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

Atomizer Aerosol Generator

ATM 228

Aerosol generator ATM 228 with internal compressor and differential nozzle pressure control.

The aerosol generator ATM 228 is a further development of the aerosol generator ATM 226 and serves for the mobile generation of test and calibration aerosols from pure liquids, solutions and suspensions. The generator complies to all requirements of VDI 3491-2.

Aerosol generation is realised by a brushless compressor. Accordingly, no external compressed air supply is required. For the purpose of reproducible and long-term stable aerosol generation, the air flow rate is controlled via the pressure drop over the nozzle. This allows also a reproducible and stable generator operation even at very low air flow rates and thus also at lowest particle production rates.

Applications

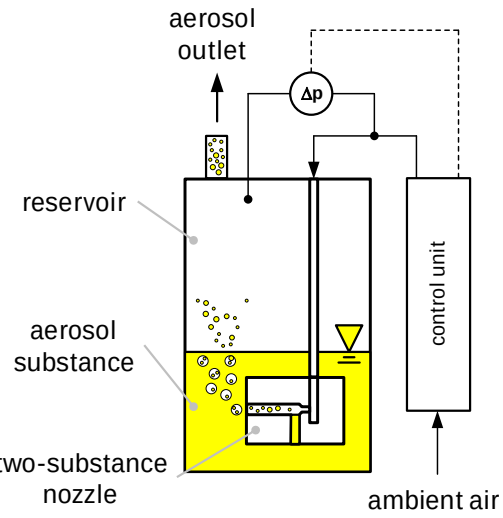
- aerosol generation from pure liquids, solutions and suspensions
- integrity and recovery testing of HEPA/ULPA filters according to ISO 14644-3
- acceptance measurements for clean rooms, safety work benches and smoke detectors
- generation of calibration aerosols (e.g.: for particle counters) at low air flow rates

Features

- stable aerosol generation even at lowest particle production rates
- safe and reproducible adjustment of operating points
- suitable for mobile operation (internal compressor, optional battery operation mode)
- remote control via serial interface (optional)

Principle of operation

For the dispersion of the substance to be aerosolised (aerosol substance), the ATM 228 is equipped with a two-substance nozzle designed by the Topas GmbH. The nozzle is operated within the aerosol substance (submerged operation mode) and consists of two inlet ports for the supply of air as well as aerosol sub-stance and one outlet port for the generated primary aerosol.



Principle of aerosol generation: two-substance nozzle in submerged operation mode according to VDI 3491-2.

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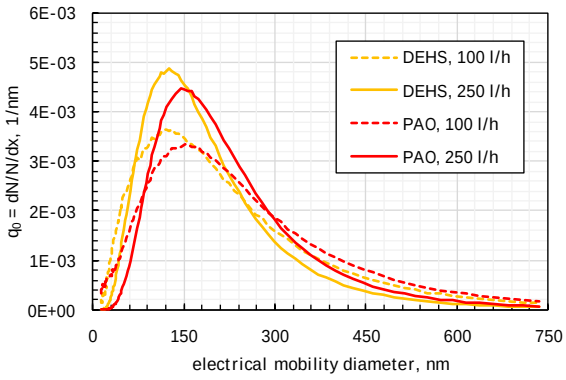
Specifications

The supply of a defined air flow rate causes a negative pressure at the nozzle inlet port for the aerosol substance. The aerosol substance flows thus into the dispersion zone of the nozzle, where aerosol substance and gas flow converge and form a droplet aerosol that passes the aerosol substance within bubbles. Finally, the droplet aerosol that leaves the generator is released due to bubble bursting at the liquid surface.

Details

The droplet size distribution at the outlet of the generator depends on the nozzle pressure and the physical properties of air and aerosol substance (density, dynamic viscosity, surface tension).

The operation of the generator with DEHS or PAO leads to size distributions in the size range of the most difficult to filtrate particle size (most penetrating particle size, MPPS ≈ 0,2 µm).



Size distributions of generated aerosols for DEHS and PAO (differential electrical mobility analysis).

The ATM 228 can be operated manually or via remote control (optional) and has a digital display for the nominal and actual value of the nozzle pressure.

Accessories (optional)

- battery connection cable / interface cable
- particle instruments interface modul (terminal program)
- diffusion dryer (DDU 570/L, DDU 570/H)
- aerosol substances (DEHS, PAO, PSL)

References

Mishra et al. (2019) Hygroscopic growth of CsI and CsOH particles in context of nuclear reactor accident research. J. Aerosol Sci., 132, 60 - 69. doi: 10.1016/j.jaerosci.2019.03.008

Sharma et al. (2015) Standoff Detection of Biomolecules by Ultraviolet Laser-Induced Fluorescence LIDAR. IEEE Sensors Journal, 15(6) 3349-3352. doi: 10.1109/JSEN.2015.2388547

Yu et al. (2020) A novel energy-efficient kapok filter paper with high DHC for solid-oil mixed aerosol: Performance and loading behavior evolution mechanism. Sep. Purif. Technol., 235, 116180. doi: 10.1016/j.seppur.2019.116180

Operation and display elements of ATM 228.

Technical specifications

air flow rate	20 ... 250 l/h
mass flow rate	0 ... 1,4 g/h ***continuously adjustable***
particle production rate	$4{,}0 \cdot 10^{06}$ ... $1{,}4 \cdot 10^{10}$ #/s ***continuously adjustable***
aerosol substances	DEHS, PAO (Emery 3004), paraffin oil, salt solutions, suspensions (PSL, A1)
Particle size range	0,01 ...0,8 µm (DEHS)
substance capacity	20 ... 80 ml
non-stop operation	> 44 h, with battery ≤ 10 h
counterpressure	max. 20 kPa
aerosol outlet	hose fitting ∅ 8 mm
power supply	100 ... 240 VAC, 12 VDC
power consumption	≤ 36 W
air supply	Internal compressor
noise emission	L_{pA} ≤ 75 dB(A) ± 3 dB(A)
dimensions (w × h × d)	300 × 120 × 195 mm
weight (without battery)	3,9 kg
normative references	VDI 3491-2, ISO 14644-3