

## Nebulizers

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## Introduction to Glass Expansion Nebulizers

The nebulizer is a critical component of your ICP sample introduction system, so why not opt for the highest quality? Glass Expansion has been manufacturing ICP nebulizers since the early 1980s and continually updates nebulizer designs to improve performance and ease of use. Our proprietary designs include a thick walled VitriCone capillary, UniFit sample line connector and the Direct Connect (DC) product line.

Whether your ICP laboratory is analyzing clean aqueous samples, samples containing HF and/or high dissolved salts, or volatile organic solvents; Glass Expansion has a nebulizer to suit your needs. Learn about the performance advantages and overall difference in construction quality that a Glass Expansion nebulizer can provide your ICP laboratory.

## Nebulizer Types

Nebulizer	TDS (%)	Particulates (µm)	HF	Precision	Purity	Material
SeaSpray™ MicroMist™ Conikal™ Slurry™ Quartz SeaSpray™	20 15 5 1 20	75 40* 75 150 75	No No No No No	High High High High High	Good Good Good Good Excellent	Glass Glass Glass Glass Quartz
OpalMist™	15	75*	Yes	High	Excellent	PFA
DuraMist™	30	75*	Yes	High	Good	PEEK
VeeSpray™	30	300	Yes	Moderate	Good	Ceramic

\* Varies with nebulizer uptake

## Glass Expansion Nebulizer Part Numbers Explained

### Glass DC Nebulizers

#### Conikal

1mL/min uptake

A13-07-UC1



**A**#-yy-**ZZ**nnn

- A** Gas pressure rating of 40 psi
- #** Gasline fitting type eg:  
13 = Suitable for Agilent® 5000 Series
- yy** The argon flow in L/min eg. 07=0.7L/min
- ZZ** Nebulizer model type:  
UC = Conikal U-Series nebulizer  
US = Slurry U-Series nebulizer  
USS = SeaSpray U-Series nebulizer  
UM = MicroMist U-Series nebulizer  
CV = Ceramic VeeSpray v-groove nebulizer  
DM = DuraMist HF resistant nebulizer  
PFA = OpalMist PFA HF resistant nebulizer
- nnn** Aspirated uptake at nominal argon flow, in mL/min eg:  
UC1 = 1mL/min  
UM04 = 0.4mL/min  
PFA005 = 0.05mL/min

## Learn About Glass Expansion Nebulizers

All Glass Expansion concentric nebulizers use the unique VitriCone™ construction delivering the best possible precision.

### DC Nebulizer



The DC (Direct Connection) nebulizer has a UniFit sample connector which slides easily over the sample arm and an argon connector configured to connect directly to your ICP.

#### DC Nebulizer Benefits:

- Inert metal-free argon connector.
- Instrument-specific Direct Connect flexible argon line.
- Reliable ratchet fitting ensures leak-free gas connection.

DC versions of the SeaSpray, MicroMist, Conikal, Slurry, DuraMist, OpalMist and VeeSpray nebulizers are available to suit the most common models of ICP-OES and ICP-MS.

The DC nebulizer part number has a prefix specific to each type of gas connector. For example, the prefix “A13-” denotes a connector for the Agilent® 5000 ICP-OES Series, so part number A13-07-USS2 is a SeaSpray nebulizer configured for direct connection to the Agilent® 5000 Series.

#### In addition to these unique benefits, the DC nebulizer shares the following benefits with the U-Series nebulizer:

- Resists blockage: The sample channel is uniform from the entry point to the tip, so there is nowhere for particulates to be trapped.
- Fast washout: Since there is nowhere for sample to be trapped, the fastest possible washout and highest sample throughput is achieved.
- Simple to use: Our proprietary UniFit connector slides easily over the sample arm and creates an excellent seal.
- Full length VitriCone construction: With the VitriCone design, the sample channel is constructed from heavy glass capillary which is machined to very high tolerances.



### DC Nebulizer Gas Fitting Connectors

Agilent® Vista/700-ES, 4100/4200	70-803-0969
Agilent® 7700/7800/7900/8800/8900	70-803-1105
Agilent® 5000 ICP-OES Series	70-803-1105
Analytik Jena® ICP-MS	70-803-2002
Analytik Jena® ICP-OES	70-803-1105
Horiba® Jobin Yvon (All models)	70-803-1105
Leeman (All Models)	70-803-0969
Nu Instruments ICP-MS	70-803-1858
Nu Instruments TOF-ICP-MS	70-803-2044
PerkinElmer® ICP-OES	70-803-1070
PerkinElmer® Elan/NexION 300/350	70-803-1049
PerkinElmer® NexION 1000/2000/5000	70-803-1449
Radom MICAP – OES™ 1000	70-803-2054
Shimadzu® (All models)	70-803-1311
Spectro™ (All models)	70-803-1070
Thermo® PRO, 6000/7000, Q/RQ/TQ/RQ Plus, X-Series & Neoma	70-803-1105
Thermo® Neptune	70-803-1468

## U-Series Glass Concentric Nebulizers

SeaSpray, MicroMist, Conikal and Slurry U-Series nebulizers are available to suit all common models of ICP-OES and ICP-MS. Each U-Series nebulizer is supplied with a UniFit sample connector.

U-Series nebulizers can be identified by the letter 'U' in the part number, eg. ARG-07-USS2 or ARG-1-UM04.

All glass concentric nebulizers in this catalog are U-Series nebulizers.

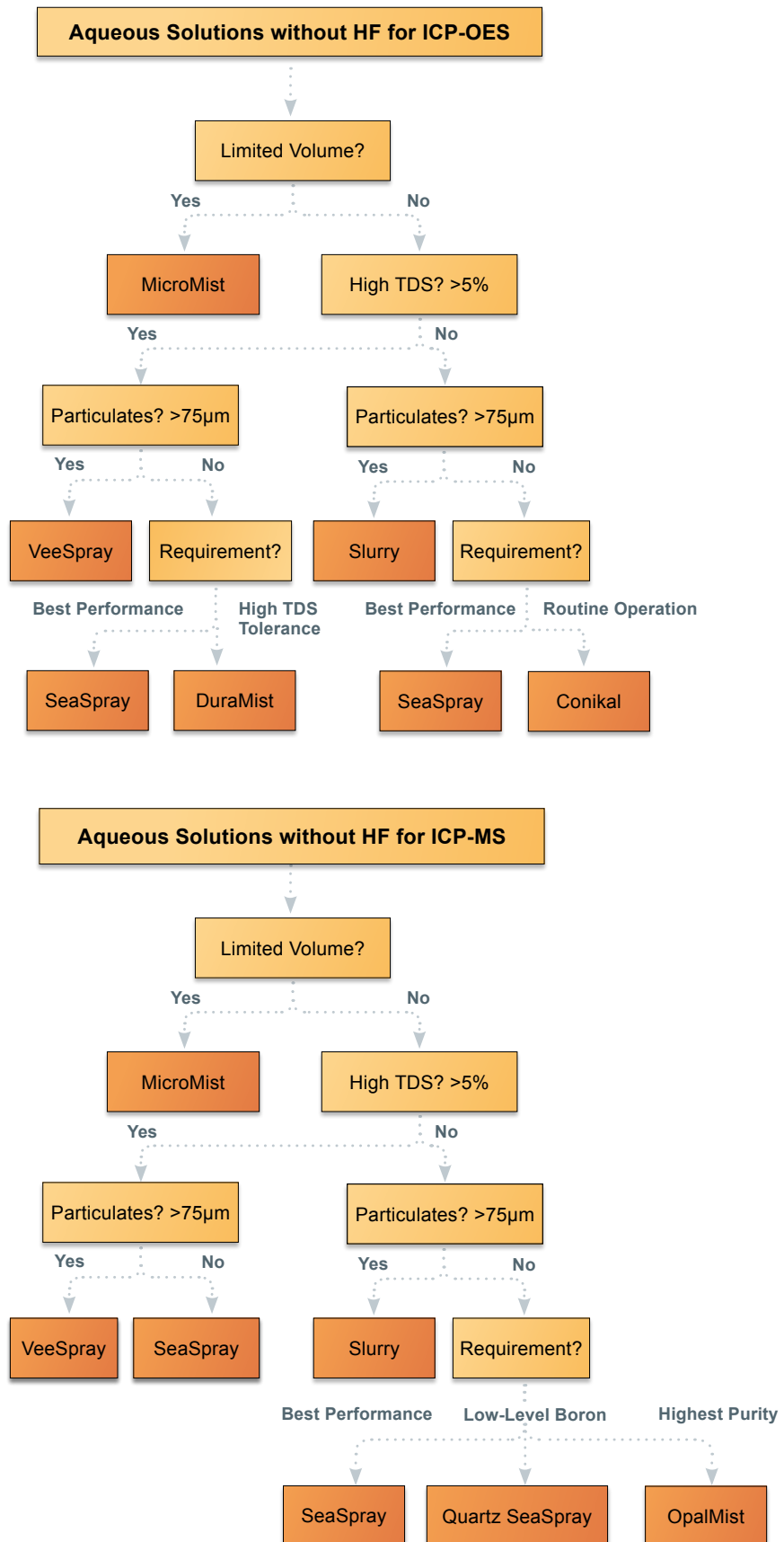


## Quartz SeaSpray DC Nebulizer

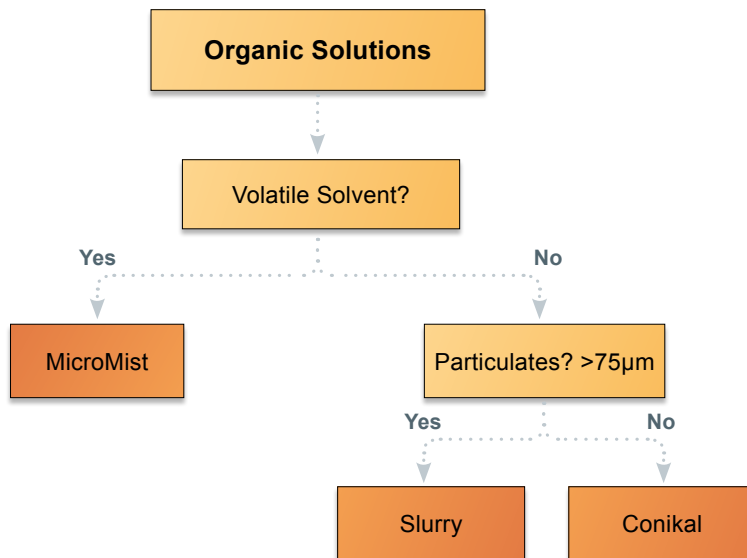
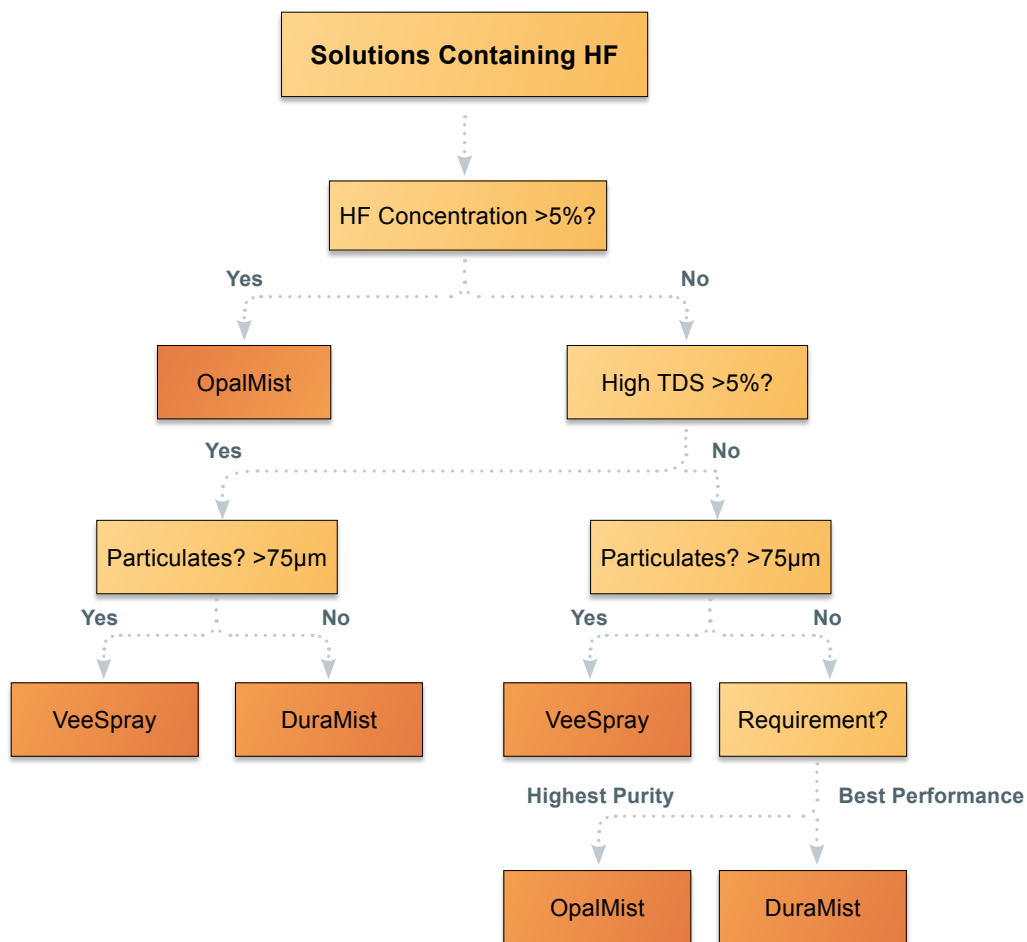
The Quartz SeaSpray DC nebulizer is made from ultra pure quartz and offers outstanding nebulization efficiency for trace level analyses. It offers freedom from clogging while nebulizing solutions to the limit of solubility of most mineral salts, and conferring significant sensitivity gains. It is specifically designed for ultra trace level analysis.



Nebulizer Selection Guide










## Nebulizer Selection Guide



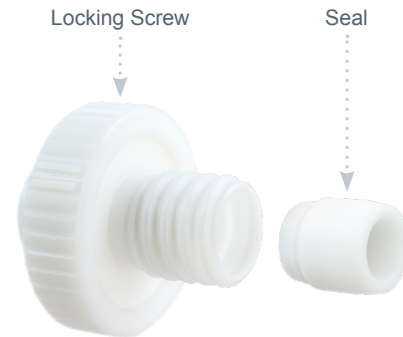
## Introduction to Glass Expansion Spray Chambers

The spray chamber is a crucial component of the ICP sample introduction system since it has a profound effect on transport efficiency, precision, and washout. Glass Expansion revolutionized the spray chamber design for the ICP industry with the Tracey and Twister cyclonic spray chamber, providing improved efficiency and reduced washout. Glass Expansion's unique Helix CT nebulizer interface, provides a zero dead volume seal that results in higher throughput compared to non-Glass Expansion designs.

### Spray Chamber Types

Tracey™		Internal Volume, mL: 50 Internal Baffle: No HF-resistant: No Precision: Very Good Purity: Good Material: Glass
Twister™		Internal Volume, mL: 50 Internal Baffle: Yes HF-resistant: No Precision: Excellent Purity: Good Material: Glass
Cinnabar™		Internal Volume, mL: 20 Internal Baffle: No HF-resistant: No Precision: Very Good Purity: Good Material: Glass
Twinnabar™		Internal Volume, mL: 20 Internal Baffle: Yes HF-resistant: No Precision: Very Good Purity: Good Material: Glass
Tracey™ TFE		Internal Volume, mL: 50 Internal Baffle: No HF-resistant: Yes Precision: Good Purity: Good Material: PTFE
Twister™ TFE		Internal Volume, mL: 50 Internal Baffle: Yes HF-resistant: Yes Precision: Very Good Purity: Good Material: PTFE
Tracey™ PFA44		Internal Volume, mL: 44 Internal Baffle: No HF-resistant: Yes Precision: Good Purity: Excellent Material: PFA

## Helix CT™ - The Modern Interface Between Nebulizer and Spray Chamber



Traditionally, ICP-OES and ICP-MS sample introduction systems have relied on o-rings to form a gas-tight seal between the nebulizer and spray chamber. There are several drawbacks with an o-ring seal, such as:

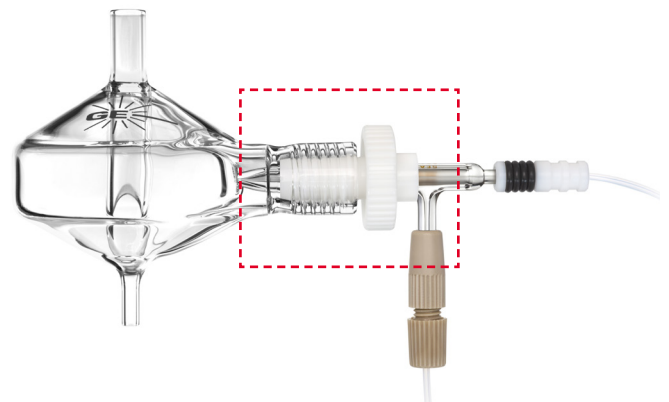
- Potential for contamination due to dead volume around the o-ring seal
- Chemical resistivity of strong acids and organic solvents
- The o-rings are difficult to replace, often requiring tools
- Bonding to the nebulizer can result in breakage

Glass Expansion Helix CT spray chamber with ConstantTorque™ technology, provides a constant, reproducible, inert, gas-tight seal between the nebulizer and spray chamber.

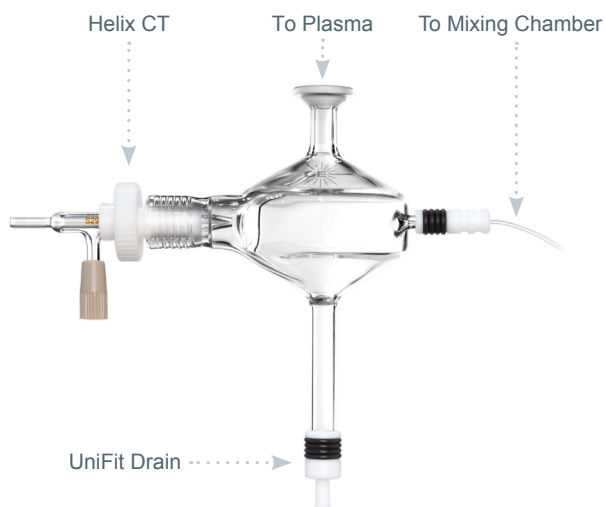
The main feature of the Helix CT spray chamber is the Helix locking screw with built-in torque control mechanism that allows for a consistent seal of the PTFE ferrule against the nebulizer –making it impossible to overtighten or undertighten while ensuring a gas-tight seal each and every time.

A PressFit PTFE ferrule provides a chemically inert seal around the nebulizer, which is immune to strong acids and organic solvents routinely used in ICP sample preparation.

The Helix CT cyclonic spray chamber by Glass Expansion, therefore, eliminates all the drawbacks of the o-ring nebulizer seal, while improving user safety by preventing broken nebulizers.



## HydraMist™ Simultaneous Cold Vapor/ Pneumatic Nebulization Spray Chamber



\* Note: Nebulizer is not included in HydraMist Kit.

The Glass Expansion HydraMist is a sensitive, simple-to-use spray chamber for Inductively Coupled Plasma (ICP) that allows simultaneous operation of both conventional pneumatic nebulization and cold-vapor/hydride generation. Cold vapor generation can provide more than 10-fold improvement in sensitivity on ICP for cold vapor forming elements such as As, Sb, Se, and Hg. The generation of volatile species of these elements results in increased analyte loading of the analytical plasma giving lower detection limits.

The design of the HydraMist spray chamber is based upon Glass Expansion's industry-standard cyclonic spray chamber, giving excellent sensitivity and short-term analytical precision with fast washout. The HydraMist spray chamber features a secondary inlet port that mixes the aerosolized sample and liquid reductant inside the spray chamber for rapid conversion of the As, Sb, Se, and Hg analytes into volatile hydride species. The unique drain design ensures fast, complete removal of waste from the spray chamber, eliminating excess hydrogen build-up that causes sample reflux degrading analytical precision.

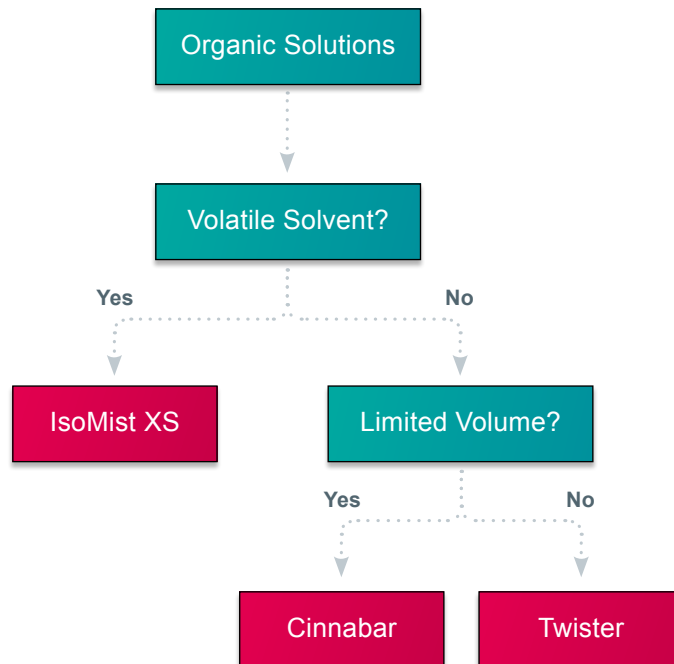
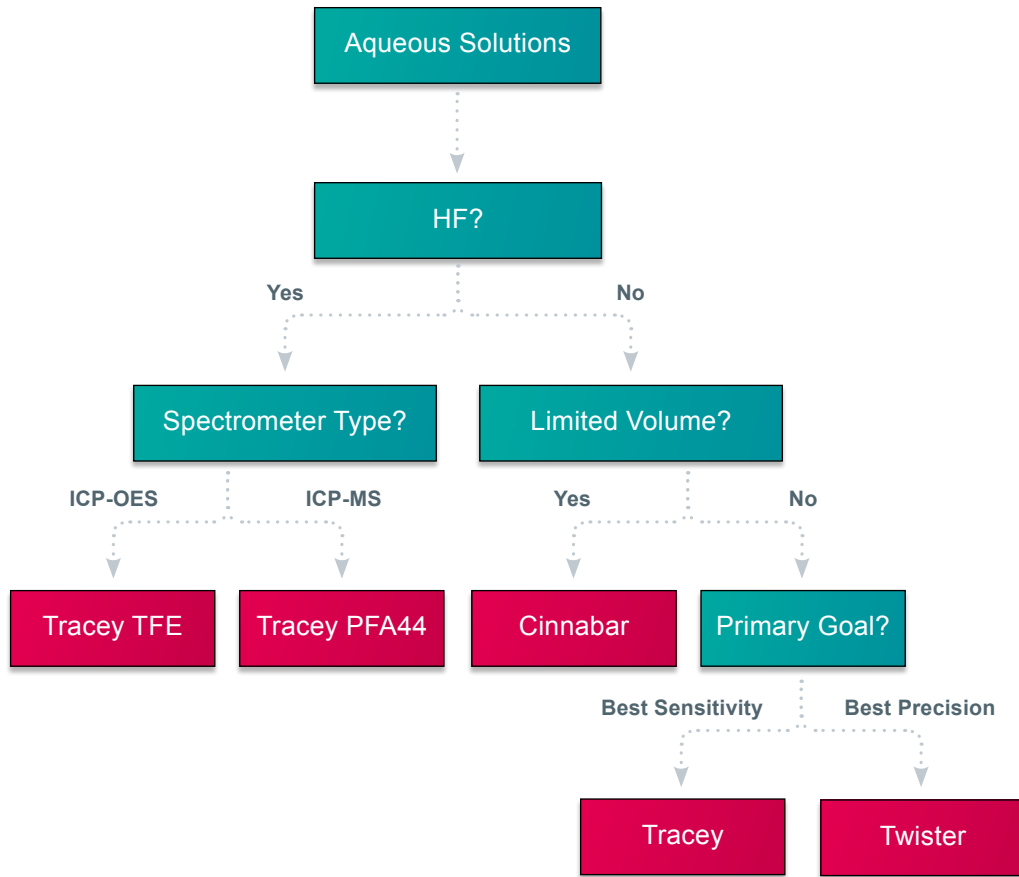
The HydraMist Spray Chamber Features:

- The same outstanding short-term analytical precision and washout as other Glass Expansion cyclonic spray chambers
- Fast and complete vapor phase formation of volatile As, Se, Sb, and Hg species for the best detection limits in hydride generation mode
- A unique drain design to eliminate hydrogen build-up and sample reflux that degrades short-term precision
- Economic, just replace your current spray chamber and keep your existing nebulizer
- Improve productivity by analysing non-hydride forming elements and cold vapor elements simultaneously, avoiding system shutdowns to change over between the hydride generator accessory and conventional pneumatic nebulization

### HydraMist Kit

HydraMist Kit	
Agilent® 5000 ICP-OES Series	KT-1157
Agilent® 7700/7800/7900/8900	KT-1168
Analytik Jena® PQ 9000	KT-1157
PerkinElmer® Avio 200/500	KT-1157
PerkinElmer® Avio with HTS system	KT-2742
PerkinElmer® Optima 8000/8300 DV	KT-1162
PerkinElmer® Optima 4000/5000/7000 DV	KT-1162
Shimadzu® ICPE 9000/9800	KT-1157
Spectro™ Arcos II SOP/EOP and Blue EOP/SOP	KT-1160
Thermo® PRO	KT-1160
Thermo® Duo 7600	KT-1156
Thermo® Duo 6000/7200/7400	KT-1179

Spray Chamber Selection Guide





## D-Torch™ (Demountable Torch)

The D-Torch is a revolutionary demountable torch design. It provides the benefits of a fully demountable torch at a significantly lower cost. Interchangeable outer tubes made of quartz or ceramic are available. The quartz tube is ideal for most aqueous applications and, since the outer tube is usually the first to wear, you can make a significant saving by replacing just the outer tube rather than the whole torch.

The ceramic outer tube is of particular benefit for the analysis of samples with high salt content or wear metals in engine oils, where quartz outer tubes often suffer from short lifetime. The ceramic outer tube has a much longer lifetime, greatly reducing interruptions and downtime due to torch failure. The D-Torch uses the same mounting system as the standard fixed torch so there is no additional cost or complexity to install it.

- Demountable outer tube – why replace the entire torch when just the outer tube wears?
- Interchangeable quartz and ceramic outer tubes.
- Much lower cost than other demountable torches.
- Interchangeable injectors for aqueous, organics, high dissolved solids or HF applications.

\* The D-Torch is covered by US Patent 8,232,500 B2

The D-Torch models suited for the Agilent® 5000 Series, PerkinElmer® Avio 200/500, Thermo® PRO and Spectro™ Arcos II and Blue incorporates the same easy to use, self-aligning and locking features of the standard torch in a robust cost effective design.

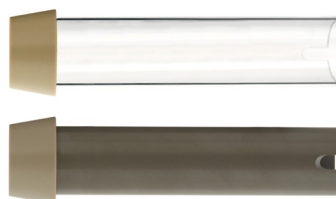
### Complete D-Torch



### Injectors



### Outer Tubes



### Torch Body



## Semi Demountable Torch



- Highly accurate construction
- Lower running cost than one-piece torches

Usually comprises a quartz torch body, a torch adaptor, an injector and GazFit connectors. All these parts are replaceable, making the semi demountable torch more cost effective than the fixed quartz torch. The design of the torch for standard analyses and HF analyses is the same, with only the injector material changing. For aqueous and organics analyses use a quartz injector, while for HF analyses use an alumina injector. Hence simply interchange between quartz and alumina injectors for appropriate analyses. Several internal diameters for both quartz and alumina injectors are also available.

## Fixed Quartz Torches (One Piece)



- Precise quartz construction
- Wide range held in stock
- Simple to use
- Lowest initial cost

## RF Coils – more efficient energy transfer



Glass Expansion Coils are produced from the highest quality raw materials and plated using prescribed methods to obtain maximum RF (Radio Frequency) transmission efficiency. There are numerous papers published on RF transmission with regard to conductor and coating resistance.

### Why Change your RF Coil?

- Regular replacement of corroded coils reduces the load on the RF generating system.
- Changing corroded coils increases energy transfer, resulting in a more robust plasma and generally higher analytical line intensities.

### Advantages of Glass Expansion RF Coils

- High quality and consistent plating of our coils promotes extended coil life.
- Each coil is supplied on a plastic former ensuring correct dimensions and easier installation.
- Each coil is supplied in a special protective container to ensure correct dimensions are maintained, and the coil arrives corrosion free.
- Correct alignment of the RF Coil with respect to the torch body reduces devitrification of the outer tube.
- Reusable alignment tools ensure correct installation every time. Our Do-it-yourself instructions saves time.

### Glass Expansion installation Kits for RF Coils

- Incorrect alignment of the torch in the coil will dramatically reduce torch life. The Glass Expansion Installation Kits help ensure correct alignment and maximum torch life.
- Correct alignment of the RF Coil with respect to the torch body reduces devitrification of the outer tube.
- Re-usable alignment tools are available separately to ensure correct installation of the coil every time.
- Our easy to follow Do-It-Yourself installation instructions save you time, and the cost of a service call.

### All kits contain:

- An Installation Kit – Aligns coil to torch mounting bracket.
- Required Spanner/s – Designed specifically for each instrument.
- USB - Do-It-Yourself instructions.



## ICP-MS Cones



Our ICP-MS interface cones are made from ultra-pure metals sourced from specialty smelters. Our highly experienced machinists use state of the art CNC machines and electron beam welding to provide cones with the finest tolerances for the highest quality.

We supply cones for all of the popular ICP-MS models and, to make sure you get all the support you need, we have a staff of technical experts and a fully equipped ICP-MS laboratory for testing and evaluation.

### No-risk guarantee:

As with all of our products, our cones are backed by our complete satisfaction guarantee.

### Refurbishment:

Extend the life of your platinum cones with our refurbishment program. In many cases, a platinum cone can be refurbished multiple times and its lifetime greatly extended.

### Platinum reclaim:

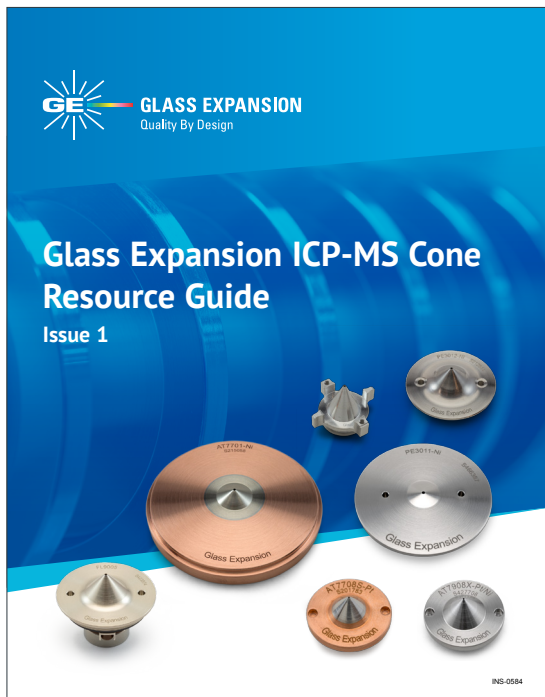
If your platinum cone cannot be refurbished, we will provide a rebate for the value of platinum in the cone.

### Coneguard

The ConeGuard Thread Protector protects the cone thread from corrosive cleaning solutions and greatly extends cone life.

## ICP-MS Cone Resource Guide

Our ICP-MS Cone Resource Guide answers all the questions you ever had about cones. It includes the “why” and “how” of selecting the right cones, details on the advantages of different cone materials, and tips on care and maintenance.



### Includes:

- About Glass Expansion ICP-MS Cones
- Platinum Cone Refurbishing
- Cone Material Guidelines
- Cones by ICP Model
- Cone Conditioning, Gasket & O-ring replacement guidelines
- Cone Maintenance

Scan the QR Code to view our ICP-MS Cone Resource Guide:



## IsoMist XS™ Programmable Temperature Spray Chamber



The IsoMist XS builds off the legacy IsoMist and IsoMist XR line of Glass Expansion's industry leading compact, programmable, temperature-controlled, cyclonic spray chambers. The IsoMist XS maintains the powerful electronic Peltier that enables cooling or heating the spray temperature in a range of  $-25^{\circ}\text{C}$  to  $+80^{\circ}\text{C}$ , programmable in  $1.0^{\circ}\text{C}$  increments, while maintaining a stability of  $\pm 0.1^{\circ}\text{C}$ .

The IsoMist XS programmable temperature controlled cyclonic spray chamber now features an improved thermodynamic design providing a faster cool-down, from ambient temperature,  $0^{\circ}\text{C}$  can be achieved in less than 15 minutes.

Two additional new design features to the IsoMist XS are a completely inert back plate, providing enhanced chemical resistivity and the software is now controlled via an ethernet cable enabling superior connectivity and control via the instrument PC.

### Improved Analytical Stability with Precise Temperature Control

Fluctuations in lab temperature affect sample viscosity and nebulization efficiency. Maintaining the sample introduction at a constant and stable temperature improves analytical reproducibility, enhances throughput, and lowers operating costs by reducing the need to re-run samples due to signal drift caused by temperature fluctuations. Temperature fluctuations in ICP analysis can cause baseline drift, impacting measurement accuracy. A stable temperature improves QC recoveries, eliminating the need for daily recalibrations and ensuring consistent results.

### Reduce Oxide Interferences in ICP-MS

The advantages of cooling a sample using a sub-ambient temperature spray chamber on an ICP-MS are well known. Maintaining a cooled sample within the spray chamber ensures less water vapor is transferred to the plasma, resulting in lower oxide formation and reduced polyatomic interferences – improving accuracy and detection limits. With the IsoMist XS you can fine tune that temperature setting in  $1^{\circ}\text{C}$  increments to create the most robust plasma conditions for your application.

### Perfect for Naphtha and Gasoline Analysis

When analyzing volatile organic solvents such as naphtha along with various types of fuels, a lower spray chamber temperature reduces transport efficiency avoiding quenching of the plasma from solvent over-loading. Having the capability to reach a stable temperature as low as  $-25^{\circ}\text{C}$ , allows for the analysis of highly volatile organic solvents and fuels without dilution, significantly improving limits of detection.

### Elevated Sample Introduction Temperatures Enhances Sensitivity

The sensitivity for many analyses can be enhanced by running the spray chamber at an elevated temperature, which improves transport efficiency by reducing droplet size. Increased transport efficiency is particularly important for samples with limited volume, such as, clinical, radioactive and forensic samples, in addition to precious metals. An elevated temperature can also be beneficial when analyzing food-based oils and lubricants by decreasing viscosity.

### Application Flexibility and Superior Design Innovation

The IsoMist XS incorporates Glass Expansion's proven Twister cyclonic spray chamber design, available in glass, quartz, and HF resistant, high-purity PFA. All of which are easily interchangeable, allowing for application flexibility should sample matrices change. All of Glass Expansion's cyclonic spray chambers, including the IsoMist XS feature the Helix CT interface. The Helix CT fitting is completely inert and carefully designed to fix the depth of penetration and torque of the nebulizer seal so that the aerosol produced is optimal. The Helix interface is also the only true zero-dead volume nebulizer/spray chamber interface providing unmatched washout efficiencies. These design innovations have provided Glass Expansion spray chamber sensitivity gains, reduced washout times and reduced matrix effects not possible with other spray chambers.



### Improved Connectivity

The IsoMist XS preserves the user friendly, stand-alone software control for easy start up and temperature control and monitoring. New to the IsoMist XS, is an Ethernet cable enabling superior connectivity and control via the instrument PC. An optional Ethernet to USB dongle is also provided if an Ethernet connection is not available.

### Elegant, Ergonomic and Compact

The compact design and customized kit allow the IsoMist XS to be compatible with virtually any ICP-OES or ICP-MS.

## Guardian™ In-Line Sample Filter

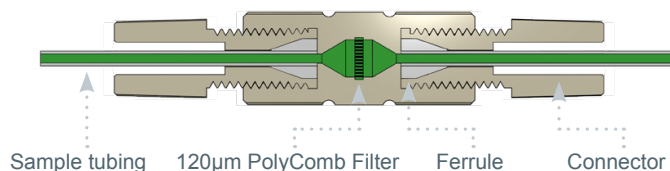


If there are particulates in your samples, there is a risk that they may get trapped in the narrow bore sample tubing or within the nebulizer. The Guardian In-Line Sample Filter provides a simple and effective way to eliminate this risk. This filter is easily inserted in the sample tubing between the autosampler probe and the nebulizer. It incorporates a 120 micron PolyComb filter and is suitable for use with 1/16 inch (1.6mm) OD or 1.3mm OD sample tubing.

The purpose-built clog-resistant design is ideal for ICP samples. Unlike sintered or frit style filters, the linear honeycomb structure makes the PolyComb filter resistant to clogging from particulates. Any particle build-up is easily removed by back-flushing using the Eluo Adaptor 70-803-1160. And the PEEK material is suitable for use with all of the most common ICP solutions.



Eluo Adapter For In-Line Filter



Guardian In-Line Sample Filter	
In-Line Filter	70-803-1108
Eluo Adaptor for In-Line Filter	70-803-1160
Replacement O-rings for Eluo Adaptor	70-V-009
Fitting Seal 1/16 (PKT 10)	70-803-0749
Fitting Seal 1.3mm (PKT 10)	70-803-0748
Ratchet Connector	70-803-1350

## Guardian™ In-Line Non-Return Gas Filter



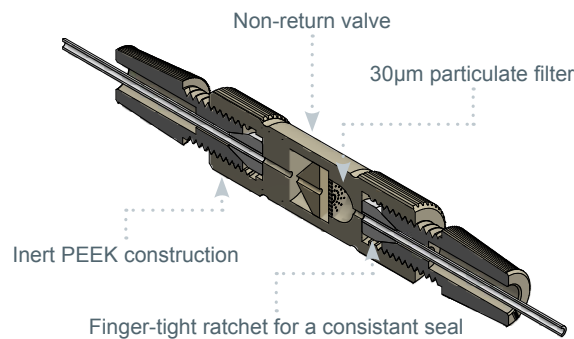
The new Guardian In-line Non-Return Gas Filter provides protection for your ICP system in two ways:

1. A non-return valve prevents acidified sample or rinse solution syphoning into the instrument gas box.
2. 30µm PolyComb filter protects the nebulizer from particulates in the instrument gas supply.

The Guardian In-line Non-Return Gas Filter is positioned between the Argon inlet on the Direct Connection nebulizer and the gas supply fitting on the instrument. The In-line Non-Return Filter has a one-way valve that allows argon to flow from the instrument into the nebulizer, but prevents liquid syphoning into the instrument. A unique PolyComb 30µm filter design protects the nebulizer from particulates from the gas supply or from worn or damaged fittings in the gas lines. Unlike Sintered or Frit style filters, the linear honeycomb structure makes PolyComb most resistant to particulate and dissolved solid clogging.

Syphoning of the sample or rinse solution into the nebulizer argon control module on your ICP can occur at the end of an analytical run when the nebulizer gas pressure is turned off and there is liquid in the sample flow path. It is made worse if the autosampler probe stays in the rinse position at the end of a run.

A real problem using an autosampler for unattended overnight runs, it is a silent, invisible killer of your ICP. Acidified solution in the instrument Argon control module can cause corrosion to electronic sensors in mass flow controllers and damage regulators that can result in expensive repairs to your ICP and un-planned down time.



Guardian In-Line Non-Return Gas Filter	
Guardian DC In-Line Non-Return Gas Filter	70-803-1942
Guardian In-Line Non-Return Gas Filter	70-803-1362

\*Choose P/N 70-803-1942 if using a DC nebulizer model.

## Eluo™ Nebulizer Cleaning Tool



### Cleaning your nebulizer is as easy as 1, 2, 3.

1. Fill your Eluo with Methanol.
2. Insert your nebulizer, tip first, into the Eluo.
3. Clean your nebulizer by pressing the Plunger down.

Particle build-up in a nebulizer capillary and tip causes sample flow to be constricted, reducing nebulizer efficiency and performance. Now, blocked nebulizers can be safely and easily restored to optimum performance with a revolutionary cleaning instrument – the Eluo.

The Eluo is designed to efficiently deliver a cleanser through the nebulizer capillary to dislodge particle build-up and thoroughly clean the nebulizer. One simple action does it all. No more messy procedures or shattered nebulizers in ultrasonic baths. Use the Eluo regularly to maintain nebulizer performance and prolong nebulizer life. Every lab should have an Eluo.

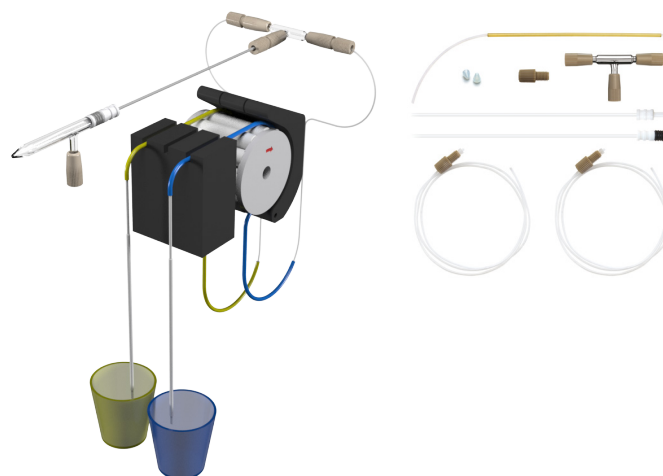
The Eluo can also be conveniently used to clean the Inline Particle Filter P/N 70-803-1108 with the addition of Adaptor P/N 70-803-1160.

We have found that using a dilute concentration of Fluka RBS-25 is the best cleaning solution. Stubborn clogs may require an overnight soak or additional cleaning with nitric acid.

### Eluo Nebulizer Cleaning Tool

Eluo for Glass concentric Nebulizers	70-ELUO
Eluo HF for OpalMist or DuraMist	70-ELUO-OPD
Eluo Barrel	703-0058
Eluo Plunger	70-703-0070
Eluo HF Nebulizer Holder	70-803-0932
Eluo Nebulizer Holder for Glass concentric Nebulizers	70-703-0069
Fluka RBS-25 concentrate	FLUKA25
O-ring Kit for Eluo (2 sets)	70-0806

## Trident CT™ In-Line Reagent Additions Kits



Internal standards are often used in ICP Spectrometry to improve stability. The internal standardization process involves the addition of a known concentration of a particular element to every sample and can be a very time-consuming procedure. The Glass Expansion Trident Kits allow the internal standard to be automatically mixed with each sample during sample introduction, saving considerable sample preparation time.

The Trident CT mixing chamber is based on the industry-proven design of the Trident, but with the addition of Glass Expansion's ConstantTorque (CT) to provide a simple-to-use, leak-free connection for both the internal standard and sample, every time.

The heart of the kit is the mixing chamber, designed with zero dead volume CT fittings. With other mixing chambers, worn or improperly fitted connections leak, inject a stream of air bubbles into the nebulizer flow, degrading short-term analytical precision (%RSD). By using CT ratchet-style fittings, the Trident CT eliminates air leaks, optimizing analytical performance.

### The Trident CT features:

- Compact, efficient mixing chamber ensures complete mixing of the sample and reagent.
- CT fittings for a durable, leak-free seal on all connections.
- Zero dead volume connections.
- Completely modular so that damaged or lost components can easily be replaced.

Check the Trident Dilution Factor Calculator on our website to find out the sample and internal standard dilution factors for selected combinations of pump tubing.

The peristaltic pump tubing is not supplied as part of the Internal Standard Kit but can be ordered separately.

### In-Line Reagent Additions Kits

Trident CT In-Line Reagent Additions Kit	60-703-1179
Trident Internal Standard Kit for HF (original design)	60-808-1150

## Elegra™ Argon Humidifier



Elegra

Elegra Dual

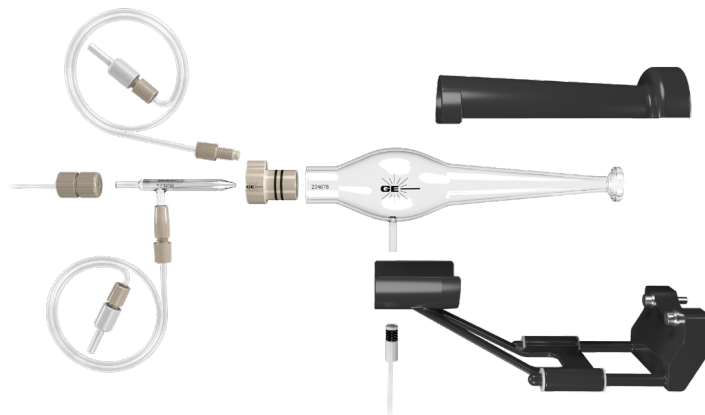
An Argon Humidifier is commonly used in ICP analyses involving samples with high concentrations of dissolved solids. It helps to alleviate salt deposits in the nebulizer and torch injector, allowing uninterrupted and maintenance-free operation.

- Compact, cost-effective design.
- No heating or electric power required.
- Non-pressurized water reservoir.
- An easy-to-use bypass switch allows you to take the Elegra off-line without disconnecting argon lines. (Not available with Elegra Dual)
- Highly efficient membrane humidification technology.
- Improved signal stability for samples with high TDS.
- Simple to install, use and maintain.
- Improves productivity by reducing down-time for cleaning.
- Inert metal-free construction eliminates contamination.
- Maximum and minimum fill marks ensure that you are always operating under optimum conditions.
- Compatible with all ICP-OES and ICP-MS models. Direct connection to argon outlet provided for most models.
- Elegra Dual two-channel configuration available for ICP-MS instruments using auxiliary argon.

### Elegra Argon Humidifier

O-ring for Capricorn or Elegra Cap (PKT 3)	70-V-225
Elegra Stand	70-803-1581
Elegra Membrane	70-803-1286
Elegra Reservoir	70-803-1257

## High Efficiency Sample Introduction System (HE-SIS)



Originally designed as a highly efficient single-cell sample introduction system, Glass Expansion's HE-SIS has been redesigned to provide superior performance across a wide variety of applications, including single-cell, single particle, nanoparticle, and low-volume sample studies, with up to 95% transport efficiency.

### Key HE-SIS Components

#### MicroMist™ High Efficiency (HE) Nebulizer

This specially designed concentric glass nebulizer is based on our popular MicroMist design, capable of efficiently nebulizing limited sample volumes at low sample and argon gas flow rates.

#### Patent-pending MicroJet™ Gas Adapter

Our patent-pending MicroJet gas adapter shapes the nebulizer aerosol plume to reduce sample deposition on the spray chamber walls and enhance transport efficiency.

#### Lotis™ High Efficiency (HE) Spray Chamber

The Lotis HE spray chamber directly couples to the ICP-MS torch, providing the highest transport efficiency and excellent washout between samples.

### High Efficiency Sample Introduction System

For Agilent® ICP-MS	KT-1155
For Thermo® Q/RQ/TQ ICP-MS	KT-1172
For Thermo® Neoma MC-ICP-MS	KT-1172
For TOFWERK icpTOF	KT-1172
For PerkinElmer® NexION 1000/2000/2200/5000	KT-1184
For PerkinElmer® NexION 300/350	KT-1204
For Nu ATTOM	KT-1205
For Thermo® X Series	KT-1213
For Thermo® Neptune/Element	KT-1215
For Nu Instruments® Vitesse TOF-ICP-MS	KT-1219

## Laser Ablation

P/N: 21-809-4309



P/N: 70-803-1600



P/N: 31-808-4034



P/N: 20-809-4550



P/N: 21-809-2801



P/N: 31-808-4289



P/N: 31-808-4107



P/N: 31-808-3863  
OD: 4mm  
ID: 2mm

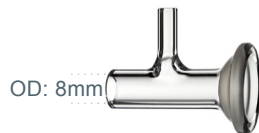


## S13 (13 mm) cup Adaptors

P/N: 31-800-1007  
ID: 4mm



P/N: 21-809-4140



P/N: 21-809-0965C  
OD: 6mm  
ID: 4mm



P/N: 31-808-3045  
OD: 4mm  
ID: 2mm



## GazFit Connectors



### GazFit Union Connectors (for rigid walled tubing)

GazFit Union 4mm (PKT.2)	GAZ-04U
GazFit Union 6mm (PKT.2)	GAZ-06U
GazFit Union 8mm (PKT.2)	GAZ-08U

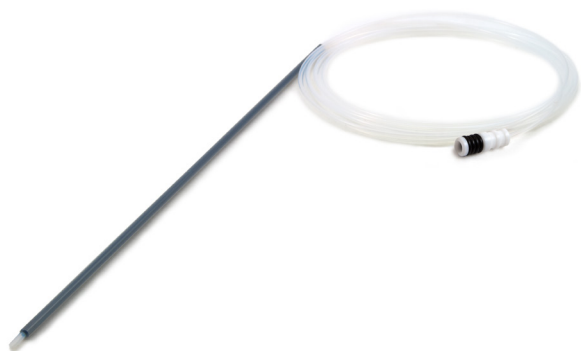


### Standard GazFit Connectors (for soft walled tubing)

GazFit Connectors for 4mm OD side arm (PKT.4)	GAZ-04
GazFit Connectors for 5mm OD side arm (PKT.4)	GAZ-05
GazFit Connectors for 6mm OD side arm (PKT.4)	GAZ-06
GazFit Connectors for 8mm OD arm (PKT.2)	GAZ-08
GazFit Connectors, 2 for 6mm OD side arms, 2 for 4mm OD side arms (PKT.4)	GAZ-0604
GazFit Connectors for 6mm OD side arm with connection for 1/8inch ID tubing (PKT.4)	GAZ-06-3.2B



## Autosampler Probes



### Suitable for Cetac ASX-200/500/800 Series and PerkinElmer S20 Series

PTFE Encapsulated Carbon Fibre Probe 0.25mm ID with EzyFit	70-803-1088
Polyimide sheathed Autosampler Probe 0.5mm ID	60-808-1186L
PTFE Encapsulated Carbon Fibre Probe 0.25mm ID	70-803-1523
PTFE Encapsulated Carbon Fibre Probe 0.5mm ID	70-803-0784
PTFE Encapsulated Carbon Fibre Probe 0.5mm ID with UniFit	70-803-1380
PTFE Encapsulated Carbon Fibre Probe 0.75mm ID with ratchet fitting	70-803-1443
PTFE Encapsulated Carbon Fibre Probe 0.75mm ID	70-803-1880
PTFE Encapsulated Carbon Fibre Probe 1.0mm ID with ratchet fitting	70-803-0793
PTFE Encapsulated Carbon Fibre Probe 1.0mm ID	70-803-1879

### For Cetac ASX 110

PFA sheathed Autosampler Probe 0.25mm ID with EzyFit	70-803-1072
PFA sheathed Autosampler Probe 0.25mm ID with UniFit	70-803-1073
PTFE Sheathed Carbon Fibre Probe 0.18mm ID with UniFit	70-803-1684
PTFE Encapsulated Carbon Fibre Probe 0.3mm ID with UniFit	70-803-1191
PTFE Encapsulated Carbon Fibre Probe 1.0mm ID	70-803-1182

### For Agilent® SPS 3/SPS 4

PTFE Encapsulated Carbon Fibre Probe 0.25mm ID	70-803-0910
PTFE Encapsulated Carbon Fibre Probe 0.50mm ID	70-803-0909
PTFE Encapsulated Carbon Fibre Probe 0.75mm ID	70-803-0908
PTFE Encapsulated Carbon Fibre Probe 1.0mm ID	70-803-0853

### For Agilent® I-AS

PTFE Encapsulated Carbon Fibre Probe 0.25mm ID with UniFit, 1100mm total length	60-703-1010
PTFE Encapsulated Carbon Fibre Probe 0.3mm ID with UniFit, 686 mm total length	60-703-1009
PTFE Encapsulated Carbon Fibre Probe 1.0mm ID	60-703-0533

### For PerkinElmer® S10 or AS93+

PTFE Encapsulated Carbon Fibre Probe 0.25mm ID	70-803-1071
PTFE Encapsulated Carbon Fibre Probe 0.5mm ID with UniFit	70-803-0991
PTFE Encapsulated Carbon Fibre Probe 0.5mm ID	70-803-1440
PTFE Encapsulated Carbon Fibre Probe 1.0mm ID	70-803-0816

### For Shimadzu®

PTFE Encapsulated Carbon Fibre Probe 0.3mm ID with UniFit, for Shimadzu® ASC-6100F/9800	70-803-1200
PTFE Sheathed Carbon Fibre Probe 0.75mm ID with UniFit, for Shimadzu® AS-10	70-803-1477

## Guardian™ Autosampler Probes

The unique design of the robust tip—which combines drip-resistance and built-in particle filtering—helps to prevent cross-contamination during probe movement and blockages in your nebulizer and capillary tubing. Constructed entirely from PEEK and PFA, the Guardian autosampler probe also provides exceptional resistance to strong acids and solvents. The Guardian probe has an ID of 1.0mm, with interchangeable UniFit sample capillaries that are available in IDs of 0.3, 0.50, 0.75 and 1.0mm.



### Benefits:

- Robust tip design eliminates crushed and damaged tips due to misalignment.
- Drip-resistance prevents cross contamination of samples, especially with oils.
- Built-in particle filtering holds back particulates from blocking the line.
- Completely inert design, all PEEK and PTFE construction.
- Interchangeable UniFit sample lines available in various IDs (e.g. 0.3, 0.50, 0.75 & 1.0mm)
- Designed to suit Teledyne Cetac, AimLab & Agilent SPS3 /SPS4 Autosamplers.

### Suitable for Cetac, Aim Lab and Agilent SPS3 / SPS4 Autosamplers

Guardian Probe for SPS3/SPS4/AIMS, 0.75mm Probe Connecting Line (Red)	70-803-1957
Guardian Probe Cetac ASX-200/500/800, 0.75mm Probe Connecting Line (Red)	70-803-1803

### Guardian Probe only

Guardian Probe for SPS3/SPS4/AIMS	70-803-2008
Guardian Probe for Cetac ASX-200/500/800 Series	70-803-1787
Guardian Probe for Cetac ASX-112FR	70-803-2029

### Probe Connecting Lines for SPS3/SPS4/AIMS & Cetac ASX-200/500/800

Probe Connecting line 1.0mm ID (Green)	70-803-1721
Probe Connecting Line 0.75mm ID (Red)	70-803-1714
Probe Connecting Line 0.5mm ID (Blue)	70-803-1852
Probe Connecting Line 0.3mm ID (Black)	70-803-1853

### Probe Connecting Lines for ASX-112FR

Probe Connecting Line 0.18mm ID (Black)	70-803-2030
Probe Connecting Line 0.18mm ID with EzyFit (Green/Black)	70-803-2085