

Be sure. **testo**



Test any vehicle. Anywhere.

testo NanoMet3 for real driving emissions (RDE).

The objective of nanoparticle measurement: **Clean, healthy air**



Nanoparticles from combustion engines are a health hazard. Thanks to new engine technologies and the use of particle filters, particle emissions are reduced in terms of total mass, however due to the higher injection pressures, the emitted particles are also considerably smaller. Because of their high ability to diffuse, these nanoparticles are deposited in the pulmonary alveoli, penetrate from there deeper into the human organism and increase the risk of contracting cancer or suffering a heart attack.

The demands placed on such a system are high:

- Precise, reproducible measurement results
- Identical instrument settings for petrol and diesel vehicles
- Easy, uncomplicated handling

testo NanoMet3: Portable nanoparticle counter

Thanks to years of experience with nanoparticle measuring equipment for automobile, laboratory and environmental applications, Testo has been able to develop a robust, portable and cost-efficient particle counter, a so-called Portable Emission Measurement System (PEMS).

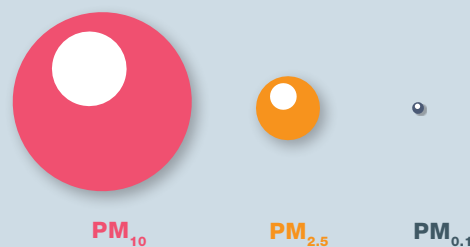
For this reason, the number concentration of nanoparticles in the exhaust gas of combustion engines must also be determined, in addition to the gravimetric exhaust gas measurement. To achieve this, monitoring facilities and Research and Development departments require highly sensitive measurement technology which provides precise results not only under laboratory conditions or on a rolling road test bench, but also under real conditions in road traffic. This is the only way Real Driving Emissions (RDE) can be determined.

The testo NanoMet3 offers high-precision measurements over a large concentration range and is therefore suitable for a wide range of applications:

- Particle measurement according to RDE for type testing in accordance with Euro 6c standard
- Particle determination for the research and development of particle filters
- Characterization of particle emissions from petrol and diesel engines

The broad measuring range from 10,000 to 300,000,000 pt/cm³ covers practically all exhaust gas norms regarding particle number.

PM₁₀: Fine particulate matter, particle diameter < 10 µm
 PM_{2.5}: Fine fraction, particle diameter < 2.5 µm
 PM_{0.1}: Nanoparticles/ultrafine particles, particle diameter < 0.1 µm / < 100 nm



testo NanoMet3: Mobile nanoparticle counting and measurement

The compact dimensions of the testo NanoMet3 – only 526 x 409 x 216 mm – allow it to be comfortably stowed in any car trunk. The exhaust gases are drawn through the heated sampling hose, which is connected to the exhaust pipe, into the measuring instrument, where the following values are recorded:

- The particle number concentration (pt/cm³)
- The average particle size from 10 to 300 nm
- The particle mass (mg/cm³)
- The Lung Deposited Surface Area – LDSA (µm²/cm³)

Since a PC, including pre-installed software, is built into the testo NanoMet3, the recorded data can on the one hand be saved and documented on the internal hard drive. On the other hand, the data can also be exported by SD card or displayed via a connected monitor, and further processed.



The unique Testo principle

Since the sampling point in most PEMS is situated at the output of the tailpipe, the volatile substances can condense into nano-droplets which are then identified as particles together with the non-volatile, solid substances. In order to measure only the actual solid particle fraction, the exhaust gas sample is diluted with the help of a rotation diluter, so that the volatile component is separated in the evaporation pipe. This corresponds to the exhaust gas preparation according to the Particle Measurement Program (PMP) of the Transport Division of the UN/ECE.

Diffusion charging

A further special feature of the testo NanoMet3 is the mini diffusion classifier, a new sensor for the measurement of the number concentration and the mean diameter of nanoparticles. In contrast to most PEMS which work with

a condensation particle counter (CPC), and which pass the nanoparticles through a chamber saturated with solvent vapour, Testo relies on the measurement principle of diffusion charging. The particles pass through an electrical alternation field where they become more or less charged, depending on their size. The two subsequent electrometers measure the charge, thus providing information on the number and mean diameter of the particles.

This method improves the quality of the measurement, as the hydrocarbon emission measurements are not influenced by butanol contamination in the test chamber or impure air. The acquisition and testing costs are also considerably lower.

The advantages of PEMS

With mobile emission measuring instruments, combustion engine emissions can be more authentically recorded under real conditions than with standard laboratory measurements. In addition to this, PEMS are a cost-efficient solution for testing the engines of heavy utility vehicles under genuine driving conditions. The engine does not need to be de-installed in order to pass through the official test cycle on a test bench. The vehicles are simply equipped with onboard emission measuring instruments, and tested in real driving conditions.

testo NanoMet3: Easy handling, numerous advantages

Apart from its precise results, the testo NanoMet3 also convinces thanks to its uncomplicated operation and handling:

- One-button operation
 - No operating materials, such as working fluids or radioactive sources needed
 - Identical instrument settings for petrol and diesel vehicles
 - Integrated PC and pre-installed software
 - Integrated data reporting and data storage
 - Storage on SD card or built-in hard drive
 - Easy maintenance
 - Low-maintenance – thanks to a special rotation diluter coating, the service interval is 1,000 operational hours
- Diverse connection options**
- 2 USB connections
 - RS232 connection
 - AO connection
 - LAN/Ethernet connection
 - Wireless LAN (optional)
 - AK protocol
 - INCA communication



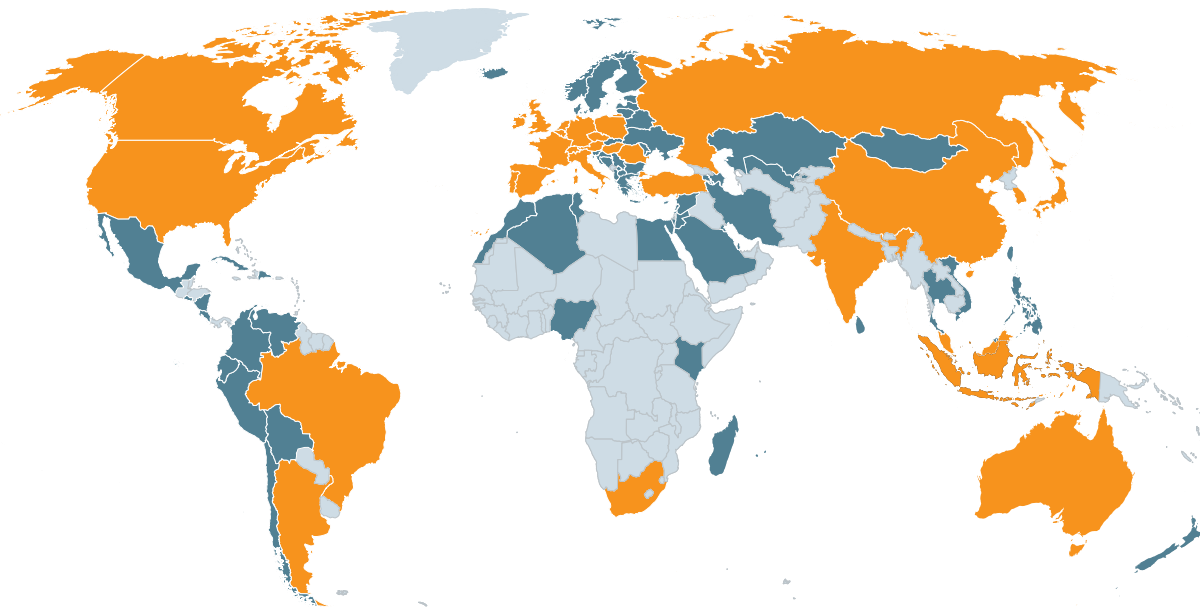
- Interfaces for PC
- SD card slot
- Power supply via 12V/24V battery

- Heated hoses for heat treatment of sampled exhaust gas
- Quick coupler for measurement gas intake

- Display of results on a connected monitor



Your partner for nanoparticle management



As a measurement technology specialist, Testo not only has years of experience with nanoparticle measuring equipment. In 2015, Matter Aerosol AG, the specialist for nanoparticle management, was integrated into the company. The comprehensive and recognised specialist know-how of Matter Aerosol in Research and Development is thus supplemented by Testo's over 60 years of experience as a world market leader in professional measuring technology.

This allows Testo optimally to utilize synergies in Research and Development, as well as applying the extensive and proven possibilities of industrial production, service and sales in a targeted and customer-oriented way. Thanks to numerous subsidiaries and service partners on five continents, Testo is able to offer its customers optimum support in all things concerning the topic of nanoparticle measurement and air pollution prevention – for companies as well as for state monitoring authorities.

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