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Your Alternative
To The Obvious

Model 3100
Portable Tritium in Air Monitor

Features

- No Zero Adjust Control Needed
- Easily Calibrated with ^{137}Cs Gamma Range
- Temperature and Altitude Compensation
- "Check Mode" Self-Test Feature Determines Instrument State of Health
- Digital Backlit Display with Status, Airflow Readout, and Diagnostic Information
- Purge Mode to Dry Ion Chamber
- Internal Chamber with Replaceable Desiccant
- Passed USA Military Tests Including: MIL-STD-810G, MIL-STD-461G, MIL-STD-901D, MIL-STD-1399
- Readout in µCi/m^3 or MBq/m^3

Introduction

The Model 3100 Tritium in Air Monitor features ruggedized and flexible operation. It may be powered by either 115 Vac, 50/60 Hz or by rechargeable internal NiMH batteries. It features a maintenance-free diaphragm air pump to pull air through the 250 cc tritium chamber, and the air flow is measured internally with a mass-air flow sensor. A second 250 cc chamber is used to provide gamma compensation, allowing operation in higher gamma fields. Other internal sensors measure temperature and ambient pressure and provide compensation for these effects.

The heart of the tritium detection is the sealed electrometer chamber, using the latest low-noise electrometer chip. This electrometer can reliably measure the femtoamperes of current resulting from tritium within the chamber and does not require the user to adjust an offset or zero knob. The pixelated digital display provides feedback on the tritium concentration, as well as showing status on several important conditions: temperature, pressure, power, airflow, chamber bias, and alarm or failure status.

The Model 3100 is easy to use, having only a few simple controls, and can be used while wearing gloves. A clear window allows the user to see the condition of the desiccant in the integrated desiccant chamber. A toggle switch allows the user to put the desiccant chamber in-line to the incoming air. The instrument comes in a rugged hard-shell commercial case with wall-mounting brackets. The Model 3100 has passed USA military testing for RF susceptibility and emission, shock and vibration, temperature and blowing rain, as well as other tests.

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Specification

EFFECTIVE RANGE OF MEASUREMENT: displays up to 740 MBq/m3 (20,000 µCi/m3)
MINIMUM DETECTABLE ACTIVITY (MDA): 0.074 MBq/m3 (2 µCi/m3)
GAMMA COMPENSATION: allows for tritium monitoring in gamma fields up to 0.05 mSv/h (5 mR/hr)
LCD DISPLAY: 6.9 cm (2.7 in.) diagonal transflective backlit LCD housed inside the electronics case
BACKLIGHT: rotary control adjusts backlight intensity for maximum contrast
MODE SWITCH: rotates between CHECK, MEASURE, SAMPLE (PUMP ON), and PURGE modes
ALARM POINT: adjusts the tritium alarm threshold anywhere from OFF to 740 MBq/m3 (20,000 µCi/m3)
RESPONSE TIME: less than 60 seconds
ZERO STABILITY: 60 second countdown on power-up to 1 µCi/m3 or less
AUDIO: 75 ± 5 dB at a frequency of 2500 Hz on alarm or failure conditions
TEMPERATURE RANGE: 0 to 50 °C (32 to 122 °F)
PUMP: maintenance-free diaphragm pump, typical airflow 1.5 L/min
OUTPUT: sealed 9-pin D connector provides potential-free relay contacts for energized and activated pump status, also provides data out for streaming measurements
POWER: 115 Vac, 50/60 Hz input with 1.5A circuit breaker, or 8 NiMH AA cell batteries. Typical continuous battery life is 16 hours.
CONSTRUCTION: rugged, gasketed waterproof aluminium case
AIR FILTER: external user-replaceable 0.2 µm PTFE air filter
DIMENSIONS: Instrument: 20 x 16 x 30 cm (7.9 x 6.3 x 11.8 in.) (H x W x L)
Case: 20 x 40 x 51cm (7.9 x 15.5 x 19.9 in.) (H x W x L)
WEIGHT: Instrument: 4 kg (9 lb) with attached cables and tubing
Case: 9.5 kg (21 lb) with instrument, hose, power cord, and manual
SOFTWARE:
P/N 4520-169-02: Includes calibration software and USB cable.
P/N 4293-676-01: Includes calibration software, pressure calibration kit, and USB cable.

Type Testing

This is a partial listing of the tests performed on the Model 3100.
(Tests per ANSI N42.30, MIL-STD-810G, MIL-STD-461G, MIL-STD-901D, MIL-STD-1399-300B)
BLOWING RAIN: > 64 kph (40 mph) wind blown rain, < 0.5 mL accumulation inside instrument
TEMPERATURE: 10 day high heat +40°C (+104°F) storage, then operation; -25°C (-13°F) storage, then 0°C (+32°F) operation
HUMIDITY: several days at 95% RH, instrument must work after being dried out
SALT FOG: 48 hours exposure to 35°C (95°F) salt fog with at least 5% salinity, no excessive corrosion
PRESSURE: ±1200 meter altitude change does not cause readings to change
ACCURACY: within 10%, proved to tritium gas and gamma equivalency
DRIFT: 8 hour test at background levels, no reading drift
COEFFICIENT OF VARIATION: 10 readings taken at least 1 minute apart, verified < 10% COV
VIBRATION: 4 to 33 Hz vibrations at amplitudes of up to 1.5 mm (0.06 in.), no change in readings
TRANSPORT SHOCK: dropped in case 27 times from 1.2 m (4 ft.) in different geometries, no effect
SHOCK: instrument mounted to bulkhead, six blows, instrument shall not become hazard
RF SUSCEPTIBILITY: at up to 50 V/m from 2 MHz to 18 GHz, no change in readings
CONDUCTED SUSCEPTIBILITY: on all cables, instrument will not respond to surges, spikes, noise
SMOKE/AEROSOL: does not respond to 1 µg/L of aerosols 0.5 µm in size