AMETEK®
PROCESS INSTRUMENTS

APPLICATION NOTE

5100/5100HD VERIFICATION AND VALIDATION

AMETEK 5100 Analyzers

INTRODUCTION

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 ANALYZERS

PRODUCT

In the case of the AMETEK 5100 Tunable Diode Laser Absorption Spectroscopy (TDLAS) system, the detector element does not come into 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 into the complete analyzer system and therefore needs validation.

The AMETEK 5100 TDLAS uses two methods to provide the analyzer performance 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 a validation/calibration 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).

FEATURES

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 desired 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 validation and users can challenge the analyzer's response (single-point span check and zero) with a gas blend that includes a known concentration of the analyte(s) of interest. If needed, the analyzer response can be adjusted through automatic changes in the calibration parameters. These adjustments are achieved via manually driven or fully automatic external switching valves, which allows auto zero and span validation performed periodically without human interaction.

SUMMARY

The two features above make the AMETEK 5100 truly robust in its performance and reliability. The unique performance verification approach designed into the 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.

SALES, SERVICE & MANUFACTURING

USA - Pennsylvania
150 Freeport Road
Pittsburgh PA 15238
Tel: +1 412 828 9040
Fax: +1 412 826 0399

USA - Delaware
455 Corporate Blvd.
Newark DE 19702
Tel: +1 302 456 4400
Fax: +1 302 456 4444

Canada - Alberta
2876 Sunridge Way NE
Calgary AB T1Y 7H9
Tel: +1 403 235 8400
Fax: +1 403 248 3550

WORLDWIDE SALES AND SERVICE LOCATIONS

USA
Tel: +1 713 466 4900
Fax: +1 713 849 1924

Brazil
Tel: +55 19 2107 4100

France
Tel: +33 1 30 68 89 20
Fax: +33 1 30 68 89 99

Germany
Tel: +49 2159 9136 0
Fax: +49 2159 9136 39

India
Tel: +91 80 6782 3200
Fax: +91 80 6780 3232

Singapore
Tel: +65 6484 2388
Fax: +65 6481 6588

China
Beijing
Tel: +86 10 8526 2111
Fax: +86 10 8526 2141
Chengdu
Tel: +86 28 8675 8111
Fax: +86 28 8675 8141
Shanghai
Tel: +86 21 5868 5111
Fax: +86 21 5866 0969

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