



## Performance & evaluation criteria for calibration workshops & ACTRIS compatibility

ACTRIS aerosol in-situ variable: Cloud condensation nuclei number concentration

Responsible CAIS-ECAC units: WCCAP

Instrument type: Cloud Condensation Nuclei Counter

Technical checks & calibration:

- zero check with filter on inlet at 1% supersaturation
- leak test
- check performance of solenoid pumps
- determination of the status values such as temperatures set/read, total flow, sheath & aerosol flow, flow rate
- measurement of the counting efficiency against CPC with ammonium sulfate particles at high supersaturation for large particles (e.g., 1% supersaturation and 100nm), below 7500 #/cm<sup>3</sup> to avoid coincidence
- calibration of flows
- calibration of supersaturation with size selected ammonium sulfate particles for at least 5 supersaturation steps

Criteria for evaluation:

Compare  $N_{CCN}$  @ 5 supersaturation steps against reference instrument for ambient aerosol:

- $N_{CCN}$  must be within +/-10% for any supersaturation above 0.2%
- below 0.2% supersaturation +/-20% in  $N_{CCN}$  are acceptable.

Information for the user:

- regular checks and replacements as given in manual, such as replacement of Nafion Membran.
- calibration of supersaturation with size selected ammonium sulfate particles for at least 5 supersaturation steps to be also done for the ambient pressure at observatory at least annually.
- check frequently: first stage monitor, flow ratio, pump performance

Literature:

- Rose, D., S. S. Gunthe, E. Mikhailov, G. P. Frank, U. Dusek, M. O. Andreae, and U. Poschl (2008), Calibration and measurement uncertainties of a continuous-flow cloud condensation nuclei counter (DMT-CCNC): CCN activation of ammonium sulfate and sodium chloride aerosol particles in theory and experiment, Atmospheric Chemistry and Physics, 8(5), 1153-1179.
- Gysel, M., and F. Stratmann (2013), WP3 -- NA3: In-situ chemical, physical and optical properties of aerosols, Deliverable D3.11: Standardized protocol for CCN measurements, [https://actris-ecac.eu/pluginAppObj/pluginAppObj\\_230\\_192/WP3\\_D3.13\\_M24.pdf](https://actris-ecac.eu/pluginAppObj/pluginAppObj_230_192/WP3_D3.13_M24.pdf)