Product data sheet

Palas® Aerosol generator for solid particles DNP digital 2000

Applications

- Calibrating the PMP measurement system
- Calibrating particle measurement devices
- Calibrating sampling lines

Benefits

- Excellent short-term and long-term particle size and concentration constancy
- Particle size distribution able to be quickly adjusted
- Particle structure similar to that of diesel soot
- No volatile fractions in the aerosol
- Aerosol temperature-resistant up to 400°C
- Easy to transport
- Easy to operate
- Reliable function
- Best reproducibility
- Low maintenance
- Reduces your operating expenses

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Description

Particle measurement devices should be calibrated using particles with characteristics, e.g. shape, size, density, surface condition, and refractive index, that are similar to those of the actual aerosol to be tested, e.g. diesel soot. The new DNP digital 2000 generates a condensation aerosol from monolithic graphite. The resulting carbon agglomerates are similar to diesel soot with respect to particle size distribution. The particle measurement program (PMP) recommends that the particle size be adjusted to 30 nm, 50 nm, and 100 nm for calibration of the complete measurement chain. The 30 nm, 50 nm, and 100 nm particle fractions are able to be classified with a DEMC (differential electro mobility classifier) based on the particle spectrum provided by the DNP digital 2000. The DNP digital 2000 is able to quickly, reliably, and reproducibly determine the transmission behavior/function of a particle measurement chain, e.g. the PMP measurement chain, and individual components also at corresponding temperatures of up to 400 °C.

Due to the new digital regulation, the generator enables an enhanced setting range as well as an even higher constancy of the generated particle size and concentration.

The DNP digital 2000 requires nitrogen as the carrier gas. Nitrogen causes virtually no change in the density of the exhaust gas being measured.

Function

The DNP digital 2000 aerosol generator is used to generate a jump spark between two graphite electrodes under high voltage. The jump spark rips tiny amounts of graphite material from the electrodes at high temperatures. The graphite material that is vaporized by this spark then condenses to form extremely tiny particles. The high number concentration can result in the coagulation of these very small particles into agglomerates. By adding mixed air, the aerosol is able to be diluted, enabling the defined adjustment of the agglomerate formation. The generated aerosol distribution is very similar to the distribution of diesel soot particles from a combustion engine. The energy converted in each spark remains constant due to the constant sparkover voltage. This constant energy in each individual spark guarantees stable particle size distribution (see Fig. 1). A technically sophisticated control of the distance between the electrodes during burn-off ensures very high long-term stability. The mass flow is able to be quickly and easily adjusted within a wide range using the spark frequency (see Fig. 2).

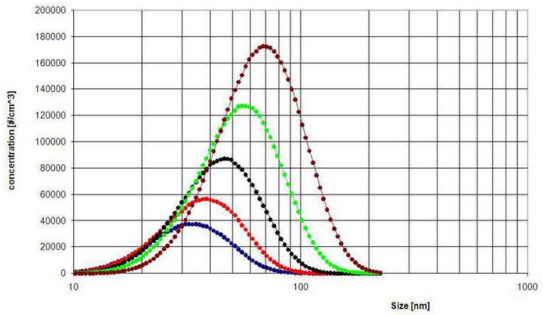

Fig. 1: Size distributions of the particle agglomerates at various spark frequencies

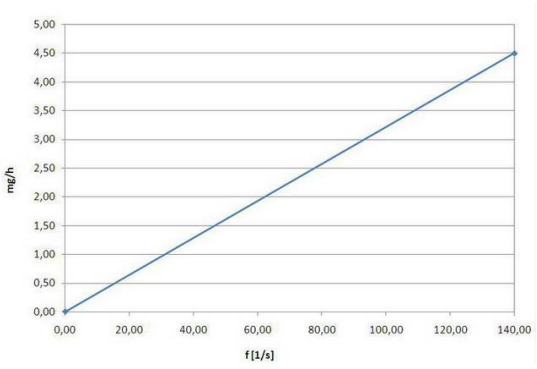

Fig. 2: Particle mass flow of the DNP digital 2000 as a function of the spark frequency

The digital regulation of the frequency and the continuouse regulation of the voltage guarantee a more specific regulation of the distance between the two electrodes. This enables a higher constancy of the particle size distribution and the mass flow. Furthermore, each single sparkover can be regulated and the

energy of the single spark can be determined in principle. An AK-protocol for an ethernet connection via UDP protocol is part of the delivery.

Due to its easy startup, excellent reproducibility and high level of functional reliability, the DNP digital 2000 is especially well suited for the calibration of particle measurement devices and complete particle measurement chains.

Carrier gas: Nitrogen

Specifications

Volume flow	4 – 58 l/min
Power supply	115 - 230 V, 50 - 60 Hz
Dimensions	125 • 470 • 435 mm
Weight	23 kg
Particle material	Carbon, copper, silver, gold and other metals
Dosing time	Several hours nonstop
Maximum particle number concentration	Approx. 107 particles/cm³
Mass flow (particles)	0.06 – 9 mg/h (for carbon)
Particle size range	0.02 – 0.35 µm
Carrier/dispersion gas	Nitrogen
Pre-pressure	4 – 8 barg
Maximum counter pressure	500 mbarg
Compressed air connection	Quick coupling
Aerosol outlet connection	Øinside = 6 mm / Øoutside = 8 mm
dilution gas	Particle-free and dry compressed air
Particle size range (primary particles)	3 – 10 nm
Volume flow (carrier/dispersion gas)	4 – 8 l/min
Volume flow (dilution gas)	0 – 50 l/min

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