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Perchloroethylene Sensor

Additional information

Aeroqual sensors utilize gas sensitive semiconductor technology. Combined with our proprietary system this offers rapid response, high accuracy, stability, low cross-sensitivity, and low drift characteristics. Aeroqual's product design utilizes the concept of removable/replaceable sensor heads. The benefits of this design include the minimization of downtime, elimination of field-calibration and lower overall cost of ownership.

The heads are pre-calibrated and are designed to clip on and off our standard range of bases. The software recognizes which head is attached. The heads are simply swapped out at the end of their life for either new or refurbished ones at up to half the cost.

Aeroqual's range includes both hand held and industrial/commercial monitors, together with network system products. We offer comprehensive functionality including data logging, self diagnostics, min/max/average reports, user defined control and alarm points at cost effective price points.

Target Markets

- Dry cleaning
- Metal degreasing
- Industrial hygiene
- Perchloroethylene-based solvent applications

Perchloroethylene in liquid form is used extensively in the dry cleaning industry as a fabric cleansing fluid. Aeroqual monitors accurately detect primary and secondary sources of solvent exposure to dry cleaning workers including solvent spills; emissions during machine operation; fugitive leaks from piping and tanks; off-gassing from clothing; and vapors from spotting agents.

Reasons for performing air monitoring of perchloroethylene levels include:

- To determine the perchloroethylene exposure levels of individual employees;
- To identify sources of leaks in equipment; and
- To measure perchloroethylene levels before and after modifications to equipment or procedures

Perchloroethylene Sensor Head Specification

Range	0 to 200 ppm perchloroethylene
Accuracy	<+/- 5 ppm 0 to 50 ppm +/- 10% 50 to 200 ppm
Resolution	1 ppm
T50 response	<30 seconds
Reading update	2 seconds
Sensor type	Gas sensitive semiconductor
Operating temperature range	-20°C to 60°C
Operating relative humidity range	5 to 95% non-condensating

Recommended period between calibration checks: 6 months

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Technology Comparison

Photo-Ionisation Detector (PID) technology is the market leading technology but lacks specificity and is expensive. Lamps can fail and are affected by high humidity. The target application is the petrochemical industry which requires intrinsic safety. This is not the target market of Aeroqual's products.

Gas Chromatograph (GC) technology is specific with high sensitivity but is expensive and primarily aimed at spill analysis and environmental monitoring.

Infra-Red (IR) technology requires expensive maintenance on lamps but has low cross-sensitivity.

Heated Metal Oxide (HMOS) sensors (i.e. solid state tin-oxide) are inexpensive and have a reputation of sensor drift, poor accuracy, poor T90 and T50 response and poor reliability. Traditional HMOS monitors are also affected by cross sensitivities and require regular calibration.

Aeroqual uses Gas Sensitive Semiconductor (GSS) technology where some of the principles of HMOS technology are used. Aeroqual has developed exclusive techniques to dramatically improve accuracy, T90 response, cross sensitivities and sensor drift. These techniques also dispense with the costs of calibration and maintenance. Aeroqual's product range is unique in the global monitor marketplace and has been designed to provide near scientific accuracy, functionality, and rapid response at an affordable price.

Sensor Life

Sensor head warranty: 6 months
Expected sensor life: 5 years
Recommended calibration or performance check: 6 months

Sensor Head Shelf Life

The sensor heads do not degrade in storage. They will survive unused and remain in calibration for a minimum of 5 years.

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Laboratory Evaluation of Leak Detectors

California Environmental Protection Agency – Air Resources Board

Excerpt from Table 2 page H-5 of Appendix H "Laboratory Evaluation of Leak Detectors"—*California Dry Cleaning Industry Technical Assessment Report* (Draft Report). Published by California Air Resources Board Stationary Source Division, Emissions Assessment Branch (October 2005). Final report pending.

Portable VOC Analyzer Response to PERC Calibration Gas Standards

Date	Analyzer (display, detection, delivery)	PERC Standard concentration	# Trials	Average Response
28 Jan 05	**TIF-5100** (audible, semi-conductor, diffusion)	50 ppmv	4	rapid beep
31 Jan 05		25 ppmv	3	
28 Jan 05	**Eco Sensors C-21** (LED, semiconductor, diffusion)	50 ppmv	4	no response
31 Jan 05		25 ppmv	3	
23 May 05	**PhoCheck** (LCD, PID, internal pump)	50 ppmv	3	49.5 ppmv
		25 ppmv	3	26.8 ppmv
23 May 05	**Tek-Mate** (audible, semi-conductor, diffusion)	50 ppmv	3	constant tone
		25 ppmv	3	constant tone
23 May 05	**D-Tek** (audible/LED, infrared, diffusion)	50 ppmv	3	no response
		25 ppmv	3	
10 Aug 05	**Micro 5** (LCD, PID, diffusion)	50 ppmv	3	58.0 ppmv
		25 ppmv	3	26.4 ppmv
10 Aug 05	**Draper** (LCD, chemical cell, internal pump)	50 ppmv	4	29.6 ppmv
		25 ppmv	3	20.7 ppmv
23 Aug 05	**Aeroqual S200** (LCD, semi-conductor, diffusion)	32 ppmv	2	30 ppmv
		16 ppmv	2	15 ppmv
25 Aug 05	**Aeroqual S500** (LCD, semi-conductor, diffusion)	36 ppmv	1	31 ppmv
06 Sep 05	**MiniRae2000** (LCD, PID internal pump)	50 ppmv	3	50.7
		25 ppmv	3	24.2
Reference Analyzer	**HW-101** (analog, PID, internal pump)	50 ppmv	8	48 ppmv
		25 ppmv	8	26 ppmv

Additional Laboratory Comments

Aeroqual Series 200 and 500 monitors. The humidified standards were prepared by introducing dry 25 ppmv and 50 ppmv perc into a 3 liter tedlar bag. 30 micro liters of distilled water were then injected into each bag and allowed to equilibrate for three hours at 72 degrees F to produce a standard of approximately 50% RH.

Prior to exposing the monitors to the standards, the standards were screened with a portable PID. The original 50 ppm standard had decreased to 32 ppm and the 25 ppm standard decreased to 16 ppm. The decreases in concentration are probably due to sample degradation (the gas standards are usually exposed to the analyzers within minutes of being introduced into the bag). The humidification technique may have accelerated this effect.

When the humidified standards were exposed to the Aeroqual monitors, the Series 200 produced responses of 30 ppm and 31 ppm to the 32 ppm standard and with responses to the 16 ppm standard of 15 ppm and 15 ppm. The baseline reading for the Series 200 ranged from 0 - 3 ppm.