AIM Model 8647A

AIR INSTRUMENTS & MEASUREMENTS, LLC

FAST RESPONSE REMOTE MULTICOMPONENT VEHICLE EXHAUST ANALYZER

IR: CO_2, THC, CO;
Optional *CH_4 , CH3OH, N_2O, H_2O, etc*

Vis: OPACITY(%), DUST (mg/m^3)

UV: NO;
Optional *SO2, NH3, Cl2, HCHO, Aromatics, etc.*

APPLICATION:

★ **Remote Vehicle Emissions Monitoring**
and with modified software....
★ **Roadside Ambient Monitoring**
★ **Tunnels, Parking Garage Monitoring**

OPEN-PATH ANALYSIS

The Model 8647A © is an advanced DIR dispersive infra red analyzer combined with our patented DUV dispersive UV analyzer capable of continuously monitoring multiple gases, plus Opacity (%T) and Dust (mg/m3). This dual beam, double pass across the path [road or open area], analyzes emissions wherever they intercept the light beam, employing DOAS with AIM's proprietary PLS SVD pattern recognition software.

The system incorporates a rugged optoelectronic design with a patented optical projection system for maximum energy throughput and a reflector on the opposite side of the road [4 -7m], a set of in-line flow-through calibration cells, and a micro-processor based control unit for reliable long term operation.

SYSTEM FEATURES AND BENEFIT:

- **OPEN-PATH** design captures the data instantaneously as the vehicle intercepts the light beam.
- **MULTIPLE GAS ANALYSIS** - Monitor four gases (std), or more (plus dust/opacity).
- **PC CONTROLLER** - Digital signal processing & storage.
- **FIELD CALIBRATION** - Manual or Auto cal on demand, internal EPA approved cylinder gas audits (CGAs).
- **ROUTINE MAINTENANCE** –None Req'd.
- **DIAGNOSTIC FEATURE** - Built-in self diagnostics, alarms, optional remote modem communications, etc.
- **EPA COMPLIANT** - System is in compliance with 40 CFR Part 58 and Calif BAR OREMS Specification
- **LICENSE PLATE READER & SPEED and ACCELERATION MEASUREMENTS**

SPECIFICATIONS:

Accuracy:	+/- 2% F.S
Span/Zero drift:	+/- 1% F.S in 24 hr
Ranges:	ppm to % levels
Response Time:	≤ 0.1 second, total
Repeatability:	+/- 1% F.S
Reliability:	≥ 98%

- RS 232, RS485 outputs, std.

Alarm contacts for level alarms & Pass/Fail; programmable system diagnostic & trigger.

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Model 8647A Specifications

1. Analytical Technique:
   Fast Response Dispersive IR & UV Spectroscopy; DOAS, with AIM proprietary Chemometric signal processing software.

2. Typical Ranges:

CO		IR	0 - 10%
HC (as propane)		IR	0 - 3%
CO2		IR	0 - 20%
NO		UV	0 - 1%
Opacity	Vis	0-100%	

3. Measuring Rate(*): ≥ 720 vehicles/Hour

(*) Measurement cycle time ~ 10 msec (UV), 82 msec (IR)...with Data Analysis & Display, time < 3 sec

4. Vehicle Velocity Limitation: None [from full stop to >150 Km/Hr] *(However please understand that the vehicle emissions will be different, typically lower, at idle as compared to when the engine is accelerating),.*

5. Data Display:
   Select (a) measurements ratioed to CO2 (normalized), (b) compensated to fixed CO2 in the exhaust (correcting for variable dilution), or (c) raw (as measured). Data displayed within 4 sec after measurements.

6. Alarms:
   Operator selectable alarm levels. Output alarm when any level is exceeded.

7. Calibration:
   Factory calibrated; EPA approved reference cylinder gas calibration (on-demand and/or optionally fully automatic) through internal cells. Optional calibration verification with release of gas into the measurement beam.

8. Power: Please select prior to order... 100, 115, 220, 240 V; 50, 60 Hz

9. Signal Processing: Digital, with internal industrial PC. Digital RS232C output standard; Alarm contact closures for level alarm, system alarm, etc. Trigger to camera available for synching capture of license plate image.

10. Spectral Capture & Post Processing; The system can store selected measurement spectra for post processing of unknowns

11. Display PC: Emissions Data and optional license plate and speed & acceleration data can be displayed in Excel or similar program.

DOAS "*Differential Optical Absorption Spectroscopy*": A device is used to capture a spectra of the sample or standard being analyzed. Typical devices are dispersive or fourier transform spectrometers, for recording spectra in the UV, visible and/or IR. Alternately a tunable laser-based system might be applied. In addition, a PC is generally used for its high-speed processing as well as its data storage capabilities.

Absorption spectroscopy follows very well-known and predictable rules. If two analytes both absorb at the same wavelength, for example, the resulting absorption will be the sum of the two individual absorptions. *Therefore it is possible to mathematically treat the signal produced, to eliminate interferences, and to produce the spectrum for each analyte being sought.* The ability to differentiate between adjacent absorption features is improved with increased system resolution. In addition, modern pattern recognition signal processing techniques allow the analysis of such low concentrations that no recognizable patterns are apparent when inspecting the spectra.

Sample Analysis - Modern analyzers allow the capture of a spectrum generally in much less than a second. Multiple spectra may be collected and added to improve Signal/Noise, and/or individual spectra may be analyzed to record changes as a function of time. Specific pre-selected analytes may be quantified by analyzing their specific absorption features, but also other "unknowns" can be analyzed by searching through a library of absorption spectra. In addition, the spectra can be stored for subsequent analysis for even a broader list of potential sample components.

Spectral Analysis - Since the absorption spectrum is a fundamental physical property, it is possible to compute the concentration of the absorbing gas directly from the measured spectra, without "calibrating" the analyzer each time with known concentrations of reference gases. This significantly reduces the time and cost of the analysis. However AIM does recommend the periodic introduction of cal gases as an independent verification of the credibility of the data.