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: 3750200601

Customer: TSI Instruments Ltd.

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

Date of Calibration: March 18, 2020

Summary of Intercomparison:

The candidate passed the quality standards of ACTRIS and GAW. The candidate reached 99% efficiency at 40 nm. The Dp50 is at 6.09nm. The CPC efficiency curve corresponds to the standard of ACTRIS and GAW.

Certificate / Reference: WCCAP

Date of issue: March 20, 2020 Signature:

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

Leibniz-Institut für Troposphärenforschung e.V.
Telefon: +49 341 2717-7060
Telefax: +49 341 2717-99-7060
info@tropos.de
http://www.tropos.de

Commerzbank Leipzig
KTO 102 14 50
BLZ 860 400 00
IBAN: DE77 8604 0000 0102 1450 00
SWIFT CODE: COBADEFF 860

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Date of arrival of instrument in calibration lab:	*March 16, 2020*
Instrument:	*Condensation Particle Counter*
Model and serial number of instrument:	*CPC 3750 S/N* 375200601
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:	*March 18, 2020*
Lab temperature and pressure:	*23.0°C, 1008 mbar*
Measured aerosol flow rate of CPC:	*0.999 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 and logging via TROPOS Labview software):

Particle size (nm)	***40***	***30***	***20***	***15***	***10***	***09***
Number concentration (cm-3)	1315	1487	991	1197	1644	1608
Counting efficiency η	*0.97*	*0.99*	*0.99*	*0.99*	*0.90*	*0.85*
Particle size (nm)	***08***	***07***	***06***	***05***	***40***	
Number concentration (cm-3)	1426	1420	804	357	1071	
Counting efficiency η	*0.76*	*0.64*	*0.47*	*0.23*	*0.98*	

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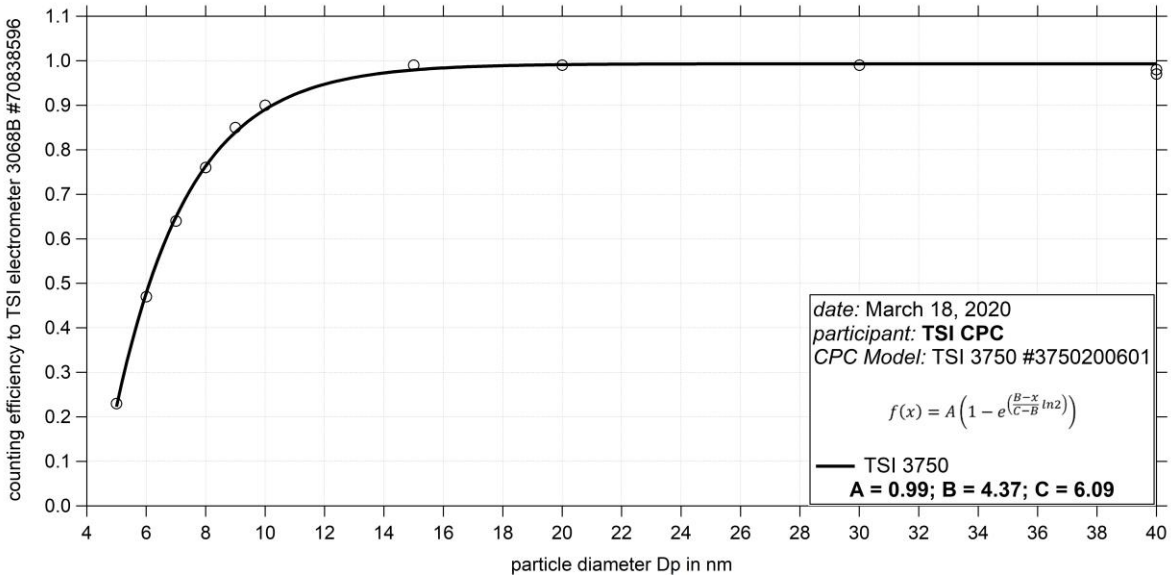

Fig. 1: Counting efficiency for CPC 3750 S/N 3750200601 against aerosol electrometer 3068 S/N 70838596; silver particles between 5 and 40 nm were used for calibration; the calculated Dp50 is 6.09 nm.

Status information:

Status	*T SAT*	*T CON*	*T OPT*	*T CAB*	*P AMB*	*P VAC*
from display	39.0	18	40.0	23.8	101.6	77.3
Status	***P OR***	***P NO***	***Laser***	***LV***	***flow***	***P INLET***
from display	74.5	2.43	41	full	0.999	-0.3

Results (using pulse output and logging via TROPOS Labview software):

without coincidence correction					
Concentration EM in #/cm³	59180	52207	40447	30357	21658
Number concentration without coincidence correction (cm-3)	46224	41463	33363	25900	19096
Counting efficiency η	0.78	*0.79*	*0.83*	*0.85*	*0.88*
Concentration EM in #/cm³	11176	*8737*	*3986*	*2053*	
Number concentration without coincidence correction (cm-3)	10875	8206	3836	2002	
Counting efficiency η	*0.92*	*0.94*	*0.96*	*0.98*	

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Results (using USB-C connection and logging via TSI software):

with coincidence correction					
Concentration EM in #/cm³	**59180**	**52207**	**40447**	**30357**	**21658**
Number concentration with coincidence correction (cm-3)	60093	52226	40091	30037	21457
Counting efficiency η	*1.02*	*1.00*	*0.99*	*0.99*	*0.99*
Concentration EM in #/cm³	**11176**	***8737***	***3986***	***2053***	
Number concentration with coincidence correction (cm-3)	11177	*8777*	*4015*	*2076*	
Counting efficiency η	*1.00*	*1.00*	*1.01*	*1.01*	

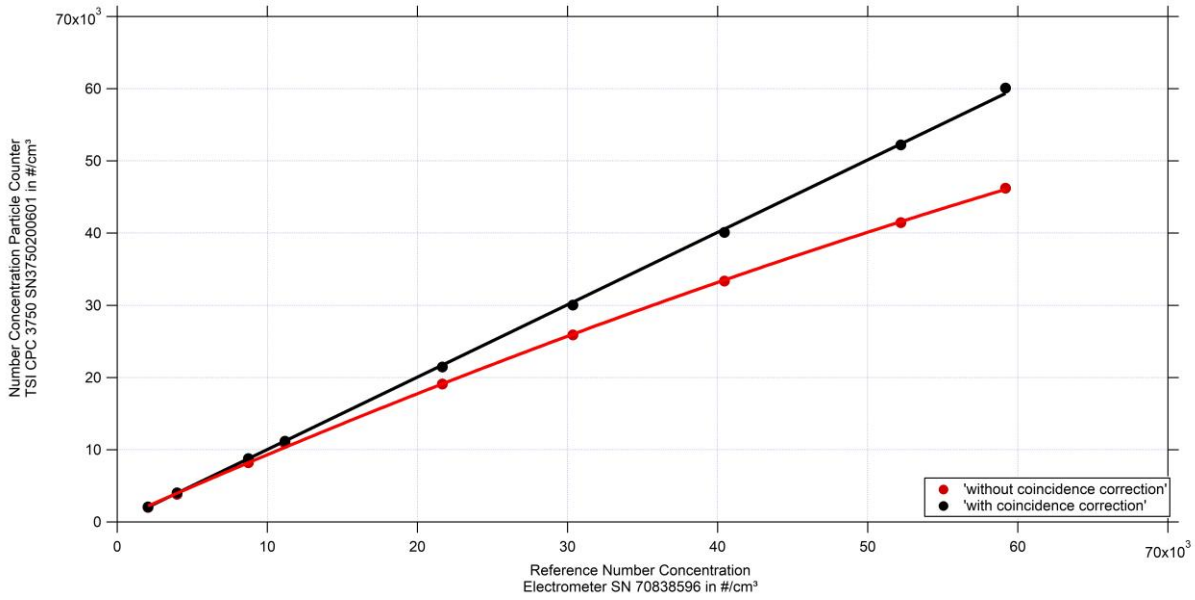

Fig. 2: Linearity test for TSI CPC 3750 SN 3750200601 *against aerosol electrometer 3068 SN 70838596; silver particles with a diameter of 30 nm were used for number concentrations between 2000 and 60000 particles per cm³.*

Date of issue: *March 20, 2020*

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

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