C97

(1/3)

LIGHTHOUSE
WORLDWIDE SOLUTIONS BENELUX BV

ilac-MRA

RvA KALIBRATIE RvA K 166

Calibration certificate

Certificate number: LH62134

Revision 3.3

Applicant	:	CCSTEC GesmbH Triesterstrasse 36 A-2512, Oeynhausen Austria	
Instrument	:	Description	: Airborne particle counter
		Manufacturer	: Lighthouse
		Model	: Remote 2014
		Serial no.	: 191121036
		Customer ID	: C97
Date of calibration	:	14 December 2020	
Due date calibration	:	December 2021	
Calibration location	:	Lighthouse Benelux Calibration laboratory in Boven-Leeuwen	
Calibration method	:	Calibration has been accomplished as described in ISO21501-4:2018. All work performed is in accordance with Lighthouse Worldwide Solutions Benelux, Master Calibration Document: I201 and is recorded and maintained as such.	
Results	:	The results of the measurements are shown in the appendix. The unit is readjusted.	
Compliance, As left	:	All measured values comply with the specification limit(s).	
Traceability	:	The measurements have been executed using standards for which the traceability to (inter)national standards has been demonstrated towards the Raad voor Accreditatie.	
Uncertainty	:	The reported expanded uncertainty is based on the standard uncertainty of the measurement multiplied by a coverage factor k, such that the coverage probability corresponds to approximately 95%. The standard uncertainty is determined in accordance with EA-4/02. Compliance statements are given in accordance with ISO21501-4:2018.	
Date of issue	:	15 December 2020	
Authorized by	:	M.A.W. van Boxtel Head of calibration	

Lighthouse Worldwide Solutions Benelux BV
Van Heemstraweg 19A 6657 KD
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E-mail: csbenelux@golighthouse.com

The Raad voor Accreditatie is one of the signatories of the Multilateral Agreement of the European Cooperation for Accreditation (EA) for the mutual recognition of calibration certificates.

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Appendix

Certificate number: LH62134

Date of calibration : 14 December 2020

Calibrated by : A.C.G. Gerritse

Function : Calibration & Service Engineer

Environmental conditions : The ambient temperature was 21,8°C at a relative humidity of 40,9%

Measurement results, As found

Performance information

Test	*Test result*		*Expanded uncertainty*	*Criteria*	
ISO21501-4 Flow	2,95l/min		0,11l/min	2,83l/min ±5%	Pass
JIS B 9921 Zero count	0		N/A	≤1 in 5 mins	Pass
ISO21501-4 False count rate	Upper confidence level 212 particles/m3		N/A	N/A	N/A
ISO21501-4 Timer check	60,1 seconds		0,40s	±1%	Pass
ISO21501-4 Size resolution	1,11%	used size 0,24µm	5,27%SR	< 15%	Pass
ISO21501-4 Counting efficiency 50%	49,1%	used size 0,20µm	2,59%CE	(50±20)%	Pass
ISO21501-4 Counting efficiency 100%	100,2%	used size 0,30µm	5,65%CE	(100±10)%	Pass

Size calibration

Channel	*Channel Size*	*Threshold voltage*	*Calculated size*	*Expanded uncertainty*	*Calculated Sizing error (±10%)*	
1	0,20µm	49mV	0,199µm	0,007µm	-0,66%	Pass
2	0,30µm	484mV	0,306µm	0,007µm	2,16%	Pass
3	0,50µm	2251mV	0,523µm	0,010µm	4,53%	Pass
4	1,00µm	4022mV	1,031µm	0,018µm	3,09%	Pass

Notes

Counting efficiency: used size 0,5 µm: 99,1 %CE ± 5,68%CE
Counting efficiency: used size 1,0 µm: 101,3 %CE ± 6,05%CE

Reference equipment

Model	*S/N*	*Due to*	*Certificate number*
TSI Mass Flowmeter 4040	40401919024	12-Aug-2021	63031
MCA8000D	564	3-Mar-2021	20-13808-3-1
Fluke-175	12170245	6-Apr-2021	20-13808-4-2
Fisher Scientific 0666256	200359247	16-Jun-2022	1042-11351217
Palas	6752 / 6751	23-Nov-2021	235-11058

Particle size standards

Size	*Description*	*Due to*	*Lot#*
0,20µm	3200 & 3200A Nanosphere size standards	1-Mar-2022	D20014
0,25µm	3240A, Nanosphere size standards	1-Apr-2021	D20024
0,30µm	3300A & 3300B, Nanosphere Size Standards	1-Apr-2023	D20015
0,50µm	3500 & 3500A, Nanosphere Size Standards	1-Apr-2022	D20017
1,00µm	4009A, 4009A & 4009B Microsphere Size Standards	1-Oct-2022	D20020

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KALIBRATIE
RvA K 166

Appendix

Certificate number: LH62134

Date of calibration : 14 December 2020

Calibrated by : A.C.G. Gerritse
Function : Calibration & Service Engineer

Environmental conditions : The ambient temperature was 21,8°C at a relative humidity of 40,9%

Measurement results, As left

Performance information

Test	*Test result*		*Expanded uncertainty*	*Criteria*	
ISO21501-4 Flow	2,95l/min		±0,11l/min	2,83l/min ±5%	Pass
JIS B 9921 Zero count	0		N/A	≤1 in 5 mins	Pass
ISO21501-4 False count rate	Upper confidence level 212 particles/m3		N/A	N/A	N/A
ISO21501-4 Timer check	60,1 seconds		0,40s	±1%	Pass
ISO21501-4 Size resolution	0,00%	used size 0,24µm	5,79%SR	< 15%	Pass
ISO21501-4 Counting efficiency 50%	39,8%	used size 0,20µm	2,10%CE	(50±20)%	Pass
ISO21501-4 Counting efficiency 100%	96,6%	used size 0,30µm	5,45%CE	(100±10)%	Pass

Size calibration

Channel	*Channel Size*	*Threshold voltage*	*Calculated size*	*Expanded uncertainty*	*Calculated Sizing error (±10%)*	
1	0,20µm	52mV	0,204µm	0,007µm	1,75%	Pass
2	0,30µm	454mV	0,300µm	0,007µm	0,09%	Pass
3	0,50µm	2162mV	0,501µm	0,010µm	0,27%	Pass
4	1,00µm	4033mV	1,000µm	0,018µm	0,01%	Pass

Notes

Counting efficiency: used size 0,5 µm: 96,5 %CE ± 5,53%CE
Counting efficiency: used size 1,0 µm: 94,5 %CE ± 5,64%CE

Reference equipment

Model	*S/N*	*Due to*	*Certificate number*
TSI Mass Flowmeter 4040	40401919024	12-Aug-2021	63031
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0,30µm	3300A & 3300B, Nanosphere Size Standards	1-Apr-2023	D20015
0,50µm	3500 & 3500A, Nanosphere Size Standards	1-Apr-2022	D20017
1,00µm	4009A, 4009A & 4009B Microsphere Size Standards	1-Oct-2022	D20020