



09-008A
07 August, 2009

ADDING A CO₂ SENSOR OPTION TO THE M200EM

I. PURPOSE:

This service note is to provide instructions on how to add the CO₂ option (67A) (054250000 OPTION, CO₂ SENSOR 20%) to your M200EM.

II. TOOLS:

Philips screwdriver
¼ inch, 9/16, 7/16 box/open end wrenches

III. PARTS:

KIT000298 (054250000 OPTION, CO₂ SENSOR 20%)
KIT000299 (054250000 OPTION, CO₂ SENSOR 20%)
KIT000300 (054250000 OPTION, CO₂ SENSOR 20%)



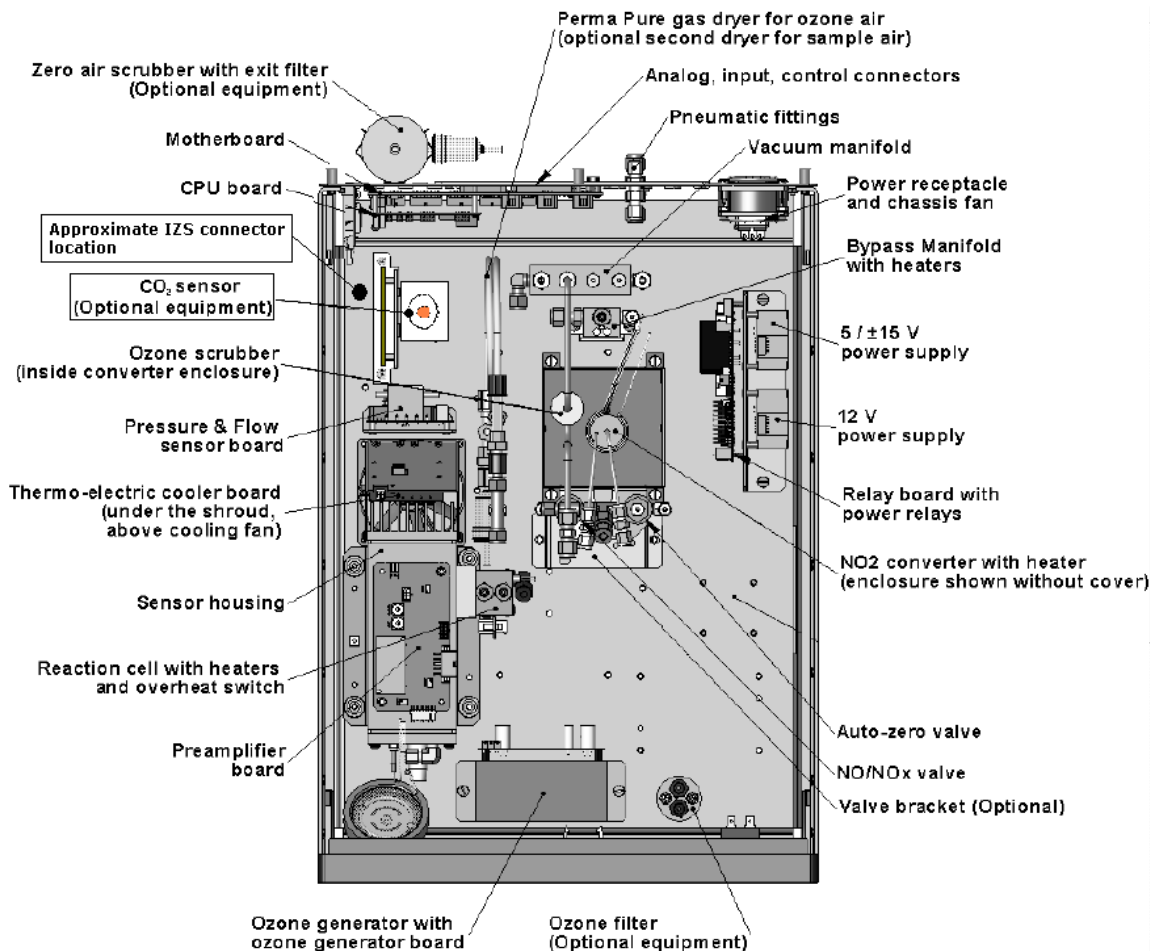
The electronics used in T-API analyzers are sensitive to Electrostatic Discharge (ESD). When working on any T-API device, please ensure that you are properly grounded prior to handling or touching any electronic circuitry in the analyzers! For more information on how to protect sensitive components from ESD during handling, please contact T-API customer service and ask for the ESD Service note number 03-022A.

IV. PROCEDURE:

1. First the pneumatic layout of your instrument must be determined. Compare your instruments serial number to the following chart. Use this chart to determine the section and figure numbers that apply to your instrument.

Starting Serial #	Ending Serial #	Service note Section	Figure #	KIT #
0	288	VII.	8	KIT000298
289	424	VI.	7	KIT000299
425	Higher	V.	2	KIT000300

2. Comparing figures 1 through 10 will help to familiarize you with the components, their arrangement, and pneumatic path.
3. The CO₂ sensor and PCA will have come to you preassembled on their bracket. Install the assembly into the chassis as depicted in figure #1. Insure that the assembly is oriented with the PCA towards the (left) chassis wall.



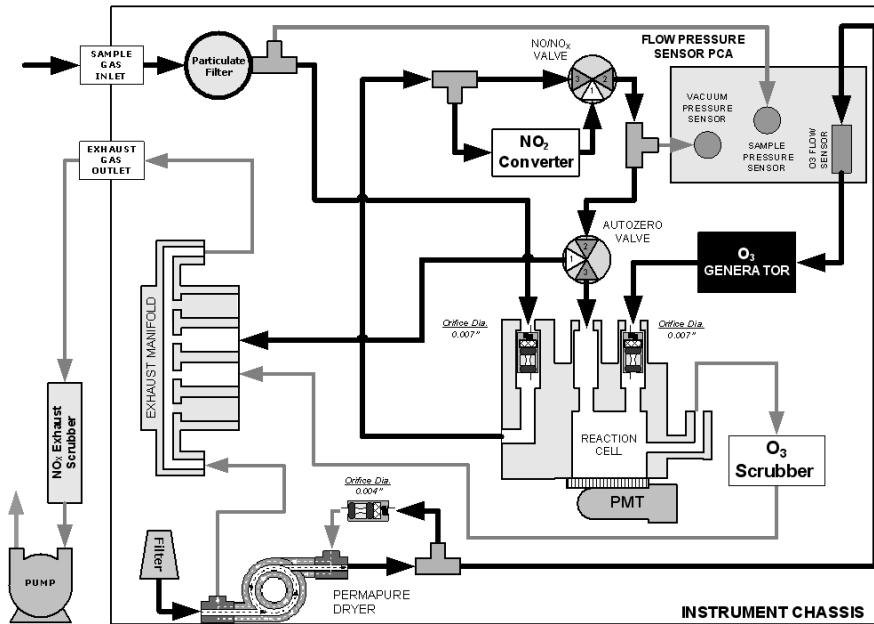
**M200EH/EM Layout
Figure #1**

V. M200EM with a 3 port reaction cell:

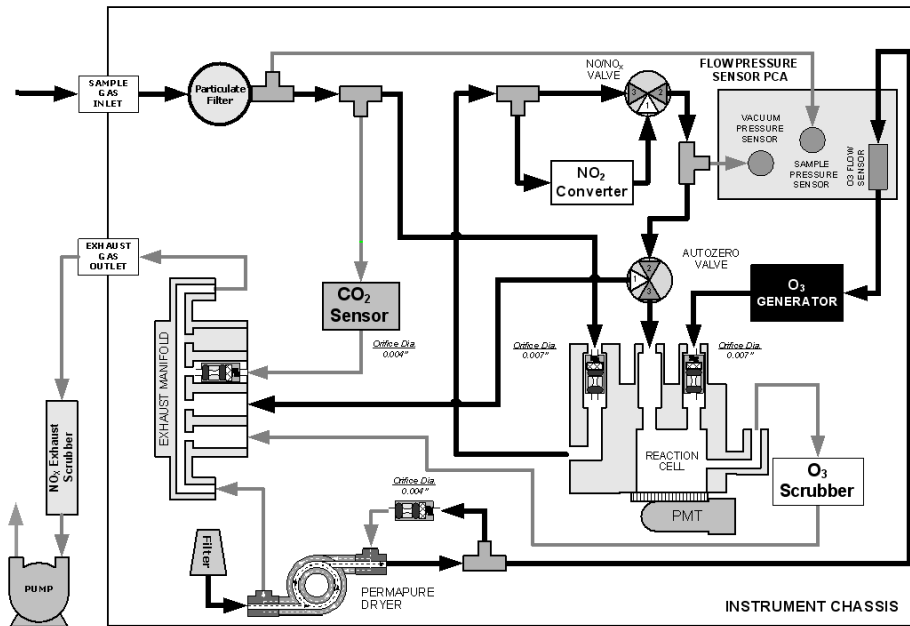
4. Refer to Figure #2.
5. Locate the Tee fitting on the Particulate filter assembly. Note that one connection on the Tee runs back to the Sample pressure transducer and the other pneumatic tube runs to the reaction cell manifold. Disconnect the pneumatic tube from the sample filter Tee fitting that runs to the reaction cell manifold.
6. Install the Tee fitting that came with your kit on the loose end of the pneumatic tube from step 5, see figure #2.
7. Install the 8-inch Teflon tubes that came with your kit to one of the open ports on the newly installed Tee fitting from step 6, see figure #2.

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8. Install the loose end of the Teflon tube from step 7 onto the open port of the sample filter Tee fitting from step 5, see figure #2.
9. Locate the 1/8th inch clear pneumatic tube attached to the INLET of the CO₂ sensor. Connect this tube to the open port on the Tee fitting from step 6, See figure #2 and #4.



M200EM Pneumatic Diagram



M200EM Pneumatic Diagram with CO₂ Sensor option

FIGURE #2

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10. **Locate** the vacuum manifold and remove one of the plugs, see figure #3. Install the flow control assembly into the port. Ensure that the new fitting has adequate Teflon tape on the threads before installing it; see figure #2 and #3.

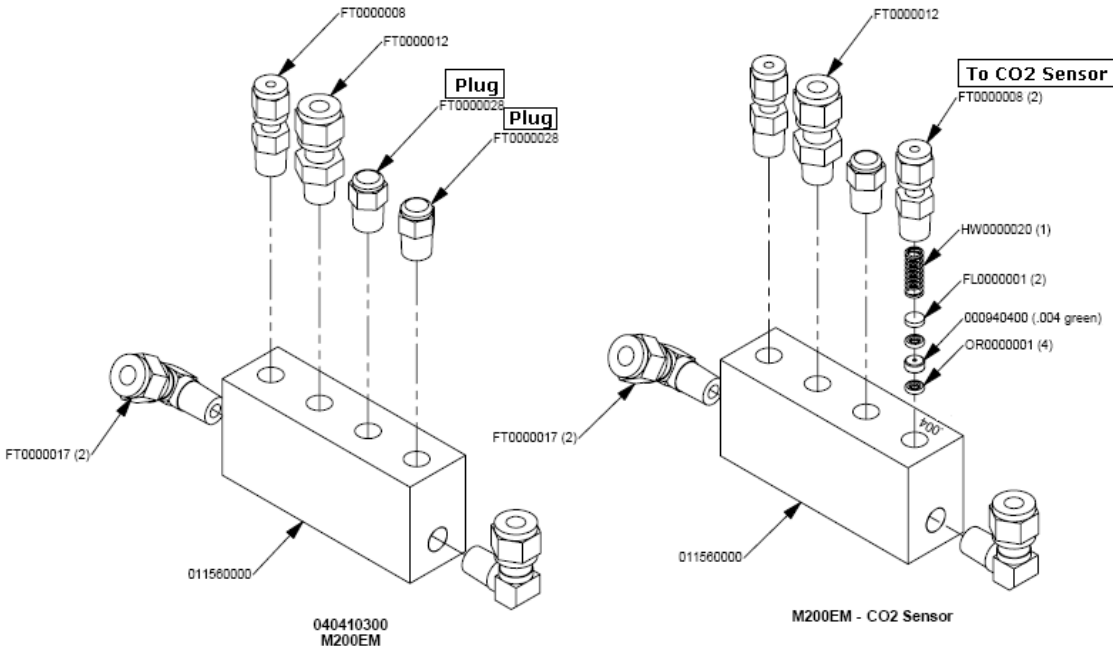


FIGURE #3

11. Locate the 1/8th inch clear pneumatic tube attached to the OUTLET of the CO₂ sensor. Connect this tube to the Flow control fitting from step #8; See figure #'s 2, #3 and #4.

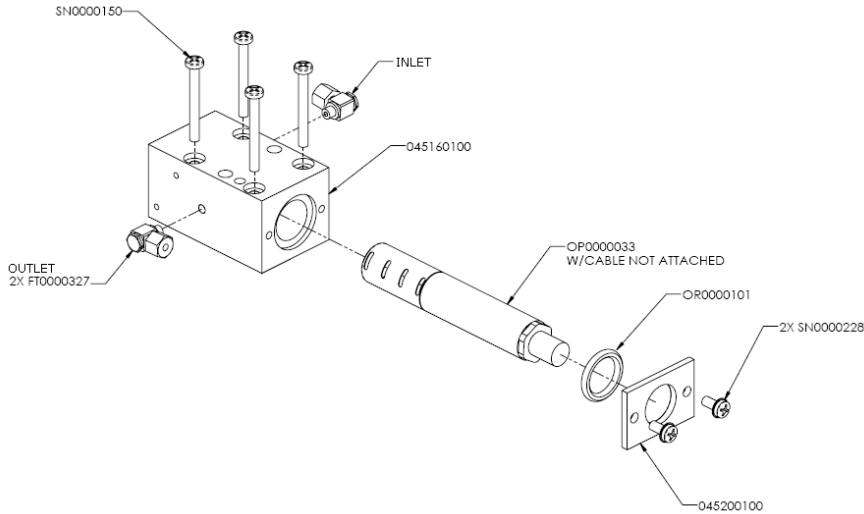


FIGURE #4

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12. Comparing figure #5 to your instrument will help to familiarize you with the electrical components, their arrangement, and connections.

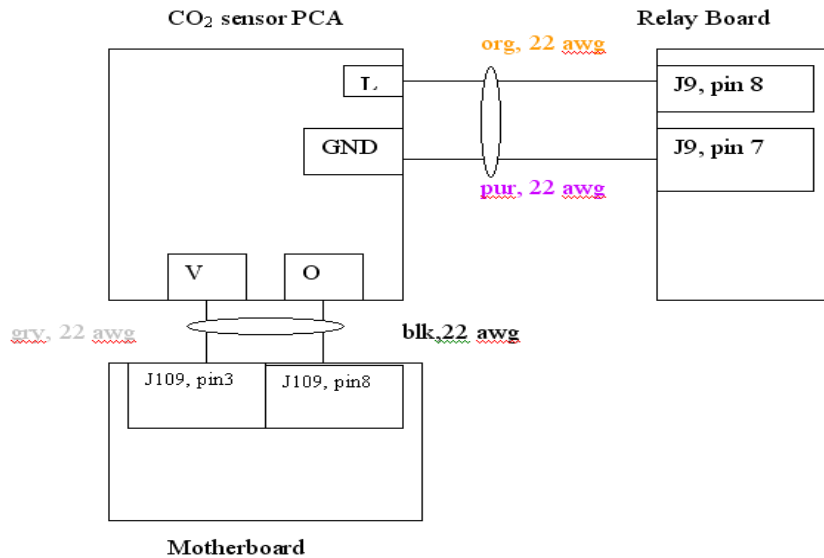


FIGURE #5

13. Locate connector J9 on the relay board. See figure #1 and #5. Install the 24-inch orange/purple cable that came with your kit by inserting the pin connectors in the white connector at J9 on the relay board, see figure #5. Connect the free end of the cable to the tie-down posts T, and GND on the CO₂ sensor PCA, see figure #5. The orange wire should connect from the relay board J9, pin #8 to the tie-down post marked T, of the CO₂ sensor PCA. The purple wire should connect from the relay board J9, pin 7 to the tie-down post, marked GND of the CO₂ sensor PCA.
14. Locate connector J109 on the motherboard. See figure #1, #5 and #6. Install the 10-inch black/gray cable that came with your kit by inserting the pin connectors in the black Microfit connector at J109 on the motherboard, see figure #5 and #6. Connect the free end of the cable to the tie-down posts V, and O on the CO₂ sensor PCA, see figure #5. The black wire should connect from the motherboard J109, pin #8 to the tie-down post marked O, of the CO₂ sensor PCA, see figure #5 and #6. The gray wire should connect from the relay board J109, pin 3 to the tie-down post marked V, of the CO₂ sensor PCA, see figure #5 and #6.

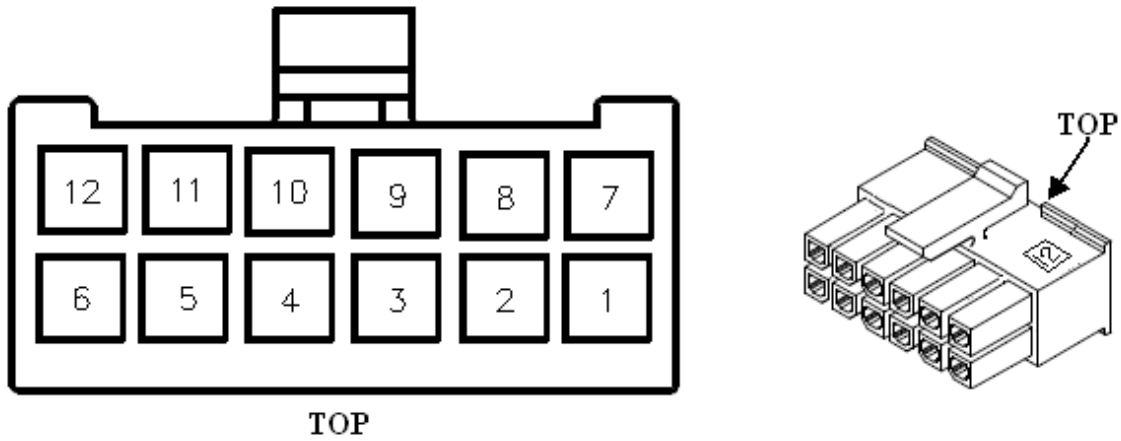


FIGURE #6

15. The CO₂ sensor's manifold is heated and will have arrived in your kit with the heater and thermistor pre-installed.
16. To connect the CO₂ sensors heater/thermistor connector, first locate the IZS connector. See figure #1 for the approximate location. The connector will be cable tied to the cable bundle and the connector will be covered with black heat shrink. There may be several unused connectors in the area with heat-shrink. It will be necessary to remove the black heat-shrink to identify the connector labeled "IZS." See figure #7.
17. Connect the CO₂ heater plug to the IZS connector from step 14.

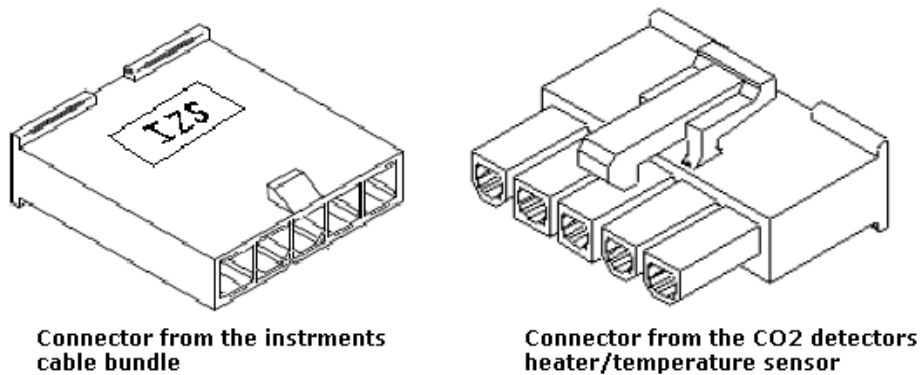


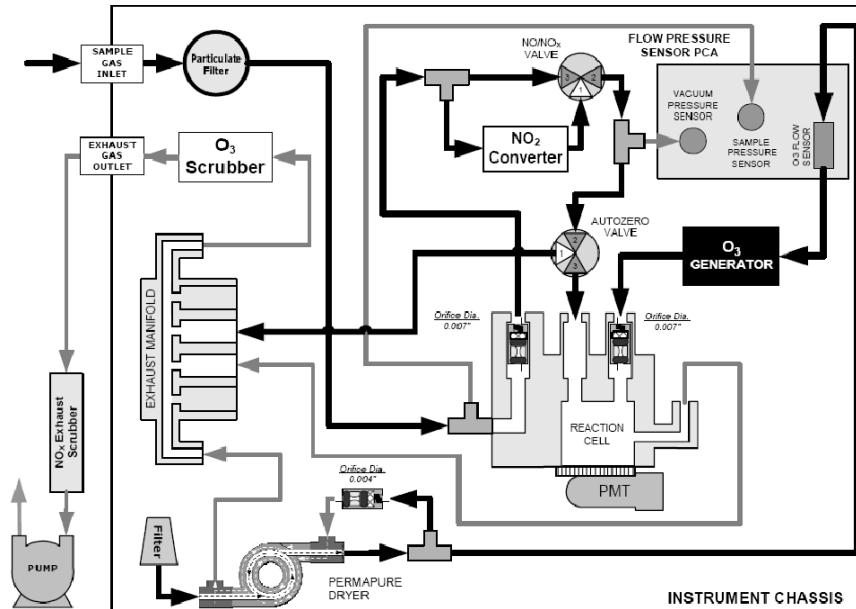
FIGURE #7

18. Connect the Orange sensor cable to the top of the CO₂ sensor and secure the locking ring.
19. Install the replacement Disk On Chip containing the instruments new firmware. Refer to service note 03-013 for instruction on changing the analyzers firmware by replacing the D.O.C.
20. See the Cover Letter included in your kit for calibration instructions.

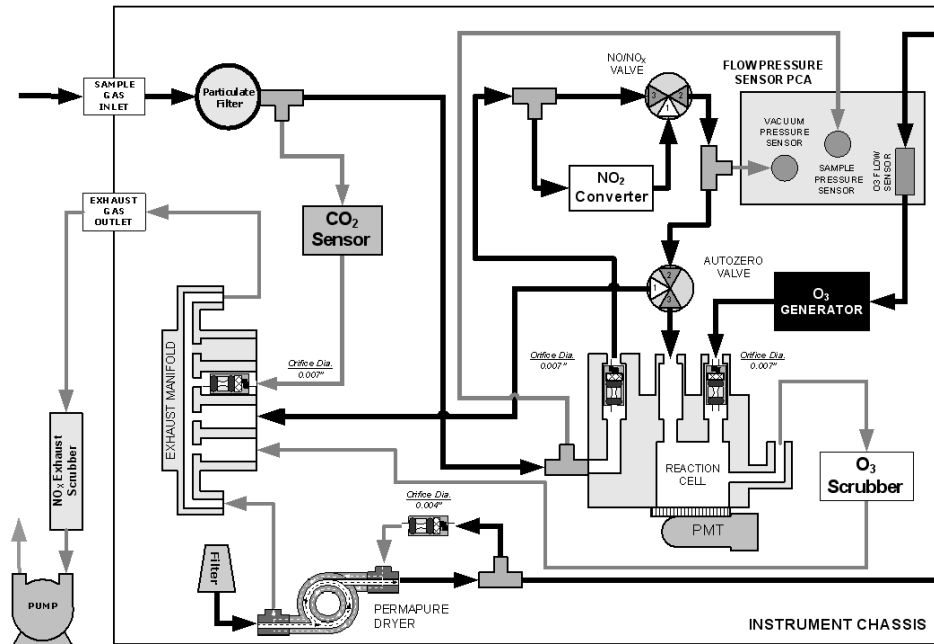
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VI. M200EM with a 3 port reaction cell, old configuration:

21. Follow the CO₂ Module installation procedure in section IV. **PROCEDURE.** Refer to figure #8



M200EM Pneumatic Diagram



M200EM Pneumatic Diagram with CO₂ Sensor option

FIGURE #8
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22. Locate and remove the Particulate filter assembly. Remove both stainless steel fittings from the assembly. The removal of both fittings is necessary to install the new Tee fitting, supplied with your kit.
23. Locate the Tee fitting that came with your kit. Wrap the machine threaded port of the Tee fitting with two turns of Teflon tape and install in the output port of the sample filter assembly, see figure #8 and #9.

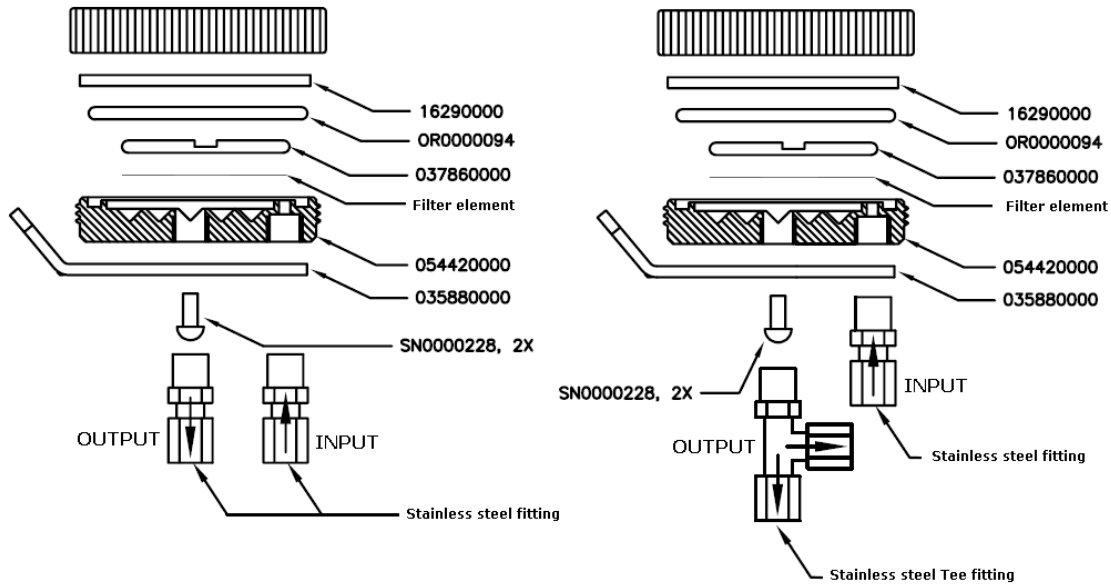


FIGURE #9

24. Remove the old Teflon tape from the stainless steel inlet fitting removed in step 19 and add two turns of fresh Teflon tape.
25. Reinstall the inlet fitting in the sample filter assembly.
26. Locate an unused port on the exhaust manifold and remove its plug. Install the flow control assembly that came with your kit into this unused port, see figure #3 and #8. Ensure that the fitting has been wrapped with Teflon tape.
27. Locate the 1/8th inch clear pneumatic tube attached to the OUTLET of the CO₂ sensor. Connect this tube to the Flow control fitting from step #8, See figure #4, and #8.
28. See step 16 and 17.

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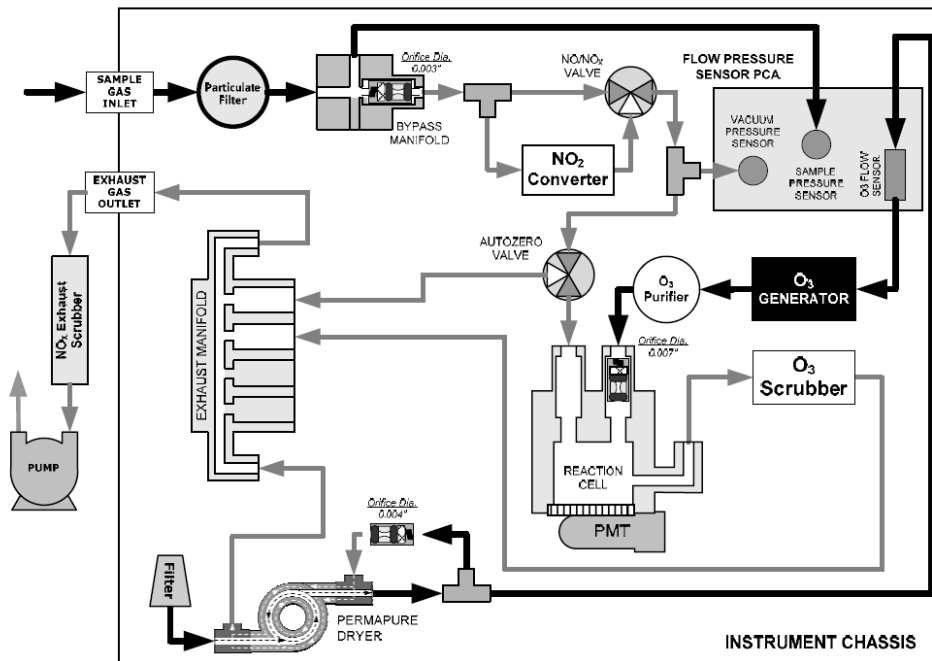
VII. M200EM with the oldest configuration 2 port reaction cell:

29. Follow the CO₂ Module installation procedure in section **IV**.
PROCEDURE. Refer to Figure #10.
30. Locate the bypass flow manifold. On the bypass flow manifold, locate and remove the pneumatic tube and fitting that leads to the sample pressure sensor, see figure #10.
31. Wrap the machine threads with two turns of Teflon tape and install the Tee fitting that came with your kit on the empty port of the bypass manifold, see figure #10.
32. Attach the pneumatic tube that leads to the sample pressure transducer that was disconnected in step 27 to one of the empty ports of the Tee fitting from step 28.
33. Locate the 1/8th inch clear pneumatic tube attached to the INLET of the CO₂ sensor, see figure #4. Connect this tube to the open port on the Tee fitting from steps 28, See figure # 10.
34. Locate an unused port on the exhaust manifold and remove its plug. Install the flow control assembly and fitting that came with your kit into this unused port, see figure #3. Ensure that the fitting has adequate Teflon tape on the threads.
35. Locate the 1/8th inch clear pneumatic tube attached to the OUTLET of the CO₂ sensor. Connect this tube to the flow control fitting from step 31, See figure #3 and #10.
36. Follow step's 10-15 of section **V**. for connecting the CO₂ sensor electrically.
37. See step 16 and 17.

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M200EM Internal Pneumatic Block Diagram - Standard Configuration

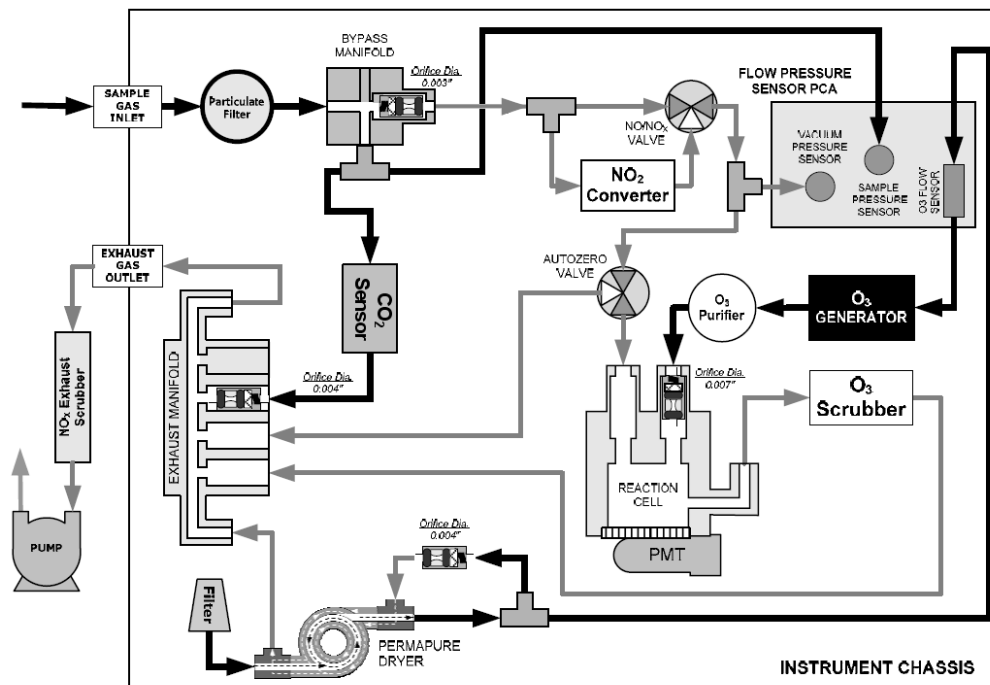


Figure 5-9: M200EM – Internal Pneumatics with CO₂ Sensor

FIGURE #10

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