DYNAMENT

GOLD SERIES

TAKING INVENTIVE STEPS IN INFRARED….

Application Note AN5

MINIATURE INFRARED GAS SENSORS

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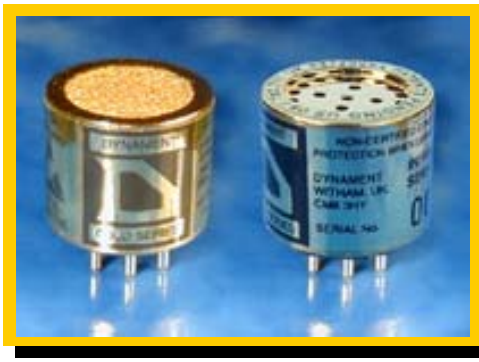
UK Patent App. No. 2372099A
USA Patent App. No. 09/783,711
World Patents Pending

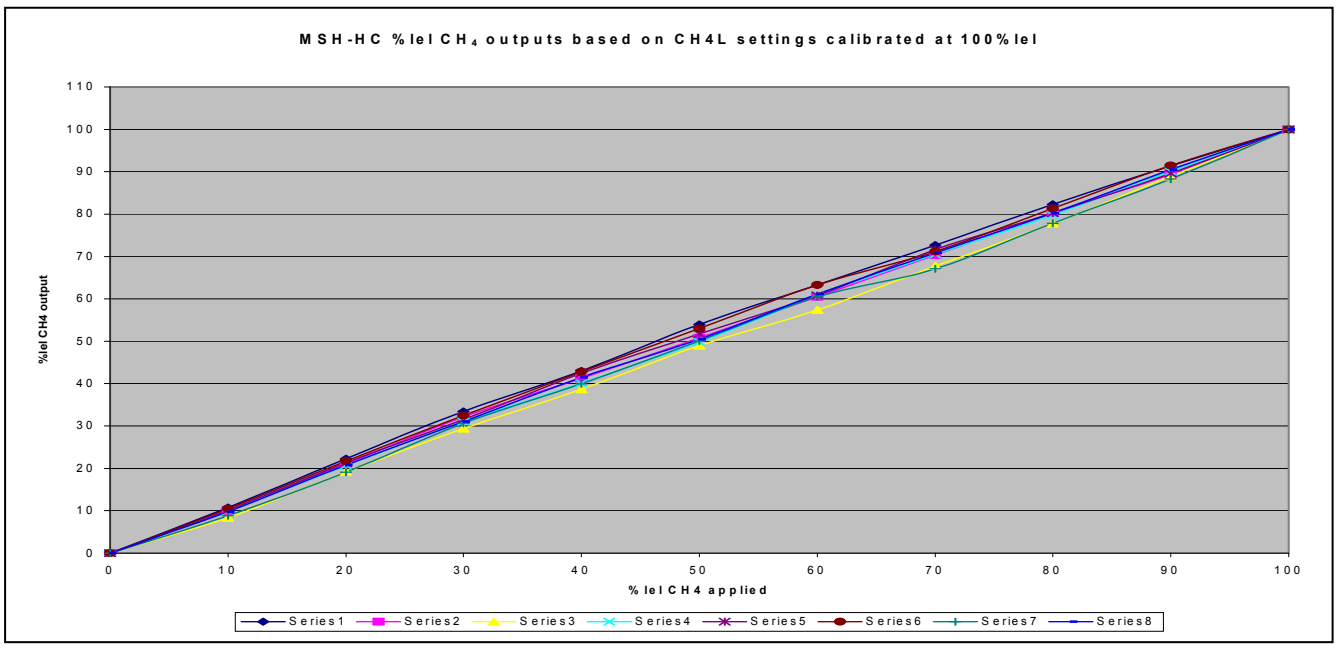
LINEARITY CONSIDERATIONS



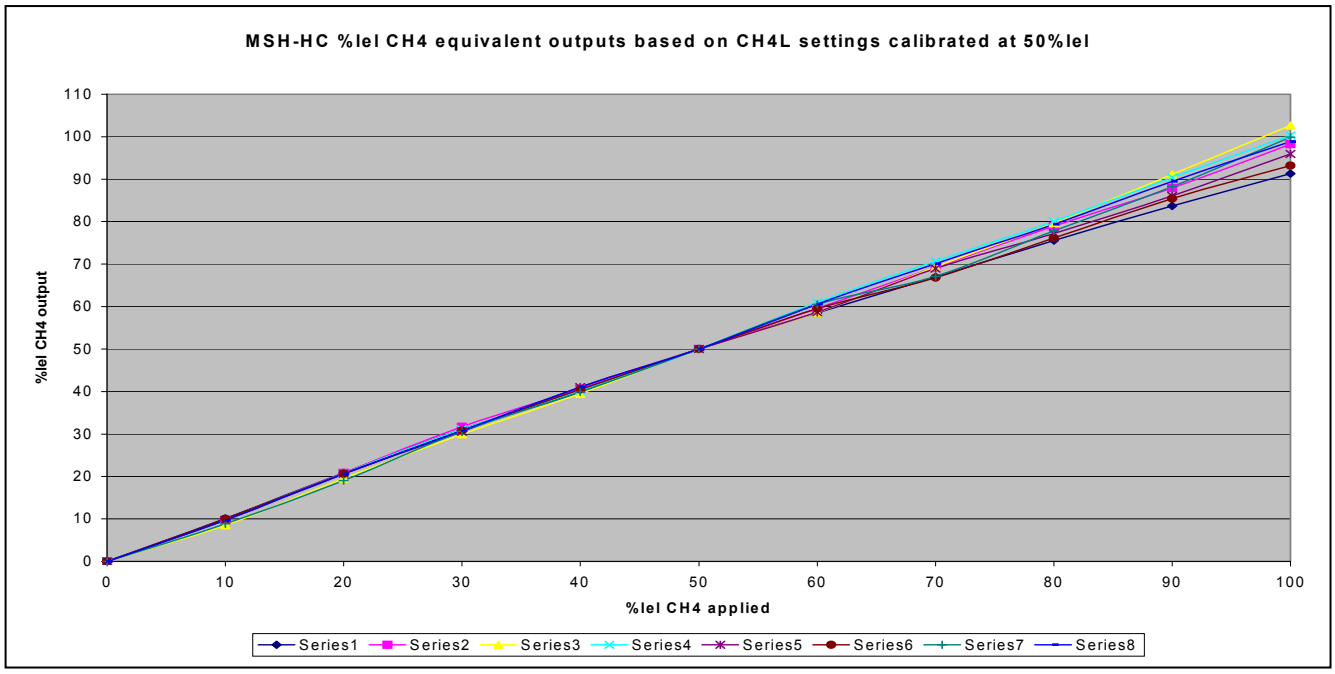
The most common applications for hydrocarbon monitoring, and in particular % lel monitoring of methane, bring in the most challenging requirements for temperature stability, linearity and relative responses. In this newsletter we address some of the main issues and illustrate the performance that can be expected.

Linearity considerations and calibration level:

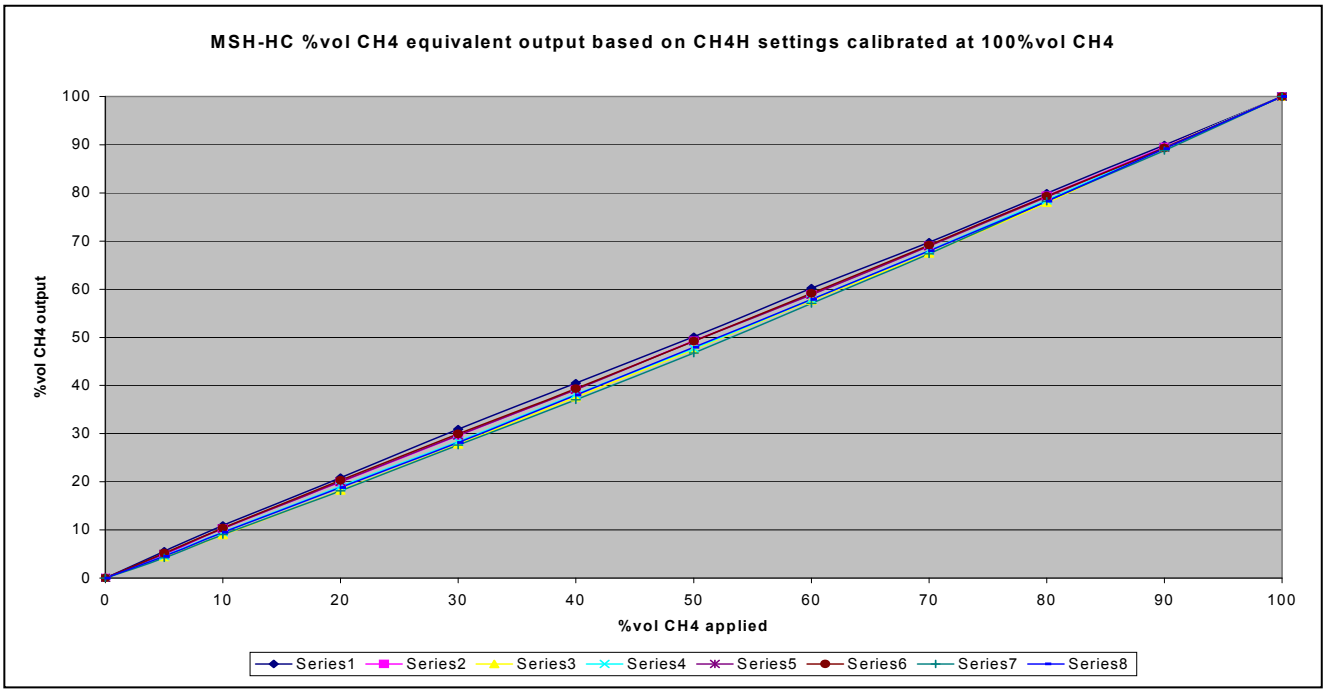
The intrinsic response from an IR sensor is nonlinear. This is described in our application note AN0003 "Signal Extraction" where the mathematics are discussed in order to achieve a linear output result. However, deviations from the ideal curvature of the intrinsic response cause the linearity to be affected slightly by the calibration gas concentration. An example of calibrating a group of MSH-HC sensors at 100%lel methane is illustrated below and shows a maximum deviation of less than ±4%lel at mid range:



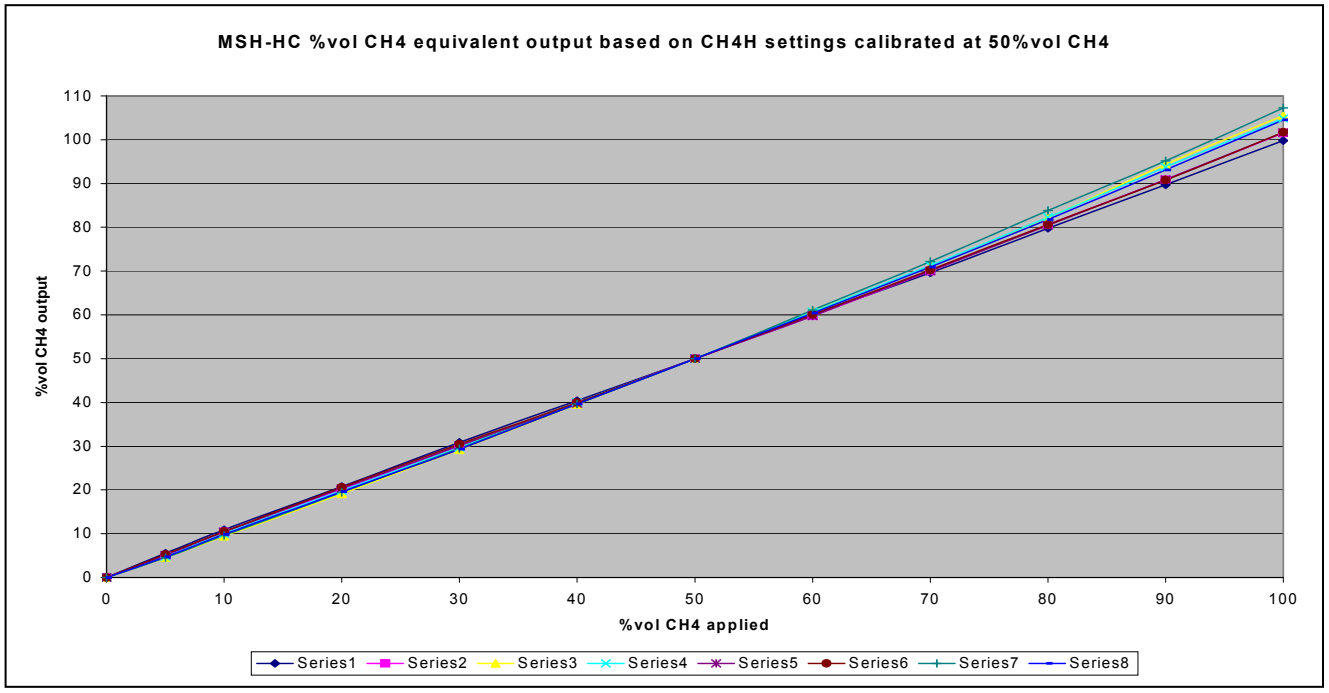
Equally, an example of calibrating the same group of sensors at 50%lel methane is illustrated below and shows the deviation at full scale to be between –9%lel and +3%lel:



It is therefore recommended that the critical alarm point or full scale be the best calibration concentrations to select, depending on the application.
The MSH-HC sensor is also easily capable of monitoring for methane in the 0-100%vol range and the same considerations apply. An example of calibrating a group of MSH-HC sensors at 100%vol methane is illustrated below and shows a maximum deviation at mid range of between –3%vol and +0.1%vol:



Equally, an example of calibrating the same group of sensors at 50%vol methane is illustrated below and shows the deviation at full scale to be between –1%vol and +7%vol:



So again, the calibration point can be selected to optimise the accuracy at an appropriate level dependent on the application. Fine tuning of linearity coefficients can accommodate the linearity deviations but to enable a simple two point calibration (zero and span) it is more efficient to maintain default linearity coefficients and accept a small amount of nonlinearity.

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