World Calibration Centre
for Aerosol Physics

Leibniz-Institut für Troposphärenforschung Permoserstraße 15 04318 Leipzig

TROPOS
Leibniz Institute for
Tropospheric Research

CPC Model: TSI CPC 3750

CPC Serial Number: 3750193901

Customer: TSI Instruments Ltd.

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

Date of Calibration: November 13, 2019

Summary of Intercomparison:

The candidate passed the quality standards of ACTRIS and GAW. The candidate reached 95% efficiency at 40 nm. The Dp50 is at 7.07 nm. The CPC efficiency curve corresponds to the standard of ACTRIS and GAW.

Certificate / Reference: WCCAP

Date of issue: November 13, 2019 Signature:

Reviewed by: **TROPOS** Name: **Kay Weinhold**

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Date of arrival of instrument in calibration lab:	*November 11, 2019*
Instrument:	*Condensation Particle Counter*
Model and serial number of instrument:	*CPC 3750 S/N 3750193901*
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:	*November 13, 2019*
Lab temperature and pressure:	*24.5°C, 982.5 mbar*
Measured aerosol flow rate of CPC:	*1.007 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)	1250	1223	1426	1176	1126
Counting efficiency η	*0.97*	*0.96*	*0.94*	*0.92*	*0.79*
Particle size (nm)	***09***	***08***	***07***	***06***	
Number concentration (cm-3)	1175	727	651	386	
Counting efficiency η	*0.71*	*0.60*	*0.46*	*0.28*	

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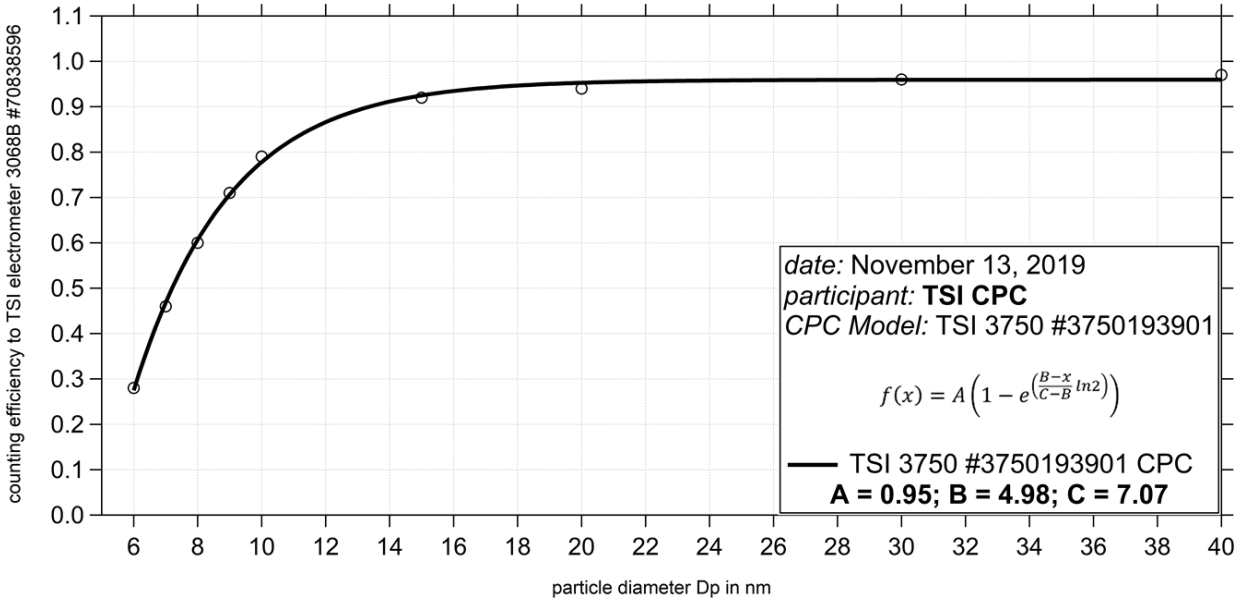

Fig. 1: Counting efficiency for CPC 3750 S/N 3750193901 against aerosol electrometer 3068 S/N 70838596; silver particles between 6 and 40 nm were used for calibration; the calculated Dp50 is 7.07 nm.

Status information:

Status	*T SAT*	*T CON*	*T OPT*	*T CAB*	*P AMB*	*P VAC*
from display	39.0	18.0	40.0	34.5	99.0	80.3
Status	***P OR***	***P NO***	***Laser***	***LV***	***flow***	***P INLET***
from display	77.3	2.49	40	full	1.007	-0.4

Results (using pulse output):

without coincidence correction					
Concentration EM in #/cm³	**66849**	**58164**	**50013**	**43197**	**32294**
Number concentration without coincidence correction (cm-3)	51709	45494	39936	35135	27079
Counting efficiency η	*0.77*	*0.78*	*0.80*	*0.81*	*0.84*
Concentration EM in #/cm³	**19887**	**11244**	**5127**	**1177**	
Number concentration without coincidence correction (cm-3)	17321	10095	4741	1101	
Counting efficiency η	*0.87*	*0.89*	*0.93*	*0.94*	

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with coincidence correction					
Concentration EM in #/cm³	**66849**	**58164**	**50013**	**43197**	**32294**
Number concentration with coincidence correction (cm-3)	*65859*	*56353*	*48197*	*41518*	*30866*
Counting efficiency η	*0.98*	*0.97*	*0.96*	*0.96*	*0.95*
Concentration EM in #/cm³	**19887**	**11244**	**5127**	**1177**	
Number concentration with coincidence correction (cm-3)	*18923*	*10761*	*4988*	*1179*	
Counting efficiency η	*0.95*	*0.95*	*0.97*	*1.00*	

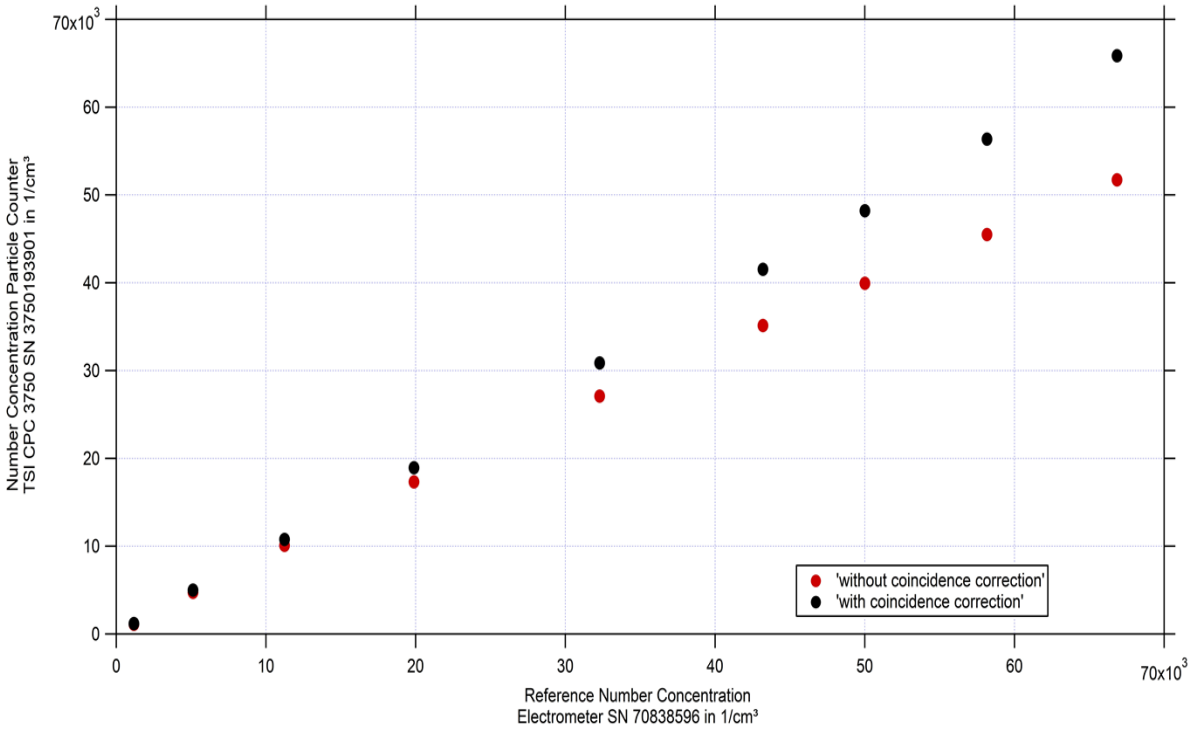

Fig. 2: Linearity test for TSI CPC 3750 SN 3750193901 against aerosol electrometer 3068 SN 70838596; silver particles with a diameter of 30 nm were used for number concentrations between 1000 and 70000 particles per cm³.

Date of issue: *November 13, 2019*

Reference: TSI electrometer, model 3068, SN *70838596*
Reviewed: TROPOS / Kay Weinhold

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