

Atomizer Aerosol Generator

ATM 221/D



ATM 221/D Atomizer Aerosol Generator for the generation of test aerosol from liquids, especially from suspension.

The ATM 221/D Atomizer Aerosol Generator serves for the generation of aerosols from liquids, especially from suspensions.

The generation of polydisperse aerosols with increased quantities of supermicron particles ($\geq 1 \mu\text{m}$) is typically done by dust generators. An elegant and more precise alternative to dry dispersion is the aerosolisation of suspensions with subsequent drying. In light of this, the ATM 221/D was especially developed for the calibration and validation of PM sensors.

Applications

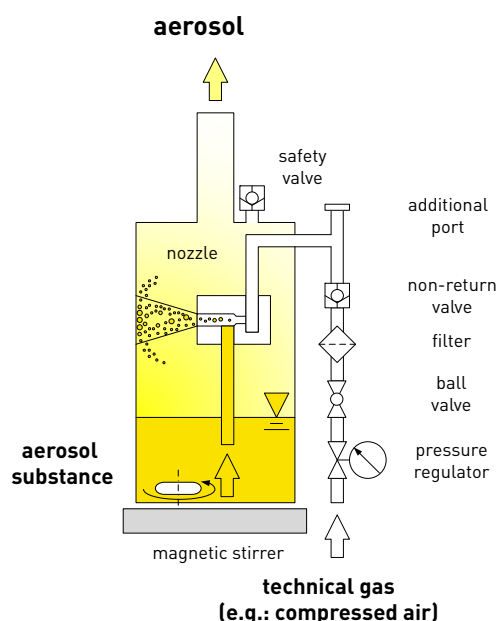
- calibration and validation of PM sensors and other aerosol technologies
- determination of fractional separation efficiency of filter elements and filter media
- material characterisation and research

Features

- removable dispersion unit for easy cleaning
- operation of dispersion unit away from base station (e.g. within thermostats)
- including magnetic stirrer for stabilisation and homogenisation of suspensions/solutions
- additional ball valve for start-stop operation at adjusted operational pressure

Principle of operation

The aerosolisation of the aerosol substance (pure liquid, solution or suspension) is realised within the ATM 221/D by a special two-substance nozzle.



Functional principle of the ATM 221/D Atomizer Aerosol Generator.

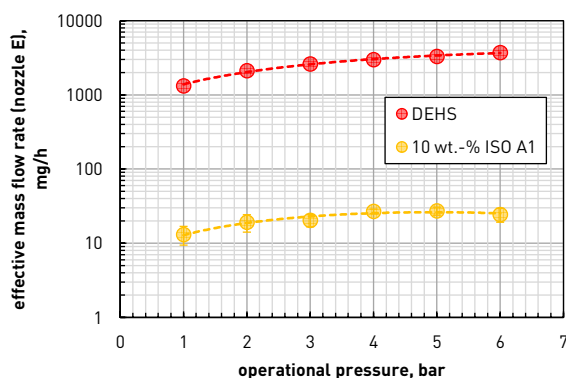
A lower pressure at the aerosol substance inlet is initiated when a gas flow passes the nozzle. This causes an aerosol substance supply into the nozzle and afterwards to its dispersion (Venturi principle).



Specifications

Details

The mass flow rate and thus the mass concentration at the outlet of the generator can be adjusted by variation of the aerosol substance and the operational pressure.



Mass flow rates over operational pressure for ATM 221/D operation with a pure liquid (DEHS) and an aqueous suspension (10 wt.-% ISO A1 test dust).

If suspensions or solutions are aerosolised, a subsequent drying (e.g. by means of diffusion dryers) of the formed droplet aerosol becomes necessary.

Application: PM-sensor calibration

Test aerosol with increased quantities of particles > 10 µm are required especially for the calibration and validation of PM sensors. This can be simply realised by means of the ATM 221/D and aqueous suspensions of test dusts (like ISO A1, Pural NF).



Application example: Loaded filter media based on ATM221/D operation with 10 wt.-% aqueous ISO A1 suspension.

Application: dust characterisation

Through liquids and appropriate techniques (e.g. ultrasonic sonodrodes) significantly higher dispersion intensities can be induced in to particle

systems than via the medium air. A suitable preparation of suspensions (Retamal Marin et al. 2018) enables thus the determination of specific material characteristics (e.g. smallest dispersible units) by means of aerosol-analytical instruments (Göhler & Stintz 2015).

Accessories

- diffusion dryer (DDU 570/L, DDU 570/H)
- ultrasonic desintegrator (UDS 751)
- aerosol substance (DEHS)
- antistatic hose lines

References

Göhler & Stintz (2015). Nanoparticle release quantification during weak and intense dry dispersion of nanostructured powders. J. Phys.: Conf. Ser. 617, 012029 [A3]. doi:10.1088/1742-6596/617/1/012029

Retamal Marín et al. (2018). Effects of sample Preparation on particle size distributions of different types of silica in suspensions. Nanomaterials 8 (7). doi:10.3390/nano8070454

Technical specifications

setting parameter	operational pressure
setting range	max. 6 bar
setting resolution	continuously adjustable
setting method	manual
volume flow rate	200 ... 750 L/h (1 ... 6 bar)
mass flow rate	1,3 ... 3,7 g/h (DEHS) 10 ... 25 mg/h (10 wt.-% A1)
aerosol substances	pure liquids (DEHS, PAO, ...) suspensions (A1, PSL, ...) solutions (glucose, ...)
hose connector, outlet	8 mm (outer diameter)
dimensions (w × h × d)	250 × 300 × 200 mm
weight	4,7 kg
normative references	CEN/TS 17660-2 CEN/TS 18086 VDI 3491-2

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