

# ULTRA LOW LEVEL MONITOR

MODEL 593

## TRITIUM PROPORTIONAL COUNTER

### DISCRIMINATES AGAINST OTHER RADIOISOTOPES

Model 593 is sensitive only to tritium. A semipermeable membrane is used to isolate tritium oxide for passage into the instrument measuring system. All other sample constituents, including pollutants, radioisotopes, aerosols or particulates are removed and eliminated from the measurement.

### FAST RESPONSE THROUGH DEDICATED ELECTRONIC SIGNAL PROCESSING

Simultaneous pulse rise and pulse duration signal processing is used to select only those pulses which correspond to tritium beta decay.

This method of pulse selection, described by a number of authors dating back to the 1960's, brings orders of magnitude increase in speed of response, as well as in inherent sensitivity.

### MEASURES HTO OR TOTAL TRITIUM

A catalytic oxidizer can be provided so that either total tritium, or just the oxide form, can be measured at any time.

### COMPENSATED FOR EXTERNAL GAMMA FIELDS

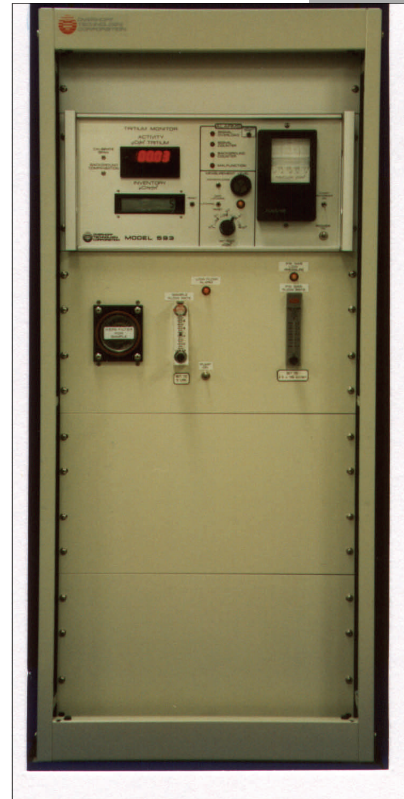
Gamma compensation is required to be able to measure to ultra low levels. Model 593 uses not only electronic signal processing to distinguish tritium signals (from background) but also uses dual counters to ensure that the effects of moderate external gamma fields are still further reduced.

Lead shielding around the counter tubes is used to reduce background gamma, thereby improving the statistical signal to noise ratio to enhance sensitivity.

### FULLY AUTOMATIC OPERATION, CONVENIENT DISPLAY AND CONTROLS

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 digital panel meter for measurement display, as well as alarm functions for measurement levels, loss of sample flow, depletion of counting gas or of electronics failure.



### MODEL 593

Specifically designed to measure ultra low levels of tritium for compliance with 10CFR61 regulations, Model 593 measures to levels of

$3 \times 10^{-9} \text{ Ci/m}^3$

$100 \text{ Bq/m}^3$

### PRINCIPLE OF OPERATION

Model 593 utilizes a pair of balanced proportional counters. The counting gas first passes through the gamma compensation counter, then traverses finally through the second proportional counter.



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## TECHNICAL SPECIFICATIONS

The Model 593 employs two balanced proportional gas flow counter tubes together with a diffusion permeation system for rapid ultra low level tritium specific measurements. The following specifications apply to the standard unit. Consult the factory for variations.

### MEASUREMENT

RANGE	0 to 2 MBq/m <sup>3</sup> (0 to 50 $\mu$ Ci/m <sup>3</sup> )
DISPLAY	4 1/2 digit panel meter, in steps of 100 Bq/m <sup>3</sup>
RESOLUTION and NOISE LEVEL	100 Bq/m <sup>3</sup> , 1 S.D. (1 $\sigma$ )
TIME BASE, MEASUREMENT	10 minutes, pulses are accumulated (measurement repetition rate) over a 10 minute period.
TIME BASE, BACKGROUND	100 minutes (or 10 minutes) pulses from the background compensation counter are averaged over a period as long as 100 minutes to enhance signal stability.
MEASUREMENT, INTERFACE OUTPUTS	i) 0 - 10 V, linear ii) logarithmic, 1 volt/decade iii) E to I, 4 - 20 mA, logarithmic 2 mA/decade iv) RS - 232
OPTIONAL DISPLAY FEATURES	i) chart recorder, logarithmic scale ii) totalizer integrates measurement

### ELECTRIC FUNCTIONS

ALARMS, MEASUREMENT	Single alarm point, logarithmic scale
ALARMS, SUPERVISORY	i) sample flow failure ii) counting gas pressure loss iii) electronics failure
ALARM INTERFACE	i) fail safe relay closures ii) RS - 232

### PNEUMATIC SYSTEM

PROPORTIONAL COUNTERS	Dual copper clad acrylic counter tubes, 2 liter active volume, 2.5 liter wetted volume, 0.001 inch tungsten collector anode
COUNTER GAS	P - 10 or "MAGIC" gas for high performance Flow rate 250 cc/min, typical
TRITIUM COLLECTION	transfer via a polysulfone semipermeable diffusion membrane
SAMPLE FLOW SYSTEM	Oscillating piston pump, flow rate 5 lpm typical
FLOW METERS	front panel rotameters and LED failure displays for counter gas and sampling system
ENCLOSURE	19" relay rack, 48" highj. 24" deep approx, indoor use only
WEIGHT	less than 200 lbs
POWER	115/230V 50/60 Hz, 100 W max.
ENVIRONMENTAL	temperature 10° C to 30° C humidity 0 - 95 % R.H.

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