MODEL 593.2
ULTRA LOW LEVEL TRITIUM IN AIR MONITOR

PURPOSE

Specifically designed to meet monitoring requirements for the accurate determination of **ultra** low levels of airborne tritium.

SENSITIVITY AND RANGE

The 593.2 features an extremely wide measurement range, spanning 6.5 decades with a resolution of 0.1 kBq/m^3 or 0.003 µCi/m^3

SENSITIVE TO ONLY TRITIUM

A semipermeable membrane is used to isolate tritium oxide before measurement. All other sample constituents, including pollutants, radioisotopes (i.e., noble gases), aerosols, and particulates are removed and eliminated from measurement.

MEASURES HTO OR TOTAL TRITIUM

A catalytic oxidizer can be provided so that elemental tritium can be converted into HTO for total tritium measurement (HT + HTO). If not included, then the Model 593.2 will measure HTO only.

GAMMA COMPENSATED

Gamma compensation is required to be able to measure ultra low concentrations of tritium. The 593.2 uses both electronic signal processing to distinguish tritium signals from background, and a second, sealed proportional counter to measure and compensate for external gamma fields.

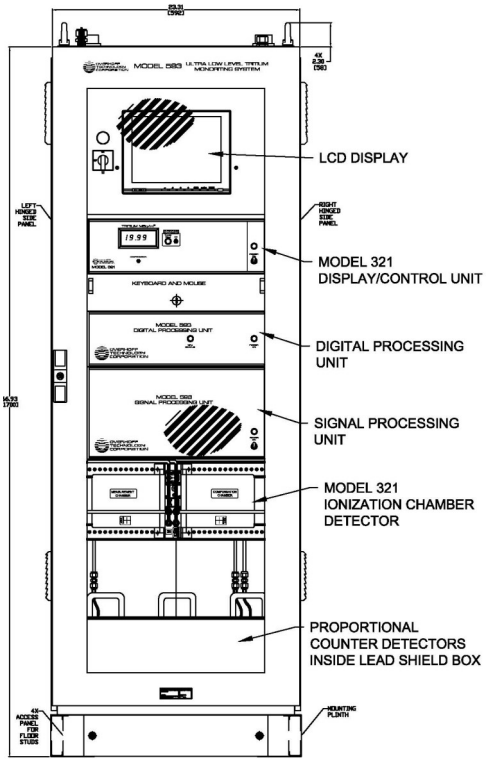
Furthermore, lead shielding around the counter tubes reduces background gamma and improves the statistical signal to noise ratio to enhance sensitivity.

FULLY AUTOMATIC OPERATION

Except for routine replacement of the counting gas cylinders, the operation of the instrument is fully automatic and requires no operator attention.

The instrument features a large color touch-screen LCD display and is housed inside an industrial IP54, NEMA 13 rated cabinet with a polycarbonate window door and key locking latch on door.

Includes custom software that allows you to view multiple display tabs, configure alarm settings, generate graphs, view trends, monitor and display malfunction and alert conditions, and log all data and events.



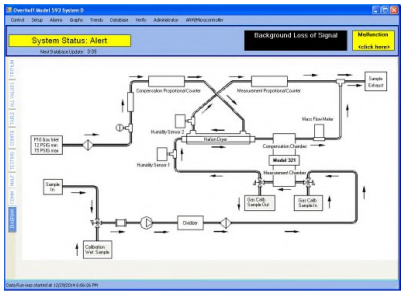
PRINCIPLE OF OPERATION

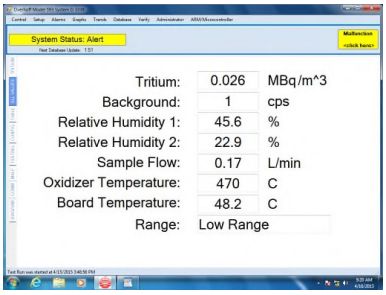
The **Model 593.2** employs a dual measurement system with automatic solenoid valve control to direct sample flow to the appropriate detector: 1) for measuring ultra low concentrations which require a long response time, and 2) for higher concentrations with a fast response time. A semi-permeable diffusion membrane filters HTO from other sample constituents.

High level measurement: A pair of 2L ionization chamber detectors are utilized for measuring the tritium when levels exceed 1 MBq/m^3 in order to provide a fast response time of 10 minutes and employ instrument air as the purge gas to save on P-10 usage. Compensation chamber is used to measure gamma and filtered radioactive gases in a differential mode.

Low level measurement: When tritium levels are <1MBq/m^3, P-10 gas is used as the counting and purge gas and the sample is directed to the proportional counting detector with a typical response time of 40 minutes to reach 90% of the final value.

Ultra Low Level Resolution: 0.1 kBq/m^3 (0.003 µCi/m^3)
Extremely Wide Range: 1 kBq/m^3 to 2,000 MBq/m^3 (0.01 to 19,999 µCi/m^3)





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TECHNICAL SPECIFICATIONS

The Model 593.2 employs two balanced proportional gas flow counter tubes together with a diffusion permeation system for slow, ultra low level tritium specific measurements and a pair of ionization chamber detectors for fast, high level tritium measurement. The following specifications apply to the standard unit. Consult the factory for variations.

MEASUREMENT RANGE	a) 1 kBq/m^3 to 2,000 MBq/m^3 b) 0.01 µCi/m^3 to 19,999 µCi/m^3
RESOLUTION	0.1 kBq/m^3 (0.003 µCi/m^3)
SENSITIVITY	1 kBq/m^3 (0.01 µCi/m^3)
DISPLAY	10” Color Touch-Screen LCD
TIME RESPONSE	Low level measurement (1 kBq/m^3 to 10 MBq/m^3): 40 minutes to reach 90% of final value High level measurement (0.1 to 2,000 MBq/m^3): 10 minutes to reach 90% of final value
MEASUREMENT, INTERFACE OUTPUTS	i) 0 - 10 V, linear ii) Ethernet
PROPORTIONAL COUNTERS	Balanced pair of copper clad acrylic counter tubes, 1.5 liters total volume each, surrounded by 1” of lead shielding
IONIZATION CHAMBER	Dual 2L ionization chambers on one axis with sample flow through both for differential tritium measurement
ELECTRIC FUNCTIONS	
ALARMS, MALFUNCTION	i) instrument air low flow ii) P-10 gas low iii) chamber or power supply malfunction iv) oxidizer temperature v) low sample flow
ALERT CONDITIONS	Background high level, tritium loss of signal, background loss of signal, tritium low counts, and background low counts
ALARM CONDITIONS	i) Tritium alert level ii) Tritium high level
ALARM INTERFACE	i) fail safe relay closures ii) Ethernet
PNEUMATIC SYSTEM	
COUNTER GAS	P - 10 (90% Argon, 10% Methane) Supply pressure: 10-14 PSIG (69-97 KPa) Usage: 400cc per minute @ atmospheric pressure
SAMPLE FLOW SYSTEM	Brushless Dual Bearing Diaphragm Pump, flow rate 5 lpm typical
FLOW METER	P-10 Gas Flow & Instrument Air Flow Adjustable 0-500 cc/min, Manual set-point 400cc/min
MASS FLOW METER	Sample Flow, range 0-250 cc/min, electronically controlled set-point 200cc/min
ENCLOSURE SIZE	70.9” [1800mm] High x 23.3” [600mm] Wide x 23.3” [600mm] Deep floor mounted painted steel enclosure with polycarbonate window door and key locking latch on door. Rear hinged door and hinged side panels. IP-54, NEMA 13 Rated
WEIGHT	630 lbs (286 kg)
POWER	115/230V 50/60 Hz, 100 W max.

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