



White Paper

Title: Field Functional Testing for Low MAP Gas Analyzer Gas Flow Conditions

TSN Number: 16

File:S:\Bridge_Analyzers\Customer_Service_Documentation\White_Papers\MAP_CAT\
16 MAP Analyzer Low Flow Field Test Sensor Air.docx

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Last Revision Date: 17-Dec-09

Problem: Slow Reading, No Reading, No Gas Flow:

The biggest problem encountered in the field with these analyzers is sample needle or sample filter contamination blocking gas flow into the analyzer. If this occurs, the analyzer will appear to perform its normal functions, but will take longer than normal to make gas measurements. It may also not transition to room air correctly during a Zero calibration, resulting in an incorrect Zero calibration and subsequent measurement instability. There is a simple and effective test that will allow the operator to detect and rectify this problem in the field.

Field Functional Test – ‘Breath Test’:

Bridge Analyzers has developed a relatively simple field test to assure the user that the gas analyzer is operating properly. This test not only assures the user that the gas sample flow is adequate, but that both CO₂ and Oxygen are being measured and the results are reasonable. While it is no substitute for calibration testing using a certified gas mixture, it does provide simple and immediate confirmation of basic analyzer function.

This method relies on the fact that human respiration is a relatively stable chemical process that utilizes the oxygen in air to produce CO₂ in exhaled breath. At the end of each breath, there should be about 14% Oxygen and 5% CO₂ in the exhaled breath. Measuring this level of Oxygen and CO₂ from your breath is a simple and practical way to provide functional verification of analyzer performance.

To do this, simply allow the analyzer to sample your exhaled breath by holding the sample needle near your open mouth and exhaling gas in such a way that you flood the area around the sample needle and the gas analyzer samples it. (Do not blow directly into the needle – just provide a large volume of exhaled breath that floods the volume air around the needle tip so that the analyzer draws in a gas sample on its own.) You should see the Oxygen gas reading rapidly go down from 20.6% O₂ to 14 - 15% O₂, and at the same time that CO₂ should go up to 4 - 5% CO₂. (The gas values in exhaled breath gradually increase to these values during the breath itself. The 5% value given is about the maximum for the end of the exhaled breath)

If the gas reading changes above do not occur, or occur very slowly, then no or low sample gas flow is indicated.

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The needle should be removed from the sample filter and the test repeated using the exposed end of the filter to sample breath to test gas analyzer function. If fast response is found, then the needle itself is plugged and should be cleaned or replaced.

If there continues to be no or slow response, remove the sample filter and repeat the test using the end of the sample line alone. If fast response occurs, then the filter is blocked and should be replaced. (This is a particulate and water blocking filter, so if water is inadvertently drawn into the sample needle, it will block the filter and shut down gas flow.) If the filter is only water blocked, it will dry naturally over 25 hours and may be re-used. If it is blocked by a liquid other than clear water, it should be replaced.

If the analyzer still shows no response with the filter removed, this is an indication that the analyzer is not sampling gas due to internal plumbing or sample pump fault. In this case, the analyzer will have to be returned to Bridge for service.

The tests above should indicate if there is sample gas flow blockage in the needle or filter. Once it is determined if the sample needle and/or filter is blocked, the item may be cleared using the methods delineated below. Alternatively, a fresh sample needle and filter should always restore analyzer function so that the field test above is successfully passed.

Sampling System Components

1. Bridge Sample Needle P/N 000617

The sample needle is a special stainless steel pencil point (closed end) cross-drilled (two gas entry holes) design which affords protection against material and liquid contamination from the sample. Only sample needles provided by Bridge Analyzers Inc. (P/N 000617) should be used for this series of gas analyzers as the use of other products (including standard hypodermic bevel cut needles) are hazardous to the user, do not provide proper contaminant protection and may restrict flow enough to drastically reduce analyzer sample flow and response time.

2. Sample Needle Cleaning Tool P/N 000888

While the needle is designed for adverse sample conditions, there is no guarantee that it will not occasionally accidentally ingest contaminants. Bridge Analyzers has developed a sample needle cleaning tool (P/N 000888) that may be used to service the sample needle in case it does become blocked.

3. Bridge Sample Filter 6-Pak P/N 108126

The sample filter used should only be the filter provided by Bridge Analyzers, Inc. (P/N 108126), which is designed to provide low gas restriction, while keeping contamination and liquids from the analyzer internals. Other filters may look similar, but do not provide adequate analyzer protection, and further reduce sample gas flow.

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