

AMETEK Model 5100 Verification / Validation

Background

Some sensors used in analyzer systems come into direct contact with the process gas, and there is the potential for sensor degradation over a period of 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 and

necessary adjustments to the calibration are made (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 specified 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, neither the laser source nor the detector element 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.

AMETEK 5100 TDLAS uses two methods to guarantee users the level of comfort they need to have about their analyzer. 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 (bottled gas etc.) can be introduced on demand or periodically to validate the



Model 5100



Model 5100 HD

analyzer calibration. The second method tests the whole analyzer system (analyzer and the sample conditioning) and eliminates sample conditioning induced errors.

Verification

A key feature of this instrument is the use of a sealed reference cell, which contains a known amount of analyte gas measured, for referencing the emission wavelength of the laser. Primarily, the use of a reference cell enables the ability 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

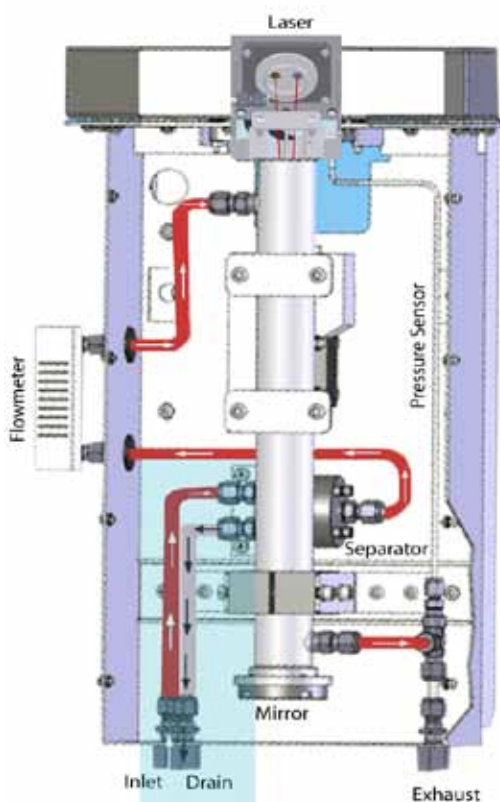
The analyzer is also configured for field calibration validation and users can challenge the analyzer response (single point span check) with a known sample such as bottled gas. If the analyzer response is within acceptable limits, necessary adjustments are made to the calibration parameters. If it is not, the data is declared invalid and a data invalid alarm is triggered.

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 calibration validation feature provides the user comfort in knowing that the analyzer results are accurate.

Typical Sample Cell System



150 Freeport Road, Pittsburgh, PA 15238
 Ph. +1-412-828-9040, Fax +1-422-826-0399
 www.ametekpi.com



© 2011, by AMETEK, Inc.
 All rights reserved. Printed in the U.S.A.
 F-0287 Rev. 2 (0511)

One of a family of innovative process analyzer solutions from AMETEK Process Instruments.
 Specifications subject to change without notice.

SALES AND MANUFACTURING:

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

USA - Oklahoma
 2001 N. Indianwood Ave., Broken Arrow OK 74012 • Tel: +1-918-250-7200, Fax: +1-918-459-0165

CANADA - Alberta
 2876 Sunridge Way N.E., Calgary, AB T1Y 7H9 • Tel: +1-403-235-8400, Fax: +1-403-248-3550

WORLDWIDE SALES AND SERVICE LOCATIONS:

USA - Texas
 Tel: +1-713-466-4900, Fax: +1-713-849-1924

CHINA
 Beijing / Tel: 86 10 8526 2111, Fax: 86 10 8526 2141
 Chengdu / Tel: 86 28 8675 8111, Fax: 86 28 8675 8141
 Guangzhou / Tel: 86 20 8363 4768, Fax: 86 20 8363 3701
 Shanghai / Tel: 86 21 5868 5111, Fax: 86 21 5866 0969

FRANCE
 Tel: 33 1 30 68 89 20, Fax: 33 1 30 68 89 29

GERMANY
 Tel: 49 21 59 91 36 0, Fax: 49 21 59 91 3639

INDIA
 Tel: 91 80 6782 3200, Fax: 91 80 6782 3232

SINGAPORE
 Tel: 65 6484 2388, Fax: 65 6481 6588