TOPAS®
Technologie-orientierte Partikel-, Analysen- und Sensortechnik

Field Calibration System

FCS 249

Field Calibration System FCS 249 for generating test and reference aerosols for validation and calibration tasks.

The FCS 249 is a mobile system for the defined generation of reference and test aerosols, which can be varied with respect to the particle number concentration in a wide working range.

In particular, the FCS 249 is suitable for the validation of condensation particle counters (CPC) or electrical aerosol monitors, which are applied for the particle number concentration measurement in exhaust gases of vehicles according to the "AU-Geräte Kalibrierrichtlinie (German exhaust emission test equipment calibration guideline)".

Applications

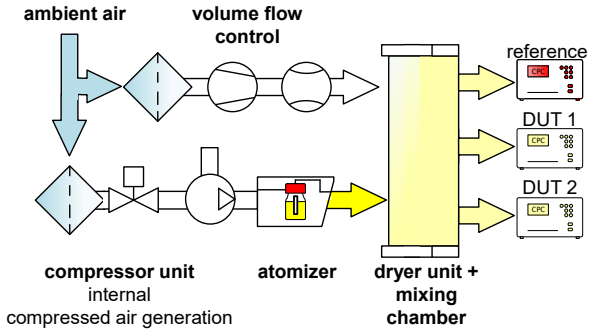
- calibration and validation of aerosol measuring devices
- comparative measurements of particle counting devices for periodical technical inspection of vehicles (PTI)
- validation of mobile measuring devices (PEMS - portable emission measurement system) for exhaust gas testing in road traffic

Features

- complies with all NaCl test aerosol requirements of the German exhaust emission test equipment calibration guideline
- mobile system (portable, no compressed air required, power supply needed)
- suitable for use in harsh workshop conditions
- suitable for commercial low-concentration NaCl solutions
- reactionless aerosol sampling
- 7 via touch screen adjustable points of particle concentration (with trim function)

Principle of operation

The FCS 249 is a combination of aerosol generator, volume flow unit, drying unit and distributor.



Schematic depiction of the functional principle of FCS 249 (DUT – device under test).

When producing test aerosols from aqueous solutions, initially a droplet aerosol is generated via a two-substance nozzle. Subsequently, this is passed through a dry atmosphere, which removes the moisture from the streaming aerosol by diffusion. In the case of salt solutions, an undisturbed, homogeneous crystallisation is thereby ensured, leading to the formation of compact, completely dried salt particles.

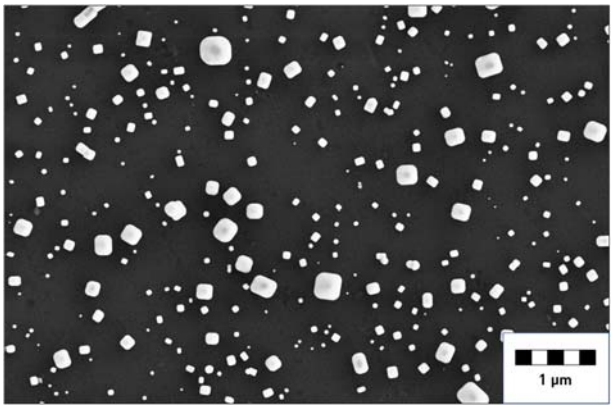
Topas GmbH
Technologie-orientierte
Partikel-, Analysen- und Sensortechnik
Gasanstaltstraße 47 · D-01237 Dresden, GERMANY

Telefon +49 (351) 21 66 43 - 0
Fax +49 (351) 21 66 43 55
E-Mail office@topas-gmbh.de
Internet www.topas-gmbh.de

Specifications

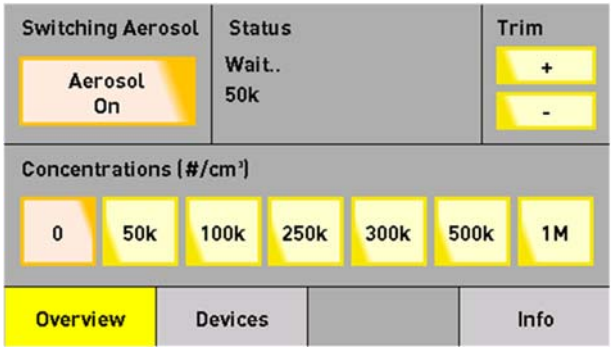
Example of use

Particle emissions in exhaust gases from motor vehicles are progressively being determined with count-based measuring instruments, e.g. using condensation particle counters or electrical aerosol monitors. These measuring devices require periodic calibration and short-term validation against a reference system. The particle size distribution of the NaCl test aerosols required for this purpose must have a mean particle size of (70 ± 20) nm and a geometric standard deviation of 1.8 ± 0.3. Using commercially available isotonic saline (0.9 wt% NaCl), the FCS 249 provides NaCl test aerosols with the required properties (confirmed by differential electrical mobility analysis and scanning electron microscopy).

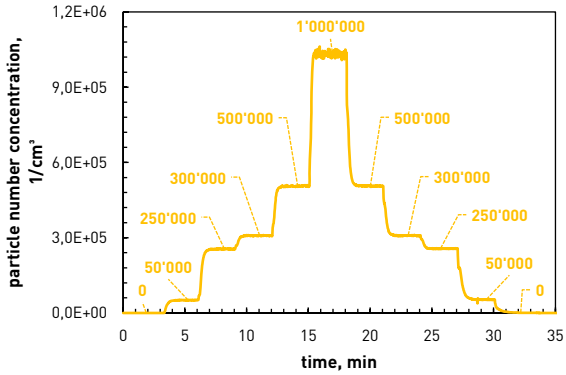


Scanning electron microscope image of electrostatically precipitated test aerosol particles generated by FCS 249 with commercial isotonic saline solution (0.9 Ma.-% NaCl).

The required particle number concentrations are selected via the touchscreen of the unit.



User interface of FCS 249: Overview menu for selecting the required particle number concentration.



NaCl test aerosols with different concentration levels generated via FCS 249 with commercially available isotonic saline solution (0.9 Ma.-% NaCl).

Accessories

- silica gel (1 kg) drying agent

Technical specifications

setting parameter	particle number concentration in cm^{-3}
setting range	0...10^6 cm^{-3} (for 0,9 Ma.-% NaCl solution)
set up time	ca. 10 min
aerosol substances	fluids (oil, suspensions or salt solutions)
liquid level	40...80 ml
opening pressure safety valve	200 hPa (200 mbar; 2,9 psi)
aerosol outlet	20 l/min*
power supply	230 V AC, 0,34 A, 50/60 Hz
air supply	intern
noise emission	L_{pA} ≤ 59 dB(A) ± 3 dB(A)
serial interface	RS 485
dimensions (w × h × d)	260 × 480 × 250 mm
weight	11,0 kg
normative references/ guidelines	VkBl. 2021, Heft 11, VO-Nr. 133, S. 640; VDI 3491-2

* Customised adaptations are possible on request.

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E-Mail office@topas-gmbh.de
Internet www.topas-gmbh.de