

MERCURY INSTRUMENTS

Analytical Technologies



VM-3000

Mercury Vapor Monitor

Continuous mercury measurement
in air and other
gases



- Direct reading mercury vapor meter
- Proven reliable detection method: UV absorption (CVAAS)
- Measuring ranges 0 - 100 / 0 - 1000 / 0 - 2000 $\mu\text{g}/\text{m}^3$
- Easy operation
- Automatic zero adjustment
- Sensitivity: 0.1 $\mu\text{g}/\text{m}^3$
- Integrated battery for mobile operation (option)
- integrated Data logger (option)

Fields of application

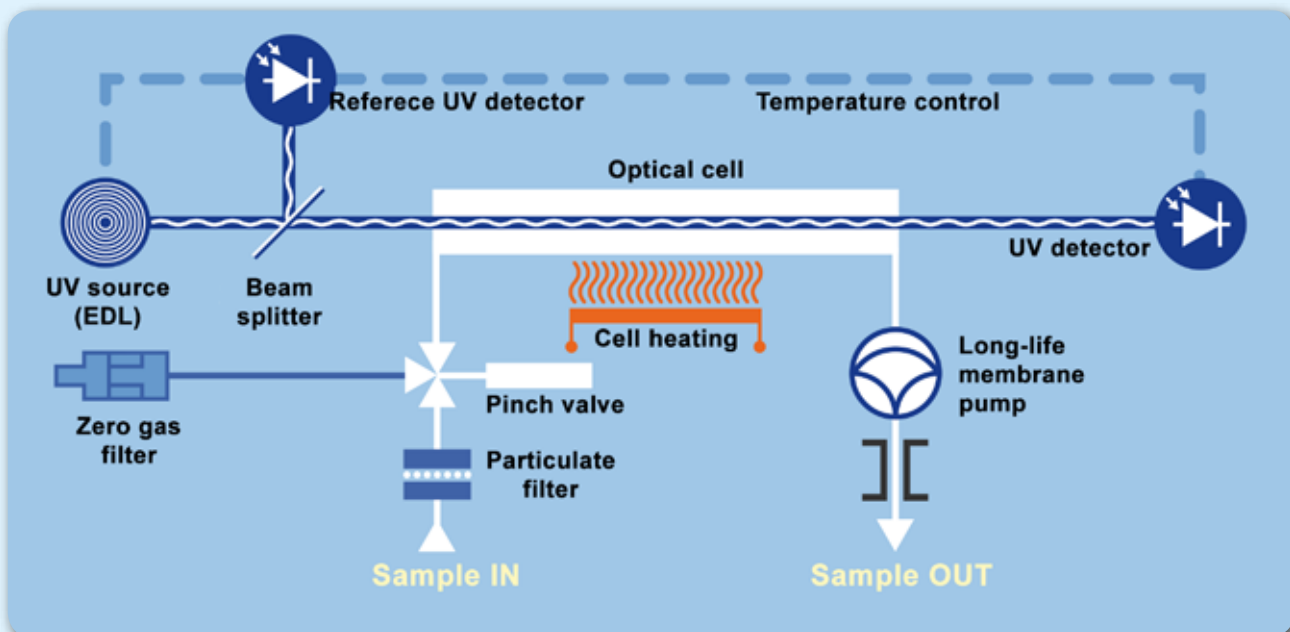
The **VM-3000 Mercury Vapor Monitor** serves for continuous measurement of the mercury concentration in air and other gases in laboratory as well as industry and mobile applications.

It has a wide variety of applications:

- work place monitoring (threshold limit value)
- exhaust air monitoring in mercury recovery plants
- emission monitoring in the chemical industry
- ground air screening of contaminated soil
- quality control of hydrogen and natural gas
- detector for laboratory applications

Measuring principle

The mercury concentration is measured in an optical cell made of fused silica. A maintenance-free membrane pump continuously feeds the sample gas to the optical cell where UV absorption measurement takes place at a wavelength of 253.7 nm. This so-called “cold vapor atomic absorption spectroscopy (CVAAS)” measuring method is extremely sensitive for mercury determination and has been used successfully for many years. In contrast to the occasionally propagated atomic fluorescence spectroscopy (AFS) method it is low in interference and requires neither an amalgamation step nor expensive noble gases as carriers.

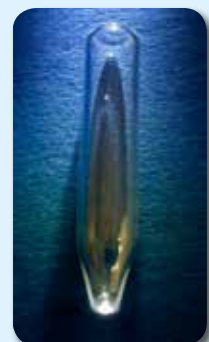


VM-3000 Flowchart

Analytical Performance

EDL inside the VM-3000

The **VM-3000** uses a high-frequency driven electrodeless Hg low pressure lamp (EDL) as UV source. It generates emission lines of an extremely narrow bandwidth which are congruent with the absorption lines of the Hg atoms. Cross-sensitivities are thus minimized. The extremely high stability of the UV source in the **VM-3000** is a result of the reference beam feedback control method. Total background noise is less than $0.1 \mu\text{g}/\text{m}^3$. To prevent temperature drift both the lamp unit and the detectors are temperature stabilized. The optical cell heating makes it insensitive to water vapor.



Special Features

- Metal housing with sturdy handle
- Option: Rack version with mounting brackets for 19" racks
- Membrane pump with long service life
- Input filter with teflon membrane
- Factory-calibrated
- Stable optical bench



Precise and proven technique:
Mercury Vapor Monitor
VM-3000



The soul of the machine:
The optical bench inside the VM-3000

Easy to operate

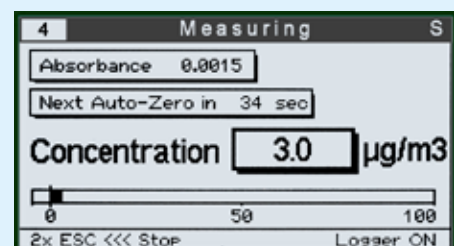
The user controls the VM-3000 by menu-guided inputs via a waterproof membrane keypad. After switch-on the light source is stabilized (approx. 1 - 15 minutes). When the measurement mode is started, a zero adjustment is first carried out automatically. Then the analyzer switches to measurement and continuously indicates the measured mercury concentration of the gas as a numerical value and a graphic bar.

The following settings are possible in the "parameters" menu:

- duration and repeat interval of the zero adjustment
- selection of the concentration unit ($\mu\text{g}/\text{m}^3$) or ppb)
- measuring range (0.1-100, 0-1000, 0-2000 $\mu\text{g}/\text{m}^3$)
- input of three different alarm levels
- calculation of a mean value over three freely selectable time intervals
- printer activation
- sample dilution factor (if required)

Display and Output of Measurements

The result of the measurement is displayed on an LCD in real time, both numerically and graphically and is output as an electrical signal of 4-20 mA. The device has outputs for alarm, status and measurement values for full integration in plant control systems. The device also features a serial interface (RS 232 / USB) for data transfer to a PC or Laptop. (Software "Hg-Transfer" included)



Extensions

The **VM-3000 Mercury Vapor Monitor** is the basic model of our modular system for mercury analytics. An optional reaction unit and activation of the appropriate software turn it into a laboratory unit for liquid samples (**Mercury LabAnalyzer-254**).



Multiplexer Operation

The **VM-3000** can be combined with a multiplexer unit for automatic monitoring of several measurement points. See information about the **Mercury Monitoring System (MMS)** in a special brochure.



Self Diagnosis System

If an important component of the **VM-3000** malfunctions the user is warned via the display (blinking messages and via output signals e. g.:

- clean cell
- lamp
- low battery
- alarm

Battery Operation

For operation independent from mains power the **VM-3000** is also available with a built-in rechargeable battery and a charger unit. This option allows mobile battery-powered applications of up to approx. 4 hours.

Data Logger Function

A data logger function can be integrated into the **VM-3000** as an option. Up to 30 000 readings can be stored in the data memory. The logging interval can be set from 1 - 999 seconds resulting in a total recording capacity of 8 hours to 346 days. The stored data can be read out with a PC using the serial interface of the analyzer (RS232 or USB). Data transfer software is included (Hg-Transfrer).

Dustproof enclosure



The **VM-3000** with dustproof enclosure is now available in our regular product line. It is meant for stationary wall or stand mounting.

All necessary cables and tubings are fed through the dustproof cable glands on the bottom of the enclosure. The **VM-3000** unit has all of its electrical in- and outputs as well as the sample gas in- and outlet on the rear. They are easily accessible by simply swinging open the enclosure.



Technical Specifications

Measuring principle:	UV-Absorption
Wavelength:	253.7 nm
UV source:	Electrodeless low-pressure mercury lamp
Stabilization:	Reference beam and thermal
Optical cell:	fused silica (Suprasil), 23 cm long, heated to avoid condensation
Measuring range:	0 ... 100 µg / m ³ ; 0 ... 1000 µg / m ³ ; 0 - 2000 µg / m ³
Sensitivity:	0.1 µg / m ³
Response time:	<1 sec
Computation of mean values:	autom. via three free selectable time intervals
Alarm:	when concentration is exceeded, 3 levels programmable
Status alarm:	Measuring cell soiled, battery state, UV source
Control pad:	waterproof membrane keypad
Measurement display:	Graphic display with background lighting
Signal outputs:	4 ... 20 mA; serial: RS 232 / USB, bidirectional; parallel (Centronics)
Pump:	membrane pump, approx. 2 L/min.
Filter:	PFTE, 1µ, 47-50 mm diameter
Power supply:	110 ... 240 V (50 / 60 Hz)
Battery operation:	optional, 12 V rechargeable batteries integrated, 4h capacity
Data logger function:	Up to 30 000 readings
Power consumption:	40 W
Dimensions:	45 x 15 x 35 cm (W x H x D)
Weight:	approx. 7 kg



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