TELEDYNE
INSTRUMENTS
Advanced Pollution Instrumentation

A Teledyne Technologies Company

Service Note

09-006A
07 August, 2009

ADDING A CO_2 SENSOR OPTION TO THE M100E-EH

I. PURPOSE:

This service note is to provide instructions on how to add the CO_2 option (67A) OPTION, CO_2 SENSOR (20%) to your M100E-EH.

II. TOOLS:

Philips screwdriver
Molex pin extractor #11-03-044
¼ inch, 9/16, 7/16 box/open end wrenches

III. PARTS:

KIT000294 (054250000 OPTION, CO_2 SENSOR (20%))

CAUTION!

ELECTROSTATIC SENSITIVE DEVICE

DO NOT OPEN OR HANDLE
EXCEPT AT A
STATIC-FREE WORK STATION

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. Before the CO_2 Sensor can be installed, it will be necessary to replace the standard reaction cell with one that has tapped holes for mounting the CO_2 sensor (000210101). Please see figure #1 for an exploded view of the reaction cell that will help guide you through the replacement.
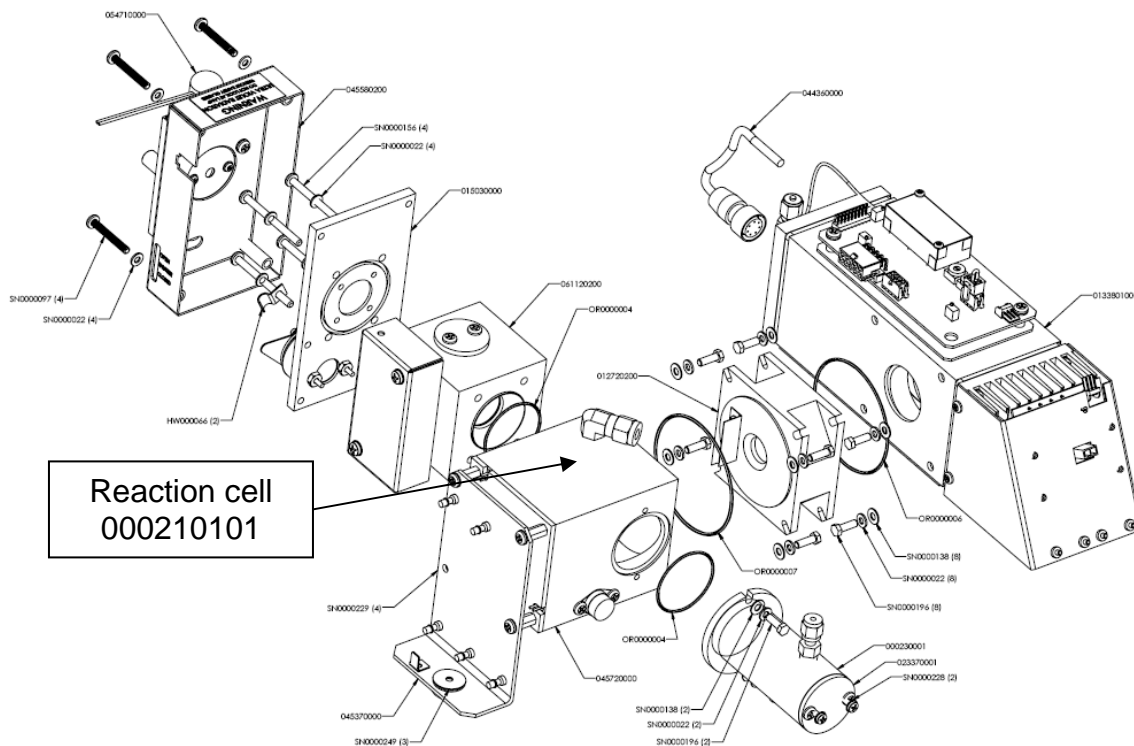
Figure #1

2. Remove the reaction cell/PMT housing from the instrument by disconnecting all of the electrical connections to the preamp, the reference detector, and lamp driver.
3. Disconnect the 2 pneumatic connections, sample inlet, and exhaust.
4. Remove the 3 retaining screws that hold the r-cell/PMT housing to the chassis and lift them from the instrument.
5. Remove 4 bolts that hold the reaction cell to the PMT housing using a 1/4 –inch wrench and remove the reaction cell.
6. Disassemble the reaction cell and replace the sample chamber with (000210101 REACTION CELL, w/CO_2 SENSOR, TF COATED).Use caution not to get fingerprints in the reaction cell or on the optics. If cleaning is necessary, use only a lint free cloth.
7. Reassemble and reinstall the reaction cell and PMT housing.
8. Comparing figures 2 and 3 will help to familiarize you with the components, their arrangement and pneumatic path.
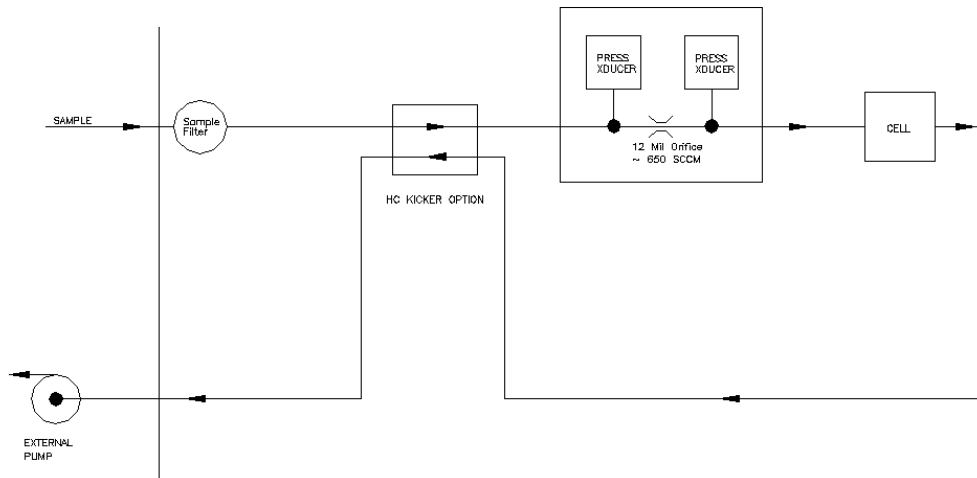
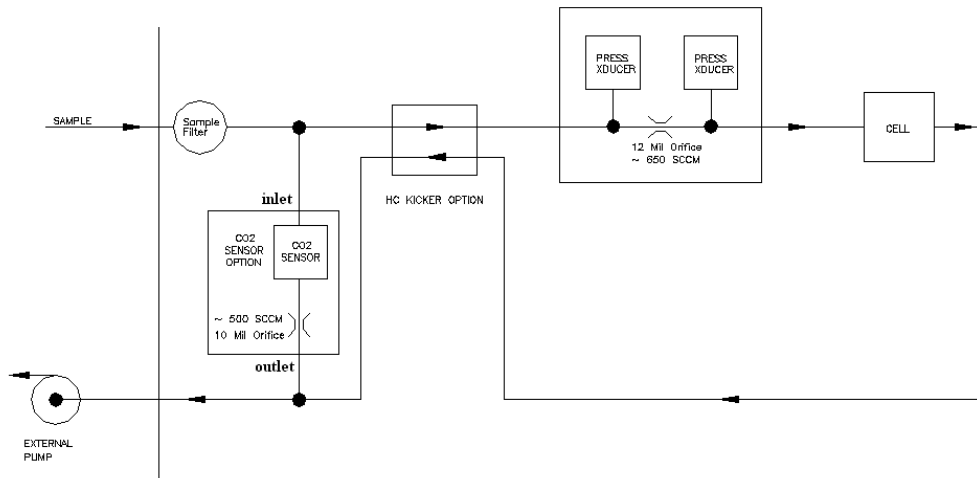**FIGURE 2 – M100E-EH**

FIGURE 3 – M100E-EH with CO$_2$ sensor

9. Using the #8 x 1.5" (sn-150) screws, mount the CO$_2$ sensor cell to top of R-Cell.
10. Install CO$_2$ sensor (OP-33) into sensor housing, with O-Ring (OR-101) and secure cap (05425), with the #8-32 x 3/8" (sn-228) screws supplied with your kit.

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11. Secure the bracket (with the CO_2 sensor PCA pre installed) to the chassis; see figure #7.
12. Plumb sensor according to the pneumatic Diagram in figure #3.
13. Install the 2 clear 1/8-inch tubes supplied with your kit to the CO_2 sensor. The shorter of the two should be connected to the fitting on the left side of the CO_2 sensor manifold (inlet). The longer of the 2 should be installed on the right side of the CO_2 sensor manifold (outlet) and fed toward the back of the instrument, see figure #4.
14. Disconnect the black tube (output) from the sample filter assembly and connect this tube to one port of the Teflon Tee fitting supplied with your kit.
15. Connect one end of the 12-inch (black) 1/8-inch tube that came with your kit to the outlet of the sample filter. Connect the other end of the 12-inch (black) tube to one of the open ports of the Teflon Tee from step 14.
16. Connect the clear Teflon 1/8-inch tube from the inlet of the CO_2 sensor to the last open port of the Teflon Tee fitting, see figure #4.
17. Secure the Teflon Tee fitting using tie-wraps, see figure #4.
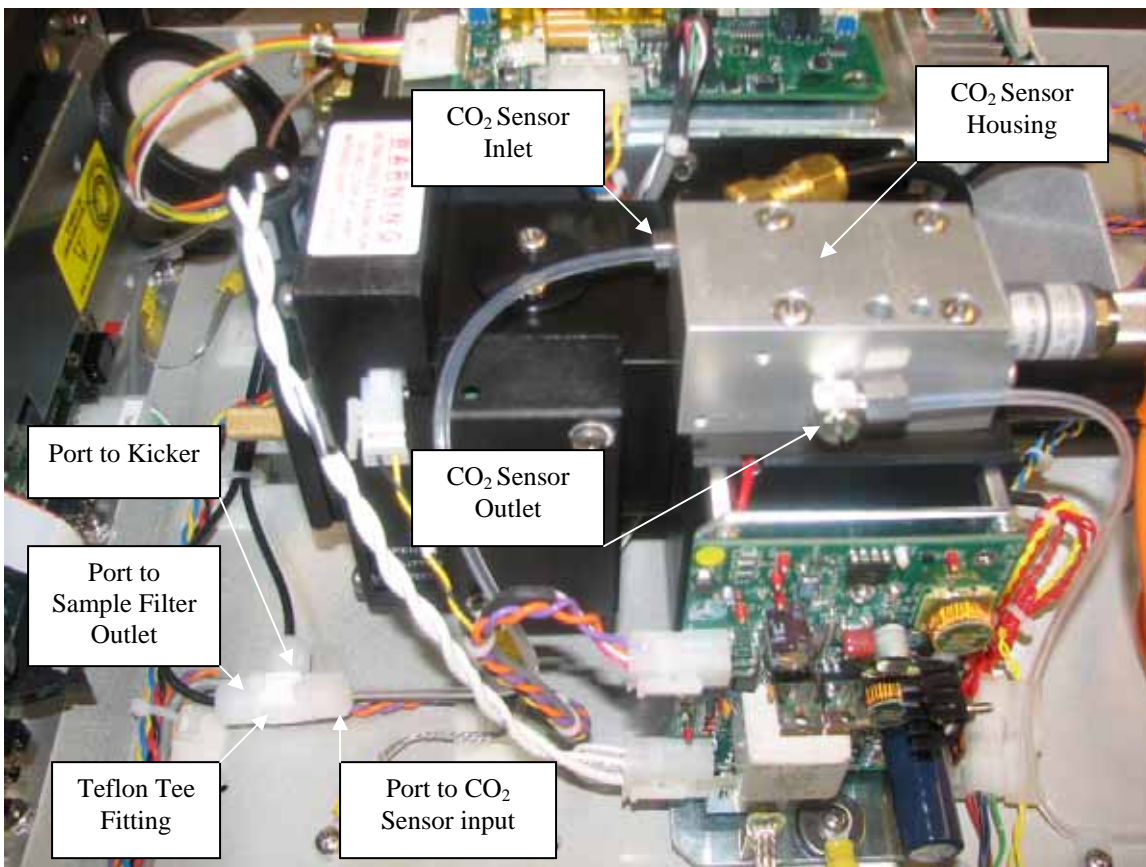

FIGURE 4

18. Disconnect ¼-inch black Teflon tube from the exhaust bulkhead fitting on the rear panel of the analyzer.

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19. Install the stainless steel Tee fitting supplied with your kit on the exhaust bulkhead fitting, see figure #5.
20. Install the flow control assembly supplied with your kit to the stainless steel Tee fitting from step 13, see figure #5
21. Connect the 1/8-inch clear Teflon tube from the outlet of the CO_2 sensor form step 7 to the inlet of the flow control assembly.
22. Connect the ¼-inch black Teflon tube disconnected in step 18 to the open port of the stainless steel Tee fitting in step 19.
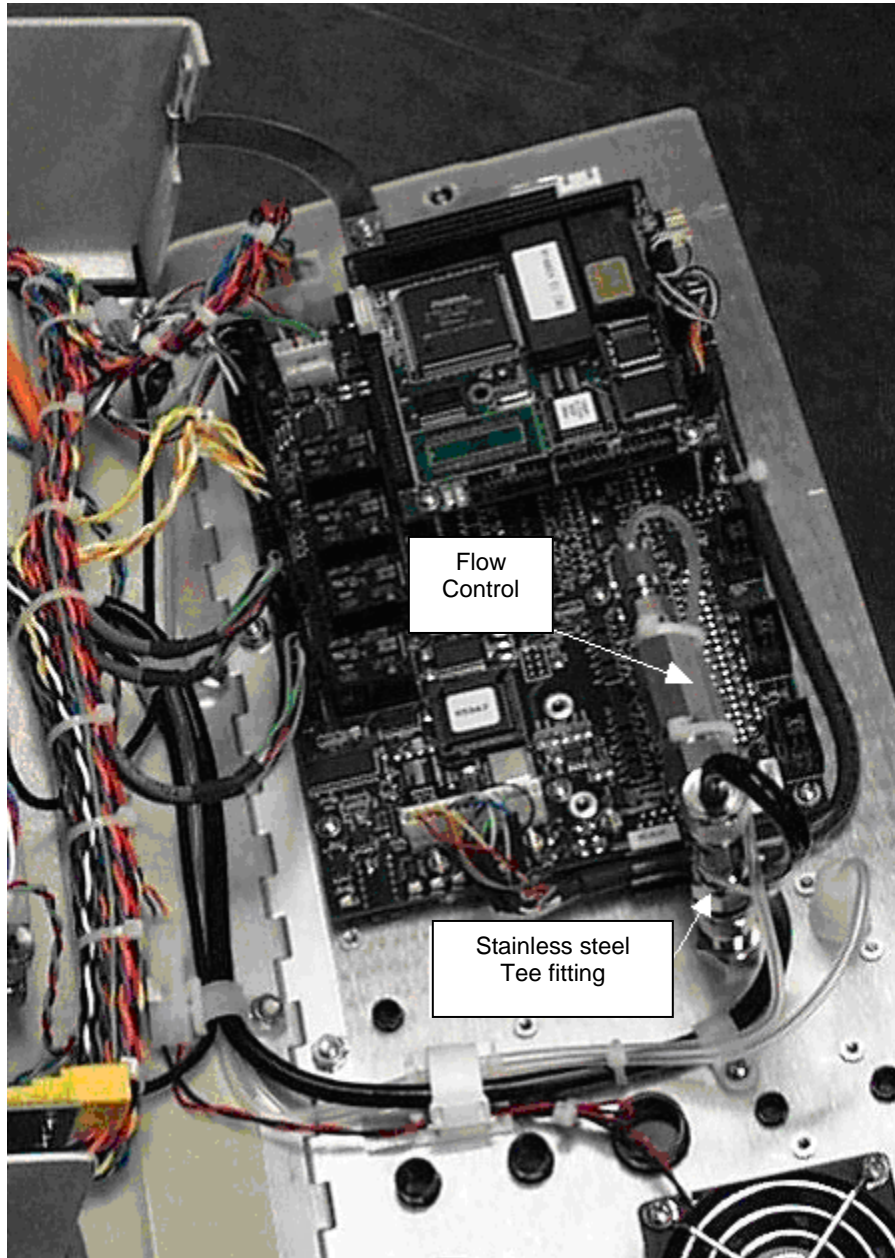23. Verify your pneumatic connections by comparing them with figure #3.

Flow Control

Stainless steel Tee fitting

FIGURE 5

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24. Comparing figure #6 to your instrument will help to familiarize you with the electrical components, their arrangement, and connections.
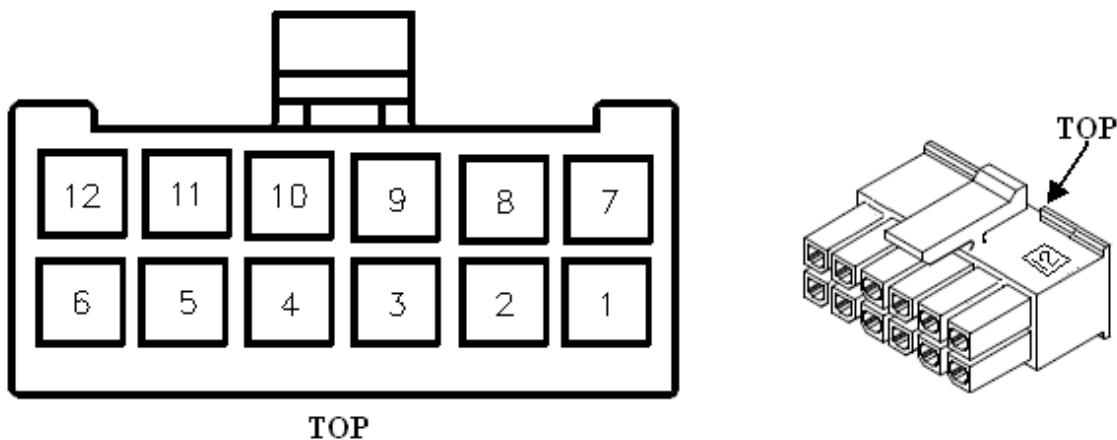

FIGURE 6

25. Fold down rear panel of instrument and, remove J-110 electrical connector from the Motherboard. Locate the pin numbers around the body of the connector. You will note that only pin 1 and pin 12 are labeled so, use caution to ensure that you are removing the correct wire, see figure #6. Using the Molex pin extractor Remove the green wire from pin 3 & remove the Black wire from pin 5.

26. Install the Green wire from step 25 into Pin 10 of J-110 & install Black wire from step 25 into Pin 3 of J-110.

27. Using the 7" of Red 22 AWG from your kit, connect "V terminal" on the CO_2 Sensor PCA to Pin 4 on Flow controller connector.

28. Using the 7" of Green 22 AWG from your kit, Connect "O terminal" on the CO_2 Sensor PCA to Pin 1 on the Flow Controller Connector.

29. Using the 12" of Blue 22 AWG from your kit, Connect "+L terminal" on the CO_2 sensor PCA to J12, Pin 4, on Relay Board.

30. Using the 12" of Green, 22 AWG from your kit, connect "GND terminal" on the CO_2 sensor PCA to J12, Pin 3, on Relay Board.

31. Install the replacement Disk On Chip containing the instruments new firmware. Refer to service note 03-013B for instruction on changing the analyzers firmware by replacing the D.O.C.

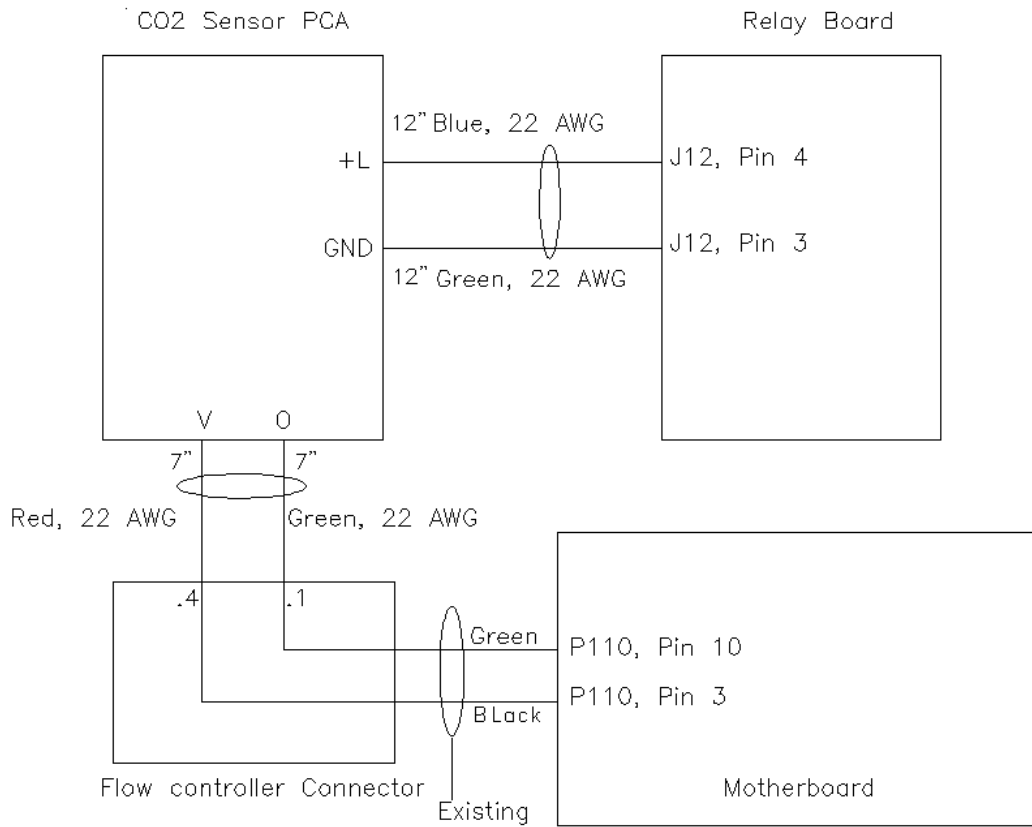32. See the Cover Letter included in your kit for calibration instructions.
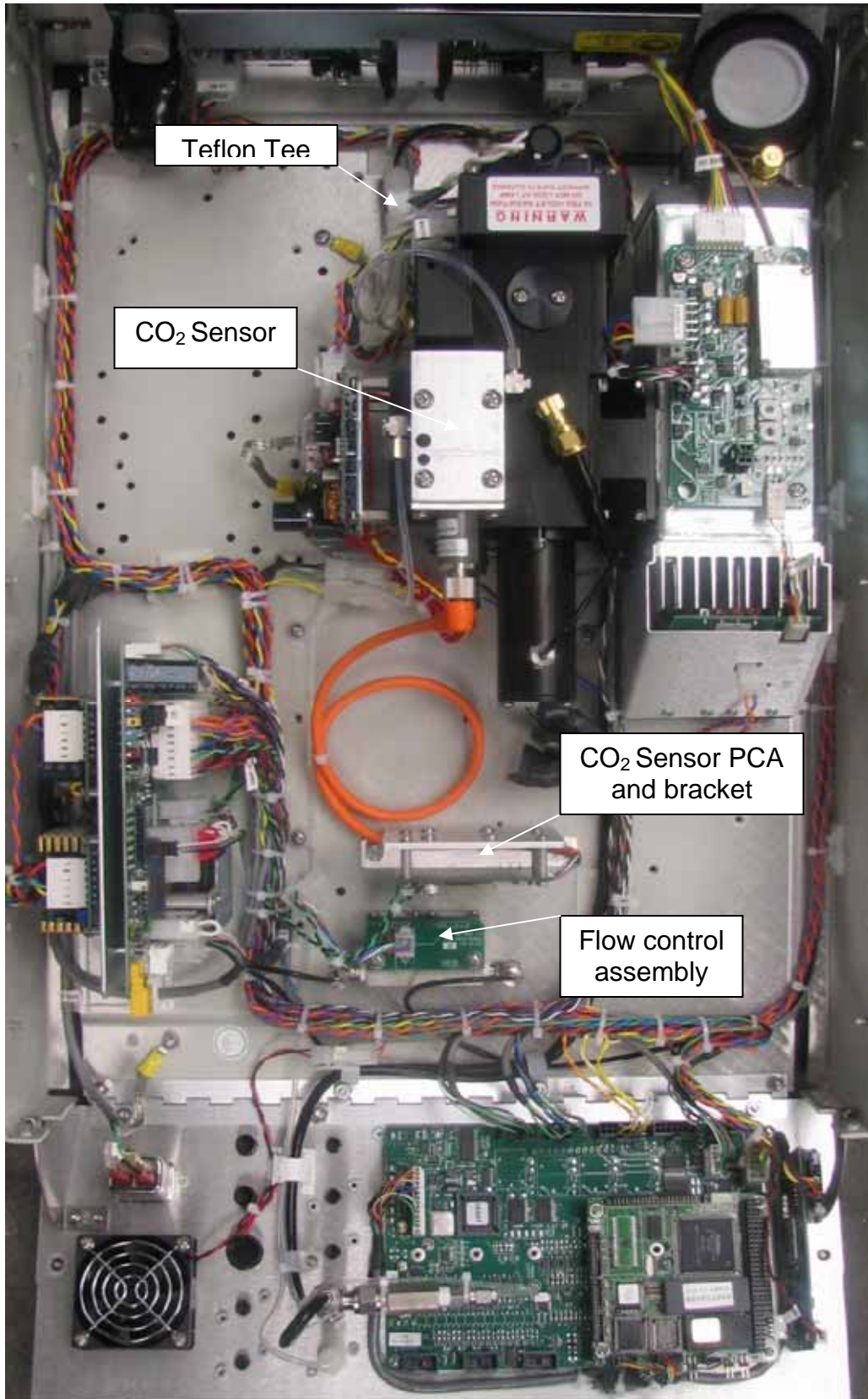
FIGURE 7 – Wiring diagram

Teflon Tee

CO$_2$ Sensor

CO$_2$ Sensor PCA and bracket

Flow control assembly

FIGURE 8 – Layout (with CO$_2$ sensor installed)

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