



Leibniz Institute for  
Tropospheric Research



World Calibration Centre  
for Aerosol Physics

## Intercomparison of Integrating Nephelometers Project No.: IN-2016-2-7

### Basic Information:

**Location of the quality assurance:** TROPOS

**Delivery Date:** 24 July, 2017

Principal Investigator	Home Institution	Participant	Instrument
Ivo Kalapov	INRNE-BAS	I. Kalpov	Nephelometer, TSI model 3563, SN 70513052

### 1. Intercomparison summary

**Status on arrival:** Lamp socket burned prior to workshop. Socket and lamp were replaced during workshop. Therefore, calibration data could not be verified and the instrument was considered to be *uncalibrated on arrival*.

**Noise:** The one minute instrumental noise (single standard deviation) was less than 0.37 for total scattering and less than 0.4 for backscattering. The noise level conforms to the expected noise.

**Span check:** The span check before inspection could not be performed. After inspection and recalibration an independent span check showed that green channel for total scattering was little higher than expected with 4%. The other channels are in the expected range 3% for total scattering and 6% for back-scattering.

#### **Comparison to a reference instrument:**

Before inspection: n.a.

After inspection and calibration: Comparison to the reference instrument (Aurora 4000, SN 14-1408) with high concentrations of ammonium sulphate showed a good agreement within 2% for total scattering and 5% for backscattering. Intercomparisons of instruments with ambient air suffered from low concentrations with total scattering less than 25 Mm<sup>-1</sup> and backscattering less than 4 Mm<sup>-1</sup>, respectively.

**Inspection:** Few metallic like particles were found on the flocked paper. Because of the missing calibration on arrival, a possible influence on the performance could not be investigated. The instrument was clean during inspection.

**Recommendations:** No recommendations.

**Overall assessment:** The instrument meets the requirements. The performance prior to the workshop could not be assessed.

## 2. Details

<b>Instrument noise.</b>						
The noise is determined by the standard deviation of a time series of 100 minutes with a temporal resolution of 1 minute. Test aerosol was filtered room air.						
	total scattering in Mm <sup>-1</sup>			backscattering in Mm <sup>-1</sup>		
Wavelength in nm	450	550	700	450	550	700
Zero check (average in Mm <sup>-1</sup> )	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
<b>Noise</b> (standard deviation)	0.37	0.223	0.36	0.29	0.16	0.39

<b>Span check</b>						
Percentage deviation to theoretical value. A positive number means that the instrument measure too high values.						
	total scattering			backscattering		
Wavelength [nm]	450	550	700	450	550	700
before recalibration (as instrument arrived) deviation [%]	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
after recalibration deviation [%]	3.3	4.0	0.8	5.3	5.9	-4.2

