# AEROSOL SENSOR WELAS® 2500




The model 2500 aerosol sensors are equipped with a very big measurement volume and are used for coincidence-free measurement with a maximum number concentrations up to 4,000 particles/cm$^3$. This aerosol sensor allows statistically reliable measurements in low raw gas concentrations down to clean room class 100,000 and for filter testing according to ASHRAE 52.2. Measuring range: 0.3 – 17 $\mu$m / 0.6 – 40 $\mu$m / 2 – 105 $\mu$m.

## MODEL VARIATIONS




Aerosol sensor welas® 2500 HP
Pressure-resistant version up to 10 bar overpressure and heatable up to 120 °C




Aerosol sensor welas® 2500 P
Pressure-resistant version up to 10 barg overpressure

# OPERATION PRINCIPLE

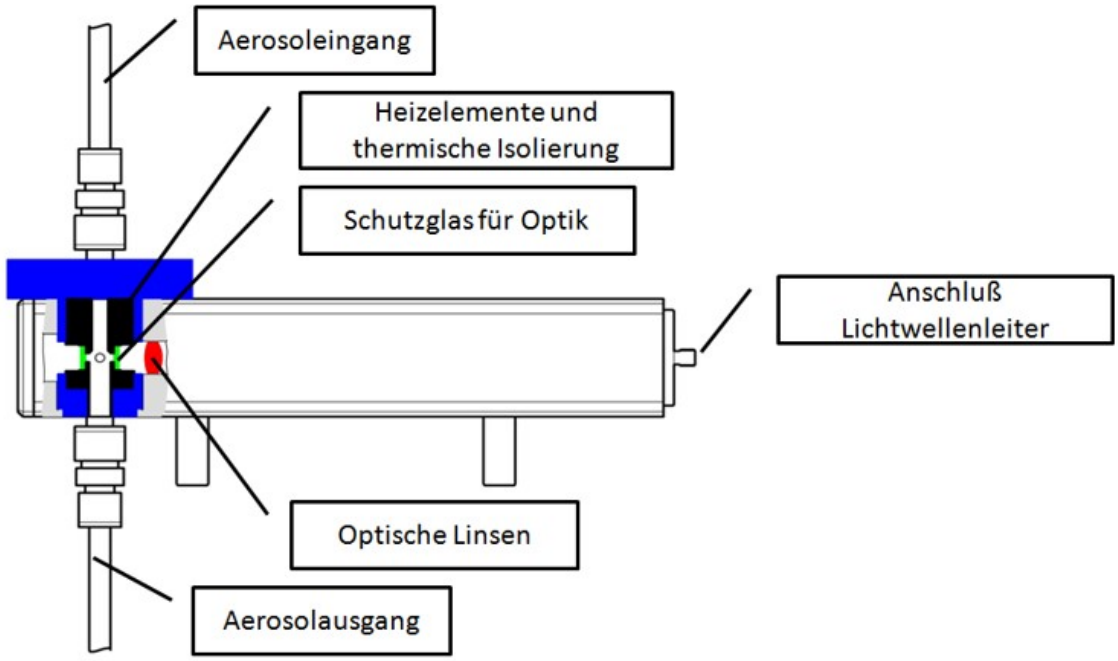
## AEROSOL SENSOR FOR NUMBER CONCENTRATIONS UP TO 4,000 PARTICLES/CM$^3$

welas® digital and Promo® digital are based on scattered-light analysis on a single particle. The particles to be measured pass through a T-shaped, optically delineated measuring volume illuminated by a white light source. This generates a scattered-light pulse whose level is a measure of the concentration.

The following special feature guarantees high-size classification accuracy and high-size resolution:

- White light and 90° light-scattering detection → unambiguous calibration curve
- Patented T-aperture technology for a T-shaped measurement technology → no border zone error
- New digital individual signal processing for the analysis of the scattered-light pulse → coincidence detection and correction, which enables measurement in up to 5 times higher concentrations

Trouble-free and reliable measurement of large particles up to 40 $\mu$m in the sensor is guaranteed by the vertical aerosol duct at a high volume flow of 5 l/min and a large sampling tube diameter.

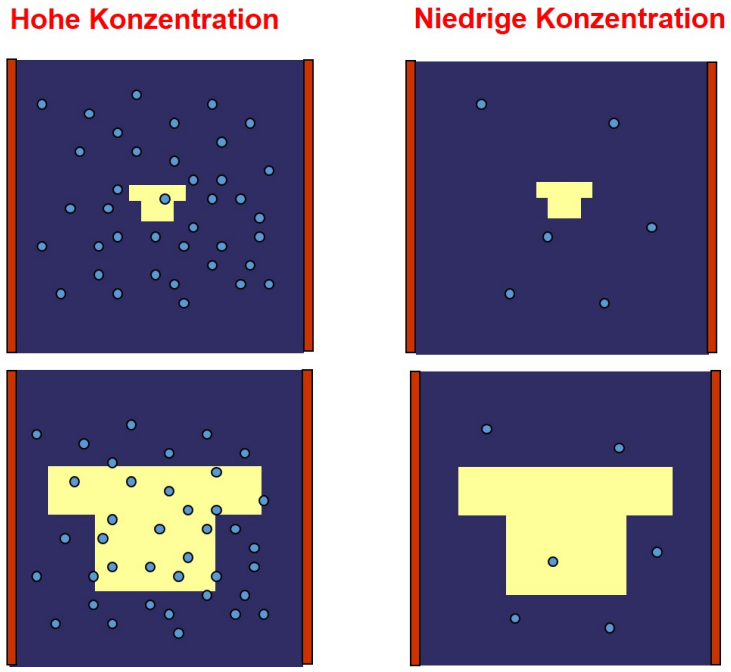



The table below shows the theoretical minimum separation of the particles at a given number concentration. At a number concentration of $10^3$ per cm$^3$, the optical measuring volume must not be larger than mm$^3$.

| Number concentration [P/m³] | Number concentration [P/cm³] | Particle distance [cm] | Particle distance [mm] | Particle distance [$\mu$m] |
|---|---|---|---|---|
| 1 | $10^{-6}$ | 100 | 1000 | |
| $10^3$ | $10^{-3}$ | 10 | 100 | |
| $10^6$ | 1 | 1 | 10 | |
| $10^9$ | $10^3$ | | 1 | 1000 |
| $10^{12}$ | $10^6$ | | 0.1 | 100 |
| $10^{15}$ | $10^9$ | | 0.01 | 10 |
| $10^{18}$ | $10^{12}$ | | 0.001 | 1 |

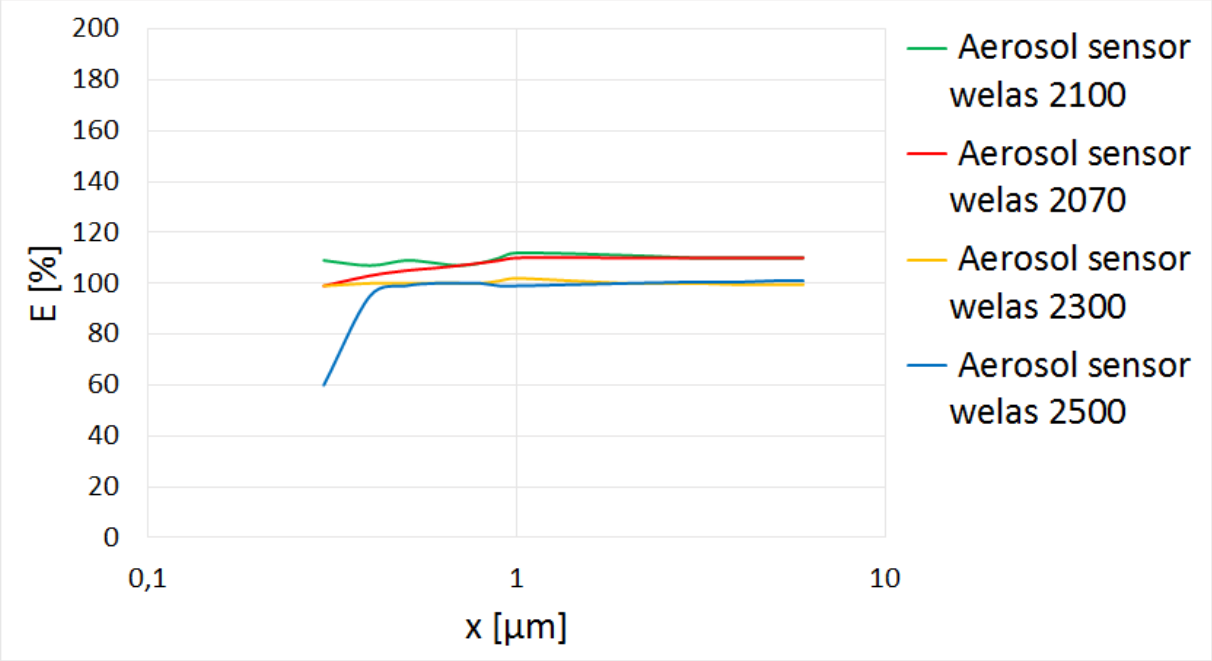
Table 2: welas / number concentration

The customer can select a sensor with the appropriate measuring volume size depending on the concentration to be measured.




For concentrations up to 1,000,000 particles/cm$^{3,}$ the welas® 2070 sensor with a small measuring volume is used. This ensures the smallest measuring volume such that only one particle ever enters the measuring volume. In low concentrations, the models with a larger measuring volume offer a higher counting rate at the same number concentration.

The welas® sensors are characterized by an excellent agreement of counting efficiency and particle size resolution. This means the measurement results are highly comparable regarding the number of concentrations and particle size measured using different sensors.




Graph 1: Counting efficiency of various sensors in relation to the welas® 2200 sensor (in the measuring range 0.2 – 10 $\mu$m)

Pressure-resistant and heatable aerosol sensors with a special cuvette for the variants P, H, and HP

**Extensions/Accessories**

Special measuring cuvettes allow the use of the welas® aerosol sensors even under unusual measuring conditions. These are available:

- heatable sensors up to 250 °C; higher temperatures on request
- pressure-resistant sensors up to 10 bar overpressure
- sensor resistant against chemically aggressive media

## BENEFITS

- The sensors are easily replaceable
- World's smallest and most robust sensors in the 2000 series
- Very good agreement of all sensors regarding particle size and particle concentration
- Minimization of particle losses in long sampling lines by easy installation of the sensor directly at the sampling point
- Sensors for in-situ measurements
- Measurement in explosive environments in 2000 series (without heating)
- Easy to clean
- Simple operation
- Reliable function
- Low maintenance
- Reduces your operating costs

## NORMS AND CERTIFICATES

ASHRAE 52.2

## DATASHEET

| | |
|---|---|
| Measurement range (number $C_N$) | 0 – 4 • $10^3$ particles/$cm^3$ |
| Measurement range (size) | 0.3 – 105 $\mu$m (3 measurement ranges) |
| Volume flow | 5 l/min (others on demand) |
| Thermodynamic conditions | +10 – +40 °C, -100 – +50 mbarg |
| Light source | Xenon arc lamp 35 W |
| Dimensions | 50 • 250 • 100 mm (H • W • D) |
| Weight | Approx. 2.8 kg |

## APPLICATIONS

- Determination of the separation efficiency of car interior filters, engine air filters, room air filters, compressed air filters, vacuum cleaner filters, cleanable filters, electrostatic precipitators, oil separators, cooling lubricant separators, wet scrubbers, cyclones, and other separators

- Isothermal and isobaric particle size and quantitative determination, for instance, in the automobile, chemical, pharmaceutical, and food industries
- Analysis of fast, transient processes
- Inspection of smoke detectors
- Particle formation for cloud formation
- Emission measurements
- Immission measurements

Mehr Informationen:
https://www.palas.de/en/product/aerosolsensorwelas2500