

NUCLEAR POWER PLANT TRITIUM MONITOR MODEL 321 NPPM

This tritium monitor is a version of the OTC standard 321/421 series, configured for the special environmental conditions associated with nuclear power plants, especially those of the CANDU type. This monitor can be used for other applications where tritium specific measurements in the presence of other radionuclides are required.

Major distinguishing features include the following:

Measures tritium or tritium oxide specifically

Immune to other radioisotopes, including reactor gases as well as radon

Gamma compensated dual chamber design

Plate out proof ionization chambers eliminate "background" zero drift

Drift free "zero"

Rugged industrial enclosure

Unaffected by variations in temperature or humidity

A variety of alarms and controls are available. Optional Remote Displays and Sampling Units can be built to suit different applications.



SENSITIVITY - NOISE LEVELS

The Model 321 NPPM has been designed to exhibit sensitivities that meet the safety requirements associated with worker exposure in power plants. Sensitivity limits induced by background noise levels with instruments incorporating 2 liter ionization chambers approach $0.4 \mu\text{Ci}/\text{m}^3$.

RANGE

The Model 321 NPPM is a single range instrument, with measurements up to 6 plus decades.

MAINTENANCE

Except for routine attention the sample line dust filters and preventive maintenance to the sampling pump, the instrument will provide decades of trouble free service.

SUPERVISORY SIGNALS

Computer compatible outputs are provided to signal operational failure including loss of sample flow, pump failure, electrical failure including that of the electronics, and failure of the ionization chambers.

300/400 UNITS - FIXED CONFIGURATION



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The following specifications will apply when this instrument is used for the measurement of tritium.

- **MEASUREMENT, TRITIUM CONCENTRATION**

RANGE	5 – 19999 kBq/m ³ (.005 – 19.999 MBq/m ³)
DISPLAY	4½ digit DPM, digits are LED's
ACCURACY	± 2 % of reading, ± L.S.D., whichever is greater
STABILITY AND DRIFT	± 0.005 MBq/m ³ long term (at least 30 days) ambient temperature
NOISE	± 0.005 MBq/m ³ , 1 sigma with alpha suppression in use.
OFFSET COMPENSATION	manual zero control provided to offset the effects of gamma radiation and/or tritium build-up
RESPONSE RATE	Two linear time constants
ELECTRONIC	approximately 15 seconds for signals up to about 1 MBq/m ³ approximately 3 seconds for signals from 1 to 20 MBq/m ³
WARM UP TIME	less than thirty minutes

- **ALARM SYSTEM**

SIGNAL ALARMS	Very High and High Concentration alarms set point adjustable from 0.001 – 1.000 MBq/m ³ . Visual indicators with latching or non-latching (toggle) modes, rear panel relay interface. 10-turn potentiometer with turns counting dial.
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- **IONIZATION CHAMBER**

VOLUME	measuring: 6,500 cm ³ total wetted: 11,240 cm ³ port to port compensation: 8,000 cm ³
ELECTRODES	Phantom wall wire grid on measurement chamber Solid wall stainless steel on compensation chamber
GASKETS	Silicone
IN/OUT CONNECTIONS	3/16" I.D. vinyl tubing hose barb fittings installed in 1/8 NPT ports
MATERIALS OF CONSTRUCTION	Chambers, stainless steel; electrometer housing, aluminum



- ENVIRONMENTAL

TEMPERATURE	storage: -20° C to +70° C
	operating: 5° C to 40° C
HUMIDITY	0 to 95 % R.H. (non-condensing)

- REAR PANEL INTERFACE

J1	ELECTROMETER SIGNAL INPUT MS3102A18-1S, 10 pin receptacle
J2	REMOTE OUTPUTS 37 pin "D" connector (female) provides connections for various outputs
J3	RS232 OUTPUTS -OPTIONAL- 25 pin "D" connector (female) provides connections for serial data output
J4	0-10vdc linear signal output Dual banana jack
TB601	ALARM RELAY OUTPUT, High and Low Level Alarms 18 position terminal block with detachable plug, relays operate in the Fail-safe mode and are rated 5A, 250VAC.

- POWER

VOLTAGE	230 VAC \pm 10 %, 50 Hz, 20 W maximum
FUSE	½ A, slow blow .25" diameter x 1.25" long

- PHYSICAL

DISPLAY	
ENCLOSURE	19" rack mount cabinet 3U height (EIA Standard)
DIMENSIONS	5.25" [133mm] high x 19" [483mm] wide x 15" [381mm] deep
WEIGHT	20 lbs [9 kgs]
IONIZATION CHAMBER, Can Be Remote Mounted Up To 25 Ft. Away	
DIMENSIONS	24" [610mm] high x 12" [305mm] wide x 12" [305mm] deep
WEIGHT	50 lbs [23 kgs]



**PERFORMANCE SPECIFICATIONS,
TRITIUM MONITOR MODEL 321**
Designation 321.2LD.ICR.APS.DA.DF.PFA

- **SAMPLE FLOW SYSTEM**

FILTER	HEPA respirator type Solberg P/N HE04
PUMP	Rubber Diaphragm type Thomas Model 107CCD18 Max Pressure 30 psi, Max Flow 18 LPM Operating voltage 220 VAC 50 Hz 1.0 Amp
FLOW METER	Polycarbonate tube variable area type, Dwyer Model VFA-25-SSV, adjustable from 3 – 25 LPM, recommended flow rate is 10 – 15 LPM
DIMENSIONS	19" [483mm] wide x 7" [178mm] high x 17" [432mm] deep
WEIGHT	18 lbs [8 kgs]