

HIGHLY SENSITIVE TRITIUM IN WATER MONITOR

LIQUID SCINTILLATION DETECTION

Model – 1925-LSC & 1925-LSC-SEA

FEATURES:

- LOW-LEVEL, REAL-TIME TRITIUM USING AUTOMATED LIQUID SCINTILLATION COUNTING;
- HIGH SENSITIVITY – 100,000 PCI/L IN 9 MINUTES OR LESS WITH 95% CONFIDENCE
- DETECTS TRITIUM IN WATER BELOW EPA DRINKING WATER STANDARD OF 20,000 PCI/L
- FULLY AUTOMATED, REAL-TIME AND CONTINUOUS OPERATION
- TRITIUM IS DETECTED BY DUAL PHOTOMULTIPLIER TUBES WORKING IN COINCIDENCE COUNTING MODE
- NO WASTE GENERATED
- INTEGRATED COMPUTER WITH CUSTOM SOFTWARE AND LARGE LCD DISPLAY
- DATA ARCHIVE AND RETRIEVAL
- COMPUTER INTERFACE

MODEL 1925-LSC-SEA

- RUGGED, ROBUST PLUMBING FOR CORROSIVE ENVIRONMENT OF SEA WATER



APPLICATION:

Detect leaks of heavy water (tritium) in nuclear power plants, however, it can also be used to monitor changes in tritium content of groundwater, rivers, lakes, or ocean currents.

DESCRIPTION:

- Tritium decay is detected via liquid scintillation counting with dual photomultiplier tubes (PMT) working in coincidence counting mode.
- The use of highly effective PMTs, specially designed sampling cell to minimize cosmic radiation and Cherenkov effects, and 1" lead shielding provides for the low background noise of only one count per second with a counting efficiency of 30%.
- MDA is 3.7 kBq/L with a 95% confidence level and a resolution of 1.0 kBq/L.

SENSITIVITY:

Sensitivity is to 100,000 PCI/L in 9 minutes or less with 95% confidence.

FULLY-AUTOMATED, REAL-TIME OPERATION:

Exceptionally rapid response.

NO WASTE GENERATED



Real-Time
Air & Water
Specialists



TECHNICAL ASSOCIATES

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OTCQB-UJLE

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THE MAIN SUBASSEMBLIES ARE:

1. Sample water input lines
2. External cooling loop input/output lines
3. Internal cooling loop complete with chiller, chiller pump and plumbing
4. PRV and RV system with manifolds
5. Water purification system (oil-in-water and micron filter)
6. Sample water pump
7. Detection module
8. Data acquisition electronics module
9. System control module
10. Wastewater output line, RV output line, and sample bypass output lines

Response time: Can be configured for 1 to 6 inputs for sampling up to 6 individual lines. The response time from when sample enters the system until the unit starts to respond is 3 minutes, and in 9 minutes the full value of tritium concentration in the sample is displayed on the screen. If selecting multiple inputs, each sample line is sampled for 10 minutes so that the effect of residual activity from the previous line is minimized.

Pressure Regulating Equipment: The pressure of input sample streams can be up to 103 kPa. This pressure is immediately reduced to 2-3psi via Pressure Regulating Valves (PRV). Each PRV is associated with Pressure Relieve Valve set to open at 100 kPa, therefore, the pressure in the system can never be more than 100 kPa, which makes it safe to handle. This also makes the instrument a Class 6 Nuclear Device.

Cooling: In order to have a maximum efficiency of the liquid scintillator, a solution that is tested inside of the sample cell is kept between 12°C and 20°C. This is achieved by an internal cooling loop system, which is a closed-loop cooling system with its own pump and chiller unit. If the unit operates in extreme temperatures (more than 45°C) external cooling loop is provided, where the user shall provide chilled water from its own source.

Routine Maintenance: Scheduled maintenance of consumables is required. The liquid scintillator needs to be replenished every 2 months and sample water filters need to be replaced. Also, a periodic check of the efficiency and background is recommended if there is a possibility of increased background contamination and due to the standard lifecycle of electronics components.



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SPECIFICATIONS:

MEASUREMENT RANGE	3.7 to 130 kBq/L
RESOLUTION	1.0 kBq/L
MINIMUM DETECTABLE LIMIT	3.7 kBq/L at a confidence level of 95%
DISPLAY	LCD Color Touch Screen; units of display user-settable (i.e., kBq/L, μ Ci/L)
RESPONSE RATE	3 minutes– beginning of response 9 minutes full valued displayed
MEASUREMENT METHOD	Liquid scintillation counting
DETECTOR	Dual PMT coincidence counters surrounded by multi-element shielding
SIGNAL PROCESSING	Electronic signal processing of coincident pulses for tritium specific wave shapes (height and duration)
ALARM SETPOINT	Can be manually adjusted
DATA RECORDING/OUTPUT	Insertable USB flash drive; Data communication via TCP/IP. Standard data output is Ethernet and USB.
SAMPLING/MIXING SYSTEM	Dual head, low flow rate pump. Liquid scintillator and sample mixed at the sample cell.
SAMPLE CELL	Stainless steel cell, volume 5cc with fused silica windows and Viton O-rings for sealing.
WASTE MANAGEMENT	Unused water output lines with Swagelok® fittings are provided, user to provide recycling system or waste collection system.
TEMPERATURE	32° F to 122° F (0°c to 50°c)
HUMIDITY	0 to 95 % R. H.
SEISMIC	Withstands modest shock
ELECTRICAL	Power 110/230VAC, 5A
MECHANICAL	Self-contained, mounted on a steel frame with lifting eyes for easy transport.
DIMENSIONS	31.5in x 23.6in x 84.0in (800mm x 600mm x 2133mm)
WEIGHT	1100 lb (500 kg)



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