

**SAMPLE AND HOLD TRITIUM IN WATER
MONITOR
MODEL – TMW-3**

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All of **Overhoff's** Water monitors have been recently reworked to take advantage of the latest technologies and to use, the new, smarter ORO data analysis software.

The remarkably Low Cost and great sensitivity level of Model TMW-3 is achieved by,

1. Using the Sample and Count Methodology
2. Removing some non-essential and special purpose features. And then letting the user decide which specialized features to add back as user selected Options.
3. Making use of the latest technologies.

SAMPLING VS. CONTINUOUS REAL-TIME

“A Sample and Hold System” such as **model TMW-3** will periodically extract a water sample, condition it, inject it into the measurement cell, count it for a long time, eject the sample and repeat. The longer the measurement time the lower the MDA, minimum detectable level.

PRO: Gives very sensitive, accurate measurement in a simple low cost machine.

CON: Short-term changes or releases that occur between one sampling moment and the next will be missed.

APPLICATION: Useful where long-term Tritium variations and trends are important, but short-term variations are not. Example: use this system to accurately document long-term increase (or decrease) of tritium levels.

“A Real-time Continuous System” such as model **HWLD-1925** will continuously extract water sample (or at very short intervals), condition it, inject it into the measurement cell, count it, eject the sample and repeat.

PRO: Gives very sensitive, accurate measurement. Even short-term changes or releases will be measured and recorded because the samples are taken one right after the other, so no “events” will be missed. Can act almost as a real-time alarm in case of a leak, spill or attack.

CON: Higher cost.

APPLICATION: Useful where immediate notice or alarm is needed or when fine-grained time variations are of interest in order to track down the cause of an event.

NOTE: In situations where there is a persistent change or trend in the Tritium concentration level, a real-time continuous monitor with smart software, can also benefit from averaging the counts over very long times to achieve remarkable low MDA, minimum detectable level.

MODEL –TMW-3 TRITIUM IN WATER
3.7kBq/L DETECTABLE IN 20 MINUTES

TMW-3 MONITORS – Recent improvements and upgrades

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| <ol style="list-style-type: none">1. Full on-board computing system for data analysis.2. Optional statistical significance lamp lets user know if measurement level exceed MCA levels. |
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This monitor is a low cost monitor for low-level detection of tritium in water. Low MDA, reliability, ruggedness and simplicity of operation is what sets this monitor apart from less durable laboratory type equipment.

LOW MINIMUM DETECTABLE ACTIVITY (MDA)

The unit detects tritium decay with Photo Multiplier Tubes (PMT) working in coincidence mode. Use of highly effective PMTs, specially designed sampling cell to minimize cosmic radiation and Cherenkov effects and 1" lead shielding provide for low background noise of only One Count Per Second and sample counting efficiency of 25%.

FAST RESPONSE TIME

The response time from the moment when sample enters the system to the moment the unit starts to respond is less than 20 seconds and in 3.0 minutes the full value of tritium concentration in the sample is displayed on the screen. New **Sample and Hold** sampling system and advanced data analysis allow detection to lower limits from 20 seconds to 30 days period in inexpensive system.

REMOTE MONITORING AND ALARMING OPTIONS

The instrument can be equipped with optional USB, Ethernet and 4-20mA output for remote monitoring as well as with 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 the electronics and/or mechanical failures in the system.

DATA RECORDING OPTION

The instrument can be equipped with optional Serial Data Recorder that utilizes **Microdrive®** card to store up to five years worth of readings in daily files. This information is in text format that is easily extractable to Excel for analysis and graphic presentation.

PRESSURE REGULATING EQUIPMENT

In applications where sample inlet line is under pressure as when measuring H-3 in drinking water pressure of input sample streams can be up to 15psi. This pressure is immediately reduced to 2-3psi via Pressure Regulator..

FULLY INTEGRATED PACKAGE

TMW-3 is a completely self-contained instrument for automatic observation of tritium concentration in water. The instrument is mounted inside of the 7' tall steel enclosure with reinforced anchoring feet and locked access. Liquid scintillator is connected to the unit externally and it is stored inside of the polyurethane drum of 16 gallons. Currently this quantity of liquid scintillator is sufficient for 6 months of continuous, 24/7 operation. (Based on 8 hour count time)

The main subassemblies are:

1. Sample water input lines
2. Sample water pump
3. Micron filter
4. Detection module
7. Data acquisition and analysis electronics module
8. System control module
9. Waste water output line

COOLING SYSTEM – OPTIONAL RECOMMENDED

In order to have maximum efficiency of the photo-multiplier tubes and the liquid scintillator, solution that is tested inside of the sample cell should be kept between 12°C and 20°C. This can be achieved by 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 can be provided, where user can provide chilled water from its own source.

PLC CONTROL

Sampling of input lines and control of alarms and pumps is done by PLC unit placed inside of the System Control Module.

ROUTINE MAINTENANCE

Scheduled maintenance of consumables is required. Liquid scintillator needs to be replenished every 6 months and sample water filters need to be replaced as needed. Also regular periodic check of the efficiency and background is recommended if there is a possibility of increased background contamination and due to standard lifecycle of electronics components.

ANNUAL INSPECTION AND SERVICE

It is recommended that the instrument be inspected and serviced on an annual basis to ensure continuing trouble free operation. All components of the instrument should be inspected and instrument recalibrated.

REPAIR

Equipment service needs of a minor nature can be repaired under local supervision by the operator of the equipment. When necessary, the manufacturer Overhoff Technology Corporation (OTC) can dispatch service personnel for quick remediation action.

DOCUMENTATION

All OTC equipment is accompanied by complete documentation, which includes the following:

1. User and Maintenance Manual that contains:
 - a. Theory of operation
 - b. Installation instructions
 - c. Operation instructions
 - d. Calibration procedure
 - e. Suggested maintenance
 - f. Repair instructions
 - g. Drawings, diagrams and schematics

Factory training can be provided by the manufacturer. Assistance with commissioning is also available by the manufacturer (OTC) on-site for a reasonable fee.

MODEL –TMW-3 TECHNICAL SPECIFICATION

ELECTRONICS AND MEASUREMENT

MEASUREMENT RANGE:	0 -- 130kBq/L
SENSITIVITY:	See Chart
DETECTABLE LIMIT:	100Bq/L (in 7 days) at confidence level of 90%
DISPLAY:	7" Color LCD monitor
SAMPLE AND COUNT TIME:	User settable 20 minutes to 30 days
MEASUREMENT METHOD:	Liquid Scintillation Counting. Sample and count
DETECTOR:	Dual PMT coincidence counter plus optional multi-element background shielding
SIGNAL PROCESSING:	Electronic signal processing of coincident pulses for tritium specific wave shapes (height and duration)
MEASUREMENT ALARM SET POINT:	Can be manually adjusted
DATA RECORDING (Optional)	Serial Data Recorded with Microdrive ® card

SAMPLING SYSTEM

SAMPLING/MIXING SYSTEM:

Dual head, single shaft low flow rate pump providing flow of sample and liquid scintillator.

SAMPLE CELL: WASTE

Stainless steel cell, volume 5cc with fused silica windows and Viton O-rings for sealing.

MANAGEMENT:

Waste water output lines with fittings are provided, user to provide waste collection system. Nominal 80 gallons/year.

ENVIRONMENTAL

TEMPERATURE:

5° C to 45° C

HUMIDITY:

0 to 95 % R. H.

SEISMIC:

Withstands modest shock

GENERAL:

Equipment to be sheltered from exposure to raw elements.

ELECTRICAL:

Power 110/230VAC, 5A main power, +24VDC for optional 4-20mA and connections for the remote alarms and monitoring

MECHANICAL:

Self contained, mounted on a steel frame

DIMENSIONS:

31.5in x 23.6in x 84.0in (800mm x 600mm x 2133mm)

WEIGHT:

1100 lb (~500 kg) (includes optional shielding)

OPTIONS AVAILABLE;

Statistical significance software

Datalogger

Output ports:

Serial, USB, Ethernet, 4-20 mA

Supply pump in case, inlet water is not at 5 PSI or above

Detector Shielding ¼" or 1" thick

Software for Dataloggers, Data Analysis – Graphs and trending

Detector and measurement cell cooling

Inlet filters

On-site visits for commissioning training or service

Controlled temperature enclosure

Remote Alarms

Remote readouts

Lifting eyes on cabinet- (recommended if lead shielding is selected)

High Flow intake loop manifold is recommended if TMW-3 is at a distance from the water source, so that each sample taken is fresh and long pump times are avoided.