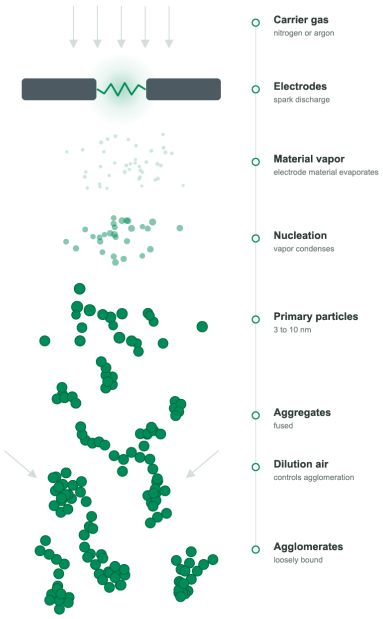
DNP DIGITAL 3000



The DNP digital 3000 generates high-purity, contamination-free nanoparticles in a gas-phase process. No chemicals, solvents, or ligands are involved. A broad range of conductive electrode materials allows the targeted production of metal, alloy, and carbon particles in the low-nanometer range. Available materials include copper, silver, gold, and graphite, as well as other electrically conductive materials; alloys and mixed electrodes are also possible. The resulting particles are suitable for material development as well as for the calibration of particle measurement devices and complete particle measurement systems. Digital control keeps particle size and concentration reproducibly constant over hours of operation.

OPERATION PRINCIPLE

GENERATION OF NANO-SCALE TEST AEROSOLS THROUGH CONDENSATION



The DNP digital 3000 uses the principle of spark ablation: a high voltage is applied between two electrodes made of conductive material, generating controlled sparks. These vaporize minute amounts of the electrode material, which then condenses in the carrier gas and forms primary particles in the range of 3 to 10 nm. Nitrogen or argon serves as carrier gas. Due to the high number concentration, the primary particles coagulate into agglomerates. Targeted dilution allows precise control of agglomerate formation, from individual primary particles to larger structures.

The spark frequency sets particle number, mass concentration, and agglomerate size quickly and across a wide range. A constant breakdown voltage ensures that the same energy is converted in every spark; a technically demanding control of the electrode gap maintains this condition even as the electrodes erode. The result is a stable particle size distribution with high long-term stability. Digital frequency control and continuous voltage control extend the adjustment range and allow more precise setting of the operating point. Each individual spark can be controlled and its energy defined.

The DNP digital 3000 is operated via an integrated touch display, which allows all instrument parameters to be set individually and stored as parameter sets. Mass flow controllers regulate the volume flows for carrier gas and dilution air. An AK protocol for the Ethernet connection via UDP is included for integration into higher-level systems.

Depending on the electrode material, the generator produces metallic nanoparticles or carbon agglomerates.

Extensions / Accessories

For calibration of the PMP measurement system, the DNP digital 3000 is combined with the REF 3000 reference exhaust. The REF 3000 covers a volume flow of 0 to 450 l/min and can be controlled separately via the DNP digital 3000, so both instruments are operated from a single interface. This combination is used with great success in the Particle Measurement Programme due to its good reproducibility and ease of handling.

Benefits

- Contamination-free nanoparticles without chemicals
- Broad material range: graphite, copper, silver, and gold, plus other conductive electrode materials, including alloys and mixed electrodes
- Fast adjustment of particle size and concentration
- Excellent short- and long-term stability for reproducible results in research and calibration
- Diesel-soot-like particle structure with graphite electrodes for PMP reference measurements
- Testing of measurement systems at up to 400 °C
- Straightforward connection to CVS systems for the PMP measurement line (in combination with the REF 3000)

DATASHEET

Particle size range	0.02 – 0.35 μm
Volume flow	4 – 70 Nl/min
Volume flow (accessories)	0 – 450 l/min (REF 3000)
Volume flow (carrier/dispersion gas)	4 – 20 l/min
Volume flow (dilution gas)	0 – 50 l/min
Mass flow (particles)	0.1 – 25 mg/h (for carbon)
Particle material	Carbon, copper, silver, gold and other metals
Dosing time	Several hours nonstop
Pre-pressure	4 – 8 bar
Carrier/dispersion gas	Nitrogen, argon
Compressed air connection	Quick coupling
Aerosol outlet connection	$Ø_{inside}$ = 6 mm, $Ø_{outside}$ = 8 mm
Particle size range (primary particles)	3 – 10 nm
Dilution gas	Particle-free and dry compressed air
Dimensions	185 • 445 • 380 mm (H • W • D)
Weight	23 kg

Applications

- Nanoparticle synthesis for material research
- Development of new nanomaterials
- Inhalation research and toxicology
- Calibration of particle measurement devices and sampling lines
- Calibration of the PMP measurement system (in combination with the REF 3000)

Mehr Informationen:
https://www.palas.de/en/product/dnpdigital3000