

Safetygram #43

Air Products Bubbler Installation and Removal Procedures

Purpose

To define procedures for the safe installation and removal of Air Products quartz bubblers.

Scope

Applies to all Air Products break seal and non-break seal bubblers.

Responsibility

All people working with quartz bubblers are responsible for following the procedures outlined.

Safety

Handling quartz bubblers requires the use of cut-resistant gloves.

SAFETY: Before proceeding, read the material safety data sheet (MSDS) for the specific chemical being used and wear appropriate personal protective equipment. An MSDS is included with every Air Products bubbler.

- Cut-resistant gloves must be worn when handling quartz bubblers.
- Do not lift or handle bubblers by the valves or fill stem.
- For installing or removing the bubbler from the temperature controller, use the fill stem and/or the quartz stem close to the bubbler body and below the bottom valve nut.
- It is critical that valve sequencing instructions be followed. End users must evaluate the effect of check valve placement on tool programming and make necessary changes.
- End users should adhere to the recommended carrier gas flow rates.

If you require additional assistance, please call your Air Products sales representative or the factory direct at 760-931-9555 or 1-800-545-9242 (Continental USA).

INSTALLATION: Refer to the recommended bubbler schematic or your delivery system equipment manual for specific installation and setup instructions.

CAUTION: Use white mineral oil to fill the thermowell (Air Products part number 1600-0001). Do not use water or volatile solvents, such as acetone, alcohol, etc. Use of these or other liquids can create a serious safety hazard in bubblers containing water-reactive chemicals and may cause damage to the temperature probe.

Air Products offers two types of bubblers: one with no break seal and one with a diaphragm break seal in both the inlet and outlet stems. The bubblers have high-purity Teflon® valves attached to each stem. Break seal bubblers are shipped under vacuum with the valves in the open position. Non-break seal bubblers are shipped at atmospheric pressure with the valves in the closed position. To gain access to the source chemical from either the break seal or non-break seal bubbler, please follow the instructions given below. Figure 1 shows the recommended bubbler plumbing schematic and Figure 2 shows bubbler components.

WARNING: The incoming gas pressure to the bubbler must not exceed 15 psig at any time; it is best to use a two-stage pressure regulator upstream of the mass flow controller. Downstream from the mass flow controller, there is to be a “safety,” such as a relief valve, to be activated at 10 psig.



Ensure that a check valve (CV1) is installed between the bubbler inlet tubing and the pneumatic system valve (V2), preferably as close to the bubbler as possible. NOTE: Check valve placement may require new sequences in tool programming.

Bubbler Installation: Follow steps below for installing the bubbler. NOTE: The sequence of events is important (refer to bubbler plumbing schematic shown in Figure 1).

1. Place the bubbler in the temperature controller.
2. Cut shrink-wrap around valve if present. DO NOT MOVE VALVE HANDLE.

Remove the plastic shipping plugs/caps from the valve fittings by unscrewing the hex nut/flare cap. This will back out the plug/cap until it is free from the fitting. DO NOT PULL ON THE SHIPPING PLUGS. This could break the bubbler stem. Save the shipping plugs for return shipment to Air Products.

3. Start carrier N_2 flow at 10% of full scale. Open valves V1 and V2; keep V3 and V4 closed (refer to bubbler plumbing schematic). Connect the incoming gas line (carrier gas) to the 1/4" Teflon valve. Ensure the Teflon tubing is round and not indented by previous use. Replace when necessary. Carefully insert the gas line into the valve and tighten the ferrule nut, 1/8 of a turn past finger-tight. **Support the valve to prevent the possibility of breaking the quartz stem.**

4. Close valve V2 and open valves V1, V3 and V4 (refer to bubbler plumbing schematic). Connect the outlet gas line (the gas line from the bubbler to the furnace) to the 3/8" Teflon valve. Ensure the Teflon tubing is round and not indented by previous use. Replace when necessary. Carefully insert the gas line into the valve and tighten the ferrule nut 1/8 of a turn past finger-tight. **Support the valve to prevent the possibility of breaking the quartz stem.**

Bubbler Leak Check: Follow steps below for leak checking the bubbler.

5. Start carrier N_2 flow at 10% of full scale. Open valves V1, V2, V3, and V4. Close valves V5a and V5b. After several minutes, no more than 5 minutes, the mass flow controller flow rate should read 0 if the connections are leak-tight.
6. When completed, close valves V2 and V3. Open V1, V4 and V5a. Reduce the carrier flow to 10% of full scale. Proceed with opening the bubbler.

Figure 1

Recommended Bubbler Plumbing Schematic

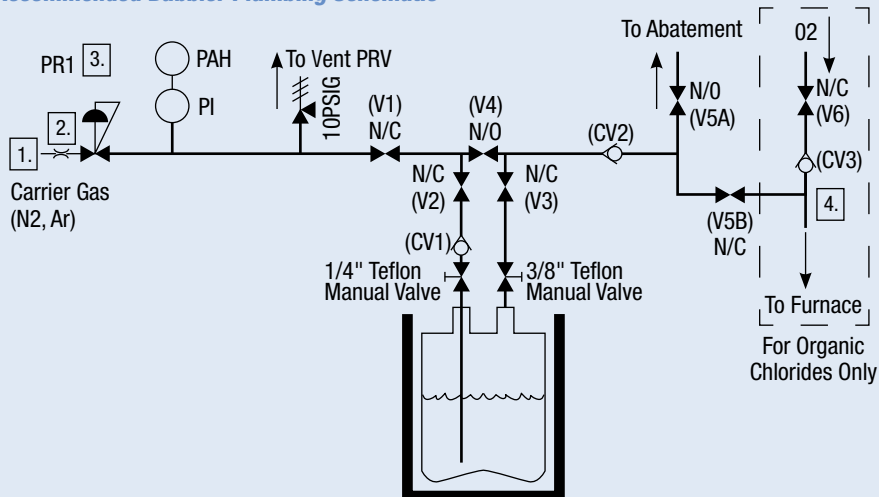
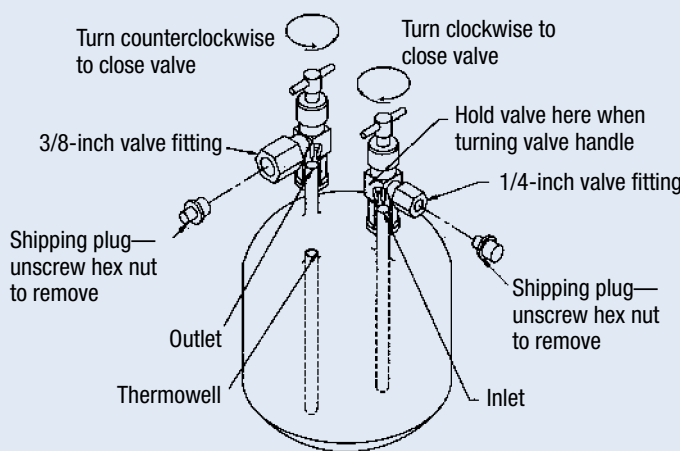


Figure 2

Bubbler



Opening the Bubbler: OUTLET

- 7a. **Break seal bubblers only ($POCl_3$ / BBr_3):** Break the outlet diaphragm by slowly turning the 3/8" Teflon valve handle clockwise while holding the valve body to prevent it from rotating on the stem. Breaking the diaphragm can be heard as well as felt, and is usually accomplished at the third full turn of the valve handle.

Open the 3/8" outlet valve by slowly turning the valve handle counterclockwise. **Support the valve body to prevent it from rotating on the stem.** Open the 3/8" Teflon valve by continuing to turn the valve handle until it stops.

- 7b. **Non-break seal bubblers only (TRANS LC):**

Open the 3/8" outlet valve by slowly turning the valve handle counterclockwise. **Support the valve body to prevent it from rotating on the stem.** Open the 3/8" Teflon valve by continuing to turn the valve handle until it stops.

Opening the Bubbler: INLET

- 8a. **Break seal bubblers only ($POCl_3$ / BBr_3):** Break the inlet diaphragm by slowly turning the 1/4" Teflon valve handle clockwise while supporting the valve body to prevent it from rotating on the stem. Breaking the diaphragm can be heard as well as felt, and is usually accomplished at the third full turn of the valve handle.

Open the 1/4" inlet valve by slowly turning the valve handle counterclockwise. **Support the valve body to prevent it from rotating on the stem.** Open the 1/4" Teflon valve by continuing to turn the valve handle until it stops.

- 8b. **Non-break seal bubblers only (TRANS LC):** Open the 1/4" outlet valve by slowly turning the valve handle counterclockwise. **Support the valve body to prevent it from rotating on the stem.** Open the 1/4" Teflon valve by continuing to turn the valve handle until it stops.
9. **Equalize the pressure:** Close all valves, then open V5a, V3, V4, and V2 in sequence. Wait 30 seconds, then close all valves.
10. **Optional test run:** It is best to ensure the bubbler is fully operational by performing a test flow through the bubbler to vent.

To run the test flow, close all valves, then open V1, V2, V3, and V5a in sequence. Allow 30 seconds for the flow to stabilize, then close all valves.

11. **To place bubbler in standby mode:** Close all valves, then open V1, V4 and V5a. Reduce the carrier flow to 10% of full scale.

Bubbler Removal: Follow the steps below for removing the bubbler. NOTE: The sequence of events is important (refer to bubbler plumbing schematic).

1. Open valves V1, V4, and V5a. Close V2, V3, and V5b. Turn down the carrier gas to 10% of full scale.
2. Close the 1/4" manual bubbler inlet valve by slowly turning the valve handle clockwise until it stops. **Support the valve body to prevent it from rotating on the stem.**

3. Close the 3/8" manual bubbler outlet valve by slowly turning the valve handle clockwise until it stops. **Support the valve body to prevent it from rotating on the stem.**
4. Disconnect the gas lines from each valve. While removing the gas lines, carefully support the valve body to prevent the possibility of breaking the quartz stem.
5. Re-insert the plastic shipping plugs/caps into each valve fitting and hand-tighten the ferrule nuts/caps.
6. The bubbler is now ready to be removed and packaged for return shipment.

Emergency Response System

- Call: 1-800-523-9374 (Continental U.S. and Puerto Rico)
- Call: +1-610-481-7711 (other locations)
- 24 hours a day, 7 days a week
- For assistance involving Air Products and Chemicals, Inc. products

Product Safety Information

- For MSDS, Safetygrams, and Product Safety Information www.airproducts.com/productsafety

Technical Information Center

- Call: 1-800-752-1597 (U.S.)
- Call: +1-610-481-8565 (other locations)
- Fax: +1-610-481-8690
- E-mail: gasinfo@airproducts.com
- Monday–Friday, 8:00 a.m.–5:00 p.m. EDT

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