AQ Guard

Measuring device for monitoring indoor air quality. Measurement of dust concentrations starting at 150nm(*1)incl. CO2and tVOC for calculation of air quality and infection risk index.

Description

Fig. 1: AQ Guard

AQ Guard, currently the most advanced compact analyzer for determining indoor air quality, continuously and reliably analyses airborne fine dust particles in the range 175 nm – 20 μm (*1)IAHP-Package starting from 150nm). A newly developed mass conversion algorithm calculates PM values based on single particle optical light scattering, taking signal duration and shape into account. Sensor system and algorithms were developed based on the technology of the EN 16450 certified Fidas® 200. The "Ambient" version (with heated aerosol inlet) achieves precision comparable to type approved analyzers, which makes AQ Guard stand out compared to similar devices.

AQ Guard

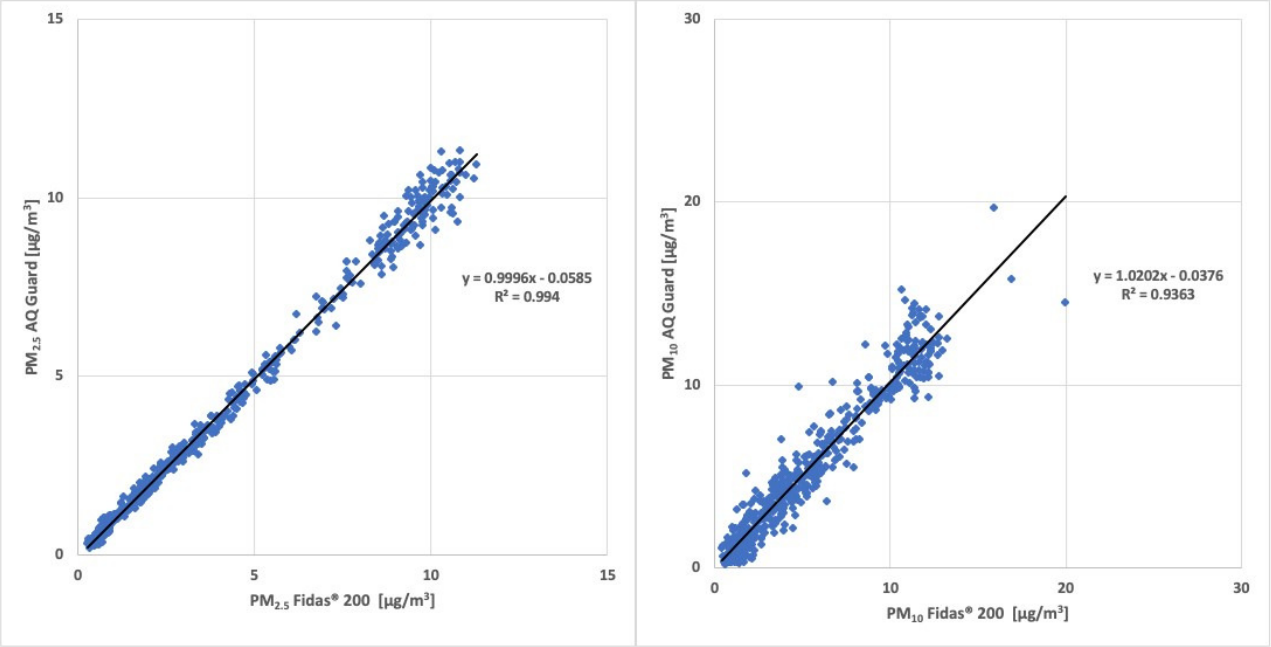

Fig. 2: Comparison of data recorded by AQ Guard ambient and Fidas® 200 S

Besides the PM10 und PM2.5 fine dust fractions, relevant for regulatory immission control, AQ Guard simultaneously calculates and records PM1, PM4, the total dust load, the particle number concentration Cn as well as the particle size distribution. AQ Guard thus provides precise and comprehensive informationen about particulates as only a single particle counting and sizing device can.

AQ Guard is designed for unattended, continuous operation and features an extraordinarily durable sampling gas blower. Aerosol sampling as well as optical sensor system resist staining but can be cleaned, if necessary, by the user.

Exceptional long term stability of the measuring system is achieved by automatic calibration tracking and allows up to two years of operation without recalibration. Calibration status can be checked, using a test powder calibrated by Palas®. This makes Palas® aerosol spectrometers the only optical fine dust monitors which can be user calibrated with a traceable standard on site.

AQ Guard

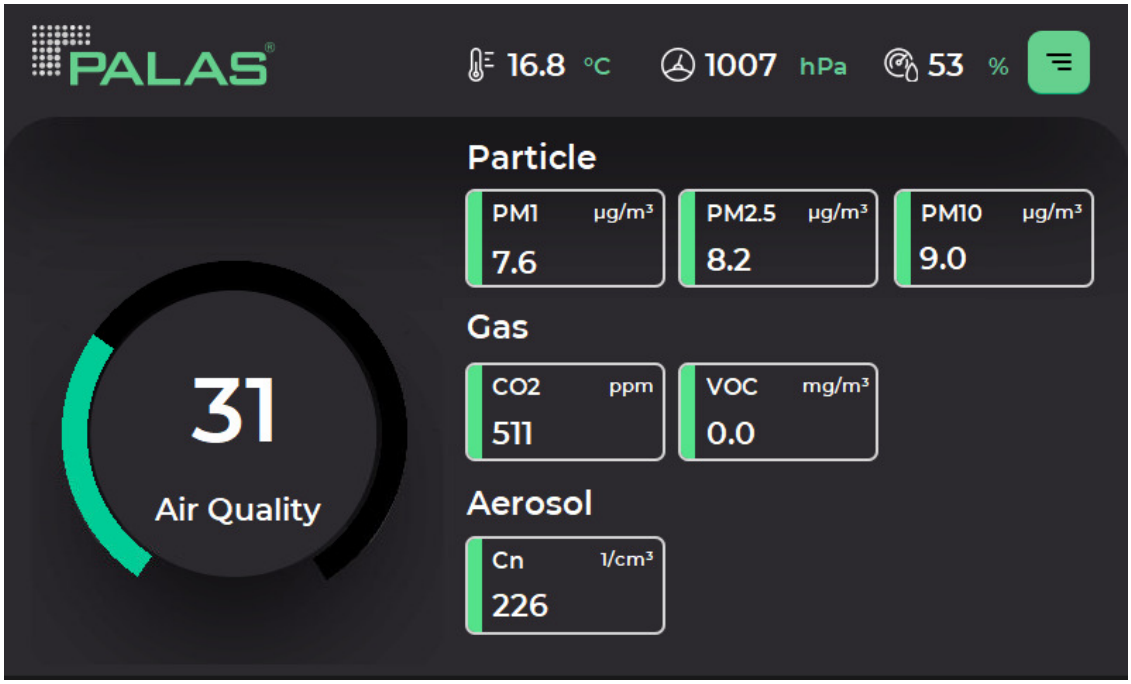

Fig. 3: AQ Guard screen view

Auxiliary sensors for CO_2 and volatile organic carbohydrates (VOC) built into AQ Guard provide data for calculating an indoor air quality index (AQI) according to the European model. AQ Guard also records air temperature, pressure and relative humidity.

Since CO2 is a tracer for human breath the combined measurement of CO2content and particle size distribution can be used to indicate air contamination by germs and particles emitted by humans. Indoors it it thus possible to determine the fraction of the air that has been exhaled by persons present and contains potentially infectious particles. This kind of data evaluation is a new dimension for assessing indoor air quality, and is available as an "infection risk indicator" (pat. pending) in the AQ Guard. An assessment of air pollution with respect to human aerosols is more specific and meaningful than a general air quality index (AQI).

To achieve better resolution and calculation of aerosol concentration in the particle size range of typical airborne viruses, the resolution of nanoscale particles is increased and lowered to 150nm instead of the usual 175nm.

The resulting improved imaging performance enables a more accurate measurement of particle concentration and concentration progression over time, which is particularly necessary to determine the effectiveness of measures to reduce the particle number concentration ([*1)]IAHP extension).

AQ Guard

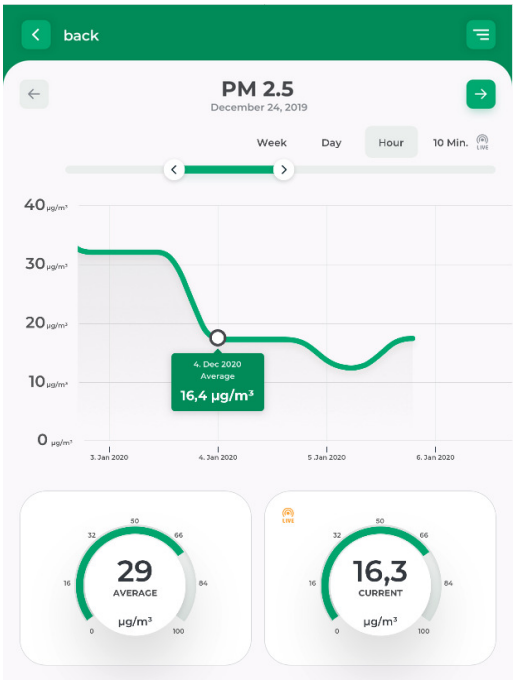

Fig. 4: Web interface

AQ Guard features fast data interfaces and allows real time access over Ethernet, WiFi or cellular network. Since all results are calculated and recorded within the analyzer it requires no external data processing by, e.g., cloud computing. Users retain full control over their data and decide over information access. AQ Guard can provide numerical data, using various communication protocols, as well as visualize information on any type of device using a modern web interface.
Compact design and optional power supply on the Ethernet port (PoE) simplifies installation in buildings and integration in an existing infrastructure.

AQ Guard is available in different expansion stages:

Basic version:

The basic version of the AQ Guard provides measured values of the fine dust fractions PM_{10} and $PM_{2.5}$.

"Fine Dust Professional" - Package:

For applications that require more detailed information on the particles, we offer the "Fine Dust Professional" add-on package. Here, further PM fractions, the number concentration as well as the particle size distribution data are available.

"Healthy Rooms" - Package:

For applications in the field of indoor air quality and hygiene we offer the additional package "Healthy Rooms". This provides measured values for CO_2 and tVOC concentration in the air, air quality index and infection risk index.

"Indoor Air Hygiene Professional" - Package:

Compared to the above packages, this version has the measurement limit for small particles extended downwards to 150 nm to meet the specific requirements of detecting airborne viruses.

The "Indoor Air Hygiene Professional" package is designed to meet the requirements of expert users in the field of indoor air and air hygiene. It includes all the features of the "Fine Dust Professional" and "Healthy Rooms" packages.

In addition, it enables the evaluation of the air hygiene quality of a room based on measured values recorded over a defined test period or, in conjunction with an aerosol generator, the investigation of the spread of aerosols and the effectiveness of measures to reduce the aerosol concentration.

AQ Guard

Benefits

- Technology based on the type approved Fidas® 200 series (EN16450 and MCERTS); simultaneous measurement of C_n, PM_1, $PM_{2.5}$, PM_4, PM_{10}
- With "Indoor Air Hygiene Professional" extension - increased counting efficiency for nano-scaled particles from 150nm
- Computation of air quality index based on measurements of particulates, CO_2, and VOC
- Estimation of infection risk based on measurements of CO_2 and particulate matter
- High accuracy due to advanced algorithms
- Long term stable due to self calibration for measurement of flow rate, particulates, and gaseous pollutants
- 2 years operation without calibration
- Operates on AC, DC, or power-over-Ethernet

AQ Guard

Datasheet

Parameter	*Description*
Interfaces	USB, Ethernet (LAN), Wi-Fi, optional: 4G
Measurement range (size)	0.175 – 20 μm (with IAHP-Package installed, starting from 0.150 μm)
Size channels	64 (32/decade)
Measuring principle	Single particle optical light scattering with evaluation of signal duration and shape,advanced mass conversion algorithm
Measurement range (number C_N)	0 – 20.000 particles/cm³
Volume flow	1.0 l/min $\triangleq$ 0.06 m³/h
Data acquisition	Digital, 22 MHz processor, 256 raw data channels
Light source	Long term stable LED
Power consumption	< 20 W
User interface	Touchscreen 800 • 480 pixel, 5" (12.7 cm)
Dimensions	175 • 280 • 140 mm (H • W • D)
Weight	2.4 kg
Operating system	Windows 10 IoT Enterprise
Data logger storage	10 GB
Software	PDAnalyze
Response time	1 s
Aerosol conditioning	Optional: thermal with compact IADS
Measurement range (mass)	0 – 20,000 μg/m³
Reported data	PM_1, $PM_{2.5}$, PM_4, PM_{10},TSP, C_N, particle size distribution, pressure, temperature, relative humidity, CO_2, TVOC, Infection Risk Index, Air Quality Index
Installation conditions	-20 – +50 °C
Linearity	0.95 – 1.05 (measured against EN16450 certified Fidas® 200)
Accuracy	R2 > 0,98 for PM2.5 and R2> 0,94 for PM10 versus EN16450-certified Fidas® 200 (15 min average, each)

AQ Guard

Applications

- Industry:
  - Production processes
  - Bulk material handling (mixing, discharge, storage, packaging etc.)
  - Fenceline Monitoring
- Construction sites: Roads, railroads, demolition sites
- Buildings: Schools, kindergartens, hospitals, hotels, offices, public service buildings
- Residential buildings near construction sites or other polluted areas
- Public transportation: Airports, train stations, tramway underground stations, cruise ships, passenger cabin, e.g. in tram, train

Palas GmbH
Partikel- und Lasermesstechnik
Greschbachstrasse 3 b
76229 Karlsruhe
Germany

Managing Partner:
Dr.-Ing. Maximilian Weiß, Udo Fuchslocher
Commercial Register:
register court: Mannheim
company registration number: HRB 103813
USt-Id: DE143585902

Contact: E-Mail: mail@palas.de Internet: www.palas.de Tel: +49 (0)721 96213-0 Fax: +49 (0)721 96213-33