

## Unblocking the MicroSprayer® Aerosolizer – Model IA-1B With the High Pressure Reverse Cleaning Adapter

### Instructions for Use

The Penn-Century MicroSprayer® Aerosolizer is a unique patented atomizer. It generates an aerosol when liquids or solutions are pushed at high manual pressure through tiny aerosolizing components in the tip of the device. At times, materials can agglomerate in the components in the tip of the MicroSprayer® that may partially or completely block it. If the standard methods we provide for clearing or unblocking the device do not work, this adapter may be useful.

The **Reverse Cleaning Adapter – RCA-1B** permits the researcher to connect the 1 ml gas-tight polycarbonate syringe to the tip of the MicroSprayer® Aerosolizer – Model IA-1B and to force hot water or solvent backwards – that is, in reverse direction from the tip to the hub. If successful, this process will loosen and force out whatever is blocking (clogging) the MicroSprayer® tip.

#### Before you begin: CAUTIONS!

- **The Adapter will not work in all cases. In some cases, material may be stuck in position or may have hardened over time, and may not be possible to clear using this Adapter.**
- **This Adapter has been successfully used by Penn-Century’s technical staff for several years, but it requires patience and skill to operate successfully. The right amount of manual force/pressure must be applied to the plunger at the right rate - otherwise the MicroSprayer® may be damaged beyond repair.**

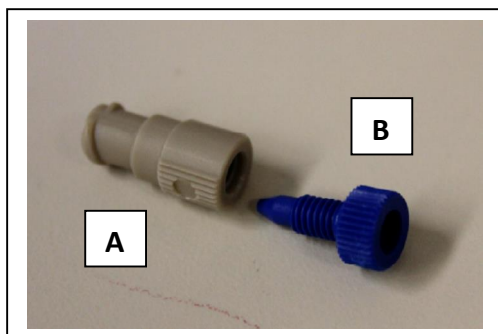
#### WARNINGS!

- **BEFORE USING THIS ADAPTER, USERS MUST READ ALL OF THE FOLLOWING INSTRUCTIONS TO AVOID CAUSING DAMAGE TO YOUR DEVICES.**
- **ONLY USE THIS ADAPTER IF THE CLEANING METHODS RECOMMENDED IN THE INSTRUCTIONS FOR CLEARING OF THE MICROSPRAYER® AEROSOLIZER - MODEL IA-1C DO NOT WORK AFTER REPEATED ATTEMPTS.**

#### DISCLAIMER

**PENN-CENTURY ACCEPTS NO RESPONSIBILITY FOR DAMAGE THAT MAY OCCUR AS A RESULT OF MISUSE OR INCORRECT USE OF THIS ADAPTER.**

## High Pressure Reverse Cleaning Adapter – RCA-1B



The Reverse Cleaning Adapter consists of two parts:

- A - Syringe Fitting
- B - Sprayer® Tip adapter

In addition you will need the 1 ml polycarbonate syringe that was provided with MicroSprayer® Aeosolizer - Model IA-1B that is blocked.

1. **Soak the MicroSprayer® Aerosolizer in boiling hot water.** To begin, pour a small amount of boiling water into a clean bowl and immerse the very tip of the MicroSprayer® Aerosolizer in the boiling water for 1-2 minutes. This will help to soften any material that may have hardened inside.
2. **Ultrasound may also be helpful.** You also may safely immerse and sonicate the MicroSprayer® for several minutes in hot water or any organic solvent in an ultrasound device. **NOTE! Take care to position the MicroSprayer® in the ultrasound bath so the tip of the MicroSprayer® is not resting directly on the bottom surface of the ultrasound. Constant vibration may cause distortion of the tip of the device.** If you prefer, you can place the MicroSprayer® inside of a small plastic dish, cover it with boiling water or organic solvent and place the dish inside the ultrasound device. Observe carefully to see if any material appears to emerge from either the tip or the hub

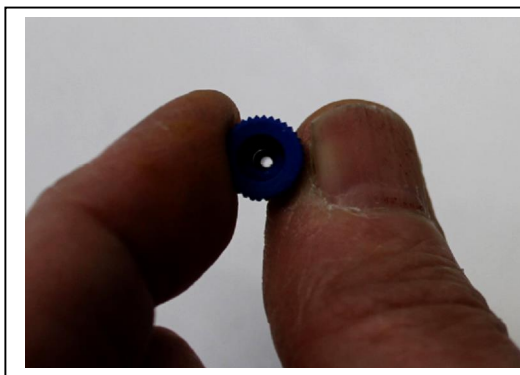
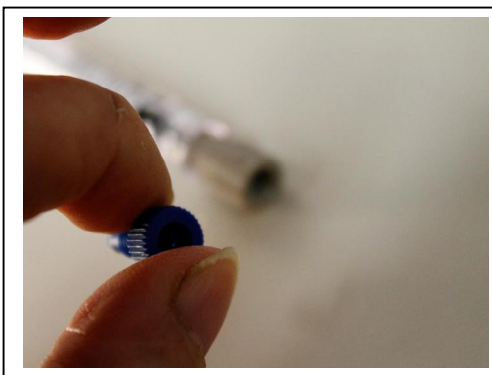


3. Remove the protective blue cap from the 1 ml polycarbonate syringe. Fill the syringe with very warm filtered water or de-ionized water. **Warning: The syringe and plunger are made of plastic and may become softened or distorted if water temperature is excessively hot.**

4. Firmly attach the beige **Syringe Fitting (A)** to the screw threading of the 1 ml syringe, as shown:

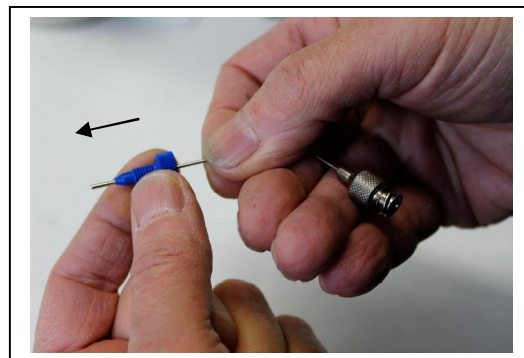


- Next, hold the blue **Sprayer® Tip Adapter (B)** in your non-dominant hand with the wide end facing you. Note the small hole at the center.



- Hold the tip of the **MicroSprayer® Aerosolizer** in your dominant hand so your fingers are near the distal tip and are supporting the thin tubing.

- SLOWLY, CAREFULLY AND GENTLY**, push the **MicroSprayer®** tip through the hole in the hub of the **blue Sprayer Tip Adapter (B)**. Try to maintain the tubing of the sprayer in a straight line and not at an angle to the adapter. This hole will feel tight and you will feel some resistance at first.

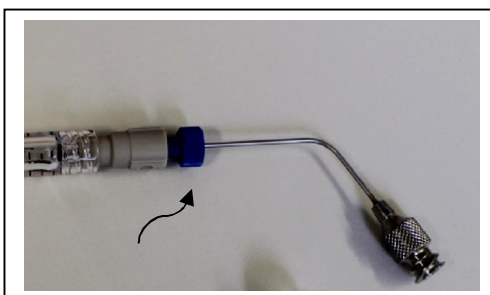
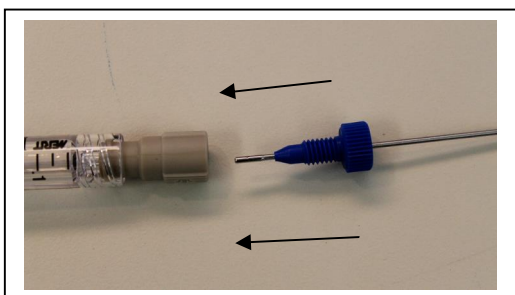


- Keep your finger tips near to the tip of the **MicroSprayer®** to support the fragile tubing. Apply moderate pressure as you guide the sprayer tip through the hole, until the **MicroSprayer®** tip is protruding at least 1 cm beyond the bottom of the threaded screw portion of the **Sprayer Adapter (A)**.

**WARNING! TAKE CARE! DO NOT HOLD THE MICROSPRAYER® BY THE HUB WHEN INSERTING IT INTO THE HOLE IN THE ADAPTER. YOU MAY ACCIDENTALLY PUSH TOO HARD AND CAUSE A SHARP BEND IN THE DELICATE TUBING. THIS WILL DAMAGE IT BEYOND REPAIR!**

- After the tip of the **MicroSprayer®** is inserted in the **Sprayer Tip Adapter (B)**, remove the protective white cap from the **hub** of the **MicroSprayer® Aerosolizer**.

- Next, move the tip of **MicroSprayer®** toward the opening of the **Syringe Fitting (A)**. Hold only the blue rim of the **Sprayer Tip Adapter (B)**. Allow the **MicroSprayer®** to move freely. Insert the tip of the **MicroSprayer®** and the **Sprayer Tip Adapter (B)** inside **Syringe Fitting (A)**. Screw the two parts together. Tighten both parts firmly. Do not over-tighten. The **MicroSprayer®** will now be held tightly in one position.





11. Hold the syringe and rest the MicroSprayer® Aerosolizer hub on a paper towel or clean surface. Slowly begin to push the plunger of the syringe. **Push firmly and continuously – but do not use excessive force.** Notice if the plunger moves forward. Observe if a drop of water passes through the MicroSprayer® and leaks out from the hub.
12. At first, you may feel no movement - only resistance. This may give way suddenly or gradually and you may observe drop of water leak out of the hub of the MicroSprayer®.
13. If this does not occur and nothing is coming out, do not use excessive force.
14. **Be patient. It may take 2 – 3 attempts to free the blockage.** If the first attempt has not worked:
  - a. Detach the Reverse Cleaning Adapter from the syringe. Unscrew the **Sprayer Tip Adapter (B)** and gently pull out the MicroSprayer® Aerosolizer. Soak the MicroSprayer® again in boiling hot water for a few more minutes.
  - b. Refill the syringe. If you used warm water the first time, you may try soaking the MicroSprayer® in an organic solvent instead of hot water as suggested in our Instructions, and also filling the syringe with organic solvent such as ethanol, methanol or sodium dodecyl sulfate in solution.
  - d. Repeat steps 4- 13.
15. If you are able to feel the resistance that is blocking the tip has given way and the plunger can be pushed in with minimal force, remove the MicroSprayer® from the Adapter and remove the Adapter parts from the syringe.
16. **TEST THE MICROSPRAYER®.** Fill the 1 ml syringe with filtered or de-ionized water, attach the MicroSprayer® Aerosolizer to the 1 ml syringe as normal, and test everything. Is the aerosol uniform? Does the device feel as if it is working as it normally does - without undue resistance? If you feel the device is still partially blocked, repeat the Reverse Cleaning steps. If the device feels and looks normal when tested, you may still wish to repeatedly flush it with water and/or solvent until you are assured that everything that was blocking it is now fully removed.
17. Note that if air bubbles are trapped in the syringe, you may observe streaming rather than a uniform cloud of aerosol. If so, vigorously tap the sides of the syringe with your finger tips to drive the air

bubbles up to the tip and push them out. Reload the syringe underwater to avoid reintroducing more air.

18. Feel free to contact us at any time for questions. We also appreciate your feedback and suggestions about the use of this tool.

**If the resistance that you feel in the plunger of your syringe will not give way and the MicroSprayer® Aerosolizer still appears to be blocked, do not force it. Contact Penn-Century to inquire about our repair services at 215-753-6540 or email us at [info@penncentury.com](mailto:info@penncentury.com) .**