



Air or Stack Monitor

Gas, Gross Beta-Gamma Particulate and Iodine

Model: CAM-33 -1P

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 system. 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.

Features

- Three Channel Simultaneous Measurement
- Detector Verification Capability Using Gas and 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
- USB and Ethernet
- Self-Contained Cabinet
- Rugged, Caster Mounted
- **IP32**



**TECHNICAL ASSOCIATES
OVERHOFF TECHNOLOGY**

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DIVISIONS OF



USNUCLEARCORP

OTCQB-UCLC

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Specifications

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

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

Detectors

- Particulate Beta-Gamma: 2" diameter GM or optional Proportional Detector. **(1 each)**
- Iodine: 2" diameter NaI(Tl) Model PGS-3LI (Spectroscopic Grade) **(1 each)**
- Gas Standard Range: 2-inch diameter GM **(2 each)**
- Shielding:
 - » 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.

Moving Air 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, +/- 0.2cfm (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



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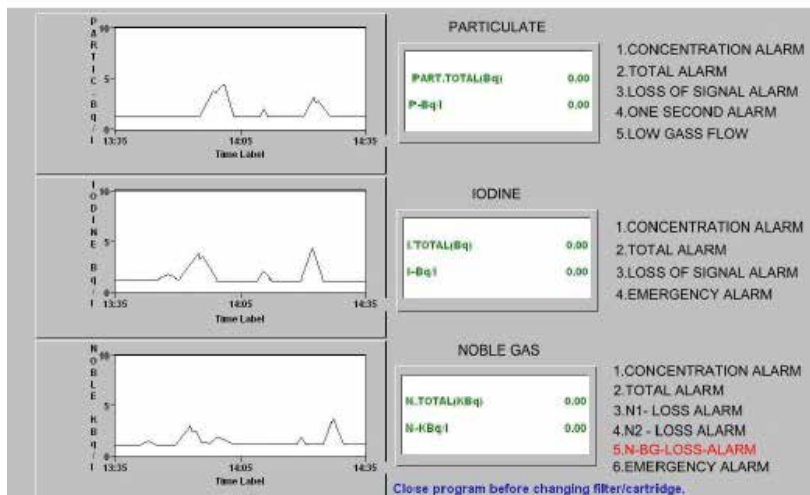
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DETECTOR TYPE	1 MINUTE	1 HOUR	10 HOURS	1 DAY	1 WEEK	TOP OF RANGE
ALPHA	$6 \times 10^{-10} \mu\text{Ci/ml}$	$1 \times 10^{-11} \mu\text{Ci/ml}$ $3.7 \times 10^{-7} \text{ Bq/ml}$	$1 \times 10^{-12} \mu\text{Ci/ml}$ $3.7 \times 10^{-8} \text{ Bq/ml}$	$6 \times 10^{-13} \mu\text{Ci/ml}$ $2.4 \times 10^{-8} \text{ Bq/ml}$	$1 \times 10^{-13} \mu\text{Bq/ml}$ $4 \times 10^{-9} \text{ Bq/ml}$	1.0 <u>Bq/ml</u>
PARTICULATE BETA-GAMMA	$6 \times 10^{-10} \mu\text{Ci/ml}$	$1 \times 10^{-11} \mu\text{Ci/ml}$ $3.7 \times 10^{-7} \text{ Bq/ml}$	$1 \times 10^{-12} \mu\text{Ci/ml}$ $3.7 \times 10^{-8} \text{ Bq/ml}$	$6 \times 10^{-13} \mu\text{Ci/ml}$ $2.4 \times 10^{-8} \text{ Bq/ml}$	$1 \times 10^{-13} \mu\text{Bq/ml}$ $4 \times 10^{-9} \text{ Bq/ml}$	1.0 <u>Bq/ml</u>
IODINE	$3 \times 10^{-9} \mu\text{Ci/ml}$	$1 \times 10^{-11} \mu\text{Ci/ml}$ $3.7 \times 10^{-7} \text{ Bq/ml}$	$1 \times 10^{-12} \mu\text{Ci/ml}$ $3.7 \times 10^{-8} \text{ Bq/ml}$	$6 \times 10^{-13} \mu\text{Ci/ml}$ $2.4 \times 10^{-2} \text{ Bq/ml}$	$1 \times 10^{-13} \mu\text{Bq/ml}$ $4 \times 10^{-9} \text{ Bq/ml}$	0.1 <u>Bq/ml</u>
GAS-STANDARD RANGE	$6 \times 10^{-7} \mu\text{Ci/ml}$	$1 \times 10^{-7} \mu\text{Ci/ml}$ $3.7 \times 10^{-3} \text{ Bq/ml}$	$2.7 \times 10^{-8} \mu\text{Ci/ml}$ $1 \times 10^{-3} \text{ Bq/ml}$	$1 \times 10^{-8} \mu\text{Ci/ml}$ $3.7 \times 10^{-4} \text{ Bq/ml}$	$2.7 \times 10^{-9} \mu\text{Bq/ml}$ $1 \times 10^{-4} \text{ Bq/ml}$	10^{15} Bq/ml POST-ACCIDENT $4 \times 10^{21} \text{ Bq/ml}$



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:



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Standard Specifications

High Voltage Supply:	Separately variable from 0 to 2,000 VDC at 200 μ a on scintillation or proportional channels.
LCD Color Monitor:	17" Monitor shows both real time concentration and accumulated dose for all Channels
Flow Control:	Flow Regulator Controls the flow from 0-4 cfm, +/- 0.2cfm (User Settable)
Flow Rate:	Factory setting is at 4 cfm.
Shielding:	Mass flowmeter feeds Real-Time data to CAM-33 software.
Accuracy:	1" lead; 4 pi. Plus 1-inch lead placed between adjacent
Repeatability:	+/- 10% except for resolution loss and statistical variation
Alarms:	+/- 15% of expected count rate
Low Level Alarm:	Alarms are pre-settable to any trigger level - Fail
High Level Alarm:	Automatic Reset
Alarm Indication Lights:	High level alarm remains activated until RESET button is pushed
Audio:	6 Lights Red-high level; Amber-low level count for each channel, plus additional indicators shown on LCD Monitor.
Calibration:	1,000 Hz, greater than 80 db
Outputs:	Primary Calibration from factory Using Xe-133 and Kr-85
Standard Installation:	Alarm Condition Outputs: 1. Logic Level Signal 2. Contact Closure or Opening
Special Safety:	Cabinet: heavy gauge steel. Skid or caster mounted 4 five-inch ball bearing casters. Two are full 360 degree swiveling. Loss of system vacuum air flow alarm and relay switch closure. Loss of signal alarm. All system circuits fused.
Power:	120 VAC – 220 VAC; optional 50/60 Hz
Features:	Thermal protection on motor. Positive Displacement Pump. Internal Piping tested to Technical Associates' specifications.

***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 and testing
- Temperature and Pressure measurement automatic correction
- Three push-button Detect and 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



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Weight, Demension, Shipping

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.



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Airborne Activity	Model	TOTAL-6-TCI (1)	TOTAL-6-TCO (1)	TOTAL-6-TC	CAM-33-1P	CAM-33	CAM-33-4	CAM-33-6
	Chemical Form							
Tritium H3	T ₂ , HTO T ₂ O	YES	YES	YES	OP	NO	OP	YES
Carbon C-14: Inorganic Organic	CO ₂ Various	YES —	— YES	YES OP	OP			OP YES
Particulate	Alpha				YES	OP	OP	OP
Particulate	Beta				YES	YES	YES	YES
Iodine				OP	YES	YES	YES	YES
Noble Gas: Gross/All				YES	YES	YES	YES	YES
Argon				OP				OP
Xenon				OP				OP
Krypton				OP				OP
Radon				RX				OP - RX

Number of Channels:

YES = Measures Separately

RX = Rejects

OP = Optional

NOTE: Models TOTAL-6-TCO-H³ and TOTAL-6-TCI- H³ work best if no other nuclides are present.
See Spec Sheet details for the CAM-33 series.



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