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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 solution

GRIMM AEROSOL TECHNIK

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

Benefits

- Compact instrument setup
- All in one solution
- 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

Technical data

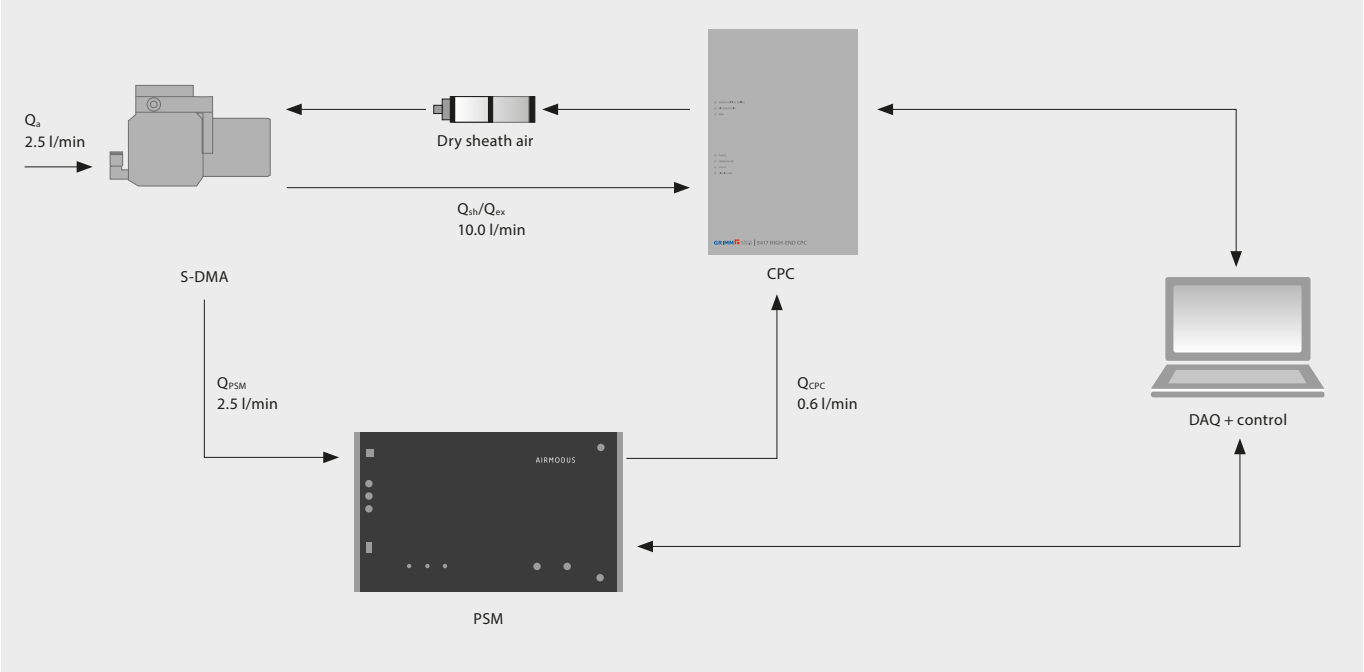
Airmodus Particle Size Magnifier (PSM-A10): First stage of particle detection	
Working fluid	Diethylene glycol
50% particle size cut-off	Adjustable 1.3 … 3.5 nm (determined with Nickel Chromium particles)
Sample flow rate (Q_{PSM})	2.5 l/min
External vacuum requirement	100 … 350 mbar at NTP
External 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 5417 CPC: Second stage of particle detection	
Working fluid	n-butanol
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/cm3 Photometric mode: up to 107p/cm3
Response time t10… t90	< 3 s

Power requirements	90 … 264 VAC; 47 … 63 Hz; 80 … 130 W
Connectivity	USB, RS-232, analog pulse out
GRIMM 5417 dimensions (h x w x d)	40 x 25 x 29 cm (15.7 x 9.8 x 11.4 inch)
GRIMM 5417 weight	12.4 kg (27.3 lbs)
Classifier	
DMA	GRIMM Vienna type S-DMA or M-DMA
Particle size ranges	1.1 … 55 nm@10 l/min Q_{sh} 2.8 … 155 nm@10 l/min Q_{sh}
Particle size resolution	Stepping mode: 45 … 255 channels Scanning mode: 64 channels per decade; logarithmic spacing
PSMPS Handling	
Data output	Particle number size distributon (dN/dlogD)
Sample humidity	0 … 95% RH, non-condensing
Absolute pressure range	600 … 1050 mbar
Operating temperature	15 … 30 °C (59 … 86 °F)
Operating humidity	0 … 95% RH, non-condensing

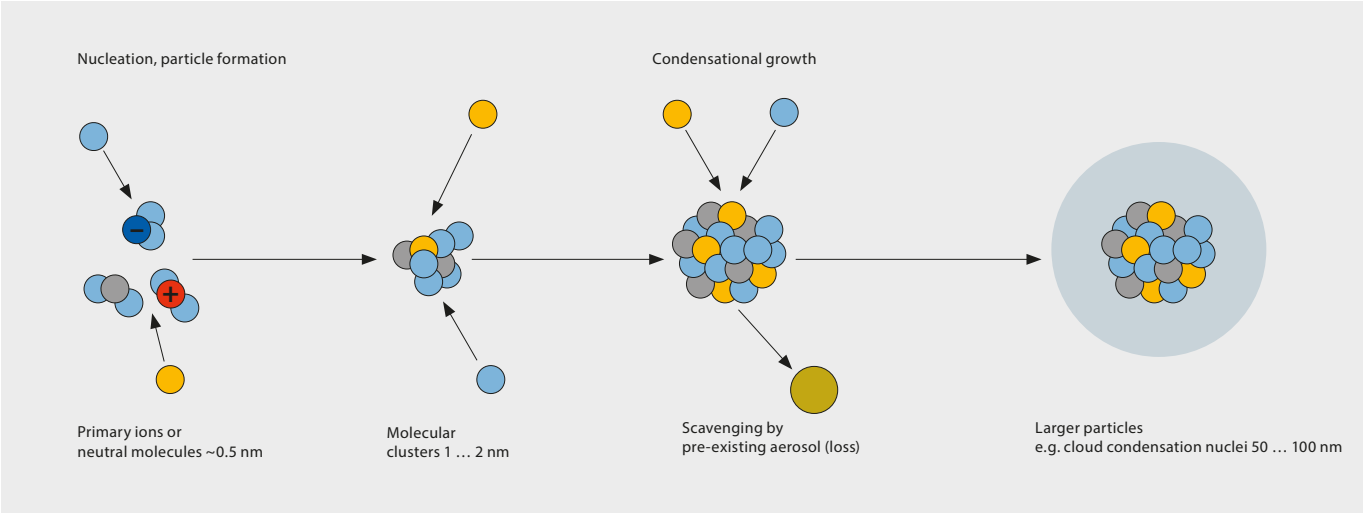
PSMPS | MOBILITY PARTICLE SIZE SPECTROMETER

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[1]). 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).

PSMPS | SCHEMATIC SETUP OF THE PSMPS



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



1. KULMALA, M. (2013) DIRECT OBSERVATIONS OF ATMOSPHERIC AEROSOL NUCLEATION. SCIENCE, 339, 943

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