



06-008A
20 July, 2006

Retrofit on IZS Permeation Tube for NO₂ Holdup in M200E Nox Analyzer

I. PURPOSE:

The NOX analyzer experiences NO₂ holdup which is prominent during IZS calibration. NO₂ holdup is seen as the NO₂ (and NO_x) concentration not dropping off as quickly as NO concentration.

With the installation of a modification kit, this holdup can be greatly reduced.

One consolation of using this method is that the overall concentration will be reduced from the perm tube. The concentration of the NO₂ perm tube is reduced by up to 5%.

II. TOOLS:

Work bench with vice

Slot head screwdriver

Phillips screwdriver

Tubing cutter

X-Acto or similar razor knife or scissors

III. PARTS:

KIT000247, KIT, RETRO, NO₂ HOLDUP, 200E, W/IZS INST

IV. PROCEDURE:

WARNING: DO NOT at any time power off the sample pump while the permeation tube is installed, as this allows the perm tube to contaminate the analyzer.

1. Take cover off instrument and tip back panel down.
2. Pull foam up from permeation tube oven top, remove 3 mounting screws on top of perm tube oven and remove oven cap, refer to Figure 1.
 - a. Extract the perm tube and place in perm tube original shipping container.
 - b. Re-attach the oven cap with the three screws.
 - c. Allow to purge for 5 minutes.
 - d. Power down analyzer and remove power cord from back panel.
3. Remove the tubing from the fitting on the oven cap that is closest to the side with 2 mounting screws, this is the oven outlet fitting.
4. Remove this oven outlet fitting from the oven cap. Install the new 1/8" "T" (p/n FT33) connector using teflon tape (p/n HW36). Face the leg of the "T" towards the front / center of the oven cap as depicted in Figure 2.
5. Cut a slice or slot in the foam to allow for the new "T", stuff foam back in for now.
6. Loosen the captive screws that fasten the perm tube oven to the bottom chassis and lift oven up enough to access the fittings, electrical connectors, and bottom screws on the valves.
7. Mark and remove valve wiring electrical connectors from the top of the IZS valve bracket.
8. Mark and remove bottom electrical connectors from the valve bracket.
9. Mark or memorize tubing locations to all tubings on valves, refer to Figures 3 and 4. Remove all tubings from the valve fittings. Remove and discard the tubing that connects

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- the oven outlet fitting to the zero / span valve side “T” fitting (valve with the “T” on top and “T” on the side).
10. Lift oven up more to access under the valves. Remove the screws holding the valves to the bracket and remove the valve assembly to a work bench with a vice.
 11. Use a vise to gently hold the valve with the “T” installed on the side (use padding / do not crush valve body). Remove this “T” (from port 1 – the port #'s are stamped on the valve body) and install a new elbow fitting (p/n FT15) with teflon tape. Tighten with the elbow facing up.
 12. Re-install the valve assembly to the bracket with screws.
 13. Re-install the bottom electrical connectors from the valves to the valve bracket and then the top connectors.
 14. Other tubings will still need to be installed –do not re-fasten the oven yet but place the oven back into chassis.
 15. Trial fit the desorber to the inside back panel in between the thru-panel bulkhead fittings. Determine where to attach two releasable cable clamps to secure the desorber to the back panel as depicted in figures 5 and 6, attach the two releasable cable clamps (p/n HW127) to the back panel.
 16. Cut and attach a new 32” piece of 1/8th inch teflon tubing (p/n TU1) from the desorber inlet fitting to the new “T” on the oven outlet fitting, install to the side (center) port of the new oven “T”.
 17. Cut and attach a new 20” piece of 1/8th inch teflon tubing (p/n TU1) from the desorber outlet fitting to the zero / span valve bottom new elbow fitting.
 18. Install desorber with attached tubings into the releasable clamps.
 19. Use cable ties (p/n HW37) to secure desorber tubings to other tubings to ensure no tubings get kinked when the back panel moves up and down.
 20. Loosen the captive screws that secure the permature dryer (for O3) to the bottom chassis and lift assembly up to access the lower fittings.
 21. Cut cable tie that holds brass “T” to dryer bracket, refer to Figure 7.
 22. Remove the Tygon tubing from the lower brass “T” fitting that runs down to the lower Kynar fitting of the dryer.
 23. Attach the new brass “T” (p/n FT35) end fitting to the original brass “T” fitting. The new “T” end fitting is attached to the existing “T” center fitting. The new “T” center fitting is to be pointed down.
 24. Reattach the Tygon tubing that comes from the lower Kynar dryer fitting to the end of the new “T”.
 25. Remove plug (or use razor knife to cut through mask) to open hole on rear panel that is adjacent to the “Zero Air” bulkhead fitting. Install new stainless ¼” bulkhead fitting (p/n FT40) and label the back panel to indicate “From Dryer” if not already labeled, refer to Figure 8 and Figure 9.
 26. Cut and attach a new 21” piece of Tygon tubing (p/n TU9) (use brass tubing insert p/n FT67 for the dryer end) to lead from center fitting of the newly installed brass “T” on the permature dryer to the new rear panel bulkhead fitting (use stainless tubing insert p/n FT68 on the bulkhead fitting end).
 27. Attach a cable fastener (p/n HW92) if necessary to the permature dryer bracket in-between the new and old “T”s”, fasten and trim a tie-wrap (p/n HW37) to secure new “T” into place.
 28. Reattach the permature dryer to the chassis with the captive screws, ensure no wires or tubings get pinched under the bracket.
 29. Install the new ¼” Kynar elbow fitting (p/n FT53) to the top of the Zero Air canister on the back panel, use teflon tape, refer to Figure 10.
 30. Cut and attach a new 17” piece of Tygon tubing (use 2 stainless tubing inserts p/n FT68) from the newly installed bulkhead fitting to the top of the zero air canister.
 31. Install a cable tie to secure the two tubings together.
 32. Reattach tubing that connects the perm tube purge orifice on the vacuum manifold to the end fitting of the new “T” on the oven outlet fitting, refer to Figure 11 and Figure 12.
 33. Reattach tubing from sample inlet fitting to the top port of the sample / cal valve.

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34. Reattach tubing from oven outlet to "T" on top of zero / span valve.
35. Reattach tubing from zero air inlet fitting to "T" on top of zero / span valve.
36. Guide oven down to chassis bottom, ensure no tubings or wires get under the oven and fasten oven down with the two captive screws.
37. Perform a leak check and repair any leaks before continuing.
38. Measure Sample Flow, O3 Flow, and Perm Tube Bypass Flow.
39. Re-install perm tube, power up analyzer, allow 72 hours for the perm tube to stabilize before performing calibrations.
40. Perform Zero and Span calibrations, note that span value will decrease by up to 5% after installation of desorber.

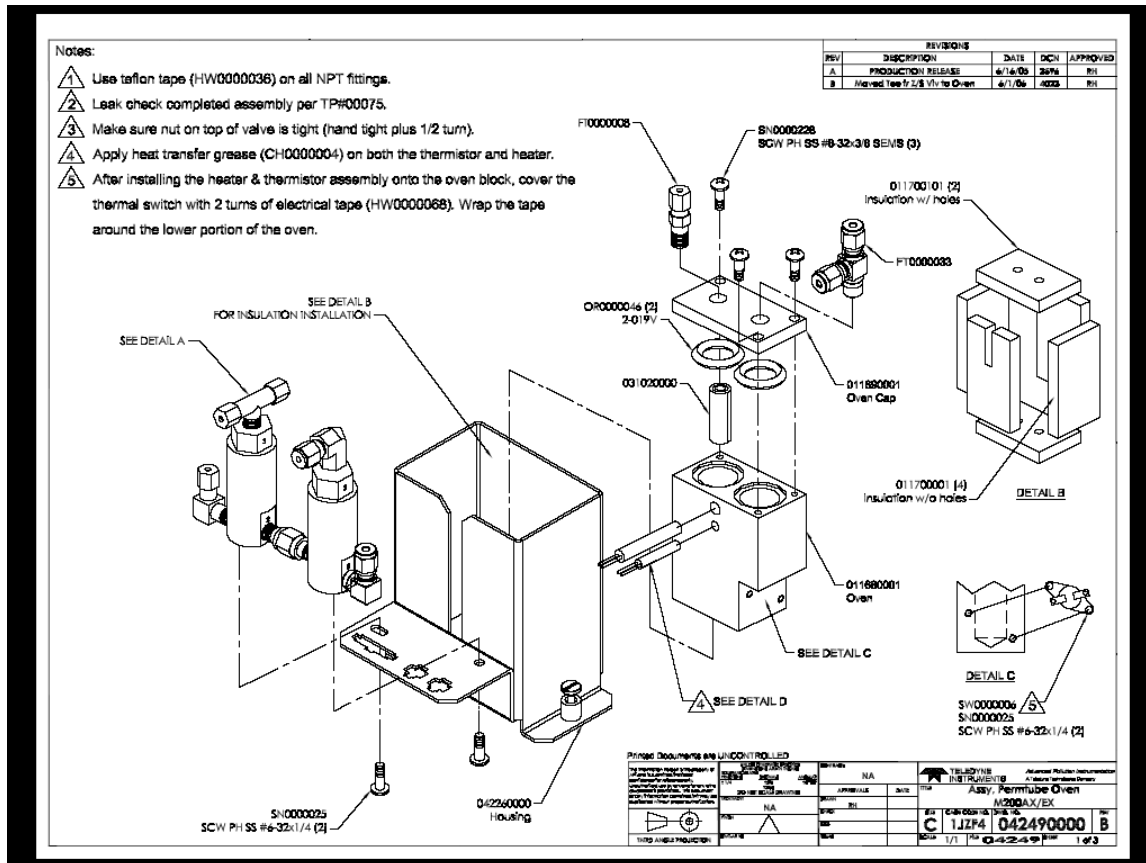


Figure 1

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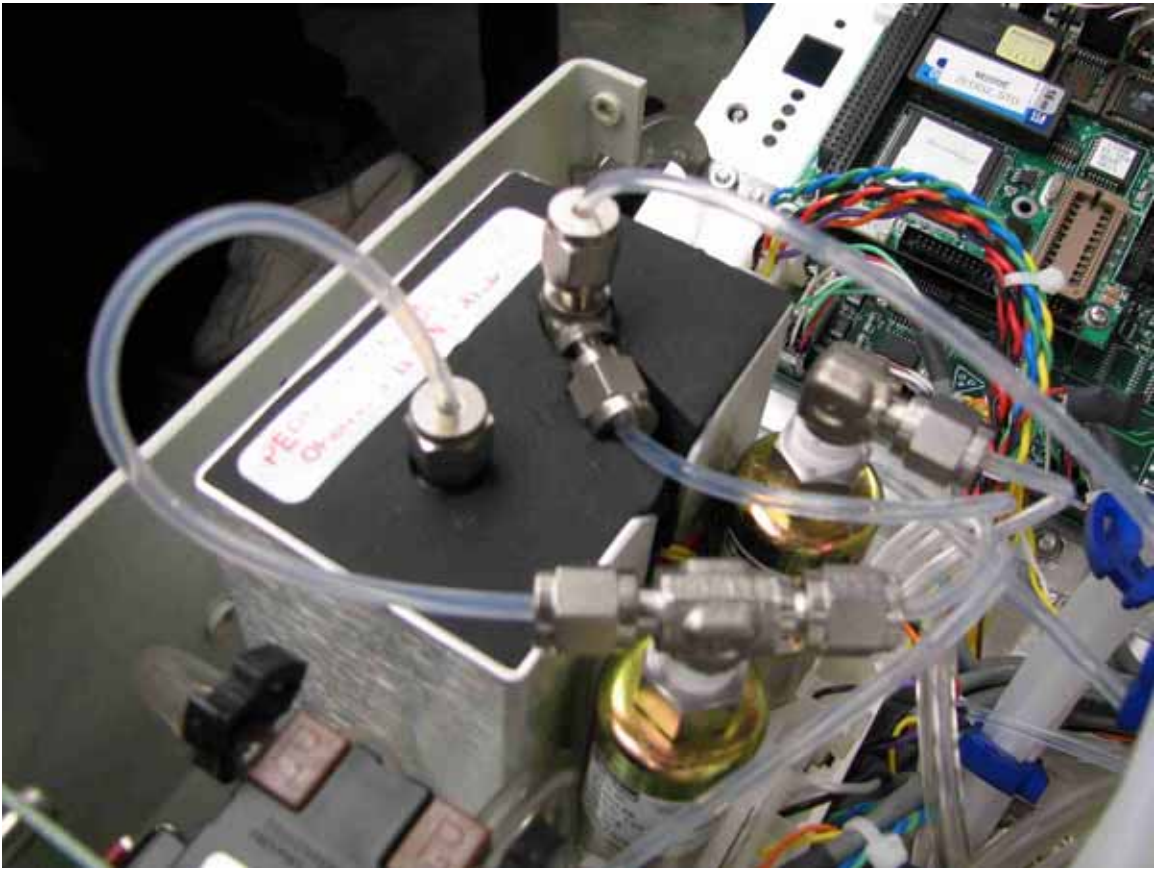


Figure 2

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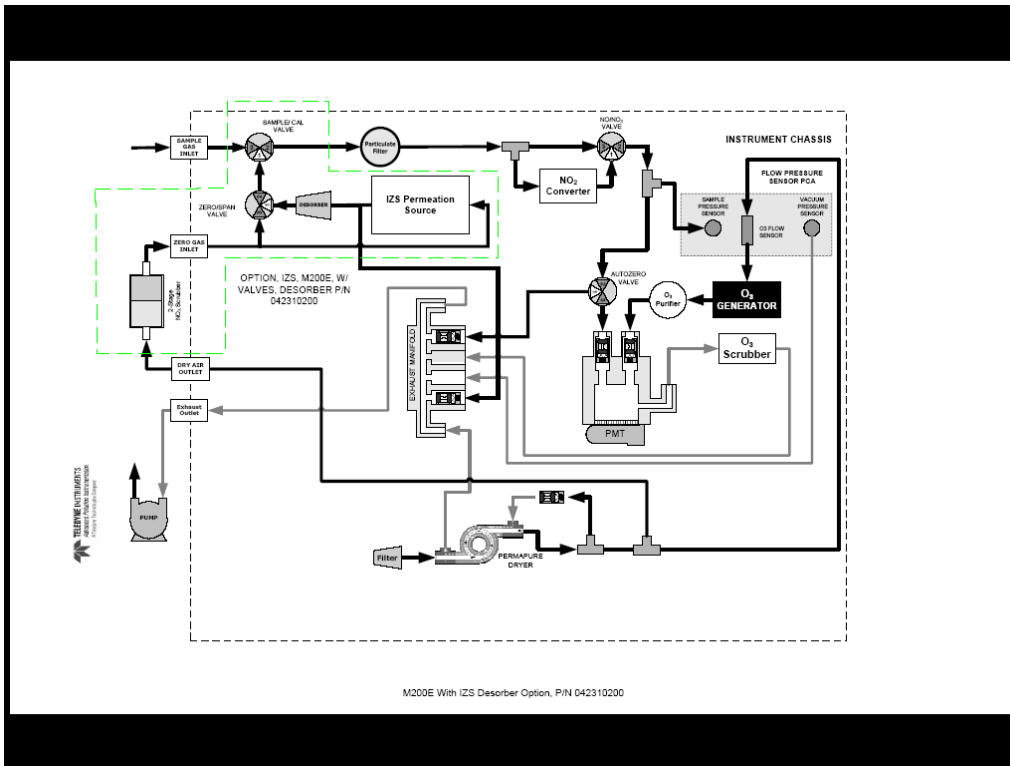


Figure 3 (Retrofit for NO2 holdup)

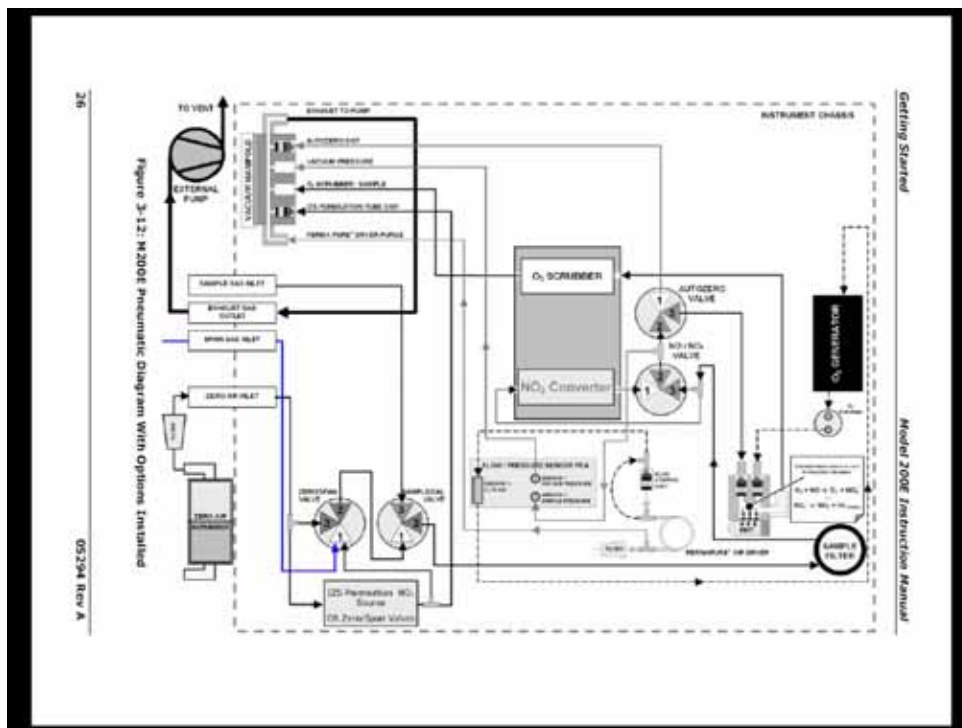


Figure 4 (original configuration)

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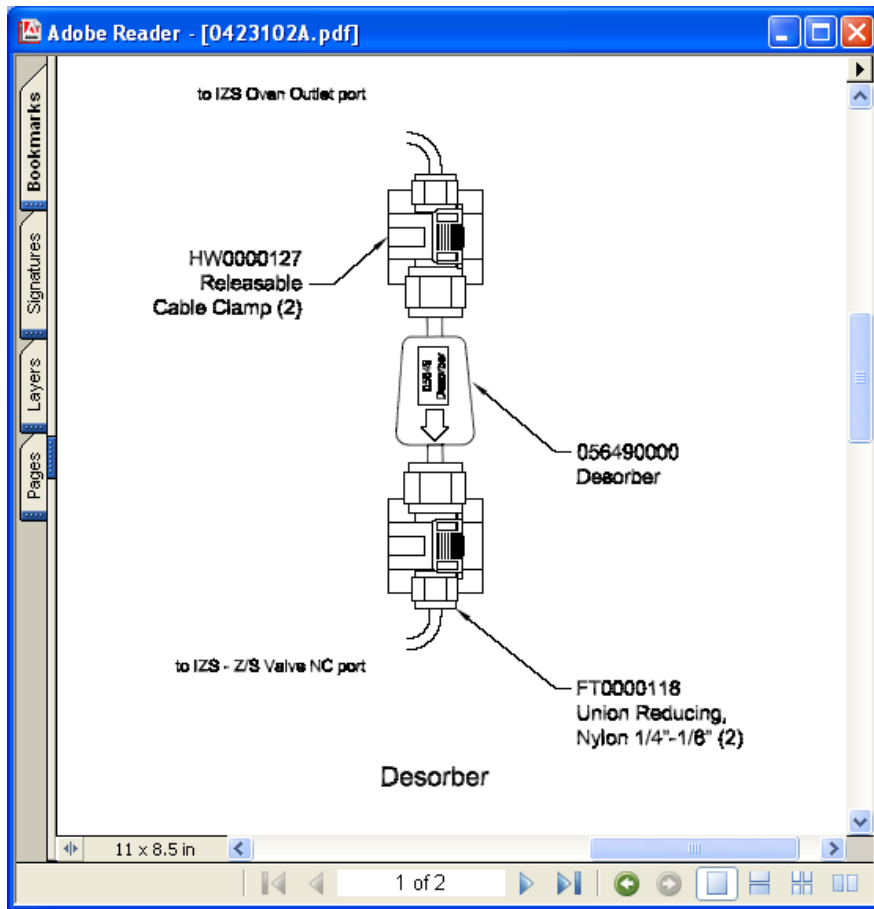


Figure 5



Figure 6

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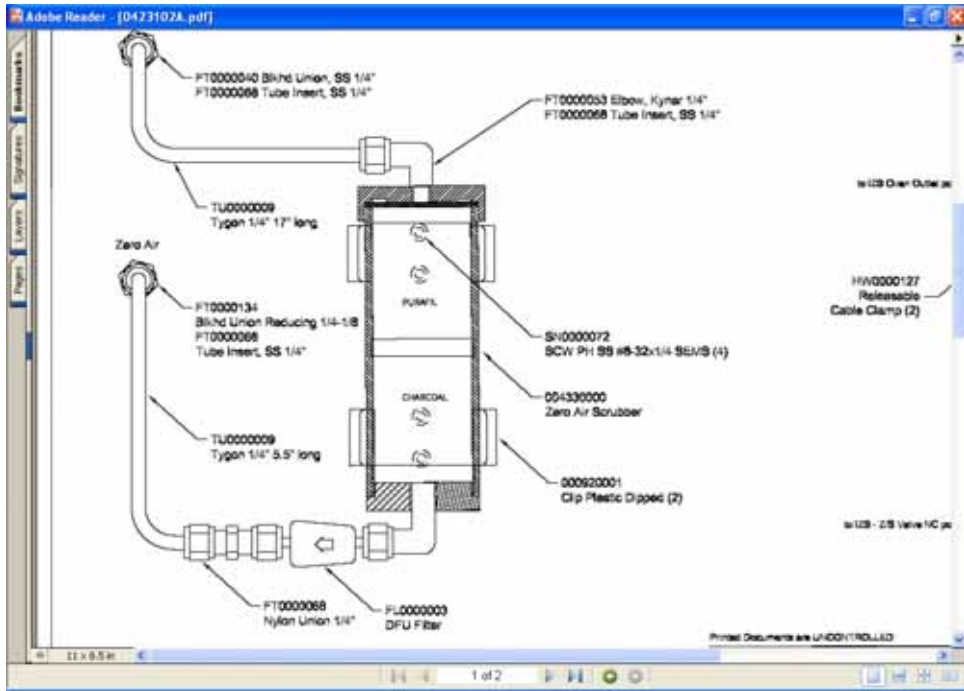


Figure 9



Figure 10

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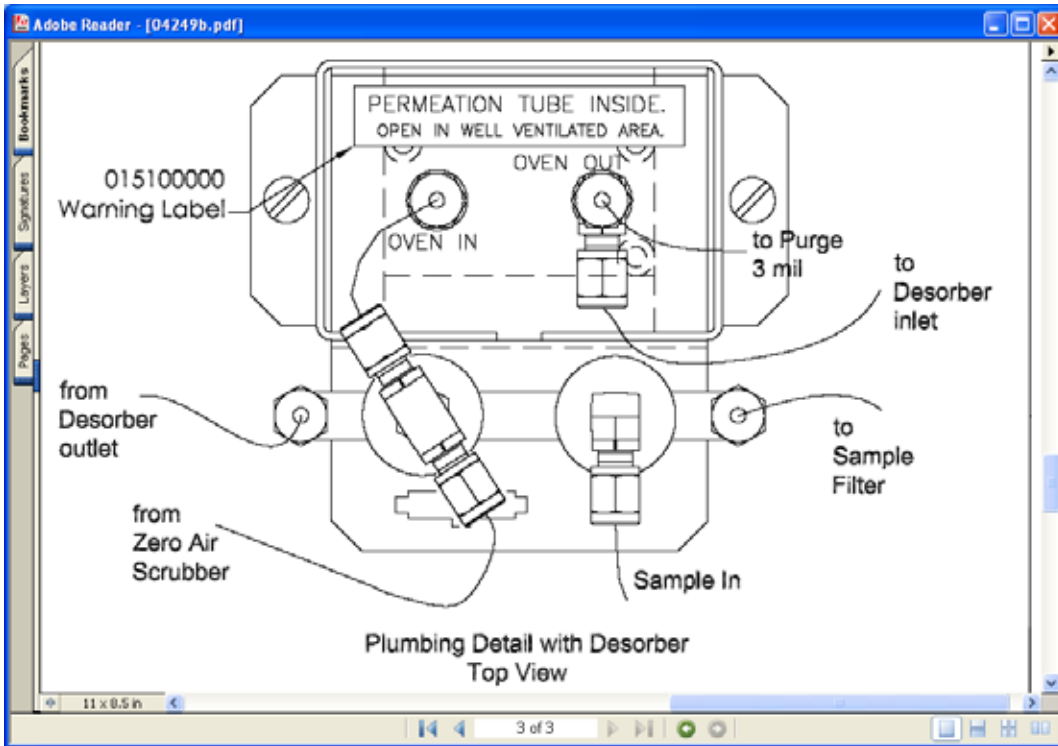


Figure 11 (Retrofit for NO2 holdup configuration)

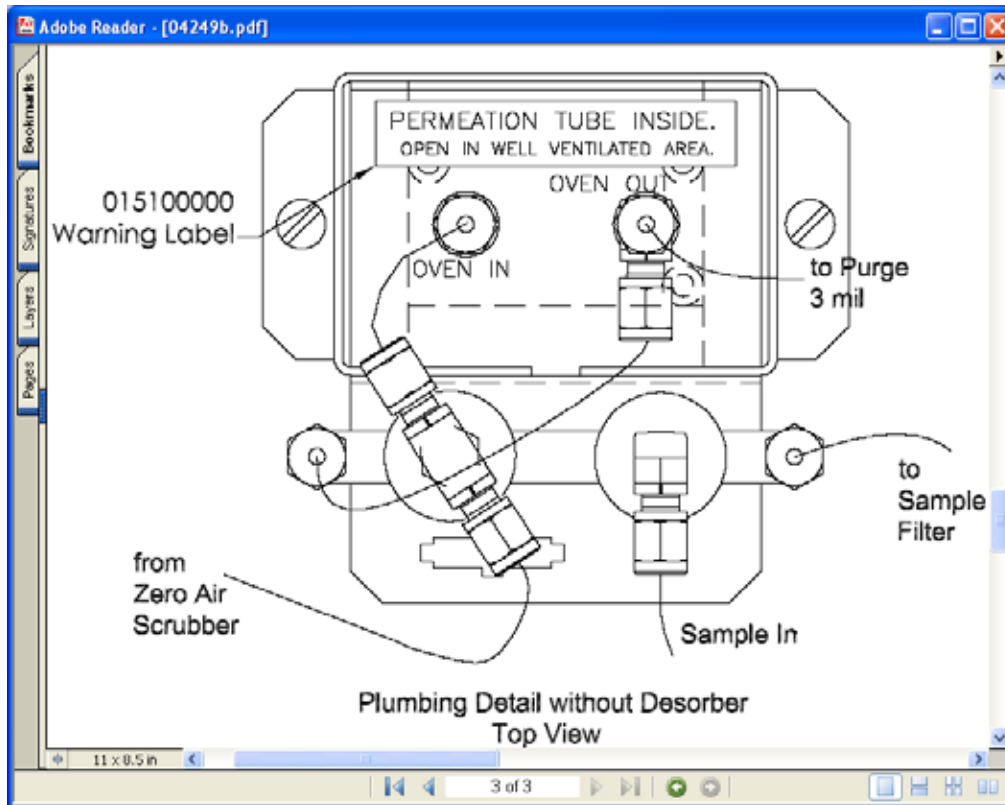


Figure 12 (original configuration)

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