



Leibniz Institute for
Tropospheric Research

Leibniz-Institut für Troposphärenforschung Permoserstraße 15 04318 Leipzig

Intercomparison of Condensation Particle Counter

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| <i>Project No.:</i> | CPC-2019-5-8 |
| <i>Principal Investigator:</i> | Christian Maier |
| <i>Home Institution:</i> | ZAMG, Austria |
| <i>Participant:</i> | Christian Maier and Gerhard Schauer |
| <i>Candidate:</i> | CPC ENVI |
| <i>Counter (SN):</i> | PALAS CPC Model ENVI #9532 |
| <i>Location of the quality assurance:</i> | TROPOS Leipzig, lab 130 |
| <i>Comparison period:</i> | October 08, 2019 |
| <i>Last Intercomparison (with Project No.):</i> | |
| <i>TROPOS Reference Instrument:</i> | Electrometer: TSI model 3068B #70838596, Last calibration in September 2018 |
| <i>Additional Equipment:</i> | Bubble flow meter 'Gilibrator', Gilian (Sensidyne) #1711008-S, Last calibration in January 2018 |

Summary of Intercomparison

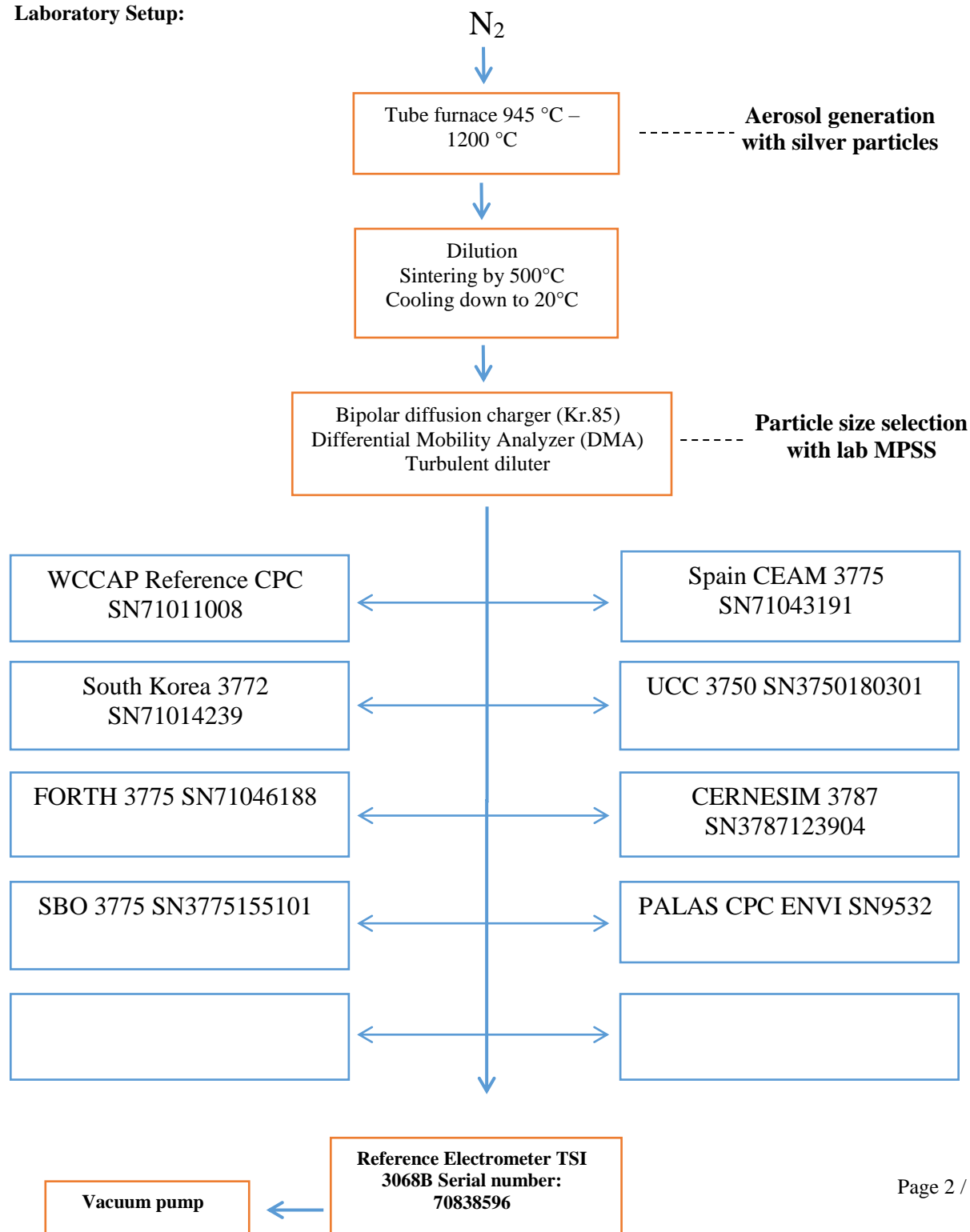
Status:

The candidate passed the quality standards of ACTRIS and GAW. The candidate reached 100% efficiency at 40 nm. The Dp50 is at 8.03 nm. The CPC efficiency curve corresponds to the standard of ACTRIS and GAW.

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Laboratory Setup:





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Date of arrival of instrument in calibration lab:

October 08, 2019

Instrument:

Condensation Particle Counter

Model and serial number of instrument:

PALAS CPC ENVI S/N 9532

Result of physical inspection:

no damages

Result of functional test:

no repair

Internal parameters of instrument

nominal flow rate 0.9 l/min

**Model and identification number of
aerosol electrometer:**

TSI Electrometer Model 3068, S/N 70838596

Electrometer calibration certificate:

*September 05, 2018, calibrated at PTB
Braunschweig*

**Corrections of electrometer, for instance,
differing flow rate:**

*Within tolerance range (+/-2%); reference: 4.0
l/min, measured: 4.00 l/min*

Software for recording:

*LabView 2010; National Instruments; Program
„LabCount.vi“*

Date of calibration:

October 08, 2019

Lab temperature and pressure:

22.2°C, 985 mbar

Measured aerosol flow rate of CPC:

0.893 l/min

Uncertainty in measured flow rate:

3%

Flowmeter used:

*Gilian Gilibrator V; S/N 1711008-S,
January, 2018*

Particles and gases used for calibration:

silver particles and nitrogen

Method of particle generation:

tube furnace generator

Zero measurement of instrument:

0 particles/cm³ in 5 minutes

Results (using pulse output):

| Particle size (nm) | 40 | 30 | 20 | 15 | 10 |
|-----------------------------|------|------|------|------|------|
| Number concentration (cm-3) | 1304 | 1587 | 1198 | 1103 | 921 |
| Counting efficiency η | 1.03 | 1.02 | 1.01 | 0.94 | 0.79 |
| Particle size (nm) | 09 | 08 | 07 | 06 | 05 |
| Number concentration (cm-3) | 1032 | 1008 | - | - | - |
| Counting efficiency η | 0.72 | 0.48 | - | - | - |
| Particle size (nm) | 40 | | | | |
| Number concentration (cm-3) | - | | | | |
| Counting efficiency η | - | | | | |

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Special Information regarding to the Candidate:

| Was it necessary to: | yes/no | information |
|--------------------------|--------|-------------|
| do a second run | no | - |
| clean the optics | no | - |
| clean the nozzle | no | - |
| clean the saturator | no | - |
| change the wick | no | - |
| change the laser | no | - |
| change internal settings | no | - |

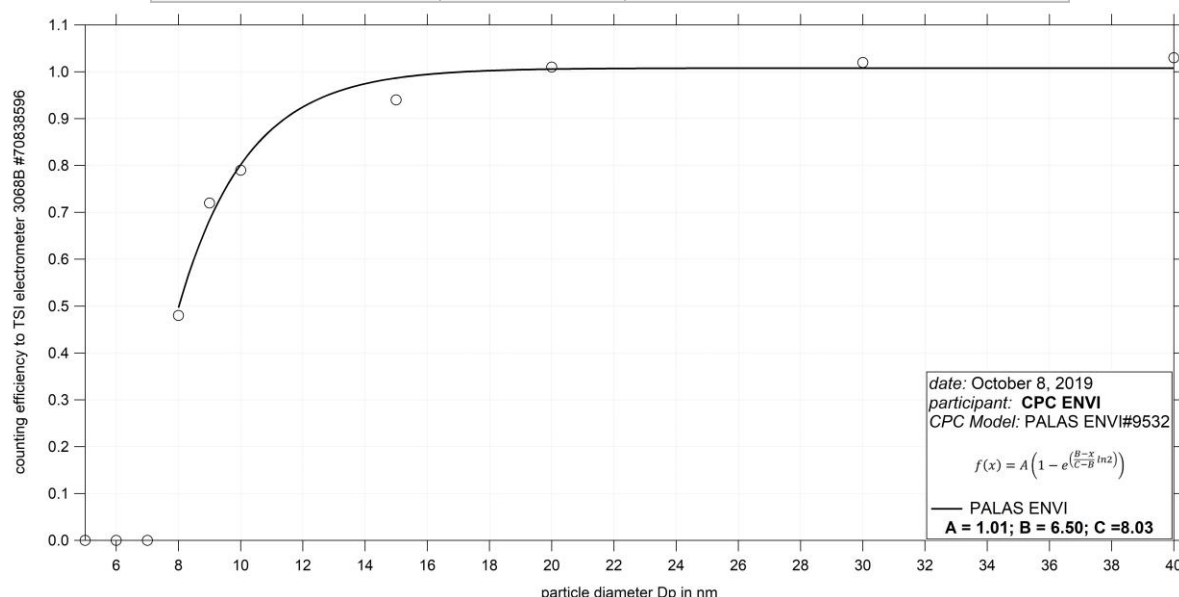


Fig. 1: Counting efficiency for PALAS CPC ENVI S/N 9532 against aerosol electrometer 3068 S/N 70838596; silver particles between 5 and 40 nm were used for calibration; the calculated D_{p50} is 8.03 nm.

Status information:

| Status | T SAT | T CON | T OPT | T CAB | P AMB |
|--------------|-------|-------|-------|-------|-------|
| from display | - | - | - | - | - |
| Status | P OR | P NO | Laser | LV | flow |
| from display | - | - | - | - | 0.893 |

Date of issue: October 08, 2019

Reviewed: TROPOS / Kay Weinhold

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