



Cerex Monitoring Solutions, LLC

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Product Information – AirSentry Open Path FTIR Analyzer

Cerex Monitoring Solutions, LLC is pleased to present the following information regarding our AirSentry Portable Open Path FTIR Air Monitoring system. The system represents a real-time air monitoring system that can be easily deployed, setup, and collecting data in minutes. The analyzer is provided with a library of nearly 400 compounds, so flexibility for current and future project requirements is easy and comes at no additional cost.



The AirSentry FTIR's scale of size is shown here, relative to a typical laptop pc. Both the transmitter and receiver are located together in the same housing. The telescope section is removable with a single screw. The remaining piece of equipment that completes the beam path is a retro-reflector array (not shown).



AirSentry in use by Missouri State DNR



AirSentry under test outside the Cerex factory.

Summary Elements of CEREX Open Path FTIR Air Monitoring System

- System Cost Complete turnkey system includes base unit, retroreflector, calibration system, gas spectral library.
- Current Spectral Library Standard compound library has over 380 gases.
- Regulatory Uses Used by various Local, State, and Federal agencies for industrial and community-based monitoring.
- Long term maintenance Recommended option - 10,000 hour cryocooler insures long operation, and no need for liquid nitrogen to be hauled to the monitoring site.
- Portable System can be installed and producing data in 10 minutes.

Cerex's AirSentry is a "Monostatic" system whereby the emitter and receiver are co-located within the same housing at one end of the measurement path. The retroreflector is required at the other end of the path to complete the optical beampath.

Cerex's AirSentry utilizes an ultra-sensitive MCT (mercury-cadmium-telluride) detector element that requires cooling to cryogenic temperatures (77 kelvin) to be fully responsive to the low levels of Infrared Radiation. The cooling can be accomplished with an automated stirling engine cryocooler or a liquid nitrogen filled dewar. These cryocooler devices were originally developed for use in missile technology, and have since been adapted to commercial detector cooling applications. Cerex is one of two manufacturers of open path FTIR's that has successfully integrated cryocooler technology into our systems without suffering the negative effects of degraded signal to noise ratio.

Model 5K

- Cryocooler provided with a warranty of 5,000 hours or 1 year (whichever comes first)
- manufacturer states the observed average running time exceeds 10,000 hours
- compressor is replaced at a modest cost – approx. \$5500 (comes with a renewed warranty)
- Lower initial cost than similar commercially available equipment

The added value of employing a cryocooled detection system within the FTIR are;

- LN2 offers no advantage in signal to noise...our cryocooled systems meet the same specs as our LN2 - cooled systems.
- LN2 is an added burden to haul for a "portable" system
- Often LN2 is not available near the site
- LN2 lasts in the dewar only 8-10 hours (max) and then must be refilled to continue operation of the system. This requires man hours / labor to watch the system and refill.
- Autofill systems are available and can be provided. However, these tend to be less reliable, require hoses, extra monitoring equipment, and a large LN2 supply vessel...again none of which lend themselves to portable applications.

Advantages of the CEREX AirSentry Op-FTIR Air Monitoring System:

- ❖ **Modulated Light Beam:** Modulating the light at this point in the optical design acts to allow AirSentry to remain immune from the effects of changes in ambient infrared energy. These effects manifest themselves in other systems as “baseline shifts” in the data. Such shifts are so erratic, that accurate unattended real-time processing is nearly impossible, and an “expert” (experienced PhD or other highly skilled individual) is nearly always required to post-process the data set. Since AirSentry eliminates these effects through a better design, our system allows accurate concentration data to be calculated by the analytical software in real-time.
- ❖ **Optically Stable Interferometer:** The Cerex AirSentry interferometer is manufactured by Bomem, and employs a unique corner-cube design. The corner-cube enables optical stability, and freedom from spectral shifting that other systems experience as a result of temperature fluctuations. No “dynamic alignment” or other added equipment is required to further improve stability. As a result MTTF (Mean Time To Failure) is vastly improved.
- ❖ **Ease of Setup and Alignment:** Since the system is “monostatic”, meaning the source, and receiver are co-located, the optical beam path is completed with the telescope and retroreflector optics. The infrared beam is expanded, and collimated within the 12-inch cassegrain optical telescope. The retroreflector offers the absolute easiest, fastest alignment possible under working field conditions.
- ❖ **Saves Raw Spectra and Performs Real-time Quantification:** Single Beam raw data is sent from AirSentry to the PC via ethernet data stream.

The output of the system is both raw spectroscopic, and also computer-aided analysis (concentration value) data. .

Cerex supports the use of this equipment for this project for the following reasons;

- ❑ portability (can be set up in a fixed location, tripods, or vehicle mounting)
- ❑ low minimum detection levels for the compounds specified
- ❑ quality, traceable, legally defensible data
- ❑ advanced, automated software, thus reducing the costs associated with data analysis
- ❑ low cost-of-ownership due to low maintenance, no consumables
- ❑ minimal training due to easy user-interface
- ❑ Future optional Software upgrade/Dual-Use - system can easily be upgraded to detect nearly all known chemical warfare agents (nerve and blister agents). This enables system to be used for anti-terrorism emergency response applications. (may be export-restricted)
- ❑ Future Hardware upgrade – optional long pass cell easily attaches to expand applications to point-sampler / stack sample.

Shown Right – The AirSentry system can easily be converted to a point sensor, or extractive monitor. The telescope is removed, and a 20meter path multipass cell is attached. A pump is used to draw the air sample into the cell for analysis. This option allows the AirSentry to serve a dual-function, increasing its utility within your organization.



The specific item and part numbers associated with the AirSentry Op-FTIR are as follows:

P/N 282000 Cerex AirSentry Open Path Air Analyzer. The following components and accessories are included in this system:

- AirSentry Spectrometer (includes emitter and receiver)
- Telescope – Gold Coated Optics
- ZnSe Beamsplitters
- Power/Signal Cables
- PC Laptop Controller
- Continuous Monitoring Software
- Spectral Library Database

P/N 282304 30-Cube Retroreflector Array (400 meters maximum recommended pathlength)

P/N 282562 60-Cube Retroreflector Array (600 meters maximum recommended pathlength)



Shown left – The latest Model of the AirSentry is even smaller and more portable. The telescope shown in the picture is the same size as on our older models. By comparison, the main spectrometer enclosure is now much smaller and lighter!





Shown left – A typical deployment of the 30-cube retroreflector array. This design is compact, portable, and can allow the system to achieve paths in excess of 300 meters.