AIR or STACK MONITOR
GAS, GROSS BETA-GAMMA PARTICULATE, & IODINE
Model – CAM-33-1P

FEATURES:

- THREE CHANNEL SIMULTANEOUS MEASUREMENT
- DETECTOR VERIFICATION CAPABILITY USING GAS & SOLID SOURCES
- EASY DETECTOR SYSTEM CALIBRATION WITH BUILT-IN CALIBRATION INTERFACE
- INTERNAL PERIODIC SYSTEM TESTS
- DETECTORS MORE SENSITIVE BY FACTORS OF 5-500 THAN REQUIRED BY NRC
- ONE INCH LEAD SHIELDING 4 pi, ALL DETECTORS
- BUILT-IN 4 GB COMPUTER
- 17" COLOR MONITOR
- HIGH CAPACITY OIL-LESS AIR PUMP
- REAL-TIME FLOW MEASUREMENT
- DATA ANALYSIS, ARCHIVE
- SELF-CONTAINED CABINET
- RUGGED, CASTER MOUNTED
- IP32

DESCRIPTION:

The CAM-33 Series are three channel air monitors for simultaneous measuring of Gross Beta / Gamma Particulates, and Noble gaseous radioactivity, and Iodine.

Like all of the CAM-33 series, the CAM-33-1P is a continuous duty, high capacity, rugged skid or caster mounted systems. Electronics consists of Computer with 17" COLOR LCD Monitor.

Electronics are plug-in modules allowing change or addition of function as needed and allowing rapid repair by substitution of modules in the field. The modular system is covered by T/A's unique exchange warranty, in addition to the full one year warranty covering all T/A products.

Shields are void free lead encased in welded steel and with stainless steel liners for long, useful life and easy decontamination.

Filters are easily changed via quick disconnect, o-ring sealed filter holder. Shield can be opened for filter change or cleaning with minimum effort. All shield connections and openings are sealed against air leaks. The air moving system is based on a high capacity oil less air pump capable of delivering 120 lpm (4cfm) free air and including Real time flow rate measurement and data analysis.

The entire CAM-33-1P system is mounted in a self-contained rugged cabinet and comes complete with all cabling, connectors, and software in place, setup, and ready to operate. The standard unit is operated from 115V single phase, 60 Hz; 220V optional, 50 or 60 Hz.
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GAS, GROSS BETA-GAMMA PARTICULATE, & IODINE
Model – CAM-33-1P

SPECIFICATIONS:

Channels: Three
Activity Detected: Gross Beta-Gamma Particulate, Iodine, Noble Gas

STANDARD DETECTORS:

<table>
<thead>
<tr>
<th>Activity Detected</th>
<th>Gross Beta-Gamma Particulate</th>
<th>Iodine</th>
<th>Noble Gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filters:</td>
<td>2” dia.</td>
<td>2.5&quot; dia x 1” thick</td>
<td>One Liter Chamber</td>
</tr>
<tr>
<td>Filter Type:</td>
<td>Glass Fiber Filter</td>
<td>TEDA Activated Charcoal Cartridge</td>
<td>Stainless Steel Lined</td>
</tr>
<tr>
<td>Collection Efficiency</td>
<td>Up to 99% efficiency at 0.3 micron particle size</td>
<td>60 KeV to 3 MeV (7 MeV optional)</td>
<td>60 KeV to 3 MeV (7 MeV optional)</td>
</tr>
</tbody>
</table>

DETECTORS:

- Particulate Beta-Gamma: 2” diameter GM or optional Proportional Detector. (1 each)
- Iodine: 2” diameter NaI(Tl) Model PGS-3L1 (Spectroscopic Grade) (1 each)
- Gas Standard Range: 2 inch diameter GM (2 each)
- Shielding: 1” lead; 4 pi. Plus 1 inch lead placed between adjacent detectors

- Detector Sensitivity: Monitor is more sensitive on all channels by factors of 5 to 500 than is required by USNRC and other regulatory agencies.
- Calibration: Follow on screen instructions for user assisted automatic calibration.
- Decontamination: Shields are straight-through bore with Stainless Steel liner for easy decontamination. Other wetted parts are Stainless Steel or quick and easy replacement.

AIR MOVING SYSTEM:

Air Pump: Extremely rugged continuous duty
Pumping System: Pump noise is reduced by heavy duty internal muffler
Oil-less Pump Motor: 3/4 Horsepower, 50/60Hz capacitor start, induction run
Flow Control: Flow Regulator Controls the flow from 0-4 cfm, +/- 0.2 cfm (User Settable)
Flow Rate: Factory setting is at 4 cfm. Mass flowmeter feeds Real-Time data to CAM-33 software.
Settable Flow Rate: On screen Flow Rate Display 0 to 4cfm or 0-120 lpm - Factory Set at 120 lpm (User Settable)
Inlet and Outlet: 20 foot 3/4” hose inlet: 6 meter 2.5 cm I.D
20 foot 1” hose outlet. May be extended
AIR or STACK MONITOR
GAS, GROSS BETA-GAMMA PARTICULATE, & IODINE
Model – CAM-33-1P

<table>
<thead>
<tr>
<th>DETECTOR TYPE</th>
<th>1 MINUTE</th>
<th>1 HOUR</th>
<th>10 HOURS</th>
<th>1 DAY</th>
<th>1 WEEK</th>
<th>TOP OF RANGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>ALPHA</td>
<td>$6 \times 10^{-10}$ µCi/ml</td>
<td>$1 \times 10^{-11}$ µCi/ml</td>
<td>$1 \times 10^{-12}$ µCi/ml</td>
<td>$6 \times 10^{-13}$ µCi/ml</td>
<td>$1 \times 10^{-13}$ µBq/ml</td>
<td>$1.0$ Bq/ml</td>
</tr>
<tr>
<td></td>
<td>$3.7 \times 10^{-7}$ Bq/ml</td>
<td>$3.7 \times 10^{-8}$ Bq/ml</td>
<td>$2.4 \times 10^{-8}$ Bq/ml</td>
<td>$4 \times 10^{-9}$ Bq/ml</td>
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<tr>
<td>PARTICULATE BETA-GAMMA</td>
<td>$6 \times 10^{-10}$ µCi/ml</td>
<td>$1 \times 10^{-11}$ µCi/ml</td>
<td>$1 \times 10^{-12}$ µCi/ml</td>
<td>$6 \times 10^{-13}$ µCi/ml</td>
<td>$1 \times 10^{-13}$ µBq/ml</td>
<td>$1.0$ Bq/ml</td>
</tr>
<tr>
<td></td>
<td>$3.7 \times 10^{-7}$ Bq/ml</td>
<td>$3.7 \times 10^{-8}$ Bq/ml</td>
<td>$2.4 \times 10^{-8}$ Bq/ml</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IODINE</td>
<td>$3 \times 10^{-9}$ µCi/ml</td>
<td>$1 \times 10^{-11}$ µCi/ml</td>
<td>$1 \times 10^{-12}$ µCi/ml</td>
<td>$6 \times 10^{-13}$ µCi/ml</td>
<td>$1 \times 10^{-13}$ µBq/ml</td>
<td>$0.1$ Bq/ml</td>
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<td>$3.7 \times 10^{-8}$ Bq/ml</td>
<td>$2.4 \times 10^{-8}$ Bq/ml</td>
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<td></td>
</tr>
<tr>
<td>GAS-STANDARD RANGE</td>
<td>$6 \times 10^{-7}$ µCi/ml</td>
<td>$1 \times 10^{-7}$ µCi/ml</td>
<td>$2.7 \times 10^{-8}$ µCi/ml</td>
<td>$1 \times 10^{-8}$ µCi/ml</td>
<td>$2.7 \times 10^{-3}$ µBq/ml</td>
<td>$10^{15}$ Bq/ml</td>
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<tr>
<td></td>
<td>$3.7 \times 10^{-3}$ Bq/ml</td>
<td>$1 \times 10^{-3}$ Bq/ml</td>
<td>$3.7 \times 10^{-4}$ Bq/ml</td>
<td>$1 \times 10^{-4}$ Bq/ml</td>
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<td></td>
</tr>
</tbody>
</table>

Each Detector is Protected Against Corrosion and Moisture by Design, Construction, and 0.0005” Window.

Display Mode: Model CAM-33-1P features a Computer with a Color LCD Monitor. Direct read out in concentration Bq/l or other units. Daily total activity reads through the CAM-33-1P in KBq or Curies, etc.

Operation: In normal operation the CAM-33-1P, the Color LCD Monitor displays:

- **PARTICULATE**
  - 1. CONCENTRATION ALARM
  - 2. TOTAL ALARM
  - 3. LOSS OF SIGNAL ALARM
  - 4. ONE SECOND ALARM
  - 5. LOW GAS FLOW

- **IODINE**
  - 1. CONCENTRATION ALARM
  - 2. TOTAL ALARM
  - 3. LOSS OF SIGNAL ALARM
  - 4. EMERGENCY ALARM

- **NOBLE GAS**
  - 1. CONCENTRATION ALARM
  - 2. TOTAL ALARM
  - 3. N1- LOSS ALARM
  - 4. N2 - LOSS ALARM
  - 5. 0% ELLS KEEP ALARM
  - 6. EMERGENCY ALARM

Close program before changing filter cartridge.
AIR or STACK MONITOR
GAS, GROSS BETA-GAMMA PARTICULATE, & IODINE
Model – CAM-33-1P

STANDARD SPECIFICATIONS:

High Voltage Supply: Separately variable from 0 to 2,000 VDC at 200 μa on scintillation or proportional channels.

LCD Color Monitor: 17” Monitor shows both real time concentration & accumulated dose for all Channels

Flow Control: Flow Regulator Controls the flow from 0-4 cfm, +/- 0.2 cfm (User Settable)

Flow Rate: Factory setting is at 4 cfm. Mass flowmeter feeds Real-Time data to CAM-33 software.

Shielding: 1” lead; 4 pi. Plus 1 inch lead placed between adjacent

Accuracy: +/- 10% except for resolution loss and statistical variation

Repeatability: +/- 15% of expected count rate

Alarms: Alarms are pre-settable to any trigger level - Fail

Low Level Alarm: Automatic Reset

High Level Alarm: High level alarm remains activated until RESET button is pushed

Alarm Indication Lights: 6 Lights Red-high level; Amber-low level count for each channel, plus additional indicators shown on LCD Monitor.

Audio: 1,000 Hz, greater than 80 db

Calibration: Primary Calibration from factory Using Xe-133 & Kr-85

Outputs: Alarm Condition Outputs:

1. Logic Level Signal
2. Contact Closure or Opening

Standard Installation: Cabinet: heavy gauge steel. Skid or caster mounted

Special Safety: Loss of system vacuum air flow alarm and relay switch closure.

Power: 120 VAC – 220 VAC; optional 50/60 Hz


* Internal piping tested to TA Specifications

OPTIONS:

- Fork Lift Skid Mount
- Grab Sample Port
  - Allows for redundant filter sample collection for all three channels
  - Used for in-situ calibration & testing
- Temperature & Pressure measurement automatic correction
- Three push-button Detect & Test sources (License exempt quantities) of the three channels.
- Flow rate can be increased to 30 cfm with larger pump and minor changes in the plumbing
- All wetted surfaces stainless steel

TECHNICAL ASSOCIATES
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tagold@nwc.net WWW.TECH-ASSOCIATES.COM
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Model – CAM-33-1P

WEIGHT, DEMENSION, SHIPPING:
Dimensions: 23" wide x 36" deep x 66" high - exclusive of casters.
Weight: 1200 lbs.
Shipping Weight: 1400 lbs.

ELECTRONIC SYSTEM DESCRIPTION:
1. CPU with data acquisition
2. High Resolution, 17" LCD Color Monitor Display
3. Mouse
4. 3 Channel 4-20mA Chart Recorder Drive available as option
5. Keyboard
6. Audio
7. Manuals
8. 4 GB hard drive - Stores programs, plus room to add additional new software functions in the future
9. Non-volatile 1 year data storage. Data stored every 2 minutes all year.
10. Specialized Air Monitor software custom tuned and designed for the CAM-33-1 Air Monitor.
11. Output:
   - Ethernet LAN Connection
   - USB Ports

OPTIONAL:
- Graphic Printer for hard copy - 3 trace graphs

Special Upgrades Incorporated into CAM-33-1P Air Monitor:
- 17" Color LCD Monitor
- Real-Time Mass Flowmeter

OPTIONS:
- Shrouded probe or other air collection Nozzels are available
- Touch screen feature on the LCD color monitor
- Titanium detector cover
- 4-20mA output signals - 3 channels
- Positive position motor driven check sources with LED position indicator with greater "throw length" to preserve low background when source is retracted and to give trouble free operation.
# AIR or STACK MONITOR

GAS, GROSS BETA-GAMMA PARTICULATE, & IODINE

**Model – CAM-33-1P**

<table>
<thead>
<tr>
<th>Airborne Activity</th>
<th>Model</th>
<th>TOTAL-6-TCI (1)</th>
<th>TOTAL-6-TCO (1)</th>
<th>TOTAL-6-TC</th>
<th>CAM-33-1P</th>
<th>CAM-33</th>
<th>CAM-33-4</th>
<th>CAM-33-6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical Form</td>
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<tr>
<td>Tritium H3</td>
<td>T₂, HTO</td>
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<td>—</td>
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<td>YES</td>
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<td>Iodine</td>
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<td>YES</td>
<td>YES</td>
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<tr>
<td>Noble Gas: Gross/All</td>
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<td>YES</td>
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</tr>
</tbody>
</table>

**Number of Channels:**

YES = Measures Separately
RX = Rejects
OP = Optional

**NOTE:** Models TOTAL-6-TCO & TOTAL-6-TCI work best if no other nuclides are present
See Spec Sheet details for the CAM-33 series.