



World Calibration Centre  
for Aerosol Physics



Leibniz Institute for  
Tropospheric Research

Leibniz-Institut für Troposphärenforschung Permoserstraße 15 04318 Leipzig

**CPC Model:** GRIMM WRAS\_2

**CPC Serial Number:** 54201607

**Customer:** GRIMM Instruments Ltd.

**Project No.:** CPC-2019-5-11

**Principal Investigator:** Dr. Uta Wolf-Benning

**Home Institution:** Flughafen Berlin Brandenburg GmbH

**Participant:** -

**Location of the  
quality assurance:** TROPOS Leipzig, lab 130

**Description:** Calibration of a Condensation Particle Counter (CPC, Model GRIMM WRAS\_2)

**Date of Calibration:** November 13, 2019

**Summary of Intercomparison:**

The candidate did not pass the quality standards of ACTRIS and GAW. The candidate reached 80% efficiency at 40 nm. The Dp50 is at 7.36 nm. TROPOS recommends to send the CPC for maintenance back to GRIMM.

Certificate / Reference: WCCAP

Date of issue: November 13, 2019

Reviewed by: **TROPOS**

Name: **Kay Weinhold**

Page 1 / 4

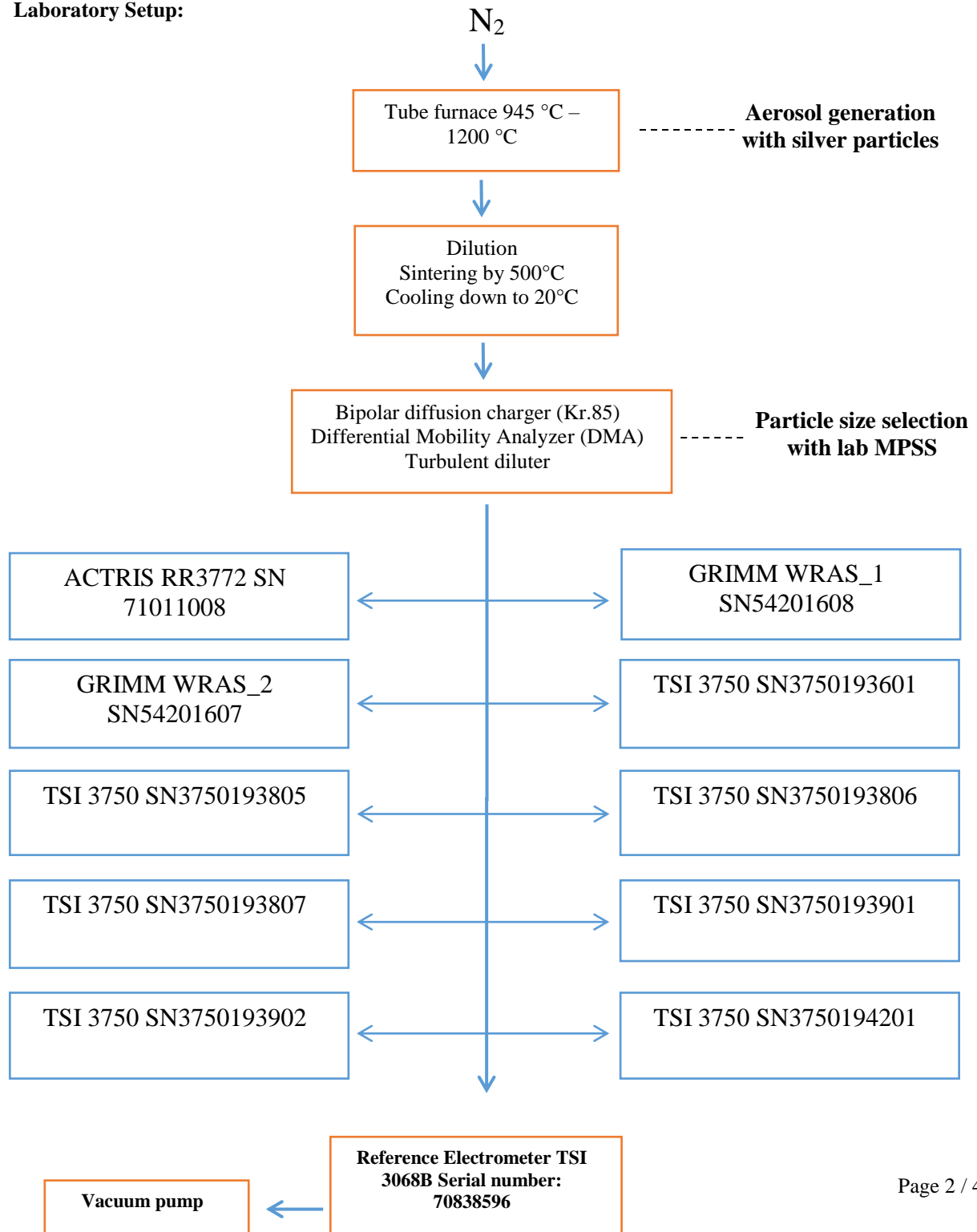


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**Laboratory Setup:**



**Date of arrival of instrument in calibration lab:** *November 11, 2019*  
**Instrument:** *Condensation Particle Counter*  
**Model and serial number of instrument:** *GRIMM WRAS2 CPC S/N 54201607*

**Result of physical inspection:** *no damages*  
**Result of functional test:** *functional test successful, no problems*

**Internal parameters of instrument** *nominal flow rate 0.3 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:** *November 13, 2019*  
**Lab temperature and pressure:** *24.5°C, 982.5 mbar*  
**Measured aerosol flow rate of CPC:** *0.302 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/cm<sup>3</sup> in 5 minutes*

**Results (using pulse output):**

Particle size (nm)	40	30	20	15	10
Number concentration (cm <sup>-3</sup> )	1053	1007	1104	854	768
Counting efficiency $\eta$	0.81	0.79	0.73	0.67	0.54
Particle size (nm)	09	08	07	06	
Number concentration (cm <sup>-3</sup> )	816	533	538	434	
Counting efficiency $\eta$	0.49	0.44	0.38	0.31	



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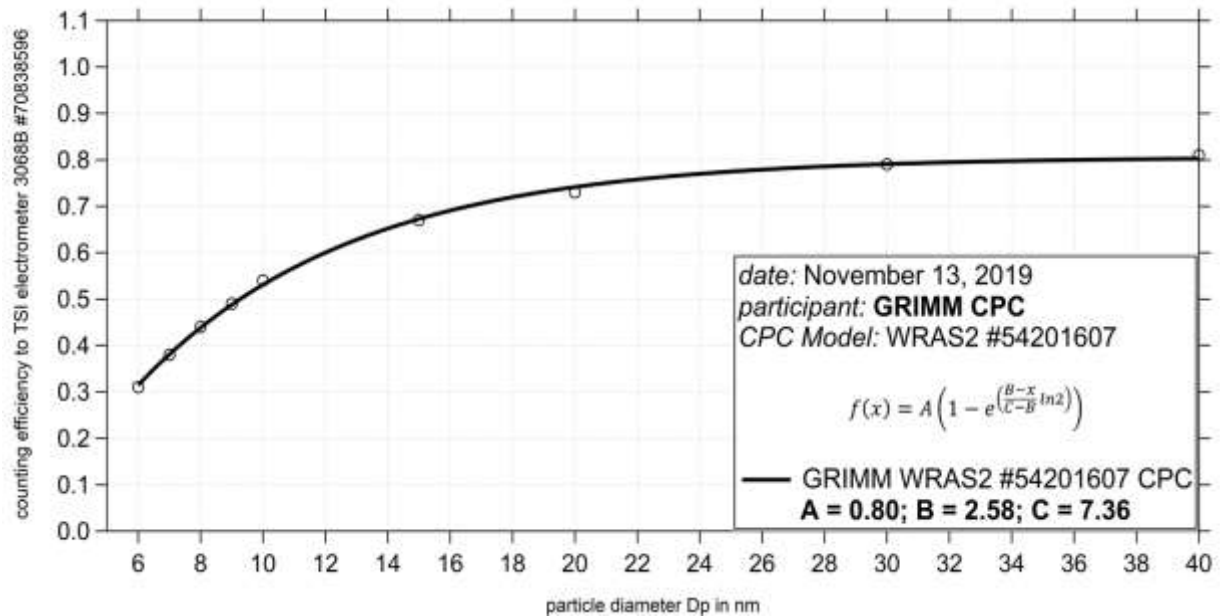


Fig. 1: Counting efficiency for CPC WRAS2 S/N 54201607 against aerosol electrometer 3068 S/N 70838596; silver particles between 6 and 40 nm were used for calibration; the calculated  $D_{p50}$  is 7.36 nm.

#### Status information:

Status	T SAT	T CON	T OPT	T CAB	P AMB	P VAC
from display	-	-	-	-	-	-
Status	P OR	P NO	Laser	LV	flow	P INLET
from display	-	-	-	-	-	-

#### Results (using GRIMM software output):

Particle size (nm)	40	30	20	15	10
Number concentration (cm-3)	1036	1000	1098	847	761
Counting efficiency $\eta$	0.80	0.78	0.72	0.66	0.53
Particle size (nm)	09	08	07	06	
Number concentration (cm-3)	809	531	531	430	
Counting efficiency $\eta$	0.48	0.43	0.37	0.31	



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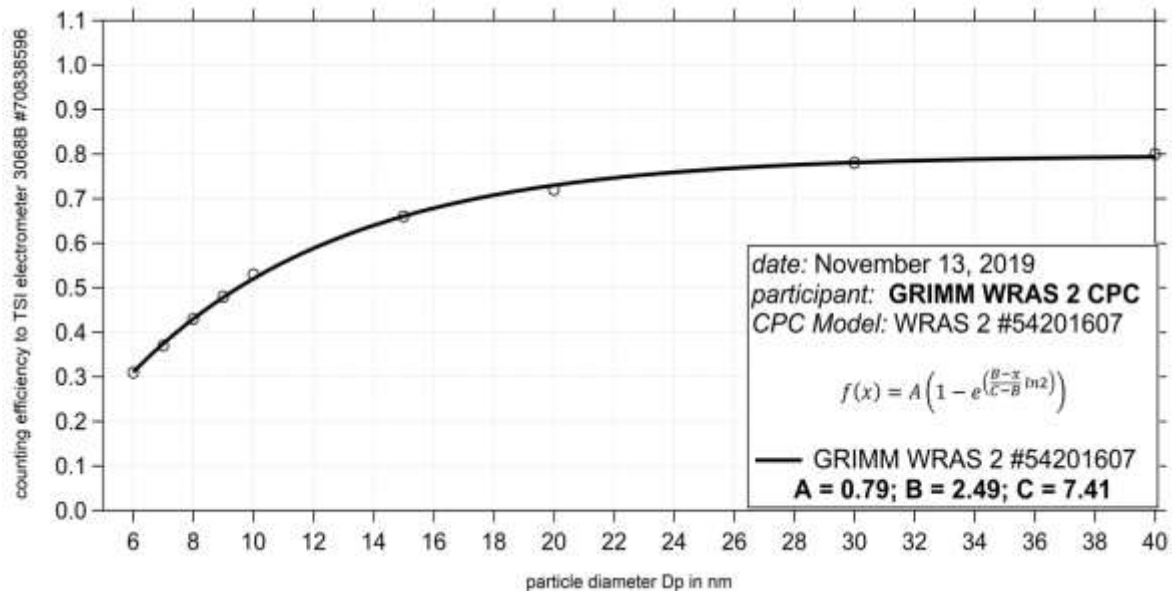


Fig. 2: Counting efficiency for CPC WRAS2 S/N 54201607 from software against aerosol electrometer 3068 S/N 70838596; silver particles between 6 and 40 nm were used for calibration; the calculated Dp50 is 7.41 nm.

**Date of issue:** November 13, 2019

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

**Reviewed:** TROPOS / Kay Weinhold