5 Troubleshooting

5.1 Troubleshooting Guide

The trouble shooting guide will help resolve many of the common problems that can occur.

NOTE

*If it is necessary to return the analyzer to the factory for repair, refer to the **Shipping the Analyzer** section on page 38.*

5.1.1 Problem Observations

Observation	Possible Remedy (See Table Below)
1. Analyzer reads low	G A B D E H I F J K
2. Analyzer reads high	A B C D E I J K
3. Analyzer output noisy	A E I K
4. Analyzer reads high with pump on	C K
5. Analyzer reads 0.00 or less at all times	D K
6. Slow speed of response	G C D E F K
7. Electrolyte residue visible on the sensor	K
8. Electrolyte Condition indicator ON	E K

Table 6: Problems and Observations

5.1.2 Remedy Table

	Remedy Description
A.	Check the analyzer calibration using a gas of known oxygen concentration.
B.	Check to see that the Zero Calibration Value agrees with the factory value marked on the sensor.
C.	Check the sample delivery plumbing for leaks using the procedure described in the Sample Gas and Plumbing Requirements section of this manual. See page 25
D.	Verify that the correct voltages are being supplied to the sensor. These voltages should be checked with the cable disconnected from the sensor. **Primary Electrodes** wht/yel (-) to wht/blk/red (+) = 1.3 +/- 0.03 VDC (For 25% sensors only = 1.4 +/- 0.03 VDC) **Secondary Electrodes** wht/blue (-) wht/red (+) = 7.0 +/- 0.5 VDC Voltage levels between any other combination of wires should be less than 0.1 VDC.
E.	Change the electrolyte Rinse the sensor with de-ionized or distilled water prior to refilling and use only DF-E05 electrolyte. Allow several hours of operation on gas to equilibrate.
F.	Turn the analyzer off and reverse the position of the two lower leads on the sensor. Establish a gas flow and allow the analyzer to operate in this fashion for more than one hour but not more than three hours. Return the wires to their original position and change the electrolyte Rinse the sensor with de-ionized or distilled water prior to refilling and use only DF-E05 electrolyte. Allow several hours of operation on sample gas to equilibrate.
G.	Remove and check the filter element. Replace if necessary.
H.	Check for contaminated plumbing. This is most easily done by examining the flow meter or the plastic outlet tubing, if so equipped, for evidence of oil, powder, or other material that might have made its way into the analyzer.
I.	Remove all devices from the analyzer outputs including alarm connections, recorders, etc. Check the operation of the analyzer with those devices removed.
J.	Make sure that the sample gas is consistent with the calibration of the analyzer as noted on the Calibration Log on the inside of the door. For example, if the analyzer is calibrated for nitrogen, a helium sample gas will not be measured accurately.
K.	Call the Delta F Service line at 781/935-5808 for assistance.

Table 7: Possible Solutions

5.2 Troubleshooting Considerations

5.2.1 Gas Pressure Effects

Gas tubing should be kept as short as possible to minimize pressure drop and overall system response time. Larger diameter tubing will help avoid pressure drop but will lengthen the response time. In general 1/8 inch tubing should be limited to 15 foot runs. Longer runs should use 1/4 inch tubing.

5.2.2 Positive Pressure Operation

Gas pressure should be set to establish a flow of 1.0 to 3.0 scfh.

If the analyzer is not vented directly to atmosphere, downstream conditions may restrict flow. Keep downstream plumbing lengths and restrictions to a minimum.

NOTE

All positive pressure flow control must be accomplished upstream of the sensor.

5.2.3 Negative Pressure Operation

If the gas stream is between 2.0 psig vacuum (12.7 psia) and 2.0 psig, a pump is recommended. If the analyzer is equipped with a pump, it will also have a flow control valve in the flowmeter.

If there is a valve or regulator up stream of the analyzer, it should be kept fully open and flow rate adjustments should be made with the downstream flow control valve in the flowmeter.

NOTE

All negative pressure flow control must be accomplished downstream of the sensor.

5.2.4 Temperature Effects on Sensor Performance

The output of the sensor, given a constant oxygen concentration, will vary slightly with sensor temperature. Temperature effects are most pronounced at concentrations near zero in the lower range analyzers. Percent range sensors will exhibit almost no temperature sensitivity.

The effects of temperature are expressed in Table 8.

Range	Temp Range (70ºF nominal)	% of Reading/°F (2% - 100% of range)	Typical Drift (lower 2% of range)
0-50 ppm	45ºF – 95ºF	±0.32	±65 ppb
0-100 ppm	45ºF – 95ºF	±0.32	±125 ppb
0-500 ppm	45ºF – 95ºF	±0.32	±250 ppb
0-1000 ppm	45ºF – 95ºF	±0.32	±500 ppb
0-5000 ppm	45ºF – 95ºF	±0.24	±2.5 ppm
0-10,000 ppm	45ºF – 95ºF	±0.20	±5 ppm
0-5%	45ºF – 95ºF	±0.12	±0.003%
0-10%	45ºF – 95ºF	±0.04	±0.005%
0-25%	45ºF – 95ºF	±0.01	±0.013%

Table 8: Typical Output Drift by Analyzer Range

5.3 Fuse Replacement

DANGER

The instrument power switch must be in the OFF position and the power cord unplugged before removing the fuse holder cap.

Failure to do so may expose the operator to hazardous voltages.

All fuses within the analyzer are user replaceable. The main power fuse is located on the rear panel above the AC power connector. Use the proper fuse for the operating voltage of the analyzer. The operating voltage for which the analyzer is set is marked beside the AC power connector. All power input fuses are 5X20 mm, 250 VAC, IEC Sheet III, Type T devices. For 110 VAC operation the fuse is a .5 A time delay device and for 220 VAC operation the fuse is a .25 A time delay device. Refer to the spare parts list on page 37 for fuse part numbers.

If the analyzer is equipped with a 4-20 mA option, it is installed on a daughter board attached to the main circuit board. There is a 5X20 mm, 250 VAC, 100 mA fast acting fuse on the 4-20 mA board.