MAE-FID

Total Hydrocarbon Gas Analyzer
### A SEMTECH ECOSTAR Product

TEST CELL EMISSIONS MEASUREMENT SOLUTIONS

Mustang Advanced Engineering offers a complete lineup of SEMTECH ECOSTAR products for engine and chassis dynamometer test cell emissions measurement.

The SEMTECH-FID measures total hydrocarbons using a vacuum flame ionization detector. The system is designed to minimize the loss of hydrocarbons prior to analysis in the FID chamber. The sample is maintained at 191° C through the use of a heated filter and heated sample line. Fittings are made of stainless steel, which has low gas absorption properties.

Warm up time from 20°C to 191°C is minimized, at approximately half an hour. Once the FID reaches temperature, the flame lights automatically. Calibration is also automatic. Freely adjustable measurement ranges ensure accuracy for a wide variety of test applications. The SEMTECH-FID is also compatible with the complete SEMTECH ECOSTAR system. It is designed to be stacked onto any other SEMTECH ECOSTAR module, with handles to lock them together, and removable cable channels for cable management and protection in the rear of the unit. System setup and basic functions are easily performed through the full-color graphical touch screen on the front panel.

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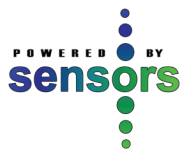
The SEMTECH-FID was designed to measure THC, both on-board and in the test cell. The system is comprised of a Flame Ionization Detector, with the following system benefits:

Automatic Flame Ignition: The FID flame will light automatically after 30 minutes of warm-up time.

**Automatic Calibration:** The system will calibrate itself automatically after flame ignition.

Measuring Range: The SEMTECH-FID has freely adjustable measurement ranges between 0-10 and 0-30,000 ppm C_3H_8.

Sample Handling: Sample probe, heated filter, coalescing filter and Nafion dryer are integrated into the tube electronics. A heated sample line delivers the sample to the FID chamber at 191°C.

Combustion Air: The system contains a catalyst, enabling the use of room air for the FID chamber combustion air.

Graphical Panel Display: A full color, graphic touch screen displays live data and enables system setup and basic functions, such as zero and span.

Power Supply Monitoring: Power can be either 110 VAC or 220 VAC, with both current and voltage monitoring.
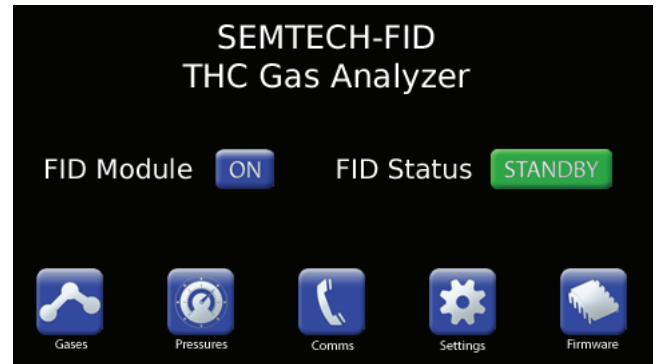

Graphical Panel Display

1065 Compliant: The SEMTECH-FID meets the EPA's 1065 compliance requirements for in-use testing.

Weatherproof Construction: The unit can be used in harsh environments, including for example, off-highway testing. All components meet IP54 (NEMA 3) standards.

Heated Components: The averaging pitot tube and pressure lines are heated at the flow tube assembly in order to prevent condensation and freezing in cold weather. The differential pressure sensors are housed in a temperature controlled manifold in the control module for added stability.
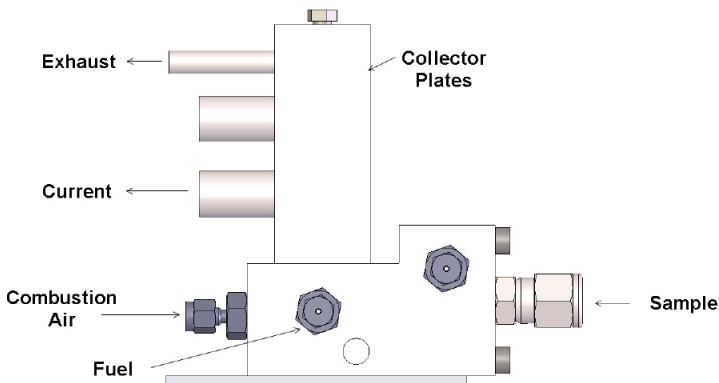
Design Details: Over a decade of experience with in-use emissions testing has gone into the design of the SEMTECH ECOSTAR system, including:
- EMI protection, including gaskets, filters and capped connectors
- Stress relief for pneumatic connections
- Channels for cable management
- Standard Swagelok bulkhead connectors
- Rugged Deutsch connectors for power and auxiliary connectors
- Handles that lock to other SEMTECH ECOSTAR modules for stable system integration

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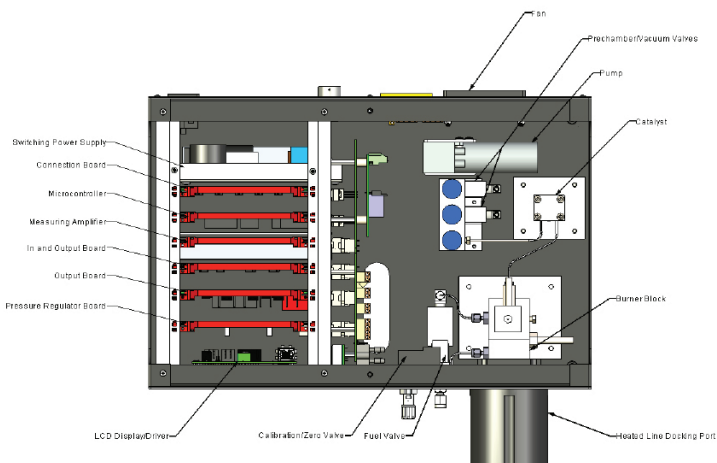
The Technology

A Flame Ionization Detector (FID) is used for the measurement of total hydrocarbons (THC). The FID chamber is first heated to 191° C, which takes approximately 25 minutes. The valve is then opened to allow FID fuel and air into the chamber and the flame is ignited. The exhaust sample can then be added. The FID fuel, air, and exhaust sample are mixed together at the bottom of the detector's flame jet and are burned on the jet's tip. The hydrocarbons then burn, forming positively charged ions. These ions are repelled by the jet's nozzle head, which has a positive bias voltage. The hydrocarbon ions are then attracted to the negatively charged collector plate, where the resulting current is measured.
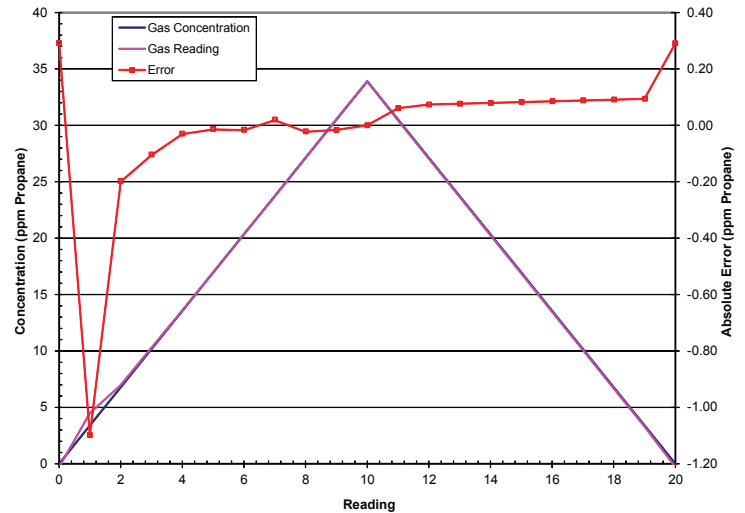
SEMTECH-FID
33.9 ppm Propane / bal N2

General FID Schematic

These graphs compare measurements taken by the SEMTECH-FID. The gas bottle listed was mixed with N_2 in 10% increments up to 100% and back down to 0%. Each increment was sampled for 30 seconds. As shown in the charts, the SEMTECH-FID was line-on-line with the actual values for both the low concentration of propane and the higher concentration of propane.

User Support

As with all SEMTECH products, the SEMTECH-FID comes with a wide range of customer support. Sensors' Remote Support, powered by WebEx, enables our trained technicians to view your SEMTECH unit in real-time to help answer your questions, diagnose issues, and evaluate data, without requiring any additional software. The customer portal contains a forum for users to share insights on the best practices for in-use emissions testing and to stay up to date with the latest software releases, manuals, technical service bulletins and tips and tricks of the trade.

SEMTECH-FID
961.5 ppm Propane / 3.50 % CO / 2.4 % CO2

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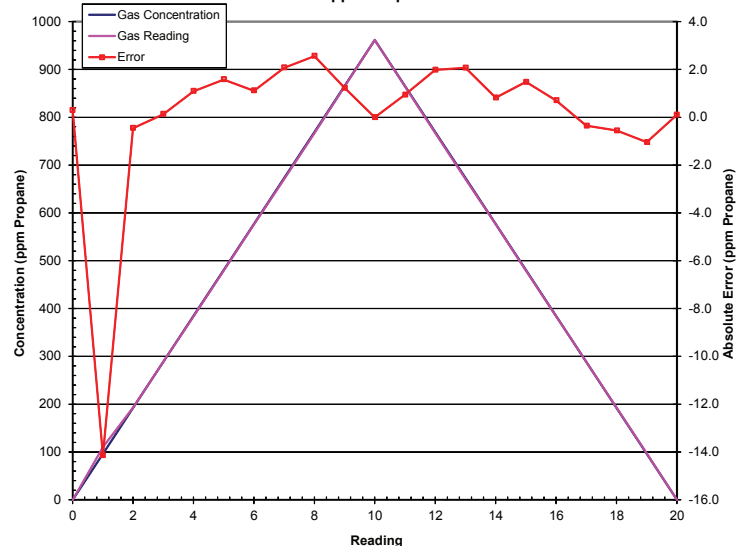
Gas Analyzer Specifications

Gas	THC
Measuring ranges	freely adjustable
Smallest measurement range	0 - 90 ppm C_1
Largest measurement range	0 - 30,000 ppm C_1
Accuracy	± 1% of reading, or ±0.3% F.S. (± 1% F.S. for lowest measurement range)
Linearity	Intercept ≤ 0.5% of range (1% for lowest range) $0.990 \leq$ Slope ≤ 1.010 SEE ≤ 1.0% of range $R^2 \geq 0.998$
Repeatability	± 1% of reading
Zero Drift	± 1% F.S. in 24 hr
Response Time	$T_{90} < 3.5$ second
Warm-up Time	approx. 30 min.*
Analog output current	0 - 20 mA or 4 - 20 mA
Analog output voltage	0 - 10 V
Power	220-240 VAC, 600 W
Ambient operating temperature	0°C to 45°C
Communications	Ethernet, USB
Dimensions	43.6cm x 30.8cm x 13.6cm (WxDxH)
Weight	12 kg
Gas Requirements	
Fuel	He/H_2
Fuel consumption	150 ml/min
Span Gas	C_3H_8
Span Gas Consumption	500 ml/min
Zero Gas	N_2 or air
Zero Gas Consumption	500 ml/min
Heated Sample Lines	
Standard Lengths	6', 12', 16'
Temperature Control	up to 200°C

* 60 minute warmup required to meet performance specification

NOTE: Specifications are subject to change without notice. While due caution has been exercised in the production of this document, possible errors and omissions can occur.

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