

# HEAVY WATER DEUTERIUM MONITOR

## Model Series D<sub>2</sub>O-HW

Models ~ D<sub>2</sub>O-HW -LO (Low Levels) - D<sub>2</sub>O-HW -HI (High Levels)

D<sub>2</sub>O-HW- HI – LO (Combined System)

### FEATURES:

- AVAILABLE ON WHEELS OR FIXED INSTALLATION
- MEASURES D<sub>2</sub>O from 0.01-5%
- REAL TIME, IN-LINE, CONTINUOUS
- HIGH SENSITIVITY FOR DEUTERIUM
- NO REAGENT TANKS TO FILL
- NO WASTE STREAM – MOST MODELS
- EASY CALIBRATION
- CONTINUOUS FLOW THRU SYSTEM
- NO MOVING PARTS
- **OPTIONAL TRITIUM DETECTION**



### APPLICATION:

Monitor water for Deuterium content and optionally Tritium content.

### DISCUSSION OF D<sub>2</sub>O-HW – HEAVY WATER:

D<sub>2</sub>O or heavy water is used as the moderator in pressurized heavy water nuclear reactors.

#### HEAT TRANSFER:

H<sub>2</sub>O or light water is used as a secondary coolant to transfer the heat energy from the primary coolant D<sub>2</sub>O pipes to the steam turbine.

#### LEAK DETECTION:

The measurement of D<sub>2</sub>O in water is important to determine whether there are any leaks between the H<sub>2</sub>O water loop and the D<sub>2</sub>O loop.

#### OTHER USES:

D<sub>2</sub>O is also used in obesity studies and other medical, biological and pharmaceutical research.

### SOLUTION:

For the first time in a Continuous Real Time water monitor Models: D<sub>2</sub>O-HW-LO, D<sub>2</sub>O-HW - HI and D<sub>2</sub>O-HW -HI-LO provide continuous monitoring of heavy water.

- The Model D<sub>2</sub>O-HW Series uses an ultra-sensitive, infra-red detector for D<sub>2</sub>O-HW and an optional Beta detector.
- The information from each detector is analyzed and displayed in units of “percent” or other engineering units.
- Measurements of concentration are logged 24 hr/day, 7 day/week.



TECHNICAL ASSOCIATES

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### DESCRIPTION:

The Model D<sub>2</sub>O-HW Series are heavy water monitor /controllers for measuring Isotopic Hydrogen content in water.

#### ELECTRONICS

- The electronics are microprocessor with LED/LCD display.
- The electronics are plug in modules allowing for changes or additional functions at a later date.

#### MODULAR DESIGN

- The modular design also allows rapid repair by module replacement in the field.
- The modular system is covered by TA's unique exchange warranty system in addition to the full one-year warranty.

#### FLOW CELLS

- The measurement flow cell is easily changed via quick disconnect fittings.
- All connections are sealed against leaks.

#### PUMP

- The standard water moving system is based on a high precision pump with a 2 liter per minute capacity.
- A wide range of pump capacities are available to meet users specific needs.
- System can also be operated using hose pressure in which case no pump is required.

#### SYSTEM

- The system electronics is mounted in a rugged cabinet for fixed installation or on wheels for portable use.
- It comes complete with all cabling tubing and connectors in place and is ready to operate.

#### POWER

- 115 Volt 60Hz is standard; 220 Volt 50/60 Hz is optional.

### OPTIONAL Tritium Measurement:

1. Beta Detector: Consists of a light-tight detector assembly which interfaces with the sample via quick disconnect coax cables and medical grade hoses. The sample is viewed by a matched pair of photo-multiplier tubes.
2. The Beta pulse analysis portion of this system conditions and analyzes the output from the photo-multiplier tubes by pulse height, duration and coincidence. Thereby permitting the system to eliminate counting most background and noise counts. Sensitivity is enhanced by the use of stochastic resonance plus high gain, low noise PM tubes and pre-amps.



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### SPECIFICATIONS:

#### Data:-Analysis-Display-Hard-Copy-DVD-ROM Archive

The concentration and total activity released and MDA levels are continuously calculated and recorded.

All data can be saved to the memory drive in spreadsheet format.

**Alarms:** Each alarm activates a relay. Relay alarms are available to the user.  
**Sample temperature standard:** up to 80° F liquid. (optional to higher temperatures)  
**Ambient temperature:** 65 - 105 ° F (18 ° 40 °C )(wider temperatures ranges optional)  
**Humidity:** 0 – 95% RH

#### OPTIONAL:

**Cooler Model** Cool-33 for detector & sample is used in case of higher sample or ambient temperatures.

**Model Temp**-Stat-33 gives precise temperature control - optional

#### RACK CABINET MOUNT

- 31' x 23' x 84' (800 x 600 x 2133 mm) Front door 110 ° open – optional
- Floor Mount Cabinet can be bolted to floor if needed. Protection grade: IP55
- Ground protection: copper strap and bolt + durable label. Water-proof cable opening- optional
- Fire retardant paint optional
- **SIZE AND WEIGHT:** Are dependent on model selected and customer requirements.
- **Inlet** – outlet plumbing fittings ¼" NPT standard. Other fittings or flanges to customer need are available.

#### Flow-thru Deuterium Water Monitors

Model #	D <sub>2</sub> O-HW-LO	D <sub>2</sub> O -HW-LO-T	D <sub>2</sub> O -HW-HI	D <sub>2</sub> O -HW-HI-T
Read-out Units (Typical) D <sub>2</sub> O-HW, T <sub>2</sub> O	Percent D <sub>2</sub> O-HW NA	Percent D <sub>2</sub> O-HW pCi/l	Percent H <sub>2</sub> O NA	Percent H <sub>2</sub> O uCi/l – Ci/l
Measures	D <sub>2</sub> O-HW	D <sub>2</sub> O-HW, T <sub>2</sub> O	D <sub>2</sub> O-HW	D <sub>2</sub> O-HW, T <sub>2</sub> O
<b>Deuterium</b> Range	0.01 – 5%	0.01 – 5%	95-100% (.01 – 5 % H <sub>2</sub> O)	95-100% (.01 – 5 % H <sub>2</sub> O)
Method	Infra-red	Infra-red	Infra-red	Infra-red
<b>Tritium</b>	NA	HWLD 1925 <a href="#">Model 1925</a>	NA	<a href="#">SSS-33M8</a>
Method		Continuous Liquid Scintillation		Crushed Crystal Scintillation



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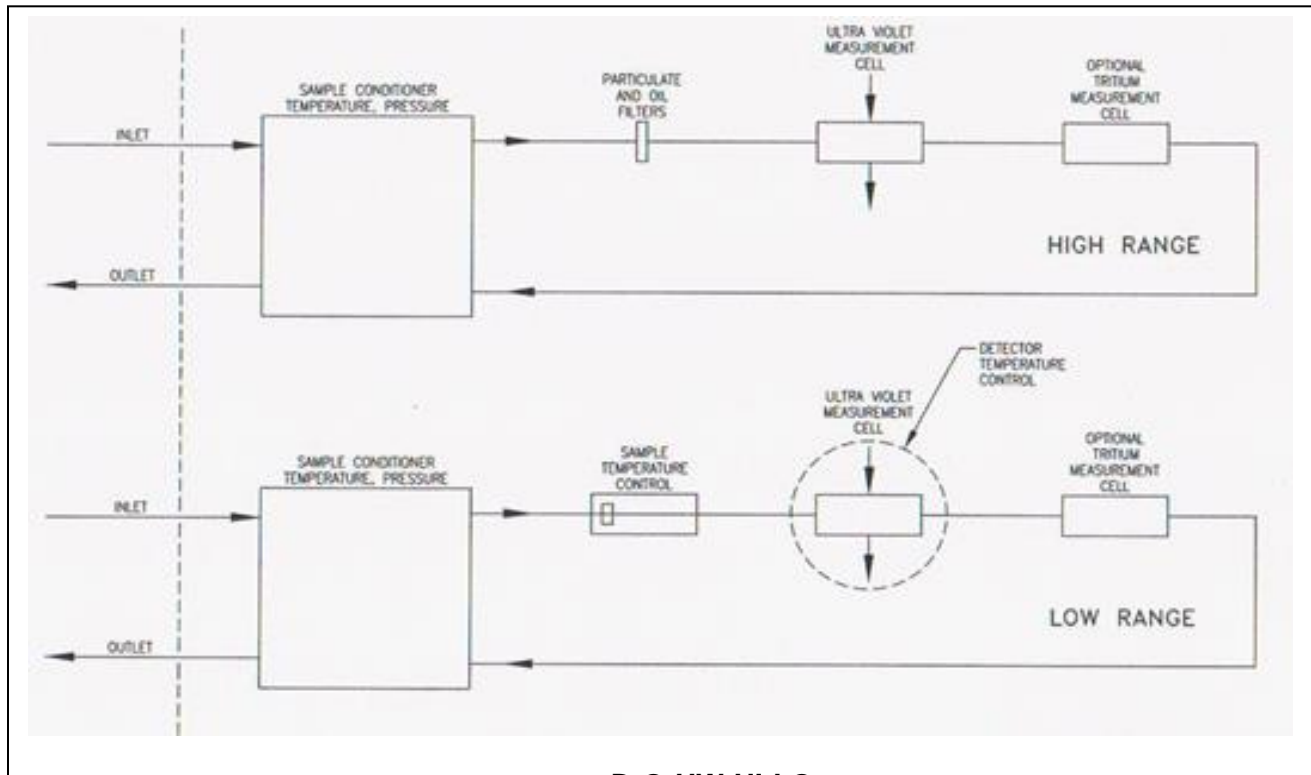
D<sub>2</sub>O-HW- HI – LO (Combined System)

### OPTIONS:

- Model D<sub>2</sub>O-HW- HI-LO is a combined two channel model
- Model D<sub>2</sub>O-HW- HI-T (Tritium) - Model D<sub>2</sub>O-HW-LO T (Tritium)
- High pressure pump to return the sample to a pressurized system
- WIN-W Data Logger Software
- Overview networking software
- Interface options
- 4-20Ma
- Serial port
- Ethernet or USB port
- Higher capacity pumps
- Longer Inlet-tubing

### FLOW PATH:

- Water Inlet port
- Pressure relief valve
- Particulate Pre-Filter (with optional Gamma Detector) Ultra Violet Sterilizer (Optional)
- Mass Flow Meter (Optional)
- Discharge water is clean and can go back into the water line. No liquid scintillant or reagents are added
- No toxic or radioactive waste of any kind.



D<sub>2</sub>O-HW-HI-LO  
FLOW CHART



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