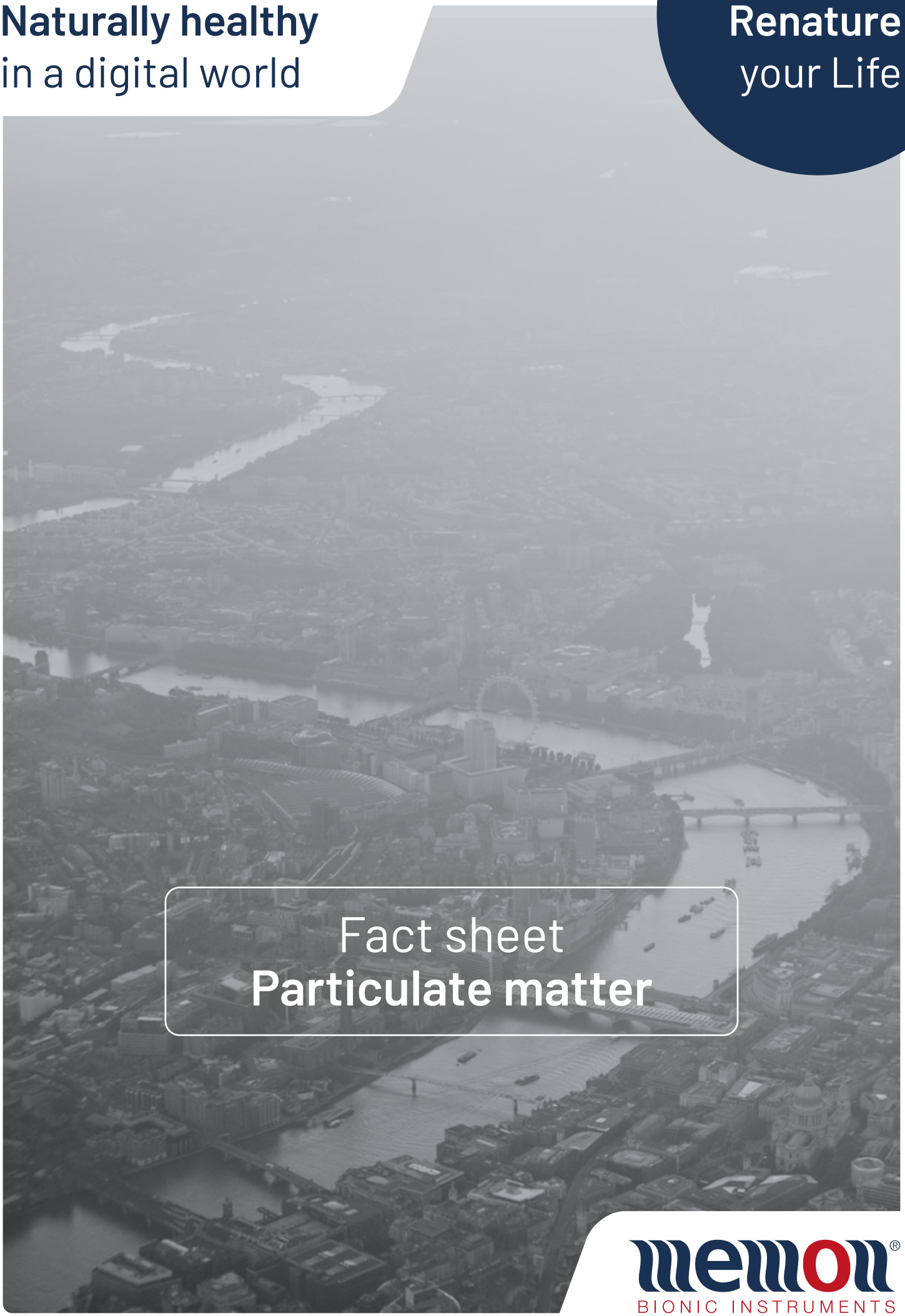
Naturally healthy
in a digital world

Renature
your Life



Fact sheet
Particulate matter

memon®
BIONIC INSTRUMENTS

FACT SHEET
PARTICULATE MATTER

Renature your Life

FACTS

Particulate matter (PM) in the air we breathe every day is a growing global health concern. According to the World Health Organization (WHO), fine particulate pollution is now among the seven leading causes of death worldwide [1], [2]. Of particular concern is the rise of ultrafine particles (UFPs) measuring 1 to 100 nanometers, which have become increasingly widespread due to technological developments since the 1990s and the growing world population. Because of their extremely small size, these particles can remain suspended in the air for long periods and travel long distances.

In the European Union, limit values have been established to regulate particulate matter concentrations. Since 2005, an annual mean value of 40 µg/m^3 and a daily mean value of 50 µg/m^3 have applied to PM10, with the daily limit permitted to be exceeded no more than 35 times per year. In 2015, an additional limit value for PM2.5 was introduced: 25 µg/m^3 as an annual mean [3].

While the discussion historically focused on outdoor air, it has become clear that indoor environments can also be significantly polluted—sometimes even more than outdoor areas. This affects not only urban centers but also rural regions. Numerous studies document clear health effects associated with fine particulate exposure [2], [4], [5], [6]. However, establishing concrete causal relationships remains difficult, as individual factors such as age, health status and genetic predisposition play a role. For indoor spaces, the WHO provides only recommendations derived from outdoor air guidelines [7]. Yet studies show that these values cannot be directly transferred, as individual resilience to particulate matter varies considerably [8].

Particulate matter consists of solid and liquid particles that occur as aerosols in the air. Their origins are diverse: PM is produced by natural processes such as volcanic eruptions, by biogenic sources such as pollen and microorganisms, and by anthropogenic activities—particularly combustion processes [9]. A distinction is made between primary particulate matter, which is emitted directly from a source, and secondary particulate matter, which forms through chemical reactions in the atmosphere.

The health risk associated with particulate matter depends not primarily on the mass of the particles but rather on their size, chemical composition and surface structure. Ultrafine particles pose a particularly high risk because their large specific surface area combined with their low mass leads to increased biological reactivity [6]. Their ability to penetrate deep into the lungs and, in some cases, enter the bloodstream makes them especially dangerous.

Overall, it is clear that both outdoor and indoor environments contribute significantly to particulate matter exposure and represent a serious threat to human health. Effective protective measures and differentiated guidelines—especially for indoor environments—are urgently needed.

Conclusion:
memon technology measurably reduces the concentration of fine dust particles in indoor air. The particles agglomerate because **memon** increases the number of positive and negative ions in the air, causing them to settle more quickly. This effect is particularly pronounced with ultrafine particles. As a result, less particulate matter is inhaled.

REFERENCES

[1] Institute for Health Metrics and Evaluation. (2020). Global Burden of Disease Study 2019 (GBD 2019). Seattle: University of Washington.

[2] Prinz, S. & Richter, M. (2021). Feinstaubbelastung und Gesundheit. 2. Aufl. Wiesbaden: Springer.

[3] Umweltbundesamt. (2009). Feinstaub: Gesundheitliche Bewertung von Feinstaub in der Luft. Dessau-Roßlau: Umweltbundesamt.

[4] Heyder, J. (2004). Feinstaub – ein unterschätztes Umweltproblem. München: Umwelt & Gesundheit Verlag.

[5] Ibald-Mulli, A., Wichmann, H. E., Kreyling, W. & Peters, A. (2002). Epidemiological evidence on health effects of ultrafine particles. Journal of Aerosol Medicine, 15(2), 189–201.

[6] Kappos, A., Bruckmann, P., Eikmann, T., Englert, N., Heinrich, U., Höppe, P. & Wichmann, H. E. (2003). Health effects of particles in ambient air. International Journal of Hygiene and Environmental Health, 206(4-5), 323–335.

[7] World Health Organization. (2006). WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide. Global update 2005. Geneva: WHO Press.

[8] GSF-Forschungszentrum für Umwelt und Gesundheit, Mitglied der Helmholtzgemeinschaft, Hrsg. (2005): Großes Netzwerk für kleine Teilchen AEROSOLFORSCHUNG IN DER GSF. GSF, Neuherberg.

[9] Tang, T., Gminski, R. & Mersch-Sundermann, V. (2010). Toxikologie luftgetragener Partikel. Berlin: Umweltmedizinischer Fachverlag.

20251211_Faktenblatt_Feinstaub_EN