



**World Calibration Centre  
for Aerosol Physics**

Leibniz-Institut für Troposphärenforschung Permoserstraße 15 04318 Leipzig



**Leibniz Institute for  
Tropospheric Research**

**CPC Model:** TSI CPC 3750

**CPC Serial Number:** 3750200903

**Customer:** TSI Instruments Ltd.

**Description:** Calibration of a Condensation Particle Counter (CPC, Model 3750)

**Date of Calibration:** May 08, 2020

**Summary of Intercomparison:**

The candidate passed the quality standards of ACTRIS and GAW. The candidate reached 100% efficiency at 40 nm. The Dp50 is at 5.82nm. The CPC efficiency curve corresponds to the standard of ACTRIS and GAW.

Certificate / Reference: WCCAP

Date of issue: May 11, 2020 Signature:

Reviewed by: **TROPOS**

Name: **Kay Weinhold**

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**Date of arrival of instrument in calibration lab:** *April 30, 2020*  
**Instrument:** *Condensation Particle Counter*  
**Model and serial number of instrument:** *CPC 3750 S/N 3750200903*

**Result of physical inspection:** *no damages*  
**Result of functional test:** *functional test successful, no problems*

**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 5, 2018, calibrated at PTB Braunschweig*

**Corrections of electrometer, for instance, differing flow rate:** *Within tolerance range (+/-2%); reference: 4.0 l/min, measured: 4.000 l/min*

**Software for recording:** *LabView 2010; National Instruments; Program „LabCount.vi“*

**Date of calibration:** *May 08, 2020*  
**Lab temperature and pressure:** *25.35°C, 999 mbar*  
**Measured aerosol flow rate of CPC:** *0.962 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 and logging via TROPOS Labview software):**

<b>Particle size (nm)</b>	<b>40</b>	<b>30</b>	<b>20</b>	<b>15</b>	<b>10</b>	<b>09</b>
<b>Number concentration (cm-3)</b>	933	1377	1178	1450	1667	1588
<b>Counting efficiency <math>\eta</math></b>	0.99	1.00	1.01	1.01	0.94	0.90
<b>Particle size (nm)</b>	<b>08</b>	<b>07</b>	<b>06</b>	<b>05</b>		
<b>Number concentration (cm-3)</b>	980	830	663	255		
<b>Counting efficiency <math>\eta</math></b>	0.83	0.72	0.55	0.25		



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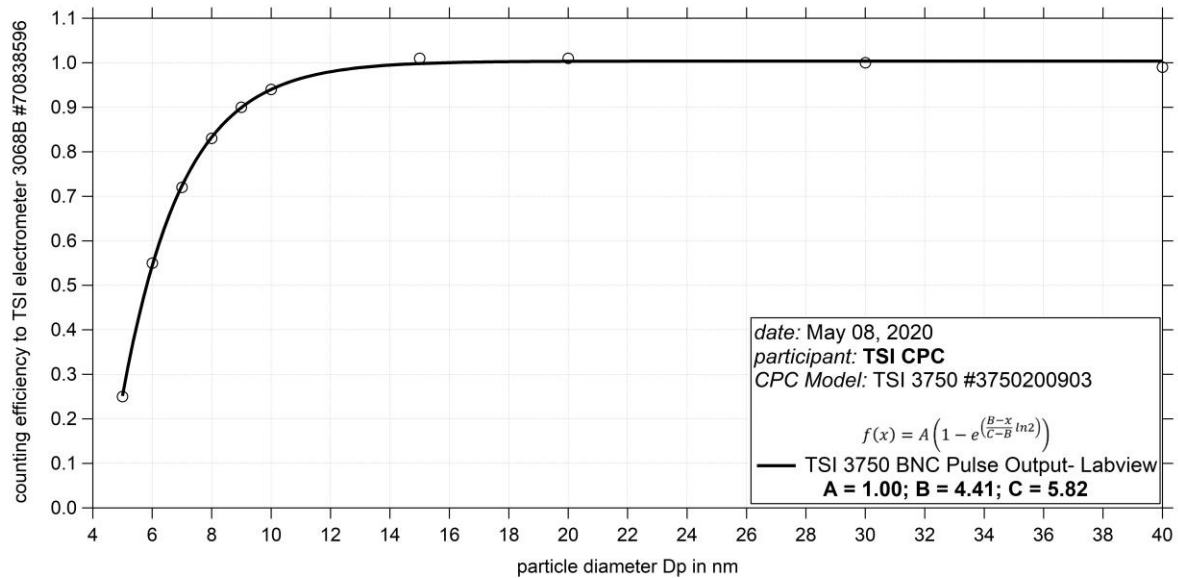


Fig. 1: Counting efficiency for CPC 3750 S/N 3750200903 against aerosol electrometer 3068 S/N 70838596; silver particles between 5 and 40 nm were used for calibration; the calculated  $D_{p50}$  by the BNC Pulse Output on Labview is 5.82 nm.

**Status information:**

<b>Status</b>	<b>T SAT</b>	<b>T CON</b>	<b>T OPT</b>	<b>T CAB</b>	<b>P AMB</b>	<b>P VAC</b>
from display	39.0	18	40.0	24.3	100.5	83.7
<b>Status</b>	<b>P OR</b>	<b>P NO</b>	<b>Laser</b>	<b>LV</b>	<b>flow</b>	<b>P INLET</b>
from display	80.9	2.22	41	full	0.962	-0.4

**Results:**

<b>using pulse output and logging via TROPOS Labview software: without coincidence correction</b>					
<b>Concentration EM in #/cm<sup>3</sup></b>	<b>63148</b>	<b>50591</b>	<b>39465</b>	<b>28761</b>	<b>19905</b>
<b>Number concentration without coincidence correction (cm-3)</b>	51715	43025	34705	26133	18618
<b>Counting efficiency <math>\eta</math></b>	0.82	0.85	0.88	0.90	0.94
<b>Concentration EM in #/cm<sup>3</sup></b>	<b>11054</b>	<b>5392</b>	<b>1825</b>		
<b>Number concentration without coincidence correction (cm-3)</b>	10700	5363	1854		
<b>Counting efficiency <math>\eta</math></b>	0.97	0.99	1.01		



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**Results:**

using USB-C connection and logging via TSI software: with coincidence correction					
Concentration EM in #/cm <sup>3</sup>	<b>63148</b>	<b>50591</b>	<b>39465</b>	<b>28761</b>	<b>19905</b>
Number concentration with coincidence correction (cm-3)	63684	50898	39509	28579	19769
Counting efficiency $\eta$	1.00	1.00	1.00	0.99	0.99
Concentration EM in #/cm <sup>3</sup>	<b>11054</b>	<b>5392</b>	<b>1825</b>		
Number concentration with coincidence correction (cm-3)	11084	5455	1860		
Counting efficiency $\eta$	1.00	1.01	1.02		

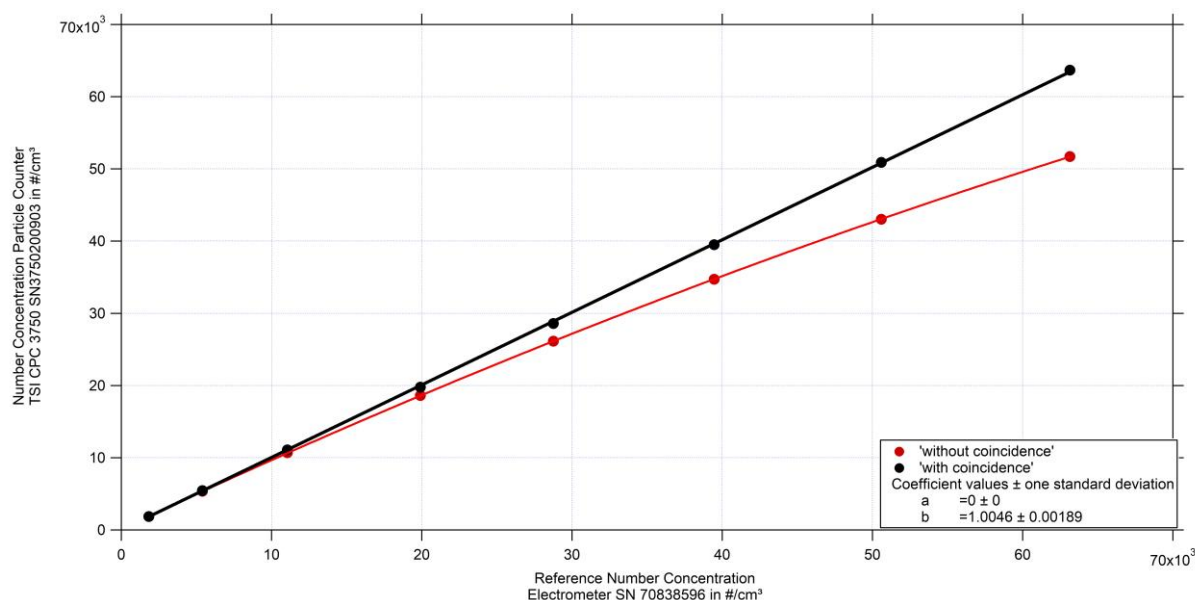


Fig. 2: Linearity test for TSI CPC 3750 SN 3750200903 against aerosol electrometer 3068 SN 70838596; silver particles with a diameter of 30 nm were used for number concentrations between 2000 and 60000 particles per cm<sup>3</sup>.

**Date of issue:** May 11, 2020

Reference: TSI electrometer, model 3068, SN 70838596

Reviewed: TROPOS / Kay Weinhold