

# Liquid Effluent Monitor LEM series



**The LEM series monitors allow off-line measurement of volume gamma activity of liquids with very low minimum detectable activities. It is suitable for spectrometric measurement and reporting of liquid effluents from nuclear power facilities.**

## Purpose

The LEM series monitors allow off-line measurements of the volume gamma activity of liquids with very low minimum detectable activities.

It is suitable for the spectrometric measurement and reporting of liquid effluents from nuclear power facilities.

The LEM monitors can be used as part of extensive monitoring systems or as an autonomous monitor, displaying results at the place of measurement or with a remote display of measurement results as well.

## Description

The LEM liquid effluent monitor consists of the following primary parts:

- Measurement chamber with variable shielding
- Spectrometric detector (NaI(Tl), LaBr<sub>3</sub> or HPGe)
- System for evaluating measured data with a multi-channel analyser (as many as 64 thousand channels) and supporting electronics
- Control unit with display
- System for automatic control with valves, standard value measurement elements, and other accessories

The detector is located in a shielded measurement chamber, where the medium is released into the valve system in such way that secures uniform mixing and the prevention of sediment and debris deposition. Information from the detector is analysed using the multi-channel analyser and processed using the evaluation unit.

The LEM monitor control unit allows:

- Comparison of the value measured with alarm levels
- Automatic background measurements at preset intervals
- Monitor calibration using a sealed source of ionizing radiation
- Filling the measurement chamber with the calibration solution
- Clear water rinsing and measurement chamber discharge
- Monitoring effluents and control of up to two inlet pumps
- Monitoring the flow rate, pressure, and temperature
- Data transfer into the host system

## Main Advantages

- System is optimal for monitoring and reporting effluents because of its low MDA
- The measurement chamber is provided with non-stick layer and drainage to prevent accumulation of mud and dirt on the chamber's inner surface.
- The system combines both the measurement chain and the automatic control system (it can replace the flowing liquid volume measuring system).
- The system's simplicity and modularity allow the user to set up the monitor from a previously used type of detector within system modernisation.
- The system is ready for integration with the system LES for collection of standard samples and post-accident samples.

## Standards and Certification

The LEM monitors have been designed in accordance with the following standards:

**Equipment for monitoring of radionuclides in liquid effluents and surface water,**  
IEC 60861

**Electromagnetic compatibility (EMC)**  
CSN EN 55022, CSN EN 61000-6-2, CSN EN61326-1

## Description

Measurements are evaluated in normal and emergency mode. There are measurement time intervals set for the individual modes. The measurement of output value activity is in units Bq/l. During the measurement, the temperature of the liquid flowing through the device is also recorded using a thermometer located in a container in the measurement chamber. The measured data is stored onto a drive in the form of hourly, daily and summary records.

## Specification

Measurement chamber volume	app. 16 l (0.565 ft <sup>3</sup> )
Medium flow speed	30 ~ 100 l/min (1 ~ 3.5 cfm)
Medium working temperature range	5 ~ 25 °C (41 ~ 77 °F)
Dimensions (W x H x L) <sup>1</sup>	700 x 1500 x 1100 mm (28 x 60 x 44 in)
Power supply	230 V / 50 Hz
Ambient working temperature range	5 ~ 50 °C (41 ~ 122 °F)

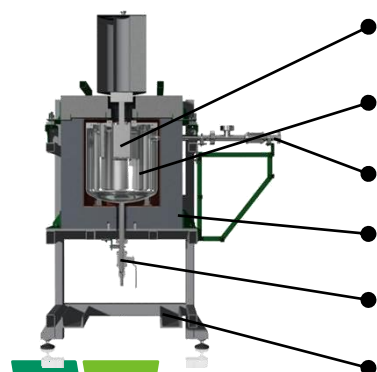
## Detector Specification

	NaI(Tl)	HPGe	LaBr <sub>3</sub>
Detector dimensions	3 x 3"	3"	2 x 2"
Energy range	50 keV ~ 3 MeV	30 keV ~ 3 MeV	50 keV ~ 3 MeV
Shielding	50 <sup>2</sup> mm (2 in)	100 mm (4 in)	50 <sup>2</sup> mm (2 in)
Weight (app.)	864 kg (1905 lb)	1670 kg (3682 lb)	864 kg (1905 lb)
MDA <sup>2</sup>	4 Bq/l	0.5 Bq/l	N/A
Reference radionuclide	137Cs		

<sup>1</sup> Dimensions can change when using another detector type

<sup>2</sup> Optionally can be extended to 100 mm – low-background shielding

<sup>3</sup> 1000 seconds of measurement, background 200 nSv/h, 50mm of shielding

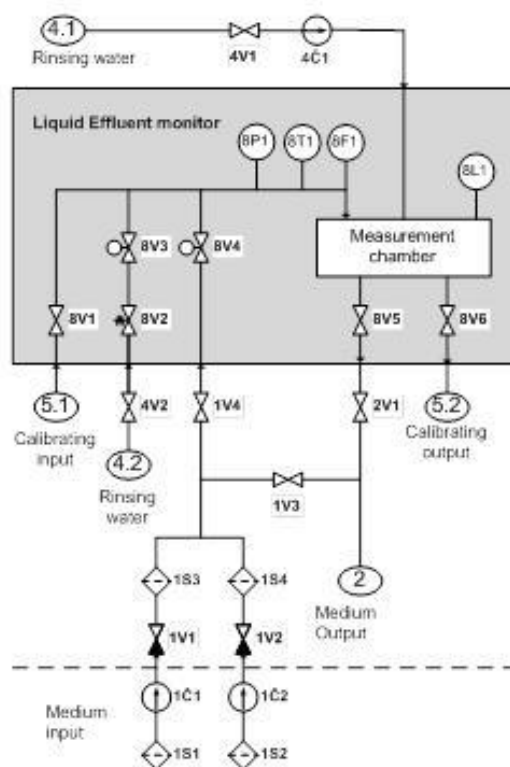


- Spectrometric detector
- Measurement chamber with non-stick surface
- Inlet and outlet valves
- Shielding
- Drain valve
- Supporting frame



## Models and Accessories

Type	Description
<b>K1440</b>	LEM-201 Liquid Effluent Monitor, with standard shielding 50 mm and a NaI(Tl) detector
<b>K1442</b>	LEM-211 Liquid Effluent Monitor, with low-background shielding (100 mm) and a HPGe detector
<b>K1441</b>	LEM-221 Liquid Effluent Monitor, with standard shielding 50 mm and a LaBr <sub>3</sub> detector
Optional Accessories	
	▪ Low-background shielding (+50 mm)
Related Products	
<b>N/A</b>	LES series – Liquid Effluent Samplers
<b>K1481</b>	LAM-501 – Liquid Activity Monitor (on-line / adjacent to line)



Scheme of the LEM monitor

[www.vf.eu](http://www.vf.eu)

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