stabilization and washout.

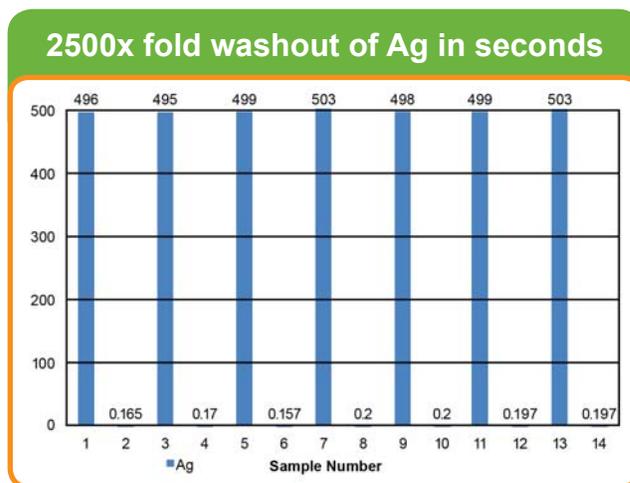
Autodilution in Seconds

Tedious manual preparation steps are automatically handled by the prepFAST system, making better use of time and resources. Automated dilution is used for both calibration and sample dilution. Dilutions are performed by accurately controlling sample and diluent flow rates and desired dilution factors are achieved in seconds by using in-valve mixing capabilities. Mixing inline eliminates the need to premix/dilute samples in discrete tubes prior to analysis and greatly improves sample throughput. Combined with FAST technology, rapid sample uptake and FAST washout times are independent of dilution factor, allowing rapid injection of the next sample.

- Rapid vacuum loading
- Inline dilution as sample is injected
- Rapid uptake and stabilization of sample



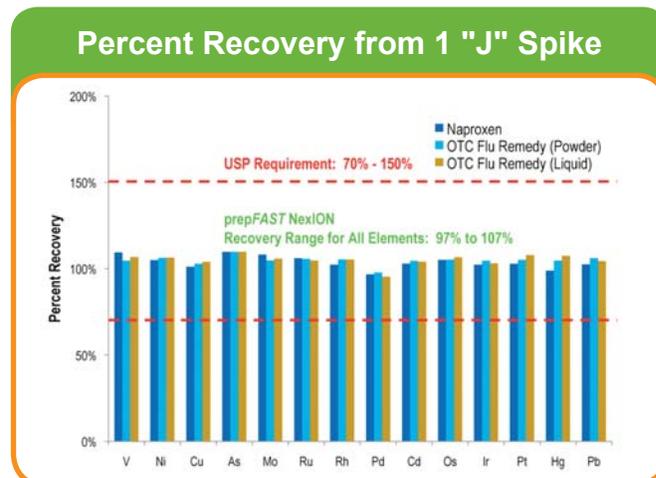
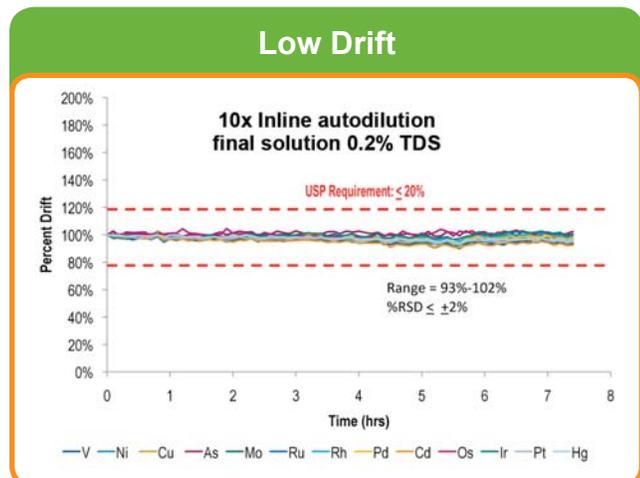
Long-term stability



FAST washout even for memory prone elements

United States Pharmacopeia 233

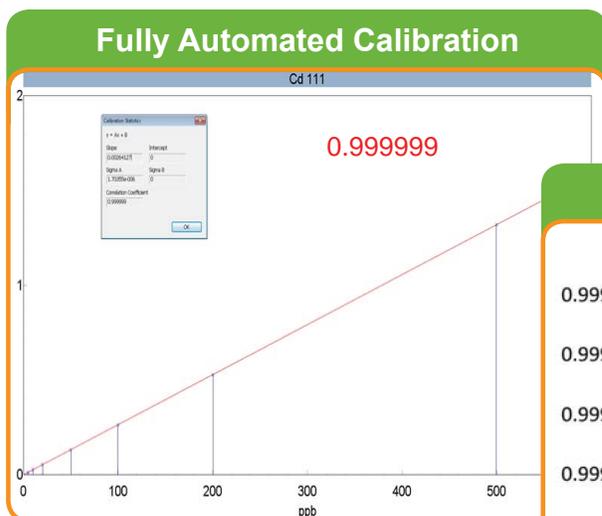
- Easy-to-use automated system for USP
 - Syringe-driven—eliminates pump tubing maintenance
 - Autocalibration at appropriate "J" values
 - Autodilute samples to 0.2% TDS
 - Pre-developed fully automated methods
- Exceeds all USP validation criteria: Stability, Repeatability, Durability and Accuracy
- Automate labor intensive steps to significantly reduce risk of human error



Autocalibration

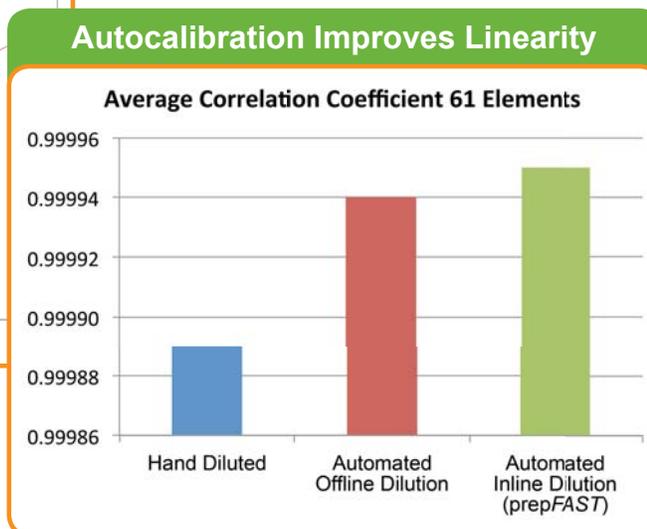
User predefined dilution factors for a single multi-element standard are used to build calibration curves. Accuracy of dilution is illustrated by excellent linearity of the calibration curve ($R^2 = 0.9999$).

- Automatically calibrates the instrument from one or more single standard solutions
- Improved linearity vs. calibrations prepared in separate tubes
- Easily create calibration curves with more points (weighted curves)
- One bottle or two bottles per method—leaves space in standards rack for other calibration curves and QC
- Eliminate manual dilution errors



prepFAST autocalibration from a single multi-element standard saves time and improves accuracy.

Manual Calibration vs. prepFAST Autocalibration

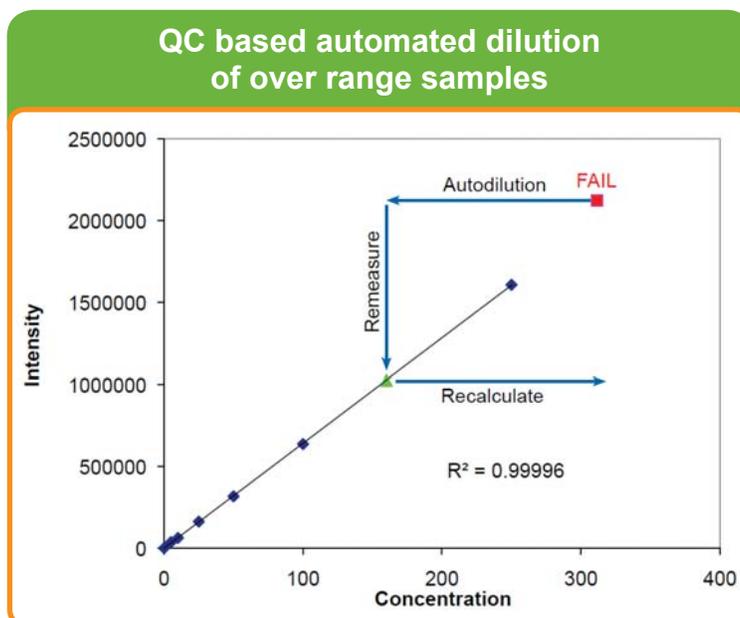


Automated QC Dilutions

NexION 1.3 and newer software automatically detects QC, internal standard and sample limit failures and directs the prepFAST to automatically and immediately dilute and reanalyze samples.

Procedure:

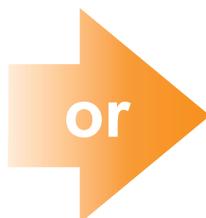
- NexION software detects QC, internal standard, or sample limit failure.
- prepFAST automatically dilutes the sample inline using a user defined dilution factor (DF).
- If the diluted sample passes, the sequence continues.
- If the diluted sample fails again, the sample is automatically diluted by DF^2 up to $DF = 400$.



prepFAST Upgrade Path For PerkinElmer NexION

Step 1. Select a prepFAST complete system

prepFAST System	Part Number
prepFAST SC-2 DXi PC ³ complete	2ADFi-84C
prepFAST SC-4 DXi PC ³ complete	4ADFi-84C
prepFAST SC-8 DXi PC ³ complete	8ADFi-84C
prepFAST SC-14 DXi PC ³ complete	14ADFi-84C



Step 1. To upgrade an existing FAST DXi, select a prepFAST S400V module (one required)

prepFAST	Part Number
prepFAST module	PF-S400V
*HF resistant prepFAST module	PF-S400V-HF

*ESI suggests the (ES-2184-5472) PFA HF-resistant spray chamber with endcap



prepFAST Complete System includes:

- SC-DX FAST autosampler
- 4 Syringe pump dilution module (S400V)
- PC³ with SSI cyclonic/Scott dual spray chamber
- FAST DXi micro peripump
- Integrated P7+ FAST valve
- Sapphire injector
- PFA nebulizer
- prepFAST cart

Step 2. Verify that you have one of the following FAST DXi systems (one required)

FAST Systems	Part Number
SC-2 FAST DXi	2DXF-84C
SC-4 FAST DXi	4DXF-84C
SC-8 FAST DXi	8DXF-84C
SC-14 FAST DXi	14DXF-84C



Step 3. (Optional) Select a prepFAST cart to match the SC-DX FAST autosampler

Cart	Part Number
SC-2 DX prepFAST Cart	SC-1210-DX-PF
SC-4 DX prepFAST Cart	SC-1410-DX-PF
SC-8 DX prepFAST Shelf	SC-1103-DX-PF
SC-14 DX prepFAST Shelf	SC-1103-DX-PF

PerkinElmer
NexION ICP-MS



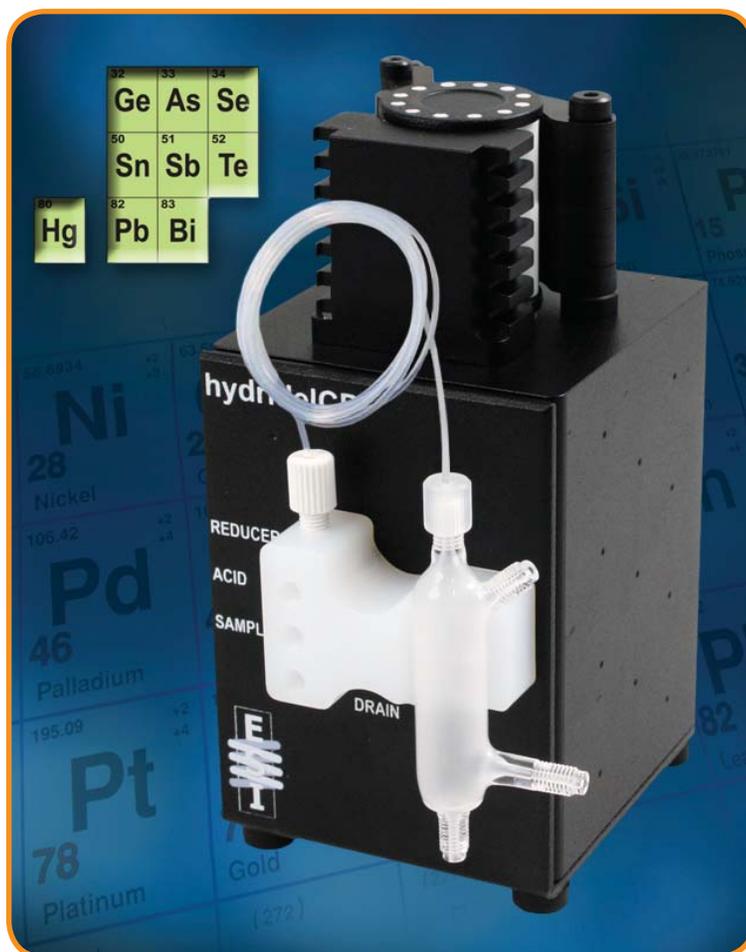
hydrideICP™

A New, Compact Hydride Generation System for ICP-MS with Improved Stability and Performance

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

Benefits:

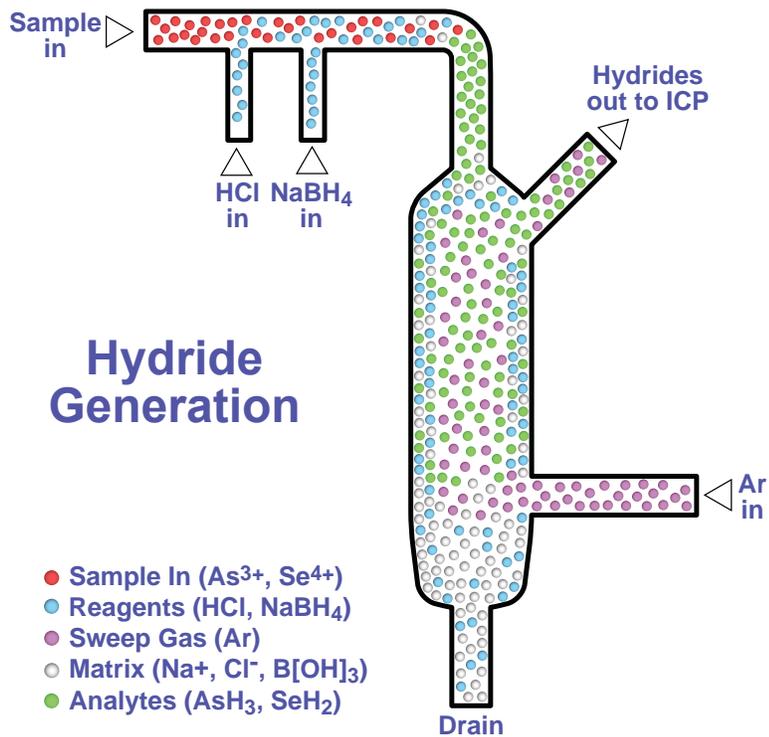
- Increased sensitivity, up to 100x for hydride-forming elements
- Improved detection limits for As, Hg, Se, Sb and other hydride-forming elements
- Improved stability
 - MP² micro peripump precisely mixes sample and reagents, producing a stable formation of H₂ gas and hydrides
- Compact
 - hydrideICP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



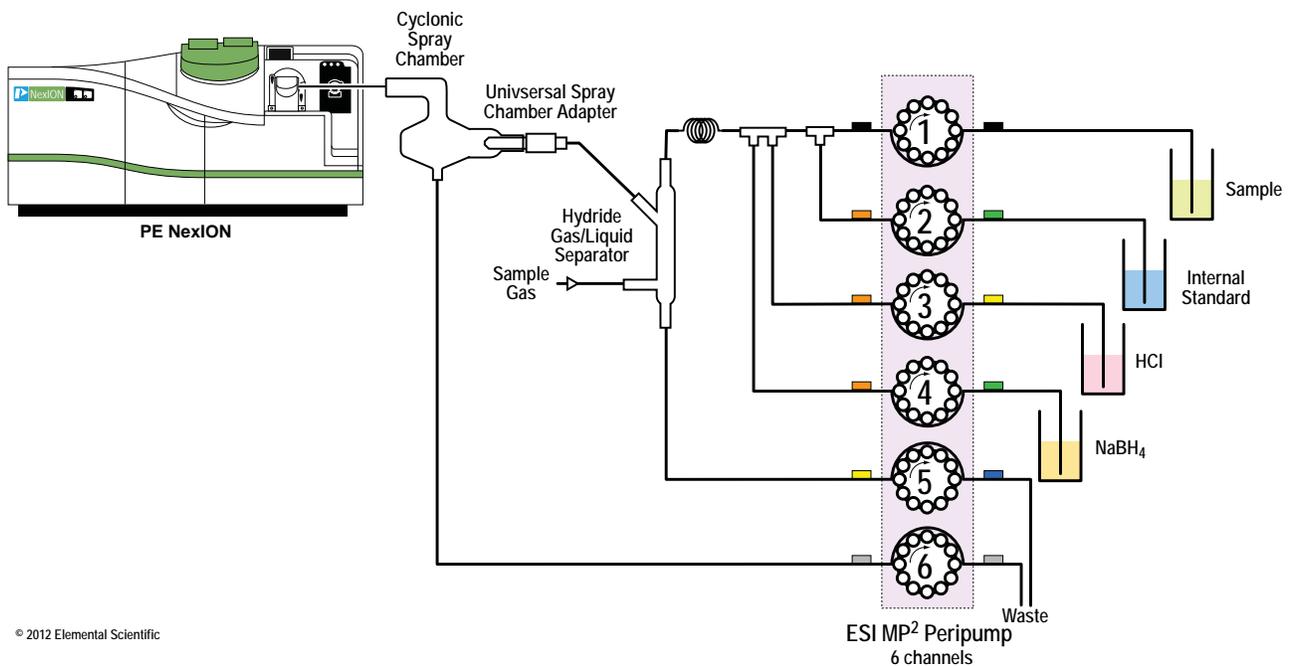
hydrideICP generation system for PerkinElmer ICP-MS



The universal spray chamber adapter is used to connect the hydride gas/liquid separator to any spray chamber.



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



hydrideICP with internal standard system diagram

Part Number	Description
HG-MP2-6-A	HydrideICP Generation System. HydrideICP Generator Kit (Hydride quartz gas-liquid separator, four way tee, MP ² precision micro peristaltic pump, universal spray chamber adapter and mounting plate).

hydrideFAST 1™

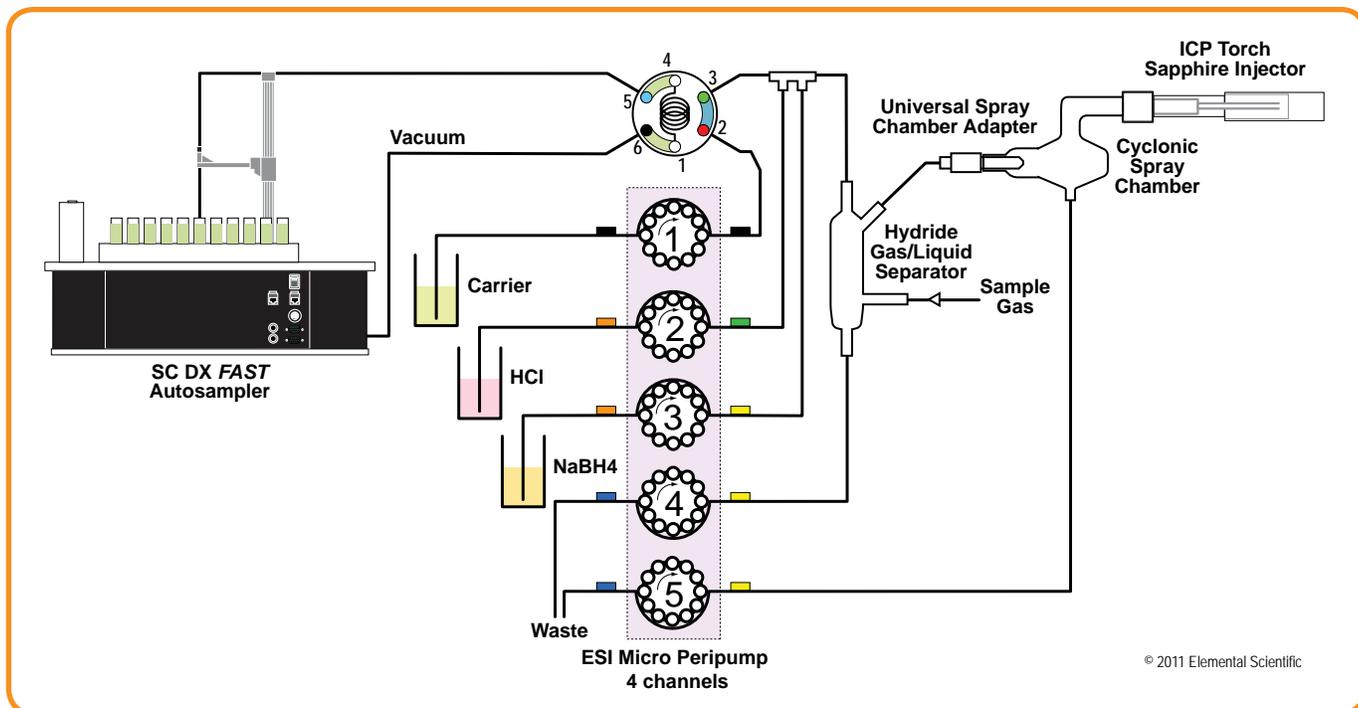
Simple, Accurate and FAST Hydride Generation for ICP-MS

The hydrideFAST 1 is a compact, inline, easy-to-use device that generates hydrides for ICP-MS detection with high sensitivity and low detection limits. The combination of the MP² precision micro peripump and the patent-pending hydrideFAST gas liquid separator provides high sensitivity and excellent detection limits.



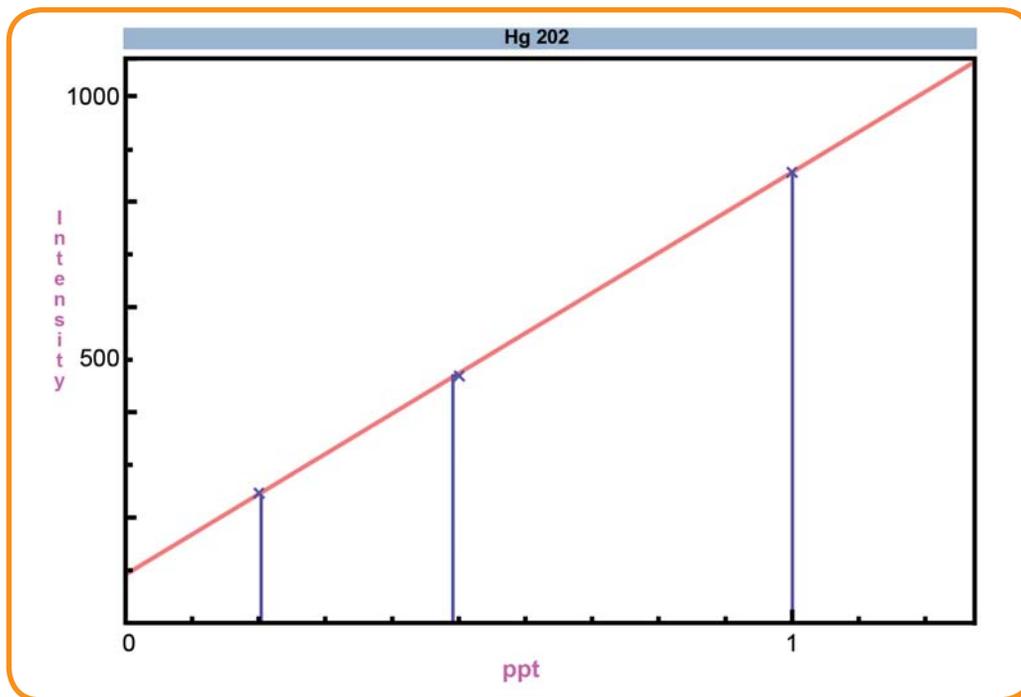
SC-4 DX hydrideFAST 1 system for the PerkinElmer NexION

hydrideFAST 1 System For PerkinElmer NexION				
System	SC-DX FAST A/S	8 Channel FAST DXi Peripump & Valve	Gas Liquid Separator	Quartz Cyclonic Spray Chamber
hydrideFAST 1 2HYF-1-84C or 4HYF-1-84C	✓	✓	✓	✓
hydrideFAST 1 upgrade from FAST HYF-UP1-A-84		✓	✓	



hydrideFAST 1 system diagram including autosampler and FAST valve

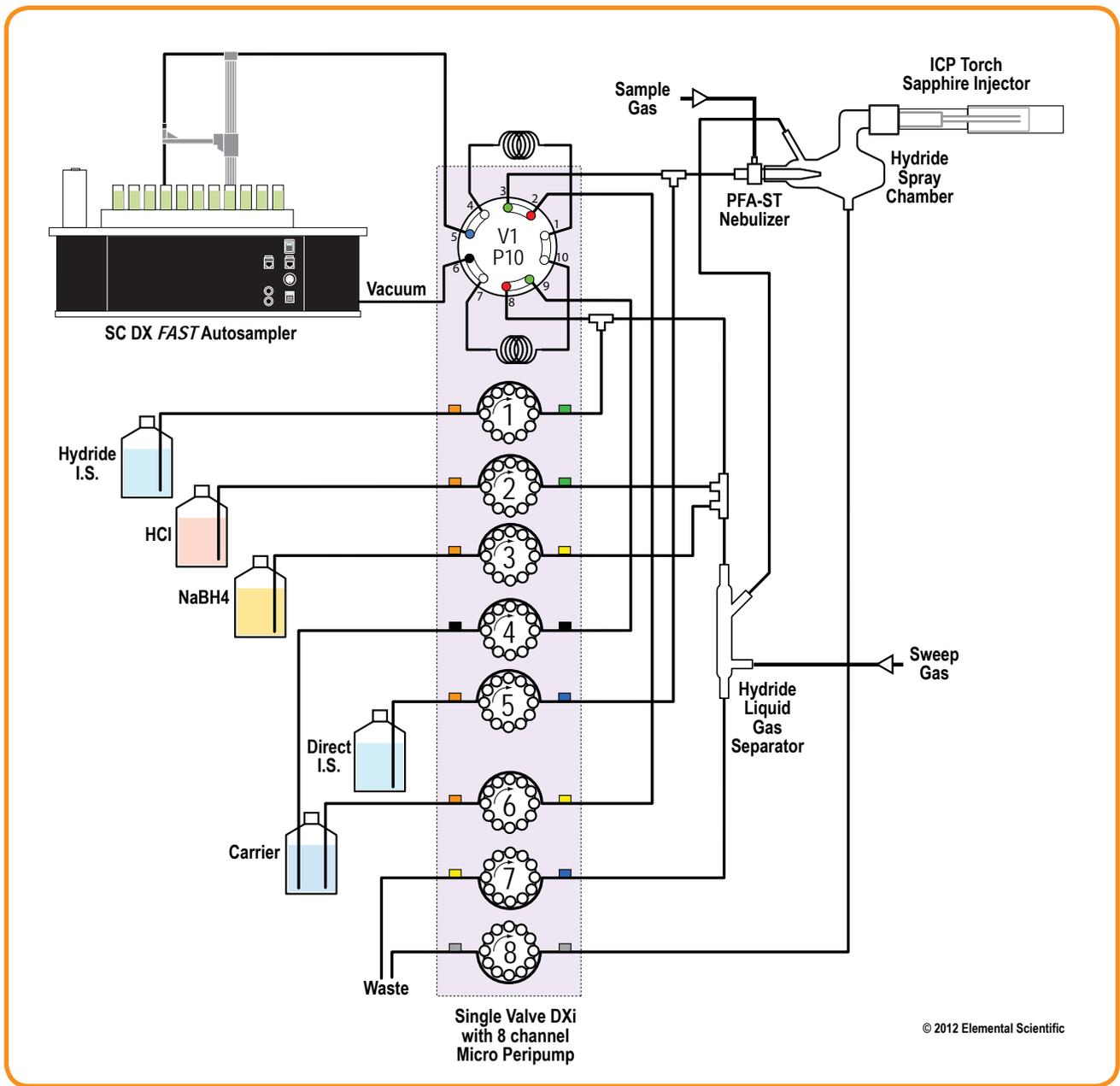
1																	2														
H																	He														
3	4	hydrideFAST 1										5	6	7	8	9	10														
Li	Be	Hydride-forming elements analyzed										B	C	N	O	F	Ne														
11	12											13	14	15	16	17	18														
Na	Mg											Al	Si	P	S	Cl	Ar														
19	20	21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



Hg calibration curve from 0.2 ppt to 1 ppt

hydrideFAST 1 Systems for the PE NexION	
Part Number	Description
2HYF-1-84C	hydrideFAST 1 system SC-2 DXi
4HYF-1-84C	hydrideFAST 1 system SC-4 DXi
HYF-UP1-A-84	hydrideFAST 1 upgrade from FAST

hydrideFAST Spares	
Part Number	Description
HG-USCA-01	Universal spray chamber adapter for hydrideFAST 1
HG-GLS-001	Quartz hydride gas-liquid separator
HG-MK-1	Hydride generator mounting kit



hydrideFAST 2 system diagram including autosampler and FAST valve

The hydrideFAST 2 system has three modes of operation:

- Mode 1** (hydride generation only)
- Mode 2** (Simultaneous hydride generation and FAST nebulization)
- Mode 3** (FAST nebulization only)

hydrideFAST 2 Systems for the PE NexION	
Part Number	Description
2HYF-2-84C	hydrideFAST 2 system SC-2 DXi
4HYF-2-84C	hydrideFAST 2 system SC-4 DXi
HYF-UP2-A-84	hydrideFAST 2 upgrade from FAST

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.

Features:

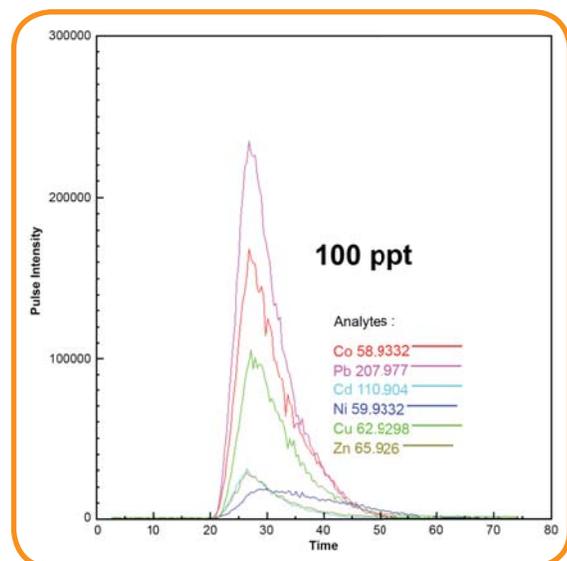
- Automated preconcentration and matrix elimination
- Simple, external calibration with acid standards
- ppt to ppq detection limits in undiluted seawater
- Eliminate manual sample preparation
- Reduced procedural blanks
- Up to 3 modes of operation available
- All syringe-driven flows (seaFAST S2)



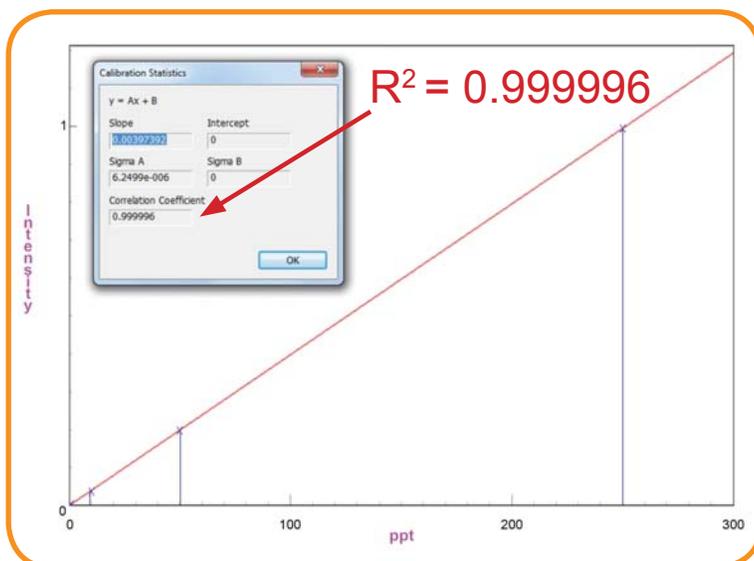
SC-4 DX seaFAST
for PerkinElmer NexION

seaFAST Systems For PerkinElmer NexION

System	SC-DX FAST	Syringe-Driven Flows (S400V)	FAST DXi Dual Valve Module	FAST DXi Triple Valve Module	PC ³	seaFAST column	Trace metals cleanup column(s)	Hydride continuum dual syringe pump	PFA batch mode hydride generation chamber	Sapphire injector	PFA-ST nebulizer
seaFAST 1 2SF-1-84C or 4SF-1-84C	✓		✓		✓	✓	✓			✓	✓
seaFAST 2 2SF-2-84C or 4SF-2-84C	✓			✓	✓	✓	✓			✓	✓
NEW! seaFAST S2 2SF-S2-84C or 4SF-S2-84C	✓	✓	✓		✓	✓	✓			✓	✓
seaFAST 3 2SF-3-84C or 4SF-3-84C	✓			✓	✓	✓	✓	✓	✓	✓	✓

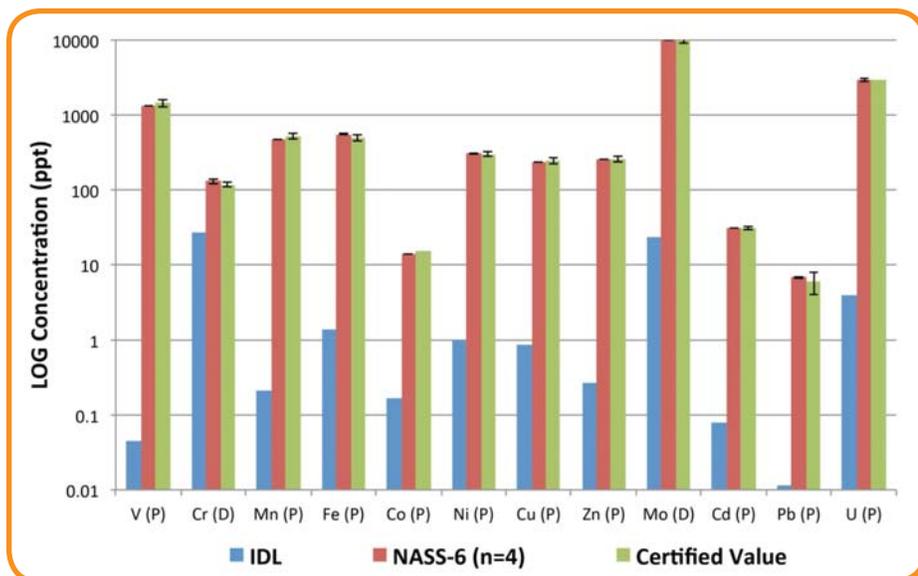


seaFAST elution profile for 100 ppt standard



seaFAST S2 Calibration of Fe in 3.5% NaCl.
Calibration spikes are 1, 10, 50 and 250 ppt.

seaFAST S2 - NASS-6 Determination



Elements determined with the seaFAST S2 are accurate and precise for elements with certified concentrations from <10 ppt to >10 ppb.

P = Preconcentration Mode
D = Direct Mode

seaFAST 1

Preconcentration Mode: A chelation column binds transition metals and rare earth elements but allows matrix Na^+ , Cl^- , Ca^{2+} and Mg^{2+} ions to be rinsed out. After the preconcentration step, analytes are eluted and detected by ICP-MS. (2 valves, all NexION models)

seaFAST 2 / seaFAST S2

Preconcentration and Direct Modes: The capabilities of seaFAST 1, plus online dilution with internal standard during the same analytical run. The syringe-driven seaFAST S2 improves detection limits, throughput and washout. (3 valves, NexION UCT models only)

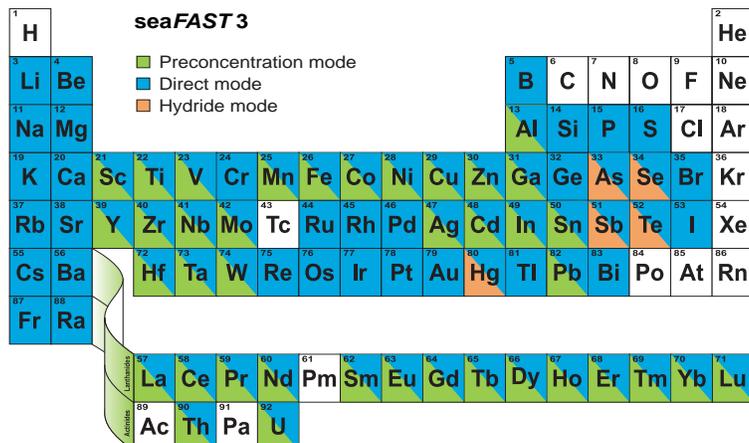
seaFAST 3

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, NexION UCT models only)

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



seaFAST Preconcentration Column



seaFAST System for the PE NexION		
System	SC-2 DX	SC-4 DX
seaFAST 1 system	2SF-1-84C	4SF-1-84C
seaFAST 2 system	2SF-2-84C	4SF-2-84C
seaFAST S2 system	2SF-S2-84C	4SF-S2-84C
seaFAST 3 system	2SF-3-84C	4SF-3-84C

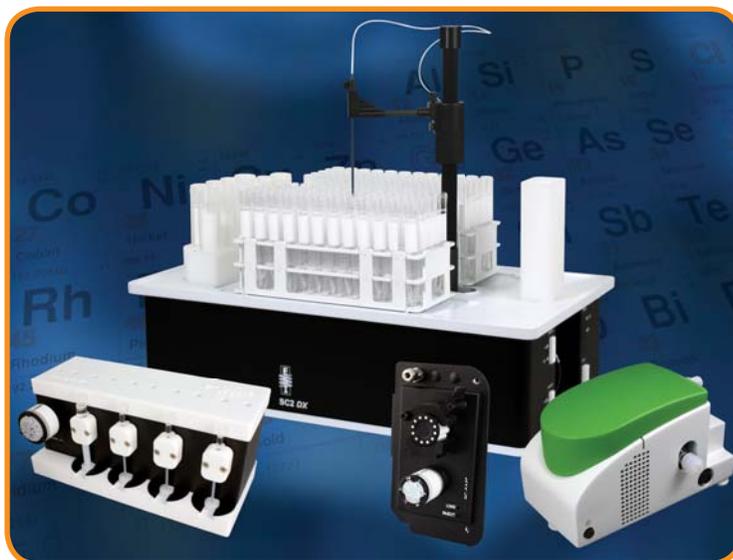
Part Number	Description
CF-N-0200	Spare seaFAST preconcentration column
CF-IDA	Spare seaFAST trace metal cleanup column
CF-M-0600	Spare seaFAST S2 trace metal cleanup column

microFAST S4™

The microFAST S4 is an automated, syringe-based sample delivery system for micro samples. One dedicated syringe loads a sample or standard onto a custom, inert injection valve. When the sample is injected into the ICP, three additional high-purity syringes, flowing at micro flow rates, perform the desired dilution and addition of internal standard.

For very small, valuable samples, the microFAST S4 achieves the best absolute detection limits of any sample introduction system due to virtually 100% sample transport efficiency. Other applications include the determination of elemental impurities in undiluted organic solvents, where low sample flow rate minimizes the solvent load in the plasma and reduces or eliminates elemental speciation effects caused by analyte volatility.

An HF-resistant version of microFAST S4 is available with all fluoropolymer wetted parts, including syringe barrels and the spray chamber.



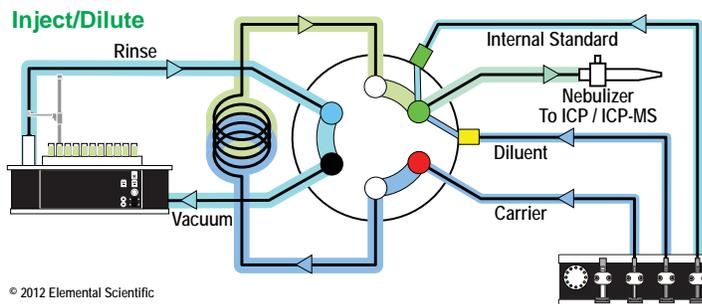
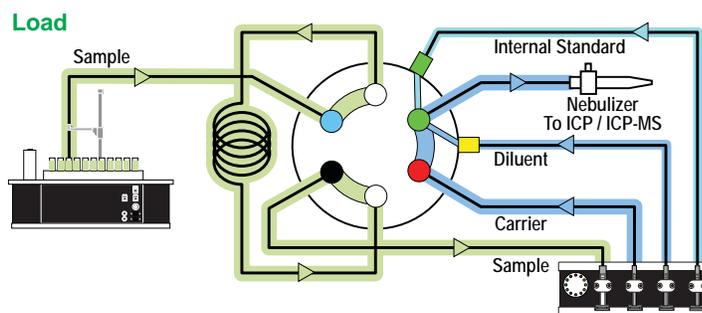
SC-2 DX microFAST S4 system for organic solvents and low flow applications. The PC^{3x} heats the spray chamber to improve sample transport efficiency and sensitivity at low flow rates.

Benefits:

- All liquid flows are syringe driven
- Syringe loading of micro samples
- Autocalibration
- Automated addition of internal standard
- Inline dilution
- Analyze undiluted volatile solvents
- Micro flow rates from 5 to 40 $\mu\text{L}/\text{min}$
- High sensitivity
- Minimize or eliminate sensitivity differences due to speciation of Si and other elements

All microFAST S4 Systems Include:

- SC-DX FAST autosampler
- FAST DXi valve module and all connections
- S400V syringe pump module
- Sapphire injector
- PC^{3x} Peltier heated or cooled quartz cyclonic spray chamber



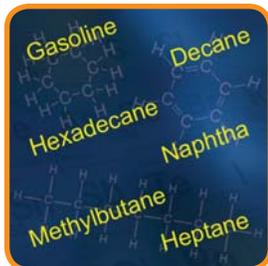
© 2012 Elemental Scientific

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 from as low as 1-5 $\mu\text{L}/\text{min}$ up to 10-15 $\mu\text{L}/\text{min}$
- Perform repeat multi-element analysis or precise isotope ratio measurements on a single sample as small as 50 μL
- Ideal for nuclear applications to minimize sample prep volume and waste



Volatile high-purity organic solvents

- Reliable sample introduction at 5 and 10 μL 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
- Prevent cone clogging
- Reduce amount of matrix reaching the ICP-MS, reducing carryover and instrument contamination from matrix elements

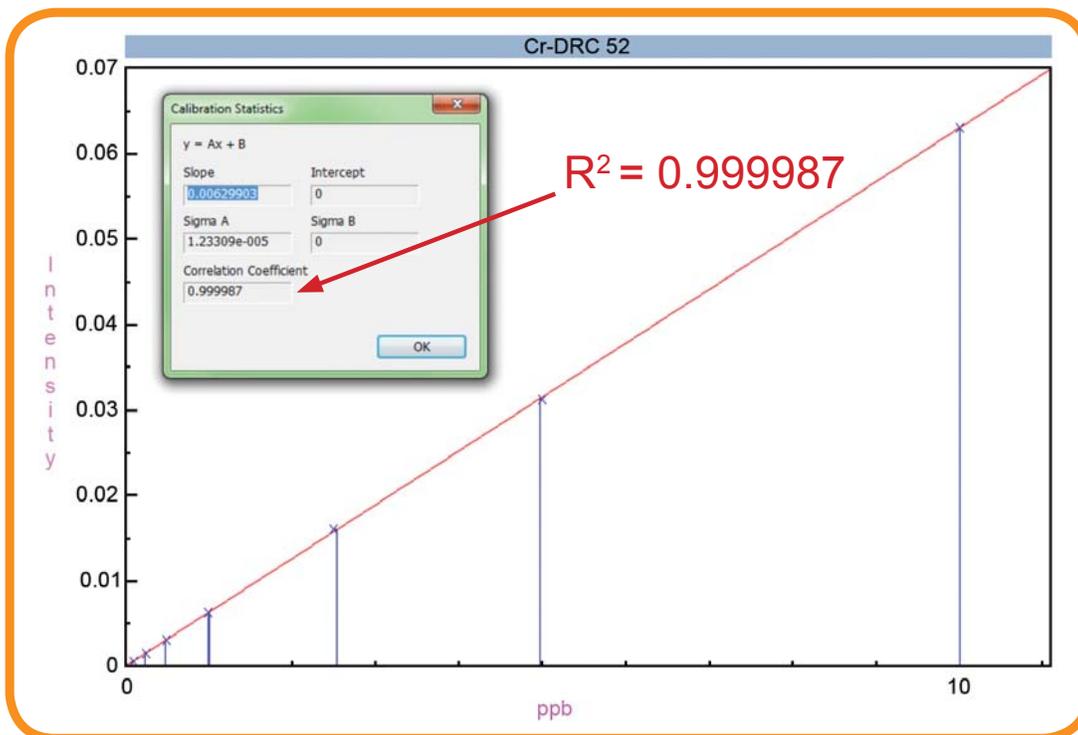


High precision isotope ratios with maximum absolute sensitivity

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

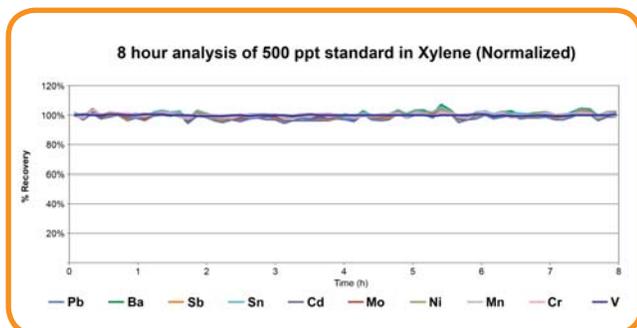
microFAST™ S4

Autocalibration in Organic Solvents



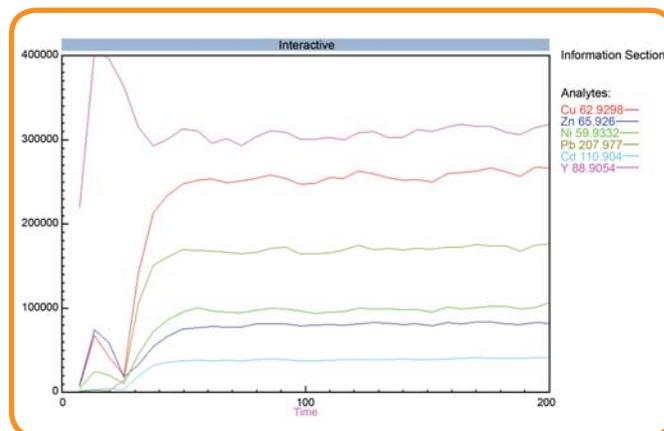
Autocalibration of Cr in xylene from 100 ppt to 10 ppb using a total combined sample and diluent flow rate of 20 $\mu\text{L}/\text{min}$ and internal standard flow rate of 6 $\mu\text{L}/\text{min}$.

Long-term Stability



Long-term stability is excellent due to low, controlled flow rates, even in undiluted organic solvents or high matrix samples.

Stabilization



Signal and internal standard (Y) stabilization at 20 $\mu\text{L}/\text{min}$, xylene.

Part Number	Description
2PFM-84C	microFAST S4 SC-2 DXi system
4PFM-84C	microFAST S4 SC-4 DXi system
2PFM-HF-84C	HF microFAST S4 SC-2 DXi system
4PFM-HF-84C	HF microFAST S4 SC-4 DXi system
ES-2060	Spare microFAST nebulizer for flow rates less than 50 $\mu\text{L}/\text{min}$. Not for use with HF.

TRUFAST™

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

Various applications are available, including:

Ra

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

Th, U

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

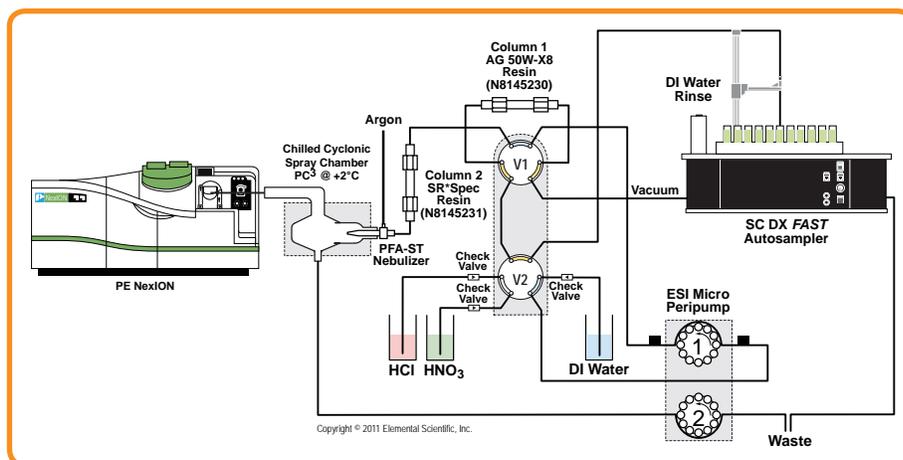


SC-4 DX TRUFAST Th/U system for the PerkinElmer NexION



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

TRUFAST Systems For PerkinElmer NexION								
System	SC-DX FAST	FAST DXi dual valve module	PC ³	Cation exchange column	Sr preconcentration column	Th/U preconcentration column	Sapphire injector	PFA-ST nebulizer
TRUFAST Radium 2TF-Ra-84C or 4TF-Ra-84C	✓	✓	✓	✓	✓		✓	✓
TRUFAST Thorium/Uranium 2TF-Th-84C or 4TF-Th-84C	✓	✓	✓			✓	✓	✓



TRUFAST configured for Radium preconcentration.

For even greater sensitivity, add the apex Q to the TRUFAST (pg 56)

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

TRUFAST Systems for the NexION ICP-MS		
System	SC-2 DX	SC-4 DX
TRUFAST Ra System	2TF-Ra-84C	4TF-Ra-84C
TRUFAST Th/U System	2TF-Th-84C	4TF-Th-84C

PFA and Polypropylene ST-Nebulizers

PFA and Polypropylene High-Efficiency MicroFlow Nebulizers



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

PFA-ST Nebulizers



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

Benefits:

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



ES-2040-54



Part Number	Description
ES-2040-54	PFA-ST self-aspirating nebulizer with external 1/4-28 threaded connector.
PF-2040	PFA-ST self-aspirating nebulizer for prepFAST with external 1/4-28 threaded connector.

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.



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.

PolyPro-ST Nebulizer

The PolyPro-ST nebulizer is a low cost HF resistant alternative to the PFA nebulizer. The PolyPro nebulizer has a lower chemical resistance than the PFA nebulizer, but has the same high-efficiency aerosol generation. 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



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 µL/min self-aspiration capillary.
ES-2002-7205-080	High temperature apex-100 PFA nebulizer with Ultem manual sampling probe, 90-150 µL/min, 80 cm capillary



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.

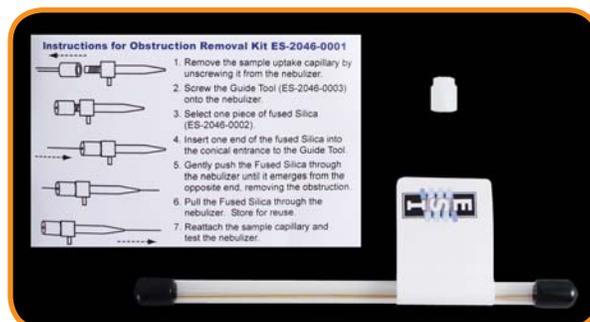
Part Number	Description
SC-0599-0109	Syringe flush kit. Includes 3 mL syringe, two luer to 1/4-28 adapters.



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.

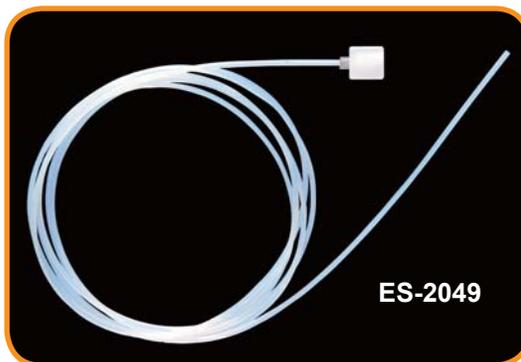
Part Number	Description
ES-2046-0001	Fused silica obstruction removal kit for ST-type nebulizers. Includes one guide, 10 pieces of fused silica and instructions.



Sample Capillaries / Probes

PFA Sample Capillaries for ST Nebulizers

Part Number	I.D.	Self-aspiration rate (@1L/m Ar)
ES-2045	0.15 mm	20 µL/min ■ (red)
ES-2043	0.2 mm	50 µL/min ■ (purple)
ES-2042	0.2 mm	100 µL/min ■ (green)
ES-2047	0.3 mm	200 µL/min ■ (yellow)
ES-2041	0.5 mm	400 µL/min ■ (orange)
ES-2044	0.8 mm	700 µL/min ■ (blue)
ES-2049	1.0 mm	1 mL/min ■ (gray)



Carbon Fiber Supported Autosampler Probes for ST Nebulizers

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

Probes for ESI SC-DX Autosamplers

Part Number	Probe i.d.	Capillary Length	Self-aspiration rate (@1L/m Ar)
ES-5037-3255-150	0.25 mm	150 cm	100 µL/min
ES-5037-3505-150	0.5 mm	150 cm	400 µL/min

Probes for ESI Non-DX Autosamplers

Part Number	Probe i.d.	Capillary Length	Self-aspiration rate (@1L/m Ar)
ES-5037-3250-080	0.25 mm	80 cm	100 µL/min
ES-5037-3500-080	0.5 mm	80 cm	400 µL/min

Also available with Ultem support.

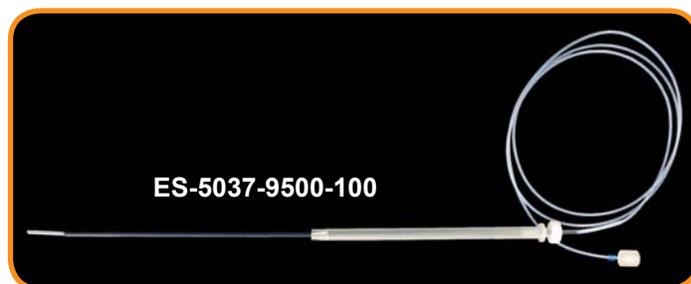


Probes for PE S10 Autosamplers

Part Number	Probe i.d.	Capillary Length	Self-aspiration rate (@1L/m Ar)
ES-5037-9250-100	0.25 mm	100 cm	100 µL/min
ES-5037-9500-100	0.5 mm	100 cm	400 µL/min

Also available with Ultem support.

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



PFA Self-Aspirating High-Purity Nebulizers

PFA Nebulizers with Integrated Capillaries



Self-aspirating 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.

Benefits:

- 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	20 μ L/min
PFA-50	ES-2000	50 μ L/min
PFA-100	ES-2002	100 μ L/min
PFA-200	ES-2003	200 μ L/min
PFA-400	ES-2005	400 μ L/min

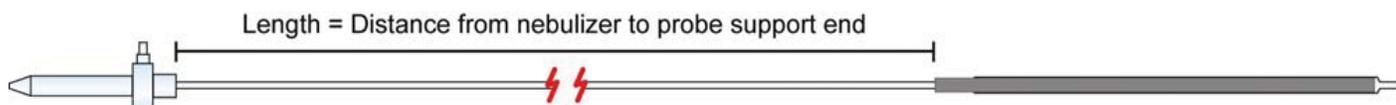
Other flow rates made to order

PFA Nebulizers with Integrated Probes

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	Part Number	Self-aspiration rate (@1L/m Ar)	Length
PFA-20	ES-2020-3503-080	20 µL/min	80 cm
PFA-50	ES-2000-3503-080	50 µL/min	80 cm
PFA-100	ES-2002-3503-100	100 µL/min	100 cm
PFA-200	ES-2003-3503-100	200 µL/min	100 cm
PFA-400	ES-2005-3503-100	400 µL/min	100 cm

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

Model	Part Number	Self-aspiration rate (@1L/m Ar)	Length
PFA-20	ES-2020-3505-080	20 µL/min	80 cm
PFA-50	ES-2000-3505-080	50 µL/min	80 cm
PFA-100	ES-2002-3505-100	100 µL/min	100 cm
PFA-200	ES-2003-3505-100	200 µL/min	100 cm
PFA-400	ES-2005-3505-100	400 µL/min	100 cm



Also available with PEEK support and for S10 Autosampler

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 40 for more information.



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



**Elemental
Scientific**

MEINHARD®

Concentric Nebulizers for ICP-MS

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

Each MEINHARD® Plus nebulizer comes with the FitKit+ gas and sample quick connect fittings. The connections are made with high-purity PFA, minimizing the chance of contamination during backflow events. The gas connection fits snugly over the maria on the sidearm of the nebulizer.

Features for all MEINHARD® Plus Nebulizers:

- Self aspiration rate 0.5 mL/min with argon flow 1 L/min at 50 PSI (3.4 bar/345 kPa).
- Peristaltic pumped rate 0.1 mL/min to 3.0 mL/min.
- Includes FG Gas Quick Connect (PFA) and F2 Quick Connect with 0.5 mm i.d. ■ (orange marker) capillary, 70 cm.

Quartz Nebulizers

NEW SilQ+ Ultra-high Purity Quartz Nebulizer

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



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

NEW TQ+ Quartz Nebulizer

- Quartz
- Low blank levels compared to glass nebulizers



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

Glass Nebulizer

NEW TR+ Glass Nebulizer

- Borosilicate glass
- Economical



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

Quartz and Glass High Purity Nebulizers

NEW SilQ+ High Purity Quartz Nebulizer

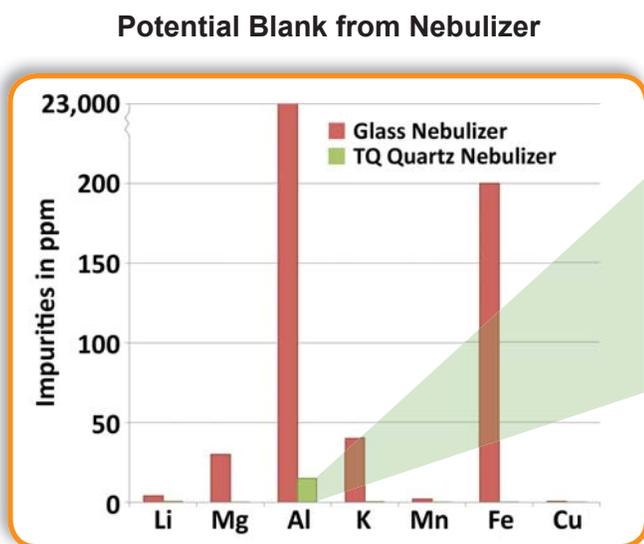
The SilQ+ nebulizer by MEINHARD® is perfect for applications requiring high sensitivity. Made from the highest purity synthetic quartz, the SilQ+ nebulizer has low levels of trace elemental impurities, reducing the risk of sample contamination. SilQ+ nebulizers improve wash-out rates and generate low,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

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

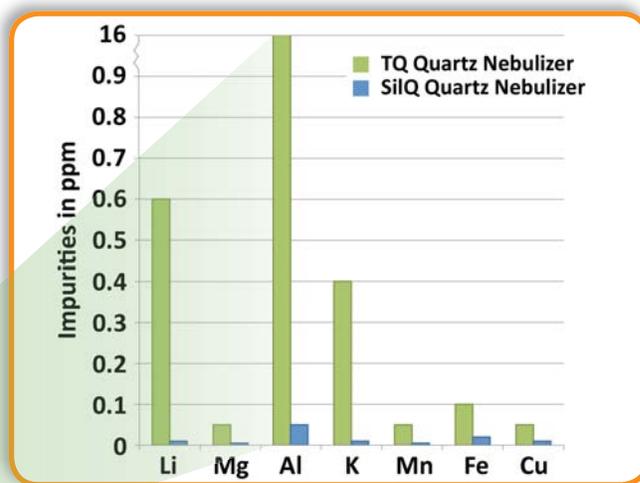
Each nebulizer is manufactured and tested to exacting specifications. The standard SilQ+ nebulizer requires 50 psi for 1 L/min of argon carrier and 0.5 mL/min solution uptake. Other versions are available.



MEINHARD® SilQ+ high purity nebulizer with PFA FitKit+



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



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

NEW Plus Nebulizer PFA FitKit Nebulizer Gas Quick Connect

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	PFA gas Quick Connect for all MEINHARD® nebulizers

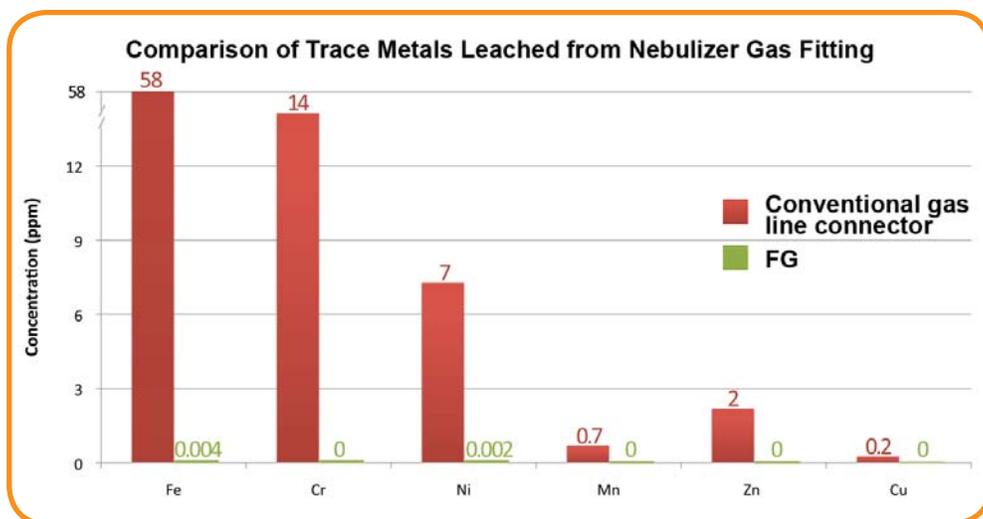
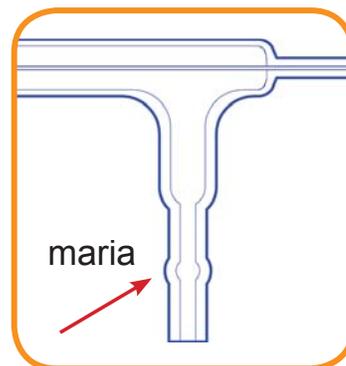
Elemental Scientific introduces the PFA FitKit Quick Connects, a revolutionary new gas and sample fitting system for MEINHARD® Plus nebulizers. The kit includes a gas connection (FG), standard integrated capillary sample connection (F2) and two other sample connection (F1 and F0) options to choose from.

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-MS 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:

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



Conventional gas line connector



PFA quick connect gas line (FG)

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

PFA Liquid Quick Connectors

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-MS applications.

Benefits:

- 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 micro flow 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 low uptake rates from 0.1 to 0.5 mL/min and 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.



pergo Nebulizer Gas Humidifier

pergo High Solids Accessory

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

A high-pressure membrane positioned inside a temperature-controlled water reservoir perfuses water vapor into the ICP-MS nebulizer gas stream. By increasing humidity in the argon nebulizer gas, the *pergo* prevents salt deposits at the nebulizer tip, improving short and long-term signal stability.

Benefits:

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

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

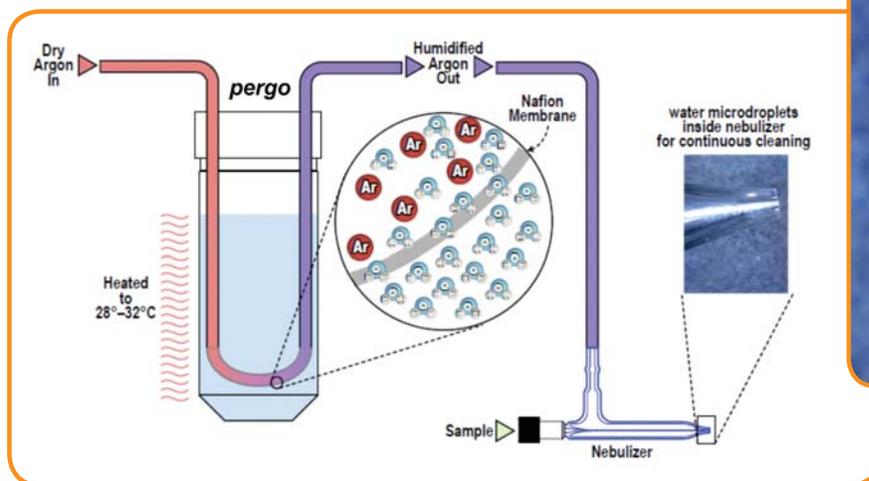
Advantages:

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

PRG-01-MAPlus *pergo* high solids accessory with TR+ MEINHARD® nebulizer



TRP-50 TR+ Glass Nebulizer



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

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

Part Number	Description
PRG-01	<i>pergo</i> argon high solids accessory. Includes nebulizer gas line connector kit.
PRG-01-MAPlus	<i>pergo</i> argon high solids accessory. Includes a MEINHARD® Type A Plus high performance nebulizer.

PC^{3x}

PC^{3x} Peltier Controlled Cyclonic Chamber

Thermally stabilized inlet system for the PerkinElmer NexION



PC^{3x} Peltier Heated or Cooled Inlet System

- Temperature control from -10°C to +80°C
- Thermal stabilization of spray chamber improves long-term stability
- Last set temperature saved for stand alone operation
- USB or Bluetooth connectivity
- Remote monitoring and control

See page 58 for more information.

**Heating Function
Increases Sensitivity!**



**Elemental
Scientific**

Cyclonic Spray Chambers

Spray Chambers for the PC³ Peltier Cooler

PC³ Cyclonic Spray Chambers

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

Part Number	Description	Application
ES-3184-1111-29	Quartz (7 mm baffle) cyclonic spray chamber for PC ³ with auxiliary gas port, drain line included (ES-2044-0002)	All-purpose for non-HF samples. Provides excellent sensitivity, stability and low blanks.
ES-3184-4111-29	Borosilicate glass (7 mm baffle) cyclonic spray chamber for PC ³ with auxiliary gas port, drain line included (ES-2044-0002)	All-purpose for non-HF samples.



HF

Part Number	Description	Application
ES-3184-3111-21	PFA (7 mm baffle) cyclonic spray chamber for PC ³ with auxiliary gas port, drain line included (ES-2044-0002)	All-purpose, offers resistance to hydrofluoric acid while maintaining the benefits of cyclonic spray chambers.



HF

Part Number	Description	Application
ES-3484-1111-21	Quartz (7 mm baffle) micro cyclonic spray chamber for PC ³ with auxiliary gas port, drain line included (ES-2044-0002)	Fastest washout for concentrated samples or carryover-prone analytes in non-HF samples.



Part Number	Description	Application
ES-3284-1111-29	Quartz SSI cyclonic/scott dual spray chamber with additional gas port, o-ring-free	Used to homogenize sample aerosol prior to introduction to the ICP-MS.



Spray Chambers

Spray Chambers

Part Number	Description	Application
ES-3184-1401-21	Quartz cyclonic spray chamber with auxiliary gas port and additional hydride inlet, drain line included (ES-2044-0002)	Simultaneously introduce nebulized aerosol and hydride species for hydrideFAST 2



Part Number	Description	Application
ES-2184-5472	PFA 47mm spray chamber with o-ring-free PFA endcap, drain line included (ES-2044-0002)	HF resistant, high sensitivity PFA spray chamber for semiconductor and other high purity applications.



Part Number	Description	Application
ES-ML140025ESQ	Quartz (7 mm baffle) cyclonic spray chamber with 12/5 socket PE torch connection for NexION.	All-purpose for non-HF samples. Provides excellent sensitivity, stability and low blanks.



Part Number	Description	Application
ES-3484-1018-29	Quartz (7 mm baffle) micro cyclonic spray chamber with 12/5 socket PE torch connection for NexION.	All-purpose for non-HF samples. Provides excellent washout, sensitivity, stability and low blanks.



PFA-Quartz Ball Joint Socket Adapter and Clamp

Part Number	Description	Application
ES-5510	Adapter, PFA/quartz. 12/5 ball joint to ESI Spray Chambers	Connects ESI spray chambers to standard NexION injector with glass ball joint inlet.
ES-2110-0002	12/5 ball and socket clamp	Used to clamp the ball joint and socket together.



SAMPLE INTRODUCTION

NEW!

P-SERIES FAST VALVES

Redesigned *FAST* valve for improved durability and performance

- NEW PFA rotors for long life and low maintenance
- Chemically resistant compression ring
 - Uniform pressure
 - Keyed for easy assembly
 - Prevents damage from overtightening
- Internal components Teflon®-coated to prevent corrosion
- All fluoropolymer flow path
- Many versions from 4 port to 13 port
 - P7 valve with integrated internal standard port
 - P7+ valve for inline dilution and internal standard addition
- Optional stator and rotor materials
 - Stator: Low-cost PPS
 - Rotor: PFA, PPS, PEEK/PTFE composite and PTFE

See page 62 for more information



PF-P6
P6 *FAST* Valve



PF-P7
P7 *FAST* Valve



PF-P7X
P7+ *FAST* Valve



**Elemental
Scientific**

Demountable Quartz Torches

Standard Demountable Quartz Torch

ELAN / NexION Standard Quartz Torch

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

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



O-Ring-Free Demountable Quartz Torch

ELAN / NexION Standard O-Ring-Free Quartz Torch

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	ELAN / NexION demountable quartz torch for o-ring-free injectors. Use with ESI o-ring-free injectors.

ppq



Low Argon Consumption High Efficiency Torches (HET), Quartz

High Efficiency Quartz Torches

The HET reduces argon cool gas consumption by up to 30% to 40% without compromising performance. Implementing the HET torch is an easy way to reduce ICP-MS operating costs.

NexION HET	
Part Number	Description
ES-1102-84-HET	NexION high efficiency quartz torch with two concentric rings

ppq



ELAN HET	
Part Number	Description
ES-1102-54-HET	ELAN high efficiency quartz torch with three concentric rings



Injectors and Shield Discs

Cassette Injectors for Standard Torch

Cassette type injectors for standard torches fit all NexION and ELAN cassette mount ICP-MS

Platinum Injectors for Standard NexION 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. [Pt cones recommended]
ES-1113-3150	1.5 mm	Platinum injector.
ES-1113-3200 	2.0 mm	Standard platinum injector. For low-ppt Al determinations.



Use with torch ES-1102 (pg 49)

Sapphire Injectors for Standard NexION Torch



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

Part Number	Size	Description
ES-1103-3150	1.5 mm	Sapphire injector. HF-resistant.
ES-1103-3180	1.8 mm	Sapphire injector. HF-resistant.
ES-1103-3250	2.5 mm	Sapphire injector. HF-resistant. Improved stability for high matrix/high TDS environmental samples.



Use with torch ES-1102 (pg 49)

Quartz Injectors for Standard NexION 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. Organic solvent introduction.
ES-1124-3150	1.5 mm	Quartz injector
ES-1124-3200	2.0 mm	Quartz injector
ES-1124-3250 	2.5 mm	Quartz injector. Improved stability for high matrix/high TDS environmental samples.



Use with torch ES-1102 (pg 49)

Shield Disc for 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. Use with torch ES-1102 (pg 49)

Platinum Shield Disc Installed



Cassette Injectors for O-Ring-Free Torch

Cassette type injectors for o-ring-free torches fit all NexION and ELAN cassette mount ICP-MS

O-Ring-Free Platinum Injectors for NexION Torch



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. [Pt cones recommended]
ES-1113-2150	1.5 mm	Platinum injector, o-ring-free.
ES-1113-2200 	2.0 mm	Platinum injector, o-ring-free. For semiconductor HF applications.

Use with o-ring-free torch ES-1102-1000 (pg 49)



O-Ring-Free Sapphire Injectors for NexION Torch



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

Part Number	Size	Description
ES-1103-2150	1.5 mm	Sapphire injector, o-ring-free. HF-resistant.
ES-1103-2180	1.8 mm	Sapphire injector, o-ring-free. HF-resistant.
ES-1103-2250	2.5 mm	Sapphire injector, o-ring-free. HF-resistant. Improved stability for high matrix/high TDS environmental samples.

Use with o-ring-free torch ES-1102-1000 (pg 49)



O-Ring-Free Quartz Injectors for NexION 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-1124-2100 	1.0 mm	Quartz injector, o-ring-free. Organic solvent introduction.
ES-1124-2150	1.5 mm	Quartz injector, o-ring-free.
ES-1124-2200	2.0 mm	Quartz injector, o-ring-free.
ES-1124-2250 	2.5 mm	Quartz injector, o-ring-free. Improved stability for high matrix/high TDS environmental samples.

Use with o-ring-free torch ES-1102-1000 (pg 49)



O-Ring-Free Shield Disc for 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. Use with o-ring-free torch ES-1102-1000 (pg 49)

Platinum Shield Disc Installed



Peristaltic Pumps

Integrated MP² Precision Micro Peristaltic Pumps for the PerkinElmer NexION

The MP² (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
- Chemically resistant
 - Ceramic pins and PTFE-coated metal components are resistant to acids and organic solvents
- Pump network software control
- Precision
- Low pulsation
 - 12 closely-spaced rollers improve signal stability
- Optimized for all flow rates
 - Accurate pumping across a wide range of rates from low 0.20 $\mu\text{L}/\text{min}$ to 10 mL/min
- 1, 2, 3, 4, 6 and 8 channels (stand alone MP²)
- 3, 4 and 6 channels (integrated MP²)

MP² NexION Specifications:

Channels:

1-6 channels

Flow Rates:

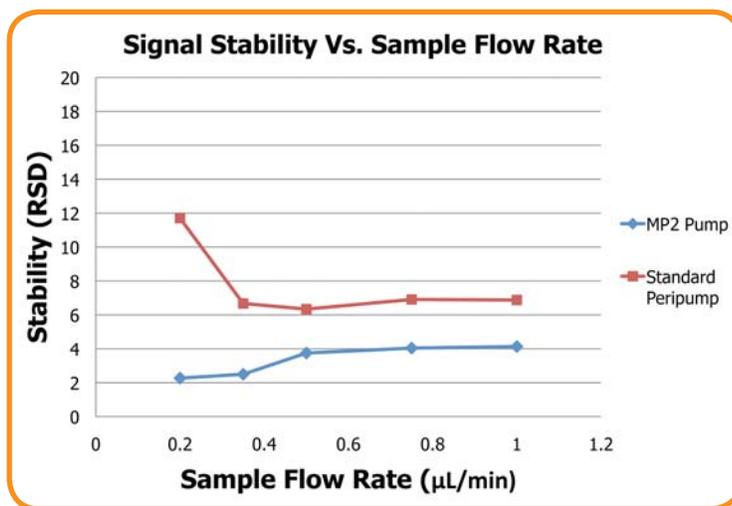
0.20 $\mu\text{L}/\text{min}$ to 10 mL/min per channel

Tubing:

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



MP2-4-57
Integrated precision micro peristaltic pump



MP² shows improved low flow stability compared to a standard peripump

Part Number	Description
MP2-3-84	MP ² integrated 3 channel precision micro peristaltic pump
MP2-4-84	MP ² integrated 4 channel precision micro peristaltic pump
MP2-6-84	MP ² integrated 6 channel precision micro peristaltic pump

Stand Alone MP² Precision Micro Peristaltic Pumps

MP² Precision Micro Peristaltic Pumps



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



MP2-4-PC stand alone precision micro peristaltic pump

SAMPLE INTRODUCTION

CONTROLLED BY THE INSTRUMENT PC USB PORT

Part Number	Number of Channels
MP2-1-PC	1 channel MP ² precision micro peristaltic pump
MP2-2-PC	2 channel MP ² precision micro peristaltic pump
MP2-3-PC	3 channel MP ² precision micro peristaltic pump
MP2-4-PC	4 channel MP ² precision micro peristaltic pump
MP2-6-PC	6 channel MP ² precision micro peristaltic pump
MP2-8-PC	8 channel MP ² precision micro peristaltic pump

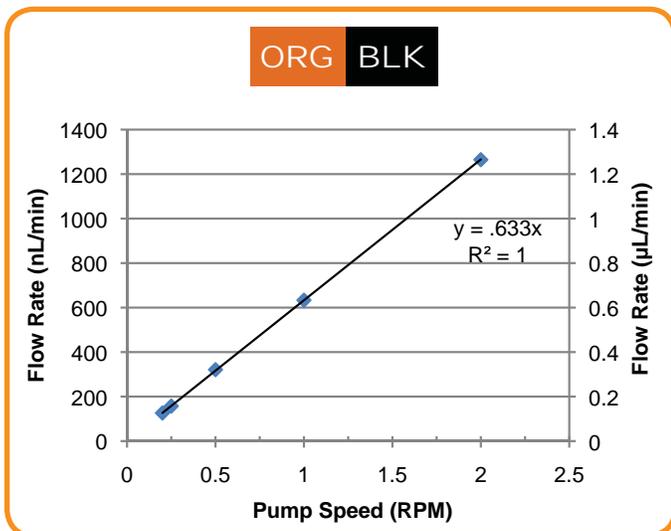
Includes: Cable to control with DX Autosampler

CTFE PERIPUMP FITTINGS (Non-barbed) Used in Low Pressure Applications

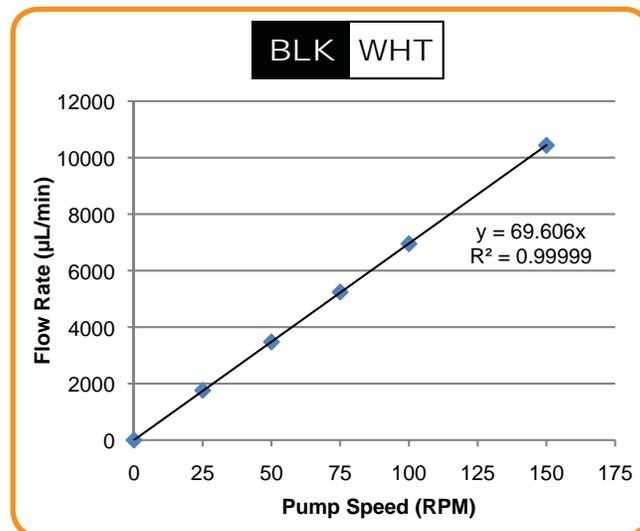
Part Number	Qty	Size	
ES-2501-PPF1	1 ea.	Female (small)	
ES-2501-PPM1	1 ea.	Male (small)	

CTFE PERIPUMP FITTINGS (Barbed) Used in High Pressure Applications

Part Number	Qty	Size	
ES-2501-PPF2	1 ea.	Female (small)	
ES-2501-PPM2	1 ea.	Male (small)	



MP² pump linearity < 1 µL/min



MP² pump linearity up to 10 mL/min

MP² Peristaltic Pump Tubing

MP² Pump Tubing



Tubing for MP² Micro Peristaltic Pumps (Packs of 12)



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

*For easy insertion of PFA capillaries

i.d. = internal diameter

Non-Flared



PVC

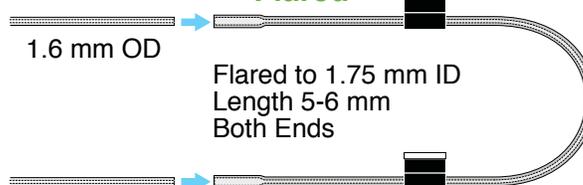


Santoprene



SOLVA

Flared



MP² PUMP TUBING STARTER KIT

Part Number	Description
MPP-K-1	MP ² Pump Tubing Starter Kit comprised of 34 packs of 12 tubes, one package of each light-green 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).

Syringe Pumps

SYRIX Syringe Pumps

SYRIX features an innovative drive mechanism for the precise control of liquid samples and reagents. Wetted parts are o-ring-free and offer high 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 $\mu\text{L}/\text{min}$ to > 40 mL/min
- A variety of syringe sizes
 - 0.3 mL to 3 mL
- O-ring-free
- Syringe material
 - Quartz/PFA
 - 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)



3.0 mL quartz syringe (PF-0599-1030)



0.3 mL quartz syringe (PF-0599-1003)

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.	Precise, controlled delivery of sample to the NexION. 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.	Accurately delivers micro-volume samples to the FAST loop.

SYRIX SYRINGE PUMP SPARES	
Part Number	Description
PF-0599-1003	0.3 mL quartz syringe
PF-0599-1030	3.0 mL quartz syringe
PF-0599-3003	0.3 mL HF resistant syringe
PF-0599-3030	3.0 mL HF resistant syringe



apex High Sensitivity Desolvation Systems

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

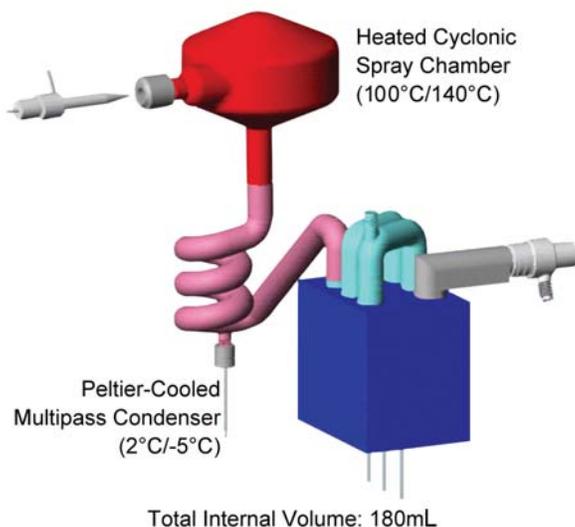
ppq

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.

ppq

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.

HF ppq



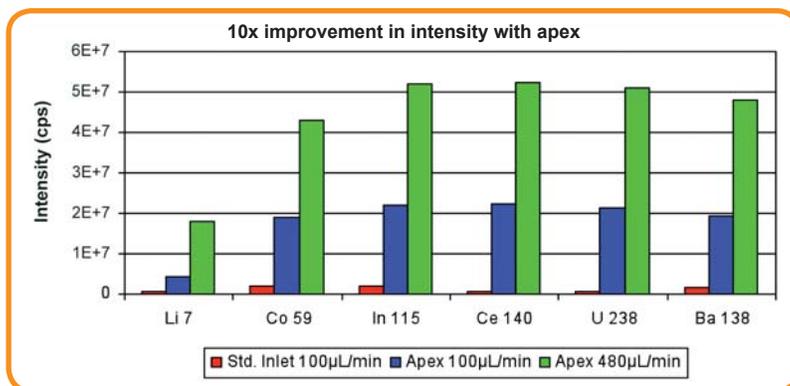
Preset dual temperature settings for heater and cooler. Patented flow path design ensures rapid wash in / washout.

See page 35 for additional information on the apex-100 PFA nebulizers

ES-4584-1000-21
apex IR



ES-4384-1000-21
apex Q



apex Mounting Shelf

The NexION mounting shelf is a multi-component shelf used to properly position the apex to the injector.



Part Number	Description
ES-2999-8421	apex two piece mounting shelf

apex FAST High Sensitivity Desolvation 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 oneFAST unit making it fully automated and integrated to any instrument.

Requires FAST-enabled autosampler.



apex FAST
with injection valve
adjacent to nebulizer
ES-43FH-21-84



Model	Part Number	HF-Resistant	Integrated Valve	High Sensitivity	O-ring-free	Dual Temperature	Mixing Chamber for Isotope Ratios
apex Q	ES-4384-1000-21			✓	✓	✓	
apex IR	ES-4584-1000-21			✓	✓	✓	✓
apex HF	ES-4484-1000-21	✓		✓	✓	✓	
apex Q FAST	ES-43FH-21-84		✓	✓	✓		
apex IR FAST	ES-45FH-21-84		✓	✓	✓		✓
apex HF FAST	ES-44FH-21-84	✓	✓	✓	✓		

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 $\mu\text{L}/\text{min}$ 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
- $\text{CeO}^+:\text{Ce}^+$ 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.

PC³ Peltier Coolers and Heaters

PC³ Peltier Cooled Cyclonic Spray Chambers



The PC³ is a small, robust Peltier cooled cyclonic spray chamber. The PC³ offers the advantages of low memory effects, constant temperature, fast rinse-out and high sample transport efficiency. The cooled outer walls of the PC³ spray chamber enhance long-term signal stability, reduce polyatomic interferences such as oxides and reduce solvent loading when volatile organic solvents are analyzed.

PC³ / PC³-LT



The PC³ has 2 preset temperatures +2°C / -5°C and is ideal for analysis of aqueous or aqueous/organic mixtures.

The PC³-LT operates at -20°C to reduce the solvent load on the plasma for analysis of 100% volatile organic solvents.

PC³ / PC³-LT Kits Include:

Quartz Injector
PFA-ST MicroFlow Nebulizer
Quartz Cyclonic Spray Chamber

HF PC³ / PC³-LT Kits Include:

Sapphire Injector
PFA-ST MicroFlow Nebulizer
PFA Cyclonic Spray Chamber

Part Number	Injector Size	Description	Temperature	Additional Gas Port
ES-4190-84-29	1.5 mm	PC ³ sample introduction kit	+2°C / -5°C	Yes
ES-4190-84-29-PFA	1.5 mm	HF PC ³ sample introduction kit	+2°C / -5°C	Yes
ES-9190-84-29	1.0 mm	PC ³ -LT organic sample introduction kit	+2°C / -20°C	Yes
ES-9190-84-29-PFA	1.5 mm	HF PC ³ -LT organic sample introduction kit	+2°C / -20°C	Yes

All PC³ kits include a PFA-ST nebulizer (ES-2040-54)



See page 26 for an alternate method for measuring undiluted organic solvents

NEW!

PC^{3x} Peltier Controlled Heated or Cooled Cyclonic Chamber

The PC^{3x} is a compact Peltier heated or cooled inlet system that controls the spray chamber temperature and improves long-term stability. In cooling mode, water or solvent is removed from the aerosol, reducing water or solvent loading on the plasma. In heating mode, sensitivity is increased and volatility-related sample transport effects can be reduced or eliminated.

- Variable temperature control from -10°C to +80°C
- Thermal stabilization of spray chamber improves long-term stability
- Last set temperature saved for stand alone operation
- USB or Bluetooth connectivity
- Remote monitoring and control

PC^{3x} Kit Includes:

PFA-ST MicroFlow Nebulizer (ES-2040-54)
Quartz Cyclonic Spray Chamber
1.0 mm Quartz Injector



Part Number	Description
PC3X-84-29	PC ^{3x} thermally stabilized inlet system

Additional PC³ Spray Chambers / PC³ with SSI Spray Chamber

Additional Spray Chambers Available for the PC³

All chambers shown fit the NexION PC³. See page 46 for additional information on spray chambers.

Part Number	Description
ES-3184-1111-29	Quartz (7 mm baffle) cyclonic spray chamber with auxiliary gas port. Drain line included.
ES-3184-4111-29	Borosilicate glass (7 mm baffle) cyclonic spray chamber with auxiliary gas port. Drain line included.



Part Number	Description
ES-3184-3111-21	PFA (7 mm baffle) cyclonic spray chamber with auxiliary gas port. Drain line included.



SSI Cyclonic / Scott Dual Spray Chambers

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

The spray chamber may be combined with PC³ to enhance long-term stability. The SSI or PC³-SSI not only improves isotope ratio precision, but is useful for any analysis where better short- and/or long-term signal stability is desired.

Benefits of SSI

- Improves signal stability ~ 2x to 3x
- Improves isotope ratio precision up to 5x
- Reduces cone deposition
- Virtually eliminates the possibility of a flooded torch and the resulting instrument damage



Part Number	Description
ES-3284-1111-29	Quartz SSI cyclonic/scott dual spray chamber with additional gas port, o-ring-free

PC³ with SSI Cyclonic / Scott Dual Spray Chamber

Benefits of SSI with PC³

- Constant temperature improves long-term stability
- Reduces oxides and polyatomic interferences
- No separate chiller required
- Very low maintenance

PC³ SSI Kit Includes:

- 1.5 mm Quartz Injector
- PFA-ST MicroFlow Nebulizer (ES-2040-54)

Part Number	Description
ES-4290-84-29	PC ³ Peltier cooler and quartz SSI cyclonic/scott dual spray chamber with ESI injector connection
ES-HK-4284	PC ³ SSI top housing kit. Includes PC ³ SSI top housing plug (ES-HP-4284) and PC ³ SSI top housing (ES-HT-4284)



HF Resistant Sample Introduction Kits

HF-Resistant Sample Introduction Kits / Pipette Tips

PFA Sample Introduction Kits for PE NexION



The PFA kit is an ultra-pure, HF-resistant introduction system for the NexION. All wetted surfaces are PFA and sapphire or platinum. It is used by a majority of semiconductor labs worldwide for the analysis of semiconductor-grade chemicals and other high purity chemicals.

Benefits:

- 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
- Fast washout



PFA-Sapphire HF Resistant Sample Introduction Kit



PFA-Platinum High Purity Sample Introduction Kit

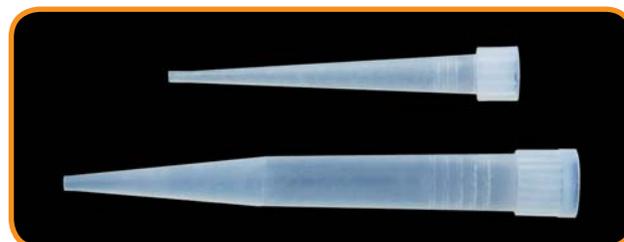
Part Number	Description
ES-2170-84-29	Complete HF-resistant sample introduction kit. Includes a PFA-ST nebulizer, PFA PureCap endcap with additional gas port, 47 mm PFA spray chamber, 1.8 mm sapphire injector, platinum shield disc and quartz torch.
ES-2141-84-19	Complete high purity sample introduction kit. Includes two PFA-100 MicroFlow nebulizers, PFA PureCap endcap with additional gas port, 47 mm PFA spray chamber, 2.0 mm platinum injector, platinum shield disc 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	100-200 µL	10 pk	Pre-cleaned PFA Pure Tip pipette tips
ES-7000-0111	100-200 µL	96 pk	Pre-cleaned PFA Pure Tip pipette tips
ES-7000-1001	1000 µL	10 pk	Pre-cleaned PFA Pure Tip pipette tips
ES-7000-1011	1000 µL	60 pk	Pre-cleaned PFA Pure Tip pipette tips



Online Mixing Kits

Online Mixing Kits for Addition of Internal Standard

Online Mixing Kit

The ESI kit for online addition of internal standard is an easy way to use internal standards without having to manually spike each sample with internal standard. The kit can also be used to mix any two reagents for other purposes. The low dead-volume, fluoropolymer mixing tee ensures good mixing at all typical ICP and ICP-MS flow rates for a wide variety of liquids, including HF.

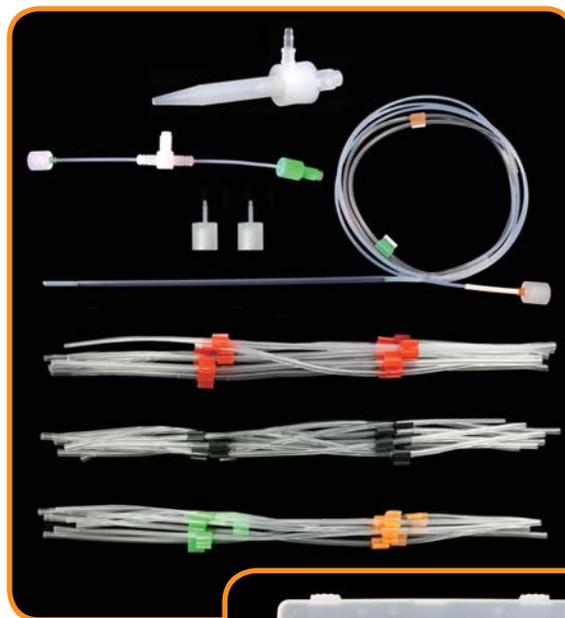
Includes:

- Low dead-volume, fluoropolymer mixing tee
 - 0.25 mm I.D. (green) for flow rates < 1 mL/min
 - 0.5 mm I.D. (orange) for flow rates > 0.3 mL/min
- Internal standard probe and addition line
- Fluoropolymer peripump fittings
- Peristaltic pump tubing starter pack

Online Dilution:

The online mixing kits include a starter pack of peristaltic pump tubing for the MP² micro peristaltic pump. Approximate dilution factors are defined by choosing the size of the sample and internal standard peristaltic pump tubing. Other pump tubing sizes are available.

Online mixing kit for addition of internal standard



Dilution Factors with Starter Pack Tubing

Sample Tubing		IS / Diluent Tubing					
		Orange	Green	Black	Black	Red	Red
Orange	Green	2		5		10	
Black	Black	1.25		2		3.25	
Red	Red	1.11		1.44		2	

Online Mixing Kits

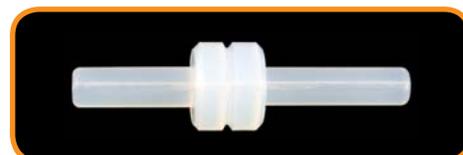
Part Numbers		
0.25 mm I.D. (Green)	0.5 mm I.D. (Orange)	Description
IS-ST-25	IS-ST-50	For use with PFA-ST nebulizers.
IS-MP-25	IS-MP-50	For use with MEINHARD® Plus nebulizers.*
N/A	IS-BRG-50	For use with MiraMist and similar nebulizers.

* Adapter below for other glass nebulizers

Online Mixing Kits with Nebulizer Included

Part Numbers		
0.25 mm I.D. (Green)	0.5 mm I.D. (Orange)	Description
ISN-ST54-25	N/A	For use with PFA-ST nebulizers. Includes PFA-ST nebulizer.
N/A	ISN-TRP-50	For use with MEINHARD® Plus nebulizers. Includes TR+ high sensitivity glass nebulizer.

Part Number	Description	Application
SC-EZ-F2	PFA adapter for glass nebulizers	Allows MEINHARD® Plus mixing kit to be used with other types of glass nebulizers



FAST Valves, Stators and Rotors

High Purity Valves

High purity valve stators and rotors provide a liquid path with low contamination and low carryover for the best ICP-MS results. The New P-Series valves feature PFA rotors, compression rings for easy assembly and Teflon® coated internal components. PFA rotors are durable, clean and chemically-resistant. CTFE stators offer high impact strength and chemical and corrosion resistance over a wide temperature range.

FAST Sample Injection 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 - P6 P/N: PF-P6

Description: P6 CTFE high-flow 6 port valve head for SC-FAST
Specifications: CTFE stator, PFA rotor, 1 mm, low maintenance
Applications: Standard FAST



7 Port Valve P/N: PF-P7 (CTFE stator)
PF-P7-8 (PPS stator)

Description: P7 CTFE high-flow 7 port valve head for SC-FAST
Specifications: CTFE stator, PFA rotor, 1 mm, 0.5 mm
Applications: Standard FAST, inline internal standard addition



8 Port Valve - P7+ P/N: PF-P7X

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



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, sample pre-loading, dual loop single carrier



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

NEW!
P-Series Valves

V-Series Syringe Loading Valves



6 Port Syringe Valve P/N: PF-V6

Description: 6 port syringe loading valve
Specifications: CTFE stator, PFA rotor, 1.0 mm
Applications: S200V syringe valve (not for sample injection)



9 Port Syringe Valve P/N: PF-V9

Description: 9 port syringe loading valve
Specifications: CTFE stator, PFA rotor, 1.0 mm
Applications: S400V syringe valve



12 Port Syringe Valve P/N: PF-V12

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

FAST Valves with Spare Rotors and Stators

P-SERIES VALVES WITH REPLACEMENT STATORS AND ROTORS

# of Ports	Bore Size	Stator Material	Rotor Material	P/N Complete Valve	P/N Stator	P/N Rotor
4 - P4	1 mm	CTFE	PFA	PF-P4	PF-P4S	PF-P4R
6 - P6	P6	CTFE	PFA	PF-P6	PF-P6S	PF-P6R
7 - P7	P7	CTFE	PFA	PF-P7	PF-P7S	PF-P6R
7 - P7	P7	PPS	PFA	PF-P7-8	PF-P7S-8	PF-P6R
8 - P7+	P7	CTFE	PFA	PF-P7X	PF-P7XS	PF-F6R
8 - P8	1 mm	CTFE	PFA	PF-P8	PF-P8S	PF-P8R
10 - P10	1 mm	CTFE	PFA	PF-P10	PF-P10S	PF-P10R
11-P11	1.0 mm	CTFE	PFA	PF-P11	PF-P11S	PF-P10R
11-A11b	A11b	CTFE	PFA	PF-A11b	PF-A11bS	PF-A11bR

V-SERIES VALVES WITH REPLACEMENT STATORS AND ROTORS

# of Ports	Bore Size	Stator Material	Rotor Material	P/N Complete Valve	P/N Stator	P/N Rotor
6	1.0 mm	CTFE	PFA	PF-V6	PF-V6S	PF-V6R
9	1.0 mm	CTFE	PFA	PF-V9	PF-V9S	PF-V9R
12	1.0 mm	CTFE	PFA	PF-V12	PF-V12S	PF-V12R
13	1.0 mm	CTFE	PFA	PF-V13	PF-V13S	PF-V13R

HIGH-FLOW VALVES 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	1.6 mm	PPS	Composite (PEEK/PTFE)	SC-0599-1032	SC-0599-1032-01	SC-0599-1032-05
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

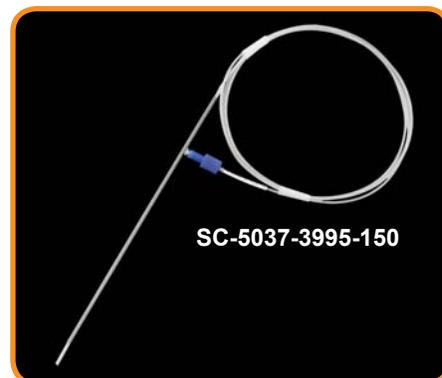
Autosampler Probes and Connectors

FAST Probes / Tees / SC-FAST Connecting Lines

Autosampler Probes for FAST

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

Part Number	Size	Description
SC-5037-3755-150	0.8 mm i.d. ■ (blue), 150 cm	PFA SC-FAST autosampler probe for high-flow SC-FAST valve, carbon fiber supported
SC-5037-3995-150	1.0 mm i.d. ■ (gray), 150 cm	



Spare Carrier or Internal Standard Probes

Part Number	Size	Description
SC-5037-3501	0.5 mm i.d. ■ (orange), 150 cm	PFA carrier liquid probe for SC-FAST valve
SC-5037-3503		PFA internal standard probe for use with standard addition tee or P7 FAST valve internal standard addition line



Internal Standard Addition Line for P7 FAST Valve

Connects the internal standard peripump tubing or probe to a P7 valve for online addition of internal standard.

Part Number	Description
SC-0317-450P-10	Internal standard line for P7 valve with XL fitting. 0.5 mm i.d. ■ (orange)



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	Description
SC-0317-1250	0.25 mm i.d. ■ (green) Attaches to port #3
SC-0317-1500	0.5 mm i.d. ■ (orange) Attaches to port #3



ESI PFA-ST Nebulizer

Elemental Scientific recommends using its PFA-ST or MEINHARD® nebulizer with the SC-FAST system for optimum throughput and performance. ESI also offers nebulizer lines for other nebulizers to improve their stabilization time and washout.

FAST Valve Nebulizer Lines for PFA-ST Nebulizers

FAST valve line that connects the P6, P7 or P7+ FAST valve to an ESI ST-nebulizer.

Part Number	Description
SC-0317-0250	0.25 mm i.d. ■ (green). Attaches to port #3 of the FAST valve.
SC-0317-0500	0.5 mm i.d. ■ (orange). Attaches to port #3 of the FAST valve.
PF-XT	0.3 mm i.d. ■ (yellow) with XL fitting.



ESI PFA-ST Nebulizer

FAST Valve Nebulizer Line for MEINHARD® Plus Nebulizers

Part Number	Fitting Type	Description
F-F2-25-14	F2	0.25 mm i.d. ■ (green), 14 cm. Attaches to port #3 of the FAST valve.
F-F2-50-14	F2	0.5 mm i.d. ■ (orange), 14 cm. Attaches to port #3 of the FAST valve.

F2 used with SILQ-50, TQP-50 and TRP-50 MEINHARD® Nebulizers

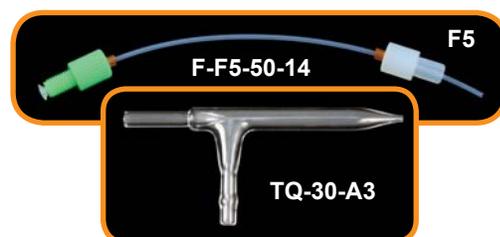


MEINHARD® Plus Nebulizer

FAST Valve Nebulizer Line for MEINHARD® Standard Nebulizers

Part Number	Fitting Type	Description
F-F5-25-14	F5	0.25 mm i.d. ■ (green), 14 cm. Attaches to port #3 of the FAST valve.
F-F5-50-14	F5	0.5 mm i.d. ■ (orange), 14 cm. Attaches to port #3 of the FAST valve.

F5 used with TQ-50-A0.5, TR-50-C0.5 and TQ-30-A3 MEINHARD® Nebulizers



MEINHARD® Standard Nebulizer

FAST Valve Nebulizer Line for PerkinElmer Gem Cone Nebulizer

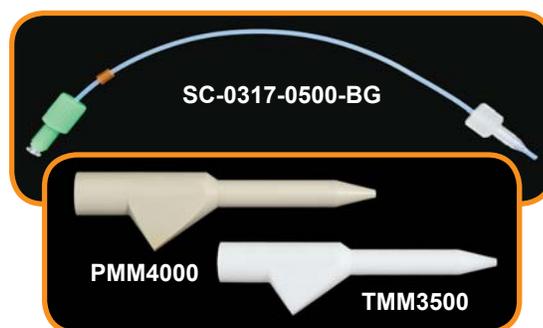
Part Number	Description
SC-0317-0500-GC	0.5 mm i.d. ■ (orange), 25 cm. Attaches to port #3 of the FAST valve.
SC-0317-0990-GC	1.0 mm i.d. ■ (gray), 25 cm. Attaches to port #3 of the FAST valve.



PerkinElmer Gem Cone Low-flow Nebulizer

FAST Valve Nebulizer Line for MIRA MIST Nebulizer

Part Number	Description
SC-0317-0500-BG	0.5 mm i.d. ■ (orange), 17 cm. Attaches to port #3 of the FAST valve.
SC-0317-0990-BG	1.0 mm i.d. ■ (gray), 17 cm. Attaches to port #3 of the FAST valve.



MIRA MIST PEEK and PTFE Nebulizers

Fittings, Tubing and Loops

Fittings / PFA Tubing / Spares Kits

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

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



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

Deluxe Spares Kits	
Part Number	Description
SC-0370-54	FAST Deluxe Spares Kit includes the contents of the Standard Spares Kit plus a PFA-ST nebulizer and spare P7 FAST valve.
PF-0370	prepFAST Deluxe Spares Kit includes the contents of the Standard Spares Kit plus a prepFAST PFA-ST nebulizer and spare P7+ FAST valve.



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	i.d.	Description
SC-0319-01	100 μ L loop	0.8 mm	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 μ L loop		



Standard for FAST Systems

SC-FAST High-Flow Sample Loops			
Part Number	Size	i.d.	Description
SC-0318-03	300 μ L loop	0.8 mm	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 μ L loop		
SC-0318-10	1.0 mL loop	1.0 mm	
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	i.d.	Description
SC-0315-60	6.0 mL loop	1.6 mm	High volume, 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-0315-80	8.0 mL loop		



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



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

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



Part Number	Qty
V-14-0309-X	10

Description
PFA cap for 14 mm micro vials



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

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



Part Number	Qty
V-15-0300-X	10

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



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

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



Part Number	Qty
V-15-0301-X	10

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



Part Number	Qty
ES-7225-0250	1

Description
ETFE tweezers for removal of PFA cap with knob



Vials	Fits Racks
V-14-0311CG	MR-21-14 (pg 75), MR-40-14 (pg 75), SR4-60-14 (pg 77)
V-14-0312CG	
V-14-0314CG	

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.

	Part Number	Description	Qty
	PFA-T16-X	16 mm o.d. PFA vial	10
	PFA-C16-X	PFA insert cap for 16 mm PFA vial	10
	PFA-PC16-X	PFA septum pierce cap for 16 mm PFA vial	10
	PFA-S16-C	PFA sheets for septum pierce cap and 16 mm PFA Tube	100
Volume			
			12 mL

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

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

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

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

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

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

	Part Number	Qty
	V-31-SC-X	10
Description		
Screw cap for 30 mm o.d. vials		



Bottles / Vials	Fits Racks
PFA-T16	LR-60-16 (pg 74), LMR-60-16-R (pg 74), SR2-80-16 (pg 76)
V-31-15	SR2-21-30 (pg 76), MR-10-30 (pg 75)
V-31-30	SR2-27-31 (pg 76), MR-10-30 (pg 75), ST10-31 (pg 78)
V-31-60	LR-21-30 (pg 74), LMR-21-30-R (pg 74), SR2-27-31 (pg 76), HR-21-30 (pg 75), ST10-31 (pg 78)
V-28-0360	SR2-27-28 (pg 76), ST10-28 (pg 78)
V-50-0360	SR2-12-50 (pg 76), ST2-9-50 (pg 78), ST4-9-50 (pg 79), SR4-20-50 (pg 77)

NEW!

2 mL PVDF Autosampler Vial

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

Elemental Scientific introduces new PVDF sample vials, a low-cost complement to our high-performance PFA vials. These high tensile strength, fluoropolymer vials can replace more expensive PFA vials in many applications.

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



VPC-14-0712
2 mL PVDF
autosampler vial



VPC-14-0712
2 mL PVDF autosampler
vial with PFA cap

Pre-cleaned PVDF Vials and Caps

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

Sample Vessels

Non-PFA Sample Vessels

Non-PFA Vials, Tubes and Bottles

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



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



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



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



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



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



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



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

Vials	Fits Racks
V-8-0505	MR-60-08 (pg 75), MR-90-08 (pg 75)
V-13-0200-R	LR-90-13-R (pg 74), LMR-90-13-R (pg 74), LMR-90-13-R-3T (pg 74), ST-PR-5 (pg 79)
V-20-0290	LR-40-20 (pg 74)
V-16-0225	LR-60-16 (pg 74), LMR-60-16-R (pg 74), SR2-80-16 (pg 76), ST-PR-5 (pg 79), HR-60-16 (pg 75)
V-28-0260	ST10-28 (pg 78), LR-21-30 (pg 74), LMR-21-30-R (pg 74), SR2-27-28 (pg 76), ST-PR-5 (pg 79), ST-EX-5 (pg 79), HR-21-30 (pg 75)
V-50-0460	SR4-20-50 (pg 77), SR2-12-50 (pg 76), ST-PR-5 (pg 79), ST2-9-50 (pg 78), ST4-9-50 (pg 79)
V-61-0661	SR4x-15-60 (pg 77), ST7-60 (pg 79), ST-PR-5 (pg 79), ST-EX-5 (pg 79)

Microtiter Plates

Microtiter Plates / Covers

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 DX



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-96-2mL-02	1 Pk (5 ea) 96 well, 2 mL microtiter plate, square well, pyramid bottom

Microtiter Plate Cover

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

Part Number	Qty	Description
MT-00-02	5	Polypropylene cover for microtiter plates



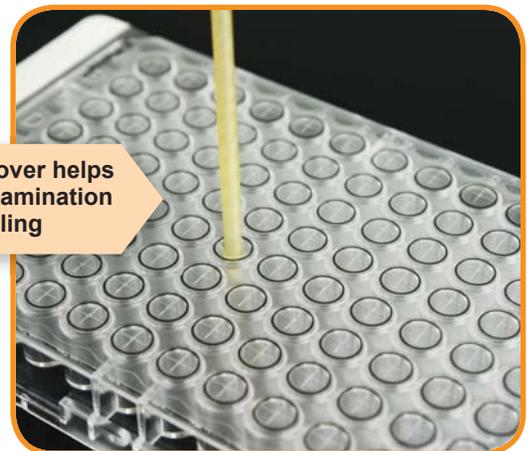
X-Piercing Film Cover / XP Probe Arm

X-Piercing Microtiter Plate and 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	Description
MT-96-XP	25	X-Piercing film cover for 96 well microtiter plate
MT-96-500-05-V	5	96-well, 500µL microtiter plate, polystyrene

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



CONSUMABLES

Large Autosampler Racks

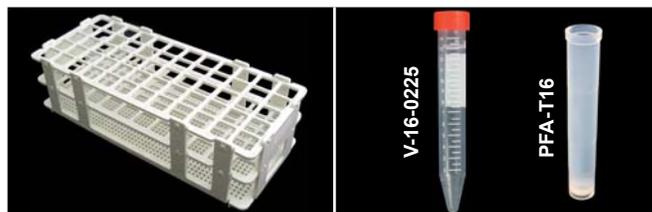
SC-Autosampler Racks (LR Size)

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



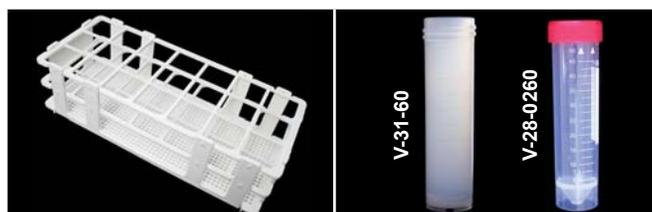
Part Number	Diam.	Description
LR-90-13-R	13 mm	90 position large sample rack for 8 mL tubes



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



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



Part Number	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.

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



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



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



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

Heated and Micro Autosampler 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



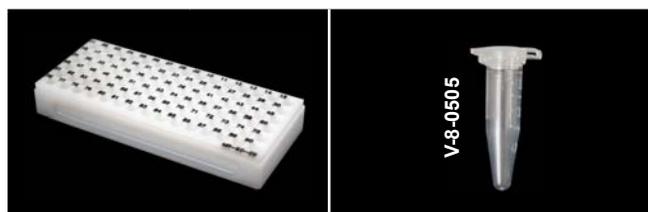
Part Number	Diam.	Description
HR-60-16	16 mm	60 position heated large sample rack for 15 mL tubes



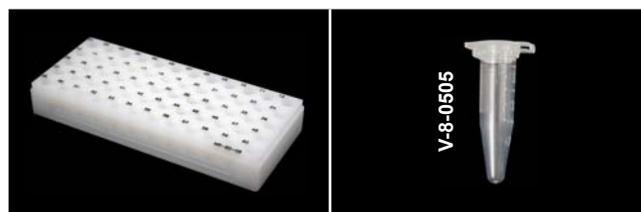
Part Number	Diam.	Description
HR-21-30	30 mm	21 position heated large sample rack for 50 mL and 60 mL tubes

SC-Autosampler Racks (MR Size)

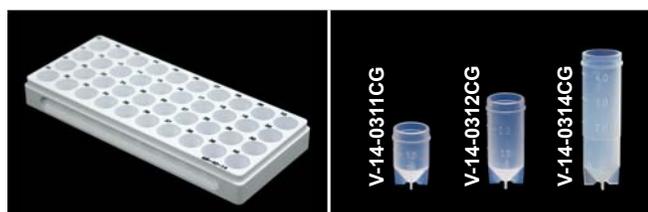
All MR racks can be used on the following Elemental Scientific autosamplers: SC-2, SC-4, SC-2 DX, SC-4 DX, SC-Micro DX



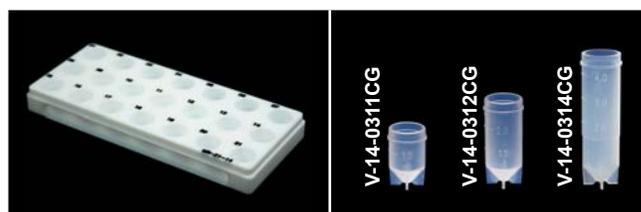
Part Number	Diam.	Description
MR-90-08	8 mm	90 position CPVC micro sample rack for 0.5 mL tubes



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



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



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



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



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

Super Autosampler Racks

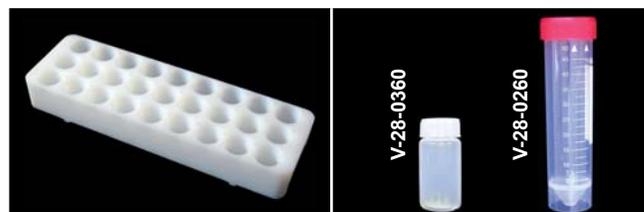
Large-volume samples can be analyzed using ESI super racks without transferring the sample to a smaller tube, reducing prep time and chance of contamination.

SC-Autosampler Racks (SR2 Size)

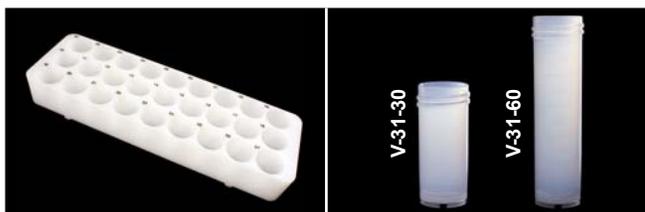
All SR2 racks can be used on the following ESI autosamplers: SC-2, SC-2 DX



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



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



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



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



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

SC-Autosampler Racks (SR4 Size, Type 1)

All SR4 racks can be used on the following ESI autosamplers: SC-2, SC-4, SC-2 DX, SC-4 DX



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



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

SC-Autosampler Racks (SR4 Size, Type 2)

All ST type 1 racks can be used on the following ESI autosamplers: SC-4, SC-4 DX



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



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



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



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

Standards Autosampler Racks

SC-Autosampler Racks (ST Size, Type 1)

All ST type 1 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 Number	Diam.	Description
ST10-28	28 mm	10 position standards rack for 20 mL and 50 mL tubes



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

SC-Autosampler Racks (ST Size, Type 2)

All ST type 3 racks can be used on the following ESI autosamplers: SC-2, SC-2 DX



Part Number	Diam.	Description
ST2-9-50	50 mm	9 position standards rack for 125 mL bottles. Recommended for prepFAST with SC-DX

SC-Autosampler Racks (ST Size, Type 3)

The ST type 2 rack can be used on the following ESI autosamplers: SC-4 DX, SC-14, SC-14 DX



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



Part Number	Diam.	Description
ST4-9-50	50 mm	9 position standards rack for 125 mL bottles. Recommended for prepFAST.

SC-Autosampler Racks (ST Size, Type 4)

The ST type 3 rack can be used on the following ESI autosamplers: SC-2 DX, SC-4 DX



Part Number	Diam.	Description
ST-PR-5	60 mm	5 position priority samples rack for 8 mL, 15 mL, 50 mL, 125 mL and 250 mL bottles. Fits over SC-DX rinse station.



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

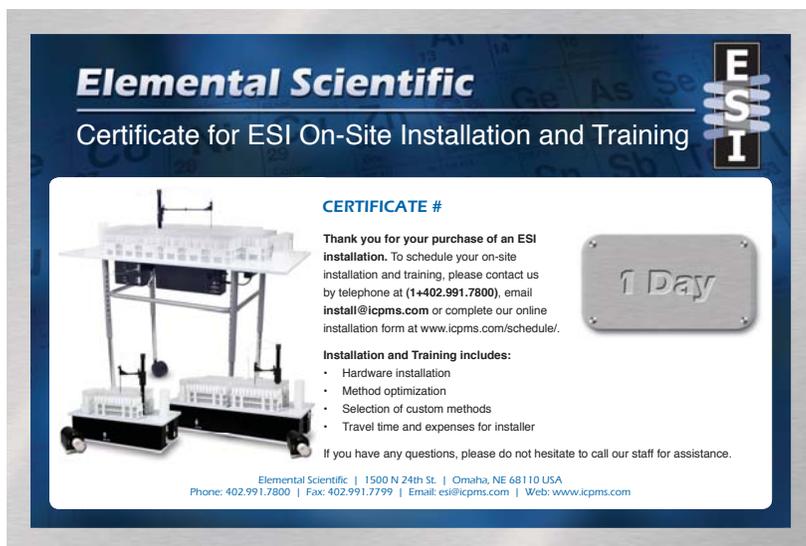
Installation and Training

Silver Level ESI Installation & Training

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

- Includes:** Hardware installation
 Software methods
 Basic system familiarization
 Travel time & expenses for ESI employee or contractor
 SC-FAST standard spares kit (SC-0380)

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



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, prepFAST or oneFAST on ICP-MS in US, Canada, or Western Europe.

- Includes:** Hardware installation
 Software methods
 Basic system familiarization
 Necessary method validation
 User Training
 Travel time & expenses for ESI employee or contractor
 SC-FAST deluxe spares kit (SC-0370-54)

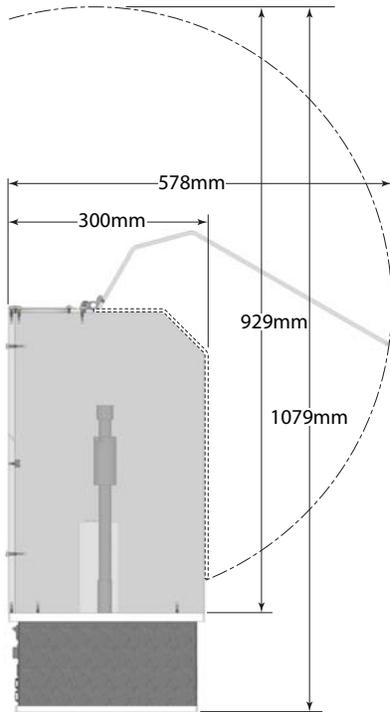
Part Number	Description
FI-SC-02-54	On-site 2½ day installation for SC-FAST systems
FI-PF-02	On-site 2½ day installation for prepFAST systems



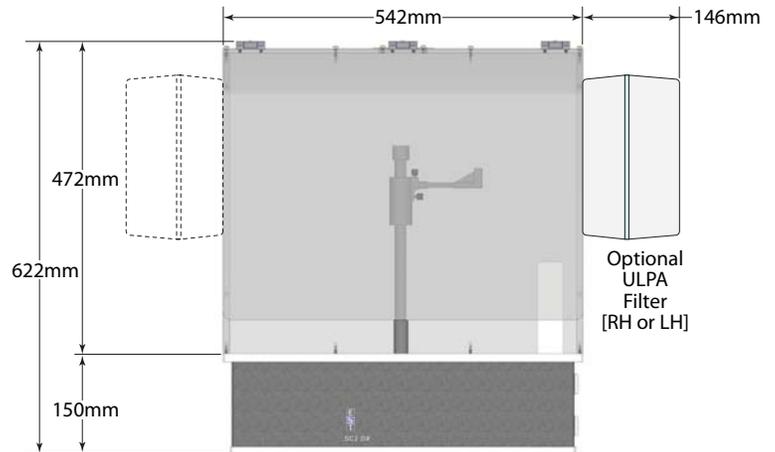
The SC-FAST and oneFAST Consumables/Spares Kit is included with the Gold Installation & Training.

Autosampler Dimensions

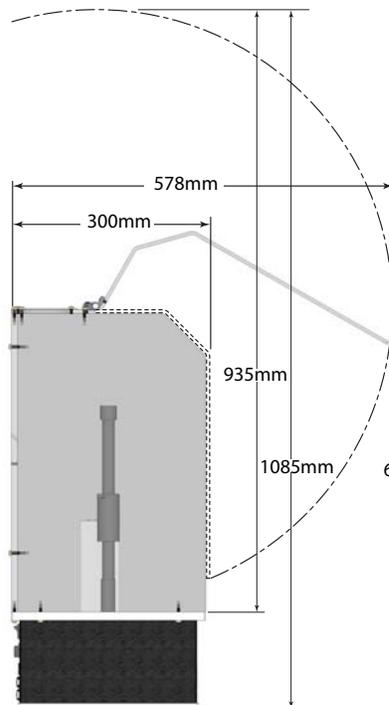
SC-2 DX Autosampler with Enclosure and ULPA Filter Dimensions



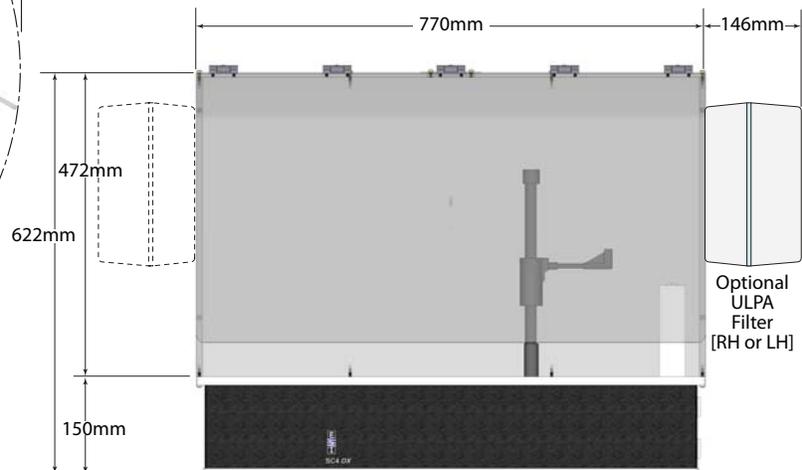
SC-2 DX Autosampler Enclosure with ULPA Filter (P/N: SC-1207-DX-1000)



SC-4 DX Autosampler with Enclosure and ULPA Filter Dimensions

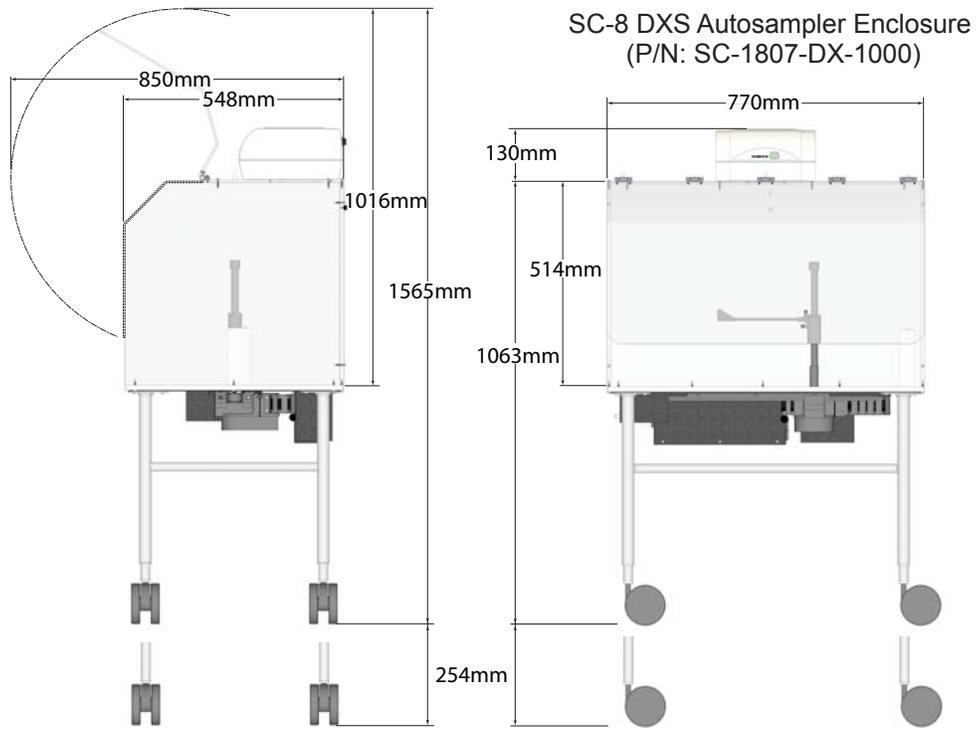


SC-4 DX Autosampler Enclosure with ULPA Filter (P/N: SC-1407-DX-1000)

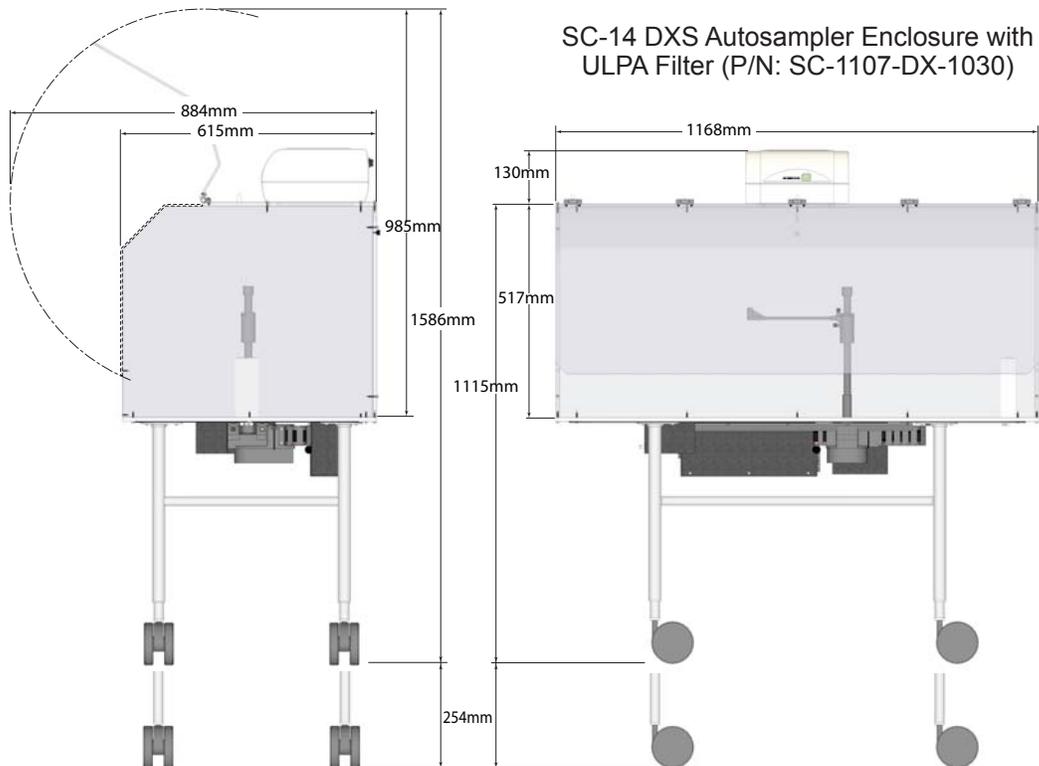


Autosampler Dimensions

SC-8 DXS Autosampler with Enclosure and ULPA Filter Dimensions



SC-14 DXS Autosampler with Enclosure and ULPA Filter Dimensions



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				Aluminum	Silicon	Phosphorus	Sulfur	Chlorine	Argon
58.9332	58.6934	63.546	65.39	69.723	72.61	74.92160	78.96	78.904	39.948
Co 27 Cobalt	Ni 28 Nickel	Cu 29 Copper	Zn 30 Zinc	Ga 31 Gallium	Ge 32 Germanium	As 33 Arsenic	Se 34 Selenium	Br 35 Bromine	Kr 36 Krypton
102.90550	106.42	107.8682	112.411	114.818	118.710	121.760	127.60	125.90447	131.904
Rh 45 Rhodium	Pd 46 Palladium	Ag 47 Silver	Cd 48 Cadmium	In 49 Indium	Sn 50 Tin	Sb 51 Antimony	Te 52 Tellurium	I 53 Iodine	Xe 54 Xenon
192.22	195.09	196.96655	200.59	204.3833	207.2	208.98038	(209)	(210)	(210)
Ir 77 Iridium	Pt 78 Platinum	Au 79 Gold	Hg 80 Mercury	Tl 81 Thallium	Pb 82 Lead	Bi 83 Bismuth	Po 84 Polonium		
(268)	(269)	(272)	(271)						

				Aluminum	Silicon	Phosphorus	Sulfur	Chlorine	Argon
58.9332	58.6934	63.546	65.39	69.723	72.61	74.92160	78.96	78.904	39.948
Co 27 Cobalt	Ni 28 Nickel	Cu 29 Copper	Zn 30 Zinc	Ga 31 Gallium	Ge 32 Germanium	As 33 Arsenic	Se 34 Selenium	Br 35 Bromine	Kr 36 Krypton
102.90550	106.42	107.8682	112.411	114.818	118.710	121.760	127.60	125.90447	131.904
Rh 45 Rhodium	Pd 46 Palladium	Ag 47 Silver	Cd 48 Cadmium	In 49 Indium	Sn 50 Tin	Sb 51 Antimony	Te 52 Tellurium	I 53 Iodine	Xe 54 Xenon
192.22	195.09	196.96655	200.59	204.3833	207.2	208.98038	(209)	(210)	(210)
Ir 77 Iridium	Pt 78 Platinum	Au 79 Gold	Hg 80 Mercury	Tl 81 Thallium	Pb 82 Lead	Bi 83 Bismuth	Po 84 Polonium		
(268)	(269)	(272)	(271)						