# Contents



**Note: Clicking on the part numbers (PN) in this document will redirect you to our website for additional information.**

# 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™ |  | 20 | 75 | No | High | Good | Glass |
| MicroMist™ | | 15 | 40* | No | High | Good | Glass |
| Conikal™ | | 5 | 75 | No | High | Good | Glass |
| Slurry™ | | 1 | 150 | No | High | Good | Glass |
| Quartz SeaSpray™ | | 20 | 75 | No | High | Excellent | 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

## Understanding Nebulizer Part Numbers

**Example:** MicroMist DC Nebulizer 0.2mL/min

| A | 1 | 3 | 0 | 7 | U | M | 0 | 2 |
|---|---|---|---|---|---|---|---|---|

**Prefix denoting the type of gas connector to suit ICP model**
e.g. A13 = Agilent®

**Argon flow in L/min**
e.g. 07 = 0.7L/min
1 = 1L/min

**Nebulizer model type**
e.g. UM = MicroMist U-Series

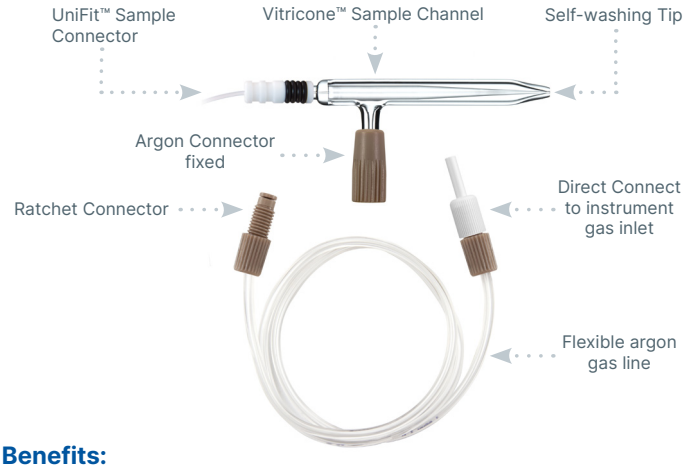
**UC** = Conikial U-Series
**US** = Slurry U-Series
**UM** = MicroMist U-Series
**CV** = Ceramic Veespray V-Groove
**DM** = DuraMist HF Resistant
**USS** = SeaSpray U-Series
**PFA** = OpalMist PFA HF Resistant

**Aspirated uptake at nominal argon flow, in mL/min**
e.g. 02 = 0.2mL/min
1 = 1mL/min

# Learn About Glass Expansion Nebulizers

## DC Nebulizers

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.




### 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.

## 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.


# DC Nebulizer Gas Fitting Connectors

| Manufacturer | Model | P/N Prefix | Gas Line Included | |
|---|---|---|---|---|
| Agilent Technologies® | 4100/4200 | MP11- | 70-803-0969 |  |
| Agilent Technologies® | Vista/700-ES | A11- | 70-803-0969 |  |
| Agilent Technologies® | 7700/7800/7850/7900/8800/8900 | A13- | 70-803-1105 |  |
| Agilent Technologies® | 5000 Series | A13- | 70-803-1105 |  |
| Analytik Jena® | ICP-MS | A61- | 70-803-2002 |  |
| Analytik Jena® | ICP-OES | A13- | 70-803-1105 |  |
| Horiba® Jobin Yvon | All Models | A13- | 70-803-1105 |  |
| Leeman | All Models | A11- | 70-803-0969 |  |
| Nu Instruments | ICP-MS | A51- | 70-803-1858 |  |
| Nu Instruments | TOF-ICP-MS | A52- | 70-803-2044 |  |
| PerkinElmer® | ICP-OES | A21- | 70-803-1070 |  |
| PerkinElmer® | Elan/NexION 300/350 | A22- | 70-803-1049 |  |
| PerkinElmer® | NexION 1000, 1100, 2000, 2200, 5000 | A23- | 70-803-1449 |  |
| Radom | MICAP® – OES™ 1000 | A70- | 70-803-2054 |  |
| Shimadzu® | All Models | A41- | 70-803-1311 |  |
| Spectro™ | All Models | A21- | 70-803-1070 |  |
| Standard BioTools™ (Fluidigm) | Helios | A21- | 70-803-1070 |  |
| Thermo Scientific™ | PRO, 6000/7000, Q/RQ/TQ/RQ Plus, X-Series & Neoma | A31- | 70-803-1105 |  |
| Thermo Scientific™ | Neptune | A11- | 70-803-0969 |  |

## 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.

The difference between the U series nebulizer and DC nebulizers lies solely in the argon gas connector. The U series nebulizer features the EzyLok argon connector, while DC nebulizers utilize advanced direct connect (DC) argon fittings. The inert, metal-free DC argon gas fittings and Ratchet Connector ensure reliable, reproducible, and leak-free connections, keeping analyses contaminant-free.

## Nexus™ Universal Nebulizer Connection Kit

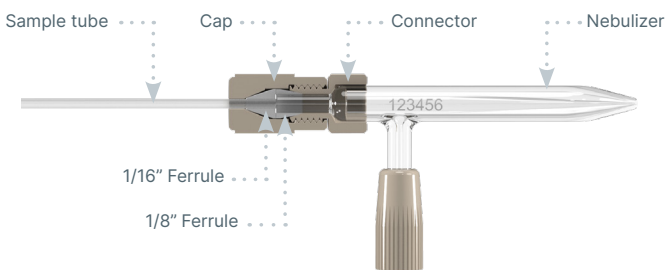
The Nexus™ Universal Connection Kit is a one-size-fits-all nebulizer connection kit which enables you to use any of Glass Expansion's industry-leading concentric nebulizers* with the sample introduction configuration of your choice, including switching valves, chromatographs (LC, HPLC, IC, etc.), and other high-performance accessories:

- **Switching Valves:** Simple and reliable custom-length connections to all high-throughput valve or syringe-drive systems.
- **Speciation Analysis:** Zero-dead-volume and secure, high-pressure connection for hyphenated techniques, such as LC-ICP-MS, HPLC-ICP-MS, IC-ICP-MS, and FFF-ICP-MS.
- **High-Efficiency Sample Introduction System (HE-SIS):** Connect to Glass Expansion's HE-SIS, which provides up to 95% transport efficiency for a variety of applications.
- **High-Precision Analysis:** Create a high-pressure seal when performing self-aspiration for the most stable sample uptake and delivery.

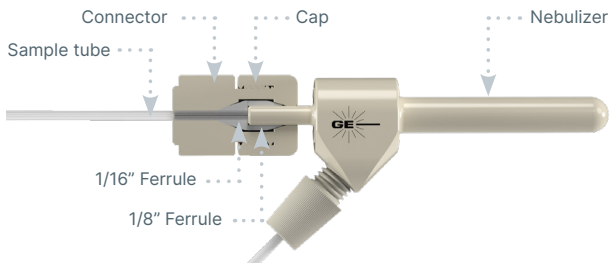
These easy-to-install kits are completely inert and configured for 1.6 mm (1/16") OD tubing, with PTFE ferrules that reliably seal with all commonly used capillary tubing materials, such as PFA, PTFE, FEP and PEEK. They provide a secure, zero-dead-volume direct connection to the liquid interface of a Glass Expansion nebulizer.

| Nexus™ Universal Nebulizer Connection Kits | |
|---|---|
| Nexus™ Universal Connection Kit for all Glass Concentric U-Series or DC nebulizers | FT-16-8 |
| Nexus™ Universal Connection Kit for Inert nebulizers | FT-16-8-X |
| Nebulizer Sample Connecting Line Kit (0.18mm ID x 220mm) | 70-803-2112 |
| Connector Tube with 1/4-28 fitting 0.25mm ID x 700mm (PKT. 3) | 70-803-1870 |
| Connector Tube with 1/4-28 fitting 0.50mm ID x 700mm (PKT. 3) | 70-803-1871 |
| Replacement Flangeless Tefzel Ferrule 1.6mm for FT-16-8 and FT-16-8-X (PKT 10) | 70-803-1315 |
| Replacement Flangeless Tefzel Ferrule 1/8 inch for FT-16-8 (PKT 10) | 70-803-1316 |
| Replacement Flangeless Tefzel Ferrule 1/8 inch for FT-16-8-X (PKT 10) | 70-803-1513 |

### P/N FT-16-8

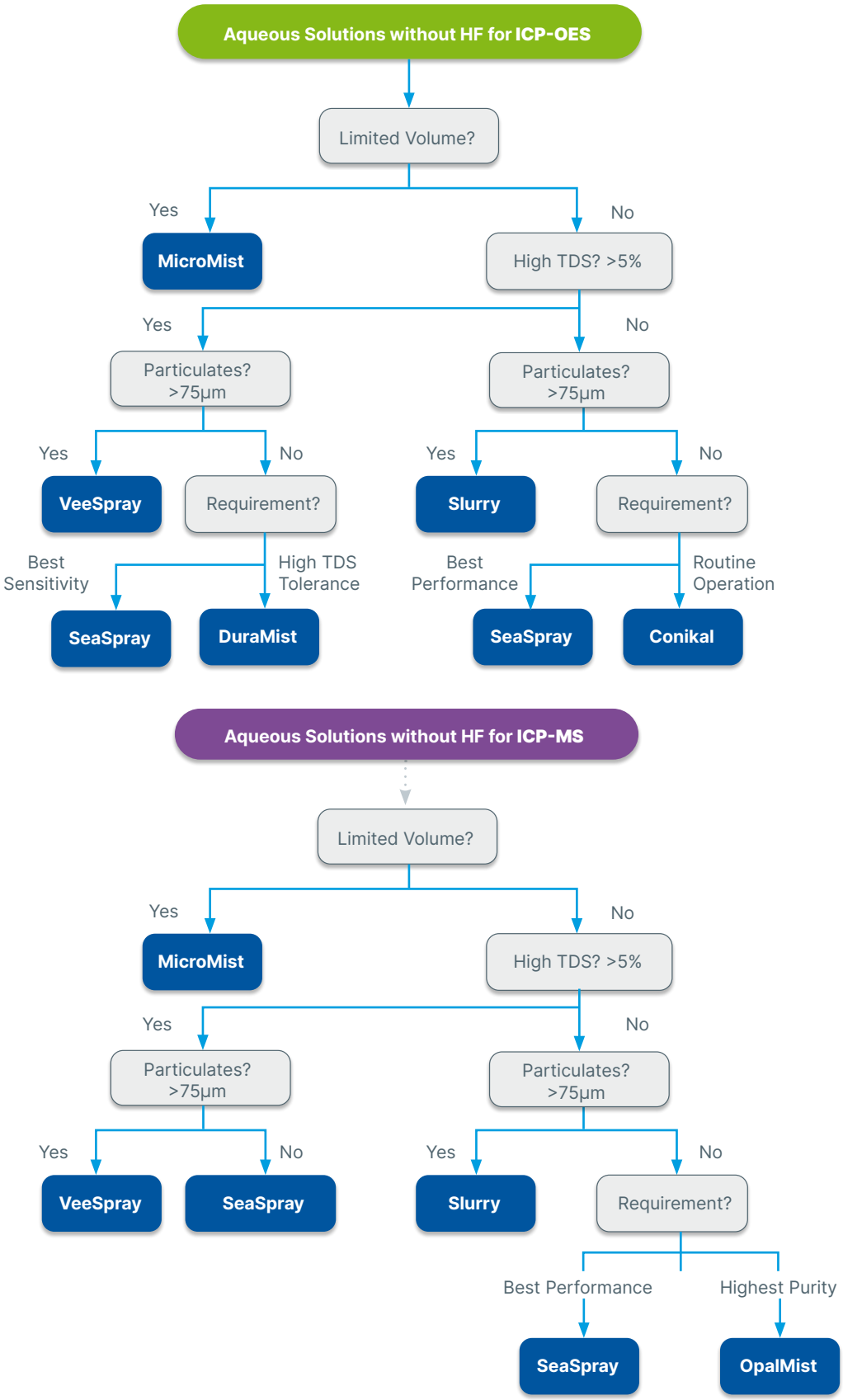



### P/N FT-16-8-X

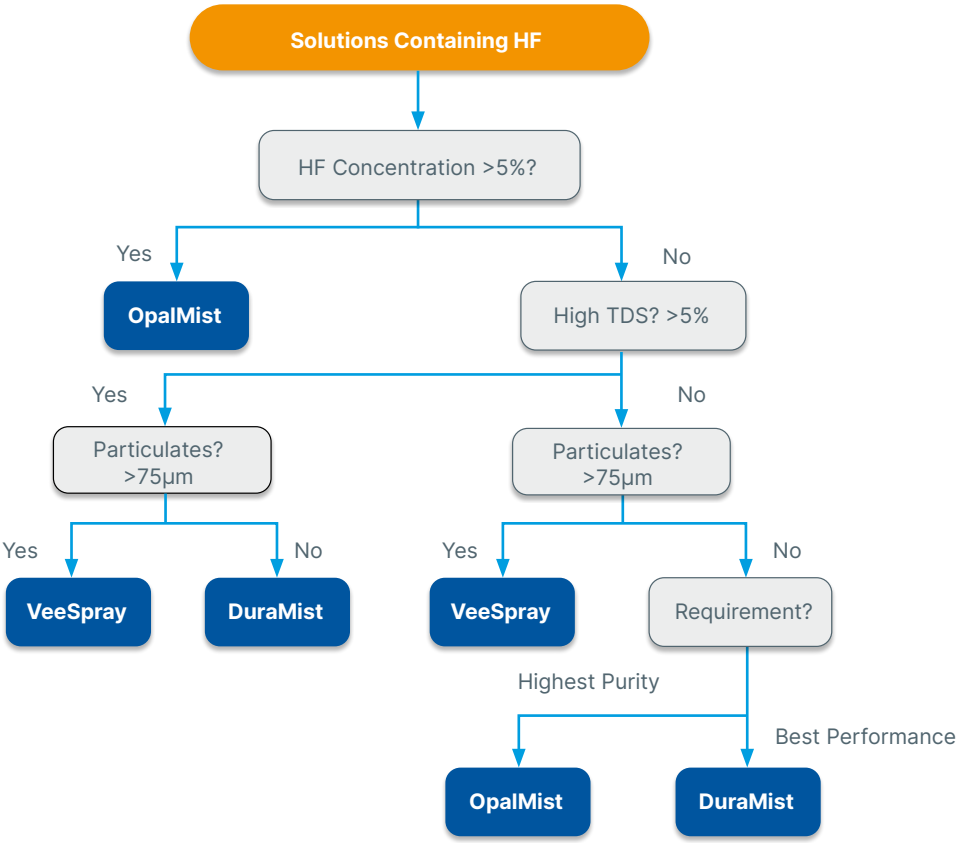


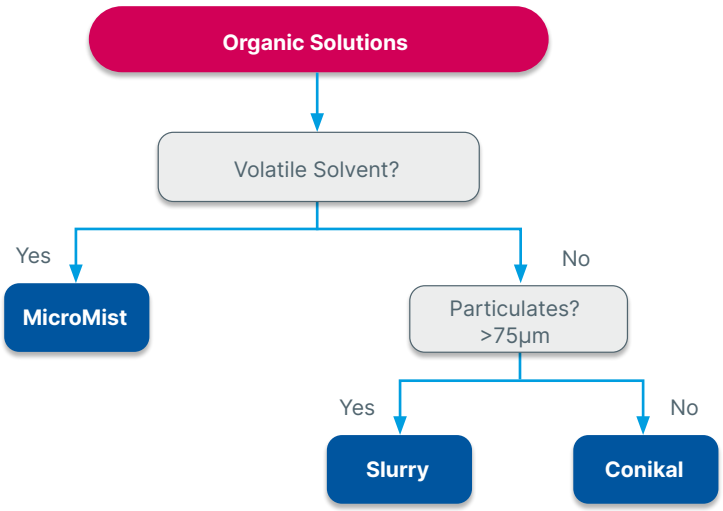

*The Nexus™ Universal Connection Kit is designed for U-Series (ARG) and DC (A##) nebulizers. It is not compatible with the older EzyFit (AR##) nebulizers.

# 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

### DC Tracey™

| | |
|---|---|
| Internal Volume, mL: | 30 |
| 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™

| | |
|---|---|
| Internal Volume, mL: | 50 |
| Internal Baffle: | No |
| 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™

| | |
|---|---|
| Internal Volume, mL: | 50 |
| Internal Baffle: | Yes |
| HF-resistant: | No |
| Precision: | Excellent |
| Purity: | Good |
| Material: | Glass |

### Twister™ TFE

| | |
|---|---|
| Internal Volume, mL: | 50 |
| Internal Baffle: | Yes |
| HF-resistant: | Yes |
| Precision: | Very Good |
| Purity: | Good |
| Material: | PTFE |

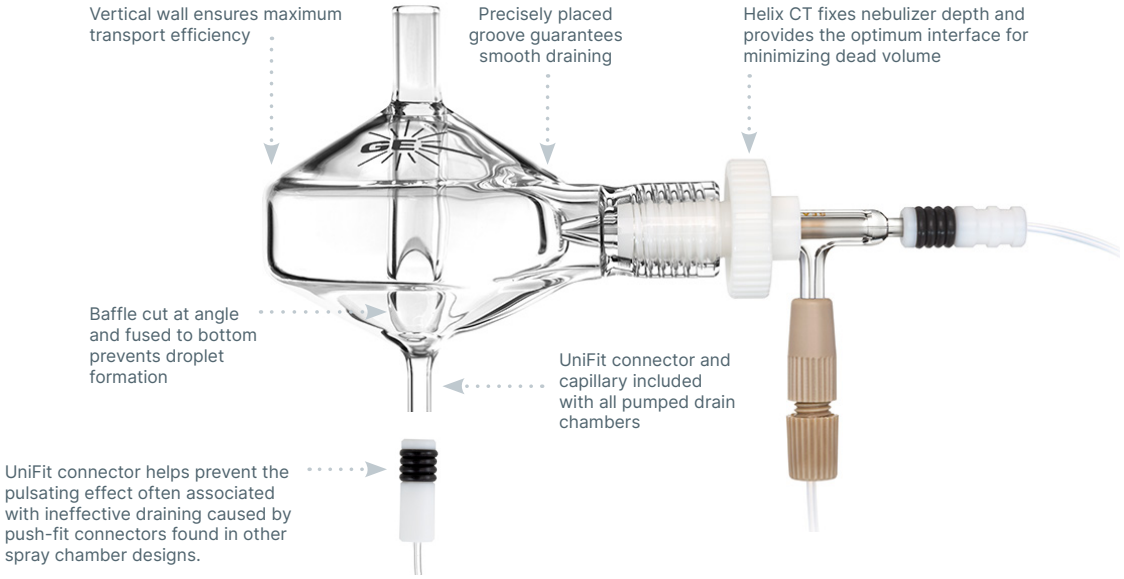
### Cinnabar™

| | |
|---|---|
| Internal Volume, mL: | 20 |
| Internal Baffle: | No |
| HF-resistant: | No |
| Precision: | Very Good |
| Purity: | Good |
| Material: | Glass |

### 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.
- Even the most chemically resistant O-rings are prone to wear and tear and require regular replacement, which is time-consuming and often requires the use of 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.

**Helix CT nebulizer interface is also simple to use:**

- Fully insert the nebulizer into the Helix CT interface, until the nebulizer side-arm comes into contact with the molded-in positive stop.
- Hand-tighten the Helix CT locking screw until the ConstantTorque mechanism clicks, indicating a secure, gas-tight seal.

Glass Expansion equips all of its cyclonic spray chambers with the Helix CT interface as standard.

| Part Number | Description |
|---|---|
| 70-803-1439 | Helix CT Locking Screw with Seal |
| 70-803-1456 | Helix CT Seal (PKT. 4) |

# HydraMist™ Simultaneous Cold Vapor/Pneumatic Nebulization Spray Chamber

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, 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.

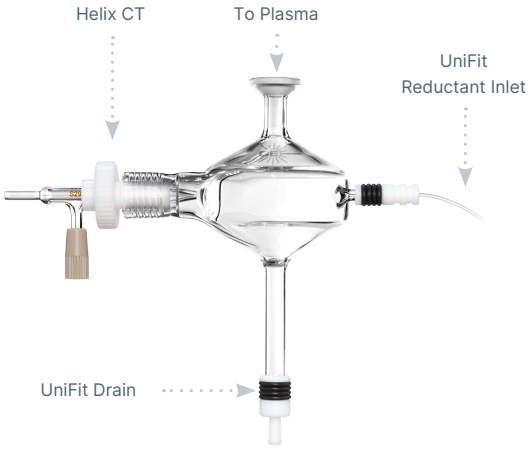
## The HydraMist Spray Chamber Features:

- 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

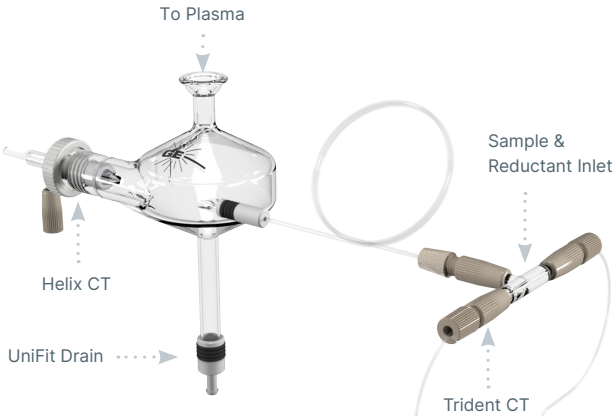
| HydraMist Kit | |
|---|---|
| Agilent® 5000 ICP-OES Series | KT-1157 |
| Analytik Jena® PQ 9000 | KT-1157 |
| PerkinElmer® Avio 200/500 | KT-1157 |
| PerkinElmer® Avio with HTS system | KT-2742 |
| PerkinElmer® Optima 8000/8300 DV | KT-1162 |
| PerkinElmer® Optima 4000/5000/7000 DV | KT-1162 |
| Shimadzu®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

* Note: Nebulizer is not included in HydraMist Kit.

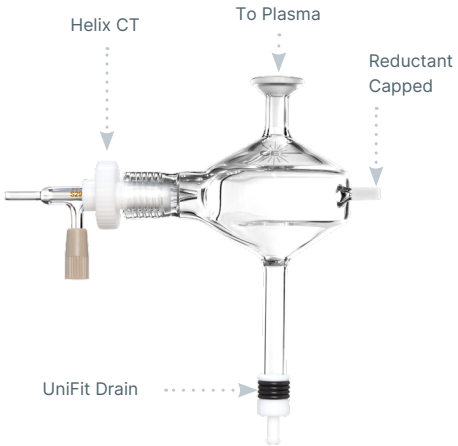
**Simple Mode**



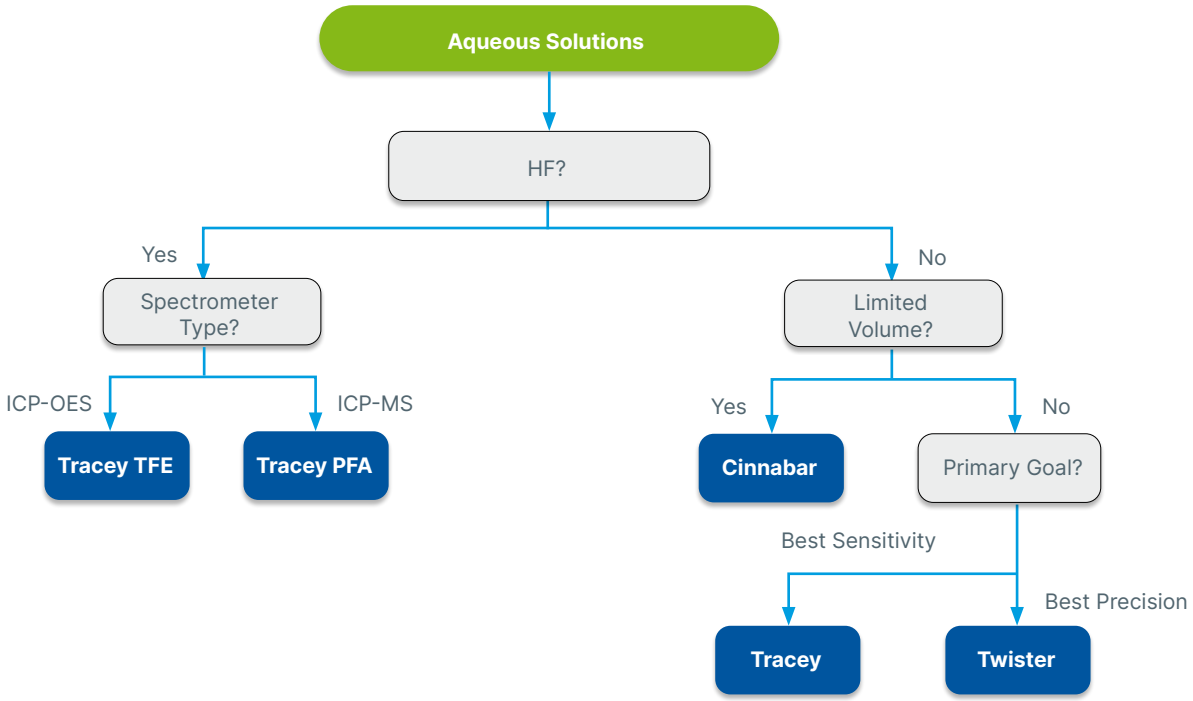

**Sensitive Mode**

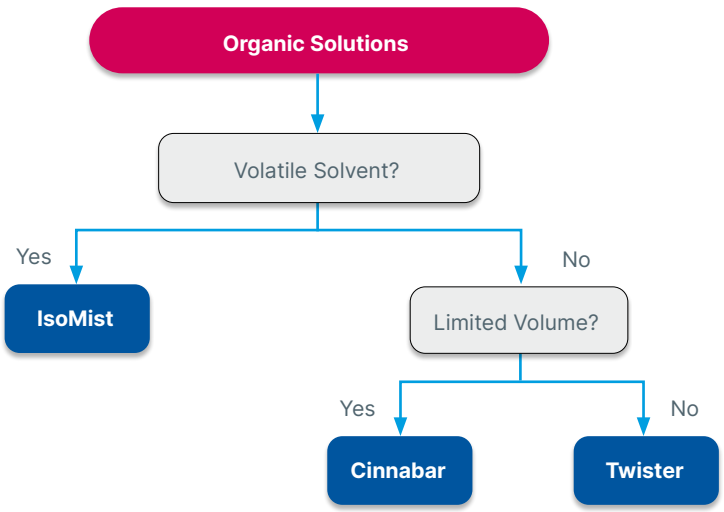



**Pneumatic Nebulization**



## 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 Scientific™ 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.

The torch box environment is highly corrosive, causing bare copper to corrode quickly and accumulate buildup, reducing coil conductivity and increasing resistance. Copper is used as the base material of all commercially available coils but different manufactures use different plating materials. Silver has the best conductance and gold the best corrosion resistance. Many platers use brighteners for a shiny finish, but high-purity silver and gold result in a dull appearance. Glass Expansion uses high-purity metals and polishes coils after plating for smoothness and reduced resistance, also enhancing visual appeal.

## 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.
- Optimal alignment of the RF coil mitigates outer tube devitrification.

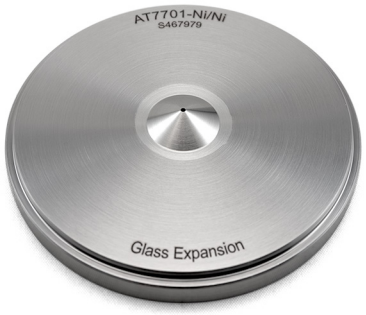
# Glass Expansion Installation Kits for RF Coils

- 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.

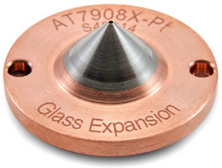

## All kits contain:

- An Installation Kit – Aligns coil to torch mounting bracket.
- Required Spanner/s – Designed specifically for each instrument.
- 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, which offer precise control, deep penetration, and minimal heat-affected zones compared to other welding techniques, 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.

### Satisfaction guarantee:

We guarantee our products to meet or exceed performance expectations.

### 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

**Click here to view the ICP-MS Cone Resource Guide.**

# IsoMist™ Programmable Temperature Spray Chamber

The IsoMist programmable temperature controlled cyclonic spray chamber now features an improved thermodynamic design providing an extended temperature range and faster cool-down, so your ICP is ready to go sooner.

The IsoMist is a compact, convenient and maintenance-free temperature controlled sample introduction system for all ICP's.

## Improved Analytical Stability with Precise Temperature Control

On the IsoMist, the spray chamber temperature is accurately controlled through an improved thermodynamic design using a multi-stage peltier device. The spray chamber temperature is settable in 1°C increments from -25°C to 80°C guaranteeing optimum conditions can be used for any application.

## Reduce Oxide Interferences in ICP-MS

Using the IsoMist spray chamber at sub-ambient temperatures on an ICP-MS, the sample is cooled, less water vapor is transferred to the plasma resulting in lower oxide formation and reduced polyatomic (ArO, ArOH) interferences. Less oxides in the plasma mean fewer interferences, improving accuracy and detection limits.

## Perfect for Naphtha and Gasoline Analysis

For volatile solvents, a lower sample introduction temperature reduces nebulization efficiency avoiding quenching of the plasma from solvent over-loading. With a minimum operating temperature of -25°C, analyzing volatile organic solvents such as naphtha and gasoline by ICP is even easier.

## Improve Analytical Stability with Constant Spray Chamber Temperature

Fluctuations in the lab temperature affects sample viscosity and nebulization efficiency. Maintaining the sample introduction system at a constant and stable temperature improves analytical reproducibility, enhances throughput and lowers operating costs by reducing the need to re-run samples when a check standard drifts outside the acceptable upper or lower limits.

## Elevated Sample Introduction Temperatures Enhances Sensitivity

The sensitivity for many analyses can be enhanced by operating the spray chamber at elevated temperatures - especially important for limited sample volumes. Heating the spray chamber also helps with the analysis of viscous samples such as lubricants and edible oils.

## A Spray Chamber Optimized for Analytical Performance

The IsoMist incorporates a proven cyclonic spray chamber design in glass, quartz and HF resistant PFA with Helix CT interface. Compared to a Scott type spray chamber, cyclonic spray chambers are more sensitive and have better washout. The IsoMist includes the Helix CT nebulizer interface, which eliminates sample contamination and ensures easy nebulizer removal for routine nebulizer cleaning. The Helix CT nebulizer interface also has zero dead volume, reducing carry-over and improving washout between samples. With a positive stop built-in, Helix CT ensures correct and reproducible nebulizer insertion depth for constant nebulizer performance.

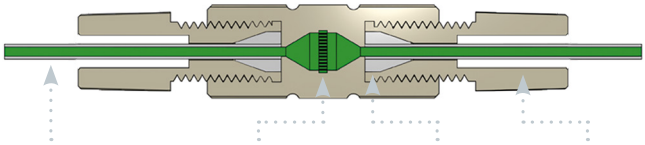

## Easy to Use Software

For maximum convenience, the IsoMist can be controlled from a PC via USB or Bluetooth wireless interface. The spray chamber temperature can be monitored during an analytical run with time vs temperature plot on your PC screen.

## Elegant, Ergonomic and Compact

The IsoMist is an elegant, compact, stand-alone system manufactured from materials resistant to attack from acids and solvents commonly used in ICP analysis. By using a peltier to maintain the spray chamber temperature, the messy, noisy and high-maintenance refrigerated circulating baths used with jacketed spray chambers has been eliminated. The compact design means all IsoMist Programmable Temperature Controlled Spray Chambers are compatible with virtually any ICP-OES or ICP-MS.

## Guardian™ In-Line Sample Filter



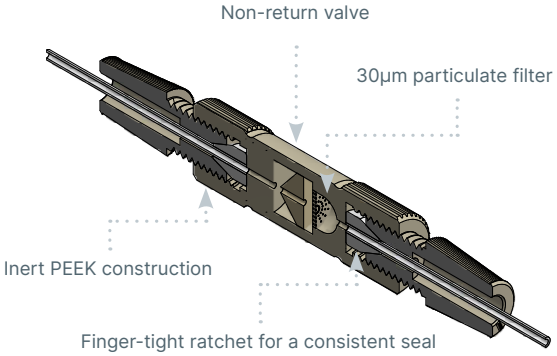

If there are particulates in your samples, there is a risk that they may get trapped in the narrow bore sample tubing or within the nebulizer. The Guardian In-Line Sample Filter provides a simple and effective way to eliminate this risk. This filter is easily inserted in the sample tubing between the 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 Viton O-rings for Eluo Adaptor (PKT 10) | 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.

An overlooked issue when using an autosampler for unattended overnight runs is its potential to silently and invisibly damage your ICP instrument. Acidified solution in the instrument's argon control module can corrode electronic sensors in mass flow controllers and damage regulators, leading to costly repairs and unplanned downtime.

| 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

## As easy as 1, 2, 3

### 1. Fill with solvent

### 2. Insert nebulizer

### 3. Clean nebulizer

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 (manufactured by Sigma-Aldrich, and is available from most suppliers of laboratory chemicals ) 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 |
| Eluo Adaptor for Inline Filter | 70-803-1160 |
| O-ring Kit for Eluo (2 sets) | 70-0806 |

# Elegra™ Argon Humidifier


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.

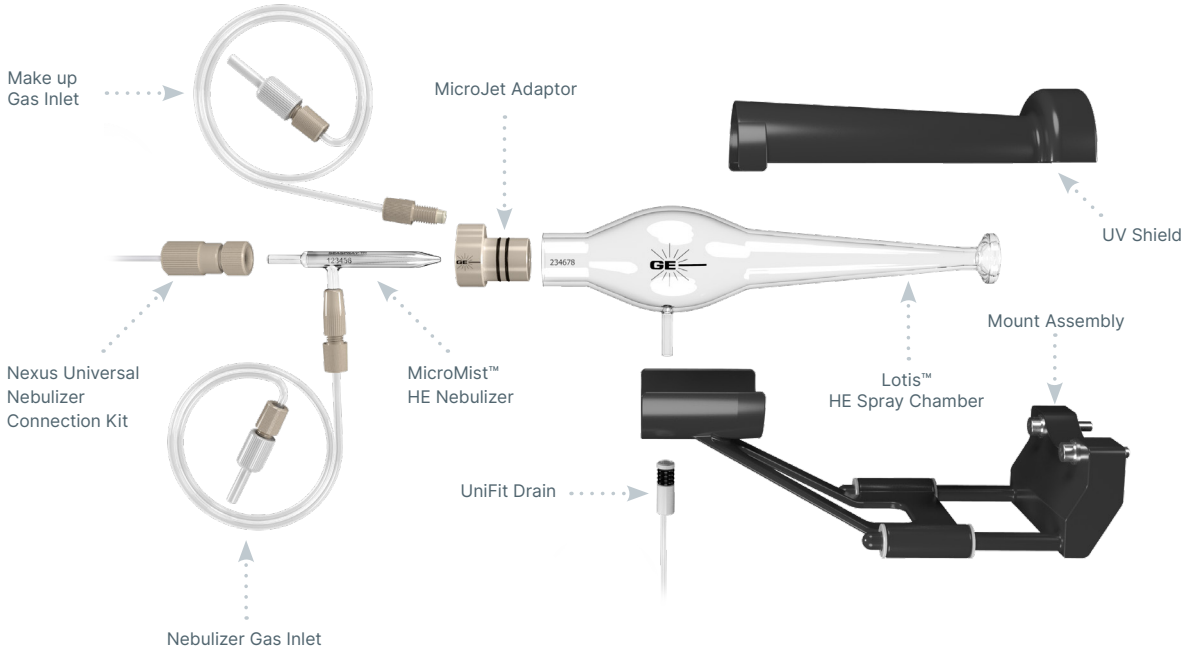
- Compact, cost-effective design.
- No heating or electric power required.
- Non-pressurized water reservoir.
- An easy-to-use bypass switch allows you to take the Elegra off-line without disconnecting argon lines. (Not available with Elegra Dual)
- Highly efficient membrane humidification technology.
- 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 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 |

**Click here to view the Elegra™ Landing page and ordering information.**

# 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

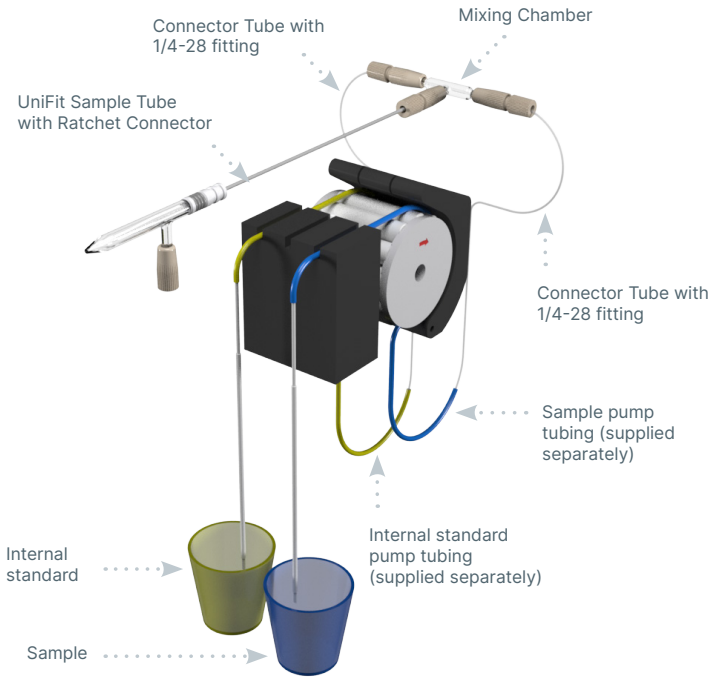
Our patent-pending MicroJet gas adapter shapes the nebulizer aerosol plume to reduce sample deposition on the spray chamber walls and enhance transport efficiency.


### 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 | |
|---|---|
| Agilent® ICP-MS | KT-1155 |
| Analytik Jena® PlasmaQuant MS | KT-2747 |
| PerkinElmer® NexION 1000/2000/2200/5000 | KT-1184 |
| PerkinElmer® NexION 300/350 | KT-1204 |
| Thermo Scientific™ Q/RQ/TQ ICP-MS | KT-1172 |
| Thermo Scientific™ Neoma MC-ICP-MS | KT-1172 |
| Thermo Scientific™ X Series | KT-1213 |
| Thermo Scientific™ Neptune/Element | KT-1215 |
| TOFWERK icpTOF | KT-1172 |
| Nu ATTOM | KT-1205 |
| Nu Instruments® Vitesse TOF-ICP-MS | KT-1219 |

# Trident CT™ In-Line Reagent Additions Kits




## 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 |

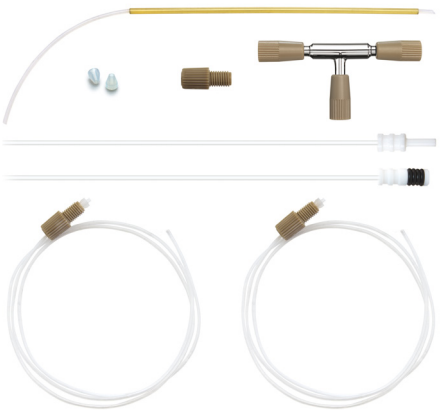
**Click here to view the consumables for the Trident CT™ In-Line Reagent Additions Kits.**

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.

**Trident CT In-Line Reagent Additions Kit for non-HF solutions:**



**Trident Internal Standard Kit for HF solutions:**

## 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

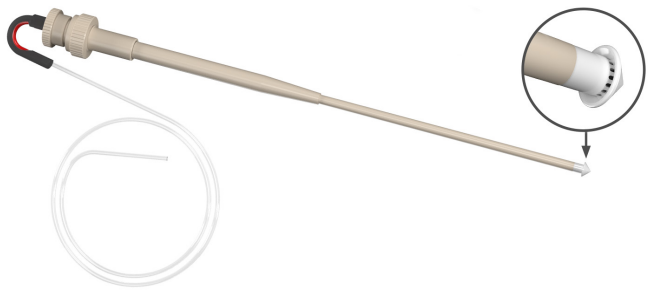
## GazFit Connectors

| 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 |

# 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 Ceramic, PEEK and PTFE, 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 Ceramic, 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 Cetac, Agilent, PerkinElmer, Shimadzu, Aim Lab, and Thermo Scientific Autosamplers.

| Guardian Probe with Connecting Line | |
|---|---|
| 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 for PerkinElmer AS93, 0.75mm Probe Connecting Line (Red) | 70-803-2836 |
| Guardian Probe for PerkinElmer S20 Series, 0.75mm Probe Connecting Line (Red) | 70-803-2097 |
| Guardian Probe for PerkinElmer S10, 0.75mm Probe Connecting Line (Red) | 70-803-2851 |

| 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 |
| Guardian Probe for AS93 | 70-803-2819 |
| Guardian Probe for PerkinElmer S20 Series | 70-803-2754 |
| Guardian Probe for PerkinElmer S10 | 70-803-2849 |

| Probe Connecting Lines for all Autosamplers (excluding ASX-112FR) | |
|---|---|
| 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 |

# 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 | 70-803-1440 |
| PTFE Encapsulated Carbon Fibre Probe 1.0mm ID | 70-803-0816 |

| For Shimadzu® | |
|---|---|
| PTFE Sheathed Carbon Fibre Probe 0.75mm ID with UniFit, for Shimadzu® AS-10 | 70-803-1477 |