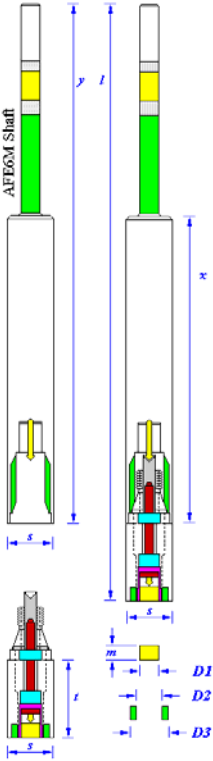
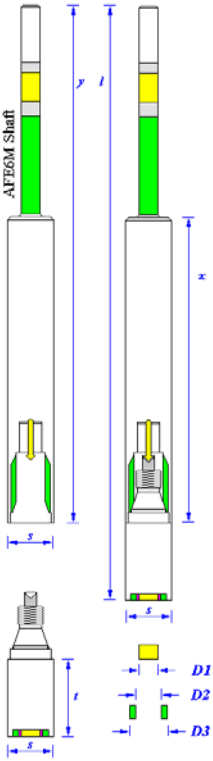


Rotated Disks Electrodes for MSR* Rotators			
E2M Series Single-Piece RDE fits MSR rotator	E3 Series Standard RDE Tip fits AFE3M shaft	E4 Series ChangeDisk RDE Tip fits AFE3M shaft	MDI19HT Series RDE Shaft & Tip for High Temperatures
E2M Series Disk Diameter (d): 5.0 Shroud Diameter (s): 12.0 Overall Length (l): 177 Upper Shaft Length (x): 139 Upper Shaft OD (y): 6.35	E3 Series on AFE3M Shaft Disk Diameter (d): 5.0 Shroud Diameter (s): 12.0 Length of Tip (t): 35 Screw Thread Type: 1/4 - 28 Overall Length (l): 170.2 Shaft Length (y): 151.9 Upper Shaft Length (x): 118.6 Upper Shaft OD (w): 6.35 Lower Shaft Diameter (v): 12 Sheath Length (z): 16.6	E4 Series on AFE3M Shaft Disk Diameter (d): 5.0 Shroud Diameter (s): 12.0 Length of Tip (t): 38.5 Screw Thread Type: 1/4 - 28 Overall Length (l): 173.7 Shaft Length (y): 151.9 Upper Shaft Length (x): 118.6 Upper Shaft OD (w): 6.35 Lower Shaft Diameter (v): 12 Sheath Length (z): 16.6	MDI19HT Series Temperature: 10°C to 80°C Disk Diameter (d): 5.00 Ceramic Sheath OD (s): 17.4 Sheath Length (z): 30.1 Length of Tip (t): 41.3 Overall Length (l): 173 Shaft Length (y): 146 Upper Shaft Length (x): 132 Shaft OD (w): 6.35 Upper Tip OD (v): 13.5
NOTES Reference dimensions given in millimeters; however, electrodes are actually machined using the nearest English dimensions. Custom electrodes with other dimensions are available upon request. Unless otherwise noted, the operating temperature range for all electrodes is 10°C to 25°C (50°F to 77°F).			

* MSR Rotators include the Pine AFMSRX, AFMSRXE, AFMSR2, and PAR Model 636 rotators.


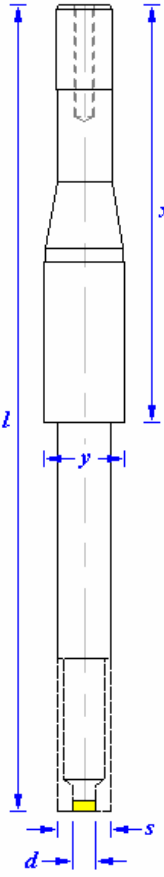
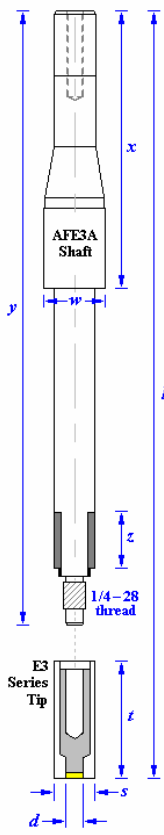
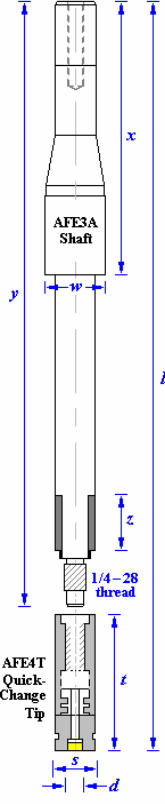


Rotated Ring-Disk Electrodes (RRDE) for MSR Rotators (Pine AFMSR, AFMSRX, and PAR Model 636)

E6 Series ChangeDisk RDE Tip fits MSR rotator (using AFE6M Shaft)	E7 Series ThinGap RDE Tips (fixed disk) fits MSR rotator (using AFE6M Shaft)	
		
<p>E6 Series Tips Disk OD (D1): 5.00 Ring ID (D2): 6.50 Ring OD (D3): 7.50 Shroud OD (s): 15.0 Collection Efficiency: 26%</p> <p>E6 Tip on AFE6M Shaft Overall Length (l): 196.9 Exposed Tip Length (t): 25.4 Shaft Length (y): 170.7 Lower Shaft Length (x): 100.8</p> <p>Removable Disk Inserts Disk Thickness (m): 4.00 Disk OD (D1): 5.00</p>	<p>Standard E7 Series Tips Disk OD (D1): 4.57 Ring ID (D2): 4.93 Ring OD (D3): 5.38 Shroud OD (s): 15.0 Collection Efficiency: 22%</p> <p>E7 Tip on AFE6M Shaft Overall Length (l): 196.9 Exposed Tip Length (t): 25.4 Shaft Length (y): 170.7 Lower Shaft Length (x): 100.8</p>	<p>E7R9 Series Tips* Disk OD (D1): 5.61 Ring ID (D2): 6.25 Ring OD (D3): 7.92 Shroud OD (s): 15.0 Collection Efficiency: 37%</p> <p>E7 Tip on AFE6M Shaft Overall Length (l): 196.9 Exposed Tip Length (t): 25.4 Shaft Length (y): 170.7 Lower Shaft Length (x): 100.8</p>

NOTES Reference dimensions given in millimeters; however, electrodes are actually machined using the nearest English dimensions. Custom electrodes with other dimensions are available upon request. Unless otherwise noted, the operating temperature range for all electrodes is 10°C to 25°C (50°F to 77°F).

* The E7R9 Series dimensions are typically used only when the ring material is glassy carbon.

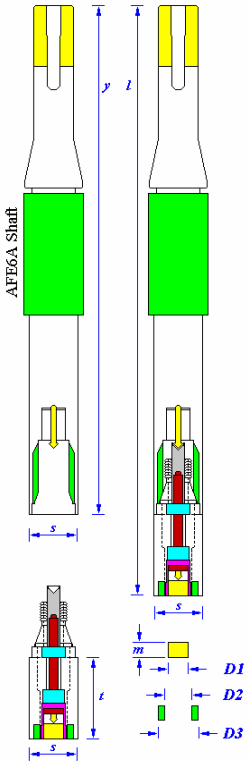
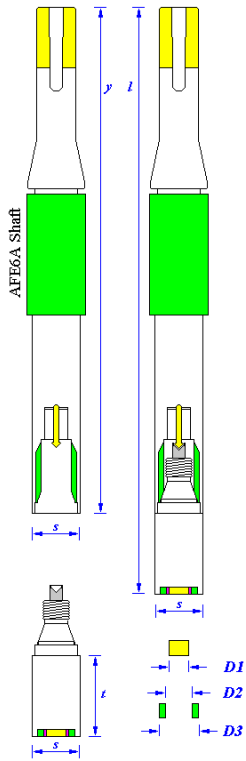
 Rotated Disk Electrodes for ASR* Rotators		
E2A Series Single-Piece RDE	E3 Series Standard RDE Tip	E4 Series ChangeDisk RDE Tip
		
<p>E2A Series Disk Diameter (d): 5.0 Shroud Diameter (s): 12.0 Overall Length (l): 184 Upper Shaft Length (x): 95.0 Upper Shaft OD (y): 18.3</p>	<p>E3 Series on AFE3A Shaft Disk Diameter (d): 5.0 Shroud Diameter (s): 12.0 Length of Tip (t): 35 Screw Thread Type: 1/4 - 28 Overall Length (l): 200.9 Shaft Length (y): 182.6 Upper Shaft Length (x): 82.6 Upper Shaft OD (w): 18.3 Lower Shaft Diameter (v): 12 Sheath Length (z): 16.6</p>	<p>E4 Series on AFE3A Shaft Disk Diameter (d): 5.0 Shroud Diameter (s): 12.0 Length of Tip (t): 38.5 Screw Thread Type: 1/4 - 28 Overall Length (l): 204.4 Shaft Length (y): 182.6 Upper Shaft Length (x): 82.6 Upper Shaft OD (w): 18.3 Lower Shaft Diameter (v): 12 Sheath Length (z): 16.6</p>
<p>NOTES Reference dimensions given in millimeters; however, electrodes are actually machined using the nearest English dimensions. Custom electrodes with other dimensions are available upon request.</p> <p>Unless otherwise noted, the operating temperature range for all electrodes is 10°C to 25°C (50°F to 77°F).</p>		


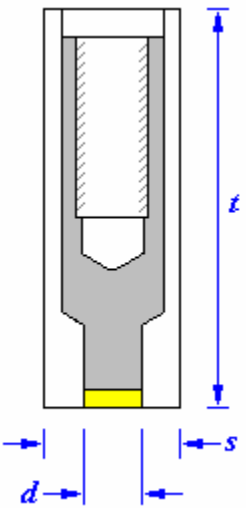
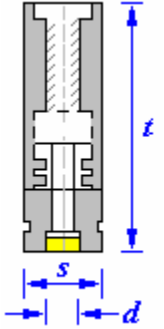
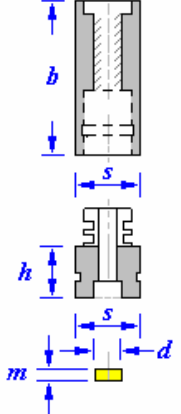
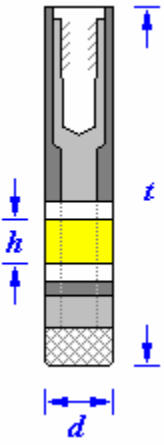
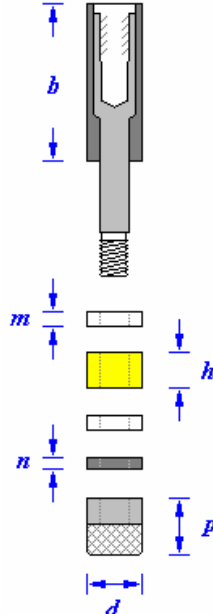
* ASR Rotators include the Pine AFASR, AFASRE, and AFPIR rotator models




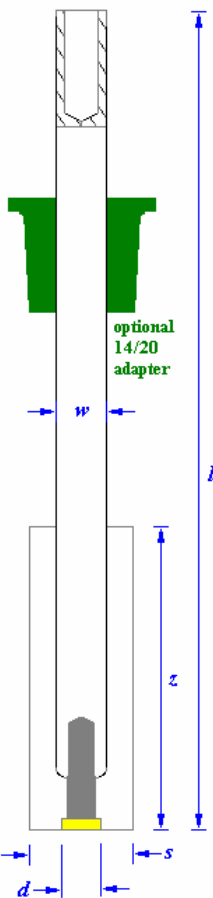
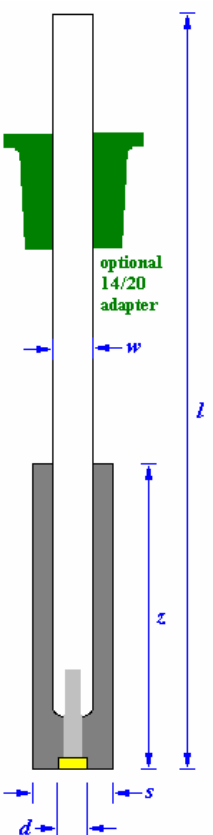
Rotated Ring-Disk Electrodes (RRDE)

for ASR Rotators (Pine AFASR, AFPIR, and AFASR2 rotators)

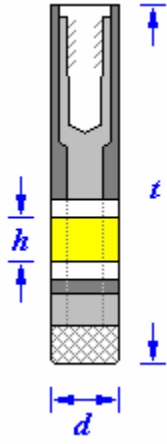
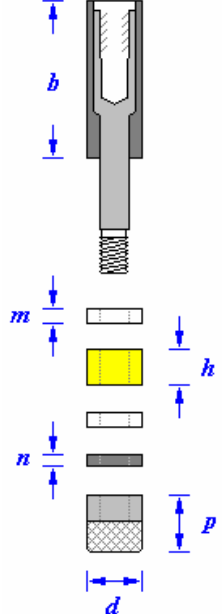
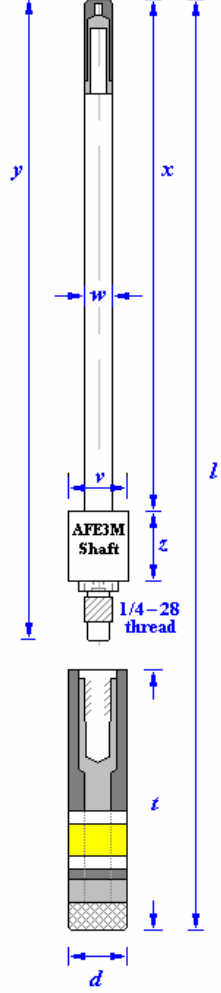
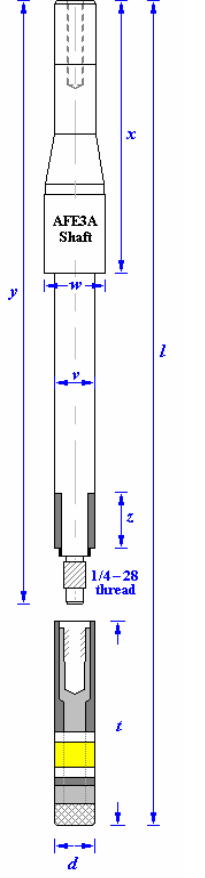

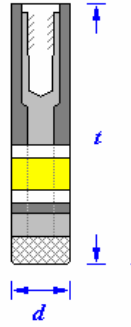
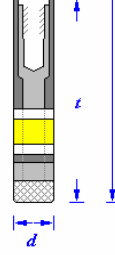
<p>E6 Series ChangeDisk RDE Tip fits ASR rotator (using AFE6M Shaft)</p>	<p>E7 Series ThinGap RDE Tips (fixed disk) fits ASR rotator (using AFE6A Shaft)</p>	
		
<p>E6 Series Tips Disk OD (D1): 5.00 Ring ID (D2): 6.50 Ring OD (D3): 7.50 Shroud OD (s): 15.0 Collection Efficiency: 26%</p> <p>E6 Tip on AFE6A Shaft Overall Length (l): 184.2 Exposed Tip Length (t): 25.4 Shaft Length (y): 158.0</p> <p>Removable Disk Inserts Disk Thickness (m): 4.00 Disk OD (D1): 5.00</p>	<p>Standard E7 Series Tips Disk OD (D1): 4.57 Ring ID (D2): 4.93 Ring OD (D3): 5.38 Shroud OD (s): 15.0 Collection Efficiency: 22%</p> <p>E7 Tip on AFE6A Shaft Overall Length (l): 184.2 Exposed Tip Length (t): 25.4 Shaft Length (y): 158.0</p>	<p>E7R9 Series Tips* Disk OD (D1): 5.61 Ring ID (D2): 6.25 Ring OD (D3): 7.92 Shroud OD (s): 15.0 Collection Efficiency: 37%</p> <p>E7 Tip on AFE6A Shaft Overall Length (l): 184.2 Exposed Tip Length (t): 25.4 Shaft Length (y): 158.0</p>
<p>NOTES Reference dimensions given in millimeters; however, electrodes are actually machined using the nearest English dimensions. Custom electrodes with other dimensions are available upon request. Unless otherwise noted, the operating temperature range for all electrodes is 10°C to 25°C (50°F to 77°F).</p> <p>* The E7R9 Series dimensions are typically used only when the ring material is glassy carbon.</p>		

 RDE & Cylinder Tips for the CPR* Rotators				
E3 Series Standard RDE Tip	E4 Series ChangeDisk RDE Tip		QC3 Series Rotated Cylinder Tip	
single-piece	assembled	unassembled	assembled	unassembled
				
E3 Series Tips Disk Diameter (d): 5.0 Shroud Diameter (s): 12.0 Length of Tip (t): 35 Screw Thread: 1/4 - 28	E4 Series Tips Disk Diameter (d): 5.0 Disk Thickness (m): 1.2 to 4.0* Shroud Diameter (s): 12.0 Length of Tip (t): 38.5 Length of Body (b): 29 Length of Disk Holder (h): 9.5 Screw Thread Type: 1/4 - 28 * Tips fabricated before SEP 2005 can only accommodate 3.0 mm thick disk inserts		QC3 Series Tips Length of Tip (t): 64.3 Cylinder Diameter (d): 12.0 Cylinder Height (h): 7.95 Cylinder Area (approximate): 3.0 cm ² Seal Washer Thickness (m): 3.18 Compression Washer Thickness (n): 2.36 Length of Body (b): 34.9 Length of Keeper Nut (p): 12.7 Screw Thread Type: 1/4 - 28	
NOTES Reference dimensions given in millimeters; however, electrodes are actually machined using the nearest English dimensions. Custom electrodes with other dimensions are available upon request. Unless otherwise noted, the operating temperature range for all electrodes is 10°C to 25°C (50°F to 77°F).				

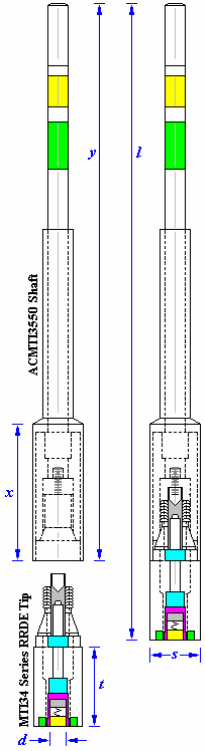
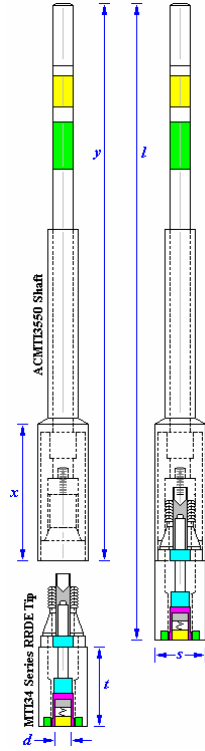
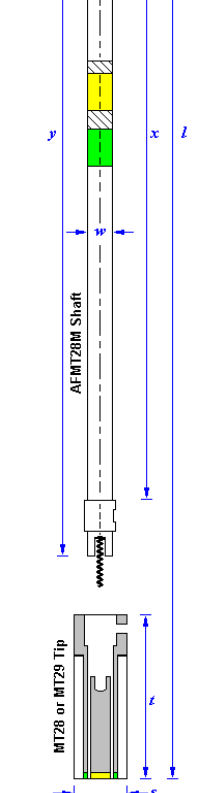
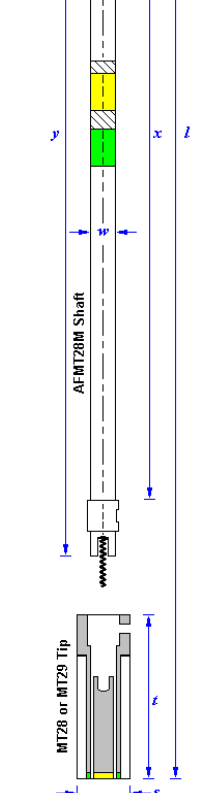
* CPR Rotators include the Pine AFCPRB, AFCPRBE, and PAR Model 616 rotators.

 Stationary Disk Electrode Dimensions	
E1E Series Single-Piece Stationary Disk Electrode	E1F Series Single-Piece Stationary Disk Electrode
 <p style="text-align: center;">Adapter fits standard 14/20 joint (part AFE1H1420)</p> <p style="text-align: center;">The shroud on an E1E series electrode is made out of chemically resistant Teflon, for use in a wide range of chemical environments.</p>	 <p style="text-align: center;">Adapter fits standard 14/20 joint (part AFE1FH1420)</p> <p style="text-align: center;">The shroud on an E1F series electrode is made from KEL-F, a plastic compatible with most solvents. Not for use in tetrahydrofuran and some chlorinated solvents (such as chloroform and carbon tetrachloride).</p>
Disk Diameter (d): 5.00 Shroud Diameter (s): 12.0 Overall Length (l): 152 Upper Shaft OD (w): 8.0 Shroud Length (z): 38	Disk Diameter (d): 5.00 Shroud Diameter (s): 9.5 Overall Length (l): 125.5 Upper Shaft OD (w): 4.8 Shroud Length (z): 38
<p>NOTES Reference dimensions given in millimeters; however, electrodes are actually machined using the nearest English dimensions. Custom electrodes with other dimensions are available upon request.</p> <p>Unless otherwise noted, the operating temperature range for all electrodes is 10°C to 25°C (50°F to 77°F).</p>	

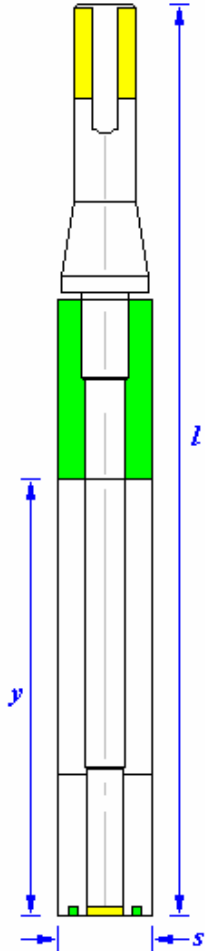
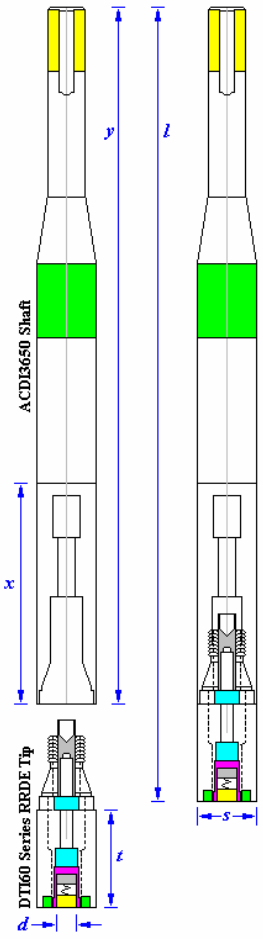
Rotated Cylinder Electrodes for all Pine Rotators

QC3 Series fits CPR Rotator using built-in shaft	QC3 Series easily disassembled to replace cylinder insert	QC3 Series fits MSR Rotator using AFE3M shaft	QC3 Series fits ASR Rotator using AFE3A shaft
			
			
<p>QC3 Tip Length of Tip (t): 64.3 Cylinder Diameter (d): 12.0 Cylinder Height (h): 7.95 Cylinder Area (approximate): 3.0 cm² Seal Washer Thickness (m): 3.18 Compression Washer Thickness (n): 2.36 Length of Body (b): 34.9 Length of Keeper Nut (p): 12.7 Screw Thread Type: 1/4 - 28</p>		<p>QC3 Tip on AFE3M Shaft Length of Tip (t): 64.3 Cylinder Diameter (d): 12.0 Cylinder Height (h): 7.95 Screw Thread Type: 1/4 - 28 Overall Length (l): 199.5 Shaft Length (y): 151.9 Upper Shaft Length (x): 118.6 Upper Shaft OD (w): 6.35 Lower Shaft Diameter (v): 12 Sheath Length (z): 16.6</p>	<p>QC3 Tip on AFE3A Shaft Length of Tip (t): 64.3 Cylinder Diameter (d): 12.0 Cylinder Height (h): 7.95 Screw Thread Type: 1/4 - 28 Overall Length (l): 230.2 Shaft Length (y): 182.6 Upper Shaft Length (x): 82.6 Upper Shaft OD (w): 18.3 Lower Shaft Diameter (v): 12 Sheath Length (z): 16.6</p>
<p>NOTES Reference dimensions given in millimeters; however, electrodes are actually machined using the nearest English dimensions. Custom electrodes with other dimensions are available upon request. Unless otherwise noted, the operating temperature range for all electrodes is 10°C to 25°C (50°F to 77°F).</p>			

Dimensions of Older Style Electrodes for the MSR Rotator

MTI34 Series (an older style now replaced by E6 Series)	MTI36 Series (an older style now replaced by E6 Series)	MT28 Series (an older style now replaced by E7 Series)	MT29 Series (an older style now replaced by E7 Series)
			
MTI34 Series Disk Thickness (m): 4.00 Disk OD (D1): 6.00 Ring ID (D2): 7.50 Ring OD (D3): 8.50 Shroud OD (s): 15.0 Overall Length (l): 177.8 Exposed Tip Length (t): 25.4 Shaft Length (y): 152.4 Lower Shaft Length (x): 33.3 Collection Efficiency: 24%	MTI36 Series Disk Thickness (m): 4.00 Disk OD (D1): 5.00 Ring ID (D2): 7.50 Ring OD (D3): 8.50 Shroud OD (s): 15.0 Overall Length (l): 177.8 Exposed Tip Length (t): 25.4 Shaft Length (y): 152.4 Lower Shaft Length (x): 33.3 Collection Efficiency: 22%	MT28 Series Disk OD (D1): 4.57 Ring ID (D2): 4.93 Ring OD (D3): 5.38 Shroud OD (s): 13.5 Overall Length (l): 173.8 Length of Tip (t): 42.0 Shaft Length (y): 146.1 Upper Shaft Length (x): 131.8 Upper Shaft OD (w): 6.35 Collection Efficiency: 22%	MT29 Series* Disk OD (D1): 5.61 Ring ID (D2): 6.25 Ring OD (D3): 7.92 Shroud OD (s): 13.5 Overall Length (l): 173.8 Length of Tip (t): 42.0 Shaft Length (y): 146.1 Upper Shaft Length (x): 131.8 Upper Shaft OD (w): 6.35 Collection Efficiency: 37%
<p>NOTES Reference dimensions given in millimeters; however, electrodes are actually machined using the nearest English dimensions. Custom electrodes with other dimensions are available upon request. Unless otherwise noted, the operating temperature range for all electrodes is 10°C to 25°C (50°F to 77°F).</p> <p>* The MT29 Series dimensions are typically used only when the ring material is glassy carbon.</p>			

Dimensions of Older Style Electrodes for the ASR Rotator

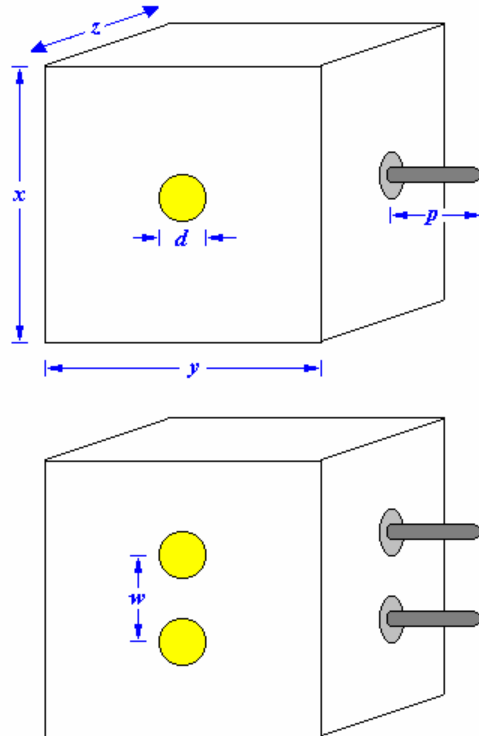
DT21 Series (an older style now replaced by E7 Series)	DTI60 Series (an older style now replaced by E6 Series)
	
<p> Disk OD (d): 5.00 Ring ID (R1): 5.51 Ring OD (R2): 7.16 Shroud OD (s): 18.3 Overall Length (l): 184.2 Length of Shroud (y): 92 Collection Efficiency: 39% </p>	<p> Disk OD (d): 6.00 Disk Thickness: 4.00 Ring ID (R1): 7.50 Ring OD (R2): 8.50 Shroud OD (s): 18.3 Overall Length (l): 196.8 Exposed Tip Length (t): 42.8 Shaft Length (y): 153.9 Lower Shaft Length (x): 57.2 Collection Efficiency: 24% </p>
<p> NOTES Reference dimensions given in millimeters; however, electrodes are actually machined using the nearest English dimensions. Custom electrodes with other dimensions are available upon request. Unless otherwise noted, the operating temperature range for all electrodes is 10°C to 25°C (50°F to 77°F). </p>	

Liquid Chromatography Electrodes

LCA Series

Replacement Electrodes
for HPLC Detectors

for Waters 464 and EG&G Model 400 Detectors



Temperature Range: 10°C to 25°C
Disk Diameter (d): 3.00
Block Length & Width (x & y): 25.4
Block Thickness (z): 12.7
Pin Length (p): 9
Pin Diameter: 1.6
Dual Disk Separation (w): 8.1