

BIOSCIENCE INTERNATIONAL

Innovative Microbiology Products
 11333 Woodglen Drive • Rockville, Maryland 20852
 301.231.7400 • www.biosci-intl.com • fax: 301.231.7277

CERTIFICATE OF CALIBRATION

Model:	SAS Super 100
Air Sampler Serial #:	04-C-02947
Air Sampler Head Serial #:	6163
Customer:	Aerobiology Laboratory
Customer Asset ID #:	n/a
Calibration performed at:	JBW site 10242 Little Rock Ln Frederick, MD 21702

Cal. Date:	24 Oct 2019
Cal. Due:	23 Oct 2020 (12 months)
Procedure:	EOP-030
Certificate #:	04-C-02947-1762
Volume sampled (L):	1000
Calibrated w/media type:	BBL TSA Petri
Plate Lot #:	9218872
Plate Exp Date:	1/16/2020

	As Found	In Tolerance	As Left	In Tolerance	Acceptable Range
Battery output (Volts):	10.0	n/a	9.7	n/a	>8.2
Temperature (F°):	70.0	n/a	70.0	n/a	59 - 95
Barometric pressure (in. HG):	30.1	n/a	30.1	n/a	n/a
Time to sample 1000 Liters (min)	10.24	n/a	9.88	n/a	n/a
Temp. & Pressure Standardization Factor:	1.01	n/a	1.01	n/a	n/a
Air velocity reading (ft/min)	54.0	n/a	56.0	n/a	n/a
Air velocity reading (m/sec)	0.274	n/a	0.284	n/a	n/a
Standardized air velocity reading (m/sec)	0.276	n/a	0.286	n/a	n/a
Standardized Air Flow (L/min)	97.6	Yes	101.3	Yes	95 - 105

Additional heads inspected and determined to be within +/-2%:	n/a
Additional service, preventative maintenance, or calibration notes:	n/a

Bioscience International certifies that the above described instrument conforms to the original manufacturer's tolerances for the parameters listed (not applicable to As Found data) & has been calibrated in accordance with ISO 17025:2017 guidelines using standards whose accuracies are traceable to the U.S. National Institute of Standards and Technology (NIST) or have been verified with respect to instrumentation whose accuracy is traceable to NIST, or is derived from accepted values of physical constants. Instruments are calibrated with a test uncertainty ratio of 4:1 or greater whenever possible, with uncertainty defined as within a 95 % confidence interval using a coverage factor of k = 2. In all cases, statistical methods are used to minimize uncertainty using the best commercially available methods. Calibration results relate only to the items listed above; in particular, the instrument should be recalibrated prior to switching to a different media size (e.g., from 90mm petri dishes to 55mm contact plates or vice versa).

Measurement Standards			
ID	Description	Last Cal.	Cal. Due
J-T95451921005	Velocity	5/21/2019	5/20/2020
J-6530-18178894	Temperature & Pressure	12/7/2018	12/7/2020

Work performed by / date:  / 10-24-19 Reviewed by / date:  / 10-24-19



CERTIFICATE OF CALIBRATION AND TESTING

TSI Incorporated, 500 Cardigan Road, Shoreview, MN 55126 USA
 Tel: 1-800-874-2811 1-651-490-2811 Fax: 1-651-490-3824 http://www.tsi.com

ENVIRONMENT CONDITIONS			MODEL	9545
TEMPERATURE	74.4 (23.6)	°F (°C)	SERIAL NUMBER	T95451921005
RELATIVE HUMIDITY	27	%RH		
BAROMETRIC PRESSURE	29.17 (987.8)	inHg (hPa)		

<input checked="" type="checkbox"/> AS LEFT	<input checked="" type="checkbox"/> IN TOLERANCE
<input type="checkbox"/> AS FOUND	<input type="checkbox"/> OUT OF TOLERANCE

- CALIBRATION VERIFICATION RESULTS -

TEMPERATURE VERIFICATION				SYSTEM T-100			Unit: °F (°C)
#	STANDARD	MEASURED	ALLOWABLE RANGE	#	STANDARD	MEASURED	ALLOWABLE RANGE
1	32.0 (0.0)	32.3 (0.2)	31.5~32.5 (-0.3~0.3)	2	140.0 (60.0)	140.2 (60.1)	139.5~140.5 (59.7~60.3)

HUMIDITY VERIFICATION				SYSTEM H-100			Unit: %RH
#	STANDARD	MEASURED	ALLOWABLE RANGE	#	STANDARD	MEASURED	ALLOWABLE RANGE
1	10.0	10.1	7.8~12.2	4	70.0	69.4	67.8~72.2
2	30.0	29.2	27.8~32.2	5	90.0	89.6	87.8~92.2
3	50.0	49.3	47.8~52.2				

VELOCITY VERIFICATION				SYSTEM V-109			Unit: ft/min (m/s)
#	STANDARD	MEASURED	ALLOWABLE RANGE	#	STANDARD	MEASURED	ALLOWABLE RANGE
1	0 (0.00)	0 (0.00)	-3~3 (-0.02~0.02)	7	639 (3.24)	641 (3.25)	620~658 (3.15~3.34)
2	35 (0.18)	35 (0.18)	32~38 (0.16~0.19)	8	984 (5.00)	982 (4.99)	954~1013 (4.85~5.15)
3	65 (0.33)	64 (0.33)	62~68 (0.31~0.34)	9	1466 (7.44)	1469 (7.46)	1422~1509 (7.22~7.67)
4	100 (0.51)	99 (0.50)	97~102 (0.49~0.52)	10	2497 (12.69)	2502 (12.71)	2422~2572 (12.31~13.07)
5	159 (0.81)	160 (0.81)	155~164 (0.78~0.83)	11	4500 (22.86)	4526 (22.99)	4365~4635 (22.18~23.55)
6	327 (1.66)	328 (1.67)	317~337 (1.61~1.71)	12	5800 (29.46)	5798 (29.45)	5626~5974 (28.58~30.35)

TSI does hereby certify that the above described instrument conforms to the original manufacturer's specification (not applicable to As Found data) and has been calibrated using standards whose accuracies are traceable to the United States National Institute of Standards and Technology (NIST) or has been verified with respect to instrumentation whose accuracy is traceable to NIST, or is derived from accepted values of physical constants. TSI's calibration system is registered to ISO-9001:2015.

<table border="0"> <tr> <th>Measurement Variable</th> <th>System ID</th> <th>Last Cal.</th> <th>Cal. Due</th> </tr> <tr> <td>Temperature</td> <td>E003617</td> <td>01-14-19</td> <td>07-31-19</td> </tr> <tr> <td>Humidity</td> <td>E003296</td> <td>08-15-19</td> <td>08-31-19</td> </tr> <tr> <td>Pressure</td> <td>E001557</td> <td>04-17-19</td> <td>10-31-19</td> </tr> <tr> <td>Temperature</td> <td>E001553</td> <td>04-11-19</td> <td>10-31-19</td> </tr> </table>	Measurement Variable	System ID	Last Cal.	Cal. Due	Temperature	E003617	01-14-19	07-31-19	Humidity	E003296	08-15-19	08-31-19	Pressure	E001557	04-17-19	10-31-19	Temperature	E001553	04-11-19	10-31-19	<table border="0"> <tr> <th>Measurement Variable</th> <th>System ID</th> <th>Last Cal.</th> <th>Cal. Due</th> </tr> <tr> <td>Temperature</td> <td>E003305</td> <td>01-14-19</td> <td>07-31-19</td> </tr> <tr> <td>Pressure</td> <td>E010288</td> <td>05-20-19</td> <td>11-30-19</td> </tr> <tr> <td>DC Voltage</td> <td>E005749</td> <td>08-23-18</td> <td>08-31-19</td> </tr> <tr> <td>Velocity</td> <td>E005916</td> <td>08-14-17</td> <td>08-31-20</td> </tr> </table>	Measurement Variable	System ID	Last Cal.	Cal. Due	Temperature	E003305	01-14-19	07-31-19	Pressure	E010288	05-20-19	11-30-19	DC Voltage	E005749	08-23-18	08-31-19	Velocity	E005916	08-14-17	08-31-20
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 CALIBRATED

May 21, 2019

DATE



Calibration complies with ISO/IEC
17025, ANSI/NCSL Z540-1, and 9001



Cert. No.: 6530-10004004

Traceable® Certificate of Calibration for Digital Barometer

Manufactured for and distributed by: Control Company 12554 Galveston Rd B230, Webster, TX 77598

Instrument Identification:

Model: 6530,

S/N: 181788940

Manufacturer: Control Company

Standards/Equipment:

Description	Serial Number	Due Date	NIST Traceable Reference
Digital Barometer	D4540001	22 Oct 2019	1000432773
Digital Thermometer	130070752	05 Mar 2019	4000-9285406
Chilled Mirror Hygrometer	44654/2H3737	02 Nov 2019	15478
Climate Chamber	W513.0046		

Certificate Information:

Technician: 57

Procedure: CAL-31

Cal Date: 07 Dec 2018

Cal Due Date: 07 Dec 2020

Test Conditions: 51.22%RH 23.59°C 1022mBar

Calibration Data: (New Instrument)

Unit(s)	Nominal	As Found	In Tol	Nominal	As Left	In Tol	Min	Max	±U	TUR
%RH	N.A.	N.A.		50.60	51	Y	48	54	0.74	>4:1
°C	N.A.	N.A.		24.62	24.6	Y	24.22	25.02	0.05	>4:1
mb/hPa	N.A.	N.A.		806.86	806	Y	803	811	0.62	>4:1
mb/hPa	N.A.	N.A.		909.55	910	Y	906	914	0.62	>4:1
mb/hPa	N.A.	N.A.		1021.95	1023	Y	1018	1026	0.62	>4:1

This certificate indicates Traceability to standards provided by (NIST) National Institute of Standards and Technology and/or a National Standards Laboratory.

A Test Uncertainty Ratio of at least 4:1 is maintained unless otherwise stated and is calculated using the expanded measurement uncertainty. Uncertainty evaluation includes the instrument under test and is calculated in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). The uncertainty represents an expanded uncertainty using a coverage factor k=2 to approximate a 95% confidence level. In tolerance conditions are based on test results falling within specified limits with no reduction by the uncertainty of the measurement. The results contained herein relate only to the item calibrated. This certificate shall not be reproduced except in full, without written approval of Control Company.

Nominal=Standard's Reading; As Left=Instrument's Reading; In Tol=In Tolerance; Min/Max=Acceptance Range; ± U=Expanded Measurement Uncertainty; TUR=Test Uncertainty Ratio; Accuracy= $\pm(\text{Max}-\text{Min})/2$; Min=As Left Nominal(Rounded) - Tolerance; Max= As Left Nominal(Rounded) + Tolerance;

Nicol Rodriguez

Nicol Rodriguez, Quality Manager

Aaron Justice

Aaron Justice, Technical Manager

Note:

Maintaining Accuracy:

In our opinion once calibrated your Digital Barometer should maintain its accuracy. There is no exact way to determine how long calibration will be maintained. Digital Barometer change little, if any at all, but can be affected by aging, temperature, shock, and contamination.

Recalibration:

For factory calibration and re-certification traceable to National Institute of Standards and Technology contact Control Company.

CONTROL COMPANY 12554 Galveston RD Suite B230 Webster TX USA 77598
Phone 281 482-1714 Fax 281 482-9448 sales@control3.com www.control3.com

Control Company is an ISO/IEC 17025:2005 Calibration Laboratory Accredited by (A2LA) American Association for Laboratory Accreditation, Certificate No. 1750.01.
Control Company is ISO 9001:2008 Quality Certified by DNV GL, Certificate No. CERT-01805-2008-AQ-HOU-RvA.
International Laboratory Accreditation Cooperation (ILAC) - Multilateral Recognition Arrangement (MRA).