



The welas<sup>®</sup> digital 3000 is a flexible, powerful, and economic light-scattering spectrometer system with two aerosol sensors, which determines particle concentration and size precisely and reliably.

welas<sup>®</sup> digital 3000 is famous for up to 128 size channels per measuring range and a concentration range from  $< 1$  particle/cm<sup>3</sup> to 10<sup>6</sup> particles/cm<sup>3</sup>.

## MODEL VARIATIONS



### welas<sup>®</sup> digital 3000 H

Version with heating regulation up to 250 °C for welas<sup>®</sup> aerosol sensors



### welas<sup>®</sup> digital 3000 HP

配备耐温耐压型welas<sup>®</sup> 气溶胶传感器，支持在2 - 10 bar 高压和最高120 °C 温度下测量，自动控制采样体积流量



### welas<sup>®</sup> digital 3000 P

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

## 工作原理

### AEROSOL SPECTROMETER WITH TWO AEROSOL SENSORS FOR QUASI SIMULTANEOUS MEASUREMENTS

On the welas<sup>®</sup> digital 3000, two welas<sup>®</sup> sensors are supplied with one light source, and a photomultiplier detects the scattered light pulses. This enables a quasi-simultaneous particle measurement at two sampling locations up to 100 meters apart.

The quasi-simultaneous particle size and particle quantitative determination offer particular advantages for characterizing separators with fluctuating raw gas concentrations.

With the welas<sup>®</sup> digital 3000, the user effectively has two scattered-light spectrometers in one device with the same device characteristics:

- Particle size resolution capability
- Particle size classification accuracy
- Counting efficiency
- Zero counting rate

The various welas<sup>®</sup> sensors are characterized by perfect conformity of counting efficiency and particle size resolution (see data sheet: welas<sup>®</sup> sensors).

Using optomechanical switching, the two connected sensors can be easily controlled. The sensors are controlled automatically with the software.

The particular advantage over a manual measurement selector switch:

- Faster change of the measurement location
- No deposits in sampling lines
- Long service life; no wear of the seals due to dust particles

Its optical fiber technology characterizes the welas<sup>®</sup> digital 3000<sup>®</sup> digital 3000 is characterized by its optical fiber technology. The welas<sup>®</sup> sensor is connected via a fiber optic cable of up to 30 m with the welas<sup>®</sup> digital control unit.

This minimizes particle losses in long sampling lines by simply installing the sensor directly at the sampling location.

Connection via fiber-optic cable allows the welas<sup>®</sup> 2000 and 2000 P/HP/H series sensors to be easily connected to the control and evaluation unit and interchanged as required.

The welas<sup>®</sup> sensors are equipped with different-sized measurement volumes. This allows adaptation of the measuring device to the particle concentration in the application, such that a high counting rate can be achieved with a short measuring time.

The aerosol sensors allow reliable measurement in the concentration range from  $< 1$  particle/cm<sup>3</sup> to  $10^6$  particles/cm<sup>3</sup>.

The welas<sup>®</sup> digital is based on scattered-light analysis on a single particle. With the new welas<sup>®</sup> digital, the special advantages of the well-known and internationally acclaimed welas<sup>®</sup> system are combined with new and fast digital individual signal processing, and coincidence correction is enabled.

The high size classification accuracy and the high size resolution are guaranteed by the following special feature (see Graph 1):

- White light and 90° light-scattering detection ⇒ Unambiguous calibration curve

- Patented T-aperture  $\Rightarrow$  No border zone error
- New digital individual signal processing  $\Rightarrow$  Coincidence detection and correction of the individual signal making it possible to measure in higher concentrations

welas<sup>®</sup> digital offers a fast signal processing processor, which analyses the progression of each particle signal. This makes it possible to recognize coincidental events in light scattering measurement technology at the individual signal and correct them (according to Dr. Umhauer / Prof. Dr. Sachweh).

This way, it is possible to increase the maximum concentration limit up to  $10^6$  particles/cm<sup>3</sup> (welas<sup>®</sup> 2070 sensor).

Also, low concentrations of  $< 1$  particle/cm<sup>3</sup> with the welas<sup>®</sup> 2500 sensor lead<sup>3</sup> with the welas<sup>®</sup> 2500 sensor lead to higher measuring accuracy.

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

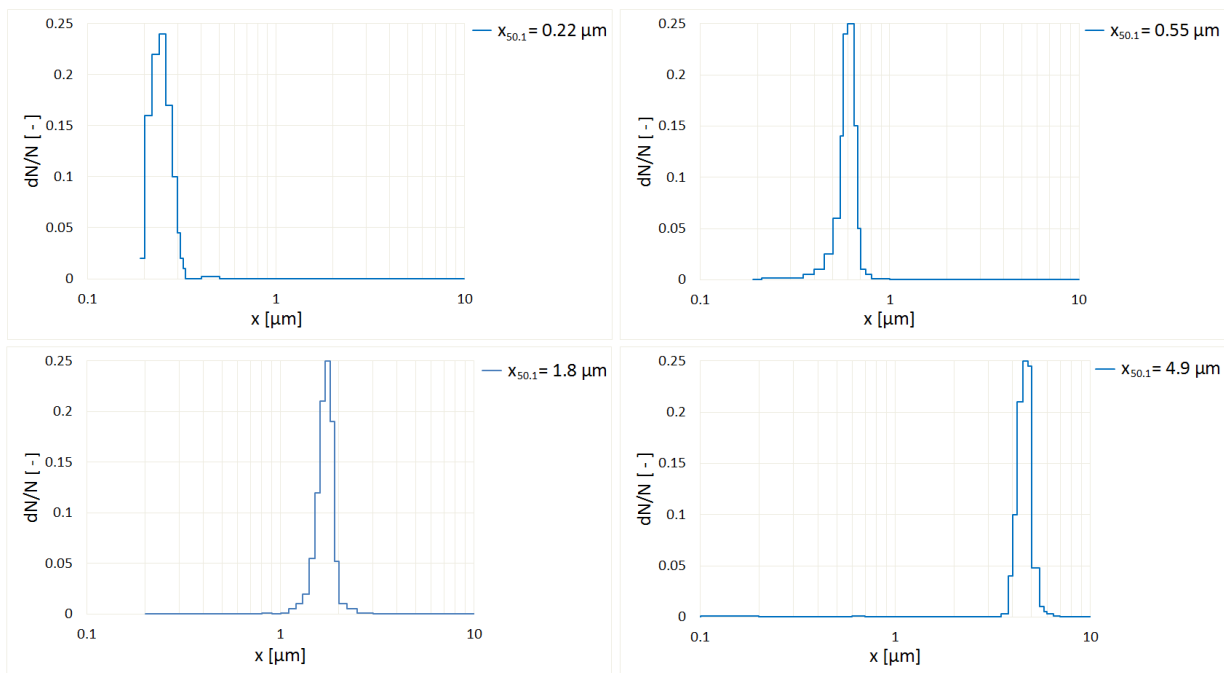


Fig. 1: Resolution capability and classification accuracy

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

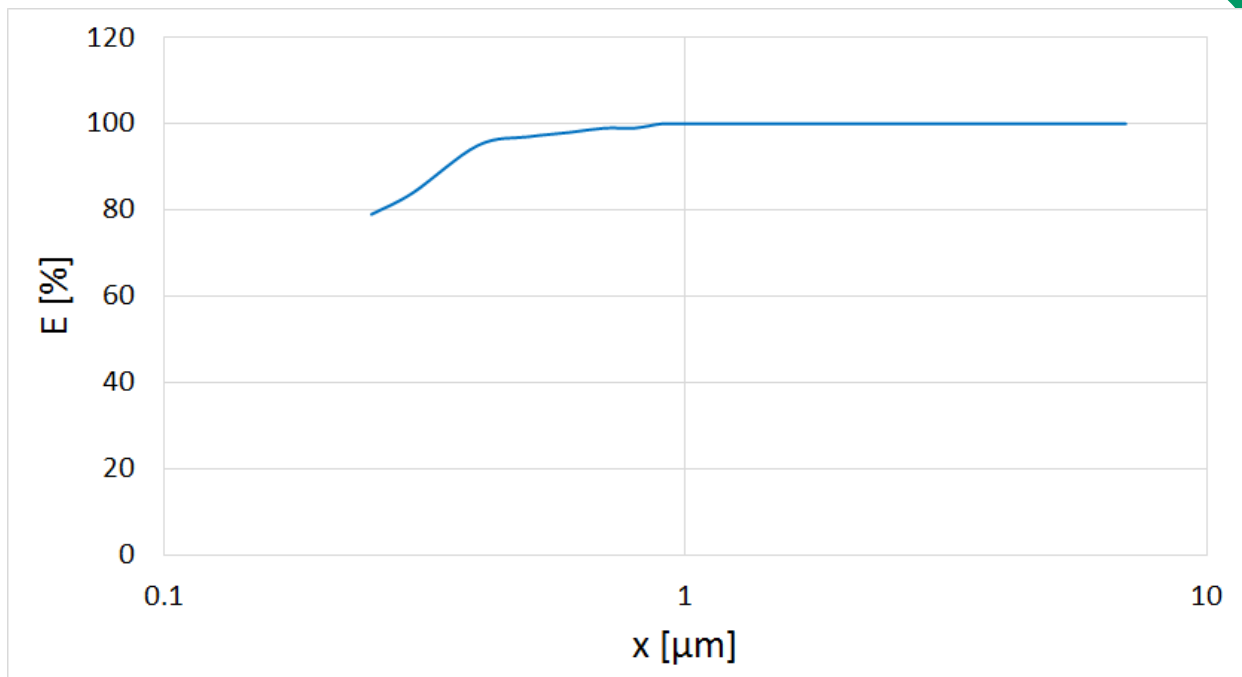


Fig. 2: Example with sensor

### Extensions/Accessories

The welas<sup>®</sup> digital is controlled via a laptop using the PDControl software. The software allows particle measurements and calibration of the measurement device.

In addition, the measurements can be analyzed and compared in detail with a temporal resolution down to 10 ms.

## 优势

- Measuring range of 0.2 to 100  $\mu\text{m}$  (4 measuring ranges selectable in one device)
- Up to four measuring ranges in only one device:
  - 0,2  $\mu\text{m}$  – 10  $\mu\text{m}$
  - 0,3  $\mu\text{m}$  – 17  $\mu\text{m}$
  - 0,6  $\mu\text{m}$  – 40  $\mu\text{m}$
  - 2  $\mu\text{m}$  – 100  $\mu\text{m}$  (additionally for sensors 2300 and 2500)
- Up to 128 size channels per measuring range
- Concentration range of 1 particle/ $\text{cm}^3$  up to  $10^6$  particles/ $\text{cm}^3$
- Calibration curves for different refractive indices
- Very high and reproducible counting efficiency rate starting at 0.2  $\mu\text{m}$  (see Graph 2)
- High temporal resolution down to 10 ms
- Optical fiber technology
- Measurement in potentially explosive environment
- Long service life of the light source of 2000 h
- Extensive PDControl
  
- Simple operation
- Calibration, cleaning and lamp replacement can all be performed independently by the customer
- Low maintenance
- Reliable function
- Reduces your operating expenses

## 技术数据

测量原理	Optical light-scattering
测量范围(数量浓度)	$< 1 \cdot 10^6 \text{ particles/cm}^3$
测量范围(粒径)	0.2 – 10 $\mu\text{m}$ , 0.3 – 17 $\mu\text{m}$ , 0.6 – 40 $\mu\text{m}$ , 2 – 100 $\mu\text{m}$
体积流量	5 l/min
Size channels	Max. 64/decade
Time resolution	$\geq 10 \text{ ms}$
接口	USB
User interface	Laptop
软件	PDControl
Thermodynamic conditions	+10 – +40 °C, -100 – 50 mbar
Data acquisition	Digital, 20 MHz processor, 256 raw data channels
Light source	Xenon arc lamp 35 W
外壳	Table housing, optional: with mounting brackets for rack-mounting
电源	115 – 230 V, 50/60 Hz
Installation conditions	+5 – +40 °C (control unit)
Dimensions	185 • 450 • 315 mm (H • W • D) (19")
重量	Control unit: approx. 18 kg, sensor: approx. 2.8 kg

## 应用领域

- Separation efficiency determination of automotive cabin air filters, engine air filters, ambient air filters, compressed air filters, vacuum cleaner filters, cleanable filters, electrostatic precipitators, oil separators, cooling lubricant separators, wet separators, cyclones, and other separators
- Isothermal and isobaric particle size and quantity determination, e.g., in the automotive, chemical, pharmaceutical, and food industries
- Investigation of fast, transient processes
- Test of smoke detectors
- Particle measurement for cloud formation
- Emission measurements
- Breathing function: inhalate / exhalate (particle size and number)



Mehr Informationen:

<https://www.palas.de/zh/product/welasdigital3000>