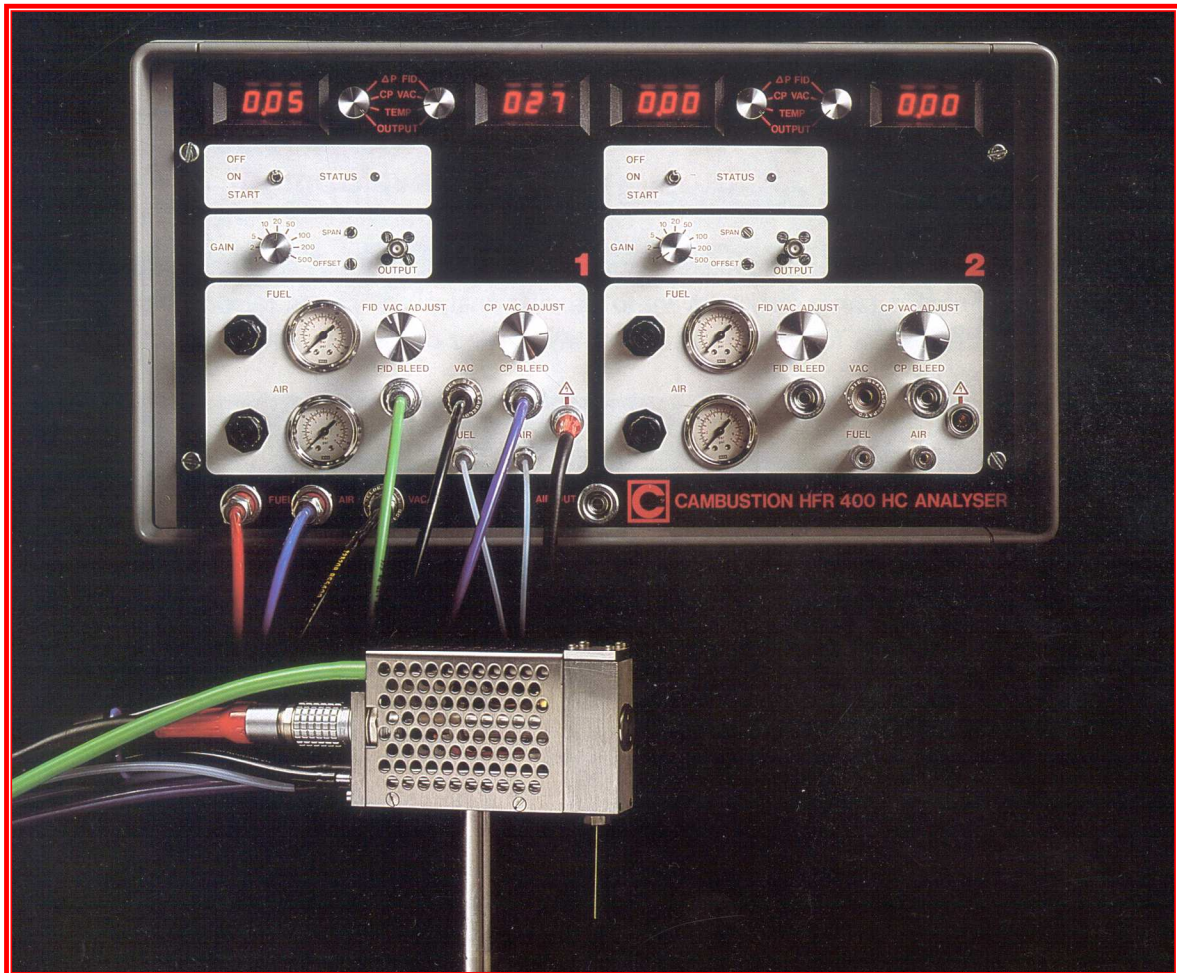


CAMBUSTION

HFR400 Fast Response FID for wind tunnel and other gas dispersion studies



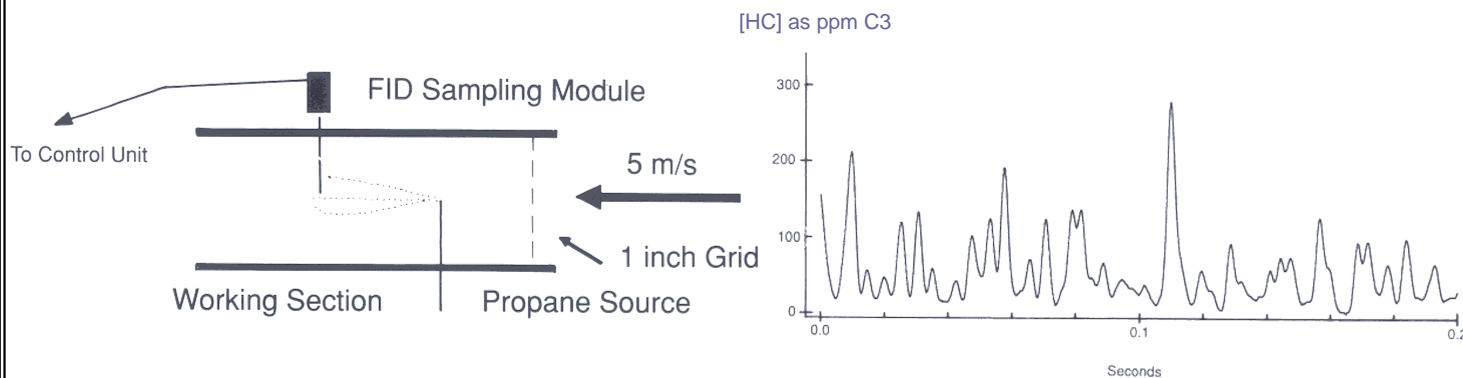
Hydrocarbon concentration measurement with millisecond response time

Techniques for hydrocarbon measurement are well established but response to concentration *fluctuations* has hitherto been limited to a few Hz. Cambustion Ltd introduced the HFR series analyzers in 1987 and some 300 units are now in operation around the world for wind tunnel, field measurements and engine exhaust gas measurements. The system is based on the industry-standard Flame Ionisation Detector (FID) principle but has a unique sampling system designed to preserve high frequency features.

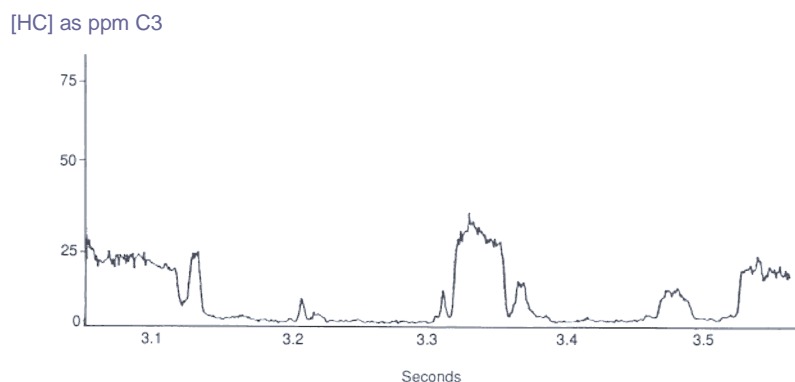
The HFR400 fast FID can analyze hydrocarbon (HC) concentration fluctuations down to typically 1-2 ms; the exact value depending on the sampling arrangement. The control unit supports 2 independent sample heads which contain the FID detectors via flexible 10-metre cables. This arrangement enables the detectors to be placed very close to the sample source.

Turbulent Gas Mixing Studies

Dispersion of dense gas clouds and more general mixing have been studied by releasing a HC tracer gas and monitoring the resultant concentration fluctuations with the HFR400.



The schematic diagram shows a wind tunnel fitted with a 1 inch grid. Propane is released from a point source upstream and an HFR400 sampling module monitors concentration fluctuations at a station downstream. The graph shows typical concentration fluctuations resulting from such an experiment.



The HFR400 is also used in field studies. This graph shows the response to continuous atmospheric release of propane at a range of 100m, height 2m with a wind speed of 7m/s.

Specifications

Sensitivity	10mV/ppm to 20µV/ppm in 9 ranges as C ₃ H ₈ equivalent at an STP sample flow of 50cc/min
Precision	+/- 2%
Response time	10-90% full scale in typically 2ms based on 200mm sample tube
Output	-10V to +10V analogue DC output via BNC front panel connections, 470ohms
Fuel gas	Pure H ₂ supplied at 3 bar gauge
Air	Zero-grade air at 5 bar gauge
Ambient Temp.	0°C to 40°C
Safety features	Flame-out detection and automatic fuel shut-off
Power	100W plus vacuum pump

Cambustion Ltd. reserve the right to change this specification without notice. Patent application numbers 8718332, 8721542, 8725093.

A typical system consists of a main control unit (comprising the gas, vacuum and the electronic/amplification systems), a suitable vacuum pump, two remote sample heads via umbilical conduits with tripod sample head supports, spares & tool kit and operator/service manual.

A full range of accessories for various applications are also available including sample capillaries of custom length and diameter, constant pressure sampling systems if applicable, (e.g. for engine applications) and sample head insulation covers.

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