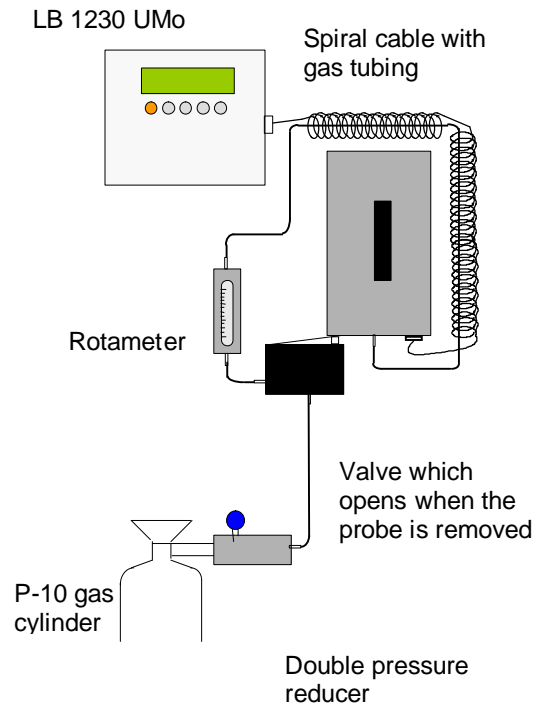


TRITIUM SURFACE CONTAMINATION MONITOR

INTRODUCTION

The tritium surface contamination monitor LB 1230/LB1239 consists of the following parts :

- ▶ Umo **basic unit LB 1230**, which identifies the connected probe and sets the measurement mode accordingly and controls the high voltage.
- ▶ Windowless **tritium probe LB 1239** with combined spiral cable/gas tubing for connection to the Umo and gas supply. The tritium probe incorporates a preamplifier and high voltage generator. Three parallel counting wires ensure a high response probability over the entire aperture area (22cm²).
- ▶ **Trolley** with gas blocking **valve** for cylinder and gas **flow meter** (rotameter). The trolley includes a **console** for Umo, tritium probe, 3-liter P-10 **gas cylinder** (optional) with double **pressure reducer** (optional) and Beta-Gamma probe (optional)
- ▶ The counting gas enters the probe via the gas blocking valve and the rotameter. The blocking valve ensures that only the required amount of counting gas is consumed and that the cylinder valve need not be opened and closed after each measurement. The gas flow is cut off as soon as the detector is correctly placed on the console. The gas consumption is approx. 2000 cm³/min. The gas exists at the window opening, building up a layer of gas between the contaminated surface and the counting wires which is required for the measurement.



Schematic set-up of LB 123T

FEATURES

- ▶ **User friendly** assembly
- ▶ Very **high efficiency**
- ▶ **Simple and quick handling**
- ▶ **Large window** opening
- ▶ **Automatic identification** of connected probe (= no resetting of detector specific parameters)
- ▶ Reduced background, reduced gas consumption and steady gas flow

APPLICATIONS

The probe detects tritium on plane surfaces with very high efficiency. In combination with an aperture plate, the tritium probe can also be used for detecting contamination on fingertips and hot spots and to a limited extent, also on specific areas on clothing.

The user-friendly assembly of the instrument on a trolley ensures simple and quick handling in the laboratory. An additional β - γ probe can be mounted on the console and connected to the Umo by changing over the connection cable.

The basic unit LB 1230 Umo is a versatile data processing electronics used in radiation protection for contamination, dose rate and activity measurements

MEASURING DATA

Detecting tritium contamination

The direct measurement of ^3H is the first choice for flat, smooth surfaces which do not allow tritium contamination to penetrate like on the working surfaces in the radionuclide laboratory.

Rough surfaces such as absorbent paper or wood make the measurement increasingly inaccurate since self-absorption in the contaminated medium can be considerable, due to the low energy of the Beta particles. In this case other methods of detection may have to be used (wipe test, washing down followed by measurement by liquid scintillation counting).

To ensure an accurate measurement, the large window opening of the LB 1239 detector requires that the surface to be monitored should totally cover the opening.

When surfaces to be monitored are not horizontal or flat, or if they do not fully cover the window opening, then the aperture plate has to be used.

Calibration factors and detection limits

When the LB 1239 detector is correctly positioned over a flat surface, about 85% of the Beta particles emitted from the surface below the opening of the window will be detected and counted, because the electrons outside the actual counting room are pulled into the detector.

The calibration for an H-3 source (free of self-absorption) is :

Point source	2.2 Bq per cps
Area source	0.1 Bq/cm ² per cps (with window completely open)
	1 Bq/cm ² per cps (with aperture plate)

With a background of approx. 1cps this results in the following detection limits for H-3 substances at a statistical level of 2 Sigma :

Point source activity	approx.	0.31 Bq
Area specific activity	approx.	0.014 Bq/cm ² (with window completely open)

The limit threshold of 5 Bq/cm² corresponds to 55 cps with fully open window or with 5 cps with aperture plate.

ELECTRONICS

- ▶ Data storage of 250 measurement data in static battery buffered RAM
- ▶ Free adjustable parameters for thresholds, background subtraction, statistical accuracy
- ▶ Local result read-out and parameter input with large display with direct user guidance
- ▶ Calculation of results in physical units (free selection)
- ▶ Printer and computer interface
- ▶ Softkeys for storage of currently measured value, acoustic single pulse indication, change between raw and calculated data, scrolling through the menus.

VERSIONS / OPTIONS

- ▶ Aperture plate to be placed on top of the tritium probe (held in position by magnets)
- ▶ An additional β - γ probe (LB 1231) can be mounted on the console and connected to the Umo by changing over the connection cable for extending the range of applications
- ▶ An additional α - β probe (LB 1232) can be mounted on the console and connected to the Umo by changing over the connection cable for extending the range of applications.
- ▶ Also refer to the technical data sheet listed below

TECHNICAL DATA

- ▶ Tritium surface contamination monitor ; Nr. : 123-80E0-00T