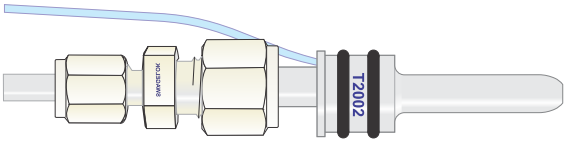
OPERATING INSTRUCTIONS

BURGENER T2002 NEBULIZER

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



ENHANCED PARALLEL PATH ICP NEBULIZERS

SAMPLE FLOW FROM .5 to 2.5 ml/min

ROBUST DESIGN, INERT TEFLON CAPILLARIES

ATOMIZES ANY LIQUID, ANY SALT LEVEL

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.

IMPORTANT

1. Handling

The gas orifice is at the very tip of the nebulizer. It is made of PTFE Teflon which is SOFT. This tip is very easily damaged and should NEVER be touched with fingers, tissues, or anything else. If the tip is accidentally touched, and the nebulizer continues to operate, then it is still functional, and its use can be safely continued.

2. Dropping and Breakage

Burgener Nebulizer bodies are strong and generally will not break. If a nebulizer is dropped such that the tip is deformed, then it will be irreparably damaged. If it continues to operate after being dropped, then it has not been affected, and it is safe to use.

T2002 Operating Instructions

Your new Burgener Nebulizer is unique. It should give you a long and convenient service on most solutions. The operation and care of your nebulizer is different from most other nebulizers in several important ways.

1. Solutions and Solvents

The T2002 capillaries handle almost all liquids. The 500 micron ID sample line capillaries will handle most undissolved particles without plugging.

2. Sample Introduction / Maximizing Stability

Burgener Nebulizers do not have any suction, so they require a pump to supply the sample solution. The pump speed and the quality of the pump tubing have a large effect on the stability of the nebulizer. Try to select a pump tubing size that allows running the pump at a high speed. Pulsations occur if the pump can not deliver constant sample flow. Change the pump tubing often: usually once a day for maximum stability and lowest %RSD.

3. Washing Your Nebulizer

Please DO NOT wash your nebulizer in acid or solvents to 'prevent salt build up'. Teflon doesn't wet, so salts do not form. For the best performance & longest life, wash your nebulizer by running water for 10 min. before turning the spectrometer off. Any other form of washing is unnecessary, and often detrimental. **Please do not remove the filter** in the back of the nebulizer.

4. Optimum Gas Flow Rate & Pressures

Burgener T2002 Nebulizers will operate safely at pressures up to 80 psi. Higher pressures produce finer mists, and larger Argon flow rates. For the T2002, on a TJA TRACE approx. 35 - 40 psi (0.8 l/min) is the normal range. Test it at various pressures to optimize. There may be an optimum rotational direction. After optimizing the gas flow, try rotating the nebulizer in 45 or 90 degree increments to see if you gain in precision.

5. Sample Uptake

Normally, **1 - 2 ml/min** seems to work best. For the TJA TRACE use about **2 ml/min** for gas flows near 1 l/min. Some systems optimize at less than 1 ml/min. For lower gas flows, higher sample flows are necessary. Rates of 4 or 5 ml/min will not harm the nebulizer, but may drown the torch and may not increase the signal. We recommend orange/orange peristaltic pump tubing with a fast rotating rate rather than larger tubing at a slower rate. Slower rates produce larger surges. For lower pressure settings, an **Increase** in sample rate may improve %RSD.

6. Humidified Argon

The Burgener Nebulizer is 100 % Teflon. Teflon doesn't wet, so salts do not begin to form at the gas orifice. You may use humidified Argon, but it will not improve the nebulizer's performance.

7. Using Surfactants

Teflon doesn't wet. This causes a slight pulsation in the nebulizer's output, related to the pump's pulsation. DO NOT soak the nebulizer in surfactants to decrease the pulsing. You may succeed, but the surfactant will also allow salts to form at the gas orifice, and plug the orifice. The pulsation is generally well averaged out in the chamber's mixing of the mist as it travels to the torch.

8. Baffles

Many chambers have baffles designed for nebulizers that extend a shorter length into the chamber. You may have to move the baffle farther into the chamber, or you may require a different style of chamber. A baffle too close to the nebulizer catches fine and coarse mists, and severely degrades the nebulizer's performance.

9. Adjusting your Plasma Height

Burgener Nebulizers produce excellent mists over a large pressure range. You can adjust the plasma height by varying the nebulizer pressure, with little change in sensitivity due to the nebulizer.

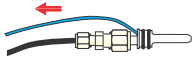
10. Clearing and Replacing the Capillary Tubing

The largest portion of the sample path to the tip of the nebulizer is at the tip of the nebulizer. It will not plug with dust or sand or other tiny particles. However, the capillary tubing may plug. Generally, the capillary tubing plugs at the joint between the pump tubing and the capillary tubing. To clear such a plug, just cut off 1 mm of the capillary tubing closest to the pump, and use it again. For plugs in the middle of the tubing, or eventually, if the tubing is getting too short, you will have to replace the capillary tubing.

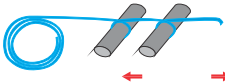
To replace the Capillary Tubing:

Pull out the old capillary tubing. It is just held in place by tension. Take a piece of new tubing, e.g. FEP tubing, O.D. 1.10 mm (0.044"); I.D. .5 mm (0.020"). Measure out the desired length (About 0.5 m is our supplied length). Wrap it around your fingers and stretch out about 4 inches to about 1/2 its original diameter. Cut the tubing from the roll at the end of the stretched part. Push the stretched portion through the Nebulizer's sample path until it extends out past the end of the nebulizer. Use the stretched portion to pull unstretched tubing past the tip of the nebulizer. Cut off the stretched portion. Pull back the unstretched portion, until the tubing is recessed about 6mm (.25") from the tip. The distance recessed back is not critical, as long as it is about 6mm or more. You are done.

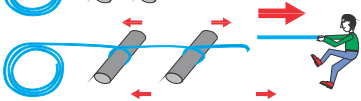
TO CHANGE THE CAPILLARY TUBING

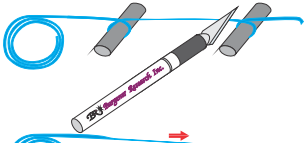
1. 

Pull out old capillary

2. 

Stretch end of new capillary

3. 

4. 

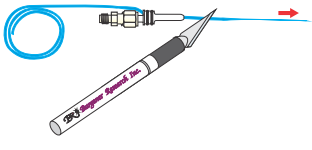
Cut off non-stretched part

5. 

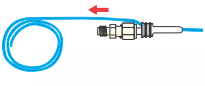
Push stretched part into T2002

6. 

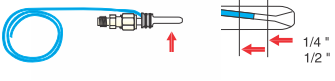
Pull non-stretched part into T2002

7. 

Cut off stretched end

8. 

Pull non-stretched end back

9. 

Set end of Capillary back about 1.2mm to .6mm inside tip.