



## Product data sheet

### Palas® Fidas® 200 E



#### Applications

- Regulatory environmental monitoring in measuring networks
- Ambient air measurement campaigns
- Long-term studies
- Emission source classification
- Distribution studies (e.g. fires, volcanoes) Indoor air quality studies

## Benefits

- High flexibility for installation due to separation of sensor unit and control unit
- Continuous and simultaneous real-time measurement of multiple PM values
- Additional information on particle number concentration and particle size distribution
- Adjustable time resolution starting at 1 minute
- Light source: LED with high stability and long lifetime
- Long service life
- Low maintenance
- External check of calibration on site possible
- Intuitive and easy to operate
- Reliable function, very high data availability (> 99 %)
- 2 pumps in parallel operation for additional operational safety due to redundancy
- Permanent monitoring of status, among others online monitoring of calibration
- Remote monitoring, maintenance and control easily possible
- Cloud zone via Palas server for worldwide data retrieval
- No radioactive material
- No consumables

## Description

The Fidas® 200 E is a fine dust monitoring and ambient air measurement system for ambient air monitoring of fine dust for regulatory purposes. This version is - like the Fidas® 200 -designed for indoor installation at temperature-controlled sites and is typically incorporated in measurement cabinets or stations.

The Fidas® 200 E enables the continuous and simultaneous measurement of PM<sub>1</sub>, PM<sub>2.5</sub>, PM<sub>4</sub>, PM<sub>10</sub>, TSP (PM<sub>tot</sub>), as well as the particle number concentration and the particle size distribution in a size range of 180 nm to 18 µm (further non-certified size ranges possible upon request).

The Fidas® 200 E is based on the Fidas® 200, which including the variant Fidas® 200 S is currently the only optical ambient air measuring system for online and simultaneous PM<sub>2.5</sub>- and PM<sub>10</sub>-measurements at single particles (counting measuring method), which is type-approved according to the Standards VDI 4202-1, VDI 4203-3, EN 12341 (PM<sub>10</sub>), EN 14907 (PM<sub>2.5</sub>) and the EN Equivalence Guide GDE and certified according to the Standards EN 15267-1 and -2.

The Fidas® 200 E differs from the Fidas® 200 in that the complete sensor unit is removed from the control unit and is placed in an external housing. The connection between the sensor unit and the control unit is carried out via respective connecting lines/-tubes (standard length 3 m, different lengths upon request). The external sensor unit itself is connected downstream to the sampling system (outlet of IADS) as usual. By separating the sensor unit from the

control unit and the related possible separation between the installation site of the control unit and installation site of the sampling, the degree of freedom for the installation of the measuring system in a measuring station is increased significantly, especially in case of already given infrastructures (e.g. existing roof penetrations from former installations). The sensor unit can also easily be re-installed in the control unit, so that at any time the measuring system Fidas® 200 E can be transferred back to the measuring system Fidas® 200.

The official declaration of suitability and the incorporation of the Fidas® 200 E into the existing certification of the Fidas® 200 respectively Fidas® 200 S according to Standard series EN 15267 has been recommended to the certification body by the responsible working group FG "Prüfberichte" and is expected in Spring 2016 (Status: mid December 2015).

The Fidas® 200 E uses the recognized measurement technology of optical light scattering of single particles and is equipped with an LED light source with high intensity (dp<sub>min</sub> = 180 nm), highly stable output and long lifetime. The calibration of the system can be checked and adjusted, if necessary, easily and quickly also under field conditions on site at any time with the help of a monodisperse test powder.

The Fidas® 200 E operates with a volume flow of approx. 0.3 m<sup>3</sup>/h and is equipped with a Sigma-2 sampling head as per Standard VDI 2119-4, which enables representative measurements even under strong wind conditions. The sampling system includes a drying system (intelligent aerosol drying system - IADS)

that prevents measurement inaccuracies caused by condensation effects resulting from high humidity. In addition, a weather station provides reliable results for ambient air temperature, atmospheric pressure, and relative humidity, by request additionally also for wind velocity, wind direction and precipitation. It is also equipped with a filter holder for the insertion of a plane filter (47 or 50 mm in diameter). This enables a subsequent chemical analysis of the composition of the aerosol, for example.

The Fidas® 200 E offers various possibilities for communication and allows both complete remote control and remote maintenance of the systems and also online data access via [www.palas.de/user](http://www.palas.de/user). The evaluation software PDAnalyze Fidas® allows additionally for versatile data evaluations (e.g. extensive statistics and averaging calculations) and offers data export possibilities.

## Design and function

The actual aerosol sensor is an optical aerosol spectrometer that determines the particle size using Lorenz-Mie scattered light analysis of single particles. The single particles move through an optically differentiated measurement volume that is homogeneously illuminated with white light. Each particle generates a scattered light impulse that is detected at an angle of 85° to 95° degrees. The particle number is measured based on the number of scattered light impulses. The level of the scattered light impulse is a measure of the particle size diameter

The lower detection limit for immission measurement was able to be reduced to

180 nm through improved optics, higher light density using a new white LED as the light source, and improved signal analysis (logarithmic analog digital converter). This enables greatly improved detection, especially of smaller particles, which are mainly found at high concentrations near roadsides (see Fig. 1).

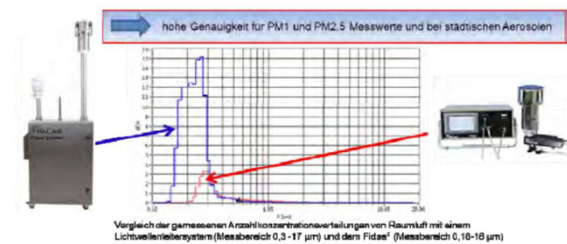


Fig. 1: Higher sensitivity with the Fidas® fine dust measurement system for the 0.18 - 18 µm particle size range

The better the classification accuracy and the resolution capacity, the more accurate the definition of the particle size distribution.

Using a white light source enables a precise and unambiguous calibration curve to be obtained, resulting in an extremely high size resolution. The patented T-stop provides a precisely defined optical measurement volume and enables particle measurement without border-zone errors, resulting in a precise size measurement. The new digitized electronic signal analysis system enables the rapid identification and correction of coincidence, as necessary.

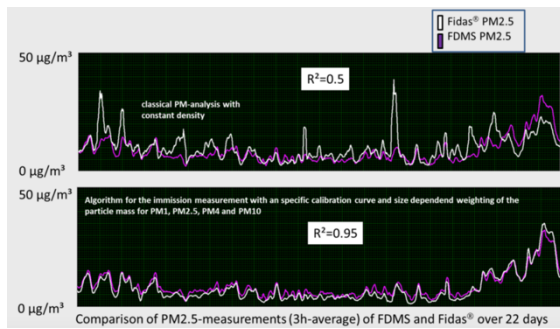


Fig. 2: Comparison of the algorithms for conversion of the particle size distribution by PM values

In order to convert the measured values into a mass or mass fraction, the high-resolution particle size distribution in each value is multiplied by a correlation factor that reflects the different sources (e.g. combustion aerosols, tire wear, pollen) of the environmental aerosol (see Fig. 2). A mass fraction is obtained by additionally applying the separation curve (see DIN EN 481) to the determined particle size distribution. Exact matches with gravimetric results cannot be guaranteed in every case due to the different principle of measurement (equivalent method), but as a matter of principle a very good correlation with the standard reference method (see Fig. 3) could be demonstrated among others during the type approval testing and can be reviewed in the type approval test report of the Fidas® 200 S respectively Fidas® 200 under [www.qal1.de](http://www.qal1.de).

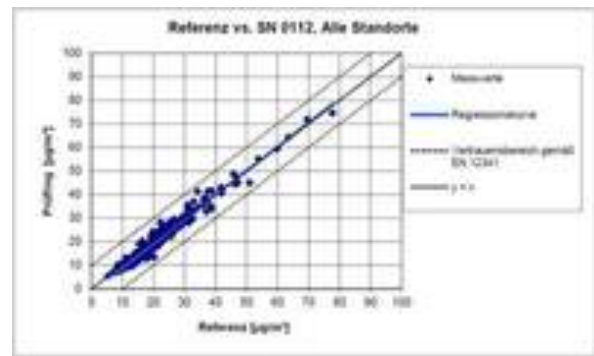


Fig. 3: PM10 reference equivalence function of the Fidas® 200 S in comparison with a reference small-filter device during the course of suitability testing from the "Report on supplementary testing of the Fidas® 200 S respectively Fidas® 200 measuring system manufactured by PALAS GmbH for the components suspended particulate matter PM10 and PM2.5, TÜV report no.: 936/21227195/A".

Multiple separation curves can be used simultaneously for the same size distribution, which enables the simultaneous output of PM10, PM2.5, PM1 (and others).

## Specifications

<b>Interfaces</b>	USB, Ethernet, RS232/485, Wi-Fi
<b>Measurement range (size)</b>	0.18 - 100 $\mu\text{m}$ (3 measuring ranges)
<b>Size channels</b>	64 (32/decade)
<b>Measuring principle</b>	Optical light-scattering
<b>Measurement range (number CN)</b>	0 - 20000 particles/cm <sup>3</sup>
<b>Time resolution</b>	1 s - 24 h, 15 min in type approved operation
<b>Volume flow</b>	4.8 l/min $\pm$ 0.3 m <sup>3</sup> /h
<b>Data acquisition</b>	Digital, 20 MHz processor, 256 raw data channels
<b>Power consumption</b>	Approx. 200 W
<b>User interface</b>	Touchscreen, 800 • 480 Pixel, 7
<b>Power supply</b>	115 - 230 V, 50 - 60 Hz
<b>Housing</b>	Table housing, optionally with mounting brackets for rack-mounting (control unit)
<b>Dimensions</b>	450 • 320 • 180,5 mm (H • B • T), 19
<b>Weight</b>	9.3 kg (control unit only)
<b>Operating system</b>	Windows embedded
<b>Data logger storage</b>	4 GB
<b>Software</b>	PDAnalyze Fidas®
<b>Aerosol conditioning</b>	Thermal with IADS
<b>Measurement range (mass)</b>	0 - 10000 $\mu\text{g}/\text{m}^3$
<b>Sampling head</b>	Sigma-2
<b>Ambient conditions</b>	-10 - +50°C