



FM-9 Electronics



Downhole Probe

# Down-Hole Tritium in Water Detector

## Model SSS-33DHC

**SSS-33DHC, SSS-33DHC-WH,  
SSS-33DHXT, SSS-33DHC4,  
SSS-33DHC4-WH**

## Features

- Enhanced Sensitivity
- Well-Head Series
- Sensitive Below EPA Clean Drinking Water Levels
- Continuous Real Time
- Not Influenced by Other Nuclides
- No Liquid Scintillant Required
- Data Archive and Retrieval

## Application

- Monitor aquifer quality
- Early Detection of Underground Plume or Tritium Leakage
- Reassure the Public by Continuous Monitoring of Drinking Water Sources

## Current Problem and Solution:

### Detectors and Detection Flow-Thru Cell:

Thousands of bore holes in the United States should be monitored for Tritium. The water in these bore holes cover a wide range of Tritium concentrations; from highly contaminated to very clean.

- Current bore hole sampling and lab test methodology involves taking a sample and sending it to a lab.
- A labor intensive, slow, and expensive process.

Automating the monitoring of these bore holes for aquifer purity with **SSS-33DHC** Detectors is a cost effective, real-time continuous monitoring process.

## Description

- Small diameter, water tight detector assembly
- Pump
- Processor

The sample is passed through a deionizer and filter and thence to the scintillation crystals in the flow cell which is viewed by a matched pair of photomultiplier tubes.



## TECHNICAL ASSOCIATES OVERHOFF TECHNOLOGY

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## Well-Head (WH) Series

- Same function as other models with significantly higher sensitivity.
- Reduced maintenance.
- Only the pump goes down the hole to bring the detection cell, filtration and amplifiers up to the surface.
- Readout and data transmission package on the surface at the **WELL-HEAD**.

The process portion of this system conditions and analyzes the output from the photomultiplier tubes by pulse height and coincidence, thereby permitting the system to eliminate counting most background and noise counts. Sensitivity is enhanced by use of stochastic resonance plus high gain, low noise PM tubes, and preamps.

## Sub Systems

**Down-hole Tritium measurement system involves the following subsystems:**

- Sonde-Casing,
- Sample water filtration and deionization pump
- Detectors and detection flow thru cell
- Plumbing
- Preamplifiers, amplifiers
- Electronic pulse analysis
- Detector bias supply
- Cables
- Data presentation
- Data archive and retrieval
- System power
- The electronics displays count-rate, total count and elapsed count time at the well head
- Data download via RS-232, USB and/or ethernet

## Specifications


<b>Sensitivity:</b>	1 $\mu$ Curie/ml in 30 minutes - LLD is better than the FDA drinking water standard which is 20,000 pCi/L (0.02nCi/ml) averaged over 48 hours
<b>Range:</b>	0-1000 $\mu$ Curies/ml
<b>Pumping Frequency:</b>	Standard - Twice per day
<b>Above Ground Dimensions:</b>	13" H x 21" W x 20" D. (Larger for weather house version)
<b>Weight (Standard Unit):</b>	Detector Housing: 30 lbs. Shipping: 100 lbs



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#### Detector Sonde and Filtration System:

- The flow path (plumbing) all wetted parts are stainless steel or chemically inert materials.
- Filters are easily cleaned/recharged/replaced in the field
- The Technical Associates Tritium detection sonde contains a 400cc screw-in replaceable cartridge consisting of two stages.
- Replaceable Particulate Filter Cartridge.
  - » The lower stage has glass wool and, Optional, micro-pore alumina ceramic filter for removal of particulates and gelatinous contaminants.
- Replaceable Deionizer Cartridge.
  - » The upper filter contains deionizer beads to remove dissolved salts and metals from the sample water.
  - » The user has the option to refill the plastic filter cartridge or to replace the plastic filter cartridge with pre-filled replacements. Both of which are low cost.
  - » The current clear-plastic filter housing allows the user to visually inspect the filter contents without opening the filter. This gives very useful information on whether filter change interval can be increased in the future for that location due to its' local ground water quality.
- Stainless Steel Sonde allows easy cleaning and maintenance.
- Pump which operates even at deep underground/underwater 1800 psi. Ambient
- Scintillation Cell
- Dual PM Tubes
- Dual Pre-amps
- Cabling

#### Options:

- Higher Temperature for sample or above ground electronics.
- Other ranges.
- Addition of Strontium90 Detector.
- Conductivity Detectors to learn more about the ground water and to tell when ion exchange beads need replacing.
- Dry Hole Detector.
- Depth/Cable Length.
- Well head display electronics mounted in weather-tight housing.
- Data stored electronically at site.
- Data transmitted periodically (twice a day) to a distant data collection lab.

#### Optional Back-Flushing:

To periodically reverse the direction of the pump flow, so as to flush the filters and thereby further extend the time between filter replacement



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### WELL-HEAD (WH) SERIES (Five Models)

DETECTOR	SSS-33DHC SSS-33DHC-WH	SSS-33DHXT	SSS-33DHC4 SSS-33DHC4-WH
<b>ENVIRONMENTAL:</b>			
<b>Sample Temperature:</b>	35 to 122 F	35 to 135 F	35 to 122 F
<b>Ambient Temperature:</b>	35 to 122 F	35 to 135 F	35 to 122 F
<b>Ambient Pressure:</b>	0-100 psi	0-1800 psi	0-100 psi
<b>Humidity:</b>	Submerged Operation	Submerged Operation	Submerged Operation
<b>Diameter:</b>	1.75"	1.75"	3.5"
<b>Recommended for Hole Diameter:</b>	CPT	CPT	4"
<b>Max. Deployment Depth:</b>	160 ft.	5,000 ft.	160 ft.
<b>Material Construction:</b>	Stainless Steel	Stainless Steel	Stainless Steel
<b>ABOVE GROUND PORTION</b>			
<b>Temperature:</b>	35 to 100 F	35 to 100 F	35 to 100 F
<b>Humidity (Non-condensing):</b>	0-96%	0-96%	0-96%
<b>Weatherproof (Optional):</b>	Yes	Yes	Yes

Note: CPT: Cone Penetrometer Technology is often used to create 2" diameter vertical holes in the ground for the purpose of monitoring soil, vapor, and ground water.

\*\*Below 0°C temperature can be accommodated by use of optional heat tracing.



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### Tritium In Water Low End Sensitivities

MODEL	TOP OF RANGE	MDA							
		20 Sec	3 Min	20 Min	3 Hr	24 Hr	7 Days	1 Month	
HWLD-77	100 kBq/L	3.7 kBq/L	1 kBq/L	500 Bq/L	185 Bq/L	60 Bq/L	20 Bq/L	TBD	
		100,000 pCi/L	27,000 pCi/L	13,5000 pCi/L	5,000 pCi/L	1,500 pCi/L	540 pCi/L	TBD	
TMW-3	300 Bq/L			20 Min	3 Hr	24 Hr	7 Days	1 Month	
				3.7 kBq/L	500 Bq/L	185 Bq/L	100 Bq/L	60 Bq/L	
				100,000 pCi/L	13,5000 pCi/L	5,000 pCi/L	2,700 pCi/L	1,600 pCi/L	
SSS-33M84	1,000 Bq/L			20 Min	3 Hr	24 Hr	7 Days	1 Month	
				37 kBq/L	5 kBq/L	740 Bq/L	185 Bq/L	TBD	
				1.0 µCi/L	0.135 µCi/L	20,000 pCi/L	5,000 pCi/L	TBD	
SSS-33DHC-WH	1,000 Bq/L			20 Min	3 Hr	24 Hr	7 Days	1 Month	
				37 kBq/L	5 kBq/L	740 Bq/L	185 Bq/L	TBD	
		Sensitivities dependent on sufficient water volume.			1.0 µCi/L	0.135 µCi/L	20,000 pCi/L	5,000 pCi/L	TBD
HW-LD	130 Bq/L		3 Min	20 Min	3 Hr	24 Hr	7 Days	1 Month	
				3.7 kBq/L	1.0 kBq/L	500 Bq/L	185 Bq/L	TBD	TBD
				100,000 pCi/L	27,000 pCi/L	13,500 pCi/L	5,000 pCi/L	TBD	TBD

Details at [Tech-Associates.com](http://Tech-Associates.com)



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