World Calibration Centre
for Aerosol Physics

Leibniz Institute for
Tropospheric Research

Leibniz-Institut für Troposphärenforschung Permoserstraße 15 04318 Leipzig

CPC Model: Palas ENVI-CPC 200

CPC Serial Number: 6954

Customer: Palas GmbH

Description: Calibration of a Condensation Particle Counter (CPC, Model ENVI-CPC 200)

Date of Calibration: January 19, 2022

Summary of Intercomparison:

The candidate reached 99% efficiency at 40 nm. The Dp_{50} is at 6.1 nm.

Certificate / Reference: WCCAP

Date of issue: January 20, 2022

Reviewed by: WCCAP

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TROPOS
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Date of arrival of instrument in calibration lab:	*January 19, 2022*
Instrument:	*Condensation Particle Counter*
Model and serial number of instrument:	*ENVI-CPC 200 SN 6954*
Result of physical inspection:	*no damages*
Result of functional test:	*functional test successful, no problems*
Internal parameters of instrument	*nominal flow rate 0.9 l/min*
Model and identification number of aerosol electrometer:	*TSI Electrometer Model 3068, SN 70838596*
Electrometer calibration certificate:	*September 24, 2021, calibrated at PTB Braunschweig*
Corrections of electrometer, for instance, differing flow rate:	*Within tolerance range (+/-2%); reference: 4.0 l/min, measured: 4.021 l/min*
Software for recording:	*LabView 2010; National Instruments; Program „LabCount.vi“*
Date of calibration:	*January 19, 2022*
Lab temperature and pressure:	*21.0°C, 1013 mbar*
Measured aerosol flow rate of CPC:	*0.899 l/min*
Uncertainty in measured flow rate:	*3%*
Flowmeter used:	*Gilian Gilibrator 3; SN 21181001005, 2021*
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*

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	Unit	Status
Model	-	ENVI-CPC 200
SN	-	6954
Firmware	-	100529
Date	-	January 2022
last service date	-	-
TSI Software Version	-	-
Saturator Temperature	°C	35.00
Condenser Temperature	°C	14.60
Optics Temperature	°C	47.00
Cabinet Temperature	°C	-
Ambient Pressure	kPa	1000
Vaccuum Pressure	kPa	-
Inlet Pressure	kPa	-
Critical Orifice Pressure	kPa	-
Aerosol Nozzle Pressure	kPa	-
Laser Current	mA	-
Liquid Level	-	full
Aerosol Flow	l/min	0.899
Zero	avg 5 min	0

		BNC (pulse output)		USB (direct output)		
Diameter	**EL 3068B (#/cm³)**	**Concentration (#/cm³)**	**Efficiency (µ)**	**Concentration (#/cm³)**	**Efficiency (µ)**	**USB-C / BNC**
40	1303			1267	0.97	
30	1294			1282	0.99	
30	1498			1479	0.99	
20	1999			1966	0.98	
14	1317			1293	0.98	
11	1507			1442	0.96	
10	1266			1203	0.95	
9	2178			2024	0.93	
8	1749			1488	0.85	
7	1529			1069	0.70	
6	1255			403	0.32	
5	1085			171	0.16	

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	BNC (pulse output)		USB (direct output)		
EL 3068B (#/cm³)	Concentration (#/cm³)	Efficiency (µ)	Concentration (#/cm³)	Efficiency (µ)	USB-C / BNC
2035			2025	1.00	
4132			4118	1.00	
8028			7783	0.97	
13063			12511	0.96	
22363			21497	0.96	
28481			27235	0.96	
38781			38000	0.98	
48732			47553	0.98	
59493			55863	0.94	

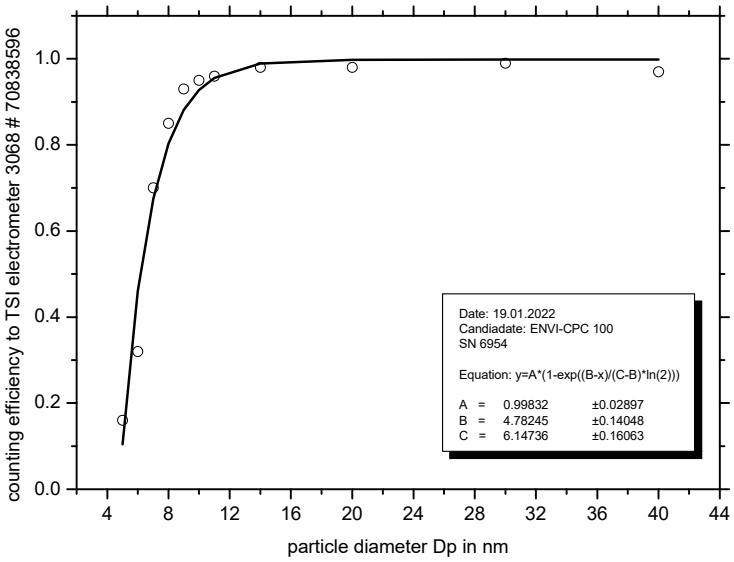

Fig. 1: Counting efficiency for ENVI-CPC 200 SN 6954 against aerosol electrometer 3068 SN 70838596; silver particles between 5 nm and 40 nm were used for calibration; the calculated Dp_{50} is 6.1 nm.

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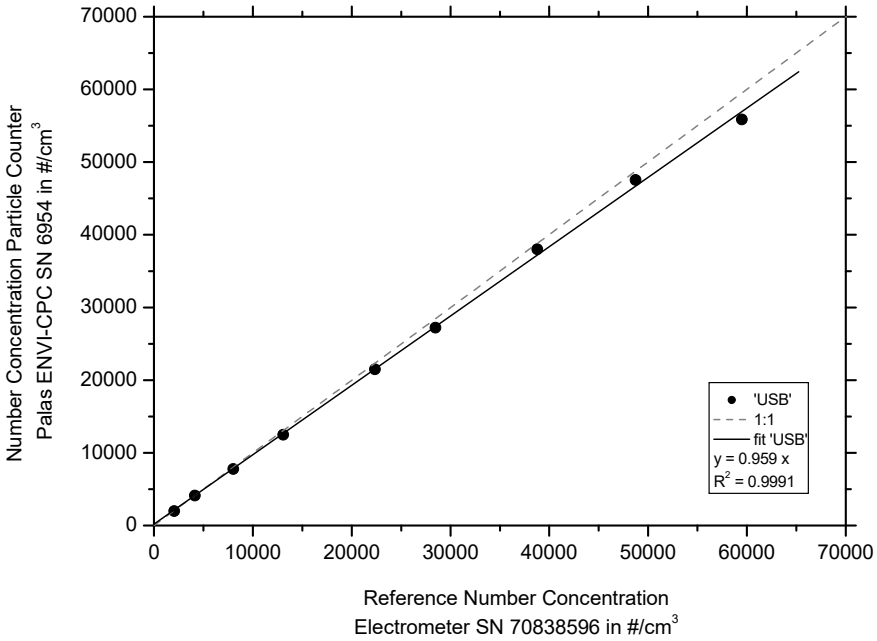

Fig. 2: Linearity for ENVI-CPC 200 SN 6954 against aerosol electrometer 3068 SN 70838596; silver particles with a diameter of 30 nm were used for number concentrations between 2000 particles per cm³ and 60000 particles per cm³.

Date of issue: *January 20, 2022*

Reference: TSI electrometer, model 3068, SN *70838596*
Reviewed: WCCAP

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