

# BETA / GAMMA PARTICULATE AIR MONITOR

## $\beta/\gamma$ 粒子空气监测器

Model ~ FM-9-M2

### FEATURES: 特点

- DETECTS BETA /GAMMA PARTICULATES  
探测  $\beta/\gamma$  粒子
- DYNAMIC BACKGROUND SUBTRACT  
动态本底补偿
- QUICK CHANGE FILTER  
快速更换过滤器
- REAL TIME CONTINUOUS OPERATION  
实时连续作业
- LOCAL OR REMOTE SAMPLING  
本地或远程采样
- MODULAR ELECTRONICS DESIGN  
模块电子学设计
- FOUR PI LEAD SHIELDING 1" - 2" THICK  
全方位1-2寸厚铅屏
- REAL-TIME AIR FLOW MEASUREMENT DISPLAY  
实时流量测量显示
- OIL-LESS GREEN TURTLE PUMP  
无油绿龟泵
- COMPUTER INTERFACE – USB OR ETHERNET  
电脑接口-USB或以太网
- DATA LOGGER – BUILT-IN  
内置数据录入



**FM-9-M2 SAMPLE  
HOLDER**

**Contains (2) 2" GM  
Pancake Tubes**



**FM-9-M2  
ELECTRONICS**

### APPLICATION: 应用

The **FM-9-M2** Air Monitors assure safety against airborne radioactivity contamination by means of constant check with alarm and record capability. It provides integrated exposure information and has digital output available.

It is a complete system but may be expanded per need with modules of the **FM-9** series.

此系统通过连续报警、录入功能，针对气溶胶污染以确保安全；此设备提供综合辐射信息，可带数字显示。系一系统可根据需要使用FM-9系列进行功能扩展。



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Model ~ FM-9-M2

### DESCRIPTION: 描述

The **FM-9-M2** is an all modular system and uses standard 47-55mm air filters held in unique quick-change holder.

此系统为全模块式，使用标准47-55mm空气过滤器，快速更换过滤盒

- Two detector tubes are contained in a lead shielded chamber to collect & measure Beta / Gamma particulates in the air.  
两个带铅屏蔽探测器来收集、测量空气中  $\beta / \gamma$  粒子
  - One detector measures the Beta / Gamma particulate contamination.  
一个探测器测量  $\beta / \gamma$  粒子污染
  - An identical second detector is used for background subtraction to correct the FM-9-M2 response for changes in ambient Gamma radiation.  
另一个相同的探测器进行本底补偿，来更正系统对本底伽马辐射影响
- Air flow is supplied by the oil-less **Green Turtle Pump**.  
无油泵抽取气样
- Real-Time air flow rate data from built-in mass flow meter feeds directly into data analyzer software and embedded processor for highest concentration accuracy.  
经过内置流量计的实时气样直接进入数据分析软件和处理器进行精确浓度分析
- Alarms: Audible & visual alarm; high level alarm; low level alarm.  
报警：声光报警，上限、下限报警
- The FM-9-M2 has an auxiliary provision to remote the alarm functions.  
系统具有远程报警功能
- Air is drawn through a three-foot inlet Beta hose and exhausted via a flow meter through another three-foot Beta hose. These may be extended to allow monitoring of hoods, glove boxes, stacks, etc...  
3英尺进气管抽取  $\beta$  气样，然后通过另一条3英尺管子排出，测量排气罩，手套箱，烟道时管子可延长。
- The unit is completely self-contained and is transportable.  
此系统完全一体，可移动。

### SPECIFICATIONS: 规格

**ELECTRONICS:** 电子学

**MV-5.12.24:** Power Supply 电源

**MAC-9:** Air Control Timer; Low Flow Alarm Flowmeter 气样计时器，低流报警流量计

**FM-9:** On Board computer with color monitor 带彩屏车载电脑

**M $\mu$ P:** Imbedded processor 内置处理器

**Natural Background Response: 自然本底响应**

With Background subtract turned off, typically 25cpm with clean filter installed.



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### Model ~ FM-9-M2

本底补偿关闭时，干净过滤器情况下为25cpm.

**Background Subtraction:** Compensates for approximately 90% of Gamma background.  
Typical background count at 0.02mR/hr is 2-4cpm.

本底补偿: 补偿90%本底伽马，典型本底计数在0.02mR/hr情况下2-4cpm.

**Ranges:** Four decades: 10-100,000cpm.

**量程:** 4个量级10-100,000cpm.

**Response Time:** Varies with count rate.

**响应时间:** 根据计数率变化

**Sensitivity:**  $1 \times 10^{-12}$   $\mu\text{Ci}/\text{cc}$   $\text{Sr}^{90}\text{Y}^{90}$  after 4 hours, at 60 L/min.

$10^{-4}$   $\mu\text{Ci}$  per week (as Beta over 0.1MeV) integrated content of entire air amount drawn through system.

灵敏度: 在60 L/min时4小时内 $\text{Sr}^{90}\text{Y}^{90}$   $1 \times 10^{-12}$   $\mu\text{Ci}/\text{cc}$

通过系统全部气样一周内为精度为 $10^{-4}$   $\mu\text{Ci}$  (0.1MeV以上 $\beta$ )

This corresponds to  $10^{-8}$   $\mu\text{Ci}/\text{ml}$  minute exposure which is better than 1% of California Safety Code Title 17 and NRC Title 10 limit for 40 hour exposure to most hazardous beta and/or gamma emitter in absence of  $\text{Ac}^{227}$ .

这相当于每分钟曝辐  $2 \times 10^{-10}$  微居里/毫升，等于加州安全守则第 17 和美国核管会第 10 条的每周 40 小时对最危险  $\beta$  和/或  $\gamma$  发射器的暴露的 0.6%，不含  $\text{Ac}^{227}$

**Counting Efficiency:** Approximate efficiency for 47mm diameter standard plated sources

- 25 percent of  $2 \pi$  for Beta over 0.1MeV (including  $\text{Tc}^{99}$ )
- 50% of  $2 \pi$  for  $\text{Sr}^{90}\text{Y}^{90}$ .

计数效率: 47mm直径标准污染源大约效率: 0.1MeV以上 $\beta$   $2 \pi$  角度为25%，对于 $\text{Sr}^{90}\text{Y}^{90}$   $2 \pi$  角度为50%

**Display:** 7" Color LCD monitor built-in for digital and graphic user data display.

显示: 7寸LCD彩屏，内置，用于数字和图谱数据显示

**Readout:** Direct Readout in concentration Bq/l or other units.

读出: 直接读出浓度单位Bq/l或其它单位

**Detectors:** Two each thin window  $1 \frac{3}{4}$ " x  $1.4\text{mg}/\text{cm}^2$  pancake GM detectors Model T-1190.

探测器: 两个带规格为  $1 \frac{3}{4}$ " x  $1.4\text{mg}/\text{cm}^2$ 薄窗的扁平GM管探头，型号T-1190

**Shielding:** 1" - 2" lead shield, in all directions  $4 \pi$ .

屏蔽: 全角1-2寸铅屏

**Temperature Range:** 20 °F to 120°F (-7°C to 49°C) with less than  $\pm 20\%$  change in calibration and alarm point.

温度范围:

**Filters:** Includes package of 100 filters #41, 50mm.

过滤器: 带规格为41,50mm 100支装一包过滤网



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**Power:** 115V, 60Hz (Optional 230V, 50Hz).

电源:

WEIGHT & DIMENSIONS: 重量和尺寸

**Dimensions:** Electronics: 电子学 20" W x 13"H x 18" D.  
 Detector assembly: 探头组件 8"W x 15" H x 12" D.  
 Pump assembly: 泵组件 8"W x 8"H x 14"D.

**Weight:** Electronics: 电子学 25 lbs  
 Detector: 探头 100 lbs

**Shipping Weight:** 140 lbs.

邮寄重量: 140磅

### SYSTEM OVERVIEW: 系统概况

DESCRIPTION 描述	FM-9-M2
Read-Out Units 读出单位	Bq/l
<b>Optional</b> Read-Out Units 可选其它单位	μCi/cc, KBq/l, etc.
Measures 测量	Airborne 气溶胶浓度 Concentration
Smart System 智能系统	Calculations by Imbedded Processor 内置处理器  On Board Data Logger 机载数据录入
<b>Special Feature</b> 特点	Electronic Mass Flowmeter 电子流量计



**Quiet, Oil-Less Green Turtle Pump  
Model ~ AP-3V**



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