

Specifications



**The MEINHARD® Nebulizer**

The MEINHARD® Concentric Glass Nebulizer reflects the exacting standards in design and manufacturing that have made it the choice of the industry worldwide. Its advantages include simplicity of design and operation, reproducible and self-aligning aerosol, and close fabrication control. The MEINHARD® nebulizer is used in all major ICP instruments on the market today.

	<p><b>Specifications:</b></p>				
	<p>Configuration: Concentric, monolithic</p> <p>Material: Borosilicate glass</p> <p>Tubulation O.D.: Shell, 6mm; fluid inputs, 4mm</p> <p>Internal liquid volume: ~0.1 mL</p> <p>Annular separation at nozzle: ~20µm</p> <p>Annular area: ~0.03mm<sup>2</sup></p> <p>Capillary I.D.:</p> <table border="0"> <tr> <td>TR-series</td> <td>0.22 - 0.32mm</td> </tr> <tr> <td>HEN</td> <td>0.10mm</td> </tr> </table>	TR-series	0.22 - 0.32mm	HEN	0.10mm
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	<p>Functional criteria:</p>				
	<p><b>P<sub>c</sub></b>: Calibration input pressure at rated Ar flow</p>				
	<p><b>R<sub>a</sub></b>: Water aspiration at -5cm head, at rated Ar flow</p>				

<i>P<sub>c</sub></i> : (psig)	<i>R<sub>a</sub></i> :(mL/min)		
	Nominal	Range	
20	10-24	0.5	0.3-0.6
30	25-40	1	0.7-1.4
50	41-60	2	1.5-2.4
		3	2.5-3.5

Type A nozzle, front view  
(enlarged 20X)

**Nozzle Selection Guide:**

	TYPE A	TYPE C	TYPE K
Popular ICP applications	general	high solids	Ar low-flow
Calibration reference, L/min Ar	1.0	1.0	0.7
End surfaces	lapped	vitreous	lapped
Sample capillary tip recess, mm	0.0	~0.5	0.5
Uptake suction	+	++	++
Stability of aerosol delivery	+	++	++

**MODEL DESIGNATION:** TR-*P<sub>c</sub>*-NR<sub>*a*</sub> \ Substitute A, C or K for N to select nozzle type.

**OPERATION:** The MEINHARD® nebulizer will aspirate liquid sample naturally when the rated flow of gas is directed into the sidearm and a sample feed is connected to the liquid input. All models may be operated with externally pumped analyte provided the sample flow is not significantly below the natural aspiration rate. Calibrations reflect a standard operational reference and are not intended as limitations on conditions of use, which can vary widely. Operation can be optimized for specific instruments.

### MODIFICATIONS AND SPECIAL APPLICATIONS

**A SMALL BORE (SB)** modification provides an efficient way to link HPLC to ICP. A small bore 1/8" O.D. liquid input replaces the standard 4 mm input on the nebulizer, reducing dead volume by approximately 80%. The end of the SB tubing is prepared for a tight, leak-free seal. Internal geometric irregularities are kept to a minimum to preserve peak boundaries. A chromatographic union [Fit Kit #1](#) is available to aid in connecting to 1/16" column tubing. Order by substituting SB- for TR- in the model designation.

FOR LC-MS: the CIR-50-HK is designed to use 0.7 L/min of helium at 50 psig. A shortened liquid input allows for insertion of a fused silica LC column directly into the capillary of the nebulizer. Dead volume is virtually eliminated and there is no need for connective fittings.



## THE HIGH EFFICIENCY NEBULIZER (HEN)s

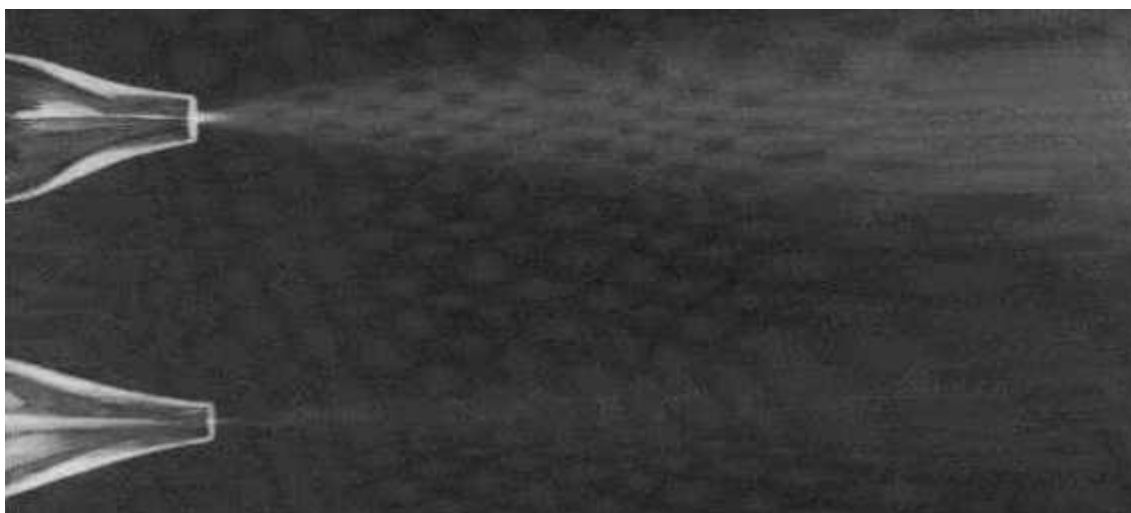
[Fit Kit #2](#) [Fit Kit #1](#) [Fit Kit #1-Micro](#)



Representative Detection Limits ( $\mu\text{g/L}$ )

Rate	( $\mu\text{L/min}$ ):	Ref. 1 1900	TR-30-A3 2000	HEN 80
Cu	324.7	5.4	3	3
Ni	231.6	15	5	5
Pb	220.3	42	20	20
As	193.6	53	30	40
Be	313.0	0.3	0.2	0.2

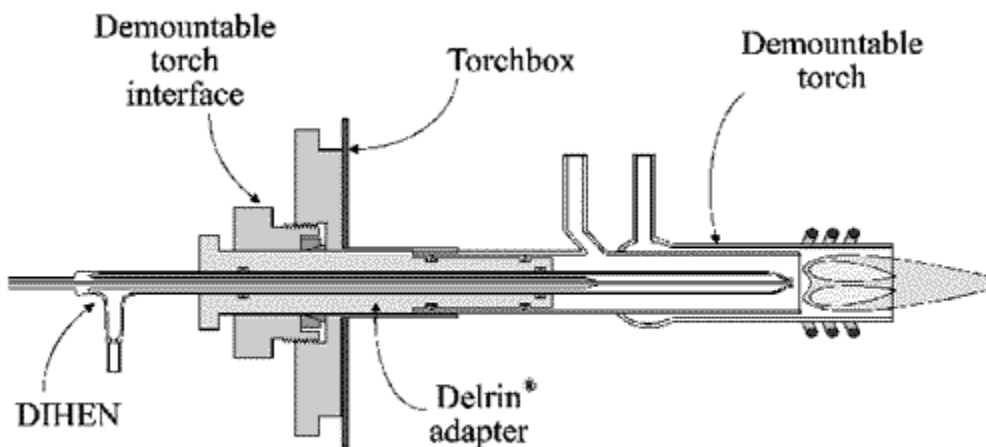
(1) R. K. Winge, V. A. Fassel, V. J. Peterson, and M. A. Floyd, Inductively Coupled Plasma-Atomic Emission Spectroscopy, An Atlas of Spectral Information, Elsevier, New York (1985)



TR-30-A3 (above) and HEN-170-AA (below) nebulizing ~3000  $\mu\text{L}/\text{min}$  and ~50  $\mu\text{L}/\text{min}$ , respectively.

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THE DIRECT INJECTION HIGH EFFICIENCY NEBULIZER ([DIHEN](#)) is the latest offering from Meinhard Glass Products that incorporates the low liquid flow rate of the HEN and the ability to inject the sample directly into the analytical plasma. At liquid flow rates from 1-100  $\mu\text{L}/\text{min}$  a small aerosol droplet size is produced and nearly 100% of the sample is introduced into the plasma. The features of the DIHEN are ideally suited for samples limited in volume, as with forensic, biological or when dilutions must be limited to maintain detection limits. These and other characteristics of the DIHEN can be found in an Analytical Chemistry article titled: 'A Direct Injection High-Efficiency Nebulizer for Inductively Coupled Plasma Mass Spectrometry', [Anal Chem](#), 1998, 70, 1012-1020



(US Patent #6166379)

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**FIT KITS** - See our [Accessories Page](#) for our Fitting Kits.

**SPECIAL REQUESTS** - If you have unique requirements or an unusual application, feel free to call. We can manufacture nebulizers with a wide variety of dynamic characteristics and we welcome your inquiries.

**MAINTENANCE TIPS** - Properly maintained, a MEINHARD® nebulizer should yield long-lasting and trouble-free performance. We offer a set of helpful tips to aid in the routine care of a nebulizer and to provide restorative procedures for inoperative (but undamaged) nebulizers. The tips are available as a courtesy to our customers on this web site or simply call to request a free printed copy.