



World Calibration Centre
for Aerosol Physics



Leibniz Institute for
Tropospheric Research

Intercomparison of Condensation Particle Counter

Project No.: CPC-2020-1-3

CPC Model: TSI CPC 3776

CPC Serial Number: 70626074

Principal Investigator: Dr. Paul Williams

Home Institution: Manchester University, UK

Participant: -

Description: Calibration of a Condensation Particle Counter (CPC, Model 3776)

Date of Calibration: March 18, 2020

Summary of Intercomparison:

The candidate did not pass the quality standards of ACTRIS and GAW. The candidate reached 100% efficiency at 40 nm. The Dp50 is at 12.13 nm, what is not the expected efficiency curve of a TSI Model 3776. TROPOS recommends to send the CPC for maintenance back to TSI.

Certificate / Reference: WCCAP

Date of issue: March 20, 2020

Signature:

Reviewed by: **TROPOS**

Name: **Kay Weinhold**

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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 3776 S/N 70626074*

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: *0.3 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)	1321	1465	795	777	696	624
Counting efficiency η	0.98	0.98	0.80	0.64	0.38	0.33
Particle size (nm)	08	07	06	05	40	
Number concentration (cm-3)	579	565	335	225	1056	
Counting efficiency η	0.31	0.26	0.20	0.14	0.97	



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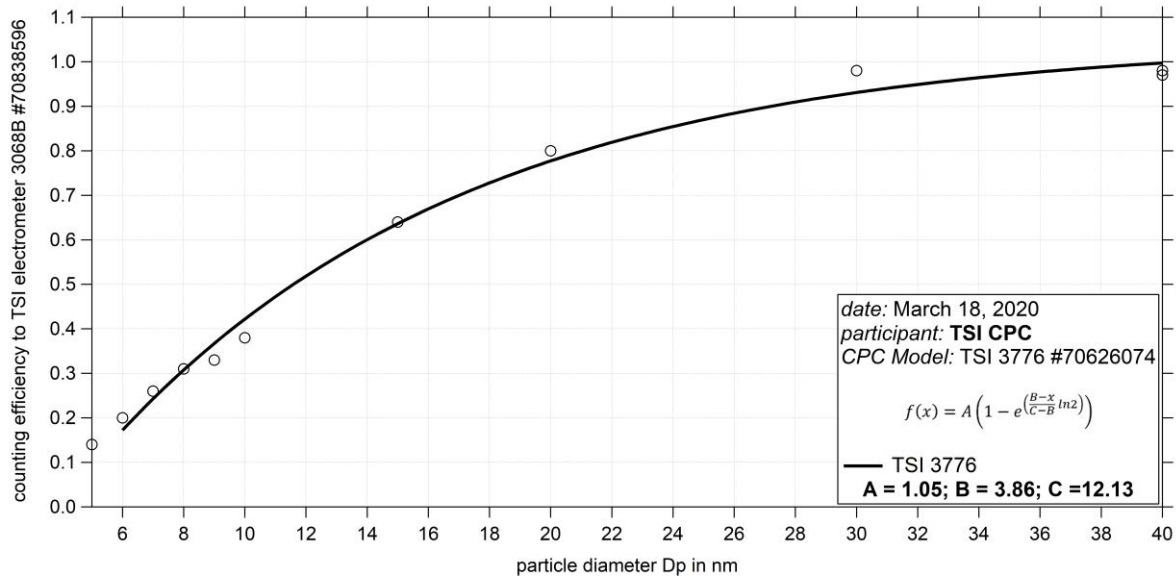


Fig. 1: Counting efficiency for CPC 3776S/N 70626074 against aerosol electrometer 3068 S/N 70838596; silver particles between 5 and 40 nm were used for calibration; the calculated Dp50 is 12.13 nm.

Status information:

Status	T SAT	T CON	T OPT	T CAB	P AMB	P VAC
from display	39.0	10	40.0	30.4	101.5	-
Status	P OR	P NO	Laser	LV	flow	P INLET
from display	55.7	3.6	33	full	0.3	-

Date of issue: March 20, 2020

Reference: TSI electrometer, model 3068, SN 70838596

Reviewed: TROPOS / Kay Weinhold