MODEL 421NPPM
NUCLEAR POWER PLANT
TRITIUM IN AIR MONITOR

PURPOSE

The **Model 421NPPM** is a dual-range tritium in air monitor configured for measuring tritium in the special environmental conditions associated with nuclear plants, especially the CANDU type.

WIDE MEASUREMENT RANGE

The 421NPPM is a multiranging instrument capable of measuring up up to 6.5 decades

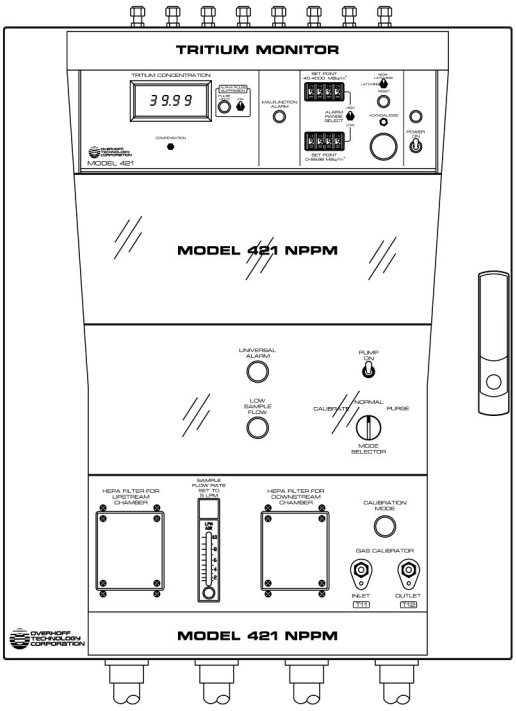
CHOICE OF DUAL 2L OR QUAD 2L ION CHAMBERS

Typical Dual 2L Range:
1 µCi/m^3 to 199.99 mCi/m^3 or 0.01 to 1,999.9 MBq/m^3

Typical Quad 2L Range:
0.1 to 19,999 µCi/m^3 or 0.01 to 1,999.9 MBq/m^3

MAJOR FEATURES OF –NPPM VERSION

i. Includes automatic recycling dryer to measure tritium oxide specifically, immune to other radioisotopes, including all reactor gases as well as radon
ii. Gamma compensated chamber design
iii. Wire-grid ionization chambers are plate-out proof, eliminates tritium contamination and background zero drift
iv. Completely drift free with automatic electronic zero
v. Unaffected by variations in temperature or humidity
vi. Modular design allows you to configure a wide variety of alarms, controls, remote display units, and air sampling units
vii. Computer compatible outputs to signal operational failure including: loss of sample flow, pump failure, electrical failure (including electronics and the chambers themselves)



EXTREMELY ACCURATE, STABLE, AND SENSITIVE

The 421NPPM has been designed to exhibit sensitivities commensurate with safety requirements for worker exposure in power plants. Accuracy is ± 2 %.

LOW MAINTENANCE

Except for routine attention to the sample line dust filters and preventative maintenance to the sampling pump, the 421NPPM will provide decades of trouble-free service.

OPTIONAL TRITIUM SAMPLING UNIT

Tritium sampling unit allows you to remotely sample up to 24 different locations. Custom configuration available for monitoring multiple locations or rooms.

TRITIUM SPECIFIC MEASUREMENTS

The Model 421NPPM is designed for measuring tritium (HTO) in the presence of other radionuclides. The automatic recycling dryer includes two copper tube columns equipped with heating elements and containing desiccant. When one column is in use, the other is being automatically heated, purged, and cooled to regenerate the desiccant.

Overhoff Technology Corporation
1160 U.S. Highway 50, Milford, Ohio, 45150-9705 USA
Telephone: 513 248 2400 Fax: 513 248 2402
Email: sales@overhoff.com www.overhoff.com

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TECHNICAL SPECIFICATIONS

MEASUREMENT

		Dual 2L Chambers	Quad 2L Chambers
TYPICAL RANGES	**Ci:**	1 µCi/m^3 to 199.99 mCi/m^3	0.1 to 19,999 µCi/m^3
	Bq:	0.01 to 1,999.9 MBq/m^3	0.01 to 1,999.9 MBq/m^3
ACCURACY		± 2 % of reading, ± L.S.D., whichever is greater	
DISPLAY		4.5 Digital Panel Meter or LCD Color Touch-Screen	
STABILITY AND DRIFT		±1.0 µCi/m^3 long term (thirty days), ambient temperature conditions	
RESPONSE RATE		three electronics time constants: approximately 40 seconds for signals up to about 80 µCi/m^3 approximately 10 seconds for signals from 80 to 10,000 µCi/m^3 approximately 3 seconds for signals above 1.00 mCi/m^3	
WARM UP		Less than 10 minutes	
MEASUREMENT, INTERFACE OUTPUTS		i) 0 - 10 V, linear ii) Multiple choices of data output: Ethernet, RS-232, USB, 4-20mA	
IONIZATION CHAMBER		Choice of dual 2L ionization chambers on one axis, or quad 2L ionization chambers arranged in cruciform pattern for optimal gamma compensation and sensitivity	

ALARM SYSTEMS

ALARMS, MALFUNCTION	i) low sample flow ii) system failure alarm, includes: high and low voltage failure and electrometer failure
LEVEL ALARM	includes dual level alarms (alert and high)
ALARM INTERFACE	i) fail safe relay closures ii) data output (ethernet, RS-232, USB)

SAMPLE FLOW SYSTEM

PUMP	diaphragm type 115/230 VAC 50/60 Hz
FLOW RATE	14 LPM maximum @ 0 psia
FLOW METER	0-10 LPM adjustable
DUST FILTER	HEPA respirator type
CONNECTION	1/4” stainless steel Swagelok tube fittings
LOW FLOW SENSOR	differential pressure switch

ENCLOSURE

SIZE	29.37’’ [747mm] High x 23.63’’[600mm] Wide x 18.62’’ [473mm] Deep wall mounted NEMA 12 painted steel enclosure with key lockable door
POWER	115/230 VAC, 50/60 Hz, 50 W max.
WEIGHT	186 lbs [84kg]

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RECYCLING DRYER UNIT

Desiccant

dual copper tube coaxial columns containing desiccant agent. Columns are equipped with Internal heaters for the regeneration of the desiccant

Cycling System

motor driven timer to control solenoid valves and the heaters for sequential modes of each column

Column A	Column B
In use	1. heat column
In use	2. purge vapor
In use	3. cool column

The sequence of events takes six hours for completion, whereupon the sequence recommences for the opposite column.

VISUAL INDICATORS

Status Indicator

Rotary pointer knob indicates different states of the sample/regenerate process for both desiccant columns

Low Flow Indicator

purge pump low flow alarm will indicate when flow falls below 2 LPM

Power

115/230 V, 50/60 Hz, 1500 Watts

Circuit Protection

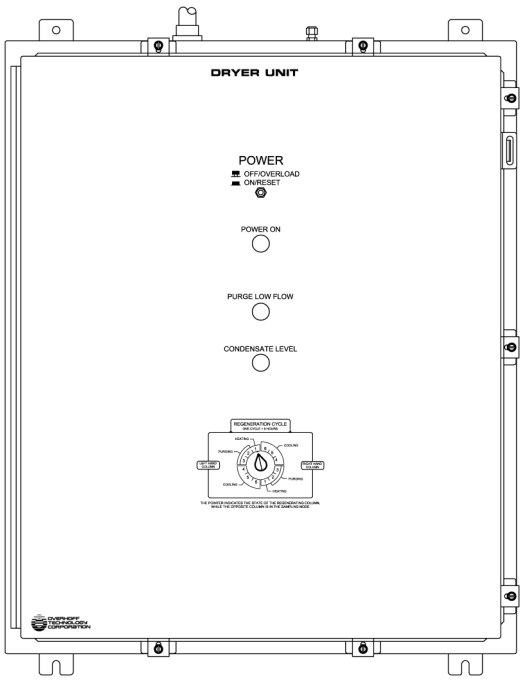
15 amp circuit breaker/power ON/OFF switch

Physical Size

30” [762mm] W x 46.75” [1187.5mm] H x 13.5” [343mm] Deep wall mounted painted steel enclosure with key lockable door

Weight

245 lbs [111 kg]



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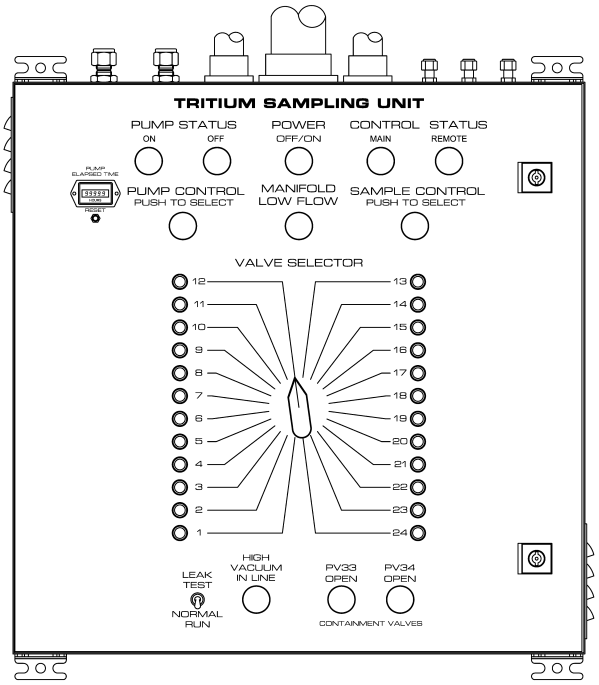

TRITIUM SAMPLING UNIT (OPTIONAL)

TRITIUM SAMPLING UNIT SYSTEM PERFORMANCE

Pump	115/230 VAC, 50/60 Hz
Flow Rate	89 LPM Maximum at 0 psia
Flow Meter	10-100 LPM
Dust Filter	HEPA respirator type
Pressure	0.1 – 2 atmospheres
Connections	1/4” stainless steel Swagelok fittings
Low Flow Sensor	differential pressure switch
Vacuum Sensor	vacuum switch

CONTROLS

Power Control	ON/OFF toggle switch for power
Pump Control	ON/OFF maintained pushbutton switch for power to pump
Sample Control	MAIN/REMOTE maintained pushbutton switch for control unit selection
Valve Selection	controlled by a rotary switch

VISUAL INDICATORS

Manifold Low Flow	red LED, “on” when purge pump flow fails or falls below 2 LPM.
Connections	1/4” stainless steel Swagelok tube fittings

ENVIRONMENTAL

Temperature	-40° C to +65° C Storage 0° C to +50° C Operating
Humidity	0 – 95 % RH
Air Conditioning	Ventilation or air conditioning is not required.

PHYSICAL

Physical Size	23.62’’[600mm]Wide x 25.75’’ [654mm] High x 15.16’’ [385mm] Deep NEMA 4
Power	120VAC, 60Hz, 1Ph, 15A
Weight	101 lbs (46 kg)

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REMOTE DISPLAY UNIT (OPTIONAL)

REMOTE DISPLAY / CONTROL UNIT SYSTEM CONTROLS

Power Control	ON/OFF toggle switch for power to unit
Pump Control	ON/OFF maintained pushbutton switch for power to pump
Sample Control	MAIN/REMOTE maintained pushbutton switch for control unit selection
Valve Selection	Valve selection controlled by PLC touch screen

VISUAL INDICATORS

PLC Touch Screen	Displays Tritium Concentration, Alarm Status
Power	120VAC, 60Hz, 1Ph, 2A

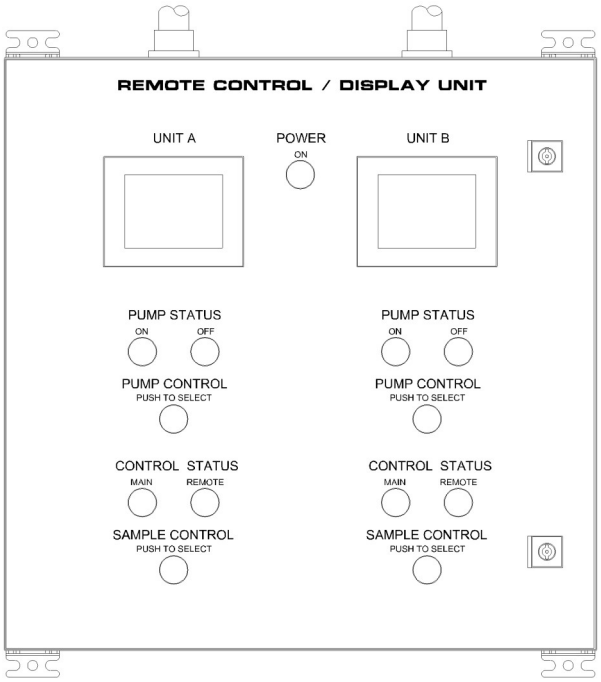
ENVIRONMENTAL

Temperature	-40° C to +65° C Storage 0° C to +50° C Operating
Humidity	0 – 95 % RH
Air Conditioning	Ventilation or air conditioning is not required.

PHYSICAL

Physical Size	23.62'' [600mm] W x 25.75'' [654mm] High x 15.16'' [385mm] Deep Excluding Hardware
NEMA Rating	NEMA 4
Power	120VAC, 60Hz, 1Ph, 2A
Weight	66 lbs (30 kg)

Remote Display Unit for two monitors, other/custom configurations available



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Overhoff Technology Corporation

Phone: 513-248-2400
Fax: 513-248-2402
Email: sales@overhoff.com
Website: www.overhoff.com