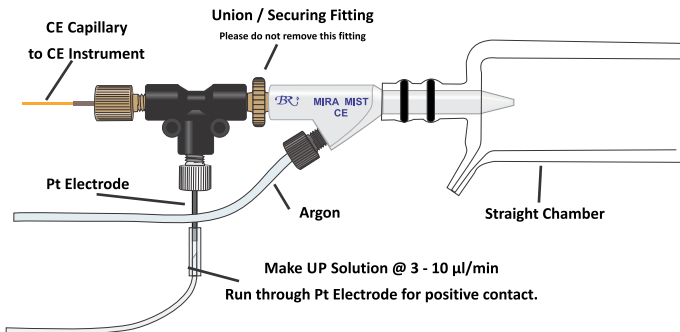




OPERATING INSTRUCTIONS

MIRA MIST[®] CE NEBULIZER

US Patents # 5,411,208; 6,634,572 Canadian Patents # 2,112,093; 2,384,201



Instantaneous Response, Zero Washout time.
Maximum Sensivity, no Signal Broadening.

Produced in Canada by:

Burgener Research Inc.

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3 MONTH SATISFACTION WARRANTY

For 3 months after receiving it, if you are not satisfied with your Burgener Nebulizer, Burgener Research will repair, replace or refund your nebulizer, at your request.

CAUTION:

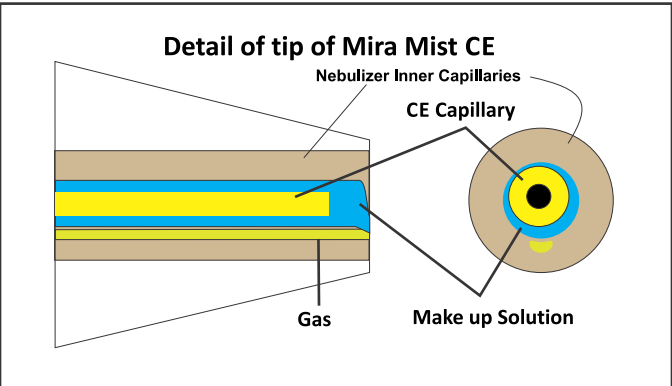
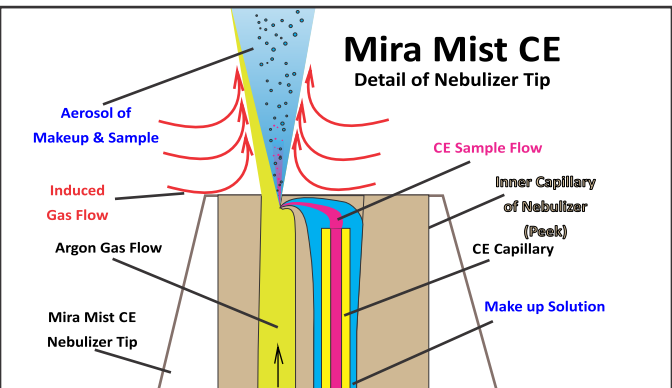
Do Not Handle unless you are sure that the nebulizer is dry or washed with clean water.

Burgener Research Inc. does not warrantee the nebulizer beyond the purchase price. The Manufacturer and Agent(s) assume NO liability for damage however caused in the handling and usage of the nebulizers. Use at your own risk. If in doubt about correct operating procedures, call an experienced operator or call Burgener Research at (+1)905 823 3535.

Close up of tip of Mira Mist CE



Showing CE Capillary beside gas orifice



IMPORTANT

The gas orifice is at the very tip of the nebulizer. It is made of PEEK which is SOFT. This tip is very easily damaged and should NEVER be touched with fingers, tissues, or anything else.

MIRA MIST CE Operating Instructions

The Mira Mist CE has a PTFE outer body and PEEK Inner capillaries. This also provides strong inner capillaries, but the PTFE body threads are soft and easily cross threaded. Please leave the Peek fittings in the Teflon body for the gas line and for the sample line, or very carefully screw them in when changing them.

The Mira Mist CE is the most convenient and best CE interface available. The Burgener Mira Mist CE Nebulizer has no suction or back pressure on the CE capillary, and provides nearly instant delivery of the solution to the torch. The Nebulizer's large sample passage ID enables the CE capillary to pass through the nebulizer to its tip. As soon as the sample flows from the CE capillary, it is swept by the makeup solution into the gas stream and atomized. With flows below 15 microliters per minute, the chamber stays dry and the aerosol is delivered immediately to the torch. You get 100% sample delivery to the torch, with virtually no background interferences. With a dry chamber there is no washout time, so the response is as quick as if the CE capillary extended into the plasma.

Operating Pressure

The Mira Mist CE Nebulizer can operate at very low flow rates when run at 70 to 90 psi. High pressure is required to maintain low flow. As the pressure is lowered, higher flows are required to maintain a good mist. It will not run low flow at lower pressures. The Mira Mist CE runs about 1 L/min at 80 psi.

Makeup Flow Rate

As long as the nebulizer makeup solution is running at 10 $\mu\text{l}/\text{min}$ or less, there should be no drops forming in the chamber. If the flow rates exceed 15 $\mu\text{l}/\text{min}$, drops will form and the washout time will rise from less than 1 second to 30 to 45 seconds. You will not get good results if the inside of the chamber becomes wet. The makeup solution needs to flow at a constant rate. All of the CE solution is swept to the plasma with the makeup flow, and the signal intensity should remain constant even with minor variations in the makeup flow rates. However, our experience has shown that changes in the makeup flow do effect the signal. To achieve a constant makeup flow rate, use gravity feed systems or a precise syringe pump. Note that air bubbles can block the makeup flow.

Make Up Solution

The make up solution can be almost any conductive liquid. The nebulizer is made of PEEK and PTFE, and is safe for almost all liquids, except for H_2SO_4 , high acid concentrations and some solvents. The nebulizer runs very low flows for liquids with low surface tension. Water has very high surface tension and the Mira Mist CE will not give its best results for 10 $\mu\text{l}/\text{min}$ or less on pure water. Add 10% alcohol, Ammonium Nitrite or a similar liquid to your makeup solution to reduce surface tension to allow the nebulizer to produce a good aerosol for the low flow rates required by the CE system.

Replacing the Makeup Capillary

The makeup liquid is delivered to the nebulizer through a Pt tube in the T fitting. This ensures that the makeup solution makes good contact with the electrode. The makeup solution capillary is held in place with a short length of larger Orange/Orange size Tygon peristaltic pump tubing. To replace the makeup capillary, pull out the old one and press the new one into the larger tubing on the Pt tube. You can fit capillary tubing from 0.040" to 1/16" (0.0625").

Electrode Voltage Caution

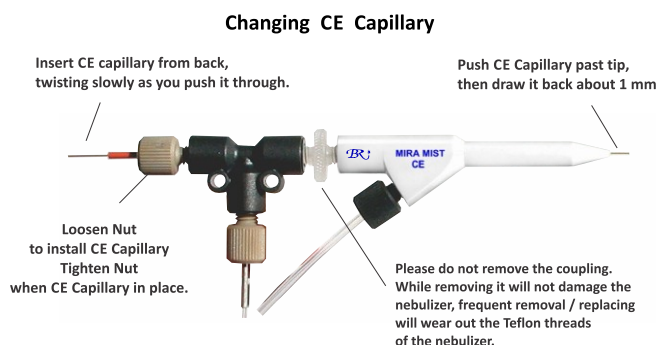
Always use the GROUND for the electrode on the nebulizer. High voltages are dangerous. Even if the electrode is protected, the rest of the system is conductive due to the conductive makeup solution.

Installing the CE Capillary into the Mira Mist CE

The Mira Mist CE will allow a 360 micron glass capillary to pass easily through the nebulizer. If the edges of the CE capillary are sharp, or rugged, then you may damage the insides of the nebulizer. The insides are made of Peek, which is fairly strong, but can be damaged with sharp glass. The CE capillary is passed through the orange or gray sleeve to be secured by the UpChurch fitting, then it is passed through the T fitting, through the coupling, and into the nebulizer. Push the Glass capillary SLOWLY, while rotating SLOWLY until it extends out the front of the nebulizer. If you feel resistance, remove it and check for sharp edges that may be catching inside the nebulizer.

The capillary should be pulled back into the nebulizer, but only enough so that the liquid from the make up solution will cover the tip of the CE capillary at all times. About 1 mm or 1/8 inch is necessary. If you pull it back too much, the response time increases. If you do not pull it back far enough, you will have poor contact between the makeup solution and the electrode. When the capillary is placed properly, tighten the fitting at the back of the T so that it does not allow the glass capillary to move.

To simplify changing the CE capillary, some have installed a short CE capillary in the nebulizer, and then used glass capillary couplings to attach the capillary from the CE instrument to the nebulizer's CE capillary.



Final Check List:

- Use Ground on electrode, not high Voltages.
- Use 10% + Alcohol in Makeup solution.
- Push CE Capillary in very carefully while twisting slowly.
- Run at 10 $\mu\text{l}/\text{min}$ or less to avoid drops forming in chamber.
- Use 75 - 90 psi (6 bar) for nebulizer Argon.