

SPM and Gas Monitoring



Mobile Dust Monitor **MDM-2** with Scattered Light Sensor for Monitoring PM_{2.5} Concentrations



Mobile Dust Monitor MDM-2

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Mobile instrument with scattered light sensor for real-time measurement of PM_{2.5} concentrations

- Real-time hand-held measuring device for PM_{2.5}
- Large color touchscreen
- Battery operation (rechargeable)
- Small dimensions and low weight
- Data storage on micro SD card
- Data transmission via USB or Bluetooth
- Intuitive PC software for evaluation of the measurement data

The hand-held MDM-2 measures the current concentration of suspended particulate matter (PM_{2.5}) at the measuring site in real time. The method applied by the MDM-2 uses light scattered by particulate matter (nephelometry) to directly determine the SPM concentration in the ambient air. A graphic trend indicator shows changes in the PM_{2.5} concentration. Additionally, a sensor measures temperature and humidity continuously. Those values are displayed as well. Thanks to its compact and lightweight design, the device can be easily moved between measuring locations.

Design

The MDM-2 consists of the following principal components:

- Scattered light photometer with laser diode and photodetector
- Vacuum pump (flow rate approx. 0.3 l/min)
- Temperature and humidity sensor
- Color touchscreen with stylus
- Rechargeable battery
- Interfaces: Bluetooth, mini USB and micro SD

Operating Principle

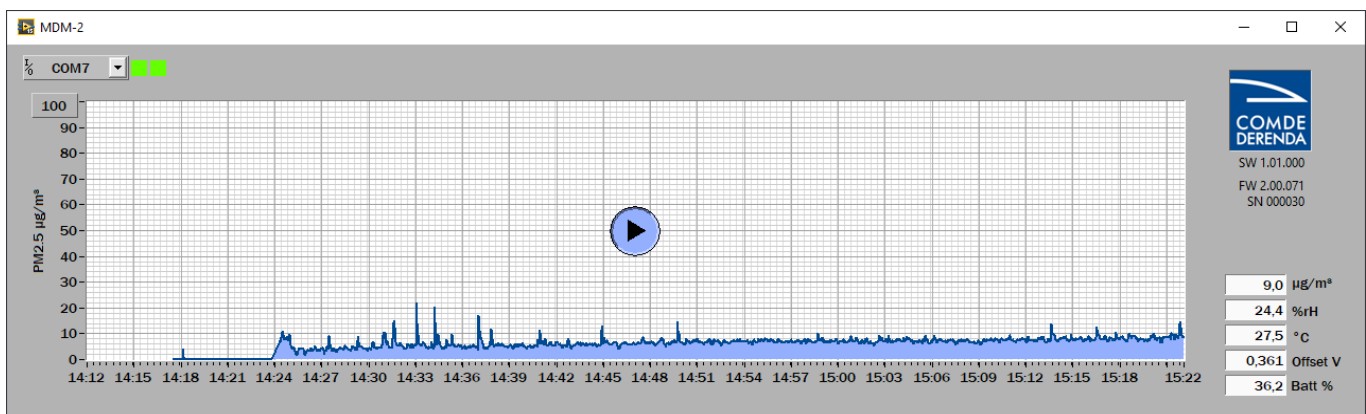
For measuring purposes, ambient air is drawn in and let through the scattered light photometer. Inside the instrument, the aerosol is illuminated by a laser diode. The light reflected

by the dust particles is captured by a photodetector, resulting in an amplified output signal. This voltage signal represents a direct measure of the aerosol particle concentration.

Because of the selected wavelength, the PM_{2.5} fraction dominates the photodetector's measuring signal, which allows this fraction to be measured directly.

An external sensor on the upper part of the device continuously monitors the ambient temperature and humidity. The ambient temperature is measured with an accuracy of ±0.5 K in a range of from -40 to +80 °C, relative humidity at an accuracy of ±3 % in a range of from 0 to 100 %.

The measured PM_{2.5} concentration is displayed on the touchscreen in real time. In addition, the sequence of measured values is stored by the device and displayed as a progressive graph.



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The MDM-2 can be operated either as a standalone device or in conjunction with a Windows PC. Software is provided that enables the user to call device functions from the PC, save the measured values, and plot trend graphs. Different measuring ranges can be selected for displaying the measured values. In addition, environmental measurement values are displayed. The captured data is stored in the internal data memory and on a micro SD card.

Process data can be transmitted to an external PC via Bluetooth or using a USB transfer cable. The data is written as CSV data file and can easily be processed with a spreadsheet application.

For zero point adjustment purposes, a zero air filter is connected to the air intake. The adjustment is then performed automatically by pressing the ZERO button.

Details of the Measurement Method

A highly sensitive scattered light sensor lies at the heart of the applied measuring method. The light emitted by an intensity-stabilized laser diode illuminates a defined measuring space. The light scattered by particles inside this measuring space is captured by a semiconductor photodetector, positioned at an angle of 90°. The wavelength of 650 nm applied by the device is most sensitive to particles in the size range from 0.5 to 1 µm. For this reason, the output signal of the photodetector deployed outdoors is dominated by the PM_{2.5} fraction.

After amplification, the result of this detection is made available as a voltage signal. The signal is directly proportional to the mass concentration of the aerosol in the measuring space (measuring range 0 ... 1000 µg/m³).



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Scope of Delivery:

Basic device MDM-2,
1x Zero air filter,
1x USB transfer cable,
Instruction manual

Accessories:

D100101 Zero air filter
D100106 USB transfer cable

Technical Data MDM-2

Volumetric flow rate	approx. 0.3 l/min
Measurement time	continuous
Power supply	5 V DC
Power consumption	approx. 0.8 VA
Measurement range	0 ... 1000 µg/m ³
Resolution	1 µg/m ³
Response time	< 5 s

Dimensions and Weight (without zero air filter)

Length	220 mm
Width	90 mm
Height	75 mm
Weight	approx. 500 g

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