Ultrafine particles

Where are they found?

Ultrafine particles (UFPs), with a diameter of less than 0.1 µm, originate mainly from anthropogenic sources such as vehicle combustion, industrial processes, domestic heating and biomass burning.

These particles are present in urban and industrial environments, as well as in areas close to roads and production plants. Natural sources also contribute, although to a lesser extent since most UFPs originate from human activities that generate complex emissions and secondary pollutants in the atmosphere.

Why measure them?

Ultrafine particles are among the most hazardous pollutants for human health due to their ability to penetrate deep into the lungs and reach the bloodstream. Their size and composition make them highly reactive, capable of causing inflammation, oxidative stress and damage to vital organs.

Measuring them is crucial for risk assessment, the design of effective policies, and the protection of vulnerable populations, particularly in urban and industrial settings where their concentration tends to be higher.

UFP sensor

The UFP sensor employs advanced technology based on electrical charging and electrostatic detection to measure, in real time, the concentration and size of ultrafine particles in the air. It incorporates a system that ionises the sampled particles and, using an electrostatic trap, removes excess ions, enabling particle size determination through a dynamic process.

The current generated by the charged particles is used to accurately calculate particle number (PN), mass concentration (PM), and the lung-deposited surface area (LDSA). Its non-collecting design minimises maintenance, as it does not require filters or consumable liquids, while its robust structure makes it suitable for outdoor use.

In addition, it features self-diagnostics and communication options for remote analysis, making it ideal for environmental monitoring in urban and industrial environments.

Measured parameters					
Parameter	**Unit**	**Measurement range**	**Particle size range**	**Resolution**	**LOD**
Particle Number (PN)	#/cm³	0 – 100,000,000	10 nm – 1 µm	1	30 #/cm³
Particle Mass (PM)	µg/cm³	0 – 80,000	10 – 300 nm	0.01	–
Lung-Deposited Surface Area (LDSA)	µm²/cm³	0 – 6,500	10 nm – 1 µm	0.01	–
Mean Particle Diameter (Dp)	nm	10 – 300	–	1	–

Operating conditions and performance			
Type	Electrical charge and electrostatic detection	**Response time** [10]	0.2 sec
Operating temp. range [3]	-20 to 50ºC	**Typical accuracy - R²** [11]	0.8
Operating RH range [4]	0 to 99 %RH	**Sampling flow rate**	1.5 L/min
Recommended RH range [5]	0 to 95 %RH	**Estimated service life** [6]	4 years

* See notes on page 32