Ultra Low-level Automated Tritium Air and Stack Monitor

Model – Trimaran-Air

PWR & BWR Produce Tritium-
10 Curie/Giga-Watt/Year

Application

- This monitor has been designed for near real time ultra low-level detection of Tritium in the industrial environment of nuclear power plants.
- Low MDA, reliability, ruggedness, and simplicity of automatic operation sets this monitor apart from typical laboratory types of equipment.
- The Model Trimaran-Air and Stack has been designed to feature sample enrichment, measuring the lowest levels of Tritium as possible.
- In addition to industrial use, this monitor is also used for other purposes, such as monitoring changes in Tritium in any setting.

Features

- Sensitive to 30 pCi/m3 (1 Bq/m3) In Air
- Optional: 6 Port Intake Manifold for Sampling 6 Individual Input Lines, Sampled in Series
- Tritium Only: Ignores Other Nuclides
- Proportional Counting
- Automatic Gamma Background Subtract
- Smart Electronics; Data Archive and Retrieval
- No Zero Drift
- Ultra Low MDA with High Accuracy
- Output Ports: USB, **Optional** 4-20 mA
- Easy Integration into Facility Mainframe
- User Settable – Units, Alarm Limits, Flow Rate, etc.
- Rugged, Reliable, Simple Operation; Steel Frame Mounted
- **IP 32**

Description

The unit condenses water vapor from the air and then extracts T2 and H2 from water vapor. The next step is enriching/concentrating the sample, then making sensitive Tritium measurement with matched gas flow proportional counters to minimize cosmic and Gamma radiation effects.

Optional ½" lead shielding provides lower background.

MDA	MDA
8 HOURS	24 HOURS
5 Bq/M^3	1 Bq/ M^3
150pCi/ M^3	30 pCi/ M^3

CBRN Real - Time Air & Water Specialists

TECHNICAL ASSOCIATES
OVERHOFF TECHNOLOGY

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Description

Fully Intergrated Package

Model Trimaran-AIR is a completely self-contained instrument for near real time continuous detection of Tritium concentration in water. The instrument is mounted inside a rugged built 200 cm tall steel enclosure with reinforced anchoring feet and locked access.

P-10 gas (90% Argon, 10% Methane, non-combustible) cylinder is connected to the unit externally.
This quantity is sufficient for 60 days of continuous operation.

The main subassemblies are:

1. Sample air input lines
2. **Optional**: Multi-line intake manifold
3. Pre-filter
4. **Optional**: External cooling loop in case of hot samples
5. Sample pump
6. Sample Enrichment assembly
7. Detection module
8. Data acquisition electronics module
9. System control module
10. Output line

Remote Monitoring and Alarming:

- USB, Ethernet and **Optional** 4-20mA output.
- 2 alarm outputs and malfunction outputs in the form of dry, fail-safe, relay contacts.
- Alarms are user adjustable.
- Malfunction alarms activate in case of electronics and/or mechanical failures in the system.

Advantages of Proportional Counting System

The Trimaran AIR utilizes proportional counting technology. A compact standard steel tank of proportional gas will last for two months and is readily available from a variety of suppliers.

The P-10 counting gas is 90% Argon and 10% Methane, is not toxic or combustible.

Measurement with this method achieves better low-end Tritium sensitivity than other methods.

The **Trimaran AI**R offers an **Optional** 6 port intake manifold for sampling 6 individual input lines, sampled in series and is programmable.

Need for Sample Enrichment

With proportional counting detectors, Technical Associates / Overhoff Technology has pushed Tritium detection to the most sensitive limit.

However, air/vapor samples may be diluted and even with large proportional detectors there are not enough Bq disintegrations per second for good measurements. This issue is overcome by concentrating or enriching the sample using iterative process to concentrate the Tritium from the Hydrogen vapor

Technical Associates / Overhoff Technology scientists have developed their own proprietary sample enrichment cycle, creating system sensitivities far beyond other automated flow-through systems

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Description

Electronicsand Measurement

Measurement Range:	0-10,000 Bq/m3 (Higher Top End is **Optional**)
Sensitivity:	See Chart 1st page
Display:	LCD Touch Screen Monitor
Units:	User Settable
Measurement Method:	Gas flow proportional counters
Detector Construction:	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:	0.5-3 CFM (User Specified) - Continuous Flow is Standard
On Board Computer:	Data-analysis, Archive, Retrieval,
Output:	USB and Ethernet **Optional** 4-20mA
Signal Processing:	Electronic signal processing of pulses for Tritium specific wave shapes (height and duration)
Alarm Set Point:	User Settable

Environmental:

Temperature:	0o C to 50 o C
Humidity:	0 to 95% R. H.
Seismic:	Withstands Modest Shock
General:	Equipment to be sheltered from exposure to raw elements.

Power

Electrical:	Power 110/230VAC, 10A main power

Weight and Dimensions:

Dimensions:	31.5" W x 23.6" D x 84" H (800mm x 600mm x 2133mm)
Weight:	1100 lbs (~500 kg)
Mechanical:	Self-contained, mounted on a steel frame with lifting eyes for easy transport.

PLC Control:

- Sampling of input lines and control of flow alarms and pumps is done by PLC unit placed inside of the System Control Module.
- A manual override is provided in the unlikely event of PLC failure providing manual operation until PLC is replaced.

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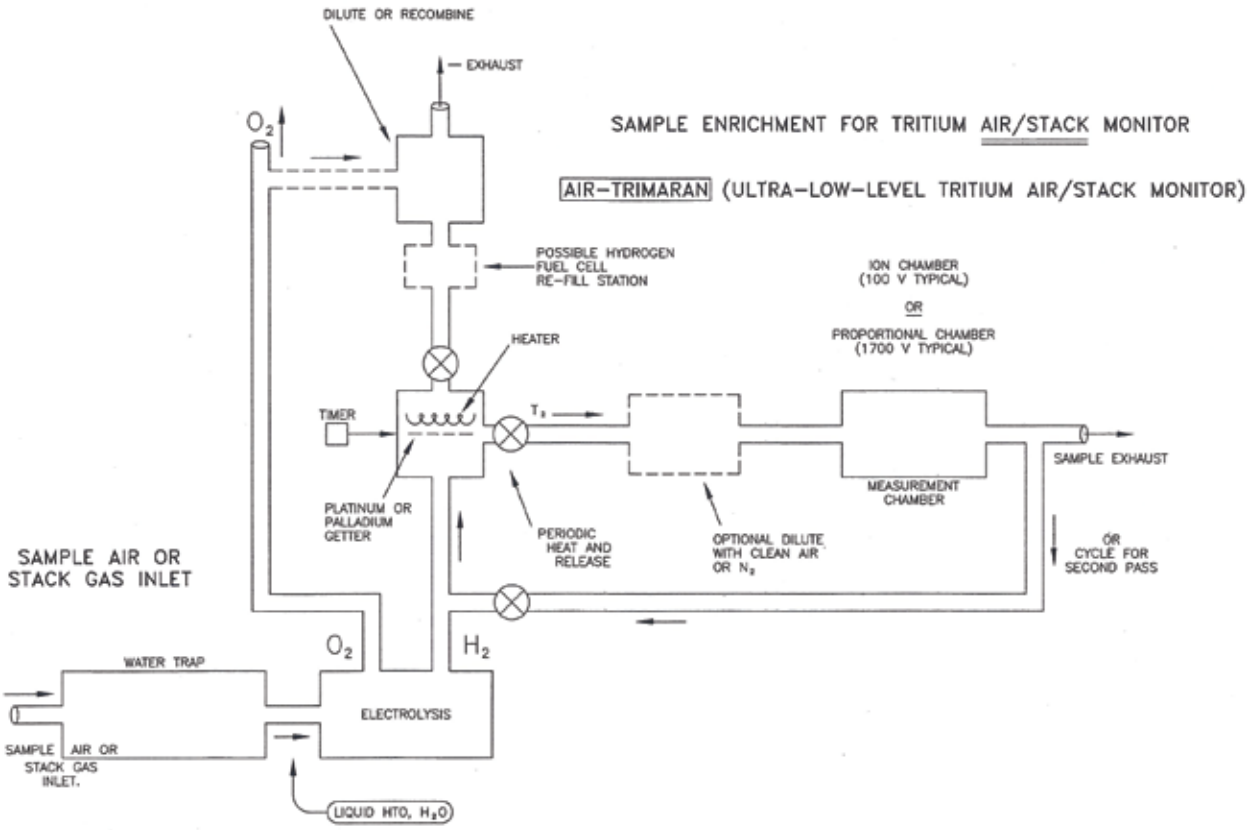

Trimaran-Air Flow Diagram

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