Aerosoltechnologie

welas®

White Light Aerosol Spectrometer

for reliable particle size and particle number measurements in gases and liquids

welas®- one system, many solutions!

The **aerosol spectrometer welas®** offers the simple and reliable solution for various applications. This is possible due to the modular setup with different sensors. Thus, the user can select the optimally suitable welas® system depending on his measuring task.

Applications

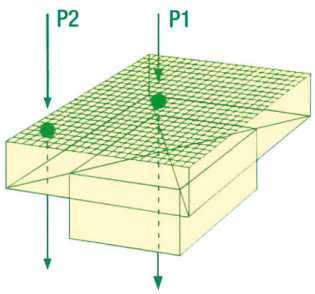
- Separation efficiency determination
- Quality control of diesel soot filters
- Isothermal particle size and particle quantity determination e.g. in the automobile industry, chemical industry, food industry etc.
- Monitoring of air jet mills
- Measurement of atmospheric aerosols
- Medical applications

(more on page 3)

The welas® measuring principle

The measuring principle of welas® is based on the patented **T-aperture technology** which supplies – in combination with white light and 90° scattered light detection – particularly accurate measurement results.

By means of the scattered light analysis at the single particle, the particle size and particle number are determined simultaneously but independently of each other. The three-dimensional T-shaped homogenously illuminated measuring volume is characteristic for the welas® system.



Due to the T-aperture technology, the welas® sensors measure without border zone error and with coincidence detection.

The advantages of welas® at a glance

- Due to **white light source and 90° scattered light detection**:
  - Clear calibration curve
- Due to the patented **T-aperture technology**:
  - Measurements without border zone error
  - Coincidence detection
- **High size resolution** and **good size classification accuracy**
- Measurements in high concentrations up to > 10^5 P/cm³ as well as in low concentrations down to 5 P/cm³ (clean room class 100 000)
- Measurements in overpressure up to 10 bar and in underpressure*
- Measurements down to -90 °C (welas® 2000/ 3000)
- Heatable up to 120 °C*
- Special version heatable up to 600 °C
- In-situ measurements
- Measurements in explosive areas
- Measuring cuvette resistant against abrasive media*
- Free aerosol flow
- Calibration curves for different refraction indices*
- Timely high-resolution measurement down to the millisecond range*
- Optical fibre technology
- Particularly wide application spectrum by means of easily exchangeable sensors with different measuring volumes
- Powerful software for an easy data transfer to Excel; software is network and internet compatible

* optional

The welas® systems at a glance

Since welas® is a modular measuring system, it can be optimally adapted to your measuring task and easily supplemented, if required. This system is ideal also for applications with different measurement requirements. Choose the suitable system according to your measuring task!

welas® for particle measurements in gases

The different sensors of the welas® systems differ in their measurable number concentration and their application areas.

Complete systems

welas® 1000

for particularly high-resolution measurements within a very wide measuring range; particle size: 0.18 - 40 µm

welas® 2000

handy sensor; with optical fibre technology

welas® 3000

quasi-simultaneous operation of two sensors of the series 2000 or of two special sensors

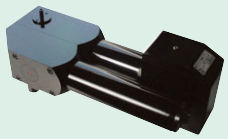
Particle size ranges of the sensors:

- 0.2 µm – 10 µm*
- 0.3 µm – 17.5 µm
- 0.6 µm – 40 µm

* This measuring range applies only to the standard sensors without cuvette; reduced counting efficiency below 0.3 µm.

Sensors

Type 1100: maximum particle concentration: 10^5 P/cm³
Type 1200: maximum particle concentration: 10^4 P/cm³



optional > 10^5 P/cm³

Others on request.

Standard sensors of the series 2000
Type 2100: maximum particle concentration: 10^5 P/cm³
Type 2200: maximum particle concentration: 10^4 P/cm³
Type 2300: maximum particle concentration: 10^3 P/cm³;
for statistically safe measurements in low clean gas concentrations down to the clean room class 100 000

The sensors are exchangeable and can be combined among each other.

Special sensors
Type 2100S: for coincidence-free measurements of highest mass concentrations, e.g. at A2 or SAE-fine up to 1000 mg/m³
Type 7000S: for particle measurements in very high temperatures
- available with cuvette heatable up to 270°C or as special version heatable up to 600°C (more information on this or other temperature ranges on request)
- in-situ measurements in tubes up to approx. Ø100 mm

Others on request.

NEW: welas® for particle measurements in liquids

This new welas® system measures particles within the size range of approx. 0.5 µm up to approx. 45 µm in water and other liquids – in concentrations up to 10^5 P/cm³. For accurate and reliable measurements e.g. in the field of liquid filtration; multi pass, single pass.

welas® FL

for measurements in liquids

Particle size range of the sensor:

- approx. 0.5 µm – 45 µm

Type 2100FL: maximum particle concentration: 10^5 P/cm³
- suction (water pump): approx. 6.8 l/min*
- for liquids with refractive index of approx. m = 1.26 - 1.5* (e.g. water, alcohol)

*Others on request.

For more technical details on the systems please ask for our separate welas® flyer "Technical Data" or visit our homepage **www.palas.de**
Do you already have a welas® system?
If necessary, you can buy subsequently additional sensors!

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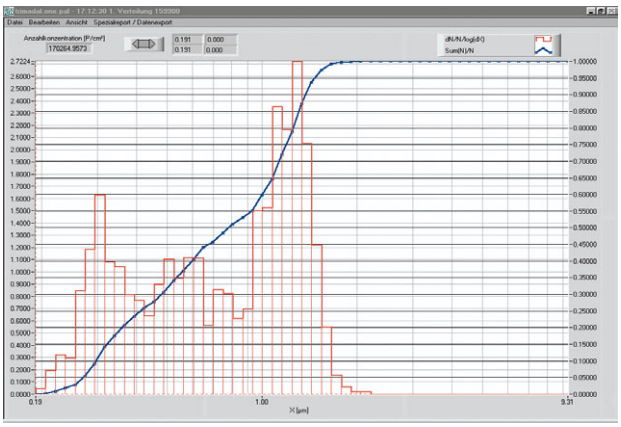
NEW: welas® 3000 – for special measuring tasks

The system welas® 3000 offers special advantages for specific applications as e.g.

- fractional efficiency determination in hardly accessible areas
- quasi simultaneous particle measurements at two different measuring points
- atmospheric measurements
- medical applications

Two sensors of the series 2000 are operated quasi simultaneously at only one optical receiver and only one light source.
Example filter test: The first sensor which can be installed in front of the filter for raw gas measurement measures with a small measuring volume the high concentration up to 10^5 P/cm³ practically without coincidence error. The second sensor for clean gas measurements after the filter measures with large measuring volume the low concentration quickly and reliably. The sensors can be flanged directly at the channel of a filter test stand. Thus, there are practically no particle losses in sampling tubings.

Measuring example



welas® measures also bi- und trimodal aerosols

welas® software

The welas® software runs under Windows® (95/98/2000/NT/XP) and allows an easy data transfer to Excel. The software is network and internet compatible. With a special software, a timely high-resolution particle size and particle quantity measurement down to the millisecond range is possible.

welas® application ranges

Pharmaceutical industry: time-resolved particle size and particle quantity determination of e.g.

- MDI (Metered Dose Inhaler)
- DPI (Dry Powder Inhaler)
- Nebulisers
- In-situ measurements at human beings: inhaled/exhaled air
- In-situ measurements in inhalation chambers

Aerosol research

- Particle measurement for clouding from -90°C
- Vaporisation processes of droplets and solid particles, in-situ measurement up to 400°C
- Isothermal particle size and particle quantity determination of „volatile“ substances, oil mist after compressors
- Characterisation of test aerosol generators
- Enlargement of measuring range by combination e.g. with CNC (condensation nucleus counter) etc.

Filter industry
Separation efficiency and fractional separation efficiency determination

- Filter media and filters (room air technique, cabin air filters, engine air filters, vacuum cleaner filters, etc.)
- Compressed air filters according to ISO 8573 and ISO 12500 ISO-bar up to 10 bar overpressure and isothermal up to 120°C
- Coolant separators
- Scrubbers
- Cyclones
- Oil mist separators (blow-by separators)

Characterisation of

- Pre-separators like e.g. PM_{10}, $PM_{2.5}$, $PM_{1.0}$
- Dilution systems
- Impactors
- Virtual impactors

Environment

- Time-resolved particle size and particle quantity determination (e.g. in the atmosphere, in stables; immission measurement, emission measurement in exhaust ducts; in the troposphere isothermal to -90 °C)
- Mass determination by means of additional separation of the sucked aerosol on an „absolute filter“

Combination possibilities

For measurements within the nanometer range: welas® CNC module

Time-resolved particle counting within the nanometer range from approx. 8 nm – also in high concentrations up to 100.000 P/cm³! ➜ For more information please ask for our separate brochure or visit our homepage www.palas.de

welas® with sampling head Sigma 2 – for outside air measurements

In combination with a standardised Sigma 2 sampling head as a defined air inlet for the welas® system, representative outside air measurements in typical outside air concentrations up to 10^5 P/cm³ can be carried out successfully without dilution and without coincidence error.