

## Tritium Monitor Model 275



The Model 275 Tritium Area Monitor is designed to measure tritium activity in air. Particularly, it detects tritiated water vapour, in nuclear power stations, tritium extraction plants, fusing facilities and in various industrial scenarios where tritium is being used. The monitor consists of two separate Modules, a Detection Unit and a Display and Control Unit.

The Detection Unit consists of a dual co-axial ion chamber assembly, air filtering system, ion trap, electrometer, sample pump, flow switch, bias power supply, and associated electronics for data output and recording.

The Display and Control Unit consists of the CPU, Controller and I/O board in a card cage and power supply. This unit includes the eight digit LED display, thumbwheel switches for setting the alarm level, connectors for remote communications, audible and visible high tritium concentration alarm and relay contacts for remote alarms, In addition, there are eighteen lights to indicate the status of the monitor and various error conditions.

The Detection Unit communicates with the Display and Control Unit via an optical link. An RS-232C link is provided for a local terminal and additional hardware is provided for a second RS-232C.

Sample air drawn into the system is filtered and passed through an electrically polarized ion trap to remove particles and extraneous ions. It is then passed through the outer chamber of the Detection Unit producing ion pairs resulting in an electron current. This ionization current is proportional to the concentration of tritium in sampled air. The inner (compensation) chamber of the dual ionizations chamber assembly provides a cancellation current to correct for currents caused by gamma irradiation of the outer (measuring) chamber. Opposing polarization of the chambers with collection of ionization current from the common electrode achieves this subtraction. O-rings seal the inner chamber from the outer chamber and the surroundings, interconnected only by a mechanical link. The electrodes are electrically isolated from ground by phenolic and polystyrene insulators.

## Technical Specifications

### 1. Performance

**Range:** Up to  $2.04 \times 10^7 \mu\text{Ci}/\text{m}^3$

**Response Time:** = 30 sec.

**Accuracy:** For concentration  $>10 \mu\text{Ci}/\text{m}^3 \pm 25\%$

**Gamma Radiation:** At ambient conditions cancellation of  $<5 \mu\text{Ci}/\text{m}^3$  per mR/h for irradiation perpendicular to the ion chamber.

### 2. Outputs

**Display:** 40 character LCD display

**Recorder:** 0 to 1.75 V analog output from the electrometer

**Relays:** For remote high activity and monitor fault alarms

**Communications:** RS-232C I/O port

### 3. Environmental

**Temperature Range:** +5 to +45°C

**Pressure Range:** Ambient  $\pm 5$  kPa

**Max. Humidity:** 95% RH (non-condensing)

### 4. Air Sampling

**Sampling Rate:** 3 to 5 litres/min. with optional external pump

**Filtration:** On-line replaceable filter ( $<3$  microns)

### 5. Physical Parameters

**Detection Unit:**

**Ionization Chamber Volume:**  $1325 \text{ cm}^3$

**Overall Height:** 30.5 cm

**Overall Width:** 42 cm

**Overall Depth:** 42 cm

**Mass (excluding pump):** 21 kg

**Remote Display:**

**Overall Height:** 9.4 cm

**Overall Width:** 21.6 cm

**Overall Depth:** 23.5 cm

**Mass (excluding pump):** 1.8 kg

### 6. Remote Display

- ? 40 Character LCD Display
- ? Alarm Acknowledge Pushbutton
- ? Monitor Fault Light
- ? High Activity Light
- ? Audio Alarm
- ? Power ON Light

### 7. Options

4-20 mA analog output

External pump

Remote display

### 8. Controls and Status Indicators

**Detection Unit:**

- ? Alarm acknowledge pushbutton
- ? Monitor fault light
- ? High activity light
- ? Auto-zero light
- ? Zero-set pushbutton
- ? Zero adjust control
- ? Integrator pushbutton
- ? Power ON light
- ? Sample inlet
- ? Sample outlet
- ? Silica gel plug
- ? Flow adjust
- ? Audio alarm
- ? Status indication on LCD display:
  - Alarm Setpoint
  - Range Selected
  - Sample Flow Low
  - Ion-Chamber Bias Voltage
  - Electrometer Zero
  - Negative Tritium
  - Integral Display
  - Auto-Zero Measure

## Qualification Specification

- ? Simple operation through built-in micro-processor
- ? Manufactured to MIL-Q-9858A and MIL-I-45208A standards
- EMI/RFI qualified to MIL-STD-461B and MIL-STD 462 (3)



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