



Leibniz Institute for  
Tropospheric Research

Leibniz-Institut für Troposphärenforschung Permoserstraße 15 04318 Leipzig

## Intercomparison of Condensation Particle Counter

*Project No.:* CPC-2019-4-12

*Principal Investigator:* Prof. Alfred Wiedensohler

*Home Institution:* Leibniz Institute for Tropospheric Research  
Permoserstraße 15  
04318 Leipzig, Germany

*Participant:* -

*Candidate:* TROPOS

*Counter (SN):* TSI CPC Model 3010 #70419349

*Location of the quality assurance:* TROPOS Leipzig, lab 130

*Comparison period:* September 11, 2019

*Last Intercomparison (with Project No.):*

*TROPOS Reference Instrument:* Electrometer: TSI model 3068B  
#70838596, Last calibration in September 2018

*Additional Equipment:* Bubble flow meter 'Gilibrator', Gilian (Sensidyne)  
#1711008-S, Last calibration in January 2018

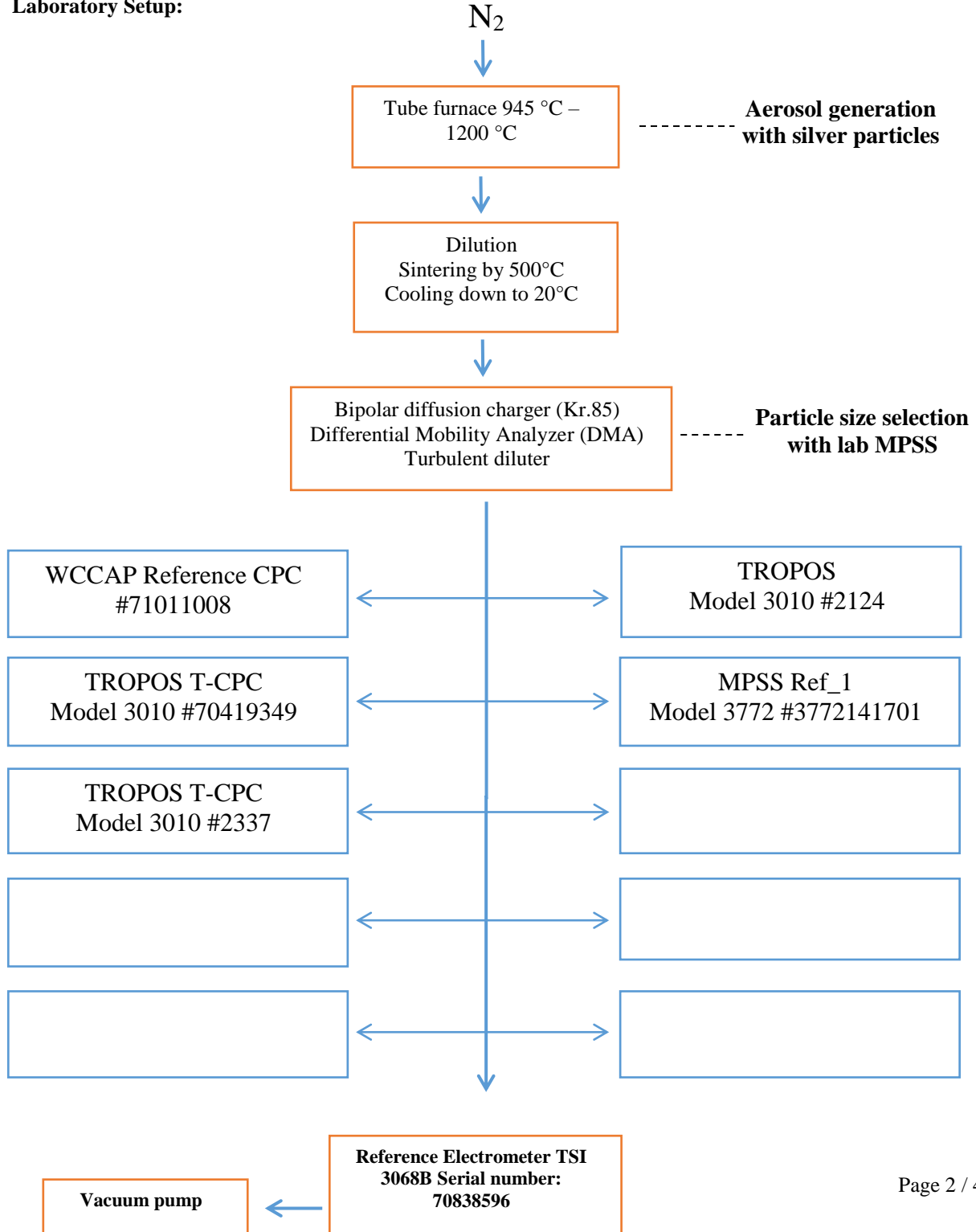
### Summary of Intercomparison

*Status:*

The candidate passed the quality standards of ACTRIS and GAW. The candidate reached 100% efficiency at 40 nm. The Dp50 is at 9.96 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:** *September 11, 2019*  
**Instrument:** *Condensation Particle Counter*  
**Model and serial number of instrument:** *CPC 3010 S/N 70419349*

**Result of physical inspection:** *no damages*  
**Result of functional test:** *maintenance by TROPOS*

**Internal parameters of instrument** *nominal flow rate 1.0 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:** *September 11, 2019*  
**Lab temperature and pressure:** *23°C, 1004 mbar*  
**Measured aerosol flow rate of CPC:** *1.006 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/cm<sup>3</sup> in 5 minutes*

**Results (using pulse output):**

Particle size (nm)	40	30	20	15	12
Number concentration (cm-3)	913	1353	1505	990	1153
Counting efficiency $\eta$	0.97	0.99	0.99	0.90	0.70
Particle size (nm)	10	09	08	07	06
Number concentration (cm-3)	934	491	403	102	3
Counting efficiency $\eta$	0.49	0.36	0.19	0.05	0.00
Particle size (nm)	40				
Number concentration (cm-3)	1117				
Counting efficiency $\eta$	1.00				

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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	Checked by TROPOS
clean the nozzle	no	Checked by TROPOS
clean the saturator	no	Checked by TROPOS
change the wick	no	Checked by TROPOS
change the laser	no	Checked by TROPOS
change internal settings	no	-

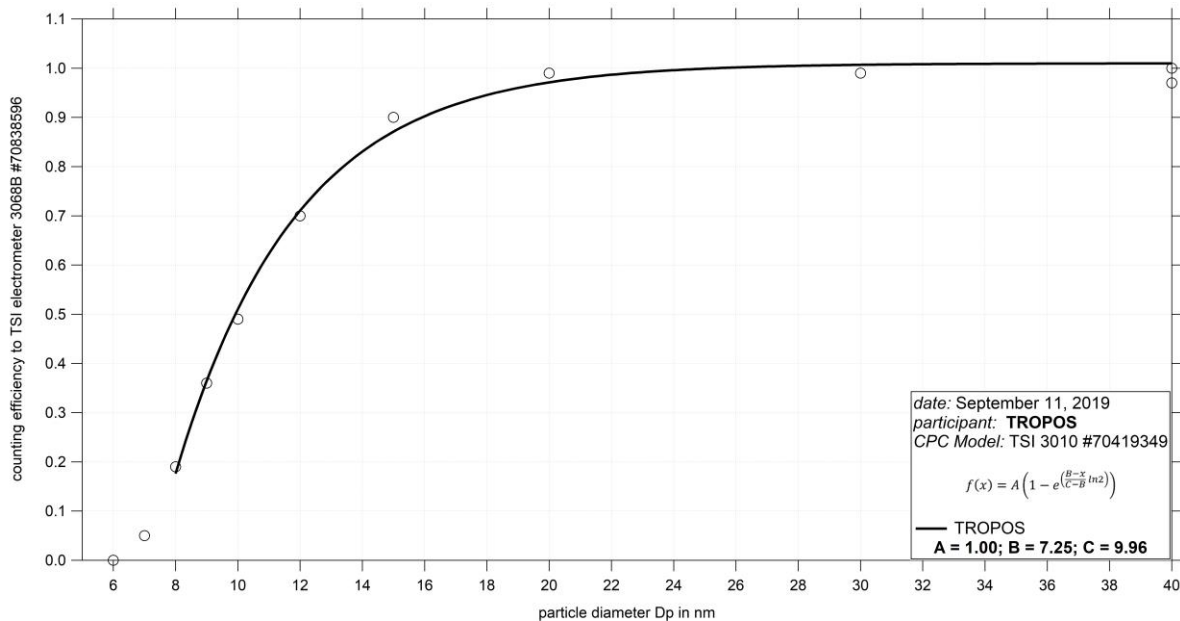


Fig. 1: Counting efficiency for TROPOS CPC 3010 S/N 70419349 against aerosol electrometer 3068 S/N 70838596; silver particles between 6 and 40 nm were used for calibration; the calculated  $Dp_{50}$  is 9.96 nm.

**Status information:**

<b>Status</b>	<i>T SAT</i>	<i>T CON</i>	<i>T OPT</i>	<i>T CAB</i>	<i>P AMB</i>
from display	-	-	-	-	-
<b>Status</b>	<i>P OR</i>	<i>P NO</i>	<i>Laser</i>	<i>LV</i>	<i>flow</i>
from display	-	-	-	full	1.006

**Date of issue:** September 11, 2019

Reviewed: TROPOS / Kay Weinhold

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