Calibration Certificate

Certificate Number 2022015246

Customer:
VTG LLC

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Model Number	CAL150	***Procedure Number***	D0001.8386
Serial Number	5928	***Technician***	Scott Montgomery
Test Results	**Pass**	***Calibration Date***	5 Dec 2022
Initial Condition	Adjusted	***Calibration Due***	5 Dec 2023
Description	Larson Davis CAL150 Calibrator	***Temperature***	22 °C ± 0.3 °C
		Humidity	36 %RH ± 3 %RH
		Static Pressure	101.1 kPa ± 1 kPa

Evaluation Method The data is aquired by the insert voltage calibration method using the reference microphone's open circuit sensitivity. Data reported in dB re 20 µPa.

Compliance Standards Compliant to Manufacturer Specifications per D0001.8190 and the following standards:
IEC 60942:2017 ANSI S1.40-2006

Issuing lab certifies that the instrument described above meets or exceeds all specifications as stated in the referenced procedure (unless otherwise noted). It has been calibrated using measurement standards traceable to the SI through the National Institute of Standards and Technology (NIST), or other national measurement institutes, and meets the requirements of ISO/IEC 17025:2017.
Test points marked with a ‡ in the uncertainties column do not fall within this laboratory's scope of accreditation.

The quality system is registered to ISO 9001:2015.

This calibration is a direct comparison of the unit under test to the listed reference standards and did not involve any sampling plans to complete. No allowance has been made for the instability of the test device due to use, time, etc. Such allowances would be made by the customer as needed.

The uncertainties were computed in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (GUM). A coverage factor of approximately 2 sigma (k=2) has been applied to the standard uncertainty to express the expanded uncertainty at approximately 95% confidence level.

Standards Used

Description	Cal Date	Cal Due	Cal Standard
Agilent 34401A DMM	07/07/2022	07/07/2023	001021
Larson Davis Model 2900 Real Time Analyzer	03/31/2022	03/31/2023	001051
Microphone Calibration System	02/23/2022	02/23/2023	005446
1/2" Preamplifier	08/23/2022	08/23/2023	006506
Larson Davis 1/2" Preamplifier 7-pin LEMO	08/08/2022	08/08/2023	006507
1/2 inch Microphone - RI - 200V	03/24/2022	03/24/2023	006511
Hart Scientific 2626-S Humidity/Temperature Sensor	07/29/2021	01/29/2023	006946
Pressure Sensor	03/15/2022	12/14/2022	PCB0087008

Output Level

Nominal Level [dB]	Pressure [kPa]	Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
114	101.0	114.01	113.70	114.30	0.14	Pass
94	101.1	94.02	93.70	94.30	0.14	Pass

-- End of measurement results--

Frequency

Nominal Level [dB]	Pressure [kPa]	Test Result [Hz]	Lower limit [Hz]	Upper limit [Hz]	Expanded Uncertainty [Hz]	Result
114	101.0	1,000.06	993.00	1,007.00	0.20	Pass
94	101.1	1,000.07	993.00	1,007.00	0.20	Pass

-- End of measurement results--

Total Harmonic Distortion + Noise (THD+N)

Nominal Level [dB]	Pressure [kPa]	Test Result [%]	Lower limit [%]	Upper limit [%]	Expanded Uncertainty [%]	Result
114	101.0	0.52	0.00	2.00	0.25 ‡	Pass
94	101.1	0.49	0.00	2.00	0.25 ‡	Pass

-- End of measurement results--

Level Change Over Pressure

Tested at: 114 dB, 22 °C, 33 %RH

Nominal Pressure [kPa]	Pressure [kPa]	Test Result [dB]	Lower limit [dB]	Upper limit [dB]	Expanded Uncertainty [dB]	Result
108.0	108.0	-0.01	-0.40	0.40	0.04 ‡	Pass
101.3	101.2	0.00	-0.40	0.40	0.04 ‡	Pass
92.0	92.1	0.00	-0.40	0.40	0.04 ‡	Pass
83.0	83.0	-0.02	-0.40	0.40	0.04 ‡	Pass
74.0	74.1	-0.06	-0.40	0.40	0.04 ‡	Pass
65.0	65.0	-0.14	-0.40	0.40	0.04 ‡	Pass

-- End of measurement results--

Frequency Change Over Pressure

Tested at: 114 dB, 22 °C, 33 %RH

Nominal Pressure [kPa]	Pressure [kPa]	Test Result [Hz]	Lower limit [Hz]	Upper limit [Hz]	Expanded Uncertainty [Hz]	Result
108.0	108.0	0.00	-7.00	7.00	0.20 ‡	Pass
101.3	101.2	0.00	-7.00	7.00	0.20 ‡	Pass
92.0	92.1	0.00	-7.00	7.00	0.20 ‡	Pass
83.0	83.0	0.00	-7.00	7.00	0.20 ‡	Pass
74.0	74.1	-0.01	-7.00	7.00	0.20 ‡	Pass
65.0	65.0	-0.01	-7.00	7.00	0.20 ‡	Pass

-- End of measurement results--

Total Harmonic Distortion + Noise (THD+N) Over Pressure

Tested at: 114 dB, 22 °C, 33 %RH

Nominal Pressure [kPa]	Pressure [kPa]	Test Result [%]	Lower limit [%]	Upper limit [%]	Expanded Uncertainty [%]	Result
108.0	108.0	0.55	0.00	2.00	0.25 ‡	Pass
101.3	101.2	0.53	0.00	2.00	0.25 ‡	Pass
92.0	92.1	0.50	0.00	2.00	0.25 ‡	Pass
83.0	83.0	0.46	0.00	2.00	0.25 ‡	Pass
74.0	74.1	0.42	0.00	2.00	0.25 ‡	Pass
65.0	65.0	0.39	0.00	2.00	0.25 ‡	Pass

-- End of measurement results--

Signatory: *Scott Montgomery*

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