

**CALIBRATION CERTIFICATE**

 Certificate Number **44217210105011**

**Model:** S1100  
**Serial Number:** 210105011  
**Sensor ID:** 210105-018  
**Calibration Location:** 1221 Disk Drive, Medford, OR 97501  
**Date of Calibration:** January 21, 2021

**Next calibration on this instrument is due:** January 21, 2022

**Calibration Method** Calibration of this instrument has been accomplished as defined in ISO 21501-4 2018: Light scattering airborne particle counter for clean spaces. All work performed is in accordance with Lighthouse Worldwide Solutions Quality Manual P/N 714252800-1. Reproduction of this certificate and accompanying documentation is prohibited without the expressed written permission of Lighthouse Worldwide Solutions. All records of work performed are maintained by Lighthouse Worldwide Solutions.

**Traceability** The Standards of the Compliant Calibration Laboratory are traceable to the International System of Units (SI) through the National Institute of Standards and Technology, and are part of a comprehensive measurement assurance program for ensuring continued accuracy and measurement traceability within the level of uncertainty reported by this laboratory. The unique laboratory calibration number identified above shall be used in referencing metrological traceability for artifacts identified only in this certificate.

**Uncertainty** The reported uncertainty is based on a standard uncertainty multiplied by a coverage factor of  $k = 2$ , which provides a confidence level of approximately 95%. The values and test criteria are applied using Simple Acceptance; Shared Risk approach.

**Results** This certifies the above named instrument conforms to the original specifications in effect at date of manufacture and test.

**Environmental Conditions** Ambient temperature 77.0 °F Relative humidity 25.0 %

**Test Equipment**

Standards	Model	Mfg	Serial#	Cal Date	Cal Due
Flow meter	4043	TSI	1705011	8/6/2020	2/6/2021
DMM	Fluke 179	Fluke	94490235	4/2/2020	4/2/2021
MCA	8000D	Amptek	979	5/15/2020	5/15/2021
Test Standard	3772	TSI	3772154004	5/6/2020	5/1/2021

**Particle Size Standards**

Nominal Size	Particle Size	Tolerance (nm)	Lot No.	Manufacturer	Expiration Date
0.10µm	0.10µm	+/-1.5	PS3338B-0319	Magsphere Inc.	3/5/2022
0.15µm	0.15µm	+/-2.5	209772	Thermo Scientific	4/30/2022
0.20µm	0.20µm	+/-2	232366	Thermo Scientific	10/1/2023
0.25µm	0.24µm	+/-2.5	223971	Thermo Scientific	10/1/2023
0.30µm	0.30µm	+/-3	231958	Thermo Scientific	10/1/2023
0.50µm	0.51µm	+/-3.5	229560	Thermo Scientific	8/1/2023
1.00µm	1.04µm	+/-6	219284	Thermo Scientific	11/1/2022
5.00µm	5.02µm	+/-20	230776	Thermo Scientific	9/1/2023

**Counting Efficiency Particle Size Standards**

Nominal Size	Particle Size	Tolerance (nm)	Lot No.	Manufacturer	Expiration Date
0.10µm	0.10µm	+/-1.5	PS3338B-0319	Magsphere Inc.	3/5/2022
0.20µm	0.20µm	+/-2	232366	Thermo Scientific	10/1/2023

**CALIBRATION RESULTS AS LEFT**

Certificate Number 44217210155011

**Size Calibrations as Left**

Channel	Chnl Size	Threshold	Particle Size	Particle Size Voltage	Expanded Uncertainty	As Left Size Error
1	0.10µm	26mV	0.104µm	26.1mV	0.003 µm	0%
2	0.15µm	1338mV	0.152µm	1338.0mV	0.005 µm	0%
3	0.20µm	2941mV	0.203µm	2941.0mV	0.008 µm	0%
4	0.25µm	4039mV	0.240µm	3890.0mV	0.006 µm	0%
5	0.30µm	4618mV	0.303µm	4652.0mV	0.009 µm	0%
6	0.50µm	5650mV	0.510µm	5679.0mV	0.01 µm	0%
7	1.00µm	6534mV	1.036µm	6555.0mV	0.021 µm	0%
8	5.00µm	7583mV	5.020µm	7587.0mV	0.05 µm	0%

**Measurements as Left**

Nominal Flow Rate:	Measured Flow:	Expanded Uncertainty	Result
28.30 LPM	27.00 LPM	(limit ±5% of nominal) 0.8L/min	Pass

False Count Rate:	Observed Cts:	Upper confidence level	Result
3S B 9921 Zero Count	0	(≤ 1 ct max / 5 min.)	Pass
ISC21501-4 False Count Rate	0	2 Particles/m3	2 Particles/m3

Counting Efficiency 50%:	Size	Expanded Uncertainty	Result
	0.104 µm 52.7% (limit 30% - 70%)	3.4 %	Pass

Counting Efficiency 100%:	Size	Expanded Uncertainty	Result
	0.203 µm 105.3% (limit 90% - 110%)	8.5 %	Pass

Size Resolution:	Size	Expanded Uncertainty	Result
	0.240 µm 2.20% (limit 15%)	3.8 %	Pass

**CALIBRATION RESULTS AS FOUND**

Certificate Number 44217210105011

**Size Calibrations as Found**

Channel	Size(um)	As Rec'd Threshold Settings mV	As measured Threshold Settings mV	As Rec'd size (um)	Percent size error (%)	Percent size error tolerance	Expanded Uncertainty	Pass/Fail
1	0.1	26	26.1	0.107	2.9%	+/- 10%	0.003 µm	Pass
2	0.15	1338	1338	0.152	1.2%	+/- 10%	0.005 µm	Pass
3	0.2	2941	2941	0.202	1.1%	+/- 10%	0.008 µm	Pass
4	0.25	4039	4039	0.249	-0.2%	+/- 10%	0.006 µm	Pass
5	0.3	4618	4618	0.298	-0.5%	+/- 10%	0.009 µm	Pass
6	0.5	5650	5650	0.499	-0.2%	+/- 10%	0.01 µm	Pass
7	1	6534	6534	0.999	-0.1%	+/- 10%	0.021 µm	Pass
8	5	7583	7583	4.995	-0.1%	+/- 10%	0.05 µm	Pass

**Measurements as Found**


Nominal Flow Rate:	Measured Flow:	Expanded Uncertainty	Result
28.30 LPM	27.00 LPM	(limit ±5% of nominal) 0.8L/min	Pass

False Count Rate:	Observed Cts:	Upper confidence level	Result
JIS B 9921 Zero Count	0	(≤ 1 ct max / 5 min.)	Pass
ISO21501-4 False Count Rate	0	2 Particles/m3	Pass

Counting Efficiency 50%:	Size	Expanded Uncertainty	Result
	0.104 µm 52.7% (limit 30% - 70%)	3.4 %	Pass
Counting Efficiency 100%:	Size	Expanded Uncertainty	Result
	0.203 µm 105.3% (limit 90% - 110%)	8.5 %	Pass


Size Resolution:	Size	Expanded Uncertainty	Result
	0.240 µm 2.20% (limit 15%)	3.8 %	Pass

Signature:  
Head of Calibration:

  
D. Spranger

Head of calibration acknowledges that the calibration has been carried out in accordance with ISO 17025:2017 and Lighthouse Worldwide Solutions ISO 17025 Quality Management system to comply to ISO 21501-4:2018 calibration requirements.

Signature:  
Calibration Tech/Engineer:

  
B. PARMER



# LIGHTHOUSE WORLDWIDE SOLUTIONS

CUSTOMER P.O. NO. 362393	ATTENTION Jennifer St Peter
SHIP TO PHONE NO.	SHIP TO FAX NO.

### SHIP TO

7573C  
VTG, LLC  
3516 Sw Industrial Way Bldg A11  
Aloha, OR 97078-1386  
US

### SOLD TO

7573\$  
VTG LLC  
18110 SE 34TH St Bldg 5  
Vancouver, WA 98683-9440  
US

<b>PACKING SLIP</b>		PRINT DATE 1/28/2021	
SALES ORDER ID S119205		SHIP DATE 1/28/2021	
DE 14	SALESMAN 9	REGION NA	CLASS N
CONFIRMED TO			
SHIP VIA FedEx Ground Ser		TERMS Net 30 Days	
CUST ACCT NUMBER 794171130		FOR Collect	
BILL OF LADING		ORDER MANAGER Jill Porzio	
REFERENCE			
FREIGHT TERMS			

### BILL TO

7573\$  
VTG LLC  
18110 SE 34TH St Bldg 5  
Vancouver, WA 98683-9440  
US

LINE	PART ID DESCRIPTION	SHIP DATE	SHIPPED QUANTITY	U/M	SERIAL NUMBER
1.00	402999398-2	1/28/2021	2	EA	210105011 210105012
2.00	APS1100*-1 SOLAIR 1100 Airborne Particle Counter; Dual Battery; Printer w/HEPA; 0.10µm@1CFM	1/28/2021	2	EA	
3.00	Std - 8 channels: 0.1, 0.15, 0.2, 0.25, 0.3, 0.5, 1.0, 5.0µm 062379800-1	1/28/2021	1	EA	
4.00	Power Cord: EL701; 6ft; Black; US *R* 402965342-1	1/28/2021	2	EA	
5.00	Accy: Carrying Case; S1100/3200/3350 E 403028044-1	1/28/2021	4	EA	
12.00	Battery Assy: S3100 E 138/145Wh 062379802-1	1/28/2021	1	EA	
	Power Cord: EL701; 6ft; Black; EUR				

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