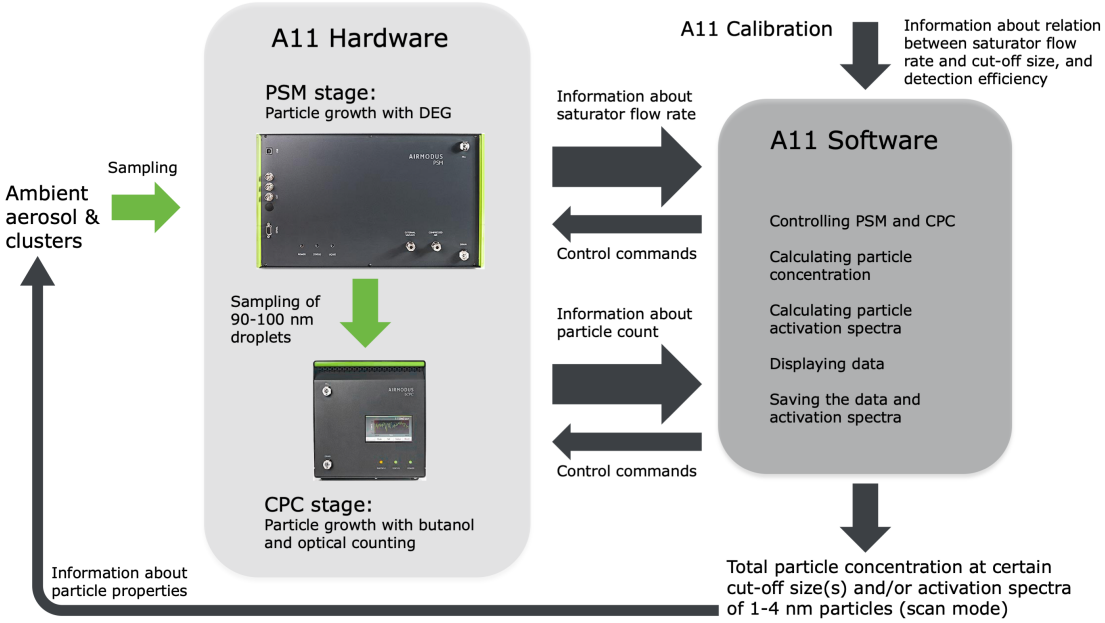
# A11 nCNC System

Study and monitor particles smaller than the detection threshold of any CPC. **Airmodus A11 Nano Condensation Nucleus Counter system** (nCNC) measures particles as small as 1 nm in diameter. It is a complete system consisting of a particle size magnifier (PSM), a condensation particle counter (CPC) and operation software. Airmodus A11 can be used to measure the total number concentration of sub-micron particles, or to learn about characteristics and dynamics of the 1-4 nm particles in real time.

## A11 nano Condensation Nucleus Counter system




**Benefits of the A11**

- Detect particles as small as 1 nm in diameter in real time
- Also the electrically neutral particles
- Study the formation and growth of 1-4 nm particles
- Activation spectrum can be used for size or composition information.
- Data inversion in real time

**Three operation modes**

- Fixed mode: One fixed cut-off* for monitoring the appearance of nanoparticles.
- Stepping mode: Steps through several user-defined cut-offs*. Use to observe pre-defined size classes.
- Scanning mode: The activation spectrum of 1 – 4 nm* particles in less than 5 minutes

# A11 nCNC Specifications

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|---|---|
| **Measurement range** | 1 - 1000 nm.<br>50% cut-off selectable: 1.3 – 3.5 nm* |
| **Concentration** | Calibrated: 0 – 100 000 #/cm$^3$<br>We recommend using in single particle counting mode: Up to 30 000 #/cm$^3$ in single particle counting mode with coincidence <10%; higher concentrations with Total Scattering Mode Correction |
| **Aerosol sample flow** | 2.5 lpm<br>(sample flow to CPC 1 lpm) |
| **Response time** | $t_{95}$ < 2 s** |
| **Working fluid** | Diethylene Glycol (>99%)<br>n-Butanol (>99%) |
| **Sample conditions** | Pressure: 90 to 105 kPa<br>Relative humidity: 0 to 95% non-condensing*** |
| **Environmental conditions** | Temperature: 15°C to 30°C<br>Pressure: 90 to 105 kPa<br>Relative humidity: 0 to 95% non-condensing |
| **Shipping conditions** | Temperature: 0 - 40°C<br>Relative humidity: <95% non-condensing<br>The instrument should be shipped dry, in upright position and should be protected against tremor and blows. |
| **External vacuum requirement** | 100 - 350 mbar pressure at NTP |
| **External compressed air requirement** | 1.5 - 2.5 bar at NTP<br>The air should be free of particles, oil and water (dew point below 0°C); maximum operating pressure is 3.0 bar at NTP. |
| **Fittings** | **Airmodus A10 PSM:**<br>*External vacuum:* fitting for 1/4 in. tubing<br>*External compressed air:* fitting for 1/4 in. tubing<br>*Inlet:* 1/4 in. stainless steel tube<br>*Outlet:* 1/4 in. stainless steel tube<br><br>**Airmodus A20 CPC:**<br>*External vacuum:* 1/4 in. stainless steel tube<br>*Inlet:* 1/4 in. stainless steel tube |
| **Communication** | **Airmodus A10 PSM:**<br>*Serial:* RS-232<br>*USB:* type B connector<br>*Analog out:* BNC connector 0 to 10 V for external devices, e.g. controlling of a DMA or ion filter.<br><br>**Airmodus A20 CPC:**<br>*Analog in:* BNC connector, 0 to 10 V (reading data of external sensor)<br>*Analog out:* BNC connector 0 to 10 V, user-selectable function output (linear concentration, also DMA voltage control)<br>*Pulse out:* BNC connector<br>*Serial:* RS-232<br>*Ethernet:* RJ45<br>*USB:* type B connector<br><br>**Both instruments:** All communication based on ASCII character-encoding scheme. |
| **Power requirements** | Both instruments (PSM and CPC) use an external power adaptor each (provided with the instruments):<br><br>**Airmodus A10 PSM:**<br>Power adaptor input:<br>100 - 240 VAC<br>50/60 Hz<br>max. 280 W<br>Power adaptor output:<br>12VDC 21 A<br><br>**Airmodus A20 CPC:**<br>Power adaptor input:<br>100 - 240 VAC<br>50/60 Hz<br>max. 160 W<br>Power adaptor output:<br>12VDC 11.5 A |
| **Software** | Airmodus A1X software for online data inversion and data acquisition (for Microsoft Windows, 7 or newer) |
| **Dimensions and weight** | **Airmodus A10 PSM:**<br>290 x 450 x 465 (h x w x l in mm)<br>17.0 kg<br><br>**Airmodus A20 CPC:**<br>260 x 230 x 400 (h x w x l in mm)<br>10.5 kg |

*) Nickel Chromium equivalent activation diameter. See calibration certificate.
Note: When delivered as part of an A11 nCNC system, the A20 CPC is delivered with a cut-off of about 10 nm (see calibration certificate).
On request the A20 CPC cut-off can be set in calibration to be in the range 5 – 10 nm.
**) Enroth et al. 2018. https://doi.org/10.1080/02786826.2018.1460458
***) Above 40% please dry the sample to avoid excess water condensation inside the instruments