

Atomizer Aerosol Generator

ATM 222



Aerosol generator ATM 222 with pneumatic coupling plug and differential nozzle pressure control.

The aerosol generator ATM 222 combines selected technical features of the generators ATM 220 and ATM 228 for long-term stable generation of test and calibration aerosols from pure liquids, solutions and suspensions. The generator complies to all requirements of VDI 3491-2.

The generator can be operated via a pneumatic coupling plug by compressed air or other pressurised technical inert-gases (e.g. with N_2 , CO_2). For the purpose of a reproducible and long-term stable aerosol generation, the propellant gas flow is controlled via the pressure drop over the nozzle. This allows also a reproducible and stable operation of the generator even at very low air flow rates and thus also at lowest particle production rates.

Applications

- aerosol generation from pure liquids, solutions and suspensions
- fractional efficiency testing of filter media and filter elements
- long-term stable generation of test and process aerosols

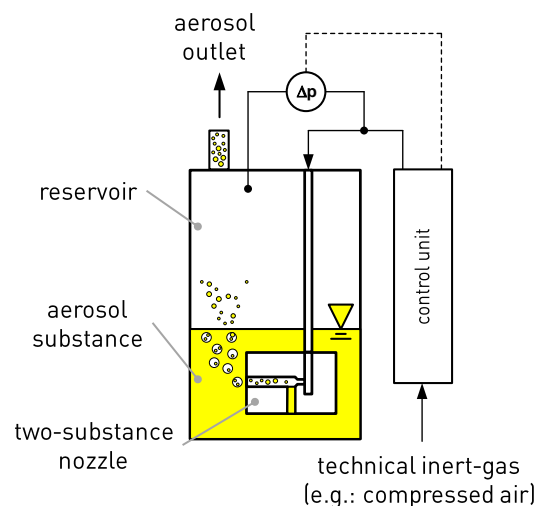
- calibration and validation of particle measurement techniques

Features

- stable aerosol generation even at lowest particle production rates
- safe and reproducible adjustment of operating points
- low noise operation via compressed air or other technical inert-gases (e.g.: N_2 , CO_2)
- remote control via serial interface (optional)

Principle of operation

For the dispersion of the substance to be aerosolised, the ATM 222 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.



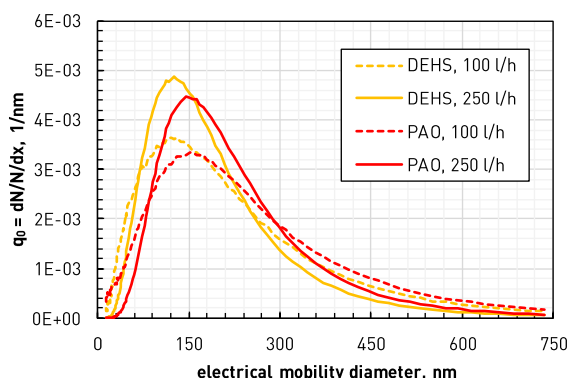
Specifications

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 propellant gas as well as 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 $\approx 0,2 \mu\text{m}$).



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

The ATM 222 can be operated manual or via remote control and has a digital display for the nominal and actual value of the nozzle pressure.

Accessories (optional)

- interface cable
- diffusion dryer (DDU 570/L, DDU 570/H)
- aerosol substances (DEHS, PAO, PSL)

References

Göhler et al. (2017) Hyperthermic intracavitary nano-aerosol therapy (HINAT) as improved approach for pressurised in-

traperitoneal aerosol chemotherapy (PIPAC). Beilstein J. Nanotechnol., 2017, 8, 2729-2740. doi: 10.3762/bjnano.8.272.

Tarik et al. (2017) A Practical Guide on Coupling a Scanning Mobility Sizer and Inductively Coupled Plasma Mass Spectrometer (SMPS-ICPMS). J. Vis. Exp., 2017, 125, doi: 10.3791/55487



Operation and display elements of ATM 222.

Technical specifications

air flow rate	20 ... 250 l/h
mass flow rate	0 ... 1,4 g/h <i>continuously adjustable</i>
particle production rate	4,0 · 10 ⁰⁶ ... 1,4 · 10 ¹⁰ #/s <i>continuously adjustable</i>
aerosol substances	DEHS, PAO (Emery 3004), paraffin oil, salt solutions, suspensions (PSL, A1)
substance capacity	20 ... 80 ml
non-stop-operation	> 44 h
counterpressure	min. 20 kPa
aerosol outlet	hose fitting \varnothing 8 mm
power supply	12 VDC, 0,4 A
compressed air supply	< 5 bar
dimensions (w × h × d)	300 × 120 × 195 mm
weight	3,0 kg
normative references	VDI 3941-2, ISO 14644-3

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QMS certified according to DIN EN ISO 9001.



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PARTICLE UNDER CONTROL