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: 3750201202

Customer: TSI Instruments Ltd.

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

Date of Calibration: September 16, 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 6.92 nm. The CPC efficiency curve corresponds to the standard of ACTRIS and GAW.

Certificate / Reference: WCCAP

Date of issue: September 16, 2020 Signature:

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

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Date of arrival of instrument in calibration lab:	*September, 2020*
Instrument:	*Condensation Particle Counter*
Model and serial number of instrument:	*CPC 3750 S/N* 3750201202
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:	*September 16, 2020*
Lab temperature and pressure:	*23.0°C, 1001 mbar*
Measured aerosol flow rate of CPC:	*0.992 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***	***14***	***11***	***10***
Number concentration (cm-3)	1288	1360	1770	1071	1459	826	1467
Counting efficiency η	*0.99*	*1.00*	*0.99*	*0.96*	*0.95*	*0.90*	*0.84*
Particle size (nm)	***09***	***08***	***07***	***06***	***05***	***40***	
Number concentration (cm-3)	1399	799	1090	604	23	1345	
Counting efficiency η	*0.77*	*0.66*	*0.50*	*0.28*	*0.02*	*0.99*	

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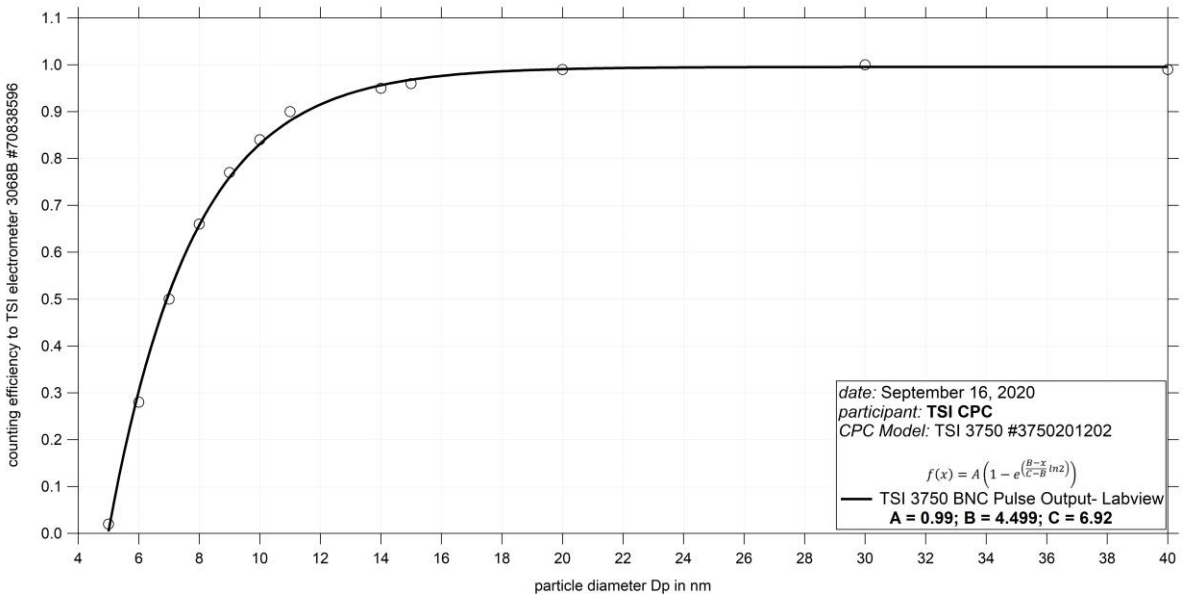

Fig. 1: Counting efficiency for CPC 3750 S/N 3750201202 against aerosol electrometer 3068 S/N 70838596; silver particles between 5 and 40 nm were used for calibration; the calculated Dp50 by the BNC Pulse Output on Labview is 6.92 nm.

Status information:

Status	*T SAT*	*T CON*	*T OPT*	*T CAB*	*P AMB*	*P VAC*
from display	39.0	19.8	40.0	22.4	100.9	82.8
Status	***P OR***	***P NO***	***Laser***	***LV***	***flow***	***P INLET***
from display	81.9	2.45	41	full	0.992	-0.3

Results:

using pulse output and logging via TROPOS Labview software: without coincidence correction					
Concentration EM in #/cm³	**61792**	**50032**	**32548**	**28098**	**17937**
Number concentration without coincidence correction (cm-3)	47550	40065	27719	24300	16225
Counting efficiency η	0.77	0.80	0.85	0.86	0.90
Concentration EM in #/cm³	**12485**	***5332***	***1436***		
Number concentration without coincidence correction (cm-3)	11536	5046	1401		
Counting efficiency η	0.92	0.95	0.98		

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Results:

using USB-C connection and logging via TSI software: with coincidence correction					
Concentration EM in #/cm³	**61792**	**50032**	**32548**	**28098**	**17937**
Number concentration with coincidence correction (cm-3)	60128	48849	31927	27558	17820
Counting efficiency η	0.97	0.98	0.98	0.98	0.99
Concentration EM in #/cm³	**12485**	***5332***	***1436***		
Number concentration with coincidence correction (cm-3)	12497	5345	1463		
Counting efficiency η	1.00	1.00	1.02		

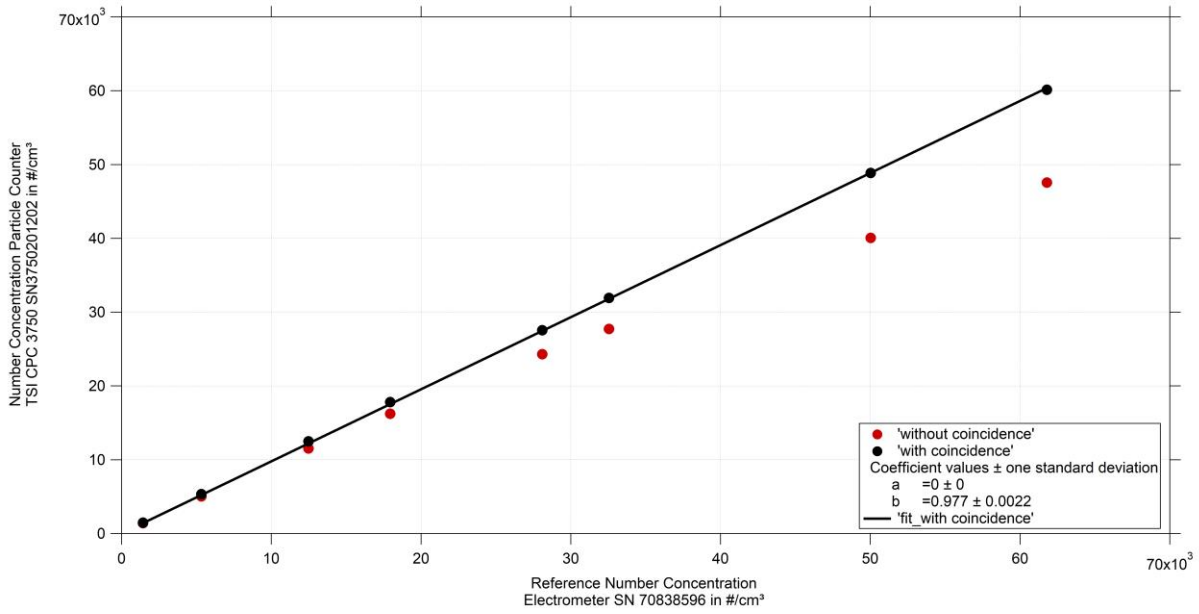

Fig. 2: Linearity test for TSI CPC 3750 SN 3750201202 *against aerosol electrometer 3068 SN 70838596; silver particles with a diameter of 30 nm were used for number concentrations between 1000 and 60000 particles per cm³.*

Date of issue: *September 16, 2020*

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

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