

5100/5100 HD Verification and Validation

Background

Many sensors used in gas analyzer systems come into direct contact with the process gas, and there is the potential for degradation over time especially with streams that contain contaminants like glycol, moderate to high levels of hydrogen sulfide etc. With sensor degradation, the analyzer response characteristics change resulting in inaccurate readings.

In order to address this problem, the analyzer is periodically challenged with a known external reference sample or internally generated traceable gas sample. Necessary adjustments are

then made to the calibration (as long as the deviation in analyzer response from the known, expected concentration is within predefined limits). If the analyzer response is not within the predefined limits, the analyzer output is considered invalid and an alarm is triggered. If the alarm condition persists, the sensor is either repaired or replaced.

AMETEK 5100 TDLAS Analyzer

In the case of the AMETEK 5100 TDLAS (Tunable Diode Laser Absorption Spectroscopy) system, the detector element does not come in to contact with the process gas and, therefore, there is no change in the system response relative to the sensor contamination issues described above. However,

it is very important for the end user to know that the analyzer system is performing properly and that the results are accurate and valid. While the analyzer with a non-contact sensor may see little or no degradation, often it is the sample conditioning that introduces analysis errors and therefore needs validation.

The AMETEK 5100 TDLAS uses two methods to provide the analyzer calibration status. One is the built-in verification that insures the integrity of the analyzer performance (making sure the analyzer is working the way it is intended). The second method is the calibration validation where a known challenge sample (bottled gas etc.) can be introduced on demand or periodically to validate the analyzer calibration. The second method tests the whole analyzer system (analyzer and the sample conditioning).

Model 5100



Model 5100 HD

Verification

A key feature of this instrument is the use of a sealed reference cell, which contains a known amount of analyte gas. Primarily, the use of a reference cell is to line-lock the laser. Any minor shift in the observed peak is used as feedback to lock the laser at the peak center. Thus, there is a real time confirmation that the laser is locked on the absorption line. Also, the calculated value of the analyte concentration in the reference cell is used as a check to confirm the analyzer response.

Validation

The analyzer is also configured for field calibration validation and users can challenge the analyzer response (single point span check and zero) with a known sample such as bottled gas. If needed the analyzer response can be adjusted through automatic changes in the calibration parameters. These are achieved via fully automatic external switching valves, which allows auto zero and span validation performed periodically without human interaction.

Safety Classification

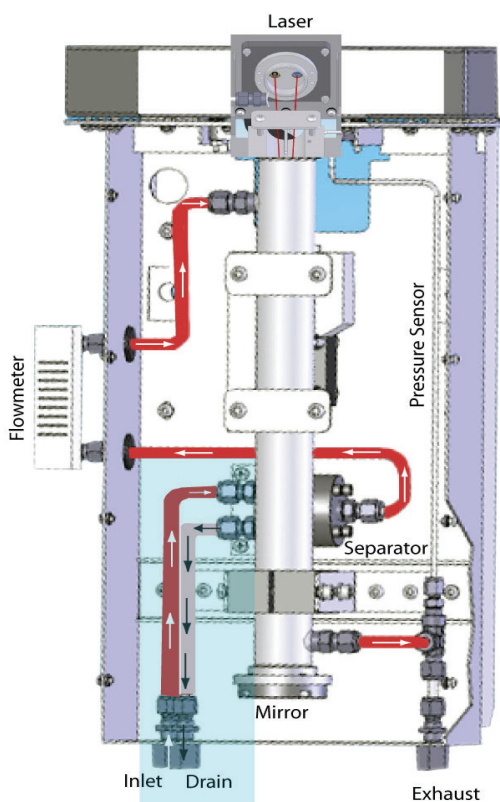
AMETEK Process Instruments TDLAS products utilize laser devices with safety classifications of Class 1 and Class 3b.

Summary

The above two features make the AMETEK Model 5100 truly robust in its performance and reliability. The unique performance verification approach designed into the Model 5100 provides a real-time indication that

the system is performing properly and that the reported concentration results for the gas stream are valid. The validation/calibration feature assures the user that the analyzer results are accurate.

Typical Sample Cell System



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