sensors

Emissions
Measurement
Solutions

# SEMTECH®–NOx

## NO/$NO_2$ Gas Analyzer

### A SEMTECH ECOSTAR Product

On Board Emissions Analyzers

Test Cell Emissions Analyzers

Emissions Testing Services

Environmental Applications


Sensors' SEMTECH-NOx uses Non-Dispersive Ultra-Violet (NDUV) technology to measure the concentrations of NO and $NO_2$ separately and simultaneously. The analyzer meets the latest 2010 US EPA standards for vehicle emissions measurements, as defined in CFR40 part 1065, enabling laboratory grade measurements in a package that is rugged enough for both laboratory and in-use 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.

## System Features and Benefits

**NO and $NO_2$ measurement:** Sensors' proprietary NDUV measures NO and $NO_2$ 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, 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 12 VDC, 110 VAC, or 220 VAC, 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, using the gas interconnect shown here. Front ports are available for the stand-alone configuration.

*Gas Interconnect*

**1065 Compliant:** The SEMTECH-NOx 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.

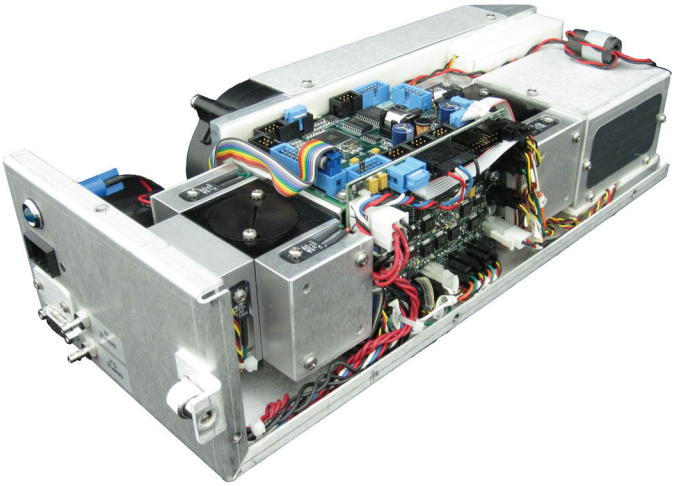
**Design Details:** Over a decade of experience in in-use emissions testing has gone into the design details of the SEMTECH ECOSTAR system, including:

- 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


*Graphical Touch Screen*

## The Technology

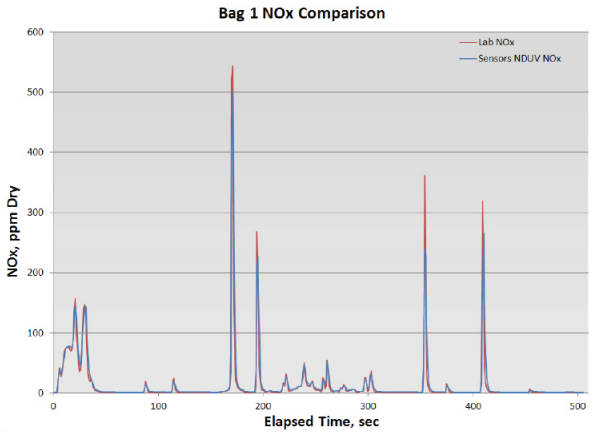
Non-Dispersive Ultra-Violet (NDUV) analysis is an absorption spectroscopy technique used for gas analysis. Ultraviolet wavelengths are used for the measurement of NO and $NO_2$ because they are not cross sensitive to $CO_2$ and $H_20$, which do not absorb well in the UV region.

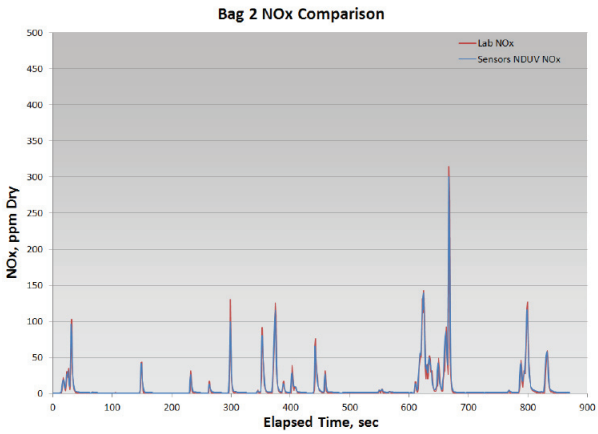


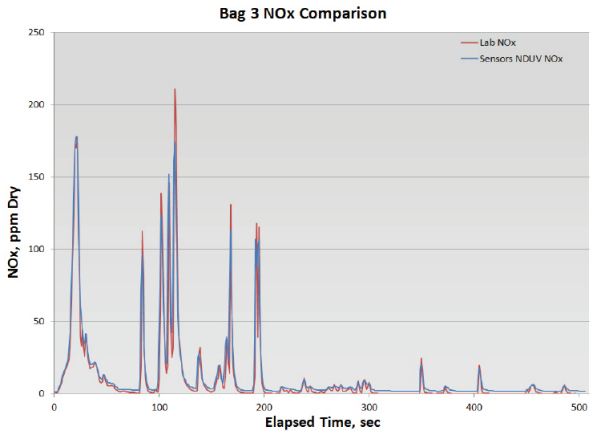
*The NDUV Analyzer*

## User Support

As with all SEMTECH products, the SEMTECH NOx 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 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.




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).

## Gas Analyzer Specifications

| Gas | NO | $NO_2$ |
|---|---|---|
| Range of measurement | 0 to 3,000 ppm | 0 to 500 ppm |
| Accuracy[1] | ± 2% of rdg or ± 0.3%[4] | ± 2% of pt or ± 0.3%[4] |
| Resolution | 0.3 ppm | 0.3 ppm |
| Linearity | Intercept ≤ 0.5% of range<br>0.990 ≤ Slope ≤ 1.010<br>SEE ≤ 1.0% of range<br>$R^2 \geq 0.998$ | |
| Repeatability[1] | ± 1% of rdg or ± 1% of FS[4] | ± 1% of rdg or ± 1% of FS[4] |
| Noise[1] | <1 ppm | <1 ppm |
| Span Drift (over 8 hours)[3] | ± 2% of span value | ± 2% of span value |
| Zero Drift (over 1 hour)[2] | ≤ 2 ppm absolute | ≤ 2 ppm absolute |
| Analyzer response time | $T_{10-90}$< 2.5 sec | $T_{10-90}$< 2.5 sec |
| System response time | $T_{10-90}$< 3.5 sec | $T_{10-90}$< 3.5 sec |
| Data Rate | <10 Hz programmable | |
| Flow rate (nominal) | 3 LPM | 3 LPM |

[1]Per CFR40 part 1065.305
[2]Over 1 hour period with ambient temperature Δ ≤ 10°C. Zero gas: bottled $N_2$.
[3]Over 8 hour period with ambient temperature Δ ≤ 10°C. Zero gas: bottled $N_2$.

| | |
|---|---|
| Power requirements: | 12 VDC nominal (10.5 - 14.5 VDC); 110 VAC or 220 VAC |
| Warm up time: | 60 minutes at 20°C ambient, to meet specifications |
| Storage temperature: | Dry -10°C to 60°C |
| Operating environment: | -10°C to 45°C |
| Dimensions: | 43.6cm x 30.8cm x 13.6cm (WxDxH) |
| Weight: | 13 kg |
| Data transmission: | Ethernet, USB |
| Electromagnetic interference and susceptibility: | CE Starndards: IEC 61326: 2002-2 |

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.

R 7/13