

# welas<sup>®</sup> digital 1000



Powerful aerosol spectrometer with the highest particle size resolution, measuring range from 120 nm to 40  $\mu\text{m}$

## Model Variations



### welas<sup>®</sup> digital 1000 P

With automatic regulation of sampling volume flow by the aerosol sensors  
welas<sup>®</sup> under overpressure up to 10 bar

## Description

The **welas<sup>®</sup> digital 1000** is a flexible, powerful and economical light-scattering spectrometer system, which determines particle concentration and size precisely and reliably.

With the **welas<sup>®</sup> digital 1000**, particle sizes above 120 nm can be reliably measured, as the special high power xenon high pressure lamp with very high light intensity and the photomultiplier are directly integrated in the aerosol sensor.

For this reason, the **welas<sup>®</sup> digital 1000** has an especially high resolution capability and an especially high classification accuracy, which is why it is used as a reference device for other measurement methods.

Unique are the four measuring ranges in only one device:

- 0.12  $\mu\text{m}$  – 3.5  $\mu\text{m}$
- 0.2  $\mu\text{m}$  – 10  $\mu\text{m}$
- 0.3  $\mu\text{m}$  – 17  $\mu\text{m}$
- 0.6  $\mu\text{m}$  – 40  $\mu\text{m}$ .

**welas<sup>®</sup> digital 1000** is famous for up to 128 size channels per measuring range and a concentration range from  $< 1$  particle/ $\text{cm}^3$  to  $5 \cdot 10^5$  particles/ $\text{cm}^3$ .

The **welas<sup>®</sup> digital** is based on scattered-light analysis on a single particle. In the **welas<sup>®</sup> digital 1000**, the special advantages of the well-known and internationally acclaimed **welas<sup>®</sup>** system are combined with new and fast digital individual signal processing. This allows a digital analysis of each individual signal with coincidence detection.

**The best size classification accuracy and the best size resolution are guaranteed by the following special feature:**

- White light and 90° light-scattering detection  
⇒ **Unambiguous calibration curve**
- Patented T-aperture  
⇒ **No border zone error**
- New digital individual signal processing  
⇒ **Coincidence detection and correction of the individual signal**

The **sensors<sup>1</sup>** are optionally available for measurements in overpressure up to 10 barg and at high temperature up to 250 °C (higher on request).

### The **welas<sup>®</sup> digital** measurement technology

**welas<sup>®</sup> digital** offers a new, fast 20 MHz signal processing processor, which analyses the progression of each particle signal.

This makes it possible to recognise coincidental events in light scattering measurement technology at the individual signal and correct them (according to Dr. Umhauer / Prof. Dr. Sachweh). This makes it possible to increase the maximum concentration limit up to  $5 \cdot 10^5$  particles/ $\text{cm}^3$ , too.

Furthermore, the new signal detection electronics, which include a new, powerful logarithmic A/D converter, allow particles of 120 nm to be measured with more than 50 % counting efficiency.

**High classification accuracy, high resolution capability and a high counting efficiency are the prerequisite for unambiguous particle measurement.**

<sup>1</sup>welas<sup>®</sup> 1100 and 1200 aerosol sensors: <https://www.palas.de/en/en/product/aerosolsensorswelas1000>

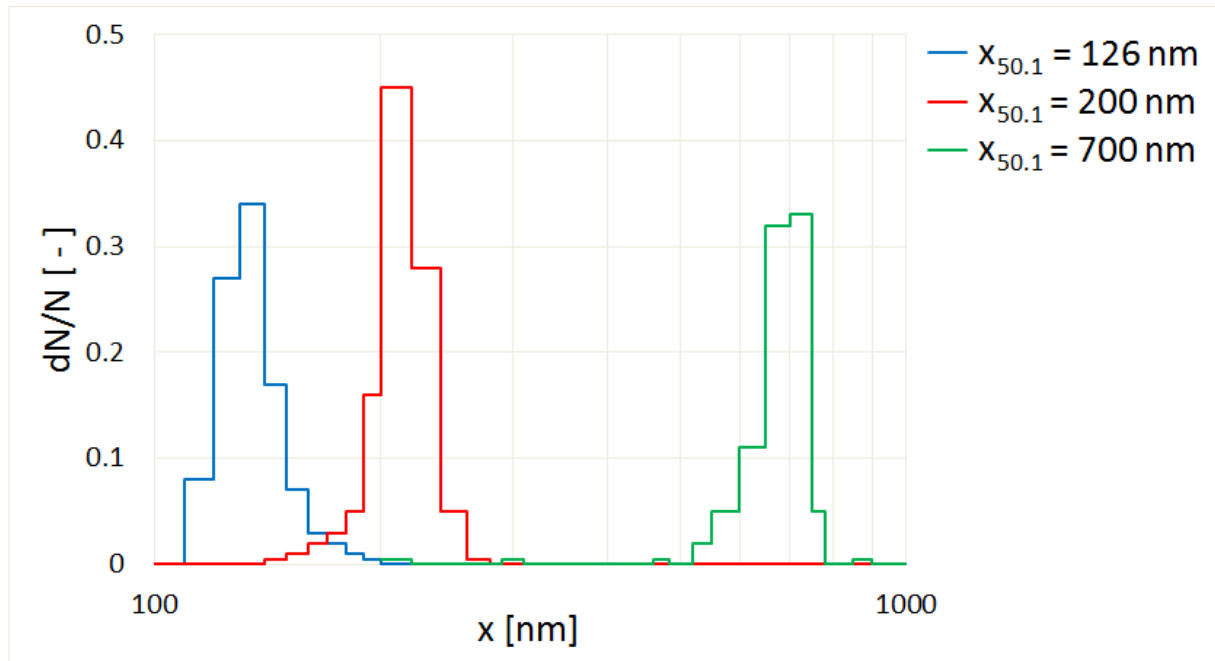


Fig. 1: Resolution capability and classification accuracy

The welas® digital is characterized by its very high counting efficiency starting from  $0.2 \mu\text{m}$ !

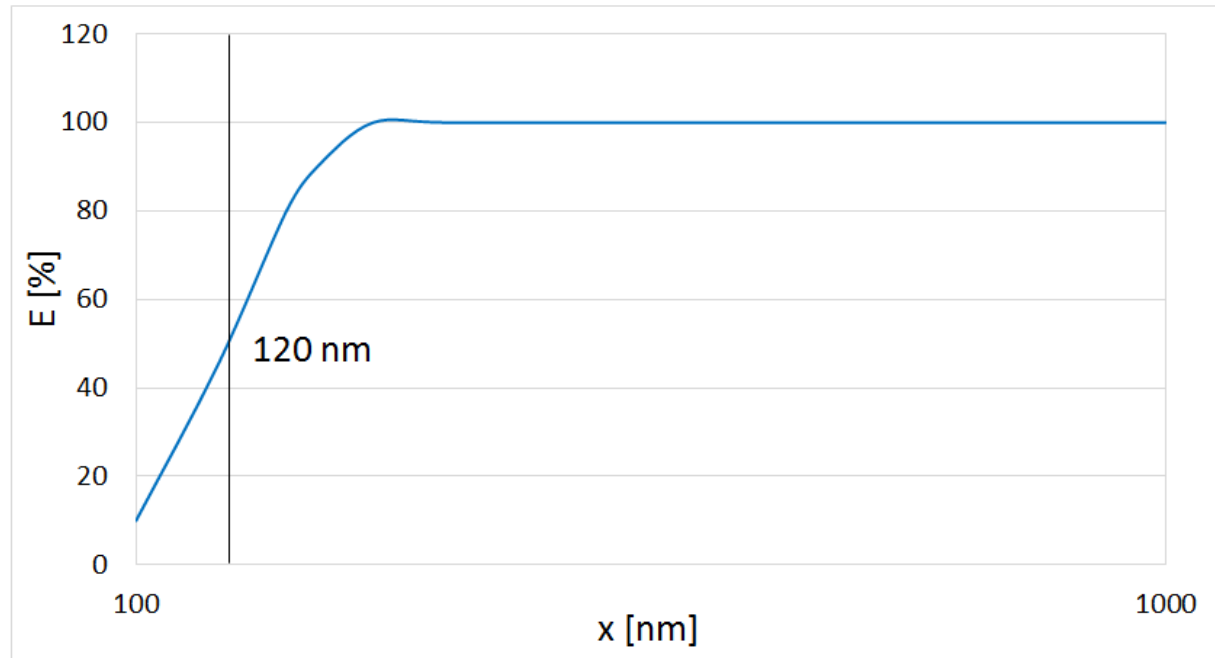


Fig. 2: Counting efficiency with the welas® 1200 sensor

The welas® digital 1000 sensors

The **welas<sup>®</sup> 1100 and 1200 aerosol sensors<sup>2</sup>** are characterized by the fact that a powerful light source and the photomultiplier are directly integrated in the sensor. This technology offers the best size resolution, the best classification accuracy and a very low detection limit.

The size of measurement volume is crucial for coincidence-free particle size and particle number measurement.

With measurements in coincidence, the diameter is measured too large and the number too small.

Theoretically, for a coincidence-free measurement, i.e. maximum one particle in the measuring volume, at a number concentration of  $10^3$  particles/cm<sup>3</sup> the measurement volume extension must not be higher than 1 mm<sup>3</sup>.

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<sup>2</sup>welas<sup>®</sup> 1100 and 1200 aerosol sensors: <https://www.palas.de/en/en/product/aerosolsensorswelas1000>

## Benefits

- Four measuring ranges in only one device:
  - 0.12  $\mu\text{m}$  – 3.5  $\mu\text{m}$
  - 0.2  $\mu\text{m}$  – 10  $\mu\text{m}$
  - 0.3  $\mu\text{m}$  – 17  $\mu\text{m}$
  - 0.6  $\mu\text{m}$  – 40  $\mu\text{m}$
- Up to 128 size channels per measuring range
- Concentration range from  $< 1 \text{ particle/cm}^3$  to  $5 \cdot 10^5 \text{ particles/cm}^3$
- Calibration curves for different refractive indices
- Very high and reproducible counting efficiency rate starting at 0.12  $\mu\text{m}$
- High temporal resolution down to 10 ms
- Extensive PDControl and FTControl software
- Strong, powerful external suction pump ASP 1000
- Calibration, cleaning and lamp replacement can all be performed independently by the customer
- Simple operation
- Low maintenance
- Reliable function
- Reduces your operating expenses

## Datasheet

Parameter	Description
<b>Interfaces</b>	USB
<b>Measurement range (size)</b>	0,12 $\mu\text{m}$ – 3,5 $\mu\text{m}$ , 0,2 $\mu\text{m}$ – 10 $\mu\text{m}$ , 0,3 $\mu\text{m}$ – 17 $\mu\text{m}$ , 0,6 $\mu\text{m}$ – 40 $\mu\text{m}$
<b>Size channels</b>	up to 64/decade
<b>Measuring principle</b>	Optical light-scattering
<b>Measurement range (number <math>C_N</math>)</b>	$< 5 \cdot 10^5$ particles/ $\text{cm}^3$
<b>Time resolution</b>	$\geq 10$ ms
<b>Thermodynamic conditions</b>	10 – 40 $^{\circ}\text{C}$ , -100 – 50 mbar
<b>Volume flow</b>	5 l/min, 1.6 l/min
<b>Data acquisition</b>	20 MHz processor, 256 raw data channels, digital
<b>Light source</b>	Xenon Hochdrucklampe 75 W
<b>User interface</b>	Laptop
<b>Power supply</b>	115 – 230 V, 50 – 60 Hz
<b>Housing</b>	Table housing, optionally with mounting brackets for rack-mounting
<b>Dimensions</b>	185 • 450 • 315 mm (H • W • D) (19")
<b>Weight</b>	approx. 8 kg (control unit), approx. 18 kg (sensor)
<b>Software</b>	PDControl, FTControl
<b>Installation conditions</b>	+5 – +40 $^{\circ}\text{C}$ (control unit)

## 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

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