



World Calibration Centre
for Aerosol Physics

Leibniz-Institut für Troposphärenforschung Permoserstraße 15 04318 Leipzig



Leibniz Institute for
Tropospheric Research

CPC Model: TSI CPC 3750

CPC Serial Number: 3750193805

Customer: UBA Langen

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

Date of Calibration: April 07, 2022

Summary of Intercomparison:

The candidate reached 93% efficiency at 40 nm. The Dp_{50} is at 8.98 nm.

Certificate / Reference: WCCAP

Date of issue: May 09, 2022

Reviewed by: WCCAP

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Date of arrival of instrument in calibration lab:	<i>April 01, 2022</i>
Instrument:	<i>Condensation Particle Counter</i>
Model and serial number of instrument:	<i>TSI-CPC 3750 SN 3750193805</i>
Result of physical inspection:	<i>no damages</i>
Result of functional test:	<i>functional test successful, no problems</i>
Internal parameters of instrument	<i>nominal flow rate 1.0 l/min</i>
Model and identification number of aerosol electrometer:	<i>TSI Electrometer Model 3068, SN 70838596</i>
Electrometer calibration certificate:	<i>September 24, 2021, calibrated at PTB Braunschweig</i>
Corrections of electrometer, for instance, differing flow rate:	<i>Within tolerance range (+/-2%); reference: 4.0 l/min, measured: 4.229 l/min</i>
Software for recording:	<i>LabView 2021; National Instruments; Program „LabCount.vi“</i>
Date of calibration:	<i>April 7, 2022</i>
Lab temperature and pressure:	<i>23.0°C, 1001 mbar</i>
Measured aerosol flow rate of CPC:	<i>0.982 l/min</i>
Uncertainty in measured flow rate:	<i>3%</i>
Flowmeter used:	<i>Gilian Gilibrator 3; SN 21181001005, 2021</i>
Particles and gases used for calibration:	<i>silver particles and nitrogen</i>
Method of particle generation:	<i>tube furnace generator</i>
Zero measurement of instrument:	<i>0 particles/cm³ in 5 minutes</i>

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	Unit	Status
Model	-	TSI-CPC 3750
SN	-	3750193805
Firmware	-	2.2.0
Date	-	2022
last service date	-	-
TSI Software Version	-	-
Saturator Temperature	°C	39
Condenser Temperature	°C	22.5
Optics Temperature	°C	40
Cabinet Temperature	°C	24.2
Ambient Pressure	kPa	97.7
Vacuum Pressure	kPa	72.7
Inlet Pressure	kPa	-0.3
Critical Orifice Pressure	kPa	69.9
Aerosol Nozzle Pressure	kPa	2.47
Laser Current	mA	37
Liquid Level	-	Full
Aerosol Flow	l/min	0.982
Zero	avg 5 min	0

Diameter	EL 3068B (#/cm ³)	BNC (pulse output)		USB (direct output)		USB-C / BNC
		Concentration (#/cm ³)	Efficiency (μ)	Concentration (#/cm ³)	Efficiency (μ)	
40	1309	1215	0.93	1247	0.95	1.03
30	1394	1270	0.91	1307	0.94	1.03
30	1254	1135	0.91	1168	0.93	1.03
20	1259	1108	0.88	1141	0.91	1.03
14	1891	1449	0.77	1495	0.79	1.03
11	1427	894	0.63	920	0.64	1.03
10	2173	1209	0.56	1246	0.57	1.03
9	1597	748	0.47	769	0.48	1.03
8	1672	585	0.35	600	0.36	1.03
7	1237	228	0.18	233	0.19	1.02
6	1806	36	0.02	37	0.02	1.03
5	1195	0	0.00	0	0.00	-



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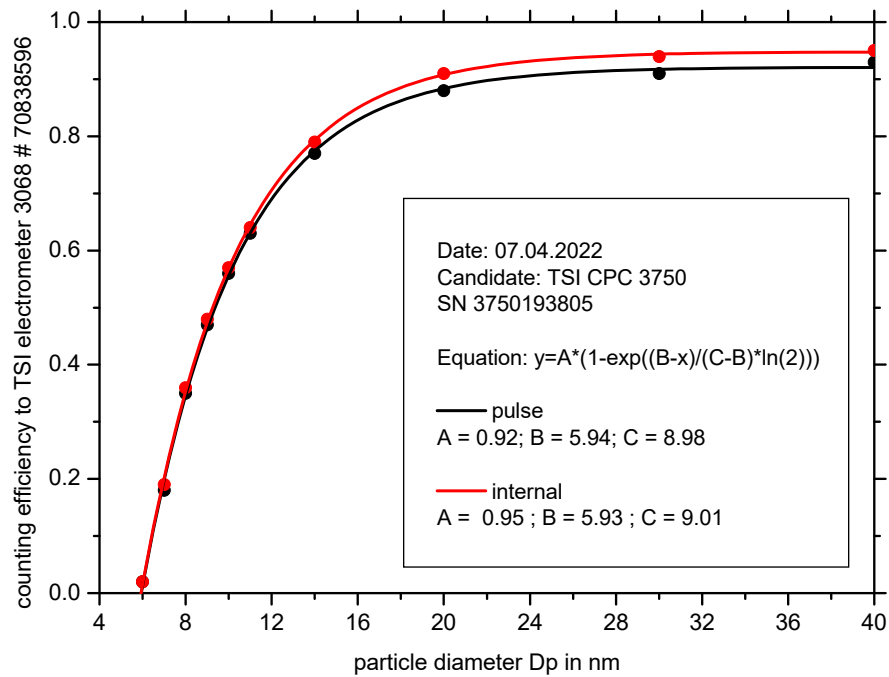


Fig. 1: Counting efficiency for TSI-CPC 3750 SN 3750193805 against aerosol electrometer 3068 SN 70838596; silver particles between 5 nm and 40 nm were used for calibration; the calculated Dp_{50} is 8.98 nm.

EL 3068B (#/cm ³)	BNC (pulse output)		USB (direct output)		USB-C / BNC
	Concentration (#/cm ³)	Efficiency (μ)	Concentration (#/cm ³)	Efficiency (μ)	
2071	1886	0.91	1893	0.91	1.00
4492	4047	0.90	4125	0.92	1.02
8400	7450	0.89	7752	0.92	1.04
13467	11692	0.87	12492	0.93	1.07
20267	17142	0.85	18931	0.93	1.10
32042	25934	0.81	30334	0.95	1.17
42071	32872	0.78	40091	0.95	1.22
53087	39691	0.75	50413	0.95	1.27
62416	44911	0.72	58656	0.94	1.31



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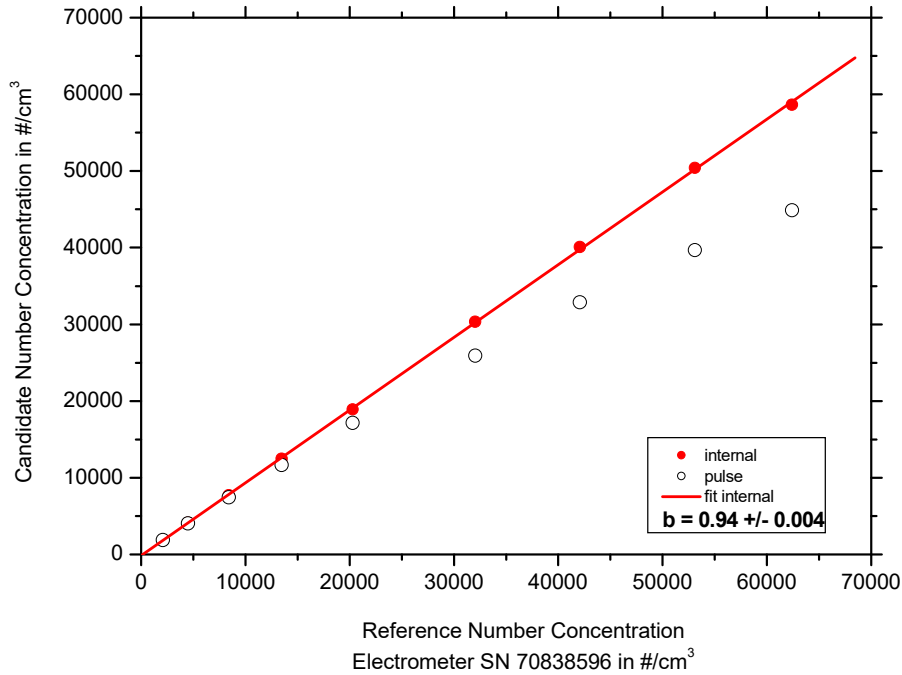


Fig. 2: Linearity for candidate CPC against aerosol electrometer 3068 SN 70838596; silver particles with a diameter of 30 nm were used for number concentrations between 2000 particles per cm³ and 60000 particles per cm³.

Date of issue: May 09, 2022

Reference: TSI electrometer, model 3068, SN 70838596

Reviewed: WCCAP / M. Merkel