



**MERCURY INSTRUMENTS**  
Analytical Technologies

Member of the envea™ Group



# Mercury Vapor Monitor VM-3000

## Continuous mercury measurement in air and other gases



- Direct reading mercury vapor meter
- Proven reliable detection method: UV absorption (CVAAS)
- Measuring ranges 0.1 - 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)

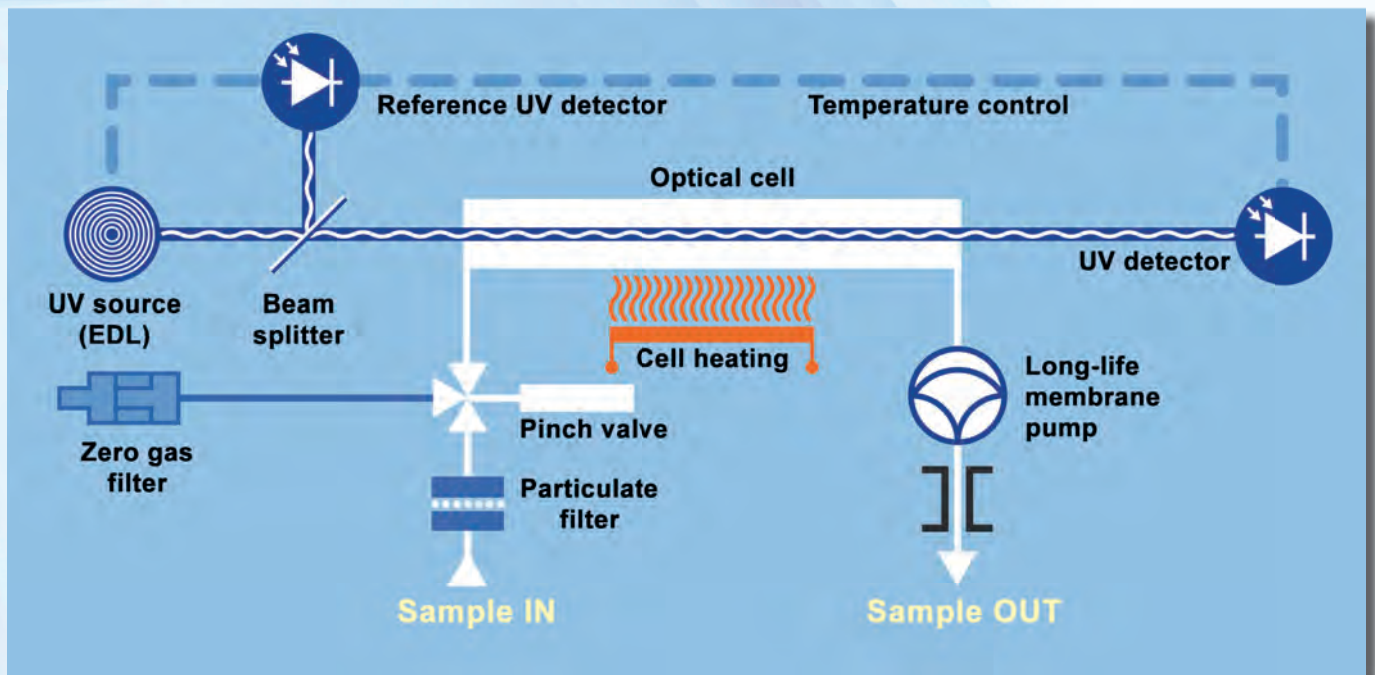
## Fields of application

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

## Measuring principle

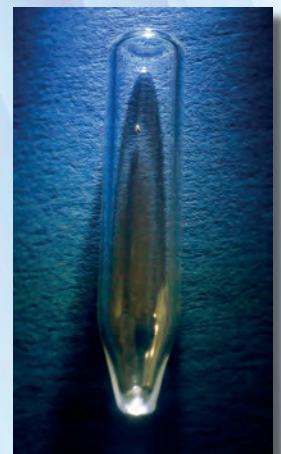
The mercury concentration is measured in an optical cell made of fused silica. A maintenance-free membrane pump continuously feeds the sample gas to the optical cell where UV absorption is measured at a wavelength of 253.7 nm. This so-called cold vapor atomic absorption spectroscopy (CVAAS) measuring 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*

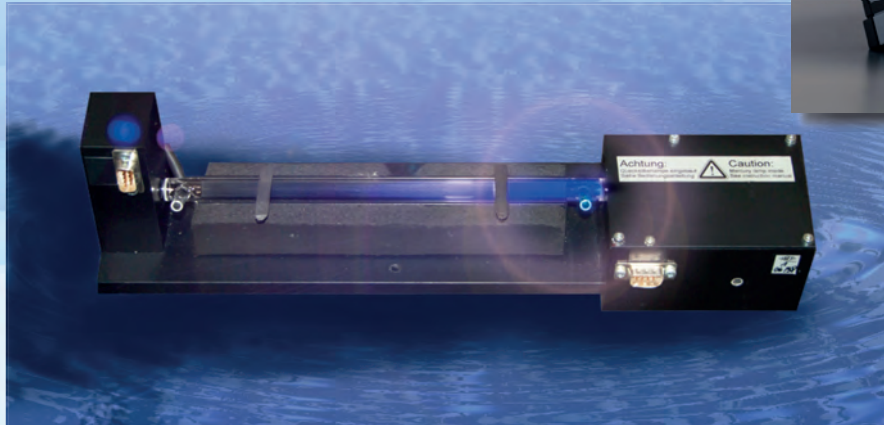
## Analytical Performance

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 congruent with the 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

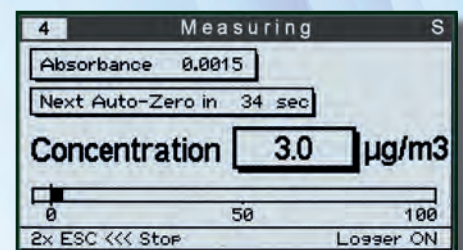
The user controls the VM-3000 by menu-guided inputs via a waterproof membrane keypad. After switch-on the light source is stabilized (approx. 1 - 15 minutes). Before the measurement starts, a zero adjustment is automatically carried out. The analyzer then switches to measurement mode and continuously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

The following settings are editable 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

## Display and Output of Measurements

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



Thanks to the built-in p- and T-sensors the Hg-concentration can be output as  $\mu\text{g}/\text{Nm}^3$  ( $\mu\text{g}$  Hg/cubic metre at normal temperature and pressure).

## 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 different 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 mobile Use

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-Transfer).

## 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 VM-3000

|                             |  |
|-----------------------------|--|
| Measuring principle:        | Cold vapor UV absorption (CVAAS)   |
| 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:            | <ul style="list-style-type: none"> <li>• 0,1 ... 100 µg / m<sup>3</sup></li> <li>• 0 ... 1000 µg / m<sup>3</sup></li> <li>• 0 - 2000 µg / m<sup>3</sup></li> </ul> |
| Sensitivity:                | 0.1 µg / m <sup>3</sup>  |
| Response time:              | <1 second  |
| Computation of mean values: | Autom. via three freely selectable time intervals  |
| Alarm:                      | On exceedance of concentration, 3 levels programmable  |
| Status alarm:               | <ul style="list-style-type: none"> <li>• Measuring cell soiled</li> <li>• Battery state</li> <li>• UV source</li> </ul>  |
| Control pad:                | Waterproof membrane keypad   |
| Measurement display:        | Graphic display with background lighting   |
| Signal outputs:             | <ul style="list-style-type: none"> <li>• 4 ... 20 mA</li> <li>• Centronics</li> <li>• RS 232</li> <li>• USB</li> </ul>   |
| Pump:                       | Membrane pump, approx. 2 L / min.  |
| Filter:                     | PFTE, 1µ, 47-50 mm diameter  |
| Power supply:               | <ul style="list-style-type: none"> <li>• 90 - 132 VAC / 47 - 63 Hz</li> <li>• 187 - 264 VAC / 47 - 63 Hz</li> </ul>  |
| Battery operation: (option) | 12 VDC rechargeable batteries integrated, 4h capacity, smart charger included  |
| Data logger function:       | Up to 30 000 readings  |
| Power consumption:          | 100 VA   |
| Dimensions:                 | 45 x 15 x 35 cm (W x H x D)  |
| Weight:                     | approx. 7 kg   |



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As a leading supplier of high precision analytical equipment, we strive at all times to offer top quality solutions. Our products are manufactured according to the ISO 9001 quality regulations.

Mercury Instruments GmbH  
Analytical Technologies  
Liebigstrasse 5  
D-85757 Karlsfeld  
mail.mi@envea.global  
Tel.: +49(0)8131 - 50 57 20  
Fax.: +49(0)8131 - 50 57 22

[www.mercury-instruments.de](http://www.mercury-instruments.de)

