



PRECISION GLASSBLOWING

ICP & ICP-MS
Consumables Catalog

Always Precise

Volume 28

About Us

Precision Glassblowing has been manufacturing ICP/ICP-MS, laboratory, and custom scientific glassware for nearly 30 years. Founded in 1982 by master glassblower Ken Petrie, Precision has continued to grow annually and now has a staff of over 20 glassblowers with a combined professional glassblowing experience of nearly 400 years and a new building to accommodate our increased staff and instrument capabilities.

Honesty, integrity and great customer service are the foundations of our company. Since our inception, we have developed a reputation for quality products at competitive prices and quick turnaround times. The reputation lives on in every new product we make.

From the start, Precision has played an integral part in creating new designs. Beyond the field of ICP, our custom glassblowing shop has contributed to the development of glassware items for original equipment manufacturers in a variety of scientific markets. Because of our size, capabilities and experience, Precision is able to assist you in every step of your design, from 1-off prototypes all the way to full production runs. We also understand that when your instrument is down it cost you money so we offer same-day shipping on most orders received before 3:00 PM and strive to maintain stock at all times on commonly ordered parts. And if you need a simple modification or repair of a pre-existing piece, we can help you with that as well.

Please don't hesitate to call, email or contact us with any questions. We look forward to serving you.

Web Address www.precisionglassblowing.com

Street Address 14775 E. Hinsdale Ave.
Centennial, CO 80112

Hours 7:00 - 4:30, Mountain Time, M-F

Phone 303-693-7329

Fax 303-699-6815

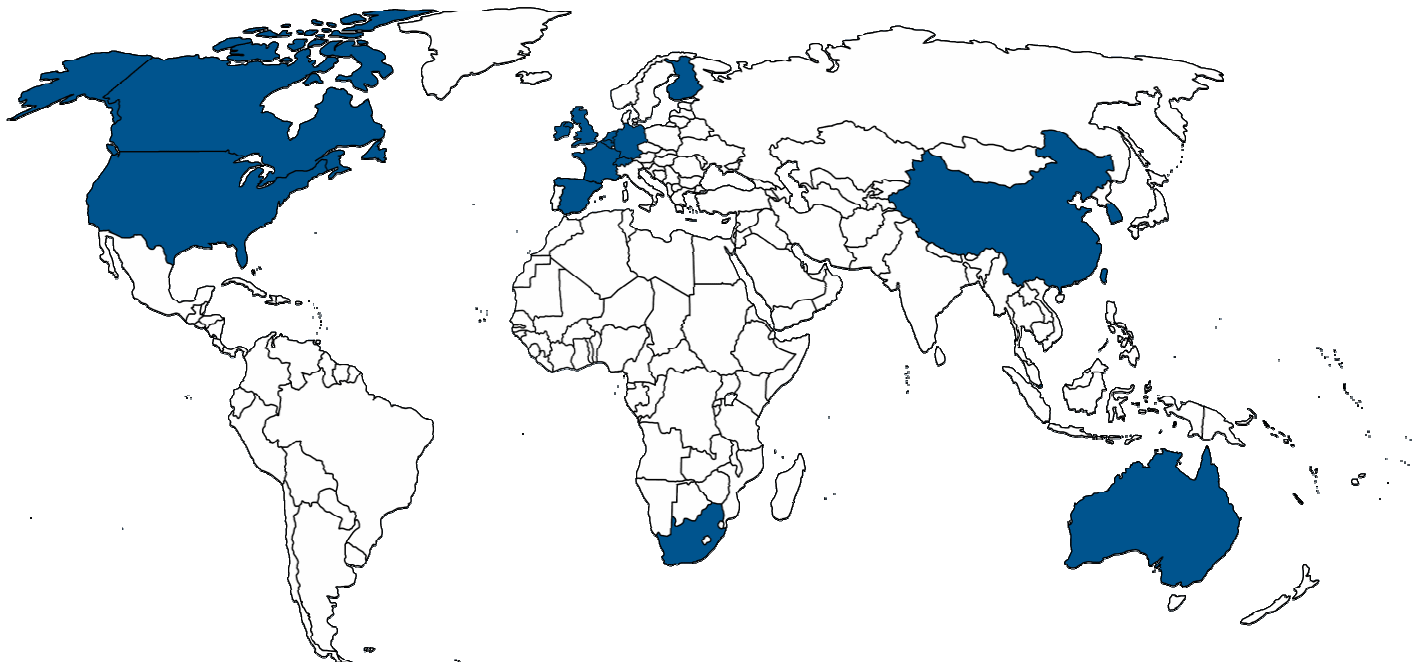
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meikrantz@precisionglassblowing.com

For sales outside of the United States, click on the map below to be taken to our [International Distributors](#) page or call or contact us at info@precisionglassblowing.com.



New Website

Precision Glassblowing of Colorado is proud to announce the launch of our new website, still located at www.precisionglassblowing.com. The newly renovated site boasts smoother navigation, higher security and more products. In addition, we have also added Quick Quote forms for custom glass and coils allowing rapid quote turnaround. Lastly, we are now offering free UPS and FedEx ground shipping on orders that apply.



We invite you to visit the site today and create your login account, password, and address book. To celebrate the new site, Precision is offering 15% off your first web order. Type in the Coupon Code "ALWZPRECISE" to take advantage of this offer. And as always, please don't hesitate to contact us with any questions. We look forward to serving you.



303-693-7329 Phone
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info@precisionglassblowing.com
www.precisionglassblowing.com
www.icpnebulizers.com

Argon Humidifier

An argon humidifier is commonly used in ICP analysis of samples with very high dissolved solids concentration. The ArH-102 Argon Humidifier from Precision Glassblowing of Colorado helps to prevent salt build-up inside the sample introduction system allowing uninterrupted and maintenance-free operation. The ArH-102 combines ease of operation, high performance and safety.



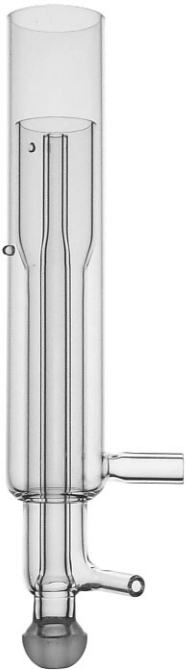
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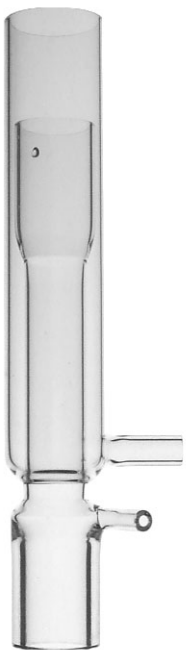
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**ICP & ICP-MS
Consumables**

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**900-01 - New Standard
Torch, 2.5mm, 2
Projections, HMI
Compatible**



**900-02 - Torch for
PFA Inert Kit**

Agilent (Hewlett Packard) 4500 & 7500

Torches & Accessories

900-01	New Standard Torch, 2.5mm, 2 Projections, HMI Compatible	G3270-67002
900-02	Torch for PFA Inert Kit	G3285-80050
900-03	One Piece Torch, 1.0mm Injector (Agilent 7500)	G1833-65425
900-04	One Piece Torch, 1.5mm Injector (HP 4500)	G1820-65528
900-05	One Piece Torch, 2.5mm Injector (HP 4500)	G1820-65028
900-06	One Piece Torch, 2.5mm Injector (Agilent 7500)	G1833-65423
900-07	One Piece Torch, 1.5mm Injector (Agilent 7500)	G1833-65424
900-08	Demountable Torch, Inert (HP 4500)	G1820-65035
900-09	Demountable Torch, Inert (Agilent 7500)	G1833-65422
900-20	Alumina Injector	
900-24	Quartz Bonnet (HP 4500)	G1820-65026
900-25	Quartz Bonnet (Agilent 7500)	G1833-65421
900-30	PTFE Injector Holder	G1820-65015

Spray Chambers & Accessories

900-10	Scott Spray Chamber, Inner/Outer Tube Flush, Drain & Exit 180°	
900-11	Scott Spray Chamber, Inner/Outer Tube Flush, Drain & Exit 90° (HP 4500, Agilent 7500)	G1820-65336
900-12	Scott Spray Chamber, Inner/Outer Tube Flush, Drain & Exit 180°, Quartz	
900-13	Scott Spray Chamber, Inner/Outer Tube Flush, Drain & Exit 90°, Quartz (HP 4500, Agilent 7500)	G1820-65337
900-14	Scott Spray Chamber, Inner Tube Extended, Drain & Exit 90°, Quartz	G1820-65339
900-16	Cyclonic Spray Chamber	
900-16Q	Cyclonic Spray Chamber, Quartz	
900-32	Quartz Socket Adapter	
900-36	Quartz Ball Adapter	
900-38	Ball & Socket Adapter, Quartz (HP4500)	G1820-80237
900-39	Ball & Socket Adapter, Quartz (Agilent 7500)	G1833-65426

Nebulizers

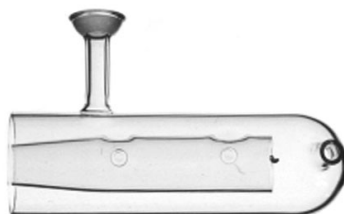
500-77	A-Type Concentric Nebulizer, 1 lpm Ar, 30psi, 3mL/min	G1820-65030
500-77Q	A-Type Concentric Nebulizer, 1 lpm Ar, 30psi, 3mL/min, Quartz	G1820-61138
500-93	Crossflow Nebulizer, High-Solids	G1820-65033
500-94	Crossflow Nebulizer, High Flow	G1833-80301
520-30	PTFE End Cap for use with Open End Spray Chamber	

HP & Agilent Type 2-Stop Pump Tubing

PT-2020P	Orange-Red, .0075" (.19mm), PVC, 12/pk	G1820-65220
PT-2160P	White-White, 0.040" (1.02mm), PVC, 12/pk	G1820-65215
PT-2160SI	White-White, 0.040" (1.02mm), Silicone, 6/pk	G1820-65217
PT-2220SA	Yellow-Blue, 0.06" (1.52mm), Santoprene, 12/pk	G1820-65216

HP & Agilent Type 3-Stop Pump Tubing

PT-3020P	Orange-Red, .0075" (.19mm), PVC, 12/pk	G1833-65571
PT-3160P	White-White, 0.040" (1.02mm), PVC, 12/pk	G1833-65569
PT-3220SA	Yellow-Blue, 0.06" (1.52mm), Santoprene, 12/pk	G1833-65570



**900-13 - Scott Spray Chamber,
Inner/Outer Tube Flush, Drain & Exit
90°, Quartz (HP 4500, Agilent 7500),
G1820-65337**



**500-77Q - A-Type Concentric
Nebulizer, 1 lpm Ar, 30psi, 3mL/min,
Quartz, G1820-61138**

ARL 3500 Maxi

Torches & Accessories

100-05	Maxi Torch	139009-0003
100-05W	Maxi Torch, Wear Metals Outer Shield	
100-06	Maxi Torch, 20mm Outer Shield	
100-08	Torch, ICPQ	137000-0000
100-09	Torch, Nitrogen, 3" Port, 28/15 Ball Joint	173127-0000
120-40	Torch, HF/CR Resistant Body	173131-0000
120-44	PTFE Insert for HF Torch	
120-45	PTFE Insert, Adjustable for HF Torch	
100-21	Torch Extension	
100-22	Torch Extension with Optical Port	
100-25	Torch Bonnet	
100-27	Torch Bonnet, Induction Coil M/S	173251-0000
100-28	Argon Snout Tube	170631-0000
120-42	Alumina Injector	1200079
120-55	O-ring for Torch, PTFE Coated Viton	

Spray Chambers & Accessories

100-12	Conical Spray Chamber for Concentric Nebulizer	173142-0000
100-14	Conical Spray Chamber for MDSN	
100-16	Conical Spray Chamber, Open End with Impact Bead	139008-0000
100-18	Conical Spray Chamber, Open End with Drain	
110-55	Cyclonic Spray Chamber, 10mm Drain	
110-55J	Cyclonic Spray Chamber, Water-Cooled, 10mm Drain	
120-30	ARL Maxi PTFE Spray Chamber	
120-51	PTFE Insert, allows 100-14 to use Concentric Nebulizer	
120-56	O-ring for Spray Chamber, PTFE Coated Viton	

Nebulizers

500-77	A-Type Concentric Nebulizer, 1 lpm Ar, 30psi, 3mL/min	914319-000P/M
510-50	Babington MDSN, HF Resistant	173259-0000
510-10S	Noordermeer V-Groove MDSN Nebulizer, 1 lpm Ar	

ARL Type Pump Tubing

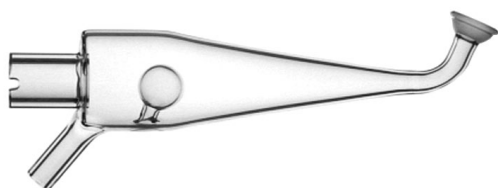
See our complete list of sizes and materials on pages 38, 39.

ICP & ICP-MS Consumables

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**100-05 - Maxi Torch
139009-0003**



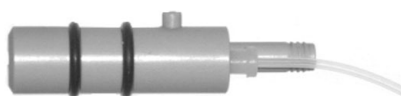
100-14 - Conical Spray Chamber for MDSN



510-10S - Noordermeer V-Groove MDSN Nebulizer, 1 lpm Ar



100-25 - Torch Bonnet



510-50 - Babington MDSN, HF Resistant, 173259-0000

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**110-30 - Mini Torch,
1.5mm Injector,
173463-0000**



**110-31 - Mini HF/CR
Torch Body,
173473-0000**

ARL 3400/3500 Accuris Mini

Torches & Accessories

110-30	Mini Torch, 1.5mm Injector	173463-0000
110-30/1.0	Mini Torch, 1.0mm Injector	
110-31	Mini HF/CR Torch Body	173473-0000
110-32	Mini Nitrogen Torch	170692-0000
110-50	Mini High-Solids Torch	
110-35	Torch Bonnet	173252-0000
110-42	Torch Mount	144860
110-48	Injector Assembly	144857
110-54	Argon Snout, Nitrogen	170693-0000
120-55	O-ring for Torch, PTFE Coated Viton	

Spray Chambers & Accessories

110-33	Conical Spray Chamber, Mini for Concentric Nebulizer	173142-0002
110-33Q	Conical Spray Chamber, Mini for Concentric Neb., Quartz	
110-34	Conical Spray Chamber for Babington MDSN	173142-0003
110-36	Conical Spray Chamber, Water-Cooled for Concentric Neb.	173142-0004
110-55	Cyclonic Spray Chamber, 10mm Drain	
110-55J	Cyclonic Spray Chamber, Water-Cooled, 10mm Drain	
110-55QJ	Cyclonic Spray Chamber, Water-Cooled, 10mm Drain, Quartz	
110-60	ARL Mini HF System	
120-51	PTFE Insert, allows 110-34 to use Concentric Nebulizer	
120-56	O-ring for Spray Chamber, PTFE Coated Viton	

Nebulizers

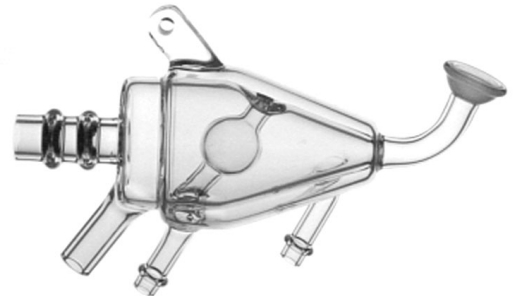
500-80	K-Type Concentric Nebulizer, 0.7 lpm Ar, 30psi, 3mL/min	915375-000P/M
510-10	Noordermeer V-Groove MDSN Nebulizer	915817-0000
510-50	Babington MDSN, HF Resistant	173259-0000

ARL Type Pump Tubing

See our complete list of sizes and materials on pages 38, 39.



**110-55J - Cyclonic Spray Chamber,
Water-Cooled, 10mm Drain**



**110-36 - Spray Chamber, Water-Cooled for
Concentric Nebulizer, 173142-0004**

ARL Maxim 1 & 3

Torches & Accessories

110-38	Maxim Torch	S111403
110-45	Maxim CR Torch	S213787
120-55	O-ring for Torch, PTFE Coated Viton	

Spray Chambers & Accessories

110-39	Spray Chamber, Water-Cooled for Concentric Nebulizer	S702174
110-40	Drain Trap	S702232
110-41	Spray Chamber for Concentric Nebulizer	S702171
110-41Q	Spray Chamber for Concentric Nebulizer, Quartz	
120-56	O-ring for Spray Chamber, PTFE Coated Viton	

Nebulizers

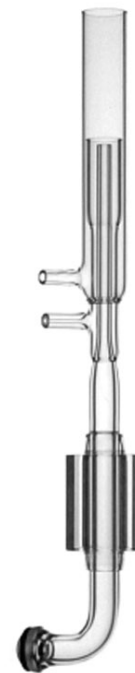
510-10	Noordermeer V-Groove MDSN Nebulizer	915817-0000
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ARL Type Pump Tubing

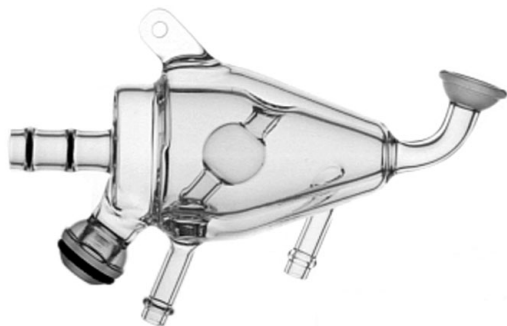
See our complete list of sizes and materials on pages 38, 39.

ICP & ICP-MS Consumables

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110-38 - Maxim Torch
S111403



110-39 - Spray Chamber, Water-Cooled for
Concentric Nebulizer, S702174



510-10 - Noordermeer
V-Groove MDSN
Nebulizer, 915817-0000



110-40 - Drain Trap
S702232

Did you know...

Standard ICP Torch Rebuilding

Most ICP torches may be rebuilt for a minimal price compared to the cost of a new torch. Rebuilding a standard torch involves replacing the entire outer shield (tube) and/or replacing broken side arms. In the event the inner shield (tube) and/or the injector on a fixed torch has become cracked or severely devitrified, the torch is considered non-repairable, as the cost of repair would exceed the price of a new torch. Once the torch has been rebuilt, it passes through the same QC program as our new torches ensuring you get a quality rebuilt torch that meets all original specifications. Some restrictions apply and certain torches cannot be rebuilt due to their design. For more information please feel free to call us at 303-693-7329 or E-mail us at info@precisionglassblowing.com.

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200-05 - Torch, Plasma Standard, 025515



200-06 - Torch, Low-Flow, 075542

Baird 27 MHz

Torches & Accessories

200-05	Torch, Plasma Standard	025515
220-55	Demountable Torch Body	069987
220-50	Alumina Injector, 4.8"	075132
220-51	Alumina Injector, 5.6"	075144
220-52	Alumina Injector, 7.7"	
220-53	PTFE Insert, Fixed	
220-54	PTFE Insert, Adjustable	

Baird Type Pump Tubing

See our complete list of sizes and materials on pages 38, 39.

Baird 2000 & 2070

Torches & Accessories

200-06	Torch, Low-Flow	075542
200-10	Demountable Torch, Low-Flow	075145
200-21	Torch Extension	
200-25	Torch Bonnet	025491
200-30	Window Tube	077611
200-36	Extension, Ball & Socket	062607
220-50	Alumina Injector, 4.8"	075132
220-51	Alumina Injector, 5.6"	075144
220-52	Alumina Injector, 7.7"	
220-53	PTFE Insert, Fixed	
220-54	PTFE Insert, Adjustable	

Spray Chambers & Accessories

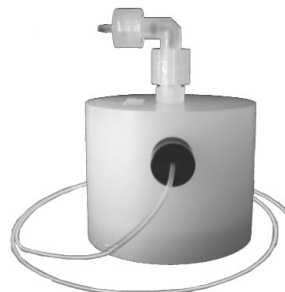
200-12	Scott Spray Chamber, Open End	025492
200-14	Scott Spray Chamber for Concentric Nebulizer	
200-15	Scott Spray Chamber, Water-Cooled	

Nebulizers

500-70	C-Type Concentric Nebulizer, 1 lpm Ar, 30psi, 1mL/min
500-92	Crossflow Nebulizer
510-10	Noordermeer V-Groove MDSN Nebulizer
510-50	Babington MDSN, HF Resistant

Baird Type Pump Tubing

See our complete list of sizes and materials on pages 38, 39.



500-92 - Crossflow Nebulizer



200-12 - Scott Spray Chamber, Open End, 025492

Baird PST

Torches & Accessories

200-06	Torch, Low-Flow	075542
200-10	Demountable Torch, Low-Flow	075145
200-21	Torch Extension	
200-25	Torch Bonnet	025491
200-30	Window Tube	077611
200-32	PST Purge Window	077200
200-36	Extension, Ball & Socket	062607
220-50	Alumina Injector, 4.8"	075132
220-51	Alumina Injector, 5.6"	075144
220-52	Alumina Injector, 7.7"	
220-53	PTFE Insert, Fixed	
220-54	PTFE Insert, Adjustable	

Spray Chambers & Accessories

200-12	Scott Spray Chamber, Open End	025492
200-14	Scott Spray Chamber for Concentric Nebulizer	
200-15	Scott Spray Chamber, Water-Cooled	

Nebulizers

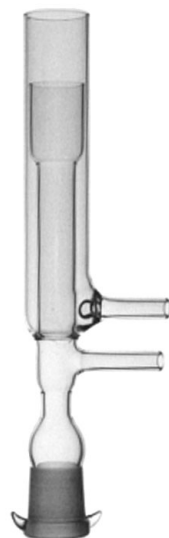
500-70	C-Type Concentric Nebulizer, 1 lpm Ar, 30psi, 1mL/min
500-92	Crossflow Nebulizer
510-10	Noordermeer V-Groove MDSN Nebulizer
510-50	Babington MDSN, HF Resistant

Baird Type Pump Tubing

See our complete list of sizes and materials on pages 38, 39.

ICP & ICP-MS Consumables

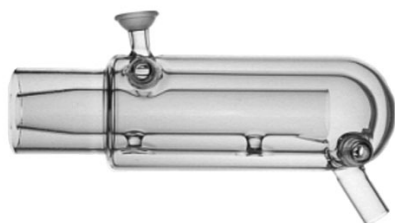
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200-10 - Demountable Torch, Low-Flow, 075145



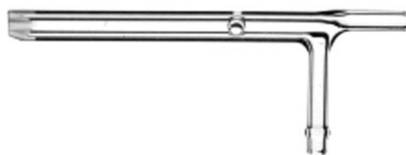
200-25 - Torch Bonnet, 025492



200-15 - Scott Spray Chamber, Water-Cooled



200-14 - Scott Spray Chamber for Concentric Nebulizer



510-10 - Noordermeer V-Groove MDSN Nebulizer



500-70 - C-Type Concentric Nebulizer, 1 lpm Ar, 30psi, 1mL/min



200-30 - Window Tube, 077611

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200-06 - Torch, Low-Flow, 075542



210-10 - AFS/ICP Torch & Tip, 676458

Baird PSQ and PSX

Torches & Accessories

200-06	Torch, Low-Flow (PSQ and New PSX)	075542
200-07	Plasma PSX Low-Flow Torch (Old PSX)	069972
200-08	Plasma Low-Flow Torch (Old PSX)	666011
200-09	PSX Labtest Low-Flow Torch	075128
200-10	Demountable Torch, Low-Flow (PSQ and New PSX)	075145
200-11	PSX Low-Flow HF/CR Torch	075129
200-21	Torch Extension	
200-25	Torch Bonnet	025491
200-30	Window Tube	077611
200-33	Entrance Tube, Plasma Labtest	
200-36	Extension, Ball & Socket	062607
200-36Q	Quartz Extension, Ball & Socket	
220-50	Alumina Injector, 4.8"	075132
220-51	Alumina Injector, 5.6"	075144
220-52	Alumina Injector, 7.7"	075145
220-53	PTFE Insert, Fixed	
220-54	PTFE Insert, Adjustable	

Spray Chambers & Accessories

200-12	Scott Spray Chamber, Open End	025492
200-14	Scott Spray Chamber for Concentric Nebulizer	
200-15	Scott Spray Chamber, Water-Cooled	

Nebulizers

500-70	C-Type Concentric Nebulizer, 1 lpm Ar, 30psi, 1mL/min
500-92	Crossflow Nebulizer
510-10	Noordermeer V-Groove MDSN Nebulizer
510-50	Babington MDSN, HF Resistant

Baird Type Pump Tubing

See our complete list of sizes and materials on pages 38, 39.

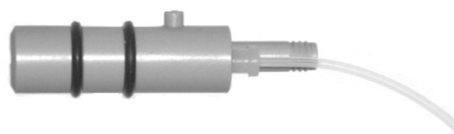
Baird AFS-2000

Torches & Accessories

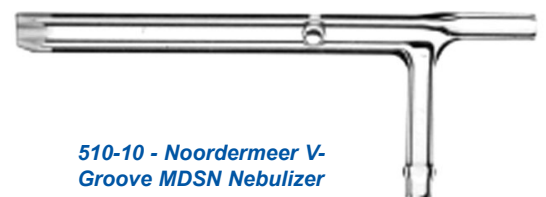
210-10	AFS/ICP Torch & Tip	676458
210-11	AFS/ICP Tip Replacements	676459

Baird Type Pump Tubing

See our complete list of sizes and materials on pages 38, 39.



510-50 - Babington MDSN, HF Resistant



510-10 - Noordermeer V-Groove MDSN Nebulizer

Finnigan Element TS/Sola

Torches & Accessories

850-05	Standard Torch, TS Sola	
850-08	Demountable Torch, TS Sola	
850-09	Quartz Injector, TS Sola	
850-10	Torch & Injector, TS Sola	
850-11	Alumina Injector, TS Sola	
850-06	Standard Torch, Element	
850-12	Demountable Torch, Element	1091250
850-25	Quartz Bonnet for Demountable Torch, Element	
850-26	Quartz Bonnet for Demountable Torch, Element, Long	
852-10	Quartz Injector, Element	1122800

Spray Chambers & Accessories

850-15	Scott Spray Chamber, Pyrex, Water-Cooled, TS Sola	
850-16	Scott Spray Chamber, Quartz, Water-Cooled, TS Sola	
850-17	Scott Spray Chamber, Pyrex, Water-Cooled, Element	
850-18	Scott Spray Chamber, Quartz, Water-Cooled, Element	
850-19	Finnigan Neptune Spray Chamber	1127121
850-31	Ball & Socket Elbow, Pyrex	
850-32	Ball & Socket Elbow, Quartz	

Finnigan Type 2-Stop Pump Tubing

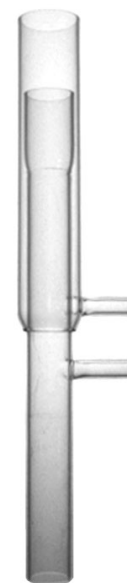
PT-2130P	Black-Black, 0.030" (.76mm), PVC, 12/pk
PT-2180P	Red-Red, 0.045" (1.14mm), PVC, 12/pk
PT-2020P	Orange-Red, .0075" (.19mm), PVC, 12/pk
PT-2130SV	Black-Black, 0.030" (.76mm), Solva, 12/pk
PT-2180SV	Red-Red, 0.045" (1.14mm), Solva, 12/pk
PT-2130SI	Black-Black, 0.030" (.76mm), Silicone, 6/pk
PT-2130V	Black-Black, 0.030" (.76mm), Viton, 12/pk

ICP & ICP-MS Consumables

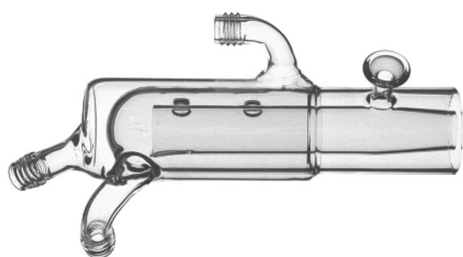
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850-10 - Torch & Injector, TS Sola



850-12 - Demountable Torch, Element, 1091250



850-18 - Scott Spray Chamber, Quartz, Water-Cooled, Element



850-32 - Ball & Socket Elbow, Quartz



852-10 - Quartz Injector, Element, 1122800

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150-05 - Torch, One Piece with Ball Joint, 49.010.100



150-15 - Cyclonic Spray Chamber, 4mm Drain, 31.030.809



160-63 - Sheath Gas, Glass, 21.356.040

JY/Instruments SA

Torches & Accessories

150-05	Torch, One Piece with Ball Joint	49.010.100
160-40	Demountable Torch Assembly, Complete	21.356.110
160-45	Demountable Torch, Body Only	
160-50	Outer Quartz Tube, 71mm, Radial	31.023.722
160-51	Outer Quartz Tube, 82.5mm, Radial	
160-70	Outer Quartz Tube, Axial	31.031.099
160-52	Inner Quartz Tube	31.023.723
160-46	O-ring Kit for Torch Body	
160-53	PTFE Centering Ring	31.023.724
160-55	PTFE Insert	31.021.730
160-58	Alumina Injector	31.021.589
160-59	Quartz Injector	
160-60	Quartz Injector, 3.0mm	
160-61	Alumina Injector and Teflon Insert	21.356.130
160-63	Sheath Gas, Glass	21.356.040
160-63S	Sheath Gas, 12/5 Socket	
160-64	Sheath Gas, PEEK	20.925.160

Spray Chambers & Accessories

150-12	Scott Spray Chamber, 12mm Drain	
150-12Q	Scott Spray Chamber, 12mm Drain, Quartz	
150-13	Cyclonic Spray Chamber, Axial	
150-14	Scott Spray Chamber, Ground Joint Drain	31.026.996
150-14Q	Scott Spray Chamber, Ground Joint Drain, Quartz	
150-15	Cyclonic Spray Chamber, 4mm Drain	31.031.279
150-15B	Cyclonic Spray Chamber, 4mm Drain, Baffled	31.030.809
150-16	Scott Spray Chamber, 12mm Drain for Concentric Nebulizer	
150-17	Cyclonic Spray Chamber, 12mm Drain	
150-21	Torch Extension	
150-25	Torch Bonnet	49.010.101
160-65	U-Drain Trap	31.026.997

Nebulizers

500-70	C-Type Concentric Nebulizer, 1 lpm Ar, 30psi, 1mL/min	47.929.006
500-70P	C-Type Concentric Nebulizer, 1 lpm Ar, 50psi, 1mL/min	47.929.001
500-71	C-Type Concentric Nebulizer, 1 lpm Ar, 30psi, 2mL/min	47.929.002
500-72	C-Type Concentric Nebulizer, 1 lpm Ar, 30psi, 3mL/min	47.929.003
500-73P	C-Type Concentric Nebulizer, 1 lpm Ar, 50psi, 0.5mL/min	47.929.004
500-92	Crossflow Nebulizer	47.929.008

JY Type 2-Stop Pump Tubing

PT-2130P	Black-Black, 0.030" (.76mm), PVC, 12/pk	46.791.022
PT-2160P	White-White, 0.040" (1.02mm), PVC, 12/pk	46.791.024
PT-2200P	Gray-Gray, 0.050" (1.30mm), PVC, 12/pk	46.791.018
PT-2250P	Green-Green, 0.073" (1.85mm), PVC, 12/pk	46.791.016
PT-2130SV	Black-Black, 0.030" (.76mm), Solva, 12/pk	46.791.010
PT-2180SV	Red-Red, 0.045" (1.14mm), Solva, 12/pk	46.791.012
PT-2130SI	Black-Black, 0.030" (.76mm), Silicone, 6/pk	LK1160497080



150-12 - Scott Spray Chamber, 12mm Drain

PerkinElmer Plasma 1000, 2000

Torches & Accessories

310-03	Torch Tube, Type II	N058-0528
310-03W	Torch Tube, Type II, Wear Metals	N068-1690
310-24	Quartz Bonnet	N058-2235
310-35	Injector Support Adapter with O-rings	N058-2248
310-36	O-ring Kit for Injector Support Adapter	N058-0539
320-33	Quartz Injector, 1.2mm	N068-1631
320-34	Quartz Injector, 1.6mm	0047-3292
320-66	Purge Extension Window	N058-1497

Spray Chambers & Accessories

300-16	Scott Spray Chamber
300-19	Cyclonic Spray Chamber
300-19J	Cyclonic Spray Chamber, Water-Cooled

Nebulizers

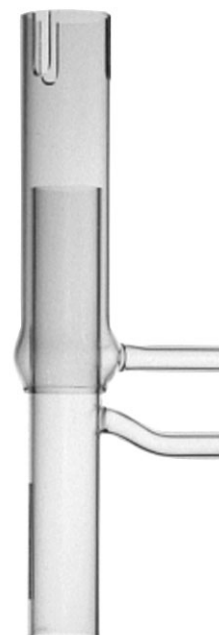
500-70P	C-Type Concentric Nebulizer, 1 lpm Ar, 50psi, 3mL/min	0047-2022
500-77	A-Type Concentric Nebulizer, 1 lpm Ar, 30psi, 3mL/min	0047-2020
500-80	K-Type Concentric Nebulizer, 0.7 lpm Ar, 30psi, 3mL/min	N068-1574

PerkinElmer® Type 2-Stop Pump Tubing

PT-2130P	Black-Black, 0.030" (.76mm), PVC, 12/pk	0990-8587
PT-2180P	Red-Red, 0.045" (1.14mm), PVC, 12/pk	N068-0375
PT-2300P	Black-White, 0.125" (3.18mm), PVC, 12/pk	N812-2012
PT-2130SV	Black-Black, 0.030" (.76mm), Solva, 12/pk	0047-3550
PT-2180SV	Red-Red, 0.045" (1.14mm), Solva, 12/pk	N068-0376
PT-2130SI	Black-Black, 0.030" (.76mm), Silicone, 6/pk	0047-3552
PT-2180SI	Red-Red, 0.045" (1.14mm), Silicone, 6/pk	N069-1595

ICP & ICP-MS Consumables

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310-03 - Torch Tube, Type II, N058-0528



300-19 - Cyclonic Spray Chamber



310-35 - Injector Support Adapter with O-rings, N058-2248

PerkinElmer Plasma II

Torches & Accessories

310-03	Torch Tube, Type II	N058-0528
310-09	Torch Tube, Type I, Slotted	N058-0376
310-24	Quartz Bonnet	N058-2235
310-35	Injector Support Adapter with O-rings	N058-2248
310-36	O-ring Kit for Injector Support Adapter	N058-0539
320-30	Quartz Injector, 1.2mm, Type I	
320-31	Quartz Injector, 1.6mm, Type I	N058-0449
320-33	Quartz Injector, 1.2mm	N068-1631
320-34	Quartz Injector, 1.6mm	0047-3292
320-66	Purge Extension Window	N058-1497

Spray Chambers & Accessories

300-16	Scott Spray Chamber
300-19	Cyclonic Spray Chamber
300-19J	Cyclonic Spray Chamber, Water-Cooled

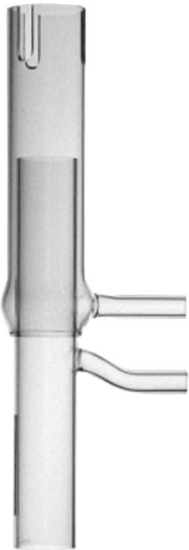
Nebulizers

500-70P	C-Type Concentric Nebulizer, 1 lpm Ar, 50psi, 3mL/min	0047-2022
500-77	A-Type Concentric Nebulizer, 1 lpm Ar, 30psi, 3mL/min	0047-2020
500-80	K-Type Concentric Nebulizer, 0.7 lpm Ar, 30psi, 3mL/min	N068-1574

PerkinElmer® Type 2-Stop Pump Tubing

PT-2130P	Black-Black, 0.030" (.76mm), PVC, 12/pk	0990-8587
PT-2180P	Red-Red, 0.045" (1.14mm), PVC, 12/pk	N068-0375
PT-2300P	Black-White, 0.125" (3.18mm), PVC, 12/pk	N812-2012
PT-2130SV	Black-Black, 0.030" (.76mm), Solva, 12/pk	0047-3550
PT-2180SV	Red-Red, 0.045" (1.14mm), Solva, 12/pk	N068-0376
PT-2130SI	Black-Black, 0.030" (.76mm), Silicone, 6/pk	0047-3552
PT-2180SI	Red-Red, 0.045" (1.14mm), Silicone, 6/pk	N069-1595

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310-03 - Torch Tube,
Type II, N058-0528



310-35 - Injector
Support Adapter with
O-rings, N058-2248



510-26 - Cyclonic
Spray Chamber, 12/5
Socket Top, 4mm
Drain

PerkinElmer Plasma 40 & 400

Torches & Accessories

310-03	Torch Tube, Type II	N058-0528
310-03W	Torch Tube, Type II, Wear Metals	N068-1690
310-09	Torch Tube, Type I, Slotted (P40)	N058-0376
310-35	Injector Support Adapter with O-rings	N058-2248
310-36	O-ring Kit for Injector Support Adapter	N058-0539
320-33	Quartz Injector, 1.2mm	N068-1631
320-34	Quartz Injector, 1.6mm	0047-3292
320-60	Purge Extension	N068-1234

Spray Chambers & Accessories

300-16	Scott Spray Chamber
300-19	Cyclonic Spray Chamber
300-19J	Cyclonic Spray Chamber, Water-Cooled
300-19Q	Cyclonic Spray Chamber, Quartz

Nebulizers

500-70P	C-Type Concentric Nebulizer, 1 lpm Ar, 50psi, 3mL/min	0047-2022
500-77	A-Type Concentric Nebulizer, 1 lpm Ar, 30psi, 3mL/min	0047-2020
500-80	K-Type Concentric Nebulizer, 0.7 lpm Ar, 30psi, 3mL/min	N068-1574

PerkinElmer® Type 2-Stop Pump Tubing

PT-2130P	Black-Black, 0.030" (.76mm), PVC, 12/pk	0990-8587
PT-2180P	Red-Red, 0.045" (1.14mm), PVC, 12/pk	N068-0375
PT-2300P	Black-White, 0.125" (3.18mm), PVC, 12/pk	N812-2012
PT-2130SV	Black-Black, 0.030" (.76mm), Solva, 12/pk	0047-3550
PT-2180SV	Red-Red, 0.045" (1.14mm), Solva, 12/pk	N068-0376

PerkinElmer ICP 5000, 5500, 5500B, 6000 & 6500

Torches & Accessories

300-05	Torch, One Piece with Ball Joint	0047-2048
310-07	Torch Tube, Type I	N058-0233
310-03	Torch Tube, Type II	N058-0528
300-21	Torch Extension	0047-3052
300-22	Torch Extension with Optical Port	
300-23	Torch Extension, Slotted	0047-3560
300-25	Torch Bonnet	0047-2033
320-30	Quartz Injector, 1.2mm, Type I	
320-31	Quartz Injector, 1.6mm, Type I	N058-0449
320-32	Quartz Injector, 2.0mm, Type I	
320-33	Quartz Injector, 1.2mm	N068-1631
320-34	Quartz Injector, 1.6mm	0047-3292
320-62	Purge Tube	0047-3187
320-64	Purge Tube for Slotted Extension	0047-3561

Spray Chambers & Accessories

300-12	Scott Spray Chamber	0041-2047
300-14	Scott Spray Chamber for Concentric Nebulizer	
510-26	Cyclonic Spray Chamber, 12/5 Socket Top, 4mm Drain	
510-26J	Cyclonic Spray Chamber, Water-Cooled	

Nebulizers

500-70P	C-Type Concentric Nebulizer, 1 lpm Ar, 50psi, 3mL/min	0047-2022
500-77	A-Type Concentric Nebulizer, 1 lpm Ar, 30psi, 3mL/min	0047-2020
500-80	K-Type Concentric Nebulizer, 0.7 lpm Ar, 30psi, 3mL/min	N068-1574

PerkinElmer® Type 2-Stop Pump Tubing

PT-2130P	Black-Black, 0.030" (.76mm), PVC, 12/pk	0990-8587
PT-2180P	Red-Red, 0.045" (1.14mm), PVC, 12/pk	N068-0375
PT-2300P	Black-White, 0.125" (3.18mm), PVC, 12/pk	N812-2012
PT-2130SV	Black-Black, 0.030" (.76mm), Solva, 12/pk	0047-3550

PerkinElmer Optima 3000 Series Radial

Torches & Accessories

310-03W	Torch Tube, Type II, Wear Metals	N068-1690
310-04	Torch Body, Optima, Radial	N069-0568
310-04W	Torch Body, Optima, Radial, Wear Metals	
310-05	Torch Bonnet, Flat Edge (Optima pre-9/94)	N069-5295
310-13	Torch Bonnet, Flat Edge (Optima post 9/94)	N069-5456
320-33	Quartz Injector, 1.2mm	N068-1631
320-43	Quartz Injector, 1.6mm	N069-5448
320-40	Quartz Injector, 2.0mm	N069-5441
320-51	Alumina Injector, 0.85mm	N058-2186
320-52	Alumina Injector, 1.5mm	N058-2185
320-53	Alumina Injector, 2.0mm	N058-2184
320-66	Purge Extension Window	N058-1497

Spray Chambers & Accessories

300-15	Scott Spray Chamber, Type II, Angled Top
300-16	Scott Spray Chamber, Type II
300-19	Cyclonic Spray Chamber, Optima

Nebulizers

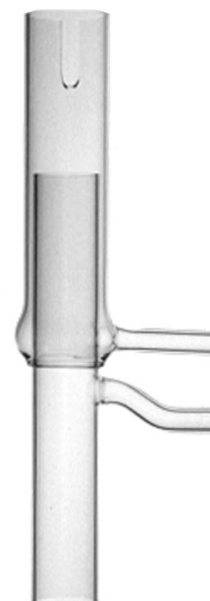
500-70P	C-Type Concentric Nebulizer, 1 lpm Ar, 50psi, 3mL/min	0047-2022
500-77	A-Type Concentric Nebulizer, 1 lpm Ar, 30psi, 3mL/min	0047-2020
500-80	K-Type Concentric Nebulizer, 0.7 lpm Ar, 30psi, 3mL/min	N068-1574

PerkinElmer® Type 2-Stop Pump Tubing

PT-2130P	Black-Black, 0.030" (.76mm), PVC, 12/pk	0990-8587
PT-2180P	Red-Red, 0.045" (1.14mm), PVC, 12/pk	N068-0375
PT-2300P	Black-White, 0.125" (3.18mm), PVC, 12/pk	N812-2012
PT-2130SV	Black-Black, 0.030" (.76mm), Solva, 12/pk	0047-3550
PT-2180SV	Red-Red, 0.045" (1.14mm), Solva, 12/pk	N068-0376
PT-2130SI	Black-Black, 0.030" (.76mm), Silicone, 6/pk	0047-3552
PT-2180SI	Red-Red, 0.045" (1.14mm), Silicone, 6/pk	N069-1595

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310-04 - Torch Body, Optima, Radial, N069-0568



300-18DV - Cyclonic Spray Chamber, N812-2188



310-15 - Torch Bonnet, N069-1664

PerkinElmer Optima 3000 Series XL & SC(X)

Torches & Accessories

310-11	Torch Body, Optima XL	N069-5379
310-11W	Torch Body, Optima XL, Wear Metals	
310-15	Torch Bonnet	N069-1664
310-37	Injector Support Adapter with O-rings for Optima XL/DV	N069-5400
310-39	Injector Support Adapter with O-rings for Optima XL/DV	N069-0780
320-46	Quartz Injector, 1.2mm	N069-5460
320-44	Quartz Injector, 1.6mm	N069-5449
320-41	Quartz Injector, 2.0mm	N069-5442
320-50	Alumina Injector, 2.0mm	N069-5362
320-65	Purge Viewing Window for Optima XL	0999-2731

Spray Chambers & Accessories

300-18DV	Cyclonic Spray Chamber	N812-2188
310-38	O-ring Kit - Optima XL/DV	N069-0769

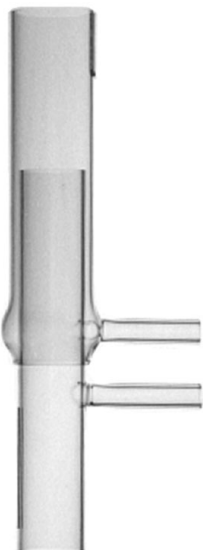
Nebulizers

500-70P	C-Type Concentric Nebulizer, 1 lpm Ar, 50psi, 3mL/min	0047-2022
500-77	A-Type Concentric Nebulizer, 1 lpm Ar, 30psi, 3mL/min	0047-2020
500-80	K-Type Concentric Nebulizer, 0.7 lpm Ar, 30psi, 3mL/min	N068-1574

PerkinElmer® Type 2-Stop Pump Tubing

PT-2130P	Black-Black, 0.030" (.76mm), PVC, 12/pk	0990-8587
PT-2180P	Red-Red, 0.045" (1.14mm), PVC, 12/pk	N068-0375

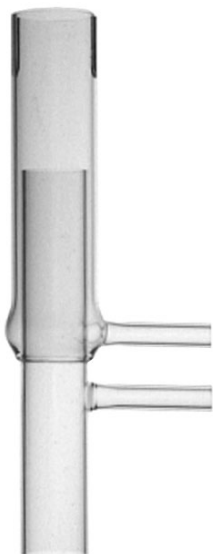
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**310-14 - Torch Body,
Optima DV, 1 Slot,
N069-1662**



**310-15 - Torch Bonnet,
N069-1664**



**310-12 - Torch Body,
Optima DV, 2 Slot**

PerkinElmer 3000 Series DV

Torches & Accessories

310-14	Torch Body, Optima DV, 1 Slot	N069-1662
310-14W	Torch Body, Optima DV, 1 Slot, Wear Metals	
310-14/3SL	Torch Body, Optima DV, 3 Slot	
310-12	Torch Body, Optima DV, 2 Slot	
310-12W	Torch Body, Optima DV, 2 Slot, Wear Metals	
310-15	Torch Bonnet	N069-1664
310-37	Injector Support Adapter with O-rings for Optima XL/DV	N069-5400
310-39	Injector Support Adapter with O-rings for Optima XL/DV	N069-0780
320-48	Quartz Injector, 0.8mm	N069-5461
320-46	Quartz Injector, 1.2mm	N069-5460
320-44	Quartz Injector, 1.6mm	N069-5449
320-41	Quartz Injector, 2.0mm	N069-5442
320-50	Alumina Injector, 2.0mm	N069-5362
320-67	Axial Purge Window	B006-6549
320-68	Purge Tube Window, Axial	N069-1678
320-69	Purge Tube Window, Radial	N069-1689
320-73	Purge Tube Window, Radial, Short	N069-0672

Spray Chambers & Accessories

300-18DV	Cyclonic Spray Chamber	N812-2188
300-18DVJ	Cyclonic Spray Chamber, Water-Cooled	
300-18DVQ	Cyclonic Spray Chamber, Quartz	
310-38	O-ring Kit - Optima XL/DV	N069-0769

Nebulizers

500-70P	C-Type Concentric Nebulizer, 1 lpm Ar, 50psi, 3mL/min	0047-2022
500-77	A-Type Concentric Nebulizer, 1 lpm Ar, 30psi, 3mL/min	0047-2020
500-80	K-Type Concentric Nebulizer, 0.7 lpm Ar, 30psi, 3mL/min	N068-1574

PerkinElmer® Type 2-Stop Pump Tubing

PT-2130P	Black-Black, 0.030" (.76mm), PVC, 12/pk	0990-8587
PT-2180P	Red-Red, 0.045" (1.14mm), PVC, 12/pk	N068-0375
PT-2300P	Black-White, 0.125" (3.18mm), PVC, 12/pk	N812-2012
PT-2130SV	Black-Black, 0.030" (.76mm), Solva, 12/pk	0047-3550
PT-2180SV	Red-Red, 0.045" (1.14mm), Solva, 12/pk	N068-0376
PT-2130SI	Black-Black, 0.030" (.76mm), Silicone, 6/pk	0047-3552
PT-2180SI	Red-Red, 0.045" (1.14mm), Silicone, 6/pk	N069-1595



**300-18DV - Cyclonic
Spray Chamber,
N812-2188**



**310-39 - Injector Support Adapter
with O-rings for Optima XL/DV
N069-0780**

PerkinElmer Optima 2000/4000/5000/7000DV Series & 4300V/5300V

Torches & Accessories

310-16	Torch Body, Optima 2000/4000/5000/7000DV, 1 Slot	N077-0338
310-16W	Torch Body, Optima 2000/4000/5000/7000DV, Wear Metals	
310-17	Torch Body, Optima 4300V/5300V	N077-1500
310-18	Torch Body, Optima 2000/4000/5000/7000DV, Short Version	N077-0344
310-19	Torch Body, Optima 2000/4000/5000/7000DV, No Slot	N077-0343
310-20	Copper Foil for Torch Body Optima 2000/4000/5000/7000DV	N077-5297
310-25	Torch Bonnet	N077-5289
310-43	O-ring Kit for Optima 2000/4000/5000/7000DV Torch	N077-0437
320-78	Quartz Injector, 0.8mm	N077-5225
320-77	Quartz Injector, 1.2mm	N077-5226
320-76	Quartz Injector, 1.6mm	N077-5223
320-74	Quartz Injector, 2.0mm	N077-5014
320-75	Quartz Injector, 3.0mm	N077-5224
310-40	Alumina Injector, 0.8mm	N077-5227
310-41	Alumina Injector, 1.2mm	N077-5228
310-42	Alumina Injector, 2.0mm	N077-5177
320-54	Alumina Injector, 1.2mm, Optima 4300V/5300V	N077-1531
320-66	Purge Extension Window, Optima 4300V/5300V	N058-1497
320-65	Axial Purge Window, Optima 2000DV	0999-2731
320-67	Axial Purge Window, Optima 4000/5000/7000DV	N077-1116
320-73	Purge Tube Window, Radial, Short, Optima 2000DV	N069-0672
320-80	Radial Purge Window, Optima 4000/5000/7000DV	N077-0322
320-81	Radial Purge Tube, Frosted, Optima 4000/5000/7000DV	N077-0944

Spray Chambers & Accessories

300-28	Nebulizer Adapter for Cyclonic Spray Chamber	
300-29	Cyclonic Spray Chamber, no Baffle with Nebulizer Adapter	N077-6052
300-30	Cyclonic Spray Chamber, Baffled with Nebulizer Adapter	N077-6053
300-30Q	Cyclonic Spray Chamber, Baffled, Quartz with Nebulizer Adapter	
300-31	Cyclonic Spray Chamber, 4mm Baffle with Nebulizer Adapter	N077-6090
300-32	Cyclonic Spray Chamber, Baffled, Optima 4300V	N077-1501

Nebulizers

500-70P	C-Type Concentric Nebulizer, 1 lpm Ar, 50psi, 3mL/min	0047-2022
500-77	A-Type Concentric Nebulizer, 1 lpm Ar, 30psi, 3mL/min	0047-2020
500-80	K-Type Concentric Nebulizer, 0.7 lpm Ar, 30psi, 3mL/min	N068-1574

PerkinElmer® Type 2-Stop Pump Tubing

PT-2130P	Black-Black, 0.030" (.76mm), PVC, 12/pk	0990-8587
PT-2180P	Red-Red, 0.045" (1.14mm), PVC, 12/pk	N068-0375
PT-2300P	Black-White, 0.125" (3.18mm), PVC, 12/pk	N812-2012
PT-2130SV	Black-Black, 0.030" (.76mm), Solva, 12/pk	0047-3550
PT-2180SV	Red-Red, 0.045" (1.14mm), Solva, 12/pk	N068-0376
PT-2130SI	Black-Black, 0.030" (.76mm), Silicone, 6/pk	0047-3552
PT-2180SI	Red-Red, 0.045" (1.14mm), Silicone, 6/pk	N069-1595

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310-16 - Torch Body, Optima
2000/4000/5000 DV, 1 Slot,
N077-0338



310-17 - Torch Body, Optima
4300V, N077-1500



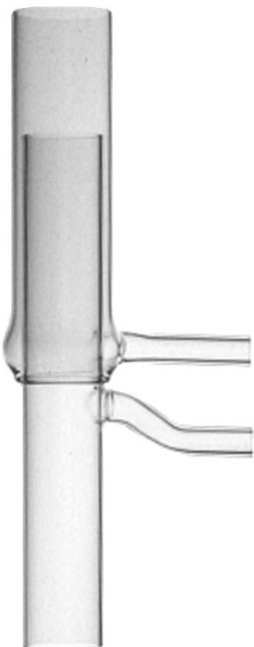
300-29 - Cyclonic Spray
Chamber, no Baffle with
Nebulizer Adapter, N077-6052



300-32 - Cyclonic Spray
Chamber, Baffled, Optima 4300V,
N077-1501



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400-10 - Torch Body, Elan,
N812-2006



400-30 - Injector, 6100DRC,
2.0mm, WE02-3948 and 400-37 -
Injector Support/Torch Base-
DRC, WE02-3951

PerkinElmer/SCIEX ELAN 250 & 500

Torches & Accessories

400-05	Short Form Torch (135mm overall length)	N810-2001
400-07	Long Form Torch (151mm overall length)	N810-2006
400-09	Long Form Torch (150mm overall length)	
320-33	Quartz Injector, 1.2mm	N068-1631
320-34	Quartz Injector, 1.6mm	0047-3292
320-35	Quartz Injector, 2.0mm	N812-5029
400-25	Torch Bonnet	

PerkinElmer/SCIEX ELAN 5000/6X00/9000/DRC II

Torches & Accessories

400-10	Torch Body, Elan	N812-2006
400-10HE	Torch Body, High Efficiency	W100-8384
320-33	Quartz Injector, 1.2mm	N068-1631
320-34	Quartz Injector, 1.6mm	0047-3292
320-35	Quartz Injector, 2.0mm	N812-5029
320-51	Alumina Injector, 0.85mm	N812-6039
320-52	Alumina Injector, 1.5mm	N812-6040
320-53	Alumina Injector, 2.0mm	N812-6041
400-31	Quartz Injector, 0.85mm, DRC	WE02-7030
400-32	Quartz Injector, 1.5mm, DRC	WE02-7005
400-30	Quartz Injector, 2.0mm, DRC	WE02-3948
400-35	Injector Support/Torch Base	N812-0116
400-37	Injector Support/Torch Base, DRC	WE02-3951

Spray Chambers & Accessories

300-19MS	Cyclonic Spray Chamber	N812-0150
300-19MSJ	Cyclonic Spray Chamber, Water-Cooled	
300-19MSQ	Cyclonic Spray Chamber, Quartz	
300-19MSQJ	Cyclonic Spray Chamber, Quartz, Water-Cooled	
300-19MSQB	Cyclonic Spray Chamber, Quartz, Baffled	
400-20	Cyclonic Spray Chamber, Quartz, DRC	WE02-5221
400-20J	Cyclonic Spray Chamber, Quartz, DRC, Water-Cooled	
400-36	Sciex O-ring Adapter Kit	N812-0100
400-38	Sciex O-ring Adapter Kit, DRC	
400-12	Scott Spray Chamber	
400-13	Scott Spray Chamber, Quartz	
400-14	Scott Spray Chamber, Water-Cooled	WE01-3829
400-16	Scott Spray Chamber, Water-Cooled, Quartz	

Nebulizers

500-70M	C-Type Concentric Nebulizer, 1 lpm, 30psi, Microflow (0.1-0.4 mL/min)	N810-2012
500-72	C-Type Concentric Nebulizer, 1 lpm Ar, 30psi, 3mL/min	N810-2011
500-80	K-Type Concentric Nebulizer, 0.7 lpm Ar, 30psi, 3mL/min	N068-1574
500-77Q	A-Type Concentric Nebulizer, 1 lpm, 30psi, 3mL/min, Quartz	WE02-4371
500-70QQDAC	C-Type Concentric Nebulizer, 1 lpm Ar, 30psi, 1mL/min, Quartz, Quick Disconnect, Argon Connect	

PerkinElmer® Sciex Type 2-Stop Pump Tubing

PT-2130P	Black-Black, 0.030" (.76mm), PVC, 12/pk	0990-8587
PT-2180P	Red-Red, 0.045" (1.14mm), PVC, 12/pk	N068-0375
PT-2300P	Black-White, 0.125" (3.18mm), PVC, 12/pk	N812-2012
PT-2130SV	Black-Black, 0.030" (.76mm), Solva, 12/pk	0047-3550
PT-2180SV	Red-Red, 0.045" (1.14mm), Solva, 12/pk	N068-0376
PT-2130SI	Black-Black, 0.030" (.76mm), Silicone, 6/pk	0047-3552
PT-2290SA	Violet-White, 0.110" (2.79mm), Santoprene, 12/pk	N812-2252

Spectro Modula, CIROS, Genesis, & ARCOS

SOP Torches

750-07	Torch, Fixed, 1.0mm	48205001
750-05	Torch, Fixed, 1.8mm, Standard	
750-05F	Torch, Fixed, 1.8mm, Standard with Fittings	75060596
750-08	Torch, Fixed, 2.5mm	
750-06	Demountable Torch, Spectroflame	48206002
750-49	Fixed Sheath Gas System Torch, 3.0 mm	
750-49F	Fixed Sheath Gas System Torch, 3.0 mm with Fittings	75260533

EOP Torches

750-41	Flared End Torch, 1.8mm	48105052A
750-41F	Flared End Torch, 1.8mm with Fittings	75160592
750-40	Flared End Torch, 2.5mm	48105052
750-40F	Flared End Torch, 2.5mm with Fittings	75160526
750-42	Demountable Torch	48206007
750-44	Demountable Flared End Torch	
750-47	Fixed Sheath Gas System Torch, 1.8 mm	
750-47F	Fixed Sheath Gas System Torch, 1.8 mm with Fittings	75160549
750-48	Fixed Sheath Gas System Torch, 3.0 mm	
750-48F	Fixed Sheath Gas System Torch, 3.0 mm with Fittings	75160537

Torch Accessories

750-21	Quartz Injector, 1.5mm, Standard	48105008
750-22	Quartz Injector, 1.8mm, Standard	48105010
750-23	Quartz Injector, 2.5mm, Standard	48105009
750-46	Quartz Injector, 2.5mm, EOP/Standard	48105058
750-55	Gas Adapter	

Spray Chambers & Accessories

750-10	Conical Spray Chamber, Slurry, Open End	
750-12	Conical Spray Chamber, Vertical Exit, Open End	48105003
750-13	Scott Spray Chamber, Double Pass, 90° Exit	48105051
750-14	Scott Spray Chamber, Double Pass, Large	48105006
750-15	Cyclonic Spray Chamber, Gravity Drain	
750-16	Cyclonic Spray Chamber, MLN, Gravity Drain	
510-27	Cyclonic Spray Chamber, MLN, Pump Drain	48105061
750-17	Elbow Adapter, EOP Torch to Spray Chamber	48105062
750-18	Elbow Adapter, EOP Torch to Slurry Spray Chamber	48105002
750-30	Spectro Drain Pressure Lock	

Nebulizers

500-70	C-Type Concentric Nebulizer, 1 lpm Ar, 30psi, 1mL/min	76060510
500-92S	Crossflow Nebulizer, 34mm	75060502
510-20S	Modified Lichte MDSN Nebulizer, 1 lpm Ar	48205036
510-20SF	Modified Lichte MDSN Nebulizer, 1 lpm Ar, with Fittings	76060529
520-30S	PTFE End Cap for use with 34mm Open End Spray Chamber	75060522
520-32S	O-ring for 500-92S	
750-93	O-ring for Crossflow Nebulizer (OEM Replacement)	

Spectro Type 2-Stop Pump Tubing

PT-2080P	Orange-Green, 015" (.38mm), PVC, 12/pk	47201037
PT-2120P	Orange-White, 0.025" (.64mm), PVC, 12/pk	47101001
PT-2140P	Orange-Orange, 0.035" (.89mm), PVC, 12/pk	47101003
PT-2150P	White-Black, 0.037" (.95mm), PVC, 12/pk	47101004
PT-2200P	Gray-Gray, 0.050" (1.30mm), PVC, 12/pk	47501010
PT-2220P	Yellow-Blue, 0.06" (1.52mm), PVC, 12/pk	47101006
PT-2230P	Blue-Blue, 0.065" (1.65mm), PVC, 12/pk	47101014
PT-2240P	Blue-Green, (1.75mm), PVC, 12/pk	47101005
PT-2080SV	Orange-Green, 015" (.38mm), Solva, 12/pk	47501016
PT-2140SV	Orange-Orange, 0.035" (.89mm), Solva, 12/pk	47501018

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750-40 - EOP Flared End Torch, 2.5mm, 48105052



750-12 - Small Upward Conical Spray Chamber, 48105003



510-20S - Modified Lichte Nebulizer (MLN), 1 lpm, Ar, 48205036



250-08 - Torch



250-25 - Torch Bonnet,
190400-75



500-92 - Crossflow Nebulizer,
126989-00

Thermo Scientific - TJA 2000-2400 Series

Torches & Accessories

250-08	Torch	
250-25	Torch Bonnet	190400-75

Spray Chambers & Accessories

120-56	O-ring for Spray Chamber, PTFE Coated Viton	
250-16	Scott Spray Chamber, Standard	127947-00
250-30	Aerosol Baffle for 250-16	003952-00
285-01	Rinse Station 1 Port, 12mm	
285-02	Rinse Station 2 Port, 12mm	
285-03	Rinse Station 2 Port, 23mm	
510-26	Cyclonic Spray Chamber, 12/5 Socket Top, 4mm Drain	

Nebulizers

500-92	Crossflow Nebulizer	126989-00
520-36	O-ring Kit for 500-92	133202-50
520-38	Argon Inlet Fittings for 500-92	

TJA® Type 3-Stop Pump Tubing

PT-3020P	Orange-Red, .0075" (.19mm), PVC, 12/pk	
PT-3080P	Orange-Green, .015" (.38mm), PVC, 12/pk	130177-06
PT-3140P	Orange-Orange, 0.035" (.89mm), PVC, 12/pk	130177-00
PT-3180P	Red-Red, 0.045" (1.14mm), PVC, 12/pk	130177-01
PT-3140SI	Orange-Orange, 0.035" (.89mm), Silicone, 6/pk	130177-02
PT-3180SI	Red-Red, 0.045" (1.14mm), Silicone, 6/pk	130177-03
PT-3140SV	Orange-Orange, 0.035" (.89mm), Solva, 12/pk	131731-02
PT-3180SV	Red-Red, 0.045" (1.14mm), Solva, 12/pk	78532
PT-3120SV	Yellow-Yellow, 0.056" (1.42mm), Solva, 12/pk	78530
PT-3230SV	Blue-Blue, 0.065" (1.65mm), Solva, 12/pk	131731-00
PT-3260SV	Purple-Purple, 0.080" (2.06 mm), Solva, 12/pk	131731-01
PT-3140V	Orange-Orange, 0.035" (.89mm), Viton, 6/pk	130177-04
PT-3180V	Red-Red, 0.045" (1.14mm), Viton, 6/pk	130177-05
PT-3210V	Yellow-Yellow, 0.056" (1.42mm), Viton, 12/pk	
ISMK-101	Internal Standard Mixing Kit, 5/pk, This product allows for simultaneous introduction of sample and internal standard.	136708-00



285-01 - Rinse Station
1 Port, 12mm



285-02 - Rinse Station
2 Port, 12mm



285-03 - Rinse Station
2 Port, 23mm

Thermo Scientific - TJA 975, 9000, 61 & 1100

Torches & Accessories

250-05	Demountable Torch with Removable 1.0mm Tip	190400-54
250-05-A	Demountable Torch with 1 Extra Removable 1.0mm Tip	
250-05-B	Demountable Torch with 2 Extra Removable 1.0mm Tips	
250-05-C	Demountable Torch with 3 Extra Removable 1.0mm Tips	
250-05W	Demountable Torch with Removable 1.0mm Tip, Wear Metals	
250-06	Demountable Torch with Removable 1.25mm Tip	
250-06-A	Demountable Torch with 1 Extra Removable 1.25mm Tip	
250-06-B	Demountable Torch with 2 Extra Removable 1.25mm Tips	
250-06W	Demountable Torch with Removable 1.25mm Tip, Wear Metals	
250-07	Demountable Torch with Removable 1.5mm Tip	
250-07-A	Demountable Torch with 1 Extra Removable 1.5mm Tip	
250-07-B	Demountable Torch with 2 Extra Removable 1.5mm Tips	
250-09	Demountable Torch with Removable 1.7mm Tip	
250-21	Torch Extension	
250-22	Torch Extension with Optical Port	
250-25	Torch Bonnet	190400-75
260-55	Demountable Torch with Removable Tip, High Solids	
260-62	TJA Standard Low Flow Torch	
260-81	Alumina Injector Tube 1.5mm	136436-02
260-82	HF/CR Torch Body for Alumina/Sapphire Injector	
260-85	PTFE Injector Holder	

Spray Chambers & Accessories

250-12	Scott Spray Chamber	190400-65
250-18	Scott Spray Chamber, Curved Drain	
250-20	Scott Spray Chamber, Open Ends, Water-Cooled	
250-20R	O-ring for Scott Spray Chamber, Water-Cooled	
250-30	Aerosol Baffle for 250-12 & 250-18	003952-00
285-01	Rinse Station 1 Port, 12mm	
285-02	Rinse Station 2 Port, 12mm	
285-03	Rinse Station 2 Port, 23mm	

Nebulizers

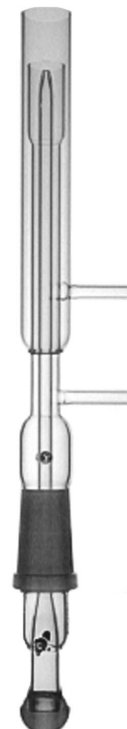
500-92	Crossflow Nebulizer	126989-00
520-36	O-ring Kit for 500-92	133202-50
520-38	Argon Inlet Fittings for 500-92	

TJA® Type 3-Stop Pump Tubing

PT-3020P	Orange-Red, .0075" (.19mm), PVC, 12/pk	
PT-3080P	Orange-Green, .015" (.38mm), PVC, 12/pk	130177-06
PT-3140P	Orange-Orange, 0.035" (.89mm), PVC, 12/pk	130177-00
PT-3180P	Red-Red, 0.045" (1.14mm), PVC, 12/pk	130177-01
PT-3140SI	Orange-Orange, 0.035" (.89mm), Silicone, 6/pk	130177-02
PT-3180SI	Red-Red, 0.045" (1.14mm), Silicone, 6/pk	130177-03
PT-3140SV	Orange-Orange, 0.035" (.89mm), Solva, 12/pk	131731-02
PT-3180SV	Red-Red, 0.045" (1.14mm), Solva, 12/pk	78532
PT-3210SV	Yellow-Yellow, 0.056" (1.42mm), Solva, 12/pk	78530
PT-3230SV	Blue-Blue, 0.065" (1.65mm), Solva, 12/pk	131731-00
PT-3260SV	Purple-Purple, 0.080" (2.06 mm), Solva, 12/pk	131731-01
PT-3140V	Orange-Orange, 0.035" (.89mm), Viton, 6/pk	130177-04
PT-3180V	Red-Red, 0.045" (1.14mm), Viton, 6/pk	130177-05
PT-3210V	Yellow-Yellow, 0.056" (1.42mm), Viton, 12/pk	
ISMK-101	Internal Standard Mixing Kit, 5/pk, This product allows for simultaneous introduction of sample and internal standard.	136708-00

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250-05 - Demountable Torch with Removable 1.0mm Tip, 190400-54



250-12 - Scott Spray Chamber, 190400-65

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**275-07 - Ceramic Base Torch,
High Flow with 1.5mm Injector,
126432-01**

Did you know...

Ceramic base torches for TJA instruments may be rebuilt multiple times at a very moderate price. Available with or without a new injector, rebuilt torches receive new precision bore quartz inner and outer tubes and new argon fittings. Furthermore, our rebuilt torches are subjected to the same QC program as our new torches. So before you throw away your next broken ceramic base torch, consider having us rebuild it. After all, it can only save you money.

Thermo Scientific - TJA 61E, Iris Advantage Radial, Intrepid Radial, Intrepid II Radial

Torches & Accessories

275-06	Ceramic Base Torch, High/Low Flow with 1.5mm Injector	126432-02
275-06W	Ceramic Base Torch, High/Low Flow, 1.5mm Inj., Wear Metals	
275-06W/O	Ceramic Base Torch, High/Low Flow without Injector	126440-02
275-07	Ceramic Base Torch, High Flow with 1.5mm Injector	126432-01
275-07HF	Ceramic Base Torch, High Flow with 1.5mm Alumina Injector	127179-01
275-07W/O	Ceramic Base Torch, High Flow without Injector	126440-01
275-08	Ceramic Base Torch, High Flow with 1.0mm Injector,Organics	125124-01
275-08W/O	Ceramic Base Torch, High Flow without Injector	126440-01
275-09	Ceramic Base Torch, Slotted with 1.5mm Injector	126432-04
275-09W/O	Ceramic Base Torch, Slotted without Injector	126440-06
250-40	Quartz Injector, 1.0mm	125407-01
250-41	Quartz Injector, 1.5mm	125407-00
250-42	Quartz Injector, 2.0mm	136502-01
250-43	Quartz Injector, 2.4mm	136502-02
254-45	O-ring for Injector Tube	125847-00
260-83	Alumina Injector, 1.5mm	136436-01
260-84	Alumina Injector, 1.0mm	
275-20	TJA PTFE Adapter, Torch	
275-25	Anti-arc Cap	085207-00
275-26	Anti-arc Cap, Flat Edge	085207-01
275-35	Argon Fittings for Ceramic Base Torches	

Spray Chambers & Accessories

250-19	Spray Chamber, Open End	130089-00
250-30	Aerosol Baffle for 250-19	003952-00
275-14	Cyclonic Spray Chamber, Radial, Pump	139663-00
275-18	Cyclonic Spray Chamber, Radial, Pump	140542-00
275-19	Cyclonic Spray Chamber, 10mm Drain	136105-00
275-19J	Cyclonic Spray Chamber, Water-Cooled, 10mm Drain	
275-21	Conical Spray Chamber	139219-00
275-53	Conical Spray Chamber, Water-Cooled	139123-00
285-01	Rinse Station 1 Port, 12mm	
285-02	Rinse Station 2 Port, 12mm	
285-03	Rinse Station 2 Port, 23mm	

Nebulizers

500-80	K-Type Concentric Nebulizer, 0.7 lpm Ar, 30psi, 3mL/min	134365-00
500-92	Crossflow Nebulizer	126989-00
510-10	Noordermeer V-Groove MDSN Nebulizer	080963
520-30	PTFE End Cap for use with 35mm Open End Spray Chambers	
520-36	O-ring Kit for 500-92	133202-50
520-38	Argon Inlet Fittings for 500-92	

TJA® Type 3-Stop Pump Tubing

PT-3020P	Orange-Red-Orange, .0075" (.19mm), PVC, 12/pk	
PT-3080P	Orange-Green-Orange, .015" (.38mm), PVC, 12/pk	130177-06
PT-3140P	Orange-Orange, 0.035" (.89mm), PVC, 12/pk	130177-00
PT-3180P	Red-Red, 0.045" (1.14mm), PVC, 12/pk	130177-01
PT-3140SI	Orange-Orange, 0.035" (.89mm), Silicone, 6/pk	130177-02
PT-3180SI	Red-Red, 0.045" (1.14mm), Silicone, 6/pk	130177-03
PT-3140SV	Orange-Orange, 0.035" (.89mm), Solva, 12/pk	131731-02
PT-3180SV	Red-Red, 0.045" (1.14mm), Solva, 12/pk	78532
PT-3210SV	Yellow-Yellow, 0.056" (1.42mm), Solva, 12/pk	78530
PT-3230SV	Blue-Blue, 0.065" (1.65mm), Solva, 12/pk	131731-00
PT-3260SV	Purple-Purple, 0.080" (2.06 mm), Solva, 12/pk	131731-01
PT-3140V	Orange-Orange, 0.035" (.89mm), Viton, 6/pk	130177-04
PT-3180V	Red-Red, 0.045" (1.14mm), Viton, 6/pk	130177-05
PT-3210V	Yellow-Yellow, 0.056" (1.42mm), Viton, 12/pk	
ISMK-101	Internal Standard Mixing Kit, 5/pk, This product allows for simultaneous introduction of sample and internal standard.	136708-00

Thermo Scientific - TJA 61E Trace, Iris AP, Intrepid, Intrepid II

Torches & Accessories

275-10	Ceramic Base Torch, Trace with 1.5mm Injector	126432-03
275-10W/O	Ceramic Base Torch, Trace without Injector	126440-03
275-10HF	Ceramic Base Torch, Trace with 1.5mm Alumina Injector	138566-03
275-10DV	Ceramic Base Torch, DV with 1.5mm Injector	
275-10DVKIT	Ceramic Base Torch, DV, 1.5mm Injector, Optic Sleeve, Seal	138562-00
275-10DVW/O	Ceramic Base Torch, DV without Injector	126440-05
250-23	Optic Sleeve for DV Torch	137689-00
250-24	Seal for Optic Sleeve - Duo Torch	137688-00
250-26	Duo Torch Sleeve and Seal Kit	138563-00
250-40	Quartz Injector, 1.0mm	125407-01
250-41	Quartz Injector, 1.5mm	125407-00
250-42	Quartz Injector, 2.0mm	136502-01
250-43	Quartz Injector, 2.4mm	136502-02
260-83	Alumina Injector, 1.5mm	136436-01
260-84	Alumina Injector, 1.0mm	
275-20	PTFE Adapter, Torch to Cyclonic Spray Chamber	

Spray Chambers & Accessories

275-13	Cyclonic Spray Chamber, Axial, Pump	139662-00
275-15	Cyclonic Spray Chamber, Gravity Drain, Trace	134620-00
275-16	Cyclonic Spray Chamber, Axial, Gravity Drain	136120-00
250-19	Spray Chamber, Open End	130089-00
250-30	Aerosol Baffle for 250-19	003952-00
285-01	Rinse Station 1 Port, 12mm	
285-02	Rinse Station 2 Port, 12mm	
285-03	Rinse Station 2 Port, 23mm	

Nebulizers

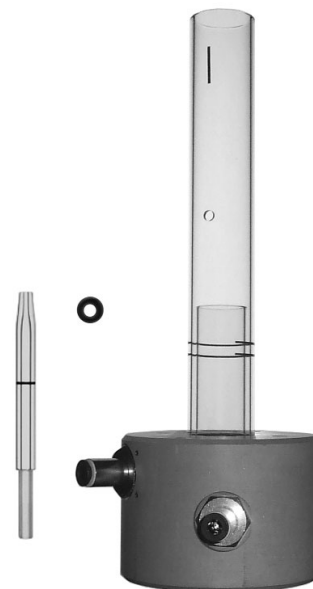
500-80	K-Type Concentric Nebulizer, 0.7 lpm Ar, 30psi, 3mL/min	134365-00
500-92	Crossflow Nebulizer	126989-00
510-10	Noordermeer V-Groove MDSN Nebulizer	080963
520-30	PTFE End Cap for use with 35mm Open End Spray Chambers	
520-36	O-ring Kit for 500-92	133202-50
520-38	Argon Inlet Fittings for 500-92	

TJA® Type 3-Stop Pump Tubing

See opposite page for complete list of TJA® Type Pump tubing.

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**275-10DV - Ceramic Base
Torch, DV with 1.5mm Injector**



**275-15 - Cyclonic Spray
Chamber, Gravity Drain, Trace,
134620-00**

Determining the Correct Replacement TJA Ceramic Base Torch and Injector

Follow the charts below to identify which torch and injector you have and the correct replacement part number from Precision Glassblowing of Colorado.

Ceramic Base Torches

TJA Part #	Rings on Outer Tube of Torch	Rings on Injector (Center Tube)	Precision Part #
126432-02	1 Red Ring, Approx. 63mm Long Outer Tube	1.5mm Quartz Injector, 1 Red Ring	275-06
126432-01	2 Red Rings, Approx. 63mm Long Outer Tube	1.5mm Quartz Injector, 1 Red Ring	275-07
127179-01	2 Red Rings, Approx. 63mm Long Outer Tube	1.5mm Alumina Injector, No Ring	275-07HF
125124-01	2 Red Rings, Approx. 63mm Long Outer Tube	1.0mm Injector, 2 Red Rings	275-08
126432-03	2 Red Rings, Approx. 136mm Long Outer Tube	1.5mm Quartz Injector, 1 Red Ring	275-10
138562-00	2 Red Rings, Hole for Radial Viewing, Approx. 136mm Long Outer Tube	1.5mm Quartz Injector, 1 Red Ring	275-10DV

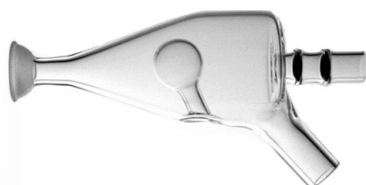
Injectors

TJA Part #	Rings on Injector (Center Tube)	Precision Part #
125407-01	Quartz, 1.0mm bore, 2 Red Rings	250-40
125407-00	Quartz, 1.5mm bore, 1 Red Ring	250-41
136502-01	Quartz, 2.0mm bore, 1 Blue Ring	250-42
136502-02	Quartz, 2.4mm bore, 2 Blue Rings	250-43
N/A	Alumina, 1.0mm bore, No Rings	260-84
136463-01	Alumina, 1.5mm bore, No Rings	260-83

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450-05 - Torch, 1.5mm,
3201192



450-13 - Conical Spray
Chamber with Impact
Bead, Quartz, 3600170



450-28 - Torch Bonnet,
72mm, 3204703

Thermo Scientific - VG PQ 1-3, Axiom, PQ ExCell

Torches & Accessories

450-05	Torch, 1.5mm	3201192
450-06	Torch, 2.0mm	3201732
450-08	Torch Body, Demountable	1200080
450-09	Quartz Injector	
450-10	Torch Body, Demountable with Quartz Injector	
450-11	Alumina Injector	1200079
450-12	Torch Body, Corrosion Resistant	3203095
450-21	Torch Extension	
450-25	Torch Bonnet	
450-26	Torch Bonnet Cap	1200274
450-27	RF Insulator Shield	3203025
450-28	Torch Bonnet, 72mm	3204703
450-29	Torch Shield	3203789

Spray Chambers & Accessories

450-13	Conical Spray Chamber with Impact Bead, Quartz	3600170
450-14	Conical Spray Chamber with Impact Bead for Concentric Neb.	
450-15	Scott Spray Chamber, Water-Cooled, Pyrex	
450-16	Scott Spray Chamber, Water-Cooled, Quartz	3200841
450-17	Conical Spray Chamber, Water-Cooled for Maxim	3203739
450-22	Conical Spray Chamber, Water-Cooled, Pyrex	3204313
450-22Q	Conical Spray Chamber, Water-Cooled, Quartz	3600374
450-30	Elbow for use with 450-13, Quartz	3600169
450-31	Elbow, Ball & Socket, Pyrex	
450-32	Elbow, Ball & Socket, Quartz	3200727

Nebulizers

500-70	C-Type Concentric Nebulizer, 1 lpm Ar, 30psi, 1mL/min	1040894
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Accessories

450-18	Clamp, Stainless Steel, #12	1201261
450-18L	Clamp, Stainless Steel, #12 with Lock	
450-19	Clamp, Stainless Steel, #18	1202081
450-36	UV Laser Sample Cell	3007383
450-40	Probe UV Laser Sample Cell	3201104
450-42	Micro Probe UV Laser Sample Cell	
450-43	Quartz Sleeve	3202287
450-44	Quartz Tube	3201759
450-45	Quartz Sleeve, #2	3200176
450-46	Quartz Sleeve, Silica	3201070
450-49	Quartz Socket Tube Adapter	3200004
450-51	Glass Probe	1041167

VG Type 2-Stop Pump Tubing

PT-2130P	Black-Black, 0.030" (.76mm), PVC, 12/pk
PT-2180P	Red-Red, 0.045" (1.14mm), PVC, 12/pk
PT-2130SV	Black-Black, 0.030" (.76mm), Solva, 12/pk
PT-2180SV	Red-Red, 0.045" (1.14mm), Solva, 12/pk
PT-2130SI	Black-Black, 0.030" (.76mm), Silicone, 6/pk
PT-2020P	Orange-Red, .0075" (.19mm), PVC, 12/pk
PT-2130V	Black-Black, 0.030" (.76mm), Viton, 12/pk

Varian 700-ES Series, Liberty, Vista

Torches & Accessories, Radial

800-05	Low Flow Torch, One Piece, Radial	20-100696-90
800-05B	Low Flow Torch, One Piece, Radial with Ball Joint,	20-100696-90B
800-05S	Low Flow Torch, One Piece, Radial with Socket	
800-08	Extended for Nitrogen Determination	20-100764-00
800-10	Torch, Demountable, Body Only, Radial	20-100729-00
800-25	Torch Bonnet	20-100707-00
800-41	Quartz Injector, 1.8mm	20-100730-00
800-42	Quartz Injector, 0.8mm	20-100775-00
800-45	Alumina Injector, 1.8mm	24-100675-00
800-46	Alumina Injector, 2.5mm	
800-48	PTFE Injector Holder	99-100573-00
800-50	Demountable Torch, Complete Kit for Radial (800-10,-45,-48)	99-100568-00

Torches & Accessories, Axial

800-12	Low Flow Torch, One Piece, Axial, 90° Bend	20-100904-00
800-12B	Low Flow Torch, One Piece, Axial, 90° Bend with Ball Joint	
800-12S	Low Flow Torch, One Piece, Axial, 90° Bend, 12/5 Socket	
800-14	Low Flow Torch, One Piece, Axial	20-100812-00
800-15	Torch, Demountable, Body Only, Axial	20-100834-00
800-41	Quartz Injector, 1.8mm	20-100730-00
800-42	Quartz Injector, 0.8mm, 3/pk	20-100775-00
800-45	Alumina Injector, 1.8mm	24-100675-90
800-46	Alumina Injector, 2.5mm	
800-48	PTFE Injector Holder	99-100573-00
800-49	Demountable Torch, Complete Kit for Axial (800-15, -45, -48)	99-100847-00

Spray Chambers & Accessories

800-20	Transfer Tube, Torch to Spray Chamber	
800-21	Cyclonic Spray Chamber, 8mm Top, 4mm Drain	20-100817-00
800-21B	Cyclonic Spray Chamber, 8mm Top, 4mm Drain, Baffle	79-100437-00
800-17	Sturman-Masters Spray Chamber, Water-Cooled	99-100704-00

Nebulizers

500-70	C-Type Concentric, 1 lpm Ar, 30psi, 1mL/min	20-100765-00
500-70MQDAC	C-Type Concentric, 1 lpm, 30psi, Microflow (0.1-0.4 mL/min), Quick Disconnect, Argon Connect	20-101021-00
500-65QDAC	K-Type Concentric, 30 psi, 2 mL/min, Quick Disconnect, Argon Connect	20-100964-00
500-80	K-Type, 0.7 lpm Ar, 30psi, 3mL/min	20-100695-00
500-80QDAC	K-Type, 30psi, 3mL/min Quick Disconnect, Argon Connect	20-101068-00
500-85	K-Type, High Flow Concentric Nebulizer	20-100816-00
510-10	Noordermeer V-Groove MDSN Nebulizer	
800-55	High Solids V-groove Nebulizer, 0.7 lpm Ar, 35psi	99-100574-00

Varian® Type 2-Stop Pump Tubing

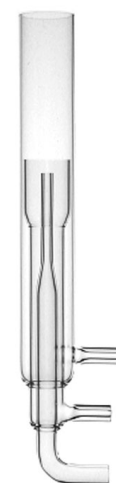
PT-2120P	Orange-White, 0.025" (.64mm), PVC, 12/pk	37-100469-00
PT-2130P	Black-Black, 0.030" (.76mm), PVC, 12/pk	37-100272-00
PT-2160P	White-White, 0.040" (1.02mm), PVC, 12/pk	37-100344-00
PT-2200P	Gray-Gray, 0.050" (1.30mm), PVC, 12/pk	37-100345-00
PT-2230P	Blue-Blue, 0.065" (1.65mm), PVC, 12/pk	37-100346-00
PT-2270P	Purple-Black, 0.090" (2.29mm), PVC, 12/pk	37-100273-00
PT-2130SV	Black-Black, 0.030" (.76mm), Solva, 12/pk	37-100348-00
PT-2160SV	White-White, 0.040" (1.02mm), Solva, 12/pk	37-100350-00
PT-2200SV	Gray-Gray, 0.050" (1.30mm), Solva, 12/pk	37-100352-00
PT-2100SA	Orange-Yellow, 0.020" (.51), Santoprene, 12/pk	37-100440-00
PT-2130SA	Black-Black, 0.030" (.76mm), Santoprene, 12/pk	37-100441-00
PT-2160SA	White-White, 0.040" (1.02mm), Santoprene, 12/pk	37-100442-00
PT-2200SA	Gray-Gray, 0.050" (1.30mm), Santoprene, 12/pk	37-100443-00
PT-2230SA	Blue-Blue, 0.065" (1.65mm), Santoprene, 12/pk	37-100444-00
PT-2100V	Orange-Yellow, 0.020" (.51mm), Viton, 12/pk	37-100435-00
PT-2130V	Black-Black, 0.030" (.76mm), Viton, 12/pk	37-100436-00
PT-2160V	White-White, 0.040" (1.02mm), Viton, 12/pk	37-100437-00
PT-2200V	Gray-Gray, 0.050" (1.30mm), Viton, 12/pk	37-100438-00
PT-2230V	Blue-Blue, 0.065" (1.65mm), Viton, 12/pk	37-100439-00

ICP & ICP-MS Consumables

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800-05 - Low Flow Torch, One Piece, Radial, 20-100696-90



800-12 - Low Flow Torch, One Piece, Axial, 90° Bend, 20-100904-00



800-21 - Cyclonic Spray Chamber, 8mm Top, 4mm Drain, 20-100817-00

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800-34 - ICP-MS Torch
with Placement Posts,
20-101007-00



800-33 - ICP-MS Spray
Chamber,
20-101010-00

Varian UltraMass-700

Torches & Accessories

800-06	Torch, One Piece, Low Flow	20-100783-00
800-11	Torch, Demountable, Body Only	20-100793-00
800-41	Quartz Injector, 1.8mm	20-100730-00
800-42	Quartz Injector, 0.8mm, 3/pk	20-100775-00
800-45	Alumina Injector, 1.8mm	24-100675-90
800-46	Alumina Injector, 2.5mm	
800-48	PTFE Injector Holder	99-100573-00
800-51	Demountable Torch, Complete (800-11, -45, -48)	99-100717-00

Spray Chambers & Accessories

510-26	Cyclonic Spray Chamber, 12/5 Socket Top, 4mm Drain	
800-17	Sturman-Masters Spray Chamber, Water-Cooled	99-100704-00
800-21	Cyclonic Spray Chamber, 8mm Top, 4mm Drain	20-100817-00

Nebulizers

500-70	C-Type Concentric Nebulizer, 1 lpm Ar, 30psi, 1mL/min	20-100765-00
500-85	K-Type, High Flow Concentric Nebulizer	20-100816-00
800-55	High Solids V-groove Nebulizer, 0.7 lpm Ar, 35psi	99-100574-00

Varian 800-MS Series

Torches & Accessories

800-34	ICP-MS Torch with Placement Posts	20-101007-00
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Spray Chambers & Accessories

800-31	ICP-MS Sheath Bypass	20-101008-00
800-32	ICP-MS Sheath Gas Port	20-101009-00
800-33	ICP-MS Spray Chamber	20-101010-00

Nebulizers

500-70	C-Type Concentric Nebulizer, 1 lpm Ar, 30psi, 1mL/min	20-100765-00
500-70MQDAC	C-Type Concentric, 1 lpm, 30psi, Microflow (0.1-0.4 mL/min), Quick Disconnect, Argon Connect	20-101021-00
500-85	K-Type, High Flow Concentric Nebulizer	20-100816-00
800-55	High Solids V-groove Nebulizer, 0.7 lpm Ar, 35psi	99-100574-00

Varian ICP-MS Type 2-Stop Pump Tubing

PT-2130P	Black-Black, 0.030" (.76mm), PVC, 12/pk	37-100272-00
PT-2160P	White-White, 0.040" (1.02mm), PVC, 12/pk	37-100344-00
PT-2200P	Gray-Gray, 0.050" (1.30mm), PVC, 12/pk	37-100345-00
PT-2230P	Blue-Blue, 0.065" (1.65mm), PVC, 12/pk	37-100346-00
PT-2270P	Purple-Black, 0.090" (2.29mm), PVC, 12/pk	37-100273-00
PT-2130SV	Black-Black, 0.030" (.76mm), Solva, 12/pk	37-100348-00
PT-2160SV	White-White, 0.040" (1.02mm), Solva, 12/pk	37-100350-00
PT-2200SV	Gray-Gray, 0.050" (1.30mm), PVC, 12/pk	37-100352-00
PT-2100SA	Orange-Yellow, 0.020" (.51mm), Santoprene, 12/pk	37-100440-00
PT-2130SA	Black-Black, 0.030" (.76mm), Santoprene, 12/pk	37-100441-00
PT-2160SA	White-White, 0.040" (1.02mm), Santoprene, 12/pk	37-100442-00
PT-2200SA	Gray-Gray, 0.050" (1.30mm), Santoprene, 12/pk	37-100443-00
PT-2230SA	Blue-Blue, 0.065" (1.65mm), Santoprene, 12/pk	37-100444-00

Specialty ICP Items

Torches & Accessories

550-05	1 Piece Torch, Beveled End, 1.0 Injector	318-0016
550-06	1 Piece Torch, Beveled End, 1.5 Injector	
550-20	1 Piece Torch with Ball Joint, Aqueous	120-3748
550-20F	1 Piece Torch with Ball Joint, Aqueous with Fittings	120-00336-1
550-22	1 Piece Torch with Ball Joint, Organics	120-3749
550-22F	1 Piece Torch with Ball Joint, Organics with Fittings	120-00336-2
550-22W	1 Piece Torch with Ball Joint, Organics, Wear Metals	
550-23	Argon Hose and Fitting for Torch	
550-43	Demountable Torch	318-0001
550-50	Aqueous Torch, Axial, 190mm Long	318-00062
550-64	Aqueous Torch, Axial	120-00200-1
550-64F	Aqueous Torch, Axial with Fittings	120-00309-1
550-65	Aqueous Torch, Axial, Dual View	318-00065
550-65F	Aqueous Torch, Axial, Dual View with Fittings	120-00309-2
550-69	Demountable Torch, Axial, Aqueous	318-00069
550-70	Demountable Torch, Dual View, Aqueous	318-00070
550-45	Quartz Injector	318-0004
550-94	Torch, Axial, 2.5mm Injector	
550-94F	Torch, Axial, 2.5mm Injector, with Argon Fittings and Restrictor	
550-95	Torch, DV, 2.5mm Injector	
550-95F	Torch, DV, 2.5mm Injector, with Argon Fittings and Restrictor	

Spray Chambers & Accessories

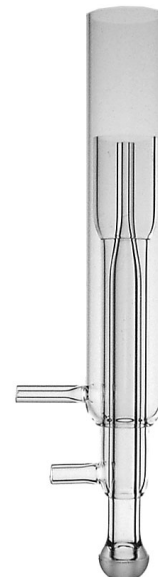
550-24	Hose and Fitting for Spray Chamber	
550-25	Spray Chamber, Scott, Radial	120-3751
550-25J	Spray Chamber, Scott, Radial, Water Cooled	
550-27	Cyclonic Spray Chamber, Radial, Hildebrand Grid	
550-37	Cyclonic Spray Chamber, Radial, Concentric	
550-38	Cyclonic Spray Chamber, Axial, Long Neck with Knockout Tube	
550-39	Cyclonic Spray Chamber, Axial, Long Neck without Knockout Tube	
550-55	Spray Chamber, Scott, Axial	120-00201-1
550-57	Cyclonic Spray Chamber, Axial, Concentric	
550-58	Cyclonic Spray Chamber, Axial, Hildebrand Grid	
550-60	Quartz Purge Window	
550-66	Purge Tube, Axial, Quartz	318-00066
550-67	Purge Tube, V2, Dual View	318-00067
550-68	Purge Tube, Radial	318-00068

Specialty 2-Stop Pump Tubing

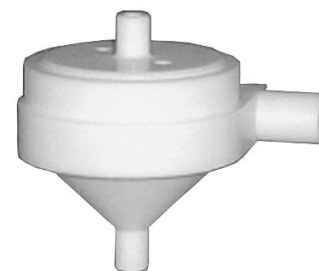
PT-2140P	Orange, 0.020", PVC, 12/pk	309-3551
PT-2130P	Black, 0.030", PVC, 12/pk	309-3552
PT-2180P	Red, 0.045", PVC, 12/pk	309-3538

ICP & ICP-MS Consumables

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550-20 - 1 Piece Torch
with Ball Joint,
Aqueous, 120-3748



510-26T - Cyclonic
Spray Chamber, PTFE

Spray Chambers

Spray Chambers & Accessories

510-26	Cyclonic Spray Chamber, 12/5 Socket, 4mm Drain	
510-26J	Cyclonic Spray Chamber, 12/5 Socket, 4mm Drain, Water Cooled	
510-26NB	Cyclonic Spray Chamber, 12/5 Socket, 4mm Drain, No Baffle	
510-26Q	Cyclonic Spray Chamber, 12/5 Socket, 4mm Drain, Quartz	
510-26QJ	Cyclonic Spray Chamber, 12/5 Socket, 4mm Drain, Quartz, Water Cooled	
510-26T	Cyclonic Spray Chamber, PTFE	
510-26U	Cyclonic Spray Chamber, Ultem	
510-27	Cyclonic Spray Chamber for Modified Lichte	
510-27J	Cyclonic Spray Chamber for Modified Lichte, Water Cooled	
510-27Q	Cyclonic Spray Chamber for Modified Lichte, Quartz	
510-30	Mini Cyclonic Spray Chamber	

Nebulizers

About our Nebulizers

Precision Glassblowing of Colorado offers the widest range of nebulizers available anywhere including exclusive rights to the world renowned Noordermeer V-groove and the patented Modified Lichte. Other companies may offer similar nebulizers but there are no substitutes for the originals. Furthermore with an ICP on site, every nebulizer is tested as part of our stringent Quality Assurance/Quality Control program.

Concentric Nebulizers

In the mid-1970's, the glass concentric nebulizer was introduced to the world and was shown to be a major improvement over nebulizers available at the time. For over 30 years, the common concentric nebulizer has remained virtually unchanged and is available most anywhere. Precision Glassblowing of Colorado has been offering Pyrex and quartz concentric nebulizers since 1987 but we have spent nearly 10 years developing a revolutionary Zero-Dead-Volume design for optimal sample transport in our glass concentric nebulizers. The design offers not only great performance but also unparalleled consistency and stability. Manufactured by our master glassblowers, we can offer most any combination of standard Argon flow, PSI, and sample flow rate. With our "QD" and "AC" fittings for sample and argon connections, it takes just moments to replace an old nebulizer. So, the next time you are looking for a concentric nebulizer, discover what the top instrument manufacturers have known for years.

Choosing the Right Nebulizer

Depending on what types of analyses you are performing and the various matrices, choosing the right nebulizer can be the difference between good results and great results. The chart on the opposite page gives a brief overview of the various nebulizers available from Precision Glassblowing of Colorado. If you cannot find what you are looking for feel free to give us a call and someone from our knowledgeable staff will be more than happy to work with you and answer any questions you may have.

Nebulizers

Nebulizer Type	Material/Chemical Resistance	Application	Sensitivity
<p style="text-align: center;">Crossflow <i>pg. 29</i></p>	<p>PVDF fluorinated polymer; Good chemical resistance for most acids and organic solvents</p>	<p>For use with Scott style spray chambers; High stability; Great high-solids capability</p>	<p>Moderate sensitivity due to wide range of droplet size</p>
<p style="text-align: center;">Noordermeer V-Groove <i>pg. 29</i></p>	<p>Quartz or Pyrex; Good for most acids and organic solvents; Not recommended for HF</p>	<p>For use with Scott style and cyclonic spray chambers; Great high-solids capability; Same principle as Babington</p>	<p>Moderate to high sensitivity for a high-solids nebulizer; Better efficiency compared to Babington V-groove</p>
<p style="text-align: center;">Modified Lichte <i>pg. 29</i></p>	<p>Quartz or Pyrex; Good for most acids and organic solvents; Not recommended for HF</p>	<p>For use with Modified Lichte spray chamber; Unique patented design; Great high-solids capability</p>	<p>Great sensitivity; Patented design with impingement bead to further atomize aerosol resulting in uniform droplet size</p>
<p style="text-align: center;">Glass Concentric <i>pg. 28</i></p>	<p>Quartz or Pyrex; Good for most acids and organic solvents; Not recommended for HF</p>	<p>For use with Scott style and cyclonic spray chambers; Not recommended for high-solids applications</p>	<p>Great sensitivity due to uniform droplet size inherent in the concentric design</p>
<p style="text-align: center;">Burgener Mira Mist & Ari Mist <i>pg. 30</i></p>	<p>Teflon; can be used for any liquid. PEEK; Good chemical resistance for most acids and organic solvents.</p>	<p>For use with Scott style and cyclonic spray chambers: Great high-solids capability.</p>	<p>Great Sensitivity; enhanced parallel path design improves upon original Babington V-groove.</p>

ICP & ICP-MS Consumables

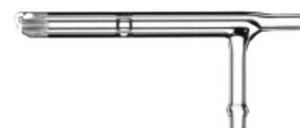
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500-92 - Crossflow Nebulizer



510-10 - Noordermeer V-Groove MDSN Nebulizer



510-20S - Modified Lichte MDSN Nebulizer, 1 lpm Ar



500-72 - C-Type Concentric Nebulizer, 1 lpm Ar, 30psi, 3mL/min



TMM 3500 - Teflon Mira Mist

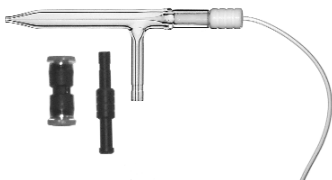
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500-70 - 30psi, 1mL/min



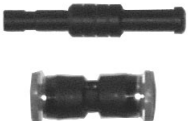
500-72QD - 30psi, 3mL/min,
Quick Disconnect



500-80QDAC - 30psi, 3mL/min,
Quick Disconnect, Argon
Connect



500-QD - Quick Disconnect for
Nebulizer, Teflon with PFA
Capillary Tubing



500-AC - Argon Connect for
Concentric Nebulizers Includes
Insert and Body

Glass Concentric Nebulizers

Concentric nebulizers sample uptake rates are as follows:

Sample flow rate (mL/min)	Accepted range (mL/min)
Micro	0.1-0.4
1.0	0.5-1.4
2.0	1.5-2.4
3.0	2.5-3.4
Argon Pressure (psi)	Accepted range (psi)
30	28-38
50	45-55

Aerosalt - High Solids, 0.7 lpm Ar

500-65QD 30 psi, 2 mL/min, Quick Disconnect

500-65QDAC 30 psi, 2 mL/min, Quick Disconnect, Argon Connect

C-Type, 1.0 lpm Ar

500-70 30psi, 1mL/min

500-70M 30psi, Microflow (0.1-0.4 mL/min)

500-70MQD 30psi, Microflow (0.1-0.4 mL/min), Quick Disconnect

500-70P 50psi, 1mL/min

500-70Q 30psi, 1mL/min, Quartz

500-70QD 30psi, 1mL/min, Quick Disconnect

500-70QDAC 30psi, 1mL/min, Quick Disconnect, Argon Connect

500-70QP 50psi, 1mL/min, Quartz

500-70QQD 30psi, 1mL/min, Quartz Quick Disconnect

500-70QQDAC 30psi, 1mL/min, Quartz, Quick Disconnect, Argon Connect

500-71 30psi, 2mL/min

500-71P 50psi, 2mL/min

500-71Q 30psi, 2mL/min, Quartz

500-71QD 30psi, 2mL/min, Quick Disconnect

500-72 30psi, 3mL/min

500-72P 50psi, 3mL/min

500-72Q 30psi, 3mL/min, Quartz

500-72QD 30psi, 3mL/min, Quick Disconnect

500-72QQD 30psi, 3mL/min, Quartz, Quick Disconnect

A-Type, 1.0 lpm, Ar

500-75 30psi, 1mL/min

500-75P 50psi, 1mL/min

500-75Q 30psi, 1mL/min, Quartz

500-76 30psi, 2mL/min

500-76P 50psi, 2mL/min

500-76Q 30psi, 2mL/min, Quartz

500-76QDAC 30psi, 2mL/min, Quick Disconnect, Argon Connect

500-77 30psi, 3mL/min

500-77P 50psi, 3mL/min

500-77Q 30psi, 3mL/min, Quartz

500-77QD 30psi, 3mL/min, Quick Disconnect

K-Type, 0.7 lpm Ar

500-80 30psi, 3mL/min

500-80Q 30psi, 3mL/min, Quartz

500-80QD 30psi, 3mL/min, Quick Disconnect

500-80QDAC 30psi, 3mL/min, Quick Disconnect, Argon Connect

500-80QQD 30psi, 3mL/min, Quartz, Quick Disconnect

500-81 30psi, 1mL/min

500-81QD 30psi, 1mL/min, Quick Disconnect

500-81QDAC 30psi, 1mL/min, Quick Disconnect, Argon Connect

500-82 30psi, 2mL/min

500-82QD 30psi, 2mL/min, Quick Disconnect

500-82QDAC 30psi, 2mL/min, Quick Disconnect, Argon Connect

500-85 High Flow Concentric Nebulizer

500-85QD High Flow Concentric Nebulizer, Quick Disconnect

500-AC Argon Connect for Concentric Nebulizers Includes Insert and Body

500-QD Quick Disconnect for Nebulizer, Teflon with PFA Capillary Tubing

Crossflow Nebulizers

500-92	Crossflow Nebulizer
500-92S	Crossflow Nebulizer, 34mm
500-93	Crossflow Nebulizer, High-Solids
500-94	High Flow Crossflow Nebulizer

V- Groove Nebulizers

Noordermeer V-Groove Nebulizers

510-10	Noordermeer V-Groove MDSN Nebulizer
510-10QD	Noordermeer V-Groove MDSN Nebulizer, Quick Disconnect
510-10Q	Noordermeer V-Groove MDSN Nebulizer, Quartz
510-10S	Noordermeer V-Groove MDSN Nebulizer, 1 lpm Ar

Modified Lichte Nebulizers

510-20	Modified Lichte MDSN Nebulizer
510-20QD	Modified Lichte MDSN Nebulizer, Quick Disconnect
510-20Q	Modified Lichte MDSN Nebulizer, Quartz
510-20S	Modified Lichte MDSN Nebulizer, 1 lpm Ar

Babington V-Groove

510-50	Babington MDSN, HF Resistant
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Nebulizer Accessories

520-30	PTFE End Cap for use with 35mm Open End Spray Chambers
520-30S	PTFE End Cap for use with 34mm Open End Spray Chambers
520-40	PTFE End Cap, 35mm for use with Babington
520-40S	PTFE End Cap, 34mm for use with Babington
510-51	O-ring for Babington MDSN Nebulizer
520-31	O-ring for Concentric Nebulizer Inlet
520-32	O-ring, 35mm for 520-30 and 520-40
520-32S	O-ring, 34mm for 520-30S and 520-40S
520-36	O-ring, 35mm for 500-92, 2 per pack
520-36S	O-ring, 34mm for 500-92S, 2 per pack
520-35	Swagelok Fitting
520-37	Sample Tube, PTFE for Crossflow Nebulizer
520-38	Argon Inlet Fittings for Crossflow
510-52	Tubing and Collet for Babington MDSN Nebulizer
510-53	Argon Tube for Babington MDSN Nebulizer

ICP & ICP-MS Consumables

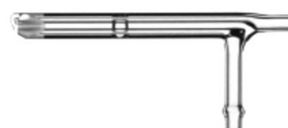
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500-92 - Crossflow Nebulizer



510-10 - Noordermeer V-Groove MDSN Nebulizer



510-20S - Modified Lichte MDSN Nebulizer, 1 lpm Ar



510-50 - Babington MDSN, HF Resistant



520-30 - PTFE End Cap for use with 35mm Open End Spray Chambers



**TMM 3500 - Teflon
Mira Mist**



**PMM 4000 - PEEK
Mira Mist**



T2100



**PMM CE - Mira
Mist CE**



AM 5000- Ari Mist



**AM HP 5000- Ari
Mist HP**

Burgener ICP - ICP-MS Nebulizers

Mira Mist and Ari Mist Nebulizers for ICP & ICP-MS

- TMM 3500** **Teflon Mira Mist**, Enhanced Parallel Path Teflon Nebulizer. Can operate on 0.2 ml/min to 2.5 ml/min. Excellent mist, and can handle high level of particulates in sample. Fits regular chambers as a direct replacement for glass concentric nebulizers. Operates on standard pressures of 35 - 45 psi. The Teflon Mira Mist can be used for any liquid. Salting is very rare, but can occur over long periods of time, especially with high Sodium levels in the solution. Such salting can be cleared easily with a dip in 5 - 10% HF, (Caution: Be careful when handling HF. It soaks into the skin before you feel it burning, and in low concentrations it looks like water.)
- PMM 4000** **PEEK Mira Mist**, Same as the Teflon Mira Mist, but easier to make than the Teflon Mira Mist, so you save a little. Works for most samples, but not concentrated acids, and not some organic solvents. Still has Teflon capillaries for the samples and for the gas. Standard pressure (45 psi), low sample flow, enhanced parallel path design. Can operate on 0.2 ml/min to 2.5 ml/min. Excellent mist, and can handle high level of particulates in sample. Fits regular chambers as a direct replacement for glass concentric nebulizers.
- T2100** Enhanced Parallel Path Teflon Nebulizer. Huge Sample Capillary: 750 microns / 1/32 inch. Designed as replacement for T2002 and BTN. Essentially unpluggable with un-dissolved particles. Can operate on 0.5 ml/min to 3.0 ml/min. Excellent mist, but not quite as good as Mira Mist, but better than most concentrics. Can handle very high level of particles in sample. Fits regular chambers as a direct replacement for glass concentric nebulizers. Operates on standard pressures of 30 - 45 psi. The T 2100 can be used for any liquid. Salting is very rare, but can occur over long periods of time, especially with high Sodium levels in the solution. Such salting can be cleared easily with a dip in 5 - 10% HF
- PMM CE** **Mira Mist CE**, Designed for ICP-MS - CE interface. Medium pressure (80-90 psi), Very low sample flow (10 µl/min or less), enhanced parallel path design. Can operate on 0.01 ml/min to 2.5 ml/min. With Alcohol solutions can operate down to .001 ml/min. Excellent mist, can handle high level of particulates in sample. Fits regular chambers as a direct replacement for glass concentric nebulizers. Designed for CE / ICP / MS analysis. Allows CE capillary to extend to tip of nebulizer for zero suction, zero back pressure CE interfacing with ICP-MS. Works best with mini chamber.
- AM 5000** **Ari Mist**, Very low sample flow, enhanced parallel path design. Standard pressure (40 - 50 psi). Black PEEK body, Teflon sample and gas capillaries. Can operate on 0.050 ml/min to 1.0 ml/min. Good for ICP & ICP-MS. Only for samples that are particulate free. Fits regular chambers as a direct replacement for glass concentric nebulizers.
- AM HP 5000** **Ari Mist HP**, Ultra low sample flow, enhanced parallel path design. Higher Pressure (80 psi). Black PEEK body, Teflon sample and gas capillaries. Can operate on 0.005 ml/min to 1.0 ml/min. Good for LC/ICP-MS. Only for samples that are particulate free. Fits regular chambers as a direct replacement for glass concentric nebulizers. When run at 10 to 15 µl/min it provides similar results to direct injection nebulizers without the difficulties of direct injection.

Glass Expansion NEW PRODUCTS

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GLASS EXPANSION

Quality By Design

Niagara II Plus

The new Niagara II Plus utilises flow injection technology to halve your analysis time.



TruFlo Sample Monitor



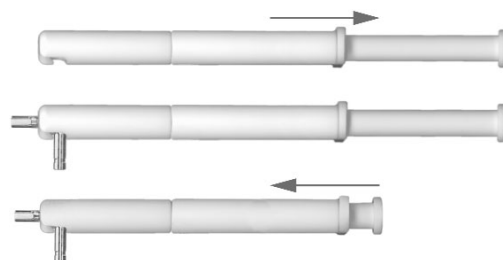
The new TruFlo Sample Monitor eliminates guesswork so you always know the actual rate of sample flow to your nebulizer.

RF Coil

- 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 coil with respect to the torch body reduces devitrification of the outer tube
- Reusable alignment tools ensure correct installation every time. Our CD with Do-It-Yourself instructions saves time



Eluo



Particle build-up in a nebulizer capillary and tip causes sample flow to be constricted, thereby reducing nebulizer efficiency and performance. Previously there was no simple way to effectively clean and unblock nebulizers. Now, blocked nebulizers can be safely and easily restored to optimum performance with a revolutionary new 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, waiting overnight or shattered nebulizers in ultrasonic baths.

IsoMist Programmable Temperature Spray Chamber



With the new IsoMist Programmable Temperature Spray Chamber. The temperature is electronically controlled and any temperature between -10degC and +60degC can be selected.

For more information, pricing, and part numbers visit our website at www.precisionglassblowing.com or contact your account representative.

Nebulizers from Glass Expansion



GLASS EXPANSION

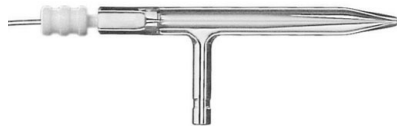
Quality By Design

GLASS EXPANSION ICP & ICP-MS Sample Introduction Systems

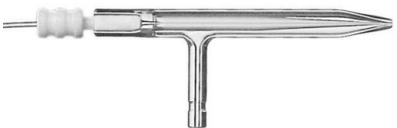
Glass Expansion Nebulizer Designations

ARxx-yy-ZZnnnE

AR	argon gas operated nebulizer
xx	the nominal argon pressure in psig (Note: 15psig~1bar) eg. 30=30psig~2bar
yy	the argon flow at nominal pressure, in L/min eg. 07=0.7L/min
ZZ	nebulizer model type:
	FC = Conikal nebulizer fitted with EzyFit
	FS = Slurry nebulizer fitted with EzyFit
	FSS = SeaSpray nebulizer fitted with EzyFit
	FM = MicroMist nebulizer fitted with EzyFit
	QV = Quartz VeeSpray v-groove nebulizer
	CV = Ceramic VeeSpray v-groove nebulizer
	CP = PolyCon Polyimide HF resistant nebulizer
	PFA = OpalMist PFA HF resistant nebulizer
nnn	aspirated uptake at nominal pressure, in ml/min eg. FC3 = 3ml/min, FM04 = 0.4ml/min, CP005 = 0.05ml/min
E	Letter "E" indicates that the nebulizer is supplied with the EzyLok argon connector



**Conikal concentric nebulizer,
AR30-1-FC2E**



**SeaSpray concentric nebulizer,
AR35-07-FSS2E**

Conikal

The Conikal concentric nebulizer gives reproducible results for standard ICP analyses. It represents the choice nebulizer for high precision, routine aqueous and organic applications.

- Material: Borosilicate glass
- High physical reproducibility ~ 1%
- TDS tolerance, typically up to 5%
- High tolerance to particulates, typically up to 75µm
- Low RSD's due to highly accurate construction
- Standard available uptake: 1, 2 & 3ml/min

SeaSpray

The SeaSpray concentric nebulizer 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.

- Material: Borosilicate glass
- High physical reproducibility ~ 1%
- TDS tolerance, typically up to 20%
- High tolerance to particulates, typically up to 75µm
- Low RSD's due to highly accurate construction
- Standard available uptake: 2ml/min. 1ml/min uptake available on request

Nebulizers from Glass Expansion



MicroMist

The MicroMist micro-uptake glass concentric nebulizer offers high performance for limited sample volumes. It makes routine ICP-MS Hg determinations possible and reduces matrix effects when used with Glass Expansion's Cinnabar spray chamber.

- Material: Borosilicate glass
- High physical reproducibility ~ 1%
- TDS tolerance, typically up to 15%
- Low RSD's due to highly accurate construction
- Standard available uptake: 0.05, 0.1, 0.2, 0.4 & 0.6ml/min

PolyCon

The PolyCon concentric nebulizer represents the choice nebulizer for high precision analyses involving samples digested in HF. The PolyCon has been used successfully in ICP desolvators such as the MCN-6000, where high temperatures are encountered. It has become a favorite in the semi conductor industry, and has enabled analysts to produce accurate ($r = 0.9998$) calibration curves for low-ppt levels of Na, K, Fe and Ca in 30% hydrogen peroxide.

- Material: HF Resistant Polyimide
- High physical reproducibility ~ 2%
- High tolerance to particulates, up to 75 μ m depending on uptake
- TDS tolerance, typically ~5%
- Low RSD's due to concentric geometry
- Uses only standard ICP argon supply pressures
- Standard 6mm size fits standard cyclonic spray chambers. Adaptors are available for Scott type spray chambers
- Standard available uptakes: 0.05, 0.1, 0.2, 0.4, 0.6, 0.8, 2 & 5ml/min for samples with large particulates

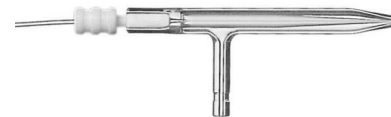
OpalMist

The OpalMist PFA concentric nebulizer represents the choice nebulizer for high precision analyses involving analyses requiring high chemical resistancy to HF, alkalis and organics. It also provides excellent results for trace analyses.

- Material: PFA
- High physical reproducibility ~ 3%
- Strong and consistent self-aspiration
- High tolerance to particulates, up to 75 μ m depending on uptake
- TDS tolerance, typically up to 30%
- Low RSD's due to concentric geometry
- Uses only standard ICP argon supply pressures
- Standard 6mm size fits standard cyclonic spray chambers. Adaptors are available for Scott type spray chambers
- Standard available uptakes: 0.05, 0.1, 0.2, 0.4, 0.6 & 2ml/min

ICP & ICP-MS Consumables

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MicroMist micro-uptake glass concentric nebulizer, AR30-1-FM04E



PolyCon concentric nebulizer, AR35-07-CP2E



OpalMist PFA concentric nebulizer, AR30-1-PFA005

e•SPEC™ Cones manufactured by Spectron

Spectron Inc. is the leader in the design, manufacture and sale of high precision consumable products for the mass spectrometry community since 1988. As a compliment to their standard product line, Spectron offers a unique line of e•SPEC™ [enhanced SPECTRON] products. Based on over 50 years of combined ICP-MS and OES experience, collaboration with fellow scientists and a unique expertise in the manufacture of high precision, analytical components, Spectron has incorporated subtle modifications to enhance the functionality and in some cases lower the cost of these products.

Many don't realize that platinum cones have always been manufactured from platinum alloys, not from pure platinum. Pure platinum is soft and more vulnerable to attack by certain matrices and plasma conditions. Alloying Pt to Rh or Ir (typically 90%/10%) increases the hardness of the metal and dramatically improves its resistance to such attack. Historically, the choice of Pt/Rh or Pt/Ir alloys has been largely due to the availability and price of raw materials. Increasing demand for Rh in exhaust catalysts and glass manufacture, and the unreliable supply of the metal has significantly inflated the price of Rh from a low of \$209/Troy oz in February of 1997 to as high as \$6,500/Troy oz. in April of 2007.

Spectron already manufactures Pt/10Ir "specials" for those customers that require very low Rh background levels in their analysis. These "specials" behave as well or better than their standard Pt/10Rh sets. Based on their experience and independent metallurgical tests, we have decided that the manufacture of platinum cones with Pt/10Ir is best suited to our customers' needs. Pt/10Ir behaves as well or better than Pt/10Rh, is less expensive and does not impart a Rh background. We are confident in these products and guarantee their quality.

e•SPEC™ Cones manufactured by Spectron

e•SPEC™ Products

	<i>PerkinElmer</i>	<i>Spectron (std)</i>	e•SPEC™ NEW!
Pt Sampler	WE027802	SC2013-Pt	SC2013-Pte
Pt Skimmer	WE027803	SC2014-Pt	SC2014-Pte

	<i>Agilent</i>	<i>Spectron (std)</i>	e•SPEC™ NEW!
Pt Sampler	G1820-65360	HP1006A-Pt	HP1006A-Pte
18mm Pt tip			
Pt Sampler	G1820-65239	HP1006-Pt	HP1006-Pte*
10mm Pt tip			

*Standard 10mm Pt tip in a nickel core for greater longevity over the Pt in Cu design.

	<i>Thermo Finnigan</i>	<i>Spectron (std)</i>	e•SPEC™ NEW!
Sampler	1044530	T1001-Ni	T1001TE-Nie
Skimmer	1067600	T1002A-Ni	T1002TE-Nie
Guard Electrode	1226640		T5004

High TDS cones for the Thermo Finnigan Element 2 and Neptune series ICP-MS

	<i>Thermo Elemental</i>	<i>Spectron (std)</i>	e•SPEC™
	<i>Xi Cones</i>	<i>Xi Cones</i>	NEW!
Sampler	3600812	VG1021-Ni/Cu	VG1021TE-Ni/Cue
Skimmer	3600811		VG1022-Ni

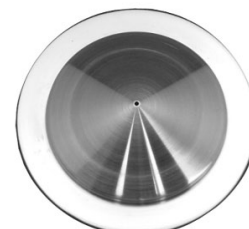
Spectron Xi cones are available in nickel/copper, nickel and aluminum configurations

ICP & ICP-MS Consumables

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e•SPEC™ platinum cones for the Elan 6000 and 9000 series ICP-MS



e•SPEC™ Thermally Enhanced (TE) cones for X-Series ICP-MS systems



e•SPEC™ HP1006-Pte sampler Displayed with Pt and Ni skimmers, Pt shields for 4500 and 7500

e•SPEC™ Thermally Enhanced (TE) cones for Element 2 & Neptune in nickel (standard) and aluminum (optional), with Pt Guard Electrode

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**HP1002-Ni - Nickel Skimmer
(4500), G1820-65265**



**HP1001-Ni - Nickel Sampler -
(25mm Nickel Insert),
G1820-65238**



T1002A-Al - Aluminum Skimmer



**T1001-Ni - 100% Nickel Sampler,
1044530**

ICP-MS Cones manufactured by Spectron

Agilent Technologies

HP1001-Ni	Nickel Sampler - (25mm Nickel Insert)	G1820-65238
HP1001T-Ni	Nickel Sampler - T Mode	G1820-65480
HP1002CE-Ni	Nickel Skimmer - 7500ce	G3270-65024
HP1002C-Ni	Nickel Skimmer - 7500c	G1833-65497
HP1002-Ni	Nickel Skimmer (4500)	G1820-65265
HP1002-Ni	Nickel Skimmer (7500)	G1820-65050
HP1002T-Ni	Nickel Skimmer - T Mode	G1820-65481
HP1006A-Pt	Platinum Sampler - (18mm Platinum Insert)	G1820-65360
HP1006-Pt	Platinum Sampler - (10mm Platinum Insert)	G1820-65239
HP1008C-Pt	Platinum Skimmer - 7500c	G1833-65092
HP1008-CS-Pt	Platinum Skimmer - 7500cs	G1883-65132
HP1008-Pt	Platinum Skimmer - (7.2mm Platinum Insert)	G1820-65237
HP5003	Platinum Shield Plate	G1820-65357
HP5004	Platinum Shield Plate (7500)	G1820-65357

LECO

LE1001-Ni	Nickel Sampler	703-633
LE1002-Ni	Nickel Skimmer	703-634
LE1002-Ni/Cu	Nickel Skimmer	
LE1002-SS	Modified; Electro polished	710-804
LE1004-SS	Skimmer cone; modified 56 mech. Polish	A117-0563
LE1006-Pt	Platinum Sampler	
LE1008-Pt	Platinum Skimmer	

Finnigan

T1001-Al	Aluminum Sampler	
T1001-Ni	100% Nickel Sampler	1044530
T1001-Ni/Cu	Nickel Sampler, Copper Core	1044520
T1002A-Al	Aluminum Skimmer	
T1002A-Ni	Nickel Skimmer	1067600
T-1002X-Al	Aluminum X-Skimmer	
T1002X-Ni	Nickel X-Skimmer	1142160
T1003-Ni	Nickel Accelerator	
T1006A-Pt/Cu	Platinum Sampler, Copper Core	1067500
T1006-Pt/Cu	Platinum Sampler, Copper Core	
T1006-Pt/Ni	Platinum Sampler, 100% Nickel Base	
T1007A-Pt	Platinum Skimmer, Nickel Base	1047510
T1007-Pt	Platinum Skimmer, Nickel Base	
T1007-Pt/Cu	Platinum Skimmer, Copper Base	
TJA1001-Ni	Nickel Sampler	133076
TJA1002-Ni	Nickel Skimmer	133075
TJA1006-Pt	Platinum Sampler	135558
TJA1008-Pt	Platinum Skimmer	135827

MicroMass

M1001-Ni/Cu	Nickel Sampler, Copper Base	M695080BD1
M1002-Ni	Nickel Skimmer	M695011BD1
M1006-Pt/Cu	Platinum Sampler, Copper Base	
M1008-Pt	Platinum Skimmer	
MM1001-Al	Aluminum Sampler	M749629CD2
MM1001-Al	Aluminum Skimmer	M695440BD2
MM1001-Al	Aluminum Sampler	M749629CD2
MM1001-Ni	Nickel Sampler	M749629CD3
MM1001-Ni	Nickel Sampler	M749629CD3
MM1002-Ni	Nickel Skimmer	M695440BD1
MM1002X-Al	Aluminum Skimmer Enhanced Low Mass	
MM1002X-Ni	Nickel Skimmer Enhanced Low Mass	
MM1003-Ni	Nickel Collimator Cone	M749666B
MM3000	Copper Cartridge	

ICP-MS Cones manufactured by Spectron

MicroMass continued

MP1001-Al	Aluminum Sampler	M695439BD2
MP1001-Ni/Cu	Nickel Sampler, Copper Base	M695439BD1
MP1002-Al	Aluminum Skimmer	M695440BD2
MP1002-Ni	Nickel Skimmer	M695440BD1
MP1006-Pt/Cu	Platinum Sampler, Copper Base	
MP1008-Pt	Platinum Skimmer	

NU

NU1001-Ni	Nickel Sampler	319-285
NU1004-Ni	Nickel Skimmer	319-284 WA6

Sciex / Perkin Elmer

SC2001-Ni	Nickel Sampler - 250/500	N810-2101
SC2002-Ni	Nickel Skimmer - 250/500	N810-2111
SC2003-Ni	Nickel Sampler - 5000	WE01-3087
SC2004-Ni	Nickel Skimmer - 5000	N812-2000
SC2005-Pt	Platinum Sampler - 250/500	N810 - 2131
SC2006-Pt	Platinum Skimmer - 250/500	N810-2141
SC2007-Pt	Platinum Sampler - 5000	N812-2025
SC2010-Pt	Platinum Skimmer - 5000	N812-2035
SC2011-Ni	Nickel Sampler - 6000/6100	WE02-1140
SC2012-Ni	Nickel Skimmer - 6000/6100	WE02-1137
SC2013-Pt	Platinum Sampler - 6000/6100	WE02-7802
SC2014-Pt	Platinum Skimmer - 6000/6100	WE02-7803
SC6000	Insertion Tool	WE01-7142

Spectro

SP2003-Ni	Nickel Sampler	46501063U
SP2004-Ni	Nickel Skimmer	46501064U
SP2007Pt	Platinum Sampler	46901016
SP2010-Pt	Platinum Skimmer	46901017

Thermo

VG1001-Ni	Nickel Sampler	3004661
VG1002-Ni	Nickel Mini-Skimmer	3004866
VG1004-Ni	Nickel Micro-Skimmer (Enhanced Interface)	3200860
VG1006A-Pt	Platinum Sampler - (18mm Platinum Insert)	
VG1006-Pt	Platinum Sampler - (15.2mm Platinum Insert)	3200262
VG1007-Pt	Platinum Mini-Skimmer	
VG1008-Pt	Platinum Micro-Skimmer (Enhanced Interface)	3201101
VG1009-Pt	Platinum Plasmatrace 1 Skimmer	3202005
VG1010-Ni	Nickel Plasmatrace 1 Skimmer	3200456
VG1011-Pt	Platinum Plasmatrace 2 Micro-Skimmer	3201941
VG1012-Ni	Nickel Micro Skimmer (PQE)	3201585
VG1014-Ni	Nickel Plasmatrace 2 Micro-Skimmer	3201457
VG1021-Ni/Cu	Nickel Sampler, Copper Core	3600812
VG1022-Ni	Nickel Skimmer	3600811
VG1023-Cu	Copper Skimmer Adapter	3600813
VG1026-Pt	Platinum Sampler	N/A
VG1028-Pt	Platinum Skimmer	N/A

Varian

UM1001C-Ni	Nickel Sampler for Cool Plasma	99-100920-00
UM1001F-Ni	Nickel Sampler F-Series Type	99-100940-00
UM1001-Ni	Standard Nickel Sampler, Copper Base	99-100698-00
UM1002F-Ni	Nickel Skimmer F-Series Type	99-100941-00
UM1002-Ni	Standard Nickel Skimmer	99-100699-00
UM1006-Pt	Platinum Sampler	99-100700-00
UM1008-Pt	Platinum Skimmer	99-100701-00

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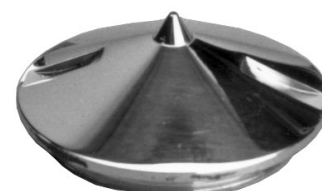
SC2011-Ni - Nickel Sampler -
6000/6100, WE02-1140



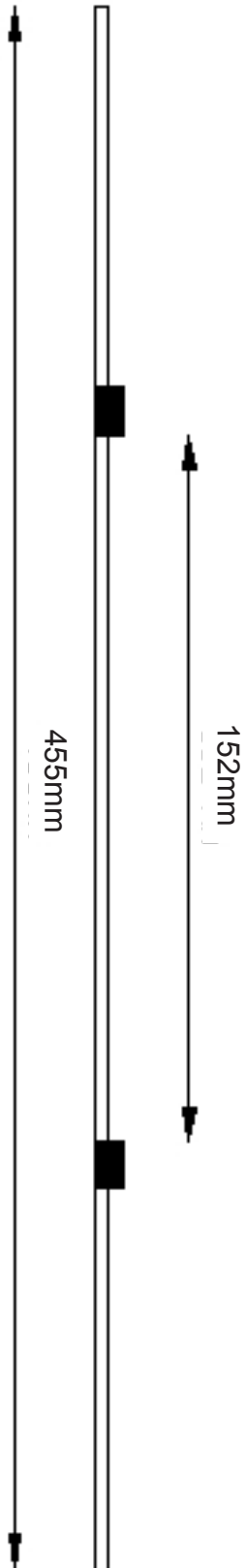
SC2012-Ni - Nickel Skimmer -
6000/6100, WE02-1137



VG1001-Ni - Nickel Sampler,
3004661



VG1004-Ni - Nickel Micro-
Skimmer (Enhanced Interface),
3200860



2-Stop Pump Tubing

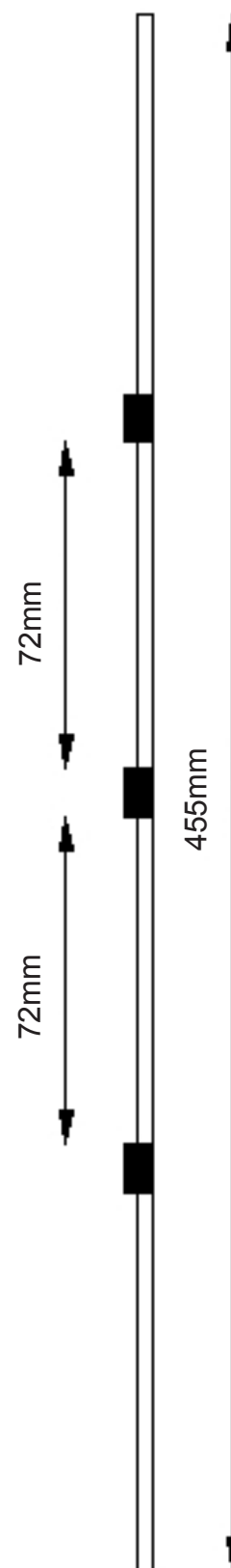
<i>Description</i>	<i>I.D.(mm)</i>	<i>PVC 12/pk</i>	<i>Solva 12/pk</i>	<i>Silicone 6/pk</i>	<i>Santoprene 12/pk</i>	<i>Viton 12/pk</i>
Orange/Black	0.13	PT-2010P	PT-2010SV	PT-2010SI	N/A	N/A
Orange/Red	0.19	PT-2020P	PT-2020SV	N/A	N/A	N/A
Orange/Blue	0.25	PT-2030P	PT-2030SV	PT-2030SI	PT-2030SA	N/A
Red/Blue	0.31	PT-2050P	N/A	N/A	N/A	N/A
Orange/Green	0.38	PT-2080P	PT-2080SV	N/A	PT-2080SA	N/A
Green/Yellow	0.44	N/A	N/A	N/A	N/A	N/A
Orange/Yellow	0.51	PT-2100P	PT-2100SV	N/A	PT-2100SA	PT-2100V
White/Yellow	0.57	N/A	N/A	N/A	N/A	N/A
Orange/White	0.64	PT-2120P	PT-2120SV	PT-2120SI	PT-2120SA	PT-2120V
Black/Black	0.76	PT-2130P	PT-2130SV	PT-2130SI	PT-2130SA	PT-2130V
Orange/Orange	0.89	PT-2140P	PT-2140SV	PT-2140SI	PT-2140SA	PT-2140V
White/Black	0.95	N/A	N/A	N/A	N/A	N/A
White/White	1.02	PT-2160P	PT-2160SV	PT-2160SI	PT-2160SA	PT-2160V
White/Red	1.09	N/A	N/A	N/A	N/A	N/A
Red/Red	1.14	PT-2180P	PT-2180SV	PT-2180SI	PT-2180SA	PT-2180V
Red/Grey	1.22	N/A	N/A	N/A	N/A	N/A
Grey/Grey	1.30	PT-2200P	PT-2200SV	PT-2200SI	PT-2200SA	PT-2200V
Yellow/Yellow	1.42	PT-2210P	PT-2210SV	PT-2210SI	PT-2210SA	PT-2210V
Yellow/Blue	1.52	PT-2220P	PT-2220SV	PT-2220SI	PT-2220SA	PT-2220V
Blue/Blue	1.65	PT-2230P	PT-2230SV	PT-2230SI	PT-2230SA	PT-2230V
Blue/Green	1.75	PT-2240P	N/A	N/A	N/A	N/A
Green/Green	1.85	PT-2250P	PT-2250SV	PT-2250SI	PT-2250SA	PT-2250V
Purple/Purple	2.06	PT-2260P	PT-2260SV	PT-2260SI	PT-2260SA	PT-2260V
Purple/Black	2.29	PT-2270P	PT-2270SV	PT-2270SI	PT-2270SA	PT-2270V
Purple/Orange	2.54	PT-2280P	PT-2280SV	PT-2280SI	PT-2280SA	PT-2280V
Purple/White	2.79	PT-2290P	PT-2290SV	PT-2290SI	PT-2290SA	PT-2290V
Black/White	3.18	PT-2300P	N/A	N/A	N/A	N/A

3-Stop Pump Tubing

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Description	I.D.(mm)	PVC 12/pk	Solva 12/pk	Silicone 6/pk	Santoprene 12/pk	Viton 12/pk
Orange/Black	0.13	N/A	N/A	N/A	N/A	N/A
Orange/Red	0.19	PT-3020P	N/A	N/A	N/A	N/A
Orange/Blue	0.25	PT-3030P	PT-3030SV	N/A	PT-3030SA	N/A
Red/Blue	0.31	N/A	N/A	N/A	N/A	N/A
Orange/Green	0.38	PT-3080P	PT-3080SV	N/A	PT-3080SA	N/A
Green/Yellow	0.44	PT-3090P	N/A	N/A	N/A	N/A
Orange/Yellow	0.51	PT-3100P	PT-3100SV	N/A	PT-3100SA	PT-3100V
White/Yellow	0.57	PT-3110P	N/A	N/A	N/A	N/A
Orange/White	0.64	PT-3120P	PT-3120SV	PT-3120SI	PT-3120SA	PT-3120V
Black/Black	0.76	PT-3130P	PT-3130SV	PT-3130SI	PT-3130SA	PT-3130V
Orange/Orange	0.89	PT-3140P	PT-3140SV	PT-3140SI	PT-3140SA	PT-3140V
White/Black	0.95	PT-3150P	N/A	N/A	N/A	N/A
White/White	1.02	PT-3160P	PT-3160SV	PT-3160SI	PT-3160SA	PT-3160V
White/Red	1.09	PT-3170P	N/A	N/A	N/A	N/A
Red/Red	1.14	PT-3180P	PT-3180SV	PT-3180SI	PT-3180SA	PT-3180V
Red/Grey	1.22	PT-3190P	N/A	N/A	N/A	N/A
Grey/Grey	1.30	PT-3200P	PT-3200SV	PT-3200SI	PT-3200SA	PT-3200V
Yellow/Yellow	1.42	PT-3210P	PT-3210SV	PT-3210SI	PT-3210SA	PT-3210V
Yellow/Blue	1.52	PT-3220P	PT-3220SV	PT-3220SI	PT-3220SA	PT-3220V
Blue/Blue	1.65	PT-3230P	PT-3230SV	PT-3230SI	PT-3230SA	PT-3230V
Blue/Green	1.75	PT-3240P	N/A	N/A	N/A	N/A
Green/Green	1.85	PT-3250P	PT-3250SV	PT-3250SI	PT-3250SA	PT-3250V
Purple/Purple	2.06	PT-3260P	PT-3260SV	PT-3260SI	PT-3260SA	PT-3260V
Purple/Black	2.29	PT-3270P	PT-3270SV	PT-3270SI	PT-3270SA	PT-3270V
Purple/Orange	2.54	PT-3280P	PT-3280SV	PT-3280SI	PT-3280SA	PT-3280V
Purple/White	2.79	PT-3290P	PT-3290SV	PT-3290SI	PT-3290SA	PT-3290V
Black/White	3.18	PT-3300P	N/A	N/A	N/A	N/A



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Flared end pump tubing from Precision Glassblowing of Colorado is a cost effective way to simplify your capillary to pump tubing connections, especially when dealing with small internal diameters. Available in PVC and Solva.

Flared End Pump Tubing

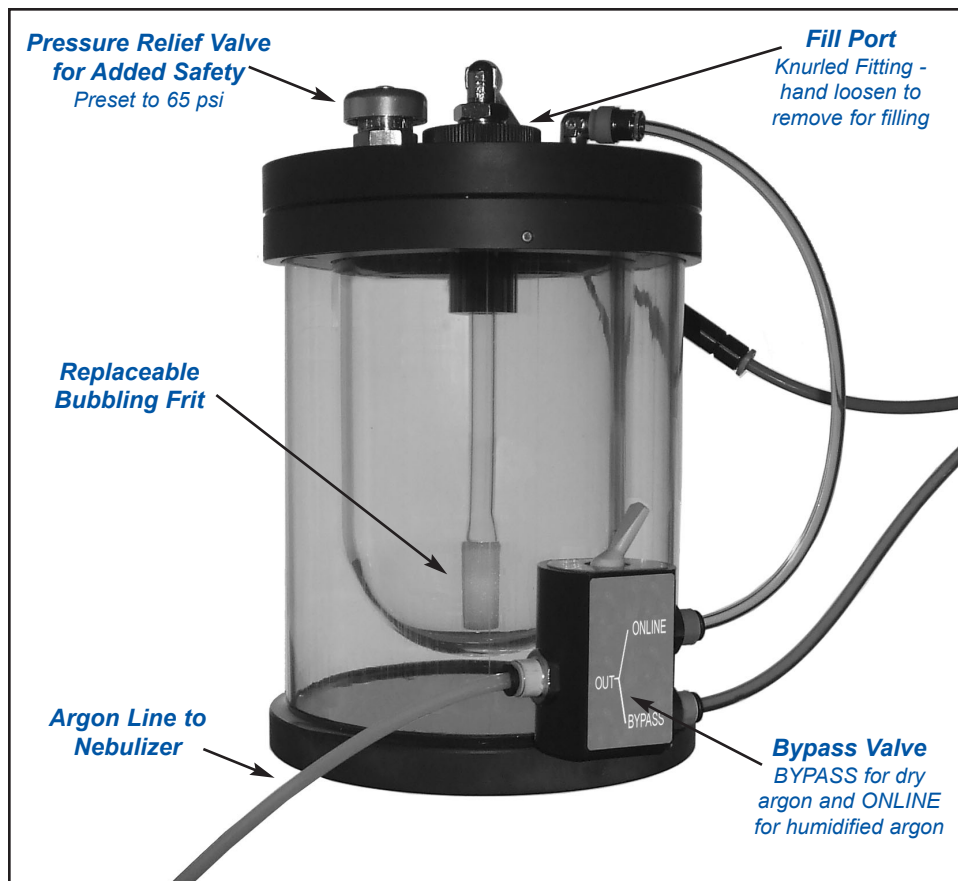
<i>Description</i>	<i>I.D.(mm)</i>	<i>2-Stop PVC 12/pk</i>	<i>2-Stop Solva 12/pk</i>	<i>3-Stop PVC 12/pk</i>	<i>3-Stop Solva 12/pk</i>
Orange/Black	0.13	PT-2010PF	PT-2010SVF	PT-3010PF	N/A
Orange/Red	0.19	PT-2020PF	PT-2020SVF	N/A	N/A
Orange/Blue	0.25	PT-2030PF	PT-2030SVF	PT-3030PF	PT-3030SVF
Red/Blue	0.31	PT-2050PF	N/A	N/A	N/A
Orange/Green	0.38	PT-2080PF	PT-2080SVF	N/A	PT-3080SVF
Green/Yellow	0.44	N/A	N/A	N/A	N/A
Orange/Yellow	0.51	PT-2100PF	PT-2100SVF	N/A	PT-3100SVF
White/Yellow	0.57	N/A	N/A	N/A	N/A
Orange/White	0.64	PT-2120PF	PT-2120SVF	PT-3120PF	PT-3120SVF
Black/Black	0.76	PT-2130PF	PT-2130SVF	PT-3130PF	PT-3130SVF
Orange/Orange	0.89	PT-2140PF	PT-2140SVF	PT-3140PF	PT-3140SVF
White/Black	0.95	N/A	N/A	N/A	N/A
White/White	1.02	PT-2160PF	PT-2160SVF	PT-3160PF	PT-3160SVF
White/Red	1.09	N/A	N/A	N/A	N/A
Red/Red	1.14	PT-2180PF	PT-2180SVF	PT-3180PF	PT-3180SVF
Red/Grey	1.22	N/A	N/A	N/A	N/A
Grey/Grey	1.30	PT-2200PF	PT-2200SVF	PT-3200PF	PT-3200SVF
Yellow/Yellow	1.42	PT-2210PF	PT-2210SVF	PT-3210PF	PT-3210SVF
Yellow/Blue	1.52	PT-2220PF	PT-2220SVF	PT-3220PF	PT-3220SVF
Blue/Blue	1.65	PT-2230PF	PT-2230SVF	PT-3230PF	PT-3230SVF
Blue/Green	1.75	PT-2240PF	N/A	PT-3240PF	N/A
Green/Green	1.85	PT-2250PF	PT-2250SVF	PT-3250PF	PT-3250SVF
Purple/Purple	2.06	PT-2260PF	PT-2260SVF	PT-3260PF	PT-3260SVF
Purple/Black	2.29	PT-2270PF	PT-2270SVF	PT-3270PF	PT-3270SVF
Purple/Orange	2.54	PT-2280PF	PT-2280SVF	PT-3280PF	PT-3280SVF
Purple/White	2.79	PT-2290PF	PT-2290SVF	PT-3290PF	PT-3290SVF
Black/White	3.18	PT-2300P	N/A	N/A	N/A

Argon Humidifier

ICP & ICP/MS Consumables

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An argon humidifier is commonly used in ICP analysis of samples with very high dissolved solids concentration. The ArH-102 Argon Humidifier from Precision Glassblowing of Colorado helps to prevent salt build-up inside the sample introduction system allowing uninterrupted and maintenance-free operation. The ArH-102 combines ease of operation, high performance and safety.



Features

- 570 mL capacity, more than 4 X the volume of the leading competitor, means less time spent refilling
- Hand tightened fill port for quick refill; no tools required
- Unique design allows for instant switching between humidified argon and bypass with minimal loss of pressure inside the vessel
- Enclosed in a polycarbonate safety shield
- Replaceable bubbling frit
- User friendly color-coded gas connections

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5010-010 - 13x100mm
Polystyrene Sample Tube



5010-030 - 16x100mm
Polypropylene Sample Tube



5020-030 - 50 mL Polypropylene
Centrifuge Tubes

Sample Tubes & Watch Glasses

Precision Glassblowing of Colorado offers disposable, metal-free test tubes and sample vessels for auto samplers as well as metal-free 15 mL and 50 mL centrifuge tubes. We have most common sizes of sample tubes and vessels available featuring screw cap or flip-top lids, graduations, and a variety of different polymers. Along with the glassware and pump tubing we have always carried, we are working to become a more convenient source for your ICP needs. Not only do we offer competitive pricing on all of our products, but we also back it up with stock and quick turnaround time to fill your orders. Next time you call feel free to ask us about this product line.

5010-010	13x100mm Polystyrene Sample Tube, 2000/case
5010-030	16x100mm Polypropylene Sample Tube, 1000/case
5010-035	White Plug Caps for 16x100mm Tubes, 1000/case
5010-050	16x125mm Polypropylene Sample Tube, 1000/case
5010-070	17x100mm Polypropylene Sample Tube, 1000/case
5010-170	2.0 mL Polystyrene Sample Cups, 5000/case
5020-010	15 mL Polypropylene Centrifuge Tubes, 500/case
5020-030	50 mL Polypropylene Centrifuge Tubes, 500/case
5030-010	70 mL Digestion Vial, Flip-Top, Graduated, 400/case
5030-020	Watch Glass, Polypropylene
5030-030	100 mL Digestion Vial, Flip-Top, Graduated, 250/case

AA Consumables

Quartz Cells

Perkin Elmer

1000-55	PerkinElmer Quartz Cell, MHS-10	B009-4415
1000-55W	PerkinElmer Quartz Cell, MHS-10 with Windows	
1000-60	PerkinElmer Quartz Cell, MHS-20	B009-7694
1000-65	PerkinElmer Quartz Cell, MHS-20 with Windows	B009-7693
1000-66	Quartz Cell for FIMHS, Complete	
1000-67	Quartz Cell for FIMHS	B050-7486
1000-68	End Cap Assembly, FIMHS (2/pk)	B050-7487
1000-71	PerkinElmer Quartz Window	B011-5576

Thermo Jarrel Ash

1100-20	TJA Quartz Cell, 120mm Long	85476
1100-25	TJA Quartz Cell, 150mm Long	122910
1100-30	TJA Quartz Cell, T-Shaped	131395

Spectro

1200-10	Spectro Quartz Cell with Fused UV Windows
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Varian

1300-30	Varian Mercury Absorption Cell, VGA-76/77	9910040700
1300-35	Varian Quartz Cell, Hydride Absorption, VGA-76/77	9910040000
1300-40	Varian Gas-Liquid Separator, VGA-76	9910040200
1300-45	Varian Mercury Absorption Cell, M-65	0110255100
1300-50	Varian Quartz Absorption Cell, M-65	0110257690
1300-60	Varian Quartz Atom Concentrator Tube, ACT-80	9910054400
1300-65	Varian Gas-Liquid Separator, VGA-77	9910071100

Inorganic Standards

Precision Glassblowing of Colorado is pleased to offer the complete lines of inorganic standards from the following quality manufacturers:



Choose from single element standards, multi-element blends, or select your own custom blend made to your specifications.

Now you can order your first and second source standards on the same purchase order as the rest of your ICP & ICP-MS related supplies.

Inorganic Standards

Single Element Standards	44
QC Standards	45
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High-Purity Standards, Inc. (HPS) has proudly served the scientific community for the past fifteen years with high-purity spectrometric standards and reference material for AAS, ICP, ICP-MS, and IC.

**ICP & ICP-MS
Consumables**

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Approximately one-half of High Purity's business is in the preparation of custom blends designed to meet customers' needs. Their vast analytical experience allows them to prepare difficult-to-make special mixtures. Whether your need is for a catalog item or a custom blend, they pride themselves on providing prompt and accurate customer service.

Single Element Standards

Precision Glassblowing of Colorado offers the following single element standards in 10 ppm, 100 ppm, 1000 ppm and 10,000 ppm concentrations as well as 50 mL, 100 mL, 250 mL and 500 mL volumes. Call today for pricing and ordering information.

Element	Matrix	Element	Matrix
Aluminum	HNO ₃	Nickel	HNO ₃
Antimony	HNO ₃ + trace HF	Niobium	HNO ₃ + trace HF
Arsenic	HNO ₃	Osmium	HCl
Barium	HNO ₃	Palladium	HNO ₃
Beryllium	HNO ₃	Phosphorus	HNO ₃
Bismuth	HNO ₃	Platinum	HCl
Boron	H ₂ O	Potassium	HNO ₃
Cadmium	HNO ₃	Praeseodymium	HNO ₃
Calcium	HNO ₃	Rhenium	HNO ₃
Carbon	H ₂ O	Rhodium	HCl
Cerium	HNO ₃	Rubidium	HNO ₃
Cesium	HNO ₃	Ruthenium	HCl
Chromium	HNO ₃	Samarium	HNO ₃
Cobalt	HNO ₃	Scandium	HNO ₃
Copper	HNO ₃	Selenium	HNO ₃
Dyprosium	HNO ₃	Silicon	H ₂ O
Erbium	HNO ₃	Silver	HNO ₃
Europium	HNO ₃	Sodium	HNO ₃
Gadolinium	HNO ₃	Strontium	HNO ₃
Gallium	HNO ₃	Sulfur	H ₂ O
Germanium	HNO ₃	Tantalum	HNO ₃ + trace HF
Gold	HCl	Tellurium	HNO ₃ + trace HF
Hafnium	HNO ₃ + trace HF	Terbium	HNO ₃
Holmium	HNO ₃	Thallium	HNO ₃
Indium	HNO ₃	Thorium	HNO ₃
Iridium	HCl	Thulium	HNO ₃
Iron	HNO ₃	Tin	HNO ₃ + trace HF
Lanthanum	HNO ₃	Titanium	HNO ₃ + trace HF
Lead	HNO ₃	Tungsten	HNO ₃
Lithium	HNO ₃	Uranium	HNO ₃
Lutetium	HNO ₃	Vanadium	HNO ₃
Magnesium	HNO ₃	Ytterbium	HNO ₃
Manganese	HNO ₃	Yttrium	HNO ₃
Mercury	HNO ₃	Zinc	HNO ₃
Molybdenum	HNO ₃ + trace HF	Zirconium	HNO ₃
Neodymium	HNO ₃		



Elements offers you both alternatives and solutions with the largest variety of stock concentrations and volumes available.

QC Standards

QC 19

Quality Control Standard, 19 Element, Available in 50ml, 100ml, 250ml and 500ml volumes.

Element	µg/mL	Element	µg/mL	Element	µg/mL
Sb	100	Cu	100	Ni	100
As	100	Fe	100	Se	100
Be	100	Pb	100	Tl	100
Cd	100	Mg	100	Ti	100
Ca	100	Mn	100	V	100
Cr	100	Mo	100	Zn	100
Co	100				

Matrix: HNO₃ + trace HF

QC 7

Quality Control Standard, 7 Element, Available in 50ml, 100ml, 250ml and 500ml volumes.

Element	µg/mL	Element	µg/mL	Element	µg/mL
Al	100	K	1000	Ag	100
Ba	100	Si	50	Na	100
B	100				

Matrix: HNO₃

QC 21

Quality Control Standard, 21 Element, Available in 50ml, 100ml, 250ml and 500ml volumes.

Element	µg/mL	Element	µg/mL	Element	µg/mL
Sb	100	Cu	100	Ni	100
As	100	Fe	100	Se	100
Be	100	Pb	100	Sr	100
Cd	100	Li	100	Tl	100
Ca	100	Mg	100	Ti	100
Cr	100	Mn	100	V	100
Co	100	Mo	100	Zn	100

Matrix: HNO₃ + trace HF

QC 26

Quality Control Standard, 26 Element, Available in 50ml, 100ml, 250ml and 500ml volumes.

Element	µg/mL	Element	µg/mL	Element	µg/mL
Sb	100	Co	100	Se	100
Al	100	Cu	100	Si	50
As	100	Fe	100	Ag	100
Ba	100	Pb	100	Na	100
B	100	Mg	100	Tl	100
Be	100	Mn	100	Ti	100
Cd	100	Mo	100	V	100
Ca	100	Ni	100	Zn	100
Cr	100	K	1000		

Matrix: HNO₃ + 3

ICP & ICP-MS Consumables

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Since their founding in 1981, VHG Labs has been an international supplier of certified standards, reference materials and consumable supplies for laboratory instrumentation.



Inorganic Ventures is a chemical Certified Reference Material (CRM) producer. While they specialize in preparing custom inorganic standards, they also sell a wide variety of conventional standards. Through their robust Quality Assurance program, they strive to flex to your specs in nearly everything they do.

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Inorganic Ventures offers more than 1,500 "off-the-shelf" standards and designed thousands of custom solutions for laboratories worldwide. Their state-of-the-art facilities can create and supply virtually anything you need within the limits of modern chemistry.



Elements uses the highest purity starting material available, ASTM Type I, 18 megohm deionized water and trace metal grade high purity acids.

Interference Standards

Interferents A

Interferents "A", CLP Standard, Available in 50ml, 100ml, 250ml and 500ml volumes.

Element	µg/mL	Element	µg/mL	Element	µg/mL
Al	5000	Fe	2000	Mg	5000
Ca	5000				
Matrix: HNO ₃					

Interferents B

Interferents "B", CLP Standard, Available in 50ml, 100ml, 250ml and 500ml volumes.

Element	µg/mL	Element	µg/mL	Element	µg/mL
Ag	100	Co	50	Ni	100
Ba	50	Cr	50	Pb	100
Be	50	Cu	50	V	50
Cd	100	Mn	50	Zn	100
Matrix: 5% HNO ₃					

Tuning Solution

Tuning Solution

ICP-MS Standard, Tuning Solution, Available in 50ml, 100ml, 250ml and 500ml volumes.

Element	µg/mL	Element	µg/mL	Element	µg/mL
Be	10	In	10	Mg	10
Co	10	Pb	10		
Matrix: HNO ₃					



VHG offers single and multi-element standards for AA, IC, ICP & ICP-MS

Precision Glassblowing of

Colorado offers the complete lines of

standards from all four of our manufacturers.

If you do not see what you are looking for please contact us by phone at 303-693-7329, find us on the web at

www.precisionglassblowing.com, or E-mail us at info@precisionglassblowing.com.

Custom Standards Order Form

DATE: _____

Company: _____

Name: _____

Address: _____

Phone: _____ Fax: _____

Account Number: _____

E-mail Address: _____



14775 East Hinsdale
Centennial, CO 80112
303-693-7329 - Phone
303-699-6815 - Fax
info@precisionglassblowing.com

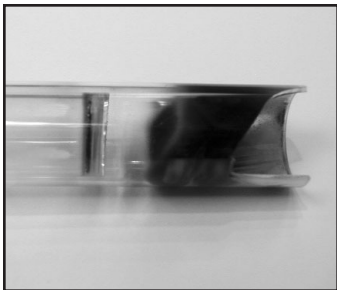
Mix Name: _____

Matrix: _____

Element Name	µg/ml	Element Name	µg/ml	Element Name	µg/ml	Element Name	µg/ml
AlAluminum	_____	GdGadolinium	_____	NiNickel	_____	SrStrontium	_____
SbAntimony	_____	GaGallium	_____	NbNiobium	_____	SSulfur	_____
AsArsenic	_____	GeGermanium	_____	OsOsmium	_____	TaTanatalum	_____
BaBarium	_____	AuGold	_____	PdPalladium	_____	TeTellerium	_____
BeBeryllium	_____	HfHafnium	_____	PPhosphorus	_____	TbTerbium	_____
BiBismuth	_____	HoHolmium	_____	PtPlatinum	_____	TlThallium	_____
BBoron	_____	InIndium	_____	KPotassium	_____	ThThorium	_____
CdCadmium	_____	IrIridium	_____	PrPraeseodymium	_____	TmThulium	_____
CaCalcium	_____	FeIron	_____	ReRhenium	_____	SnTin	_____
CCarbon	_____	LaLanthanum	_____	RhRhodium	_____	TiTitanium	_____
CeCerium	_____	PbLead	_____	RbRubidium	_____	WTungsten	_____
CsCesium	_____	LiLithium	_____	RuRuthenium	_____	UUranium	_____
CrChromium	_____	LuLutetium	_____	SmSamarium	_____	VVanadium	_____
CoCobalt	_____	MgMagnesium	_____	ScScandium	_____	YbYtterbium	_____
CuCopper	_____	MnManganese	_____	SeSelenium	_____	YYttrium	_____
DyDyprosium	_____	HgMercury	_____	SiSilicon	_____	ZnZinc	_____
ErErbium	_____	MoMolybdenum	_____	AgSilver	_____	ZrZirconium	_____
EuEuropium	_____	NdNeodymium	_____	NaSodium	_____		



Torch for standard outer
shield repair



Non-repairable due to
melted inner shield

Services Available from Precision Glassblowing of Colorado

Standard ICP Torch Rebuilding

Most ICP torches may be rebuilt for a minimal price compared to the cost of a new torch. Rebuilding a standard torch involves replacing the entire outer shield (tube) and/or replacing broken side arms. In the event the inner shield (tube) and/or the injector on a fixed torch has become cracked or severely devitrified, the torch is considered non-repairable, as the cost of repair would exceed the price of a new torch. Once the torch has been rebuilt, it passes through the same QC program as our new torches ensuring you get a quality rebuilt torch that meets all original specifications. Some restrictions apply and certain torches cannot be rebuilt due to their design. For more information please feel free to call us at 303-693-7329 or E-mail us at info@precisionglassblowing.com.

Ceramic Base Torch Rebuilding for TJA Instruments

The ceramic base torches for TJA instruments may be rebuilt multiple times at a very moderate price. Available with or without a new injector, rebuilt torches receive new precision ID/OD quartz inner and outer tubes and new argon fittings. As with our standard ICP torches, our rebuilt ceramic base torches are subjected to the same stringent Quality Control program as our new torches. So before you throw away your next broken ceramic base torch, consider having us rebuild it. After all, it can only save you money.

Custom ICP Glassware

If you have an idea or a design for a custom piece of ICP glassware, Precision Glassblowing of Colorado is the place to call. With CAD capability, we can create a print of your drawing and submit it back to you for approval.

For more information please feel free to call us at 303-693-7329 or E-mail us at info@precisionglassblowing.com.

Repair Form

Note: By sending these items to Precision Glassblowing of Colorado, customer states that all items have been cleaned of any substances that may pose a health hazard. Precision Glassblowing of Colorado reserves the right to refuse service on any items that may pose such a hazard.



14775 East Hinsdale Avenue
 Centennial, CO 80112
 303-693-7329 - Phone
 303-699-6815 - Fax
 info@precisionglassblowing.com

CUSTOMER: Please complete the following information

Bill To:

Ship To:

Same as **Bill To:**

Company Name _____
 Contact _____
 Address _____

 City _____
 State _____ Zip _____
 Phone _____
 Fax _____
 E-mail _____

Company Name _____
 Contact _____
 Address _____

 City _____
 State _____ Zip _____
 Phone _____
 Fax _____
 E-mail _____

Purchase Order # _____

Credit Card AMX, Discover, M/C, Visa: ____
 (A representative will contact you for credit card information.)

Special Instructions (check):

Return non-repairable items: _____ Call with quote prior to repair: _____ Rush (\$25 surcharge per piece): _____

Other: _____

Following to be completed by Precision

REPAIR # _____

DATE ARRIVED _____

CUSTOMER # _____

<u>Qty</u>	<u>Item</u>	<u>Cost (or reason for non-repairable)</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

OEM Cross Reference

<i>OEM P/N</i>	<i>Precision P/N</i>	<i>OEM P/N</i>	<i>Precision P/N</i>	<i>OEM P/N</i>	<i>Precision P/N</i>
Agilent (Hewlett Packard) 4500 & 7500					
G1820-61138	500-77Q	75128	200-09	N058-0376	310-09
G1820-65015	900-30	75129	200-11	N058-0449	320-31
G1820-65026	900-24	75132	220-50	N058-0528	310-03
G1820-65028	900-05	75144	220-51	N058-0539	310-36
G1820-65030	500-77	75145	200-10	N058-1497	320-66
G1820-65033	500-93	75542	200-06	N058-2184	320-53
G1820-65035	900-08	77200	200-32	N058-2185	320-52
G1820-65215	PT-2160P	77611	200-30	N058-2186	320-51
G1820-65216	PT-2220SA	666011	200-08	N058-2235	310-24
G1820-65217	PT-2160SI	676458	210-10	N058-2248	310-35
G1820-65220	PT-2020P	676459	210-11	N068-0375	PT-2180P
G1820-65528	900-04	Finnigan			
G1820-65336	900-11	1091250	850-12	N068-0376	PT-2180SV
G1820-65337	900-13	1122800	852-10	N068-1234	320-60
G1820-65339	900-14	1127121	850-19	N068-1574	500-80
G1820-80237	900-38	JY			
G1833-65421	900-25	20.925.160	160-64	N068-1631	320-33
G1833-65422	900-09	21.356.040	160-63	N068-1690	310-03W
G1833-65423	900-06	21.356.110	160-40	N069-0568	310-04
G1833-65424	900-07	21.356.130	160-61	N069-0672	320-73
G1833-65425	900-03	31.021.589	160-58	N069-0769	310-38
G1833-65426	900-39	31.021.730	160-55	N069-0780	310-39
G1833-65569	PT-3160P	31.023.722	160-50	N069-1595	PT-2180SI
G1833-65570	PT-3220SA	31.023.723	160-52	N069-1662	310-14
G1833-65571	PT-3020P	31.023.724	160-53	N069-1664	310-15
G1833-80301	500-94	31.026.996	150-14	N069-1678	320-68
G3270-67002	900-01	31.026.997	160-65	N069-1689	320-69
G3285-80050	900-02	31.030.809	150-15B	N069-5295	310-05
ARL					
144857	110-48	31.031.099	160-70	N069-5362	320-50
144860	110-42	31.031.279	150-15	N069-5379	310-11
1200079	120-42	46.791.010	PT-2130SV	N069-5400	310-37
137000-0000	100-08	46.791.012	PT-2180SV	N069-5441	320-40
139008-0000	100-16	46.791.016	PT-2250P	N069-5442	320-41
139009-0003	100-05	46.791.018	PT-2200P	N069-5448	320-43
170631-0000	100-28	46.791.022	PT-2130P	N069-5449	320-44
170692-0000	110-32	46.791.024	PT-2160P	N069-5456	310-13
170693-0000	110-54	47.929.001	500-70P	N069-5460	320-46
173127-0000	100-09	47.929.002	500-71	N069-5461	320-48
173131-0000	120-40	47.929.003	500-72	N069-5461	320-48
173142-0000	100-12	47.929.004	500-73P	N077-0322	320-80
173142-0002	110-33	47.929.006	500-70	N077-0322	320-80
173142-0003	110-34	47.929.008	500-92	N077-0338	310-16
173142-0004	110-36	49.010.100	150-05	N077-0343	310-19
173251-0000	100-27	49.010.101	150-25	N077-0344	310-18
173252-0000	110-35	LK1160497080	PT-2130SI	N077-0437	310-43
173259-0000	510-50	PerkinElmer®			
173463-0000	110-30	0041-2047	300-12	N077-0944	320-81
173473-0000	110-31	0047-2020	500-77	N077-1116	320-67
914319-000P/M	500-77	0047-2022	500-70P	N077-1500	310-17
915375-000P/M	500-80	0047-2033	300-25	N077-1501	300-32
915817-0000	510-10	0047-2048	300-05	N077-1531	320-54
S111403	110-38	0047-3052	300-21	N077-5014	320-74
S213787	110-45	0047-3187	320-62	N077-5177	310-42
S702171	110-41	0047-3292	320-34	N077-5223	320-76
S702174	110-39	0047-3550	PT-2130SV	N077-5224	320-75
S702232	110-40	0047-3552	PT-2130SI	N077-5225	320-78
BAIRD					
25491	200-25	0047-3560	300-23	N077-5226	320-77
25492	200-12	0047-3561	320-64	N077-5227	310-40
25515	200-05	0990-8587	PT-2130P	N077-5228	310-41
62607	200-36	0999-2731	320-65	N077-5289	310-25
69972	200-07	B006-6549	320-67	N077-5297	310-20
69987	220-55	B050-7486	1000-67	N077-6052	300-29
		B050-7487	1000-68	N077-6053	300-30
		N058-0233	310-07	N077-6090	300-31
				N810-2001	400-05
				N810-2006	400-07
				N810-2011	500-72
				N810-2012	500-70M
				N812-0100	400-36
				N812-0116	400-35
				N812-0150	300-19MS
				N812-2006	400-10

OEM Cross Reference

OEM P/N	Precision P/N	OEM P/N	Precision P/N	OEM P/N	Precision P/N
N812-2012	PT-2300P	3200841	450-16	190400-65	250-12
N812-2188	300-18DV	3201070	450-46	190400-75	250-25
N812-2252	PT-2290SA	3201104	450-40		
N812-5029	320-35	3201192	450-05	Varian®	
N812-6039	320-51	3201732	450-06	20-100695-00	500-80
N812-6040	320-52	3201759	450-44	20-100696-90	800-05
N812-6041	320-53	3202287	450-43	20-100696-90B	800-05B
W100-8384	400-10HE	3203025	450-27	20-100707-00	800-25
WE01-3829	400-14	3203095	450-12	20-100729-00	800-10
WE02-3948	400-30	3203739	450-17	20-100730-00	800-41
WE02-3951	400-37	3203789	450-29	20-100764-00	800-08
WE02-4371	500-77Q	3204313	450-22	20-100765-00	500-70
WE02-5221	400-20	3204703	450-28	20-100775-00	800-42
WE02-7005	400-32	3600169	450-30	20-100783-00	800-06
WE02-7030	400-31	3600170	450-13	20-100793-00	800-11
		3600374	450-22Q	20-100812-00	800-14
Spectro		003952-00	250-30	20-100816-00	500-85
47101001	PT-2120P	085207-00	275-25	20-100817-00	800-21
47101003	PT-2140P	085207-01	275-26	20-100834-00	800-15
47101004	PT-2150P	125124-01	275-08	20-100904-00	800-12
47101005	PT-2240P	125407-00	250-41	20-100964-00	500-65QDAC
47101006	PT-2220P	125407-01	250-40	20-101007-00	800-34
47101014	PT-2230P	125847-00	254-45	20-101008-00	800-31
47201037	PT-2080P	126432-01	275-07	20-101009-00	800-32
47501010	PT-2200P	126432-02	275-06	20-101010-00	800-33
48105002	750-18	126432-03	275-10	20-101021-00	500-70MQDAC
48105003	750-12	126432-04	275-09	24-100675-00	800-45
48105006	750-14	126440-01	275-07W/O	37-100272-00	PT-2130P
48105008	750-21	126440-01	275-08W/O	37-100273-00	PT-2270P
48105009	750-23	126440-02	275-06W/O	37-100344-00	PT-2160P
48105010	750-22	126440-03	275-10W/O	37-100345-00	PT-2200P
48105051	750-13	126440-05	275-10D/VW/O	37-100346-00	PT-2230P
48105052	750-40	126440-06	275-09W/O	37-100348-00	PT-2130SV
48105058	750-46	126989-00	500-92	37-100350-00	PT-2160SV
48105061	510-27	127179-01	275-07HF	37-100352-00	PT-2200SV
48105062	750-17	127947-00	250-16	37-100435-00	PT-2100V
48205001	750-07	130089-00	250-19	37-100436-00	PT-2130V
48205036	510-20S	130177-00	PT-3140P	37-100437-00	PT-2160V
48206002	750-06	130177-01	PT-3180P	37-100438-00	PT-2200V
48206007	750-42	130177-02	PT-3140SI	37-100439-00	PT-2230V
75060502	500-92S	130177-03	PT-3180SI	37-100440-00	PT-2100SA
75060522	520-30S	130177-04	PT-3140V	37-100441-00	PT-2130SA
75060596	750-05F	130177-05	PT-3180V	37-100442-00	PT-2160SA
75160526	750-40F	130177-06	PT-3080P	37-100443-00	PT-2200SA
75160537	750-48F	131731-00	PT-3230SV	37-100444-00	PT-2230SA
75160549	750-47F	131731-01	PT-3260SV	37-100469-00	PT-2120P
75160592	750-41F	131731-02	PT-3140SV	79-100467-00	800-21B
75260533	750-49F	133202-50	520-36	99-100568-00	800-50
76060510	500-70	134365-00	500-80	99-100573-00	800-48
76060529	510-20SF	134620-00	275-15	99-100574-00	800-55
48105052A	750-41	136105-00	275-19	99-100704-00	800-17
		136120-00	275-16	99-100717-00	800-51
Thermo Scientific®		136436-01	260-83	99-100847-00	800-49
78530	PT-3120SV	136436-02	260-81		
78532	PT-3180SV	136502-01	250-42		
80963	510-10	136502-02	250-43		
1040894	500-70	136708-00	ISMK-101		
1041167	450-51	137688-00	250-24		
1200079	450-11	138563-00	250-23		
1200080	450-08	138563-00	250-26		
1200274	450-26	138566-03	275-10HF		
1201261	450-18	139123-00	275-53		
1202081	450-19	139219-00	275-21		
3007383	450-36	139662-00	275-13		
3200004	450-49	139663-00	275-14		
3200176	450-45	140542-00	275-18		
3200727	450-32	190400-54	250-05		



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