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TEST CELLS



ENGINE  
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TEST CELLS



# NO/NO<sub>2</sub> Gas Analyzer

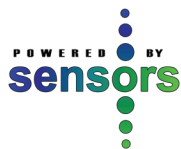
A SEMTECH ECOSTAR Product

## 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-NOx uses Non-Dispersive Ultra-Violet (NDUV) technology to measure the concentrations of NO and NO<sub>2</sub>. The analyzer meets the updated 2010 US EPA standards for vehicle emissions measurements, as put forth in CFR40 part 1065, enabling laboratory grade measurements in a package that is rugged enough for both laboratory and in-use emissions data collection.



The system is packaged for use as both a stand-alone analyzer and for use with the entire SEMTECH ECOSTAR product line. In the latter configuration, side handles lock together with those of the SEMTECH-FEM, and the sample ports connect through an intake manifold on the bottom of the SEMTECH-NOx, for a secure system setup that minimizes pneumatic hosing. Quick connect brackets on the back of the unit provide cable management conduits when needed. A full color touch screen enables system setup, basic functions such as zero and span, and a live view of the data and system monitoring.



The SEMTECH-NO<sub>x</sub> was designed to measure NO and NO<sub>2</sub>, both on-board and in the test cell. The system is comprised of a Non-Dispersive Ultra Violet (NDUV) gas analyzer, with the following system benefits:

**NO and NO<sub>2</sub> measurement:** Sensors' proprietary NDUV measures NO and NO<sub>2</sub> separately and simultaneously.

**Signal to Noise:** The LED light source can be operated at very high frequencies, enabling an excellent signal to noise ratio.

**6 Temperature Controlled Zones:** Six temperature controlled zones ensure accurate data throughout a wide range of ambient temperatures and minimize drift.

**Optimized Signal Processing:** Pre-amplifiers and ADC converters are designed to optimize dynamic range and resolution. This enhances longevity in regards to sample cell contamination and normal UV source aging.

**Sample Conditioning:** When used in conjunction with the SEMTECH-FEM, the sample is filtered and cooled prior to analysis, minimizing contamination of the analyzers.

**Graphical Panel Display:** A full color touch screen enables system setup, basic functions such as zero and span, and a live view of the data and system monitoring.

**Power Supply Monitoring:** Power can be either 12 VDC, 110 VAC or 220VAC, with both current and voltage monitoring.

**Dual Ports:** Sample air and exhaust ports are located on both the front face of the analyzer, and from the bottom. The bottom ports connect directly to the intake manifold of the SEMTECH-FEM, for a fast, simple connection of the two units. Front ports are available for the stand-alone configuration.

**1065 Compliant:** The SEMTECH-NO<sub>x</sub> 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.

**Shock Resistance:** The mechanical design has been optimized for resistance to shock and vibration, ensuring accurate data in the most rugged of in-use environments.

**Design Details:** Over a decade of experience with in-use emissions testing has gone into the design of the SEMTECH ECOSTAR system, including:

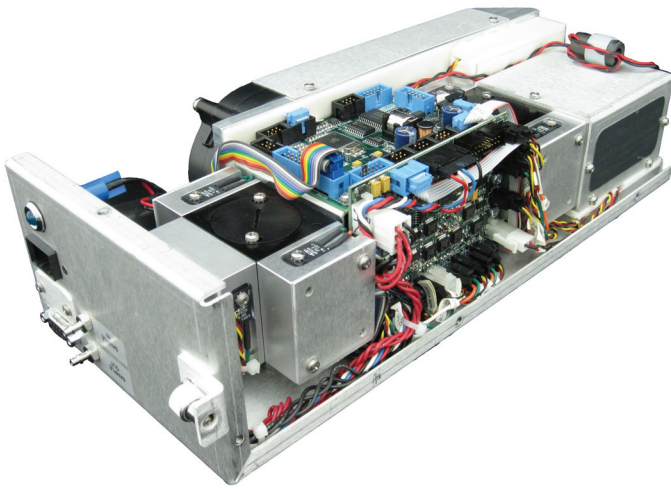
- EMI protection, including gaskets, filters and capped connectors
- Stress relief for pneumatic connections
- Channels for cable management
- Standard Swagelok bulkhead connectors
- Rugged Deutsch connectors for power and auxiliary connectors
- Handles that lock to other SEMTECH ECOSTAR modules for stable system integration



*Bottom sample ports connect directly to the SEMTECH-FEM module using three gas interconnects shown to the left*

## The Technology

Non-Dispersive Ultra-Violet (NDUV) analysis is an absorption spectroscopy technique used for gas analysis. Ultraviolet wavelengths are used for the measurement of NO and NO<sub>2</sub> because they are not cross sensitive to CO<sub>2</sub> and H<sub>2</sub>O, which do not absorb well in the UV region.

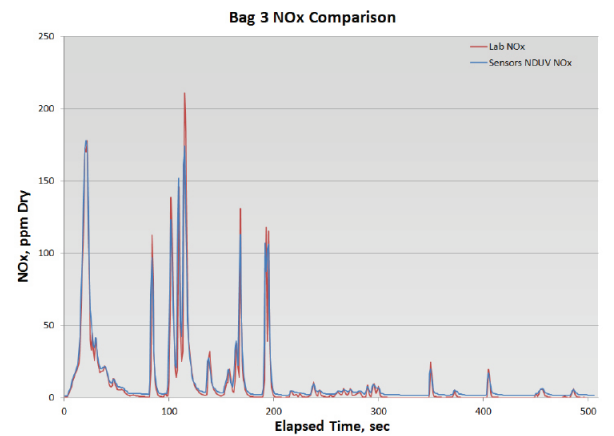
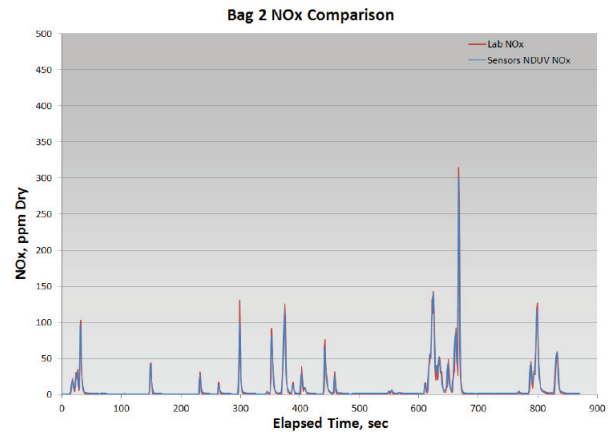
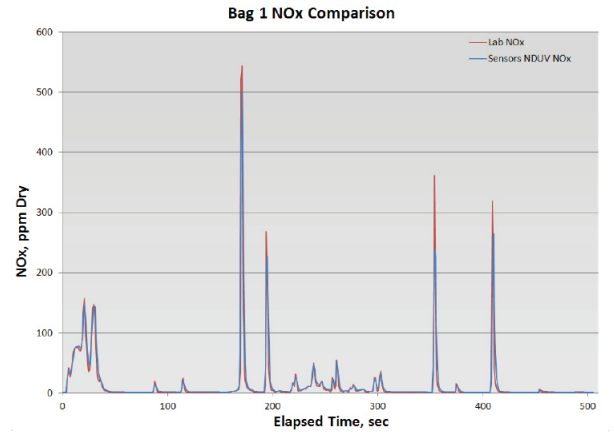


*The NDUV Analyzer*



## User Support

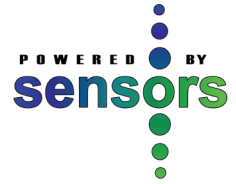
As with all SEMTECH products, the NO/NO<sub>2</sub> Gas Analyzer comes with a wide range of customer support. Sensors' Remote Support, powered by WebEx, enables our trained technicians to view your SEMTECH unit in real-time to help answer your questions, diagnose issues, and evaluate data, without requiring 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.



These graphs compare NOx concentrations from a production vehicle as measured in the laboratory, using data from Sensors' SEMTECH-NOx overlaid with data from the laboratory equipment. The data shows strong correlation for both trace amounts of NOx, and for the spikes found across the time domain, for all three phases (bags).

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## Gas Analyzer Specifications

Gas	NO	NO <sub>2</sub>
Range of measurement	0 to 3,000 ppm 0 to 900 ppm 0 to 300 ppm	0 to 500 ppm 0 to 300 ppm 0 to 100 ppm
Accuracy <sup>1</sup>	± 2% of rdg or ± 0.3% (±2ppm per 300ppm range)	± 2% of pt or ± 0.3% (±1ppm per 100ppm range)
Resolution	0.3 ppm	0.3 ppm
Linearity	Intercept ≤ 0.5% of range (1% for lowest range) 0.990 ≤ Slope ≤ 1.010 SEE ≤ 1.0% of range R <sup>2</sup> ≥ 0.998	
Repeatability <sup>1</sup>	± 1% of rdg or ± 1% of FS <sup>4</sup>	± 1% of rdg or ± 1% of FS <sup>4</sup>
Noise <sup>1</sup>	<1 ppm	<1 ppm
Span Drift (over 8 hours) <sup>3</sup>	2% of span value	± 2% of span value
Zero Drift (over 1 hour) <sup>2</sup>	≤ 2 ppm	≤ 2 ppm
Response time	T <sub>10-90</sub> < 3.5 sec	T <sub>10-90</sub> < 3.5 sec
Data Rate	1 Hz	1 Hz
Flow rate (nominal)	2-3 LPM	2-3 LPM

<sup>1</sup>Per CFR40 part 1065.305

<sup>2</sup>Over 1 hour period with ambient temperature Δ10°C. Zero gas: bottled N<sub>2</sub>.

<sup>3</sup>Over 8 hour period with ambient temperature Δ10°C. Zero gas: bottled N<sub>2</sub>.

<sup>4</sup> whichever is greater

Ambient operating temperature:	2°C to 45°C
Storage temperature:	-10°C to 60°C
Warm up time:	< 60 minutes at 20°C ambient
Power requirements:	12VDC , 110-220VAC, <100W
Communications:	Ethernet, USB, Serial Interface to OBDII
Dimensions:	43.6cm x 30.8cm x 13.6cm (WxDxH)
Weight:	13 kg

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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