BEMS 3000

In Europe, motor vehicles (light-duty vehicles) will in the future be tested for braking emissions in the WLTP cycle. The basis for this is the directive ECE/TRANS/WP.29/GRPE/2023/4, in short, UN GTR. The particle sizes in brake emissions are in the nanoparticle range of up to about 10 μm in concentrations of up to $2x10^6$ particles/cm³. Therefore, emissions in this size range are tested for TPN (Total Particle Number, solid and volatile) and SPN (Solid Particle Number, solid particles only, in particles/cm³). The $PM_{2.5}$ and PM_{10} values (in $\mu g/m^3$) are also considered.

This device is sold via our partner Link.[1]

Operation principle

Brake emission measurement system

The BEMS 3000 operates according to the specifications of the new UN GTR regulation.

Here, the aerosol for measuring TPN and SPN is drawn into the BEMS 3000 through two separate lines with a defined and monitored flow rate. Using a cyclone, particles larger than 2.5 μm are separated before measurement.

Subsequently, a defined dilution occurs in two stages with an overall factor of 1:100. The current dilution factor is continuously monitored.

In the measurement of SPN, a vaporization unit precedes the integrated condensation nucleus counters, removing volatile particles at 350°C.

The ENVI-CPC 50 is utilized here, enabling a full flow analysis and the prescribed cut-off of 10 nm.

To measure the zero count rate, the air is cleaned with a HEPA filter and then directed straight to the ENVI-CPC 50. Switching is done via an integrated valve.

Together with the BEMS 4000 aerosol spectrometer for $PM_{2.5}$ and PM_{10}, and the BEMS 3000 for TPN and SPN, Palas offers a complete package that exceeds the new regulation's requirements. Moreover, the BEMS 3000 provides time-resolved information.

[1] Link Website: https://www.linkeng.com/product/model-4222-brake-emissions-particle-measuring-system/

Extensions/Accessories

Data transmission is via an integrated interface, TCP/IP for the CPCs, and the dilution (AK-Ethernet protocol on request).

The calibration of the CPC as well as the BEMS 3000 takes place traceably at Palas, including a comprehensive calibration certificate.

Notice. Our partner, Link Engineering, distributes this product. We will be glad to forward your request.

Benefits

- Compliance with the new regulations ECE/TRANS/WP.29/GRPE/2023/4
- Integrated flow rate measurement and zero count rate verification
- Measurement paths also available separately for TPN or SPN only
- Monitoring of all data relevant to operation
- Robust, compact design
- Expandable with BEMS 4000 for time-resolved measurement of $PM_{2.5}$, PM_{10}, TSP, and particle size distribution.

Norms and certificates

ECE/TRANS/WP.29/GRPE/2023/4

DATASHEET

Measuring principle	Condensation particle counter
Measurement range (size)	10–2,500 nm
Maximum particle number concentration	0.1–1,000,000 particles/cm³, single-count mode including 1:100 dilution, photometric -10^8
Volume flow	2*5 l/min (Aerosol)
Volume flow (clean air)	180 l/min
Interfaces	Ethernet (LAN)
Protocols	RJ45 / TCP/IP
Power supply	100/230 V, 50/60 Hz, max. 600 W
Power consumption	Max. 600 W
Installation conditions	Temperature range: +15°C–25°C; humidity: 85%; operating pressure at the aerosol inlet: 850–1,050 mbar absolute
Compressed air supply	4–8 bar ISO, compressed air quality required in accordance with ISO 8573-1:2010, minimum purity class 2
Dilution factor	1:10 / 1:10
Dimensions	1,090 • 779 • 684 mm (H • W • D)
Weight	Approx. 135 kg

APPLICATIONS

- Measurement of brake dust emissions according to UNGTR
- Measurement of the number concentration up to 2.5 μm in other applications such as tire wear measurement

Mehr Informationen:
https://www.palas.de/en/product/BEMS3000