

# Portable Tritium- in-Air-Monitor

Model: 7043

## Application

Tyne Engineering's new handheld Tritium In-Air Monitor monitors for both tritium and gamma in a single robust, portable instrument.

## Features

- Simple to use, with only one operating switch with four settings: Off, Sample, Pump, Set Up.
- Gamma Compensation with four large ion chambers arranged in a cruciform configuration. Two chambers are used for measuring the air sample, and two are for compensation.
- Less than 10% inaccuracy in 20 mR/hr field
- High Sensitivity. The volume of a measured charge is 500 cc. The current amplification circuit employs ultra-low leakage technology. Each chamber has its individual amplifier, increasing the Signal-Noise Ratio of the analog circuit.
- Sensitivity is  $1\mu\text{Ci}/\text{m}^3$ .
- Radon compensation is provided by the analog filter circuit designed to separate the radon spike. The software can distinguish the radon spike from the tritium signal occurring as a slow-change signal.
- Ion-traps are built into each ion chamber.
- Noble gas compensation is accomplished by interposing a desiccant cartridge between the ports of the measurement and compensation chambers. The airflow to and from these chambers is channeled through ports that are accessible from the instrument's faceplate. The noble gas signal can be displayed by the micro-processor.
- Direct gamma measurement is provided using an installed GM tube.
- Decontamination by purging of all 4 ion chambers can be achieved with use of the centrally installed cartridge heater.



## Description

Compensation for Gamma background is crucial in tritium measurement, since a gamma field of 1mR/Hr will generate 500 times the ionization generated in  $1\mu\text{Ci}/\text{m}^3$  of tritium. Tyne designed the four, 250 cc ion chambers in a cruciform with each chamber connected to an ultra sensitive electrometer amplifier and filter. All signals pass through the ADC converter, and the micro-processor calculates and displays the tritium value. To cover high ranges of tritium a separate small ion chamber is used. Measurements such as flow from the solid-state flowmeter and chamber temperature are also monitored by the micro-processor.

Instrument output includes analog (0-5V, 4-20mA); relay alarm contact (30VDC, 1A) for operation of external equipment; and communication (RS232/RS485) to enable downloading or recording of information onto a computer. The TFT full color LCD display mounted on the surface plate clearly displays instrument readings in both digital and graphic format to show real time measurements and trends.

The well balanced, easy-to-carry instrument can be placed on its end for easy visibility of the touch screen monitors to operators working away from the instrument.

Batteries installed in the handle are easily replaced.

A powerful long-life pump can be used to draw air through a 10 meter tube. This allows the instrument to be used to measure the inside of rooms without the need to enter the room.

## Specifications

Sensitivity	$1\mu\text{Ci}/\text{m}^3$ ( 0.05 DAC)
Accuracy	$\pm 3\mu\text{Ci}/\text{m}^3$ from 1 to $100\mu\text{Ci}/\text{m}^3$ , $\pm 10\%$ from $100\mu\text{Ci}/\text{m}^3$ to $20,000\mu\text{Ci}/\text{m}^3$
Range	$1\mu\text{Ci}/\text{m}^3$ to $199,999\mu\text{Ci}/\text{m}^3$
Detector	4 matched chambers - Two for measuring, two for compensation

Measuring chamber effective volume	500 cc (2 measuring chambers of 250cc each)
Flow rate	1.0 L/m
Zero stability	$\pm 1\mu\text{Ci}/\text{m}^3$ immediately after unit is powered on
Background cancellation	Less than 10% of the reading change in 20 mR/hr field
Radon compensation	Included in the software
Ion trap	Built into each ion chamber
Dust filter	Built into the unit.
Noble gas cancellation	Ports for air inlet/outlet of measuring chambers and compensation chambers are accessible on surface plate so silica gel drier can be placed between the chambers to compensate for presence of noble gas.
Tritium Discrimination	Instrument can discriminate in a field of HTO and elemental H3 using the silica gel drier.
Purge/Decontamination	All 4 Chambers can be heated up by a cartridge heater controlled by unit
Display	Graphic touchscreen LCD display. Unit displays the values(tritium and Gamma) both in numerical format and graphical trend.
Communication	Can be configured to RS232(Short distance) or RS485(Long distance).
Analog output	0-5 V Linear or logarithmic voltage output.
Power supply	2.5 V- 5V external power supply, or 3 C-cell battery. Total power consumption is 150mA.
Gamma measurement	Gamma is measured directly by the unit. Gamma measuring range is from 0.1mR/h to 10R/h
Alarm	Tritium alarms, gamma alarms, low air flow alarms will all be shown by red LED light and by an audible device.
Data logging	The tritium and gamma values are logged every minute with current time and date stamp
Size and weight	8"(L)x5"(H)x5"(W), 7 lbs.
Drier	Note that the silica gel drier is not part of the standard equipment, but can be supplied as an extra.
Response Time	30 seconds at 90% of signal