
Vaporizer Cleaning Procedure

(For Use with L1102-i and L1115-i Vaporizers)



PICARRO INC.

Picarro Vaporizer Cleaning Procedure

Thank you for purchasing a Picarro product. Your Picarro is a quality product that has been designed and manufactured to provide reliable performance.

These instructions are an important part of maintaining your purchase as it will help maximize the performance and reliability of the vaporizer.

Please contact Picarro or your authorized Picarro distributor should you have questions regarding specific applications or if you require additional information.

Contact information:

Website: www.picarro.com

Email: customersupport@picarro.com

Picarro, Inc. reserves the right to change or update the contents of this manual and to change the specifications of its products at any time without prior notification. Every effort has been made to keep the information in this document current and accurate as of the date of publication or revision. However, no guarantee is given or implied that this document is error free or that it is accurate with regard to any specification.

Picarro, Inc. has prepared this manual for use by its customers as a guide for the proper installation, operation and/or maintenance of the Picarro Analyzer.

Picarro and the Picarro Logo are trademarks of Picarro, Inc.

© 2010 Picarro, Inc. All rights reserved.
480 Oakmead Parkway
Sunnyvale, California
CA 94085
USA.

Phone 408.962.3900 • Fax 408.962.3200
Website: WWW.PICARRO.COM

Picarro Vaporizer Cleaning Procedure

Rev. 1/27/10

Vaporizer Cleaning Procedure

Overview

This procedure was developed to clean vaporizers which have been exposed to water soluble compounds such as salts. This procedure can be performed by any user with common tools found in the laboratory and does not require disassembly of the vaporizer.

Time requirements

Elapsed time 15 hours

Vaporizer cool down- 2 hours

Actual cleaning time- 1 hour

Purge out cycle -12 hours

Picarro recommends starting this procedure at approximately 1pm so that the instrument will be ready for operation the following morning.

Required Materials

Picarro Kit (available from Picarro)

Vaporizer connections:

¼" OD PTFE tubing, 4 feet total

Stainless steel female Swagelok fitting assembly (nut, ferrule and backing) for ¼" tubing, quantity two

¼" to ¼" male-male Swagelok union, quantity 2

7/16" 20-NF coupling nut (18-8 steel), quantity 1

O-ring, quantity 2 (two different OD's provided, ID is same, choose which one fits best)

Vaporizer cable extension

Solvent source

Funnel with 3/8" ID spout

Soft blue tubing 3/8" OD and ¼" ID

Notes:

The above set up is for gravity feed. Alternatively a higher-pressure, low-flow pump can be used such as a pump for a small indoor fountain. The pump needs to be able to produce enough pressure to pump uphill about 20 inches since the 1/16" outlet tubing of the vaporizer will restrict flow and cause backpressure.

PICARRO

Solvent (Customer Supplied)

1.5 liters Deionized water or very low mineral content water

Notes:

Solvent should be chosen based on the solubility of the residue in the analyzer in that solvent. Any possible chemical transformations of the original analyte, when subject to 140 C, should be considered. Remember the valve plungers are made of Viton and EPR which have limited compatibility with organic solvents. Picarro assumes no responsibility if solvents other than water are used for this cleaning procedure.

Other (customer supplied)

Paper towels

1-2 liter container for capturing excess solvent

Stand or shelf approximately 24" high

Procedure

1. Unplug and disconnect vaporizer from analyzer. The main connection to the purge and sample ports on the vaporizer, the vacuum line, and the connection between the vaporizer outlet and analyzer should be disconnected. The connection to the analyzer should be disconnected at the largest nut (9/16"), use a second wrench to hold the smaller nut (5/16") in place while loosening the large nut.
2. Remove vaporizer from autosampler mounting.
3. Allow to cool 2 hours. If the vaporizer is too hot then the tubing may melt and the thermal shock of adding liquid water at high temperature may damage the vaporizer.
4. Remove injector port and septa, any visible solid material (such as injected salt) seen in the port should be left in place. Absence of this material at the end of the procedure will show cleaning is complete. Carefully check that the port is not hot to the touch.
5. Connect ¼" tubing (3 foot segment) with funnel to injector port using coupling nut, male-male Swagelok union. An o-ring should be placed at both ends of the coupling nut (one on vaporizer side, one on Swagelok union side) as in Figure 1.



Figure 1. Funnel connection to vaporizer injector port.

6. Connect ¼" tubing (1 foot segment) to vaporizer outlet using supplied adapter as in Figure 2. Place container at the outlet of the tubing, this will capture the rinse waste.

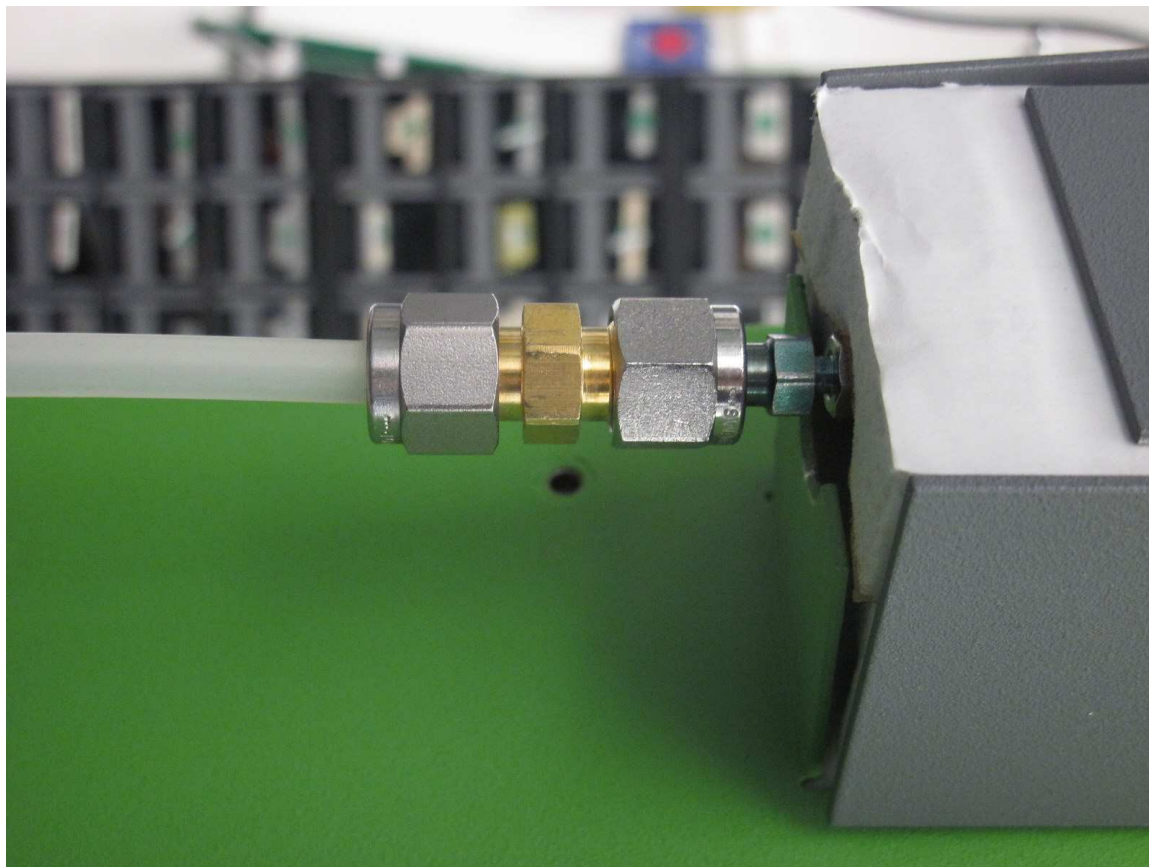


Figure 2. Tubing connected to outlet of vaporizer.

7. Place vaporizer display-side down using a piece of cardboard with a notched cutout as in Figure 3.

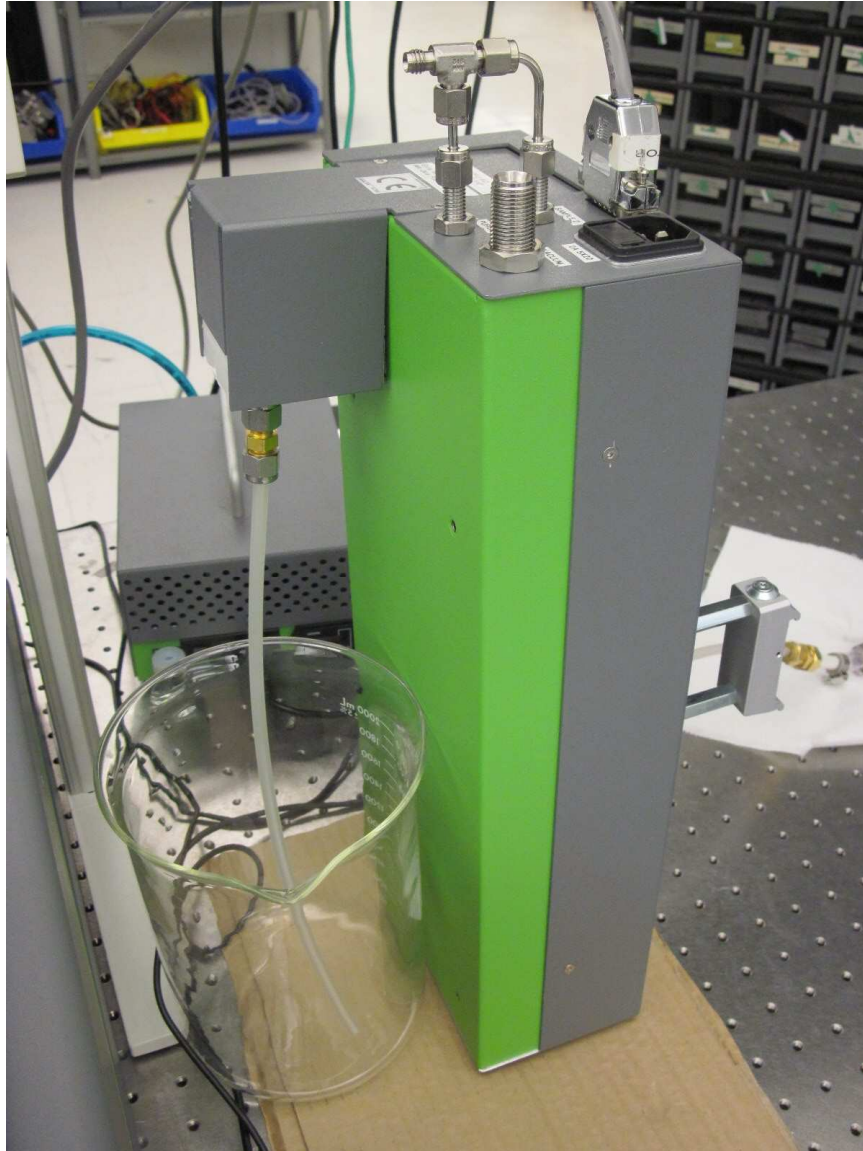


Figure 3. Vaporizer in vertical position on cardboard cutout showing drain at left and funnel connection at right.

8. Place funnel approximately one foot above top of vapor (ideally secured to a position not directly above the vaporizer). This configuration will fill the vaporizer from the bottom up and allow air to escape.

PICARRO

9. Connect the vaporizer cable extension to the existing vaporizer cable and the back of the vaporizer. Start the vaporizer cleaning software application by clicking on the file named “vaporizercleaning.exe”



10. Place a dry paper towel underneath the connection at the injector port as in Figure 4. (Note: this will catch any small leak and indicates there is problem. If this is wet stop immediately).



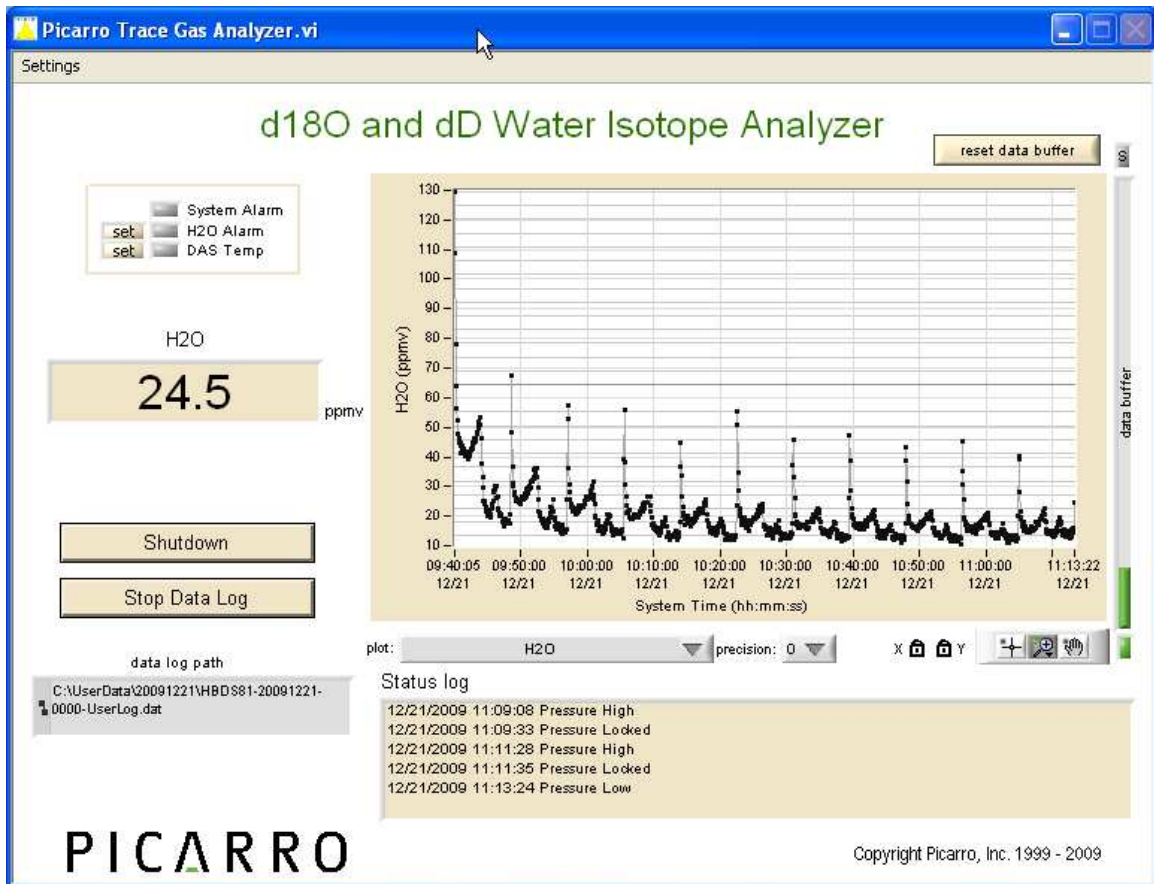
Figure 4. Paper towel at inlet port to indicate if a leak is present.

11. Prepare 500 mL of solvent; warm water (40-70 C) is recommended.
12. Verify the tubing connections are secure. The vaporizer must be unplugged from the main electrical line. If there is a leak then solvent can enter portions of the vaporizer housing which are not designed to be wetted and damage/electrical short circuit may occur.
13. In the vaporizer cleaning software select “open outlet valve”.



14. Pour the water into the funnel slowly. Verify the solvent front is moving through the tubing. Check for leaks especially at the funnel/tubing joint and the injector port. Do not overfill the funnel.
15. The vaporizer requires approximately 20mL to fill. Solvent should start dripping out a steady dropwise rate from the outlet line.
16. Set aside the rinse from the first 500mL in a separate container.
17. Repeat steps 12-15 two times more.
18. Verify the third rinsing is free of solutes, if rinsing out inorganic salts the conductivity of the solution can be checked and compared again the pure solvent (water). Use a conductivity meter or multimeter set to read Ohms to do this. For other compounds an appropriate measurement method should be used (UV-VIS, GC, etc). Perform additional rinsing if necessary.
19. Place funnel/tubing assembly into rinse container and lower both items to below the level of the injector port. This will drain the remaining liquid from the vaporizer.
20. Connect low pressure (2-3 psi) air supply (needs to be free of oil and organic contamination but need not be particularly dry) to vaporizer outlet tubing. The aquarium air pump commonly used with the waste port of the autosampler can be used for this, as can the actual dry air supply. Allow to run 30-60 minutes, there will be visible condensation and droplets in the line.
21. Discard of all rinse waste appropriately.
22. Turn off the “open outlet valve” in the software and remove tubing connections
23. Inspect the injector port for visible material. If they are still there after the cleaning procedure the material is not sufficiently soluble in the

- solvent. If some has dissolved then repeat procedure using higher temperature solvent or more rinsing, if none has dissolved then use a different solvent.
24. Reconnect the vaporizer to the analyzer. Be sure to remove the vaporizer cable extension. Plug the vaporizer into the main electrical line.
 25. Select the “vaporizer pumpdown routine” in the vaporizer cleaning software and allow to run for 12 hours. The analyzer software may show a very high water reading initially but should return to a moderate value (<10000 ppm) within 5 minutes.
 26. The H₂O concentration reported by the instrument will exhibit a saw tooth pattern over time. Verify the maximum value of spikes (which is associated with valve switching) is less than 200 ppm as shown below.



27. Exit the vaporizer cleaning software. The vaporizer is now ready for use.