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 to 6.5 decades.

CHOICE OF DUAL 2L OR QUAD 2L ION CHAMBERS

Typical Dual 2L Range:
1 µCi/m³ to 199.99 mCi/m³ or 0.01 to 1,999.9 MBq/m³

Typical Quad 2L Range:
0.1 to 19,999 µCi/m³ or 0.01 to 1,999.9 MBq/m³

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
## Technical Specifications

### Measurement

<table>
<thead>
<tr>
<th>Dual 2L Chambers</th>
<th>Quad 2L Chambers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ci:</strong></td>
<td>1 µCi/m³ to 199.99 mCi/m³</td>
</tr>
<tr>
<td><strong>Bq:</strong></td>
<td>0.01 to 1,999.9 MBq/m³</td>
</tr>
</tbody>
</table>

### 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/m³ long term (thirty days), ambient temperature conditions

### Response Rate

Three electronics time constants:
- Approximately 40 seconds for signals up to about 80 µCi/m³
- Approximately 10 seconds for signals from 80 to 10,000 µCi/m³
- Approximately 3 seconds for signals above 1.00 mCi/m³

### 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]
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.

<table>
<thead>
<tr>
<th>Column A</th>
<th>Column B</th>
</tr>
</thead>
<tbody>
<tr>
<td>In use</td>
<td>In use</td>
</tr>
<tr>
<td>1. heat column</td>
<td>2. purge vapor</td>
</tr>
<tr>
<td>3. cool column</td>
<td></td>
</tr>
</tbody>
</table>

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]
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)
MODEL 421NPPM
NUCLEAR POWER PLANT TRITIUM IN AIR MONITOR

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

Overhoff Technology Corporation

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