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: 3750192201

Customer: TSI Instruments Ltd.

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

Date of Calibration: November 24, 2020

Summary of Intercomparison:

The candidate passed the quality standards of ACTRIS and GAW. The candidate reached 97% efficiency at 40 nm. The Dp_{50} is at 6.6 nm. The CPC efficiency curve corresponds to the standard of ACTRIS and GAW.

Certificate / Reference: WCCAP

Date of issue: November 24, 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:	*November 16, 2020*
Instrument:	*Condensation Particle Counter*
Model and serial number of instrument:	*CPC 3750 SN 3750192201*
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, SN 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 24, 2020*
Lab temperature and pressure:	*23.0°C, 1007 mbar*
Measured aerosol flow rate of CPC:	*0.992 l/min*
Uncertainty in measured flow rate:	*3%*
Flowmeter used:	*Gilian Gilibrator V; SN 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 10 minutes*

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	Unit	Status
Model	-	TSI 3750
SN	-	3750192201
Firmware	-	2.3.0
Date	-	May 2019
TSI Software Version	-	-
Saturator Temperature	°C	39.00
Condenser Temperature	°C	18.00
Optics Temperature	°C	40.00
Cabinet Temperature	°C	25.10
Ambient Pressure	kPa	101.10
Vaccuum Pressure	kPa	86.60
Inlet Pressure	kPa	0.00
Critical Orifice Pressure	kPa	83.90
Aerosol Nozzle Pressure	kPa	2.40
Laser Current	mA	47.00
Liquid Level	-	full
Aerosol Flow	l/min	0.992
Zero	avg 10 min	0

		BNC (pulse output)		USB-C (direct output)		
Diameter	**EL 3068B (#/cm³)**	**Concentration (#/cm³)**	**Efficiency (µ)**	**Concentration (#/cm³)**	**Efficiency (µ)**	**USB-C / BNC**
40	1361	1313	0.97	1450	1.07	1.10
40	1314	1271	0.97	1404	1.07	1.10
30	1489	1426	0.96	1575	1.06	1.10
20	1570	1502	0.96	1660	1.06	1.10
15	1261	1193	0.95	1315	1.04	1.10
14	1818	1704	0.94	1885	1.04	1.11
12	1751	1596	0.91	1764	1.01	1.10
11	1354	1213	0.90	1338	0.99	1.10
10	1066	924	0.87	1017	0.95	1.10
9	1576	1248	0.79	1376	0.87	1.10
8	933	652	0.70	717	0.77	1.10
7	1934	1043	0.54	1149	0.59	1.10
6	1503	478	0.32	525	0.35	1.10
5	1316	50	0.04	55	0.04	1.10

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	BNC (pulse output)		USB-C (direct output)		
EL 3068B (#/cm³)	Concentration (#/cm³)	Efficiency (µ)	Concentration (#/cm³)	Efficiency (µ)	USB-C / BNC
1026	1006	0.98	1057	1.03	1.05
3150	3072	0.98	3255	1.03	1.06
8424	8037	0.95	8666	1.03	1.08
14262	13405	0.94	14692	1.03	1.10
23725	21603	0.91	24282	1.02	1.12
31121	27376	0.88	31533	1.01	1.15
40340	34555	0.86	41131	1.02	1.19
50122	41746	0.83	51319	1.02	1.23
65747	52176	0.79	67319	1.02	1.29

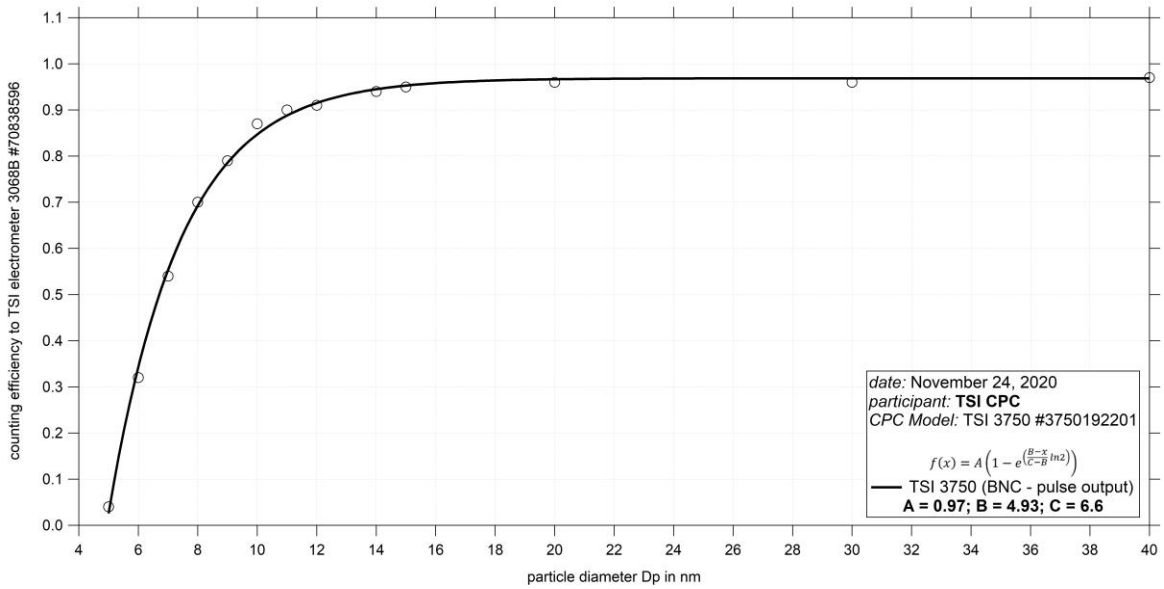

Fig. 1: Counting efficiency for TSI-CPC 3750 SN 3750192201 against aerosol electrometer 3068 SN 70838596; silver particles between 5 nm and 40 nm were used for calibration; the calculated Dp_{50} from the BNC (pulse output) is 6.6 nm.

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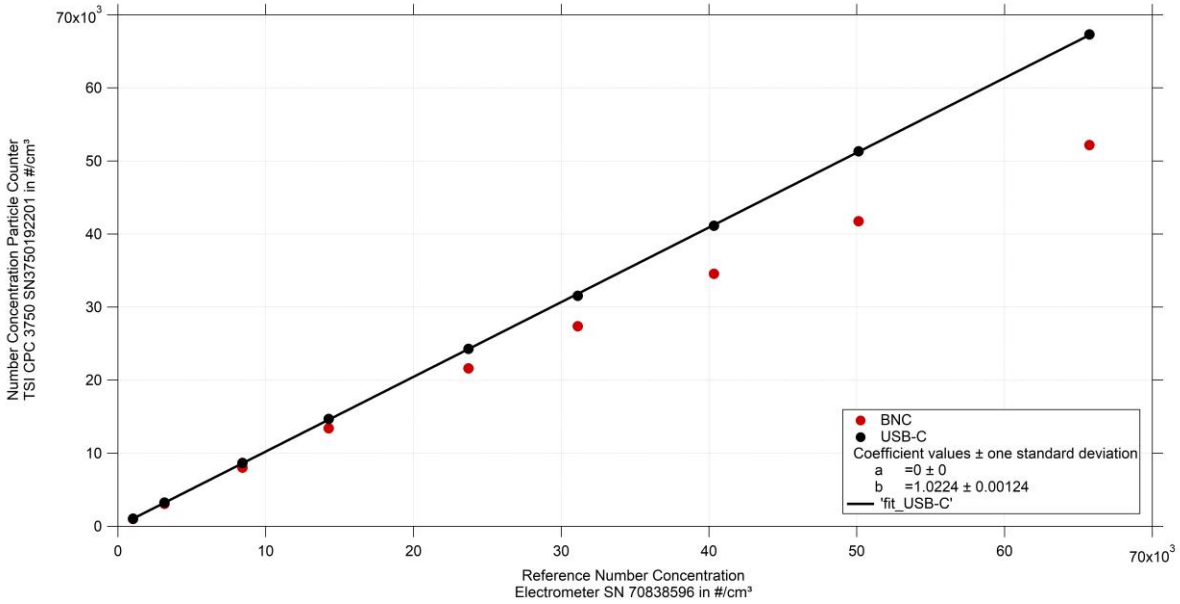

Fig. 2: Linearity for TSI CPC 3750 SN 3750192201 against aerosol electrometer 3068 SN 70838596; silver particles with a diameter of 30 nm were used for number concentrations between 1000 particles per cm³ and 60000 particles per cm³.

Date of issue: *November 24, 2020*

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

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