

GRIMM PSMPS

Nano mobility particle size spectrometer

Explore the nano clusters

- Measuring number size distributions starting at 1.1 nm
- Combination of GRIMM SMPS+C with Airmodus PSM
- All in one setup



Digital Version



FEATURES

- Measuring number size distributions starting at 1.1 nm
- Combination of GRIMM SMPS+C with Airmodus PSM
- Airmodus PSM allowing expansion of SMPS+C measurement range to the smallest nanoparticles and clusters
- Two-stage (DEG and n-butanol) CPC setup
- Updated GRIMM DMAs with optimized nanoparticle transmission
- Scanning, stepping and single channel mode of DMA

TECHNICAL DATA

Airmodus particle size magnifier (PSM 2.0): First stage of particle detection	
Working fluid	Diethylene Glycol (>99%)
50% particle size cut-off	Adjustable 1.19 ... 12 nm (determined with nickel chromium particles)
Sample flow rate (Q _{PSM})	2.5 l/min
External vacuum requirement	100 ... 350 mbar at NTP
External compressed air requirement	1.5 ... 2.5 bar at NTP; free of particles, oil and water
Power requirements	100 ... 240 VAC; 50/60 Hz; max. 280 W
Connectivity	USB or RS-232
PSM size (h x w x d)	29 x 45 x 46.5 cm (11.4 x 17.7 x 18.3 inch)
PSM weight	17.0 kg (37.5 lbs)
GRIMM SMPS+C 5417: Second stage of particle detection and DMA control	
Working fluid	n-Butanol (>99%)
50% particle size cut-off	4.0 nm (determined with tungsten oxide particles)
Sample flow rate (Q _{CPC})	0.3 or 0.6 l/min
Sheath air flow rate (Q _{SH})	3.0 or 10.0 l/min
Internal pumps	Yes
Particle concentration range	Single count mode: Up to 150,000 particles/cm ³ Photometric mode: Up to 10 ⁷ p/cm ³
Response time t ₁₀ ... t ₉₀	< 3 s
Power requirements	110 ... 240 ± 10% VAC; 50 / 60 Hz wide range power supply, max. 245 W

BENEFITS

- Compact instrument setup
- All in one setup
- Usable with various aerosol neutralizers
- Suitable for various nanoparticle applications: Studies on atmospheric nucleation, nanoparticle growth, coagulation and transport, fundamental aerosol research and many more
- Fully user configurable settings in our software

Connectivity	USB, RS-232, analog pulse out
GRIMM SMPS+C 5417 dimensions (h x w x d)	40 x 25 x 29 cm (15.7 x 9.8 x 11.4 inch)
GRIMM SMPS+C 5417 weight	12.4 kg (27.3 lbs)
Classifier	
DMA	GRIMM Vienna type S-DMA or M-DMA
Particle size ranges	S-DMA: 1.1 ... 53 nm@10 l/min Q _{SH} M-DMA: 2.8 ... 155 nm@10 l/min Q _{SH}
Particle size resolution	Stepping mode: 45 ... 255 channels Scanning mode: 32, 64, or 128 channels per size decade with logarithmic equidistant spacing
GRIMM 5540 Sheath Air Dryer	
Drying agent	Silical Gel Orange* beads with indicator * product name of the company Roth
Grain size	2 ... 5 mm
Sheath air flow rate	3 ... 20 l/min
Dimensions (Ø x h)	12.5 x 59 cm (4.9 x 23 inch)
Weight	4.5 kg (9.9 lbs)
PSMPS Handling	
Data output	Particle number size distributon (dN/dlogD)
Sample humidity	0 ... 95% RH, non-condensing
Absolute pressure range	790 ... 1050 mbar
Operating temperature	15 ... 30 °C (59 ... 86 °F)
Operating humidity	0 ... 95% RH, non-condensing

PSMPS | NANO MOBILITY PARTICLE SIZE SPECTROMETER

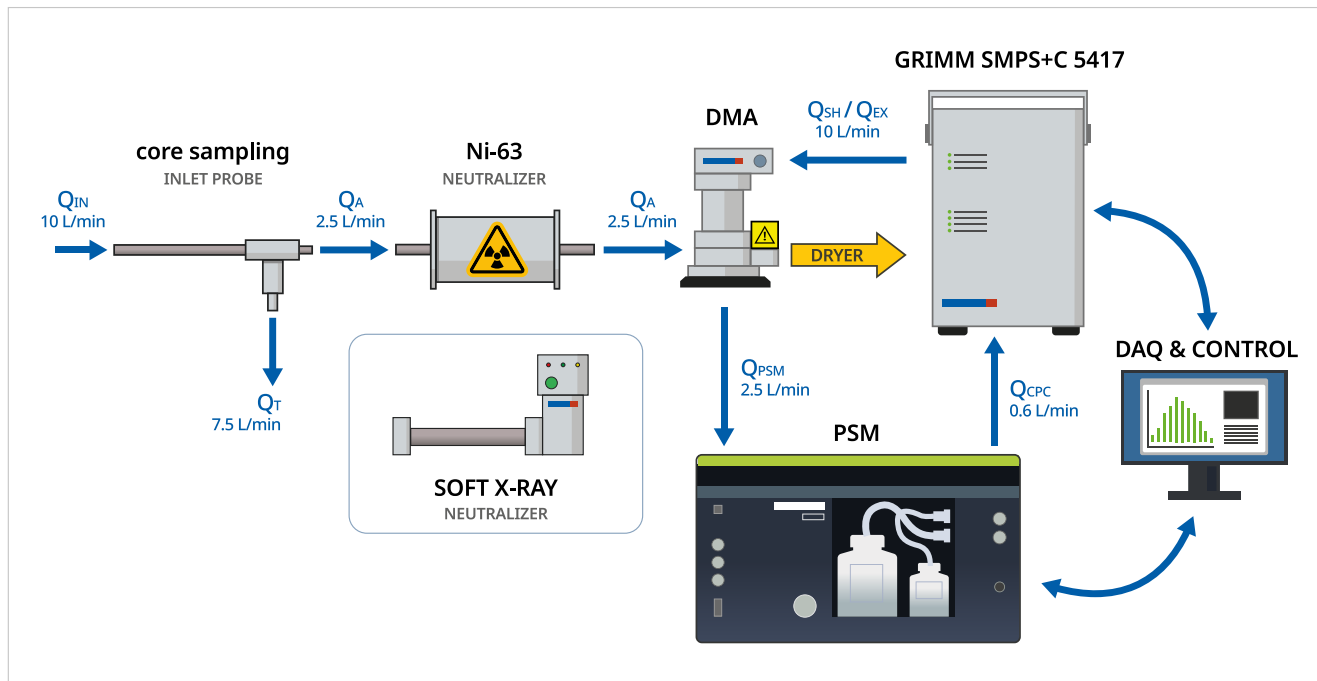
The PSMPS is a mobility particle size spectrometer that combines a Grimm SMPS+C system with the Airmodus Particle Size Magnifier (PSM). This combination allows accessing the 1 nm particle size range and offers the metrological coverage of the sub 2 nm size range that is indispensable for understanding the basic mechanisms of the highly dynamic processes of particle formation.

In studies on aerosol particle nucleation, the measurement of aerosol number size distributions starting from the sub

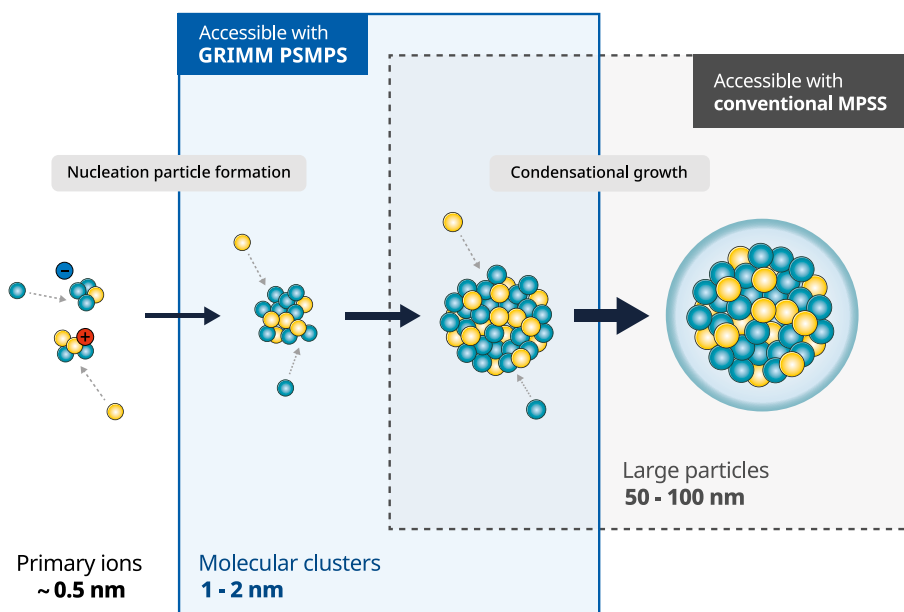
2 nm size range is crucial in order to understand the basic mechanisms of new particle formation (NPF) as well as the formation rate and growth rate of the particles (e.g. Kulmala et al. 2013). Particle nucleation processes are important in the atmosphere where they affect the formation of clouds and the radiative forcing but also in combustion related studies (e.g. the emissions of vehicle engines) and in material sciences (e.g. the synthesis of nanoparticles).

* Kulmala, M. et al. (2013) Direct Observation of Atmospheric Aerosol Nucleation. *Science*, 339, 943

PSMPS | SCHEMATIC SETUP



PSMPS | NUCLEATION PROCESS: TRANSITION FROM THE GAS PHASE TO THE PARTICLE PHASE



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