

AIR or STACK MONITOR

NOBLE GAS, GROSS BETA-GAMMA PARTICULATE, & IODINE

Optional Alpha, Tritium, Carbon-14

PART OF THE TOTAL-6 SERIES AIR & STACK MONITORS

Model – CAM-33 Series - CAM-33-2, CAM-33-3, CAM-33-4, CAM-33-6

FEATURES:

- TWO to SIX CHANNEL SIMULTANEOUS MEASUREMENT OF:
 - GAMMA PARTICULATE DYNAMIC COMPENSATION
 - BETA-GAMMA PARTICULATE
 - IODINE - MOLECULAR & ORGANIC
 - NOBLE GAS – DYNAMIC COMPENSATION
 - ALPHA PARTICULATE
 - TRITIUM
 - CARBON-14
- DETECTORS MORE SENSITIVE BY FACTORS OF 5-500 THAN REQUIRED BY NRC
- 17" COLOR MONITOR
- HIGH CAPACITY OIL-LESS AIR PUMP
- REAL-TIME FLOW MEASUREMENT
- DATA ANALYSIS / ARCHIVE / RETRIEVAL
- RUGGED, CASTER OR SKID MOUNTED, SELF-CONTAINED CABINET;
OPTIONAL - NRTL CERTIFIED CABINET
- **IP33**



DESCRIPTION:

The **CAM-33 Series** are two to six channel air monitors for simultaneous, continuous measurement of Gamma Particulates, Gross Beta / Gamma Particulates, Noble gaseous radioactivity, and Iodine.

Batch sampling or dual sampling for continuous sampling during the course of an accident are options available with the CAM SERIES

- The **CAM-33-4** includes Alpha Particulates.
- The **CAM-33-6** has six channels for also measuring Alpha Particulates, Tritium, & Carbon-14.
- These are continuous duty, high capacity, rugged skid or caster mounted systems. Electronics consists of Computer with **17" COLOR LCD Monitor**.
- 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 entire 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 120V single phase, 60 Hz; 220V optional, 50 or 60 Hz.

THE CAM SERIES REPLACES THE PING-1



TECHNICAL ASSOCIATES

OVERHOFF TECHNOLOGY

7051 Eton Ave., Canoga Park, CA 91303
818-883-7043 (Office) 818-836-0381 (Cell)

SALES@usnuclearcorp.com

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SPECIFICATIONS for CAM-33 SERIES:

	CAM-33-2	CAM-33-3	CAM-33-4	CAM-33-6
Channels	Two	Three	Four	Six
Activity Detected	1. Gamma Particulate 2. Noble Gas	1. Beta-Gamma Particulate 2. Iodine 3. Noble Gas	1. Beta-Gamma Particulate 2. Iodine 3. Noble Gas 4. Alpha Particulate	1. Beta-Gamma Particulate 2. Iodine 3. Noble Gas 4. Alpha Particulate 5. Tritium 6. Carbon-14

STANDARD DETECTORS:

Activity Detected	Gamma Particulate	Gross Beta-Gamma Particulate	Iodine	Noble Gas
Filters:	2" dia	2" dia.	2.5"dia x 1" thick	One Liter Chamber
Filter Type:	Glass Fiber Filter	Glass Fiber Filter	TEDA Activated Charcoal Cartridge	Stainless Steel Lined
Energy Range:	HPGe 50 Kev – 3 MeV		60 KeV to 3 MeV (7 MeV optional)	60 KeV to 3 MeV (7 MeV optional)

OPTIONAL DETECTORS:

Activity Detected	Gamma Particulate	Alpha Particulate	Organic Carbon-14	Tritium
Detector Type:	HPGe	2" diameter	2.5" diameter	Dual Ion Chamber
Filter Type:	Glass Fiber Filter	Glass Fiber Filter	TEDA Activated Charcoal Disk	Stainless Steel Lined
Resolution:	Less than 0.5% FWHM @ 662 KeV			



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DETECTORS for CAM-33 Series:

- **Particulate Beta-Gamma:** 2" diameter GM or optional Proportional Detector. **(1 each)**
OPTIONAL: HPGe electrically cooled
- **Iodine:** 2" diameter NaI(Tl) Model PGS-3LI (Spectroscopic Grade) **(1 each)**
- **Gas Standard Range:** 2 inch diameter GM **(2 each)**
- **Shielding:** 3" lead; 4 pi/5.9 inch. 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.
- **Temperature Maximum:** -5° C to 55° C (23° F to 131° F)

DETECTOR TYPE	1 MINUTE	1 HOUR	10 HOURS	1 DAY	1 WEEK
PARTICULATE BETA-GAMMA	6 x 10 ⁻¹⁰ μCi/ml	1 x 10 ⁻¹¹ μCi/ml 3.7 x 10 ⁻⁷ Bq/ml	1 x 10 ⁻¹² μCi/ml 3.7 x 10 ⁻⁸ Bq/ml	6 x 10 ⁻¹³ μCi/ml 2.4 x 10 ⁻⁸ Bq/ml	1 x 10 ⁻¹³ μCi/ml 4 x 10 ⁻⁹ Bq/ml
IODINE	3 x 10 ⁻⁹ μCi/ml	1 x 10 ⁻¹¹ μCi/ml 3.7 x 10 ⁻⁷ Bq/ml	1 x 10 ⁻¹² μCi/ml 3.7 x 10 ⁻⁸ Bq/ml	6 x 10 ⁻¹³ μCi/ml 2.4 x 10 ⁻⁸ Bq/ml	1 x 10 ⁻¹³ μCi/ml 4 x 10 ⁻⁹ Bq/ml
GAS-STANDARD RANGE	6 x 10 ⁻⁷ μCi/ml	1 x 10 ⁻⁷ μCi/ml 3.7 x 10 ⁻³ Bq/ml	2.7 x 10 ⁻⁸ μCi/ml 1 x 10 ⁻³ Bq/ml	1 x 10 ⁻⁸ μCi/ml 3.7 x 10 ⁻⁴ Bq/ml	2.7 x 10 ⁻⁹ μCi/ml 1 x 10 ⁻⁴ Bq/ml

OPTIONAL DETECTORS:

- **Gamma Particulate** HPGe electrically cooled **(1 each)**
- **Alpha Particulate** 2" diameter Kapton window GM **(1 each)**
- **Organic Carbon-14** 2" diameter Window Mica GM **(1 each)**
- **Carbon-14** 2" diameter CO₂ Dual Ion Chamber **(1 each)**
- **Tritium** Dual Ion Chamber **(1 each)**



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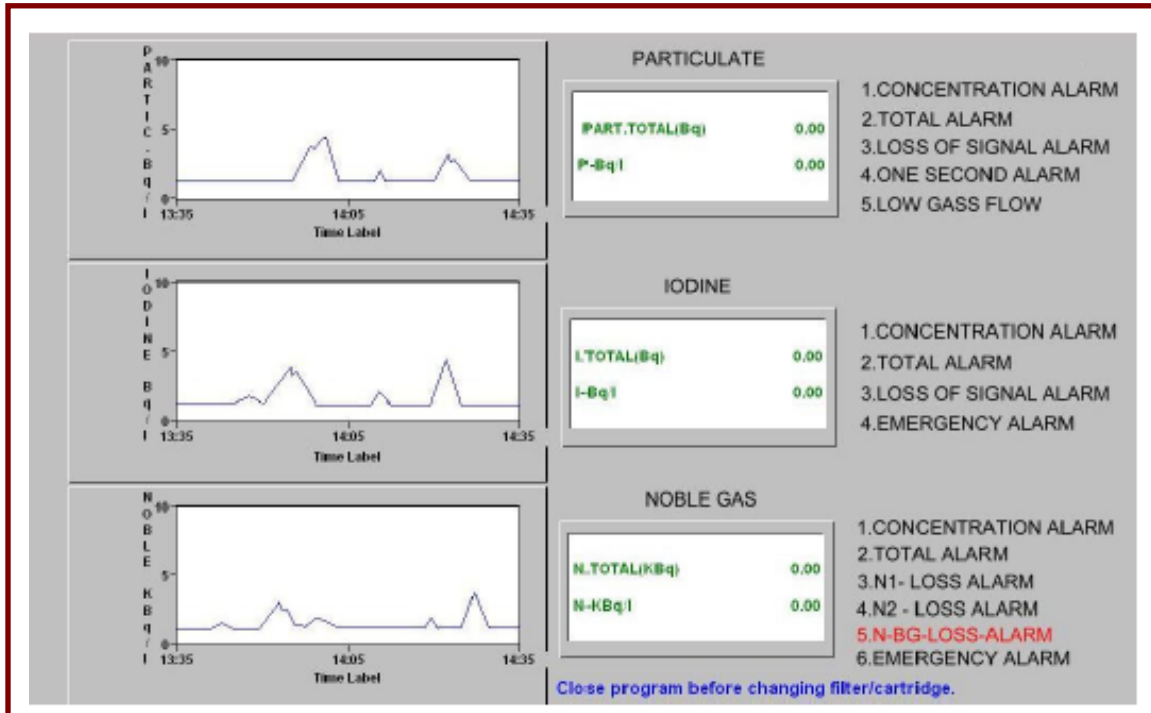
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Measurement Ranges of Optional Detectors	Bottom of Range	Top of Range 4 Decade Model	Top of Range 6 Decade Model
Tritium	10 ⁻⁷ µCi/cc	10 ⁻³ µCi/cc	10 ⁻¹ µCi/cc
Inorganic Carbon-14	10 ⁻⁸ µCi/cc	10 ⁻⁴ µCi/cc	10 ⁻² µCi/cc
Organic Carbon-14	10 ⁻⁹ µCi/cc	10 ⁻⁵ µCi/cc	10 ⁻³ µCi/cc
Alpha Particulate	5 x 10 ⁻⁸ µCi/cc	10 ⁻⁴ µCi/cc	N/A

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

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

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



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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	RX	RX				OP - RX

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



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High Voltage Supply:	Separately variable from 0 to 2,000 VDC at 200 μ a on scintillation or proportional channels.
LCD Color Monitor: Channels	17" Monitor shows both real time concentration & accumulated dose for all Channels
Accuracy:	+/- 10% except for resolution loss and statistical variation
Alarms:	Alarms are user settable to any trigger level User may set additional alarms with relay outputs.
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 more indicators shown on LCD Monitor.
Audio:	1,000 Hz, greater than 80 db
Outputs:	Alarm Condition Outputs: 1. Logic Level Signal 2. Contact Closure or Opening
Standard Installation:	Cabinet: Shielded heavy gauge steel. Skid or caster mounted 4 five inch ball bearing casters. Two of these are full 360 degree swiveling.
Special Safety:	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.

AIR MOVING SYSTEM:

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.

Air Pump:	Extremely rugged continuous duty
Pumping System:	Oil-less Pump noise is reduced by heavy duty internal muffler
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 Flowrate:	On screen Flow Rate Display 0 to 4 or 0-120lpm
Inlet and Outlet:	20 foot 3/4" hose inlet: 6 meter 2.5 cm I.D 20 foot 1" hose outlet. May be extended
Flow Rate:	Factory setting is at 4 cfm. Mass flowmeter with pressure transducer feeds Real-Time data to CAM-33 software.



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OPTIONS:

- ❖ Caster or Skid Mount
- ❖ Grab Sample Port
- ❖ 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

WEIGHT, DEMENSION, SHIPPING:

Dimensions: 29" wide x 31" deep x 41" high - exclusive of casters.
Weight: 1800 lbs. (Lighter weight model available with 1" shielding. See **CAM-33-1P**)
1100 lbs **CAM-33-2**
Shipping Weight: 1900 lbs.

ELECTRONIC SYSTEM DESCRIPTION:

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.

1. CPU with data acquisition
2. Multi-Channel Analyzer with Isotope Identification (**MCA-ID**) with standard. Library. (Library may be tailored)
3. MCA-ID standard on scintillation and solid state detectors.
4. High Resolution, 17" LCD Color Monitor Display
5. Mouse
6. 3 Channel 4-20mA Chart Recorder Drive available as option
7. Keyboard
8. Audio
9. Manuals
10. 4 GB hard drive - Stores programs, plus room to add additional new software functions in the future
11. Non-volatile 1 year data storage. Data stored every 2 minutes all year.
12. Specialized Air Monitor software custom tuned and designed for the CAM-33 Series Air Monitors.
13. Output:
 - ❖ Ethernet LAN Connection
 - ❖ USB Ports



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OPTIONAL:

- Graphic Printer for hard copy - 3 trace graphs

Special Upgrades Incorporated into CAM-33 Series Air Monitors:

- 17" Color LCD Monitor
- Real-Time Mass Flowmeter
- 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.

OPTIONS:

- ❖ Shrouded probe or other air collection Nozzles are available
- ❖ Touch screen feature on the LCD color monitor
- ❖ Titanium detector cover
- ❖ 4-20mA output signals - 3 channels
- ❖ 1" Lead (Pb) shields now lighter-weight due to more compact Beta-gamma Detectors (**CAM-33-1P**)
- ❖ UPS Battery Back Up - 60 minutes minimum
- ❖ Power Stabilizer
- ❖ Nationally Recognized Testing laboratory (NRTL) certified cabinet
- ❖ Tracking quality assurance of the calibration on a periodic basis



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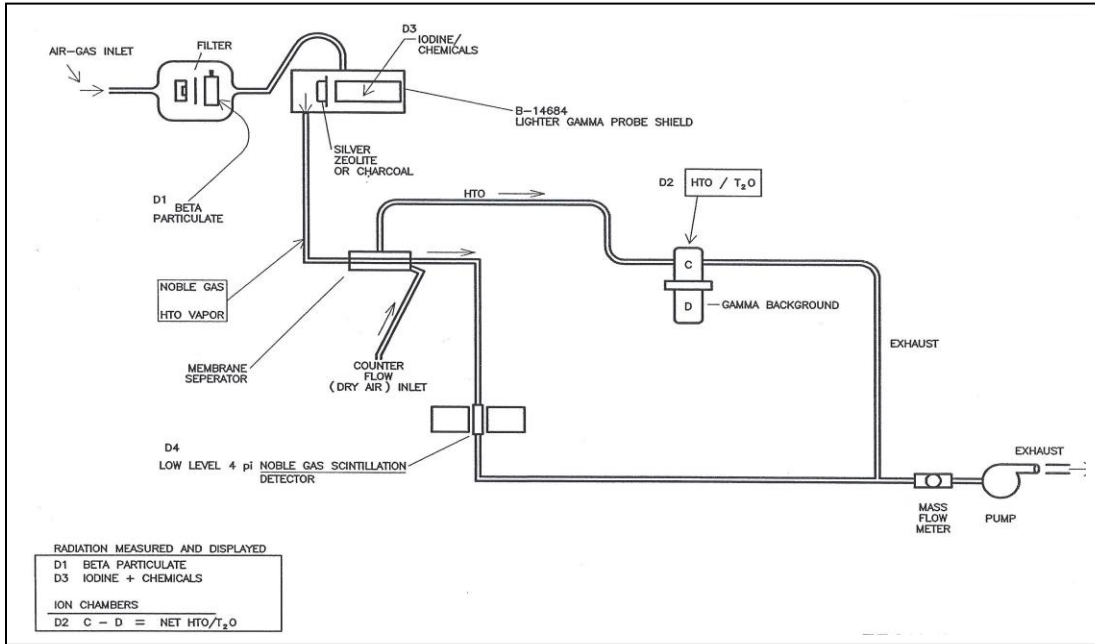
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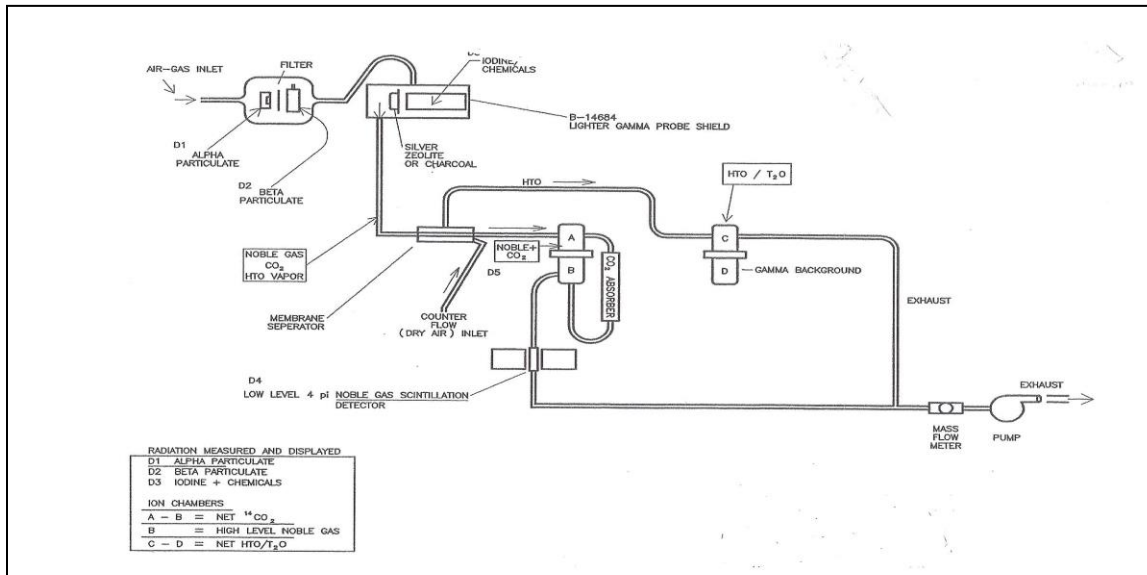
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CAM-33-4



CAM-33-6



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