Leibniz-Institut für Troposphärenforschung Permoserstraße 15 04318 Leipzig

Intercomparison of Condensation Particle Counter

Project No.:	*CPC-2019-4-1*
Principal Investigator:	*Jean-François Doussin*
Home Institution:	*CNRS LISA*
Participant:	*Mathieu Cazaunau* *Aline Gratien*
Candidate: *Counter (SN):*	LISA TSI CPC Model 3772 #3772134401
Location of the quality assurance:	TROPOS Leipzig, lab 130
Comparison period:	September 17, 2019
Last Intercomparison (with Project No.):	
TROPOS Reference Instrument:	Electrometer: TSI model 3068B #70838596, Last calibration in September 2018
Additional Equipment:	Bubble flow meter 'Gilibrator', Gilian (Sensidyne) #1711008-S, Last calibration in January 2018

Summary of Intercomparison

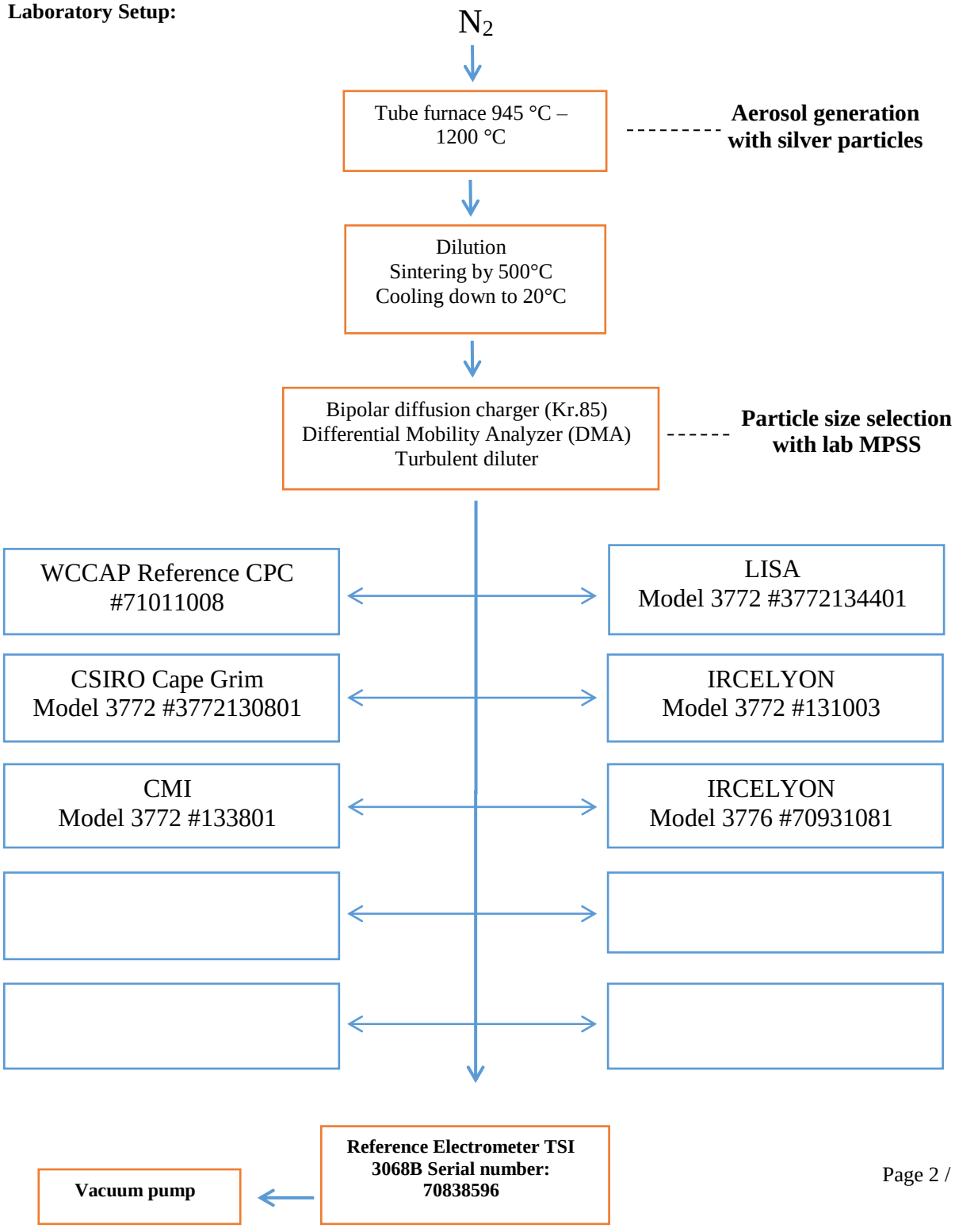
Status:
The candidate passed the quality standards of ACTRIS and GAW. The candidate reached 98% efficiency at 40 nm. The Dp50 is at 8.65 nm in the final-status. The CPC efficiency curve corresponds to the standard of ACTRIS and GAW.
Info: The candidate passed the pre-status. To increase the performance, TROPOS opened the CPC and checked and cleaned it. It was not necessary to replace or repair anything.

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

Laboratory Setup:



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

Leibniz-Institut für Troposphärenforschung Permoserstraße 15 04318 Leipzig

Date of arrival of instrument in calibration lab:	*September 17, 2019*
Instrument:	*Condensation Particle Counter*
Model and serial number of instrument:	*CPC 3772 S/N 3772134401*
Result of physical inspection:	*no damages*
Result of functional test:	*cleaned*
Internal parameters of instrument	*nominal flow rate 1.0 l/min*
Model and identification number of aerosol electrometer:	*TSI Electrometer Model 3068, S/N 70838596*
Electrometer calibration certificate:	*September 05, 2018, calibrated at PTB Braunschweig*
Corrections of electrometer, for instance, differing flow rate:	*Within tolerance range (+/-2%); reference: 4.0 l/min, measured: 4.00 l/min*
Software for recording:	*LabView 2010; National Instruments; Program „LabCount.vi“*
Date of calibration:	*September 17, 2019*
Lab temperature and pressure:	*23°C, 1004 mbar*
Measured aerosol flow rate of CPC:	*pre-status: 1.024 l/min, final status: 1.026 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/cm³ in 5 minutes*

Special Information regarding to the Candidate:

Was it necessary to:	yes/no	information
do a second run	yes	-
clean the optics	yes	cleaned
clean the nozzle	yes	cleaned
clean the saturator	yes	cleaned
change the wick	no	-
change the laser	no	-
change internal settings	no	-

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

Results (using pulse output): pre-status

Particle size (nm)	***40***	***30***	***20***	***15***	***12***
Number concentration (cm-3)	1129	1577	1667	942	1350
Counting efficiency η	*0.97*	*0.98*	*0.96*	*0.89*	*0.79*
Particle size (nm)	***10***	***09***	***08***	***07***	***06***
Number concentration (cm-3)	686	819	829	362	9
Counting efficiency η	*0.65*	*0.54*	*0.37*	*0.15*	*0.0*
Particle size (nm)					
Number concentration (cm-3)					
Counting efficiency η					

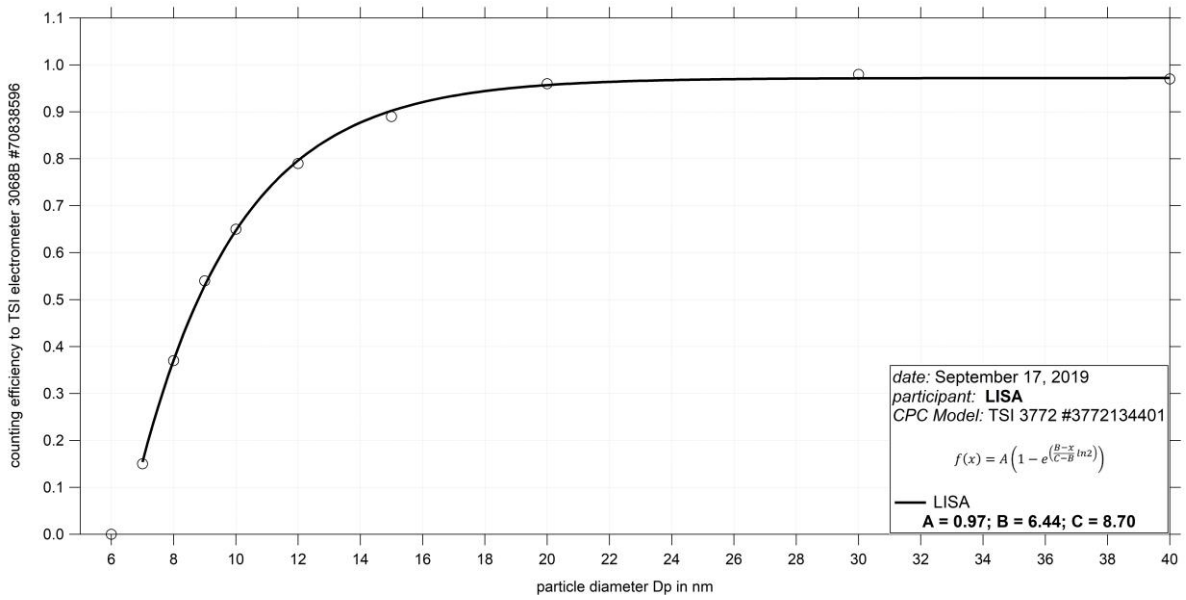


Fig. 1: pre-status: Counting efficiency for TSI CPC Model 3772 #3772134401 *against aerosol electrometer 3068 S/N 70838596; silver particles between 6 and 40 nm were used for calibration; the calculated Dp50 is 8.70 nm.*

Status information:

Status	***T SAT***	***T CON***	***T OPT***	***T CAB***	***P AMB***
from display	39	22	40	35.4	99.7
Status	***P OR***	***P NO***	***Laser***	***LV***	***flow***
from display	83.1	2.7	43	full	1.024

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

Results (using pulse output): final-status

Particle size (nm)	***40***	***30***	***20***	***15***	***12***
Number concentration (cm-3)	898	-	1433	-	-
Counting efficiency η	*0.98*	-	*0.97*	-	-
Particle size (nm)	***10***	***09***	***08***	***07***	***06***
Number concentration (cm-3)	945	-	792	-	14
Counting efficiency η	*0.66*	-	*0.38*	-	*0.01*
Particle size (nm)					
Number concentration (cm-3)					
Counting efficiency η					

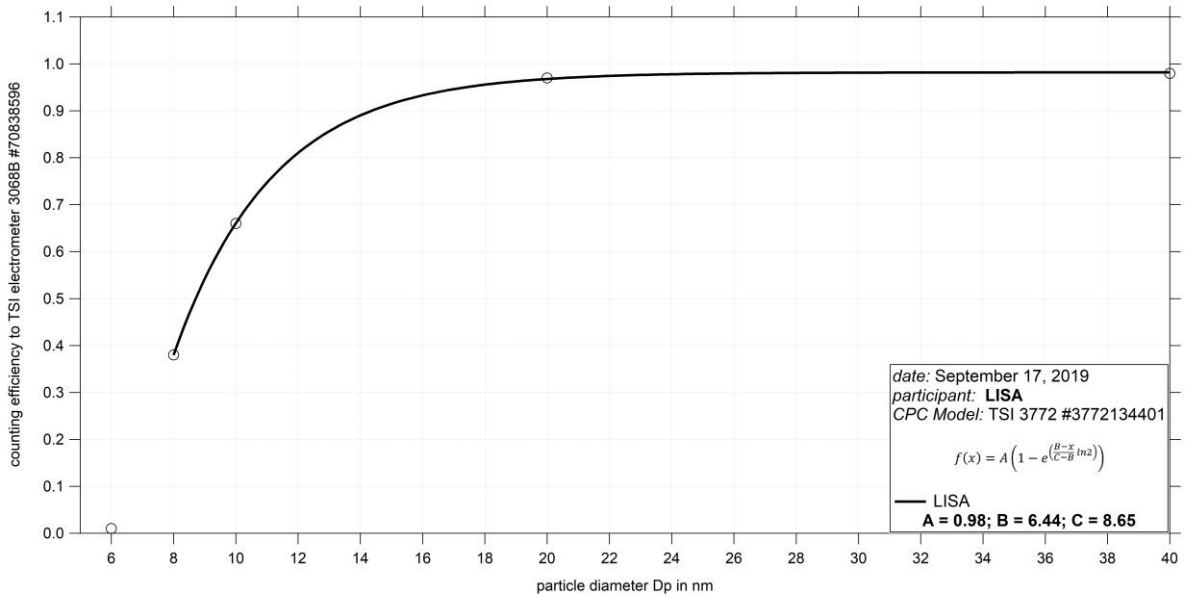


Fig. 1: final-status: Counting efficiency for TSI CPC Model 3772 #3772134401 *against aerosol electrometer 3068 S/N 70838596; silver particles between 6 and 40 nm were used for calibration; the calculated Dp50 is 8.65 nm.*

Status information:

Status	***T SAT***	***T CON***	***T OPT***	***T CAB***	***P AMB***
from display	39	22	40	35.4	99.7
Status	***P OR***	***P NO***	***Laser***	***LV***	***flow***
from display	83.1	2.6	43	full	1.024

Date of issue: *September 17, 2019*
Reviewed: TROPOS / 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