

Real-time particle size and particle quantity determination of individual spray bursts For MDIs (Metered Dose Inhaler) and nebulizers



Description

Inas[®] is the only measurement system in the world that also reliably and reproducibly determines the particle size and particle quantity of individual spray bursts from inhalers with a temporal resolution of 10 ms and in concentrations up to 10^7 particles/cm³. It is based on the counting measurement method, the welas[®] digital white light aerosol spectrometer and therefore guarantees very good particle size resolution and very good particle size classification accuracy (ISO 21501-1). The Inas[®] 40 is equipped with the welas[®] 2070 sensor and a dilution unit and can be operated with variable suction volume flows of up to 40 l/min. The volume flow is set using a mass flow. The so-called "Throat" is used as the aerosol inlet in accordance with the Pharmacopoeia. This simulates the separation of particles in the throat. The inhaler (DPI) is inserted in the Throat and the measurement is performed automatically. In addition, the Inas[®] 40 system has a powerful processor that allows the course of a measurement to be determined with regard to concentration and other distribution parameters, such as the Sauter diameter, in the particle size range 0.2 - 40 µm with a temporal resolution down to 10 ms. The evaluation of the measured data for the determination of particle size distributions is exclusively based on unambiguous, mathematically reproducible algorithms. Several spray bursts can be displayed and compared in a graph. The schematic structure of Inas[®] 40 is presented in Figure 1:

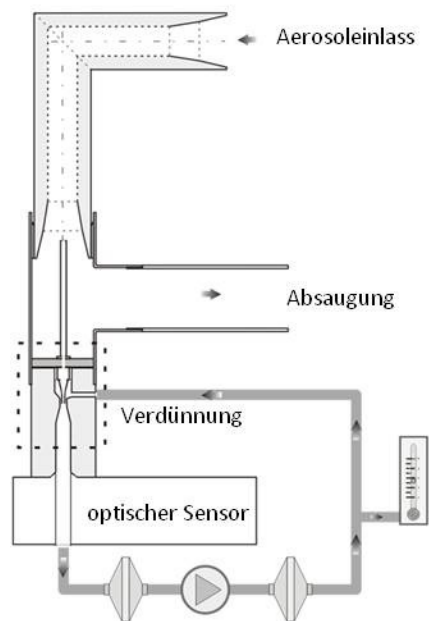
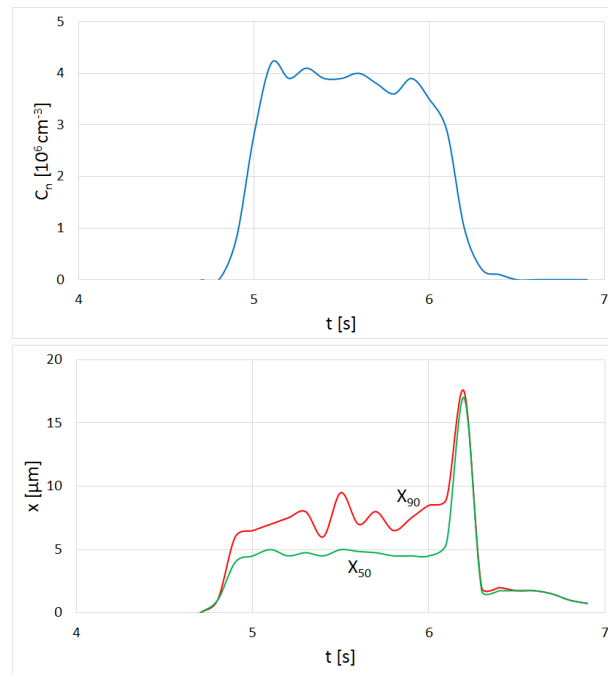
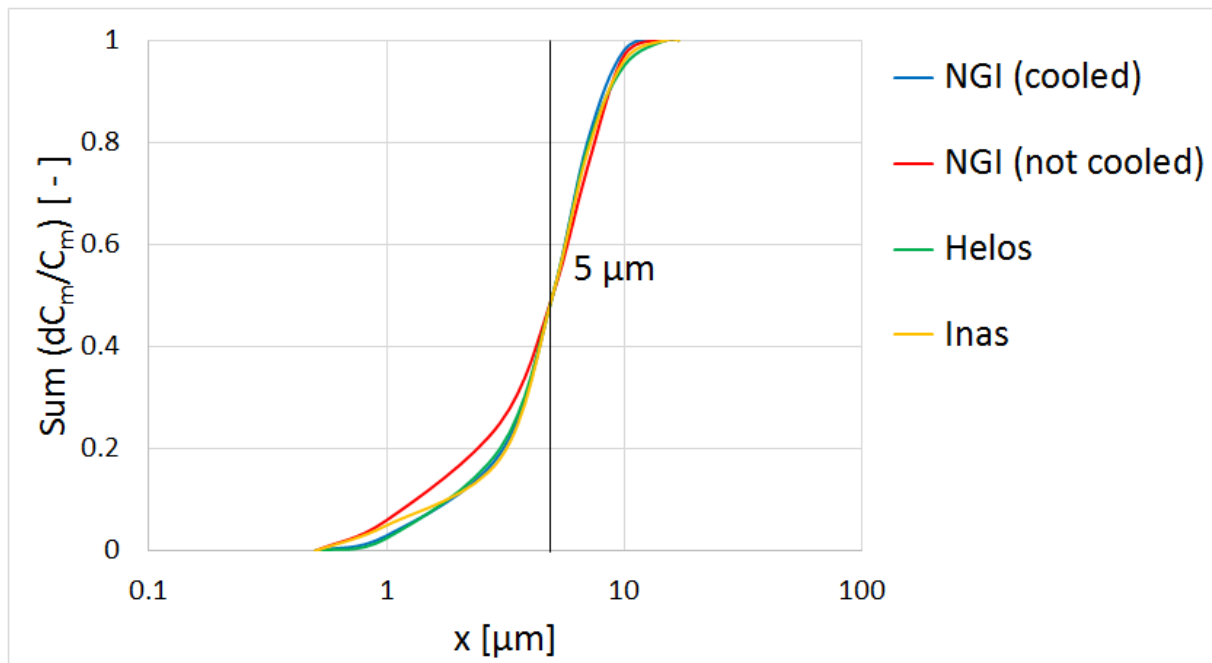


Figure 1: The schematic structure of Inas[®] 40



Graph 1*: The time course measured with Inas® of the number concentration and the mass-related X50 and X 90 value Inas of a single MDI spray burst (Respimat® Soft Inhaler, Boehringer Ingelheim) in 100 ms resolution In contrast with an impactor, with Inas® 40 a measurement can be performed in seconds and this can be immediately evaluated with a resolution down to 10 ms (see Graph 1). Compared with the laser diffractor, the Inas® 40 also measures the concentration of the aerosol and small particles with high accuracy. The good agreement of the particle size determination with other measurement methods has been determined by the Pharmaceutical Institute of the Christian Albrecht University in Kiel (Germany). Graph 2 shows the size distributions measured with the Inas® 40 as compared with measurement using a cascade impactor (NGI) and laser diffractor.



Graph 2*: Comparison of mass-related sum distributions measured with the NGI impactor (MSP Corp., USA), the Helos laser diffractor (Sympatec GmbH, Germany) and the Inas[®] light-scattering spectrometer (Palas[®] GmbH, Germany) of a nano suspension nebulized with the Pari LC Plus (Pari GmbH, Germany). On the basis of these special properties of the Inas[®] 40, the quality assurance of inhalers or the development of nozzle systems for various active substances can be carried out economically, reproducibly and convincingly. The particle sizes and quantities of inhalers can be determined in minutes at different temperatures, e.g. when stored in the car in summer or winter as compared with room temperature.

[*Source: "Entwicklung von Aufgabesystemen zur Charakterisierung pharmazeutischer Aerosole mit einem optischen Partikelzähler" (translation: "Development of sampling systems for Characterization of pharmaceutical aerosols with an optical particle counter", Maren Kuhli, doctoral theses at the Faculty of Mathematics and Natural Sciences Christian Albrecht University, Kiel (Germany))]

Benefits

- Measuring range 0.2 - 40 μm (3 measuring ranges selectable in one device)
- Very high temporally resolved particle size and particle quantity determination down to 10 ms
- Concentration range up to 10^7 particles/cm³
- Characterization of a single spray burst in a few seconds
- Rapid determination of size distributions, number and mass concentrations
- Calibration, cleaning and lamp replacement can all be performed independently by the customer
- Extensive, practically-oriented and user-friendly software
- Low maintenance
- Simple operation
- Reliable function
- Reduces your operating expenses

Datasheet

Parameter	Description
Interfaces	USB
Measurement range (size)	0.2 – 40 µm (3 measurement ranges)
Size channels	up to 128 (64/decade)
Measuring principle	Optical light-scattering
Volume flow	15 l/min (nebulizer), 30 l/min (MDI) according to the European Pharmacopoeia
Data acquisition	20 MHz processor, 256 raw data channels, digital
Light source	Xenon arc lamp 35 W
User interface	Laptop or pc
Dimensions	Top part: 600 • 260 • 170 mm, desktop case: 190 • 450 • 370 mm
Support options	Direct remote access, Palas [®] webserver service
Weight	approx. 25 kg

Applications

- Characterization of spray and nebulizer nozzles
- Characterization of inhalation aerosols in accordance with the European Pharmacopoeia with 15 l/min, 30 l/min or variable flow rates up to 40 l/min
- Measurement of MDIs and nebulizers

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