

MODEL 1925-PR TRITIUM HEAVY WATER LEAK DETECTOR 型号 1925-PR 氚重水泄漏检测器

LOW LEVEL REAL TIME TRITIUM-IN-WATER MONITOR 低限实时水氚监测

This monitor has been designed for real time low-level detection of tritium in water in the industrial environment of nuclear power plants. Low MDA, reliability, ruggedness (suitable for HWR, PWR, BWR) and simplicity of operation is what sets this monitor apart from laboratory type of the equipment. The initial purpose of the Model 1925 series was to detect the leak of heavy water in nuclear power plants that utilize CANDU reactors; however, it can be used for other purposes such as monitoring changes in tritium content of ground water, drinking water, and waste water.

这款监测器专门为核电站的工业环境设计进行实时低限水氚监测。低 MDA（最小检出放射性活度），可靠，耐用（适合重水堆、压水堆和沸水堆），操作简单使得这款监测器不同于实验室用设备。型号 1925 系列最初为检测 KANDU 反应堆核电站重水泄漏，但是也可用于其它目的如：监测地下水、饮用水和废水中氚浓度变化

MINIMUM DETECTABLE ACTIVITY 最小检出活度

The unit detects tritium decay by extracting T2 and H2 from the water, then making sensitive measurement with matched gas flow proportional counters. To minimize cosmic and gamma radiation effects, optional 1/2" lead shielding provide for low background noise. MDA is 3.7kBq/L.

此装置通过从水中提取 T2 和 H2 然后使用匹配流气式正比计数器精确测量来检测氚衰变，为了使宇宙和伽马射线影响最小化，可选购 1/2" 铅屏降低本底噪音。最小检出值为 3.7kBq/L。

RESPONSE TIME 响应时间

The unit is equipped with up to 6 inputs for sampling 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. Each sample line is sampled for 10 minutes so that the effect of residual activity from the previous line is minimized.

此装置配备多达 6 条输入线用作 6 条独立取样管线，从样品进入系统到仪器开始反应的时间为 3 分钟，9 分钟后样品中的氚浓度满值显示在屏幕上。每条样品线取样 10 分钟以便将先前管线中的残留活性影响最小化。

INTEGRATED COMPUTER, DISPLAY, AND SOFTWARE 完全一体化计算机，显示和软件

Equipped with a fully-integrated computer, this smart instrument logs all data points on an insertable USB flash drive. Data communication to external programs is available via TCP/IP. Standard data output is USB and RJ-45 with an optional 4-20 mA. Alarm relay connections are included on the back panel.

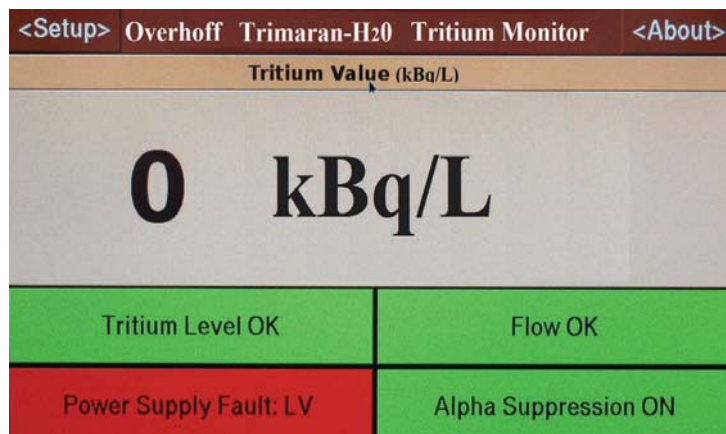
配备完全一体计算机，这台智能仪器将所有数据点记录在一个可插入的 USB 闪存中，通过 TCP/IP 与外部程序进行数据通信。标准外部数据输出为 USB 和 RJ-45，可选 4-20 mA，报警继电器连接包含在背板上。



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Custom software allows the user to adjust several of the measurement parameters, such as: units of measurement, alarm limits, flow rate for totalizing, among others.

定制软件允许客户调整几个参数，如：测量单位，报警值，累计流量等。



Highly Sensitivity 高灵敏度	to 1 kBq/L for Tritium in water 水氚到 1 kBq/L
Smart Electronics 智能电子学	Onboard computer 机载计算机 Custom software, 定制软件 Internal data-logging 内置数据录入
Gamma Compensated 伽马补偿	Automatic Gamma Background subtract 自动伽马本底扣除
Ease of Operation 容易操作	No LSC fluid needed 无需液体闪烁液 No liquid mixed waste 无液体混合废物
No Zero Drift 无零点漂移	long term zero stability 长期零点稳定
Fast Response 快速响应	3 min. initial value 3 分钟初始值 9 min. full value 9 分钟满值
<p>The Overhoff Model 1925-PR Heavy Water Leak Detector utilizes cutting-edge proportional counting technology to provide a smart instrument with unequalled performance in sensitivity, stability, ease of operation, and data acquisition/analysis. OVERHOFF 型号 1925-PR 重水泄漏检测器应用最先进的正比计数技术，在灵敏度，易操作，数据获得/分析方面为这款智能仪器提供了无与伦比的性能</p>	

PRESSURE REGULATING EQUIPMENT

压力调节装置

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 Class 6 Nuclear Device.

输入样品流压力可达 103 kPa，此压力可通过压力调节阀（PRV）立即降到 2-3psi，每个压力调节阀配备压力释放阀最大 100 kPa，因此，系统中的压力绝不超过 100 kPa，以便安全操作，也使得此款仪器定级为 6 级核装置。

FULLY INTEGRATED PACKAGE

完全一体组件

Model 1925 -PR is a completely self-contained instrument for real time observation of tritium concentration in water. The instrument is mounted inside of the 200cm tall steel enclosure with reinforced anchoring feet and locked access.

型号 1925 -PR 是一款完全独立式仪器，用于实时观察水中氚浓度。该仪器带有 200CM 高的钢制外壳，配有加固锚固脚和门禁。

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.

P-10 气瓶（90% 氩，10% 甲烷，不可燃）外接到装置中，足够 60 天连续操作使用。

The main subassemblies are: 主要组件有:

1. Sample water input lines 样品水输入管
2. External cooling loop in case of hot samples 外部冷却环路以防热样品。
3. PRV and RV system with manifolds 带歧管阀的 PRV 和 RV 系统
4. Water purification system (oil-in-water and micron filter) 水净化系统
5. Sample water pump 水采样泵
6. Detection module 检测模块
7. Data acquisition electronics module 数据收集电子模块
8. System control module 系统控制模块



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9. Waste water output line, RV output line and sample bypass output lines

废水输出管，RV 输出管和样品旁路输出管

10. Pre-filter 前置过滤器

PLC CONTROL

PLC（可编程控制器）控制

Sampling of input lines and control of alarms and pumps is done by PLC unit placed inside of the System Control Module. There is an alarm provided in case of PLC failure as well as manual override so that the operation can be continued manually until PLC is replaced. Manual operation is a backup system; the unit normally operates in automatic mode.

取样输入管路，警报与泵控制由内置在系统控制模块的 PLC 装置完成。提供报警以防 PLC 故障，还有手动操控功能以便作业能够持续直至 PLC 被更换。手动操作是一个备用系统，仪器正常自动模式操作。

ROUTINE MAINTENANCE

日常维护

Scheduled maintenance of consumables is required. P-10 gas cylinder needs to be replenished every 2 months and sample water filters need to be replaced. Also, periodic check of the efficiency and background is recommended if there is a possibility of increased background contamination and due to standard life cycle of electronics components.

要求耗材定期维护。P-10 气瓶需要每两个月重新补满，水样滤网需更换，由于电子组件正常寿命周期原因，本底污染可能性增加，所以建议精度和本底定期检查，

ANNUAL INSPECTION AND SERVICE

年检与维护

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 re-calibrated.

推荐仪器按年检修以确保持续无故障工作。所有仪器组件都应被检查并重新校准

REPAIR

维修

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

小故障可在就地由设备操作者维修，如果有必要，制造商（OTC）或其代理可派维修人员快速维修

DOCUMENTATION

文件材料

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

所有的 OTC 设备都附带有完整文字说明，包括如下：

1. User and Maintenance Manual that contains: 用户维护手册包含：

- a. Theory of operation 操作理论
- b. Installation instructions 安装说明
- c. Operation instructions 操作说明
- d. Calibration procedure 校准程序
- e. Suggested maintenance 建议维护
- f. Repair instructions 维修指南
- g. Drawings, diagrams and schematics 图纸，流程图和原理图

Training will be provided by the manufacturer, at this factory, free of charge. Assistance with commissioning is also available by the manufacturer (OTC).

制造商提供培训，工厂免费，制造商（OTC）也提供有偿服务

ADVANTAGES OF PROPORTIONAL COUNTING SYSTEM VERSUS LIQUID SCINTILLATION

正比计数系统优势 VS 闪烁计数系统

Until recently, the only detectors capable of measuring very low levels of tritium in water were Liquid Scintillation Counting (LSC) based. However, the LSC approach has some obvious



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disadvantages, such as: the LSC fluid must be constantly refilled at a significant cost in labor, money, and space; LSC fluid is also hazardous material and mixing with tritium results in 'liquid mixed waste,' which must be carefully stored, transported and disposed of.

近些年来,唯一能够测量极低的水氚的还是液闪计数(LSC),然而,液闪方法有明显不足,如:LSC液体必须持续续满,费工,费钱和占用空间,LSC液体也是有毒物质,与氚混合导致“液体混合废液”,废液必须小心存储,运输和降解。

By utilizing proportional counting technology, the user only has to acquire a compact standard steel tank of proportional gas, which will last for more than a month and is available from a variety of suppliers. The P-10 counting gas is 90% Argon and 10% Methane, and is not toxic or combustible. Measurement via this method achieves same or better low-end sensitivity, without having to deal with LSC fluid and waste.

使用正比计数技术,用户需要一个紧致标准的正比气体钢容器,一罐可用一个多月,供货方便,P-10计数气体90%氩气,10%甲烷,无毒且不易燃。通过这种方法测量可达到相同或更好的低值敏感度,而且不需要处理LSC液体和废物。

MODEL 1925-PR TECHNICAL SPECIFICATION

型号 1925-PR 技术规格

MEASUREMENT RANGE: 量程	3.7kBq/L – 130kBq/L
RESOLUTION (SENSITIVITY): 分辨率 (灵敏度)	1.0kBq/L
MINIMUM DETECTABLE LIMIT: 最小检测线	3.7kBq/L at confidence level of 95% 3.7kBq/L, 置信度 95%
DISPLAY: 显示	LCD Color Touch Screen; units of display user- settable (i.e., pCi/cc, MBq/m ³ , MPCa, μCi/m ³) LCD 彩色触摸屏, 单位显示用户设定
RESPONSE RATE: 响应率	3 min beginning of the response, 9 min full value displayed 3 分钟开始响应, 9 分钟显示满值
MEASUREMENT METHOD: 测量方法	Gas flow proportional counters 流气式正比计数器
PROPORTIONAL COUNTERS: 正比计数器	Dual copper clad acrylic counter tubes, 2 liter active volume, 2.5 liter wetted volume, 0.001 inch tungsten collector anode 双面覆铜亚克力计数管, 2 升活性体积, 2.5 升湿体积, 0.001 英寸钨接收器阳极
COUNTER GAS: 计数气体	P-10 or “MAGIC” gas for high performance Flow rate 250 cc/min, typical P-10 或 “MAGIC” 气体高性能, 流量 250 cc/min, 典型
MEASUREMENT ALARM SET POINT: 测量报警设置点	Can be manually adjusted 可手动调节
DATA RECORDING/OUTPUT: 数据录入/输出	Insertable USB flash drive; Data communication via TCP/IP. Standard data output is USB & RJ-45 插入式 USB 闪卡, TCP/IP 数据通信 标准数据输出为 USB & RJ-45



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SAMPLING/MIXING SYSTEM: 采样/混合系统	See diagram 1 on page 5. 见图表 1, 第 5 页
WASTE MANAGEMENT: 废物管理	Unused water output lines with Swagelok® fittings are provided, user to provide recycling system or waste collection system. 供应带 Swagelok®管件的未用水输出管线, 用户提供循环系统或废物收集系统。
TEMPERATURE: 温度	0°C to 50°C
HUMIDITY: 湿度	0 to 95 % R. H.
SEISMIC: 抗震性	Withstands modest shock 经受适度冲击
ELECTRICAL: 用电	Power 110/230VAC, 5A 电源 110/230V AC, 5A
MECHANICAL: 机械	Self-contained, mounted on a steel frame with lifting eyes for easy transport. 一体, 带钢架, 带吊眼易于运输
DIMENSIONS: 尺寸	31.5in x 23.6in x 84.0in (800mm x 600mm x 2133mm)
WEIGHT: 重量	1100 lb (500 kg) 1100 磅



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