

ALPHA and BETA AIR MONITOR MODEL # FM-7AB

FEATURES:

- SOLID STATE SILICON **ALPHA** DETECTOR
- RADON COMPENSATION FEATURE
- 2" DIA PANCAKE GM **BETA** DETECTOR
- READS DIRECTLY IN CONCENTRATION Bq/M³
- BOTH DIGITAL AND TREND DISPLAY
- GAMMA** BACKGROUND SUBTRACTION
- REAL TIME ALARM
- PORTABLE
- LINE OPERATED
- INTEGRATED EXPOSURE
- STANDARD FM-7 MODULES
- CAN DRAW AIR FROM HOOD, DUCT, ETC.
- QUICK CHANGE FILTER CARTRIDGE
- RS-232 COMPUTER INTERFACE
- OPTIONAL** BUILT-IN INTERNET SERVER FOR AUTHORIZED READOUT FROM ANYWHERE



APPLICATION:

The **FM-7-AB** Air Monitor assures safety against airborne radioactivity contamination by means of constant check with alarm and record capability. It provides integrated exposure information and can provide hard copy via external printer or computer. It is a complete system but may be expanded per need with modules of the FM-7 series. The **FM-7-AB** is the **more sensitive and versatile version** of the broadly used long time standard, the **FM-5-AB2**. It may be used to monitor stack effluent down to EPA levels as well as hoods or workplace air.

DESCRIPTION: The **FM-7-AB** uses a standard filter in TA's unique quick-change, no-leak holder to trap any airborne radioactivity. The filter is under constant surveillance via both an alpha silicon and a beta pancake GM detector. Air is drawn by a regulated pump through a three-foot inlet hose and exhausted via a flow meter through another three-foot hose. These may be extended to allow monitoring of hoods, glove boxes, stacks, etc. Time is recorded by an odometer type timer wired into the pump circuit. The unit is completely self-contained and portable. Complete with 100 filters.

SPECIFICATIONS:

- Alpha Sensitivity:** 2KBq/m³ Alpha ($6 \times 10^{-2} \mu\text{Ci}/\text{m}^3$) = ($6 \times 10^{-8} \mu\text{Ci}/\text{cc}$) is easily measured in one hour at 30 lpm flow rate.
- Beta Sensitivity:** Limit of sensitivity (as Cs-137 at 30 liters/minute air flow rate) is $8 \times 10^{-13} \mu\text{Ci}/\text{cc}$ integrated over an 8 hr period, or $2 \times 10^{-13} \mu\text{Ci}/\text{cc}$ for a 40 hour period. This corresponds to $4 \times 10^{-10} \mu\text{Ci}/\text{cc}$ per minute of operation, which is equal to 1% of the California Safety Code Title 17 and USNRC Title 10 limit for 40 hour weekly exposure to most hazardous beta and/or gamma emitter in absence of Ac²⁷⁷.
- Alpha Detector:** Solid State, ION implanted silicon alpha detector.
- Beta Detector:** 2" dia. T-1190 GM pancake detector with Beta window to eliminate alpha cross talk, or with 2mg/cm² window to allow C¹⁴ and S³⁵ detection.

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MODEL # FM-7AB

SPECIFICATIONS: (Continued)

Electronic Modules Includes:	
MVR-5R	Power and H.V. Bias Supply.
FIL-7DP	Programmable Scaler with Integrator and RS-232. Computer Interface and Alarm.
MAC-5MFC	Air Control Timer; Low Flow Alarm and Mass Flowmeter/Control.
MGA-5202	Single Channel Analyzer, High Voltage.
Micro	Micro-processor with 4.5" LCD trend display Data Logger Accessible Archive – non volatile.
•Pump:	Constant flow pump system & muffler & trap included. 115/230VAC 60, 0.6A System can also work from users vacuum system.
•Shielding:	1/2" lead about sample and detector.
•Beta Range:	1×10^{-13} to 1×10^{-7} μ Ci/cc or (Ci/m ³). Displays as Bq/M ³
•Alpha Range:	1cpm to 100,000cpm, 3×10^{-6} to 3×10^{-1} μ Ci on filter. Displays as Bq.
•Radiation Alarms:	Settable. 2000 Hz beeper and red flasher. Four concentration doserate alarms. Alpha Alert, Alpha High – Beta Alert, Beta High Alarms can also be set for activity on cartridge, integrated dose.
•Response Time:	Adjustable 1 second to 24 hours. (See also "Display units – pg3")
•Power:	110/220 VAC, 50-60 Hz Single Phase.
•Flow Rate:	Regulated. Normally set at 30 liters/min. or up to 40Lpm.
•Filters:	Accepts 47 or 50 mm filters. Includes package of 100 glass fiber filters.
•Trapping Efficiency:	99% trapping efficiency.
•Environmental:	Temperature: 0°C to 45°C. Humidity: 0-95% RH/non condensing.
•Case:	Electronics housed in enameled aluminum carrying case; handles included or may be rack mounted.
•Dimensions:	Excluding pump and detector assembly: 21"W x 13"H x 15" D. Detector assembly 5"W x 10"H x 6" D. Pump assembly 8"W x 8"H x 14"D.
•Accessories:	Filter: Free flowing high retention filter paper.
•System Weight:	57lbs. (26kg)
•Shipping Weight:	84lbs.
•Flow Meter:	Real-time mass flow control meters gives input to analyzer for accurate calculation of concentration Bq/m ³ .
•Status Lamps:	Six status lamps and eight user relays show system status – high alarm, detection fault, pump fault, system normal monitoring.

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SPECIFICATIONS: (Continued)

Gamma Background

Continuously compensated and updated.

Subtraction:

•**Display Units:**

Activity on Filter – Bq, CPM, CPS, nCi
 Integrated Activity – Bq-hr/m³, DAC-hr.
 Mean Airborne Concentration – Bq/m³, DAC.

•**Local Data Display:**

continuously or measured over pre-set time adjustable 3 sec to 24 hours.
 Real Time Back-light/Self Luminous LCD Monitor Display with Alpha and Numeric and Graphic (trend) Display.
 Display update frequency in user adjustable in seconds
 Numeric Airborne concentration and graphical trend data as well
 Time period selectable from 10 minutes to 1 week.

•**Data Record:**

All data is recorded to accessible non volatile memory archive every 2 minutes for the **full year** including alarms and user response. No loss of archived data even in power failure event.

•**Self Test Functions and Failure Alarms :**

FM-7AB runs thru a series of self-test and initialization and Radiation checks. Upon power turn-on and at daily intervals .

Throughout each day **FM-7AB** performs various self tests including detector/bias voltage failure, low-flow, overloaded cartridge test.

Self tests can be set to readout as warnings or as alarms

User inserted calibration sources are provided.

•**Semi-automated Calibration :**

User follows displayed messages to insert sources.

Enter sources strength on **keypad** so **FM-7AB** can automatically perform its system recalibration.

DETECTORS	ALPHA	BETA
TYPE	SOLID STATE	T-1190 Pancake GM
Sub-type	ION Implanted silicon	Kapton Alpha Shield eliminate crosstalk
Diameter	1" – 2.5 mm	2" – 50 mm
Active Area	490 mm ²	1550 mm ²
Entrance Window	Aluminum Evaporative Coating thin polymer film	1.5 – 2 mg/cm ² Mica and 1 mil Kapton
Lower Limit of Detection	2 x 10 ⁻⁶ Bq/M ³ in 1 Hour	1 x 10 ⁻¹³ uCi/cc (or Ci/ M ³)
Crosstalk Factor	Beta into Alpha Channel <0.0006	Alpha into Beta <0.0009
Humidity and Pressure Protection	Solid Crystal with Polymer film	Air tight Kapton membrane
Radon Compensation	High spectral resolution of silicon alpha detector and smart analysis gives good Radon compensation	In case of High Radon in Alpha Channel Radon compensation is applied to Beta Channel
Counting Efficiency	20% of 2Pi (Pu-239) w/ wide window	30%-2Pi, Sr-90/Y-90 or more
Gamma Detect & Compensation	Not needed	Continuous measurement and compensation of background