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.

It combines the functions of an aerosol generator, a regulated flow unit and a drying unit. As a result, particle concentrations covering a wide working range can be provided with this system.

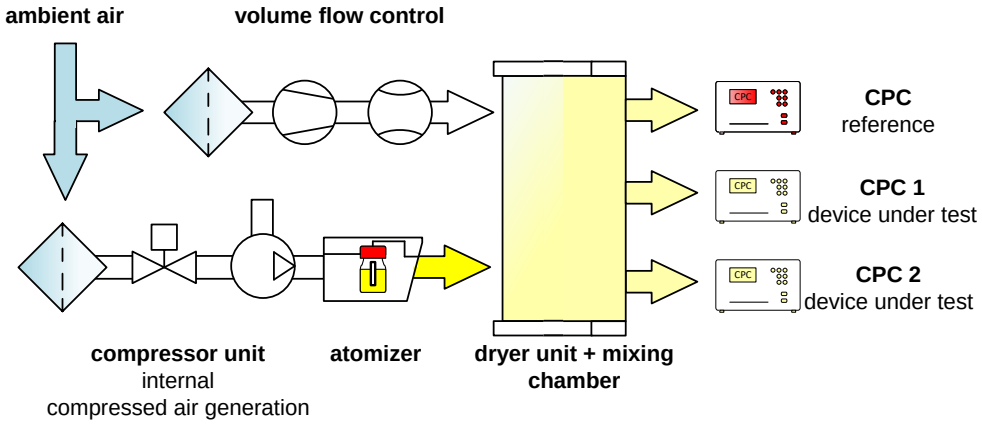
Setting parameters for various working points can be saved in the system and accessed by the push of a button.

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

- mobile system for the generation of defined test and calibration aerosols (power supply required)
- reactionless aerosol sampling
- 7 user-programmable working points (including zero count rate)



Schematic depiction of the functional principle of FCS 249.

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PARTICLE UNDER CONTROL

Specifications

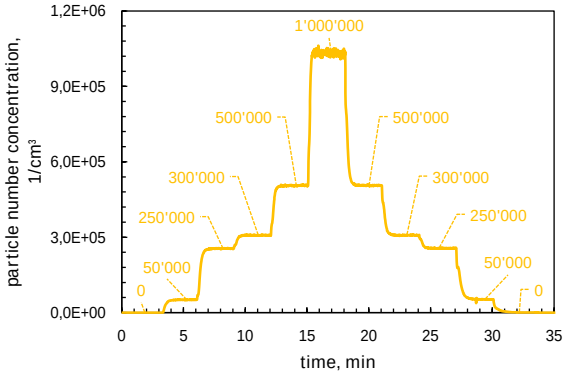
Principle of operation

Step-by-step preparation of an aerosol:

1. Dispersion of the aerosol substance in air by means of a two-substance nozzle.
2. Drying of the aerosol in a drying unit, if required.
3. Supply of particle-free mixing air to adjust the concentration range and aerosol volume flow.
4. Passive supply of the reference aerosol to an atmospherically decoupled aerosol distributor.

Example of use

To minimise particulate emissions, after-treatment systems for motor vehicles are subject to strict regulations. Until now, the particle load at the exhaust outlet was determined by means of opacity measurements. Optimised engines and after-treatment systems have led to a significant reduction in particulate emissions and thus to the need of using more sensitive methods for exhaust gas measurement. One possibility is to determine the particle number concentration (e.g. using condensation particle counters or electrical aerosol monitors). These measuring devices must be calibrated periodically and should be validated against a reference measuring system at shorter intervals.



Possible test aerosols (average particle size 70 nm ± 20 nm) with different concentration levels when operated with isotonic saline solution (0.9 wt.-% NaCl, from pharmacy).

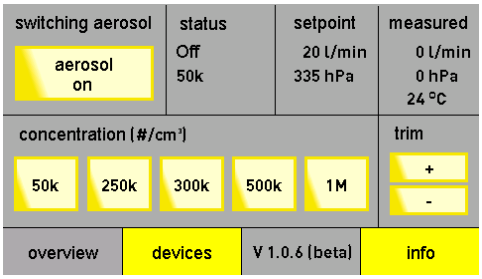
These reference aerosols are provided by FCS 249. With the integrated touch display, the desired working point can be selected.

Accessories

- silica gel (1 kg) drying agent

References and/or Patents

Hillemann et al. (2022) Referenzaerosole für die Kalibrierung von Abgasmessgeräten. Beitrag zum Jahrestreffen der ProcessNet-Fachgruppen "Grenzflächenbestimmte Systeme und Prozesse", "Partikelmesstechnik" sowie "Aerosoltechnik"



Operation of FCS 249 with integrated touch display.

Technical specifications

setting parameter	particle number concentration in cm^{-3}
setting range	≤ 10^6 cm^{-3} (for 0.9 wt.-% 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	internal
noise emission	L_{pA} ≤ 59 dB(A) ± 3 dB(A)
serial interface	RS 485
dimensions (w × h × d)	260 × 480 × 150 mm
weight	11,0 kg
normative references/ guidelines	VkBl. 2021, Heft 11, VO-Nr. 133, S. 640

* Customised adaptations are possible on request.

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