



## Suitability of HFR500 for ethanol measurements

### Introduction

Rising interest in ethanol / ethanol gasoline blends leads to the need to measure HC emissions derived from ethanol fuel. As the response of a Flame Ionisation Detector to different hydrocarbon species is known to differ, the response of the Cambustion FID to ethanol was unknown.

### Experiment

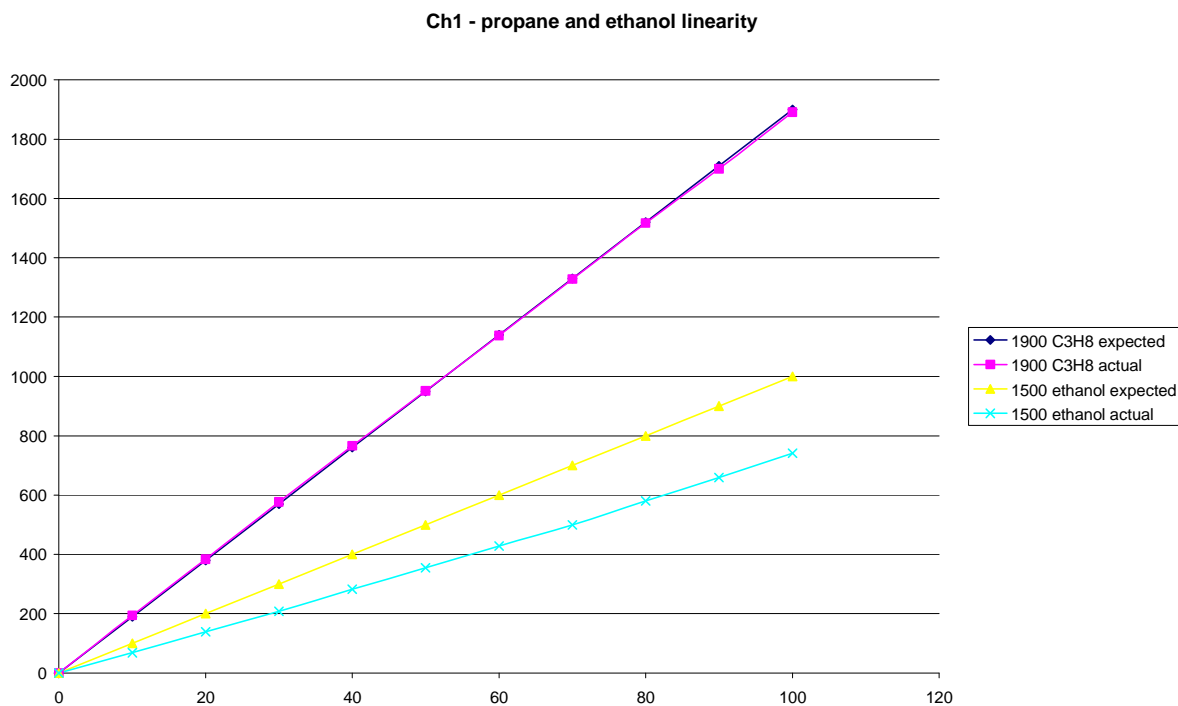
This experiment used a standard HFR500 Fast FID which had previously been linearised on 50,000ppm C<sub>3</sub> (balanced N<sub>2</sub>).

The response of the HFR500 to ethanol was characterised using a 1,500ppm ethanol in N<sub>2</sub> span gas, and a 10 stage gas divider. (Balanced N<sub>2</sub>)

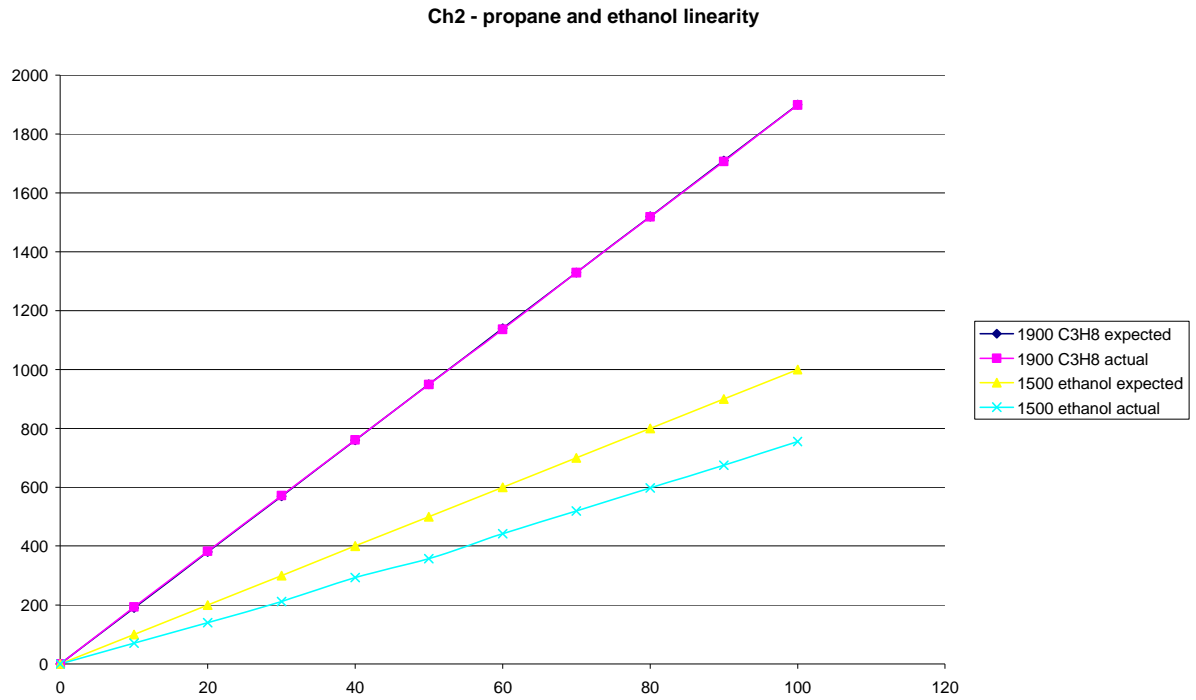
This was compared with the response to standard 1,900ppm C<sub>3</sub> span gas.

The test was repeated for both channels of the HFR500.

### Data:



The above graph compares the response of Channel 1 of the HFR500 to propane and ethanol. The “expected” ethanol response is calculated to allow for the C<sub>2</sub>/C<sub>3</sub> ratio. The actual response is linear over the range tested, and the response is 0.74 of that predicted.



The above graph shows a repeat for Channel 2. The response is linear, and 0.75 of that predicted.

**Conclusion:**

Over the range tested the HFR500 appears to be well suited for measuring ethanol emissions. With no additional calibration or hardware changes the response is linear, and repeatable between channels.

The HFR500's heated sampling system avoids water condensation issues that can be a particular problem with ethanol fuels.

The response of the HFR500 will be only 0.75 of that which is expected from the carbon content of the fuel.