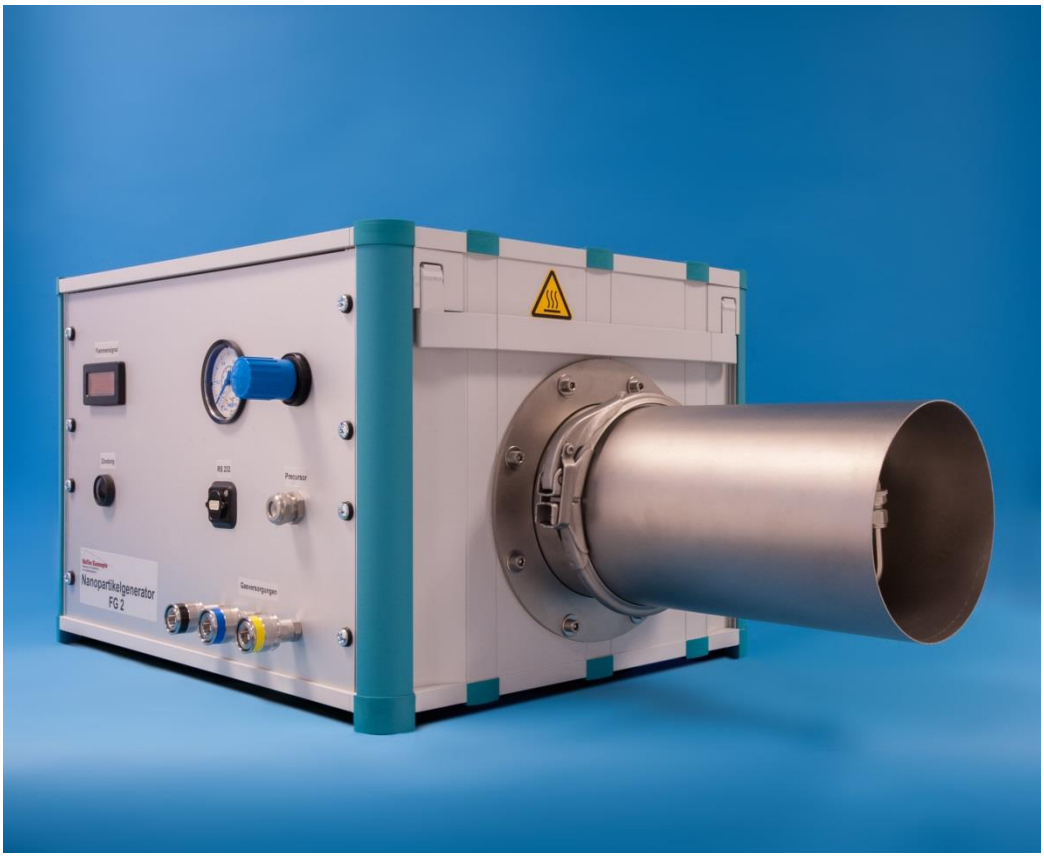
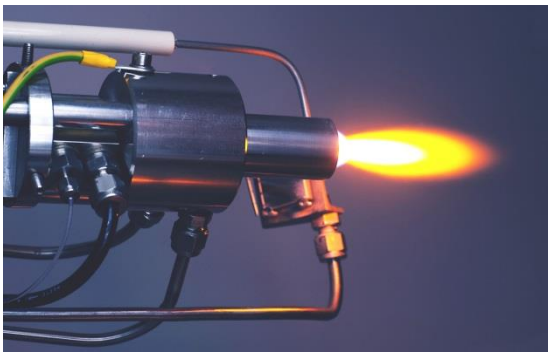
MoTec Konzepte
Beratung und Entwicklung
von Analysensystemen

# Nanoparticle generator




**Fields of applications:**
The nanoparticle generator is designed for continuous and reproducible generation of airborne salt, metal or metal oxide nanoparticles. The principal of synthesis of particles is based on the pyrolysis of finely atomized precursor solutions in a hydrogen oxygen flame. The resulting nanoparticles can be used to perform exposure experiments *in vivo* or *in vitro*. The particles are also suitable to study the removal efficiency of filter elements, to perform round robin tests or to synthesize reference materials. Suitable precursor solutions are both aqueous and nonaqueous solutions.

**Particle properties:**
The mean particle size can be adjusted in the range between 4 and 100 nm with a resulting number concentration of $10^4$ to $10^{11}$ P/cm$^3$. The geometric standard deviation of the monomodal particle size distribution is very small (1.3 to 1.7). Following nanoparticles were synthesized at several research institutes: Sodium chloride, titan dioxide, silicon dioxide, zinc oxide, palladium, copper oxide, lead oxide, nickel oxide, cobalt oxide and iron oxide.



**Functionality/ Safety equipment:**

-The generator operates with an oxyhydrogen flame. An external PC regulates mass flow controllers to setup the gas flows via a bus system.

-An external pump presses a precursor solution in a two-substance nozzle, which atomizes the medium with compressed air or nitrogen. The aerosol is sprayed directly into the flame cone. The droplets evaporate, the ingredients are pyrolyzed and nanoparticles are formed.

-The generator is equipped with a burner control system, which ignites the flame with high voltage and monitors it continuously (detection of emitted UV radiation from the flame). On a fault, the fuel gas supply shuts down with the use of redundant shut down valves. Other safety devices guarantee safe operation of the generator.

-The flame cone leaves the unit sideways in a horizontal direction.

-Automatic activation of a cleaning needle prevents clogging or blockage of the two-substance nozzle. The cycle time of the needle can be set arbitrarily.

-A quartz tube separates incompletely pyrolyzed aerosol droplets. Thus, all components inside the generator are protected against contaminations, and the nanoparticles can be generated with high chemical purity.

-The generator can be equipped with an additional argon mass flow controller to shield the flame cone against air and to minimize emissions of nitrogen oxides.

**Specifications:**

| | |
|---|---|
| Dimensions (W x H x D): | 85 x 35 x 50 cm |
| Weight: | 25 kg |
| Electrical connection: | 230 VAC, 50 Hz, max. 60 W |
| Atomizing gas: | compressed air or nitrogen |
| Max. gas flow rates: | Hydrogen: 20 L/min.; Oxygen: 10 L/min.; Argon: 20 L/min. |
| Precursor flow rate: | 0.25 - 1.50 mL/min. |

**Additional service when buying a nanoparticle generator:**

-The nanoparticle generator is available in different configuration levels. Based on customer requirements a tailored offer will be created.

-Before delivery a consultation takes place with regard to the safe handling of the flame generator. (explosion safety, protection concept, organizational procedures).

**Contact:** MoTec Konzepte – Wielandstraße 115 – 44791 Bochum
Dr. Christian Monsé, Tel: +49 (0) 234 74776, www.motec-konzepte.de
mail: info@motec-konzepte.de