Accurate. Reliable. Cost Effective.

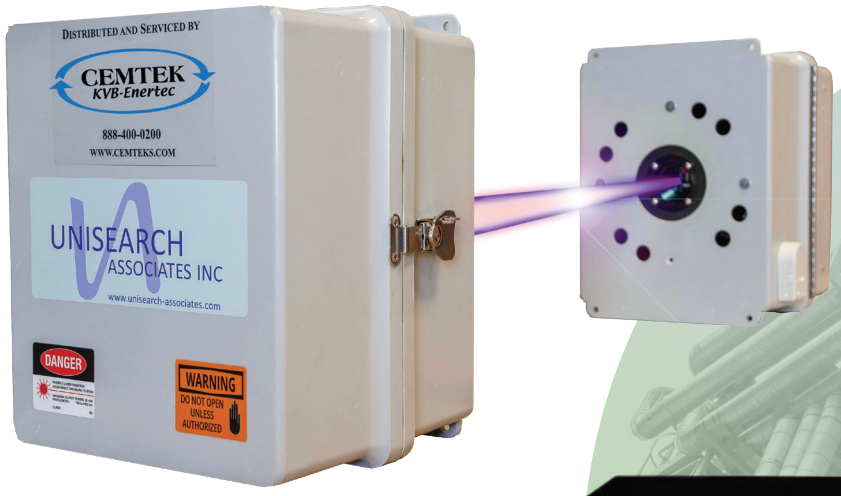
Emissions Monitoring for Compliance & Process Improvement

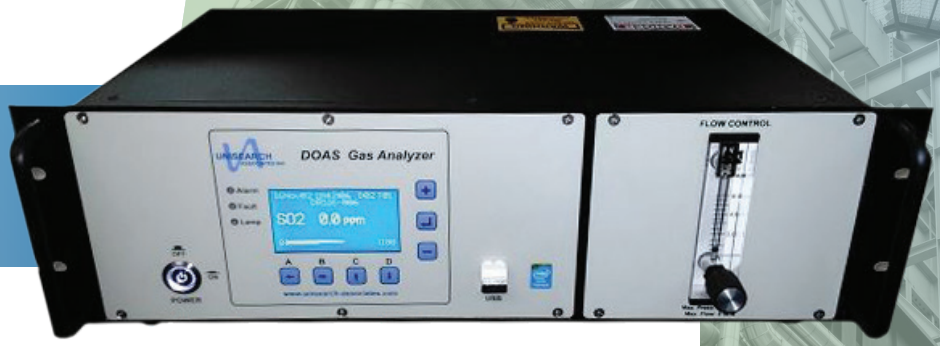
CEMTEK KVB-Enertec

DOAS MODEL 3000

CROSS STACK DIFFERENTIAL OPTICAL ABSORPTION SPECTROMETER

Optical Light Source Technology Used for EPA Compliance and Process Monitoring of SO_2, NO, NO_2, NOx, NH_3, Cl_2, Formaldehyde, O_3, CS_2, Benzene, Toluene, Ethylbenzene, Xylene and Many Others





PRODUCT DESCRIPTION

Model 3000 is an in-situ based Optical Integrated Path continuous emissions monitoring system (IP-CEMS) designed to measure up to four simultaneous measurements simultaneously including SO_2, NO, NO_2, NH_3, HCHO, O_3 Benzene, and Toluene flue gases for both compliance and process monitoring in a Cross Stack Configuration. The analyzer uses Differential Optical Absorption Spectrometry (DOAS) Technology for unsurpassed accuracy and performance. The measurements are made with non-obtrusive optical UV light source that emits the UV light across the stack/duct in a single pass design. A Windows based software package is available to display the data on either a Host laptop PC or the client's existing Data Acquisition Handling System (DAHS).

FEATURES AND BENEFITS:

Our UV-DOAS is a single instrument that brings simplicity to emissions monitoring by streamlining the process of measuring, recording, and providing a continuous gas measurement without having to extract gases from the process. While DOAS shares the advantages of most other spectroscopic techniques, its superior DOAS technology that uses multiple thousands of unique wavelengths allows for excellent specificity and greater accuracy.

Differential Optical Absorption Spectrometry (DOAS) is a UV/VIS optical measurement technique based on Beer-Lambert's Law. Since absorption coefficients in the UV are generally orders of magnitude higher than in the IR region, sensitivity is enhanced, which makes DOAS an excellent method for measuring multiple gases very accurately measuring ultra-low or high concentrations with a single analyzer.

ADVANTAGES

- Ultra-high accuracy and sensitivity
- Cross-stack non-intrusive
- One Analyzer measures up to 4 components
- Optical Integrated Path Continuous Emissions Monitoring
  - » Eliminates all components in contact with gas sample
    - › Not required: probe, sample line, chiller, filters, pump, converters, etc.
- No parts located in process stream
- No corrosion
- No particulate buildup on probe
- Do not have to pull heavy analyzer off from stack port
- Immediate response time
- Minimal maintenance and consumable parts required
- XENON lamp life 2-5 years
- Meets and or exceed EPA performance specifications, Calibration and Certification/RATA requirements per 40CFR Part 60 regulations
- Minimal Maintenance & consumable parts
- Compact and easy to install and operate
- Low operating costs

A BRIEF DESCRIPTION

DOAS is based on the principle of measuring the differential absorption of the incoming signal in the wavelength region of interest after it has passed through a gas medium. It uses a broadband light source, and the measurement is made over a large wavelength range (like FTIR and NDIR). In general, overlap of absorption features of several gases is observed. This requires the use of multiple regression methods of analysis. The concentrations of gases are calculated by comparing the absorption signals with their stored reference signals. As in any broadband measurement technique, interference from other gases must be considered and corrected to improve accuracy of measurement.

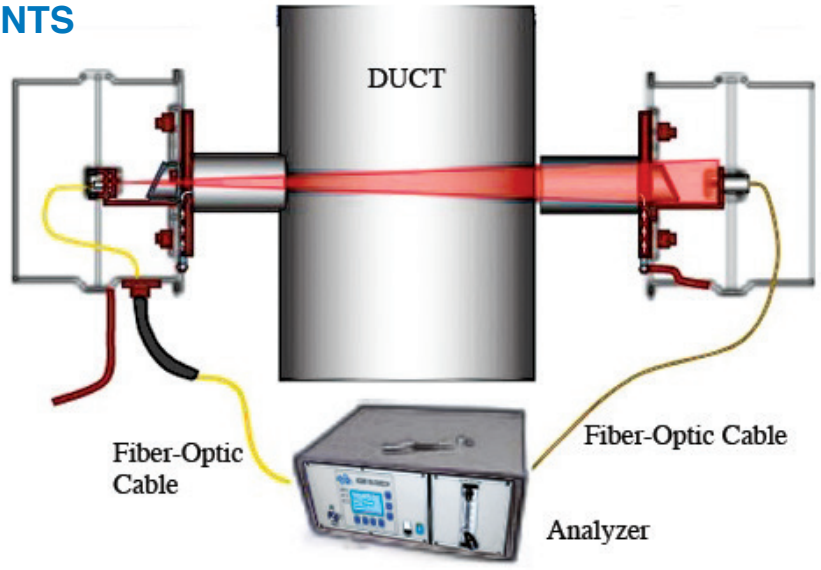
This technology is capable of measuring more than one species which either absorb in the same wavelength region (continuous monitoring of the species; e.g., NO, NH_3, SO_2 etc.) or in different wavelength regions (time-shared monitoring of the species; e.g., NO, NO_2, HCHO etc.). Many of these gases can also be measured at very high levels with no dilution requirements. For example, SO_2 can be measured down to a few ppbv/m, as well as from 0 to 100%.

DOAS instruments are available in two configurations, either utilizing a deuterium or xenon light source depending upon the application and gases that need to be monitored. The Xenon lamp utilizes a fiber optic coupled system and is capable of allowing the analyzer to be placed as far as 50 meters away from the optics/process. The deuterium lamp offers advanced features and is located in close proximity to the optics/process.

DOAS INSTALLATION & INSTRUMENTS

Reliable, Accurate with Easy Maintenance

In the standard configuration, a light source, either pulsed Xe lamp or Deuterium lamp, is utilized. Collection optics in the enclosure on the opposite side of the duct collect the light and focus it into a fiber optic cable. Fiber optic collection and transmission to the analyzer is employed to get the light to the spectrometer located in the analyzer module.



DOAS INSTALLATION & INSTRUMENTS *continued*

SEALED AUDIT CELL

The DOAS system makes absorption measurements of the species indicated, and, requires no calibration. If the user wishes to calibrate or audit the DOAS system, the client simply can connect the external sealed audit cell (which contains a known concentration of gas) in series or parallel to the optics and be able to validate or calibrate the DOAS system.

DATA PROCESSING

An on-board computer performs the data processing. The computer can be connected to the client's network and accessed from any location in the plant.

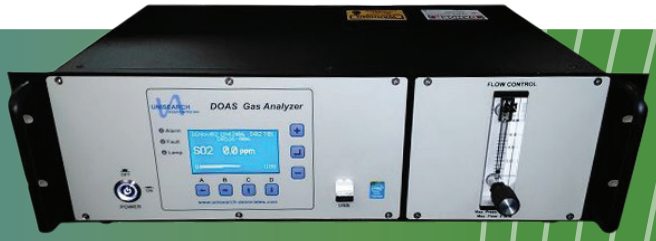
DOAS ANALYZER

An LCD on the analyzer front panel displays the concentration. The DOAS analyzer also may include a gas flow thru cell to meet EPA compliance and can be easily zero and span calibrated using standard EPA Protocol gases. The fittings for the calibration gases are located on the controller. The calibration will meet EPA standards as set by PS18.

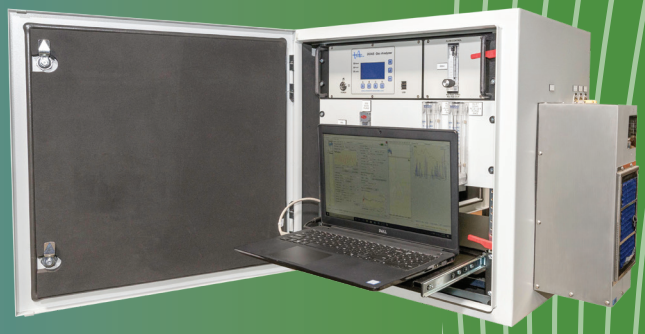
DOAS INSTRUMENTS *continued*

DOAS-R, RACK MOUNT ANALYZER

The analyzer should be mounted in a location that maintains the temperature in the range 0 to +45 °C and free from excessive vibration and humidity.

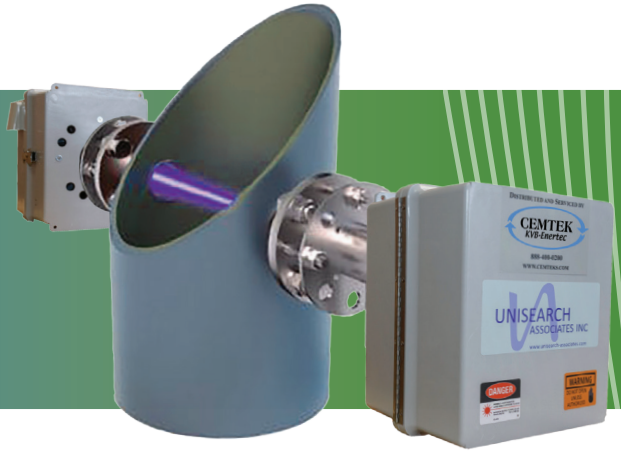


Option: if an environmentally controlled environment is not available, CEMTEK KVB-Enertec can supply the analyzer in a temperature controlled small NEMA 4X enclosure that is heated and cooled to meet the specific application requirements. For Hazardous and explosive area applications options such as C1D1 or C1D2, the enclosure can be X or Z purged to meet the specific requirements.



STACK OPTICS

The stack optics are mounted in NEMA 4X enclosures. The temperature range over which the optics can perform to specifications is -40 °C to +60 °C. NEMA 4X and Class I, Div1 or 2 enclosure options are also available.



DOAS SPECIFICATIONS

- USB ports for spectrometer control
- 4-20 mA outputs for gas level and signal power for up to 4 species
- Fault alarm dry-contact relay
- On-board computer with LasIRView V4.x software to operate the analyzer

PERFORMANCE SPECIFICATIONS

Precision:	± 2% of signal or detection limit, whichever is larger
Accuracy:	5% of signal or detection limit (2% of range), whichever is larger

ANALYZER SPECIFICATIONS

Light Source:	« Deuterium lamp / Xenon Arc lamp
Response Time:	« 0.1 seconds and higher
Area Classification:	« General Purpose « Optional C1D1 & C1D2 Enclosure. Other classifications upon request
Calibration:	« Factory Set. Factory Test results sent with every unit, in-line flow through cell option available for EPA Compliance
Outputs and Networking:	« USB, Optional 4-20mA, Status relays. Up to thirty-two 4-20mA Analog Outputs, Ethernet, MODBUS-TCP/RTU, Six Dry-Contact NC & NO Status Relays
Dynamic Range:	« 5 orders of magnitude
Data Logging and Displaying Software:	« LasIRView, « Optional Key available for diagnostic package
Data Storage:	« External storage via USB to external computer (included)
Power Supply:	« Input 100 - 240 VAC @50-60Hz, +12 VDC « Output: 12V, 60w « Operating Voltage: 12 VDC « Optional 12V Battery
Analyzer Dimensions:	19” Rack Mount Type « 5.5” (H) x 17” (W) x 12” (D) 11.5 lb (5.2 kg)
Optional Field Mount Enclosure:	« 24” to 60” (H) depending upon analyzer configuration. X 24” (W) x 12” (D). NEMA 12, 4 or 4X configurations

DOAS SPECIFICATIONS *continued*

STACK / DUCT OPTICS

NEMA Enclosure:	« 13”(H) x 11”(W) x 10”(D) (33 x 28 x 25 cm) l (10 kg)
Mounting:	« 4”OD ANSI flanges, additional sizes optional.
Optics Air Purge Requirements:	« Depending on conditions 50 psi @ 5-15 L/min per optic enclosure. High dust concentrations, high stack pressure, or high temperature may require a high air spool option that will require up to 50psi @ 40L/min per optic enclosure.
Environmental Conditions:	« Gas: -100 to +1800 oC, 5 - 95% RH, 25 - 2000 mbar « Optics: -40 to 65 oC, 5-95% RH, 25 - 2000 mbar
Optical Path Length:	« Up to 2 meters. Customization possible for greater lengths.

DETECTION LIMITS (LDL)

1. a path length of 1 m
2. at 1 atmosphere (1013.25 millibar) pressure
3. at 298.15 K Temperature
4. with 10 second integration time

Gas	Detection Limits* (ppbv-m)	Ug/m3
NO	600	800
NO_2	75	150
NH_3	10	8
HCHO	3000	4000
SO_2	300	900
O_3	35	75
Benzene	170	600
Toluene	600	2450

*Optimal. Detection limits will vary de-pending on measurement conditions.

DOAS instruments are designed and built to comply with CSA, UL and CE requirements:

- General Safety: IEC 61010
- Electro-Motive Compliance: IEC / EN 61000

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