ENVIRONICS TECHNICAL BULLETIN #129

Series 6103 – Pre- qualifying procedure for use as a Primary Standard

PURPOSE:

This procedure will allow the user to evaluate and adjust the temperature sensor and the photometer pressure transducer in order to determine if the system pre-qualifies as a primary standard. The system will still need to be sent to your EPA Region for final approval as a Primary Standard.

If the system is not being used as a primary standard or you are not required to individually calibrate these devices, then a photometer calibration/certification should suffice. Reference the Service Manual for necessary procedures.

It is important to note that the accuracy of the pressure transducer and pressure readings has more impact on the ozone reading than gas temperature change. For a 1% change in pressure, the ozone is impacted by a 1% change. However, because temperature measurement and correction are done using Kelvin, it takes an approximate 12% change in gas temperature (measured as degrees C) to have a 1% impact in ozone. The pressure sensor is the easiest to calibrate at multiple points (up to 11) and a calibration table resides in the software for saving the data.

GAS TEMPERATURE SENSOR CALIBRATION PROCEDURE

This procedure is for performing the gas temperature sensor calibration for the photometer of the 6103. Note, the temperature sensor is press fit through a hole in the barb fitting. The face of the temperature sensor is flush with the inside wall of the fitting, which causes it to be exposed to the gas as it leaves the photometer tube at the photo detector end.

Use calibrated temperature meter with exposed junction thermocouple.

1. Remove the photometer tube from the 6103 under test.
2. From one of three main menus, on the 6103 front panel, select the CALIB mode.
3. Select ADC
4. Enter 7. NOTE: This is the 6103 ADC cal table for the temperature sensor circuit on the PC415. The live reading (ADC RESP) in this table is a voltage. The voltage times 100 is the temperature in degrees K. 273.15 degrees K is 0 degrees C. The normal live reading value should be between approximately 2.96 (22.85^{o}C) and 3.0 (26.85^{o}C). To convert this voltage to degrees C:

Degrees C = live reading (ADC RESP) * 100 – 273.15

5. Set the first column first row value to 2.7315 and the second column first row value to 0.0000.
6. Insert the exposed junction thermocouple into the fitting containing the temperature sensor. Get the thermocouple as close to the sensor as possible without touching the inner wall of the fitting or any other surface.
7. Place the live reading, TEMP(**L**) of ADC 7 in the first column, second row location.
8. Place the value, measured in step 6, TEMP(**A**), into the second column, second row location. Note: This has identified to the software that for the 6103 live reading from step 7, the actual temperature is the value measured in step 6.
9. Zero all other fields in the cal table such that rows 1 and 2 are the only rows with data.

DATA IN ADC 7 CAL TABLE

ADC RESP = 3.0000		
1 =	2.7315	0.0000
2 =	3.0000	26.120
3 =	0.0000	0.0000
4 =	0.0000	0.0000

CALIBRATING PRESSURE TRANSDUCER ON PC415

Use 0 to 50 PSIA certified pressure transducer in PC224 test fixture.

PSIA(**A**)= (VDC-.5VDC)*10 PSIA/1VDC **A**=ACTUAL

= (VDC-.5)*10

Note: Open the PC224 test unit pressure transducer to ambient.

1. Remove the photometer tube from the 6103 under test.
2. From one of three main menus, on the 6103 front panel, select the CALIB mode.
3. Select ADC
4. Enter 6. NOTE: This is the 6103 ADC cal table for the pressure transducer circuit on the PC415. The live reading (ADC RESP) in this table is a voltage and the scale of the circuit is 0 to 5 VDC for 0 to 30 PSIA. The live reading should be between 2.3 and 2.5 VDC (13.8 to 15 PSIA)
5. Set the first and second column first row values to 0.

6. Measure the voltage from the PC224 test fixture pressure transducer and run it through the formula from above, PSIA(**A**)=(VDC-.5)*10
7. Place the live reading of ADC 6 in the first column, second row location.
8. Place the value, derived in step 6, into the second column, second row location. Note: This has identified to the software that for the 6103 live reading from step 7, the actual pressure is the value from step 6.
9. Zero all other fields in the cal table such that rows 1 and 2 are the only rows with data.

DATA IN ADC 6 CAL TABLE

ADC RESP = 2.4257	
1 = 0.0000	0.0000
2 = 2.4257	14.429
3 = 0.0000	0.0000
4 = 0.0000	0.0000