

Portable Tritium in Air Monitor

Model: 606



Applications

606 - Sensetecz Engineering Portable Tritium in Air Monitor is designed to monitor tritium activity levels in air.

606 uses the Single Body Quadruple Cylindrical Ion Chamber Design (US patent No.: 10725005) to achieve higher grade of gamma and noble gas compensation. An advanced electrometer circuit is used to measure the tritium in air from $1\mu\text{Ci}/\text{m}^3$ to $200,000\mu\text{Ci}/\text{m}^3$ reliably in nuclear power plants and labs, also a Gamma Survey Circuit - a separated GM tube and counting circuit, is built into the unit. This unit monitors the tritium and gamma at the same time and provides the readings for both.

606—Portable Tritium in Air Monitor

The total tritium can be measured and the reading of HTO/HT together will be provided.

606-651—Portable Tritium in Air Noble Gas Compensation Monitor

With an external dryer 651, HTO-tritium water and $^3\text{H}_2$ in air can be separated. The readings of the total tritium and HTO tritium water will be provided separately.

606-651652— Portable Tritium in Air Discriminating Monitor

With an external dryer 651 and a catalyst converter tube 652, the readings of the total tritium, HTO tritium water and pure elemental tritium $^3\text{H}_2$ rather than in air will be provided separately. Please refer to 606-651652 datasheet for details.

Advantages

- **Single body quadruple cylindrical ion chamber design US Patent Number: 10725005**

One stainless block with 4 machined hollow cylinders to get the best volume uniformity and symmetrical orientation, therefore higher grade of gamma and noble gas compensation is achieved, also reduces the leakage and simplifies the construction.



- **Full range noble gas compensation and no range switching required**

Ultra precision/stable electrometer circuit with 24 bits ADC convertor to achieve high sensitivity - better than $1\mu\text{Ci}/\text{m}^3$ and high measuring range - $1\mu\text{Ci}/\text{m}^3$ to $200,000\mu\text{Ci}/\text{m}^3$ without range switching. When combined with Sensetecz external

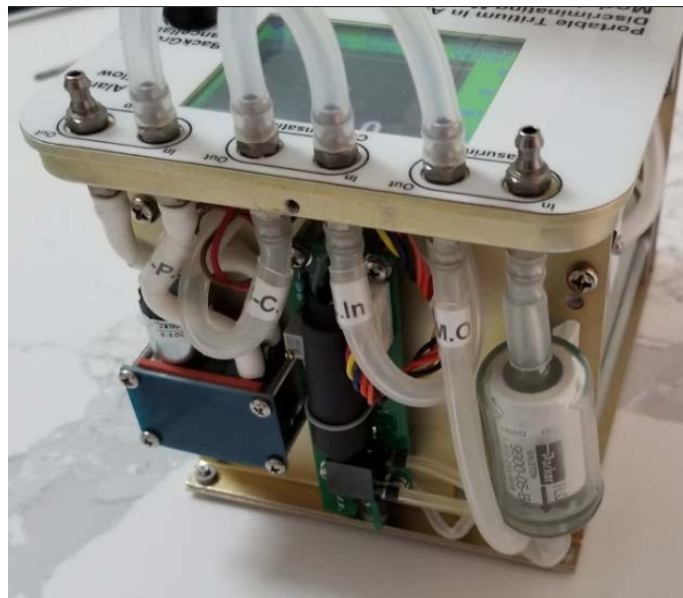
drier 651, noble gas compensation within full measuring range can be achieved. This fixes the saturation problem in high noble gas compensation.

- **Drier Monitoring by humidity sensor**

A precision humidity sensor is installed at the inlet of compensation chambers. A drier fault will be generated when humidity of compensation chamber is higher than the setting. The fault will be sent out via RS232 to the position of Flow Alarm to ensure safe operation of noble gas compensation.

Performance enhancement

- Good Stability, Ensured $\pm 2 \mu\text{Ci}/\text{m}^3$ or less for 30 days and for temperature from 0°C to 50°C . **No Negative reading shown under low temperature condition.**
- Full measuring range noble gas compensation, no range switching for full measuring range
- Dryer status is monitored to ensure safe noble gas compensation (A dryer fault will trigger the existing flow alarm contact open and send out the flow alarm via RS232).
- No chamber internal leakage due to the single body ion chamber construction .
- Built-in ion trap with high electrical field to reduce charge particle interference.
- Improved operation and maintenance ability. Simplified the construction and less mechanical parts used.



- Standard Batteries are used:
 - (1) Four of A23 12V batteries are used for ion chamber bias and can last 5 years
 - (2) Four of AA 1.5V batteries are used for powering electrometer. They are rated 2.5Ahr and can last 2 years
 - (3) Two D batteries (re-chargeable or non-rechargeable) are used for pump and display



- Fast response, less than 10 seconds will reach 90% of reading
- All alpha radiation, including radon daughter compensation are accomplished by electronic circuit and software filter
- Environmental gamma measuring is accomplished by a GM tube with the corresponding circuit
- Ion chamber decontamination by a cartridge heater
- LEDs and LCD background color changes indicate the alarm and warning states
- On-Line NiMH battery smart charger circuit with rechargeable battery recognition is used to avoid charging the non-rechargeable battery. Meanwhile the batteries are thermo-state switch protected.
- Low power consumption free scale MKL25 microcontroller is used for the control/display
- Data logging - all the readings are Time-stamped and logged into 512kbytes EEPROM

Specification – 606 portable tritium in air monitor

Performance

- | | |
|---|--|
| • Sensitivity: | Better than $1\mu\text{Ci}/\text{m}^3$ |
| • Measuring Range: | $1\mu\text{Ci}/\text{m}^3$ to $200,000\mu\text{Ci}/\text{m}^3$ |
| • Accuracy: | $1\mu\text{Ci}/\text{m}^3$ from 1 to $100\mu\text{Ci}/\text{m}^3$,
< 1% from 100 to $200,000\mu\text{Ci}/\text{m}^3$ |
| • HTO & $^3\text{H}_2$ discrimination / noble gas Compensation: | Whole measuring range with external dryer 651 |
| • Total tritium, Tritium water HTO & elemental $^3\text{H}_2$ readings: | With external dryer 651 & catalyst converter tube 652 |
| • Flow rate: | Up to 1.5L/Min, KNF long life pump |
| • Response time: | < 10S for more than 90% reading |

- Gamma compensation: Whole range compensation
<10 μ ci/m³ at 10mR/hr
compensation up to 100mR/hr
- Gamma measurement: 0.1mR/Hr to 10R/Hr
- Zero stability / long time drift: $\pm 2\mu$ ci/m³ or less per 30 days
- Temperature drift: $\pm 2\mu$ ci/m³ or less, for to 0 to 50°C
- Noble gas compensation ratio: > 150:1
- Radon Compensation: Via software discrimination and
Circuit elimination
- Operation: Real time measuring & alarm
control

Structure:

- Ion Chamber: 4 chambers, 2 for measuring, 2 for
compensation.
measuring volume: 330cc
compensation volume: 330cc
- Ion trap: Yes, built-in for each chamber
- Ion Chamber purging: Yes, with cartridge heater
- Display: 2.8" TFT LCD, touch screen

Output and communication:

- Linear analog output: 0.5 to 3.3V for 0 to 2800 μ Ci/m³
- Logarithm output: 0 to 2.65V for 1 to 200,000 μ Ci/m³
- Communication: RS232 default
- Audio and visual alarm: Low and high alarm, less than 30S
- Alarm relay output: Contact output for remote control
- Data logging: Yes, all the readings are time-
stamped and logged into 512kbytes
EEPROM

Power, operational conditions and dimension:

- Power consumption: <130mA powered by 12 VDC

external power supply without heater
<350mA powered by two size-D
batteries, 25 hours operation
<350mA powered by two size-D
NiMH rechargeable batteries
capacity 10AmpHr, 15 hrs operation

- Warm-up time: no need
- Operational humidity: 95%RH
- Operational temperature: 0°C to 50°C,
The pump's rated performance
might be affected beyond this range
- Dimension: 4.5(W)X7(L)x7(H) including handle
- Weight: 5Kgs