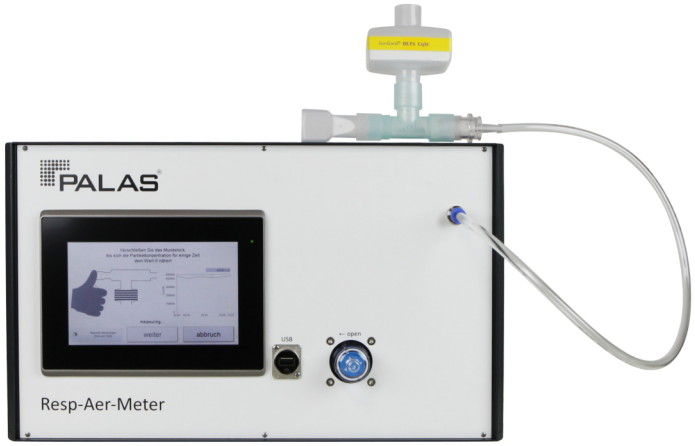
RESP-AER-METER



Viruses such as Covid-19 or flu viruses spread as aerosols and infect other people through the respiratory tract.

Superspreaders or superemitters are people who exhale a particularly high number of pathogens. They are therefore considered to be particularly infectious. The Resp-Aer-Meter helps to identify superspreaders and initiate appropriate safety measures.

MODEL VARIATIONS

Resp-Aer-Meter Infection Guard

The Resp-Aer-Meter Infection Guard helps to identify potential superspreaders and thus to detect a potential risk of infection - for example in athletes

Resp-Aer-Meter Scientific

The Resp-Aer-Meter Scientific offers a wide range of additional information and data and can be used for scientific applications, for example in the medical field

OPERATION PRINCIPLE

DETECTION OF PARTICLES IN BREATHING AIR

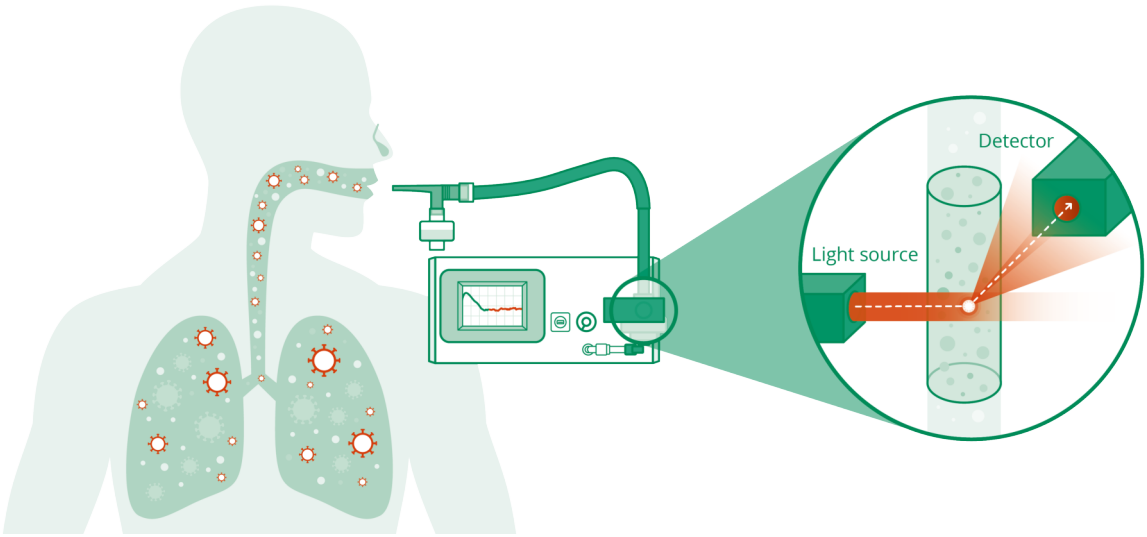


Fig. 1: Resp-Aer-Meter / How it works

To analyze the risk of infection, the test person inhales and exhales into the measuring device for approx. 30 seconds.

The Resp-Aer-Meter sucks in the exhaled air. Before the measurement, the aspirated particles are conditioned in the aerosol conditioning area to differentiate between pure droplets (e.g., spit or water droplets) and potentially infectious particles (bacteria, viruses = solid).

To measure the particle size and concentration, the Resp-Aer-Meter works with the white light LED sensor of the Fidas® system, which has proven itself in environmental measurements. Even the smallest particles from 150 nm are recorded individually, and their size and number are detected online.

More about the spread of virus-carrying aerosols by superspreaders can be found here[1] .

Comparison measurements

The Resp-Aer-Meter was the subject of a scientific study involving over 300 issues. Approximately 120 people were infected with Covid-19. The study investigated the extent to which the Resp-Aer-Meter could detect infected individuals. The values are shown here in a ROC curve, with sensitivity (true positive rate) on the y-axis and specificity (false positive rate) on the x-axis. The area under the curve (AUC) of the ROC curve measures how well the exhaled aerosols perform as an indicator of respiratory infection (COVID-19 in this case).

[1] Exhaled aerosol increases with COVID-19 infection, age, and obesity: https://www.pnas.org/content/118/8/e2021830118

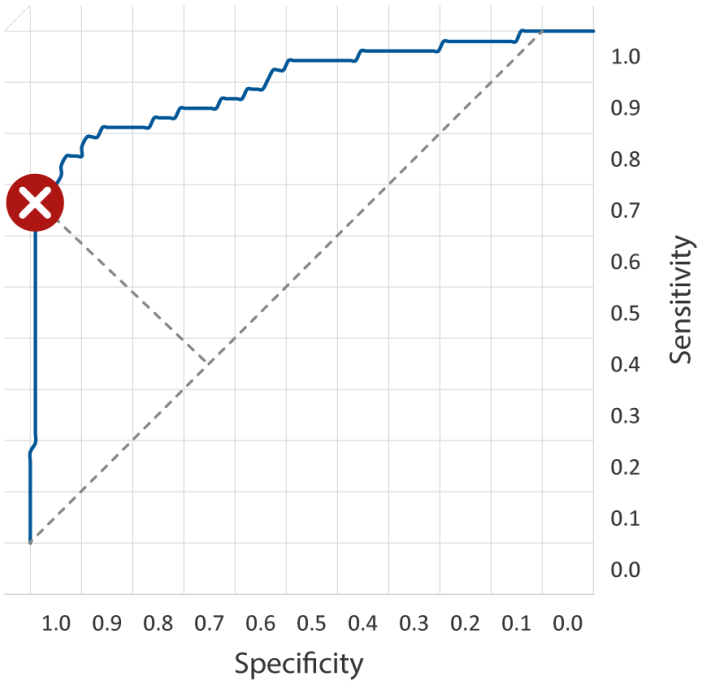


Fig. 2: ROC curve

- Exhaled aerosols are very suitable for detecting patients with respiratory diseases: This is made clear by the high AUC of 0.8951.
- The steep slope of the ROC curve shows that the particle count is very well suited to distinguish infected from non-infected persons.
- A threshold value enables a short, clear statement of whether a person is infected (a yes/no statement comparable to a PCR test).
- Furthermore, an output of the Resp-Aer-Meter is an individual false positive rate.

Find here the published study "Aerosol measurement identifies SARS-CoV 2 PCR positive adults compared with healthy controls" at Frankfurt University Hospital (doi.org/10.1016/j.envres.2022.114417)

Publications

Further publications using the Resp-Aer-Meter can be found here:

www.frontiersin.org/articles/10.3389/fped.2022.941785/full

doi.org/10.21203/rs.3.rs-1089497/v1

Benefits

- So-called "superemitters" can be identified in 30s thanks to a high number of particles
- Fast differentiation between infectious and less infectious Covid-19 carriers
- Measurement of the aerosol concentration and aerosol size in exhaled air
- Detection of particles from 145 nm to 10 μm
- Highest resolution, especially in the virus size range from approx. 145 nm to 1 μm
- Immediate evaluation and documentation of the measurement result

DATASHEET

Measuring principle	Optical light-scattering
Measurement range (number C_N)	0 – 20,000 particles/cm³
Measurement range (size)	0.15 – 10 μm
Volume flow	9.5 l/min
User interface	Touchscreen, 800 • 480 pixel, 7″ (17.78 cm)
Data acquisition	Digital, 20 MHz processor, 256 raw data channels
Power consumption	Approx. 200 W

Applications

- Detection of potential superemitters (Covid-19, flu virus)
  - in industry, e.g., meat processing, automotive, chemistry
  - in airports, train stations, public buildings
  - at events such as trade fairs and seminars
  - in hospitals and nursing homes

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