



## ALPHA SENTRY

# ALPHA SENTRY DETECTION HEAD™

Detection head for the Alpha Sentry Continuous Air Monitor (CAM) System.



## FEATURES

- Patented radon reduction screen
- Patented mass flow meter for accurate air flow measurement
- High sensitivity lowers false alarm rate
- Cleanable, rugged high resolution detector
- Patented disposable filter cartridge assembly saves time and labor

### Note:

- US Patent 5,128,539 – Radon Reduction Screen (1<sup>st</sup> bullet)
- US Patent 5,337,603 – Mass Flow Meter (2<sup>nd</sup> bullet)
- US Patent 5,404,762 – Quick Filter Change (5<sup>th</sup> bullet)

## DESCRIPTION

Based on research conducted by Los Alamos National Laboratory and Texas A&M University's Aerosol Laboratory, Mirion's sampling head represents the most advanced technology available in Alpha CAMs today.

The sampling head contains a patented diffusion screen that removes up to 95% of the newly formed radon daughters particles from the air. This is ideal for laboratory environments with HEPA filtered air which have a low concentration of condensation nuclei and hence a low attachment rate.

Such facilities typically have high air exchange rates as well, further increasing the fraction of unattached radon decay products.

## ALPHA SENTRY DETECTION HEAD | CONTINUOUS AIR MONITOR (CAM) SYSTEM

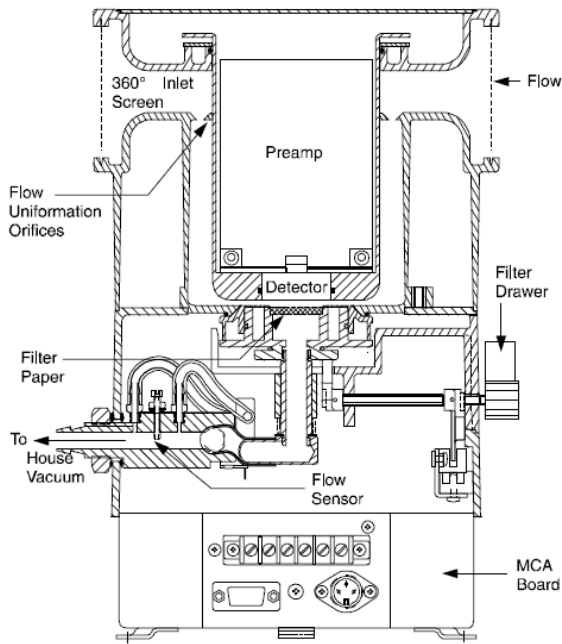


Figure 2  
Sampling Head Diagram

Representative air sampling is ensured by a radial 360° inlet and air channels optimized for uniform particulate deposition on the filter paper.

In-line monitoring is available with an optional specially designed manifold. The use of the manifold guarantees results consistent with the open radial inlet application. The in-line adapter (Figure 3) connects to any duct or pipe via 1 in. NPT thread.

The sample is uniformly deposited on a filter encased in a cartridge. The patented filter cartridges are designed to save labor and reduce operating costs. When changing filters, the entire cartridge is easily switched, rather than handling flimsy filter paper while wearing gloves. The filter paper within the cartridge is easily removed for further analysis if needed.

The activity on the filter is counted by a Passivated Implanted Planar Silicon (PIPS®) detector. This rugged, cleanable detector has an active surface area of 1700 mm<sup>2</sup>. The larger detector offers greater sensitivity due to increased efficiency and greater possible air flow.



Figure 3  
In-Line Adapter Allows Direct Connection  
of Alpha Sentry Head to Pipe or Duct

The counts from the detector electronics are stored in a 256 channel MCA, where they are continuously monitored for an acute release. Should such an event be detected, the sampling head annunciates an alarm and sends its alarm status to an optional controller.

The alarm device can be either the Mirion-supplied optional audio/visual package (driven internally), or the standard SPDT relay contacts can be used to drive custom alarm devices. Two LEDs are present on the head that indicate the counting status – normal or alarm.

In addition to collecting the spectrum, the sampling head monitors the flow rate (with a patented mass flow meter), power supply, and detector voltage. It reports these values back to the optional controller, where it is determined if an alarm condition exists.

**SENSITIVITY**

- Under the following conditions that approximate a laboratory environment (37 Bq/m<sup>3</sup> (1 pCi/L) radon background, mostly unattached, constant 1 DAC Pu concentration), the sensitivity is approximately 2 DAC-hours with 1700 mm<sup>2</sup> PIPS
- Under the following conditions that approximate a non-laboratory environment (37 Bq/m<sup>3</sup> (1 pCi/L) radon background, mostly attached, constant 1 DAC Pu concentration), the sensitivity is approximately 3.5 DAC-hours with 1700 mm<sup>2</sup> PIPS

**PARTICLE SIZE DEPOSITION**

- Equivalent diameter vs. percent
- Penetration: shown in Figure 4

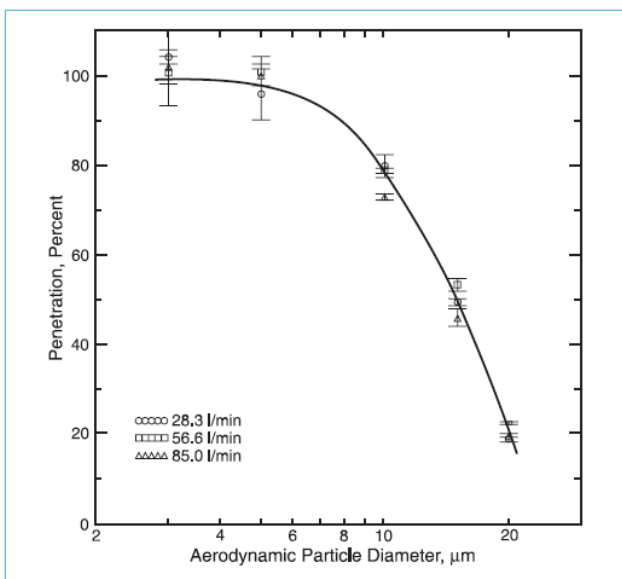


Figure 4  
Equivalent Diameter vs. Percent Penetration

- Uniform filter deposition: 9% coefficient of variation for 10 μm AED particles.

**EFFICIENCY**

- Approximately 33% with a 1700 mm<sup>2</sup> PIPS detector

**BACKGROUND REDUCTION**

- Patented screen removes > 95% of newly formed radon daughter products.

**DETECTOR**

- Type: Passivated Implanted Planar Silicon (PIPS).
- Size: both 1700 mm<sup>2</sup>
- System resolution: 1700 mm<sup>2</sup> PIPS – typically 450 keV

**FILTER CARTRIDGE AND FILTER**

- Pressure drop: 12.44 kPa (50 in. H<sub>2</sub>O) across sampling head with AS047 filter paper, at 0.94 x 10<sup>-3</sup> m<sup>3</sup>/s (2 cfm) using 1700 cartridge
- Filter: model AS047
- Type: Millipore® SS
- Pore size: 3 μm
- Active diameter: 42 mm with 1700 PIPS

**1700 mm<sup>2</sup>**

- Outside diameter: 4.765 cm (1.876 in)
- Inside diameter: 4.191 cm (1.650 in)
- Height: 1.91 cm (0.75 in)

**CABLE LENGTHS**

- Power: 3 m (10 ft) cable is standard; maximum distance for single sampling head powered directly from controller is 45 m (150 ft) using 22 gauge wire for the power cable
- Communication: 3m (10 ft) cable is standard; maximum (RS-485) distance for single sampling head powered locally or multiple heads on the same network is 1200 m (4000 ft). The latter requires a Model CA2001 Network Terminator.

**COMMUNICATION PORTS**

- Sampling head: RS-485 for communication

**PHYSICAL**

- Weight: 3.6 kg (8 lb)
- Diameter of head: 17.8 cm (7 in)
- Diameter including vacuum connection and door knob: 22.9 cm (9 in)
- Height: 30.5 cm (12 in)

**POWER**

- Sampling head: 24 V ac, 50/60 Hz, <15 W

**ENVIRONMENTAL**

- Operating temperature: 0°C to +50°C (+32°F to +122°F)
- Operating humidity: 0-95% relative, non-condensing

**ALARMS**

**Status**

- Filter door open
- Communication network down
- Low flow rate
- High flow rate
- Detector voltage
- Power
- Exposure
  - Acute

# ALPHA SENTRY DETECTION HEAD | CONTINUOUS AIR MONITOR (CAM) SYSTEM

## Sampling head: optional

- Model AS020 CAM Sampling Head Alarm, one per head
- Audible: selectable 90 or 84 dB (2900 Hz) at 60 cm (2 ft)
- Visual: > 3 watt-second xenon flash tube
- Relay contacts are standard (SPDT): 0.3 A at 30 V ac, Trouble and Exposure

## FLOW MEASUREMENT

- Range:  $0.24 \times 10^{-3}$  to  $1.42 \times 10^{-3}$  m<sup>3</sup>/s (0.5 to 3.0 cfm).
- Recommended flow setting:
  - $0.94 \times 10^{-3}$  m<sup>3</sup>/s (2 cfm) for 1700 mm<sup>2</sup> detector
  - Meter type: hot wire anemometer; accuracy:  $\pm 5\%$

## SAMPLING HEADS

- AS1700R – Radial Inlet with 1700 mm<sup>2</sup> PIPS

## OPTIONS

- AS010 In-Line Manifold Option for Sampling Head
- AS020 Alarm Option for Sampling Head
- AS032 Filter Cartridges for 1700 mm<sup>2</sup> Sampling Heads, Package of 25
- AS047 Filter Paper, 47 mm; package of 100
- AS050 Wall Mounting Bracket for Sampling Head
- AS060 Replacement Screen for Sampling Head package of 2
- AS070 Power Supply for Sampling Head (115 V ac line)
- AS085 241Am Calibration Check Source for AS1700R Sampling Heads
- C2000-X Communications Cable (ASM1000 to Multiple Sampling Heads)
- C2001-X Communications/Power Cable (ASM1000 to single Sampling Head; consists of C2000-X and C2003-X)
- C2002-X Network Access Cable (NTB to head)
- C2003-X Power Cable (ASM1000 to Single Sampling Head)
- CA2000 Network Tee Box (NTB), includes 3 m (10 ft) C2002 and CA2001
- CA2001 Network Terminator (NT)

Featuring:



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