



Technical Support Note

Title: MAP Analyzer 'Lo' and 'Off' Oxygen Sensor Prompts Explained

TSN Number: 05

File:S:\Bridge_Analyzers\Customer_Service_Documentation\Technical_Support_Notes\
05_Oxygen_Sensor_Lo_and_Off_Prompts_Explained.docx

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Last Revision Date: 11-Aug-11

What causes a 'Lo' or 'Off' prompt:

The electro-chemical O₂ sensor used in Bridge gas analyzers generally has a service life of 12 to 18 months when exposed to ambient air containing 20.9% oxygen. The analyzer automatically tests the sensor for degradation when the oxygen sensor is calibrated on ambient oxygen during the 'Zero' process – and notifies the user if degradation is detected by displaying either 'Lo' or 'Off' on the oxygen display at the end of the Zero process:

A '**Lo**' prompt means that the oxygen sensor has low sensitivity, and is due for replacement within the next month.

An '**Off**' prompt means that the sensor output is so low that it is unusable.

(Either of these prompts may be cleared by pressing any button on the front panel.)

However, a 'Lo' prompt is an indication that the oxygen readings may become more unstable and less usable in practice – and an 'Off' prompt means the oxygen readings are unreliable and a correction should be made.

Troubleshooting a 'Lo' or 'Off' display:

The most common reason for a 'Lo' display is an expiring O₂ sensor. The sensor produces a small voltage when exposed to ambient air (about 12mV when new), so a low voltage output sensor can be verified by removing it from the analyzer, and measuring the voltage between the two outside pins on the connector using a Digital Voltmeter. If it is less than 5 mV (0.005V), it is low enough to trigger the 'Lo' prompt. If it measures less than 2 mV, (0.002V), it is low enough to trigger the 'Off' prompt. In either case, the sensor should be replaced. If it is above 5.0mV then the sensor is OK – and additional troubleshooting is necessary.

If the sensor seems ok, but the display reads 'Off', check that the connector and cable are intact and installed correctly. An 'Off' prompt can be caused by a wiring disconnect between the sensor and the analyzer. If the wiring seems intact and the connector is fully installed, proceed to the steps below.

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If the oxygen sensor is not exposed to ambient air during the Zero process, it can produce a low voltage even though the sensor itself is ok. Blocked gas flow during the Zero process can prevent ambient air from displacing test gas containing little or no oxygen in the analyzer – causing a perfectly good oxygen sensor to appear weak. In order to troubleshoot this issue, perform the following steps:

1. Re-install the oxygen sensor. Restart the analyzer and make sure the sample line is exposed to room air. Execute a Zero to begin analyzer operation. (If a 'Lo' or 'Off' prompt appears, clear it by pressing the DOWN button.)
2. Temporarily block the gas output port at the top-right hand side of the analyzer for a second or so. This will pressurize the gas flow, and the oxygen reading should rise. A rising oxygen reading means that gas is flowing out the analyzer. No change in reading indicates that either there is no gas flow, or the oxygen reading is not being made correctly.
3. If there is no change in reading, remove the sample line from the analyzer and repeat the test. If there is still no rise in reading, there is an internal blockage or pump problem, and the analyzer must be returned to Bridge for service. If there is a change in reading when the sample line is removed, there is a blockage in the sample filter or needle that should be corrected before proceeding to the next step.
4. Once the blockage has been cleared, and normal gas flow appears, let the analyzer sample ambient air and perform a Zero to verify that the prompt does not appear after the Zero. Then, run a sample/hold TEST on ambient air to freeze the display and turn off the pump. Insert the needle into a package containing little or no oxygen and run another test. Confirm that the oxygen reading is below 2.000 %, and if it is no, run another test until it is. At the end of the test, leave the needle in the package and Zero the analyzer. If the 'Lo' or Off prompt appears, the test gas is not being correctly replaced by ambient air during the Zero process due to a sticky or defective gas switching solenoid, and the analyzer must be returned to Bridge for service.

Service Life effects due to process gas:

Shortened life on high oxygen concentrations: The life of the O₂ sensor is 12 to 18 months on room air containing 20.9% oxygen. A typical gas of this type is Case-Ready Hi-Ox, which contains 80% oxygen / 20% CO₂. As Hi-Ox as 80% O₂ in it – four times the oxygen concentration of room air – it will cause shortened service life from the 12-18 months above. If the sensor was continually exposed to Hi-Ox, you would see ¼ the ambient air life – or 3 to 4 ½ months. It is not continually exposed to Hi-Ox during typical use, so while the service life is less than ambient air service life, its value depends

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on the duty cycle of the analyzer in use. If it is used for 1 shift, 5 days a week, the life is reduced by 25%, making it 9 to 14 months. 2 shifts 5 days a week would reduce it to ½ the normal life., making it 6 to 9 months.

Part number 001140G (Green) sensor on high CO2: Repeated exposure of the P/N 001140 (Green) O2 sensor to CO2 levels above 20.0% can cause early failure of this sensor – 3 to 4 months as opposed to a normal service life of 12-18 months. Bridge Analyzers, Inc has an equivalent PN 001057 (Red) O2 sensor which is designed for high CO2 and has a service life of 18-24 months in these applications.

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