World Calibration Centre
for Aerosol Physics

TROPOS

Leibniz Institute for
Tropospheric Research

Project No.	CPC-2022-WCCAP-101
CPC Model:	TSI CPC 3750
CPC Serial Number:	SN 3750175101
Customer:	TSI
Description:	Calibration of a Condensation Particle Counter
Date of Calibration:	January 19, 2022

Summary of Intercomparison:

The candidate passed the quality standards of ACTRIS and GAW. The candidate reached 100% efficiency at 40 nm. The Dp50 is at 6.66 nm. The CPC efficiency curve corresponds to the standard of ACTRIS and GAW.

Certificate / Reference: WCCAP

Date of issue:	January 19, 2022
Reviewed by:	WCCAP

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

Mitglied der Leibniz-Gemeinschaft

World Calibration Centre
for Aerosol Physics

TROPOS

Leibniz Institute for
Tropospheric Research

Table 1. Diagnostic information of candidate

	Unit	Status
Participant		TSI 3750 SN 3750175101
CPC Model		CPC 3750
Firmware		
Manufacture date		
Last service date		2021-11-02
Arrival date		
Software Version		
Saturator Temperature	°C	39
Condenser Temperature	°C	19.8
Optics Temperature	°C	40
Cabinet Temperature	°C	22.5
Ambient Pressure	mbar	101.1
Vaccuum Pressure	kPa	72.9
Inlet Pressure	kPa	-0.1
Critical Orifice Pressure	kPa	70.4
Aerosol Nozzle Pressure	kPa	2.37
Laser Current	mA	47
Liquid Level		full
Aerosol Flow	L/min	0.96
Zero	avg 10 min	0
Physical inspection		ok
Functional test		ok

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

Mitglied der Leibniz-Gemeinschaft

Table 2. Calibration and laboratory conditions

	Information
Aerosol electrometer	TSI Electrometer Model 3068, SN 70838596
Particles and gases used for calibration	silver particles and nitrogen
Method of particle generation	tube furnace generator
Electrometer calibration certificate	September, 2021, calibrated at PTB Braunschweig
Corrections of electrometer (i.e. differing flow rate)	Within tolerance range (+/-2%); reference: 4.0 l/min, measured: 4.0 l/min
Logging software	LabView 2010; National Instruments; Program „LabCount.vi“
Uncertainty in measured flow rate	3%
Flowmeter used	Gilian Gilibrator 3; SN 21181001005, 2021
Lab Tempreature and Pressure	21.0°C, 1013 mbar

Table 2. Efficiency of candidate CPC per diameter against the Electrometer

Diameter	EL 3068B (#/cm³)	Pulse Output		Internal Output		Internal/ Pulse
		Concentration (#/cm³)	Efficiency (µ)	Concentration (#/cm³)	Efficiency (µ)	
40nm	1488	1468	0.99	1506	1.01	1.02
30nm_2	1275	1262	0.99	1294	1.02	1.03
30nm	1275	1266	0.99	1296	1.02	1.03
20nm	1665	1644	0.99	1687	1.01	1.02
14nm	1818	1703	0.94	1748	0.96	1.02
11nm	1991	1685	0.85	1730	0.87	1.02
10nm	1695	1339	0.79	1372	0.81	1.03
9nm	1272	922	0.72	943	0.74	1.03
8nm	1314	839	0.64	858	0.65	1.02
7nm	1303	694	0.53	711	0.55	1.04
6nm	1484	570	0.38	583	0.39	1.03
5nm	1452	383	0.26	391	0.27	1.04

Table 3. Linearity of candidate CPC against the Electrometer

EL 3068B (#/cm³)	Pulse Output		Internal Output		Internal/ Pulse
	Concentration (#/cm³)	Efficiency (µ)	Concentration (#/cm³)	Efficiency (µ)	
1896	1869	0.99	1920	1.01	1.02
4099	3998	0.98	4142	1.01	1.03
8260	7939	0.96	8326	1.01	1.05
11655	11072	0.95	11732	1.01	1.06
20967	19030	0.91	20709	0.99	1.09
29609	25959	0.88	29026	0.98	1.11
38903	32851	0.84	37863	0.97	1.15
52557	42051	0.80	50428	0.96	1.20
62862	48266	0.77	59499	0.95	1.23

World Calibration Centre
for Aerosol Physics

Leibniz Institute for
Tropospheric Research

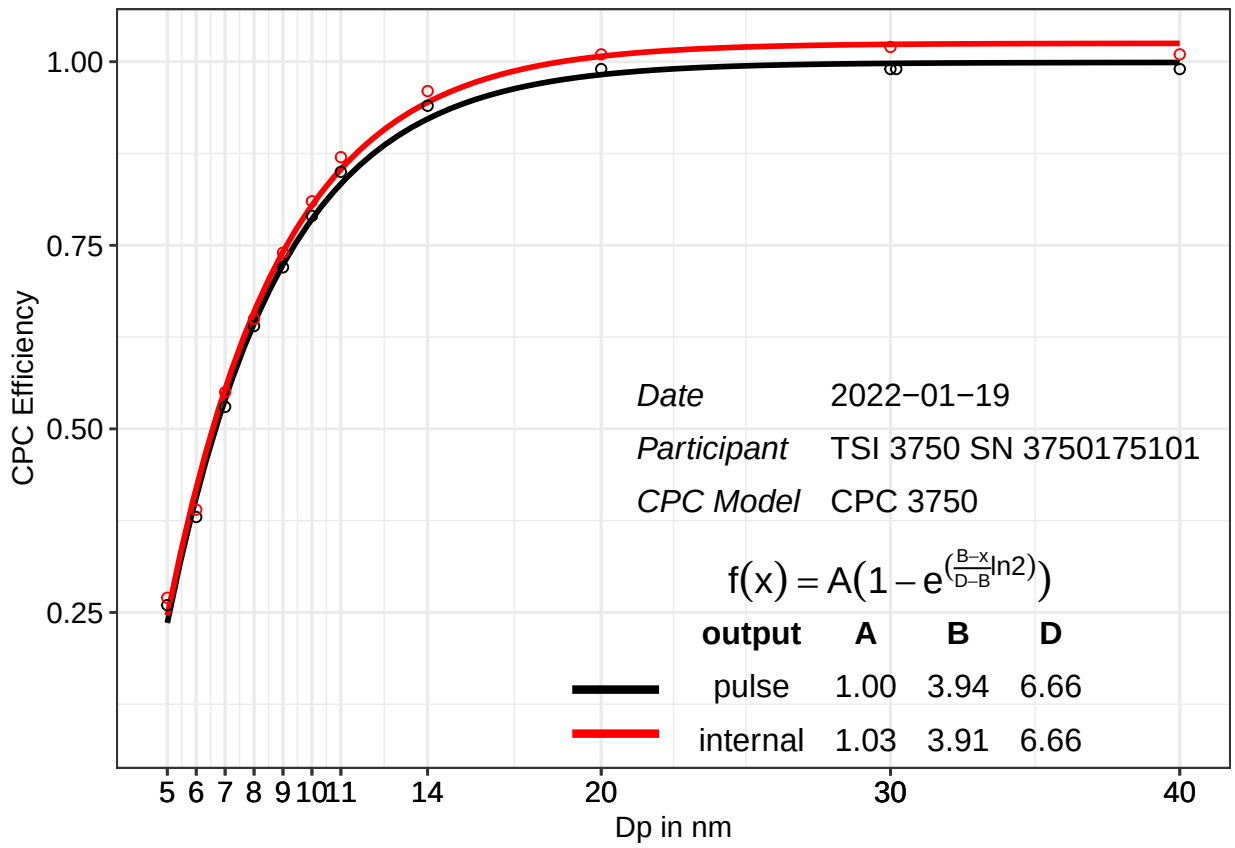

Fig. 1. Counting efficiency of candidate CPC against aerosol electrometer 3068 SN 70838596; silver particles between 5 nm and 40 nm were used for calibration.

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

Mitglied der Leibniz-Gemeinschaft

World Calibration Centre
for Aerosol Physics

TROPOS
Leibniz Institute for
Tropospheric Research

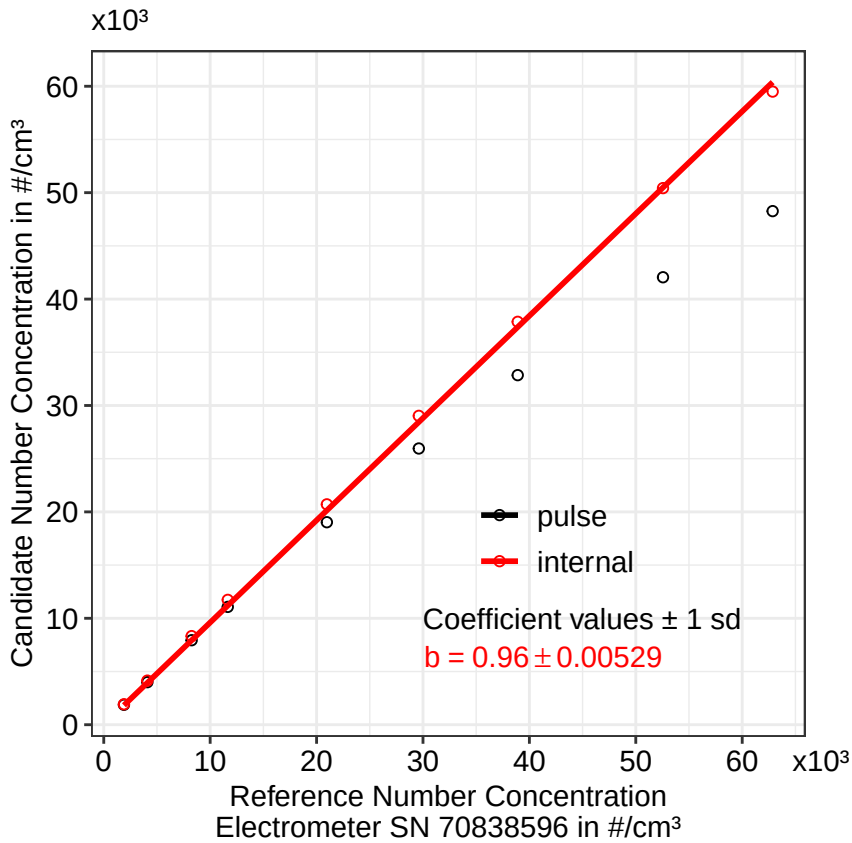

Fig. 2. Linearity for candidate CPC against aerosol electrometer 3068 SN 70838596; silver particles with a diameter of 30 nm were used for number concentrations between 2000 particles per cm³ and 60000 particles per cm³.

Date of issue:	*January 19, 2022*
Reference:	TSI electrometer, model 3068, SN 70838596
Reviewed:	WCCAP/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

Mitglied der Leibniz-Gemeinschaft