

Calibration Certificate

Certificate Number 

Customer:

MIP Electronics OY

Palokorvenkatu 2

Kerava, 04250, Finland

Model Number HVM200

Serial Number 

Test Results Pass

Initial Condition As Manufactured

Description Larson Davis Model HVM200

Procedure Number D0001.8391

Technician Ashley Mangum

Calibration Date 17 May 2017

Calibration Due

Temperature 23.39 °C ± 0.01 °C

Humidity 49.8 %RH ± 0.5 %RH

Static Pressure 85.76 kPa ± 0.03 kPa

Evaluation Method Tested electrically using ADSIT.99 test fixture. Data reported in m/s² with equivalent sensor sensitivity of 1 mV/m/s².

Compliance Standards Compliant to Manufacturer Specifications and the following standards:

ISO 8041:2005

IEC 61260:2014

ANSI S2.70

ANSI S1.11

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 17025:2005.

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 9001:2008.

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.

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Standards Used

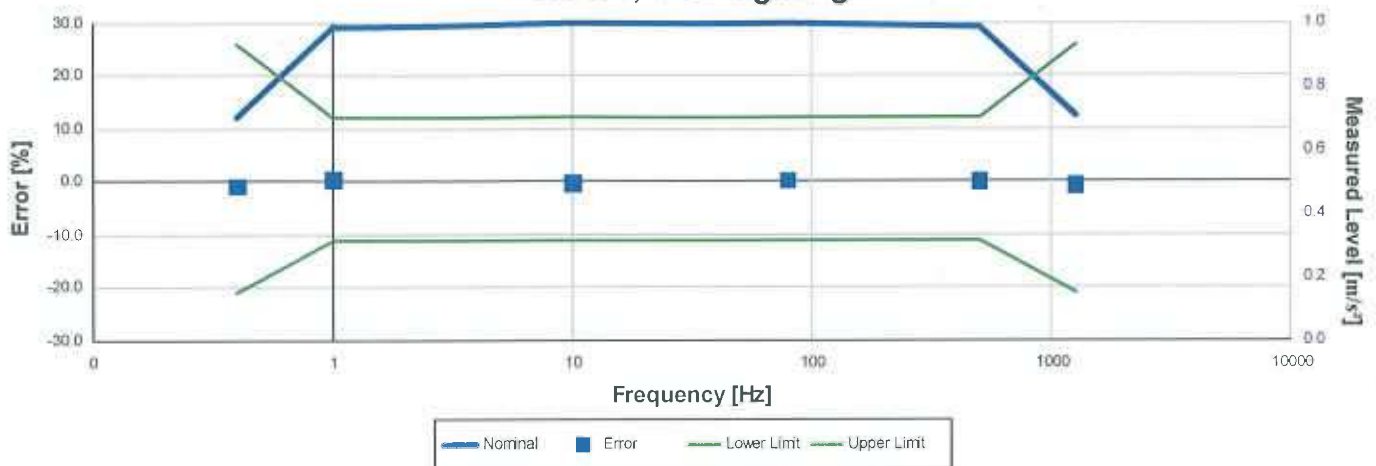
Description	Cal Date	Cal Due	Cal Standard
Hart Scientific 2626-S Humidity/Temperature Sensor	06/17/2016	06/17/2017	006946
SRS DS360 Ultra Low Distortion Generator	03/16/2017	03/16/2018	007174

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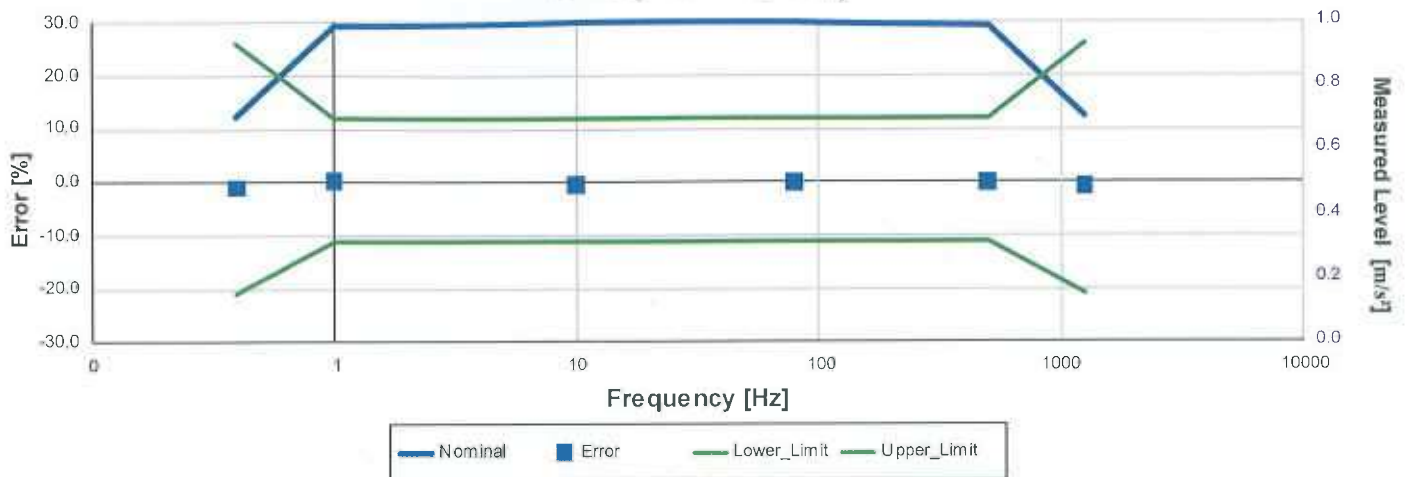
X-Axis, Fb-weighting



Electrical signal test of frequency weighting performed according to ISO 8041:2005 13.10.3

Frequency [Hz]	Test Result [m/s ²]	Error [%]	Lower limit [%]	Upper limit [%]	Expanded Uncertainty [%]	Result
0.40	0.6964	-1.04	-21	26	1.30	Pass
1.00	0.9907	0.34	-11	12	1.30	Pass
10.00	0.9962	-0.38	-11	12	1.30	Pass
79.43	0.9999	-0.01	-11	12	1.30	Pass
501.19	0.9875	-0.02	-11	12	1.30	Pass
1,258.90	0.7016	-0.78	-21	26	1.30	Pass
-- End of measurement results--						

Y-Axis, Fb-weighting

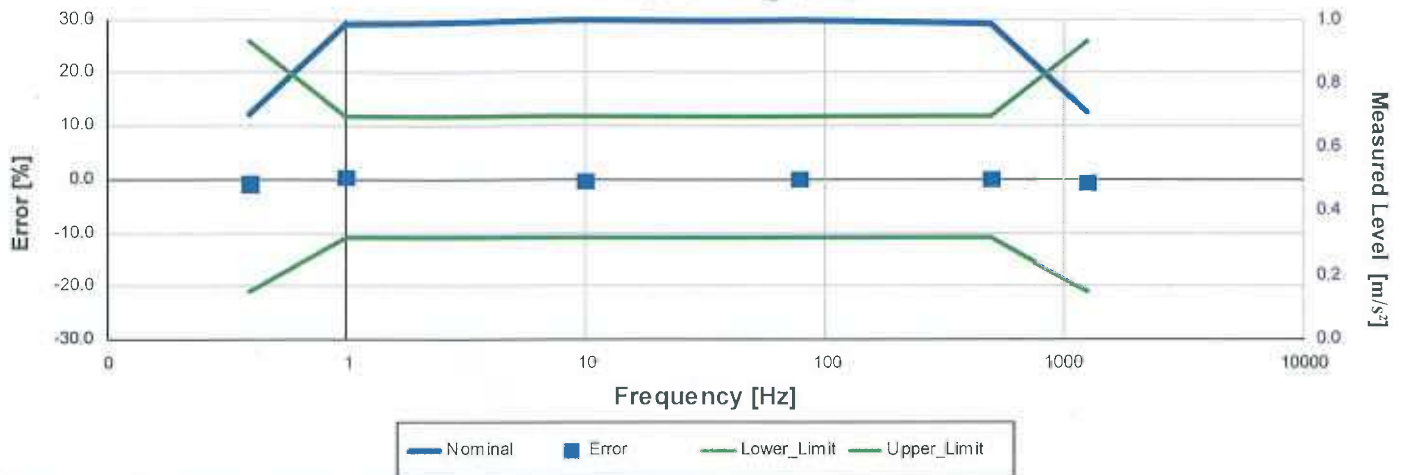


Electrical signal test of frequency weighting performed according to ISO 8041:2005 13.10.3

Frequency [Hz]	Test Result [m/s ²]	Error [%]	Lower limit [%]	Upper limit [%]	Expanded Uncertainty [%]	Result
0.40	0.6964	-1.04	-21	26	1.30	Pass
1.00	0.9908	0.34	-11	12	1.30	Pass
10.00	0.9962	-0.38	-11	12	1.30	Pass
79.43	0.9999	-0.01	-11	12	1.30	Pass
501.19	0.9875	-0.02	-11	12	1.30	Pass
1,258.90	0.7013	-0.82	-21	26	1.30	Pass

-- End of measurement results--

Z-Axis, Fb-weighting

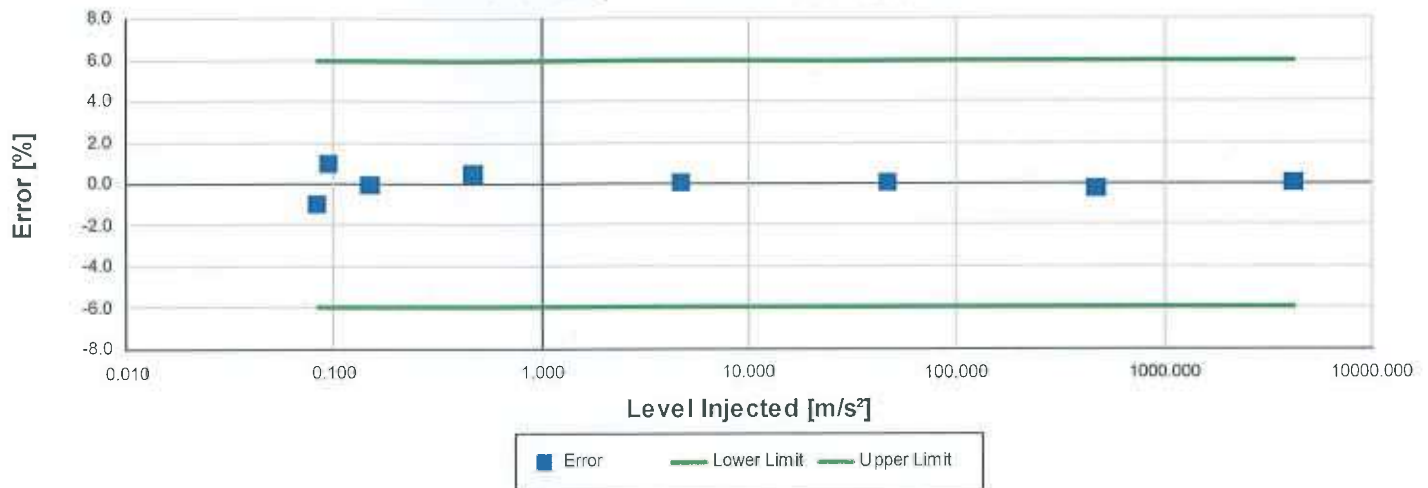


Electrical signal test of frequency weighting performed according to ISO 8041:2005 13.10.3

Frequency [Hz]	Test Result [m/s²]	Error [%]	Lower limit [%]	Upper limit [%]	Expanded Uncertainty [%]	Result
0.40	0.6964	-1.04	-21	26	1.30	Pass
1.00	0.9908	0.34	-11	12	1.30	Pass
10.00	0.9962	-0.38	-11	12	1.30	Pass
79.43	0.9999	-0.01	-11	12	1.30	Pass
501.19	0.9875	-0.02	-11	12	1.30	Pass
1,258.90	0.7015	-0.80	-21	26	1.30	Pass

-- End of measurement results--

X-Axis Log Linearity at 12.59 Hz

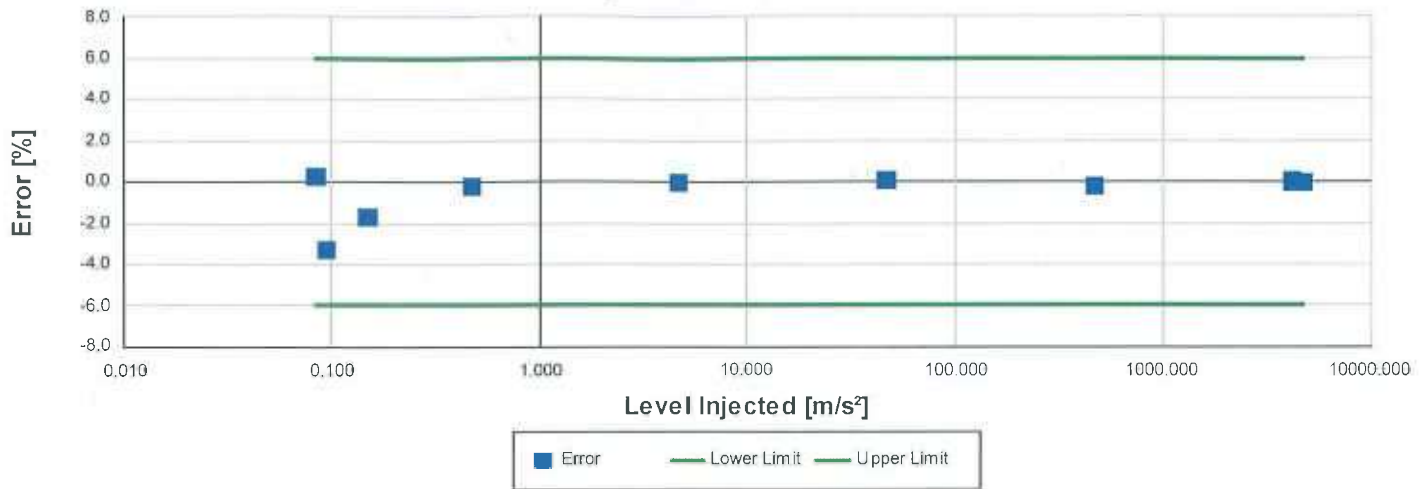


Broadband level linearity with Wh-weighting

Level [m/s ²]	Measured [m/s ²]	Error [%]	Lower limit [%]	Upper limit [%]	Expanded Uncertainty [%]	Result
0.083488	0.082649	-1.01	-6.00	6.00	1.30	Pass
0.093675	0.094571	0.96	-6.00	6.00	2.40	Pass
0.148465	0.148408	-0.04	-6.00	6.00	1.70	Pass
0.469489	0.471698	0.47	-6.00	6.00	1.40	Pass
4.694891	4.698381	0.07	-6.00	6.00	1.30	Pass
46.948907	46.979774	0.07	-6.00	6.00	1.40	Pass
469.489075	468.515503	-0.21	-6.00	6.00	1.30	Pass
4,184.325783	4,184.956055	0.02	-6.00	6.00	1.40	Pass

-- End of measurement results--

Y-Axis Log Linearity at 12.59 Hz

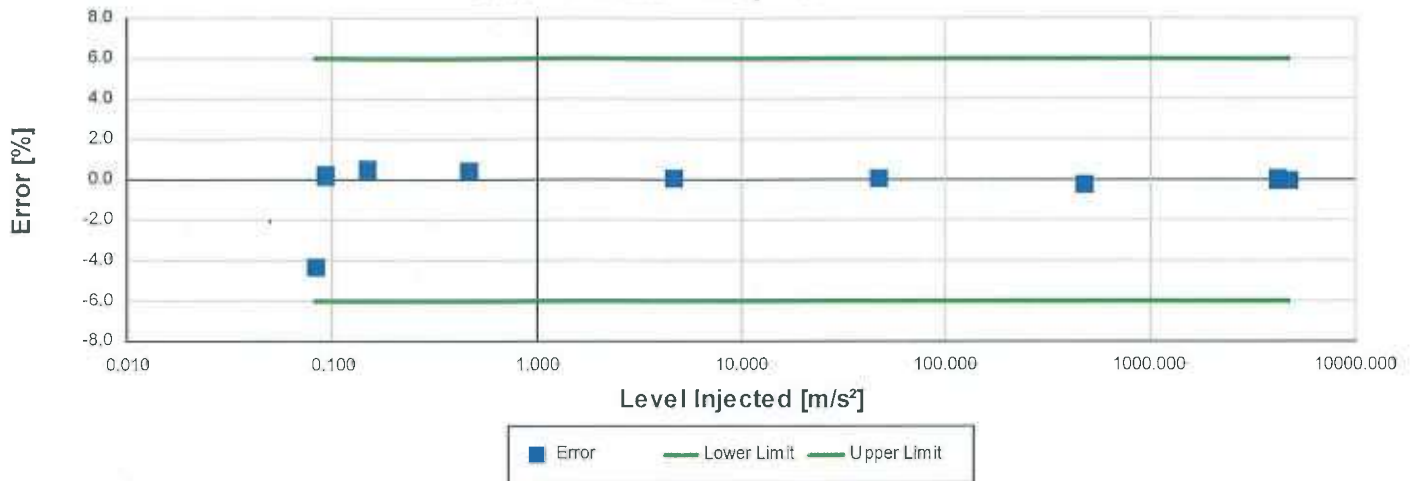


Broadband level linearity with Wh-weighting

Level [m/s²]	Measured [m/s²]	Error [%]	Lower limit [%]	Upper limit [%]	Expanded Uncertainty [%]	Result
0.083490	0.083695	0.25	-6.00	6.00	1.30	Pass
0.093677	0.090575	-3.31	-6.00	6.00	2.40	Pass
0.148468	0.145893	-1.73	-6.00	6.00	1.70	Pass
0.469496	0.468421	-0.23	-6.00	6.00	1.40	Pass
4.694964	4.694379	-0.01	-6.00	6.00	1.30	Pass
46.949637	46.981880	0.07	-6.00	6.00	1.40	Pass
469.496368	468.530945	-0.21	-6.00	6.00	1.30	Pass
4,184.390788	4,185.081543	0.02	-6.00	6.00	1.40	Pass
4,694.963684	4,694.645020	-0.01	-6.00	6.00	1.40	Pass

-- End of measurement results--

Z-Axis Log Linearity at 12.59 Hz



Broadband level linearity with Wh-weighting

Level [m/s²]	Measured [m/s²]	Error [%]	Lower limit [%]	Upper limit [%]	Expanded Uncertainty [%]	Result
0.083491	0.079893	-4.31	-6.00	6.00	1.30	Pass
0.093679	0.093864	0.20	-6.00	6.00	2.40	Pass
0.148471	0.149179	0.48	-6.00	6.00	1.70	Pass
0.469505	0.471421	0.41	-6.00	6.00	1.40	Pass
4.695055	4.698671	0.08	-6.00	6.00	1.30	Pass
46.950546	46.980377	0.06	-6.00	6.00	1.40	Pass
469.505463	468.524292	-0.21	-6.00	6.00	1.30	Pass
4,184.471840	4,185.088379	0.01	-6.00	6.00	1.40	Pass
4,695.054627	4,694.666992	-0.01	-6.00	6.00	1.40	Pass

-- End of measurement results--

Overload Detector

Overload indication performed according to ISO 8041:2005 13.12 with Fb-weighting

Measurement	Nominal [m/s²]	Test Result [m/s²]	Lower limit [%]	Upper limit [%]	Expanded Uncertainty [%]	Result
X-Axis: Negative	4,931.68	4,931.68	-15.00	15.00	1.60	Pass
X-Axis: Positive	4,931.68	4,655.81	-15.00	15.00	1.60	Pass
Y-Axis: Negative	4,931.68	4,931.68	-15.00	15.00	1.60	Pass
Y-Axis: Positive	4,931.68	4,931.68	-15.00	15.00	1.60	Pass
Z-Axis: Negative	4,931.68	4,931.68	-15.00	15.00	1.60	Pass
Z-Axis: Positive	4,931.68	4,931.68	-15.00	15.00	1.60	Pass

-- End of measurement results--

Overload Comparison

Overload indication performed according to ISO 8041:2005 13.13 with Fb-weighting

Measurement	Test Result [%]	Lower limit [%]	Upper limit [%]	Expanded Uncertainty [%]	Result
X-Axis	5.93	-15.00	15.00	2.00	Pass
Y-Axis	0.00	-15.00	15.00	2.00	Pass
Z-Axis	0.00	-15.00	15.00	2.00	Pass
-- End of measurement results--					

Cross-talk (Fb-weighting)

Cross-talk performed according to ISO 8041:2005 13.8

Injected : Read	Test Result [%]	Upper Limit [%]	Expanded Uncertainty [%]	Result
X-Axis : Y-Axis	0.002	0.50	1.30	Pass
X-Axis : Z-Axis	0.003	0.50	1.30	Pass
Y-Axis : X-Axis	0.002	0.50	1.30	Pass
Y-Axis : Z-Axis	0.002	0.50	1.30	Pass
Z-Axis : X-Axis	0.001	0.50	1.30	Pass
Z-Axis : Y-Axis	0.002	0.50	1.30	Pass
-- End of measurement results--				

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Frequency-weighted Noise Floor

Self-generated noise measured according to ISO 8041:2005 13.11

Weighting	Axis	Test Result [m/s ²]	Upper limit [m/s ²]	Result
Fb	X-Axis	0.037213	0.066800	Pass
	Y-Axis	0.045710	0.066800	Pass
	Z-Axis	0.041636	0.066800	Pass
-- End of measurement results--				

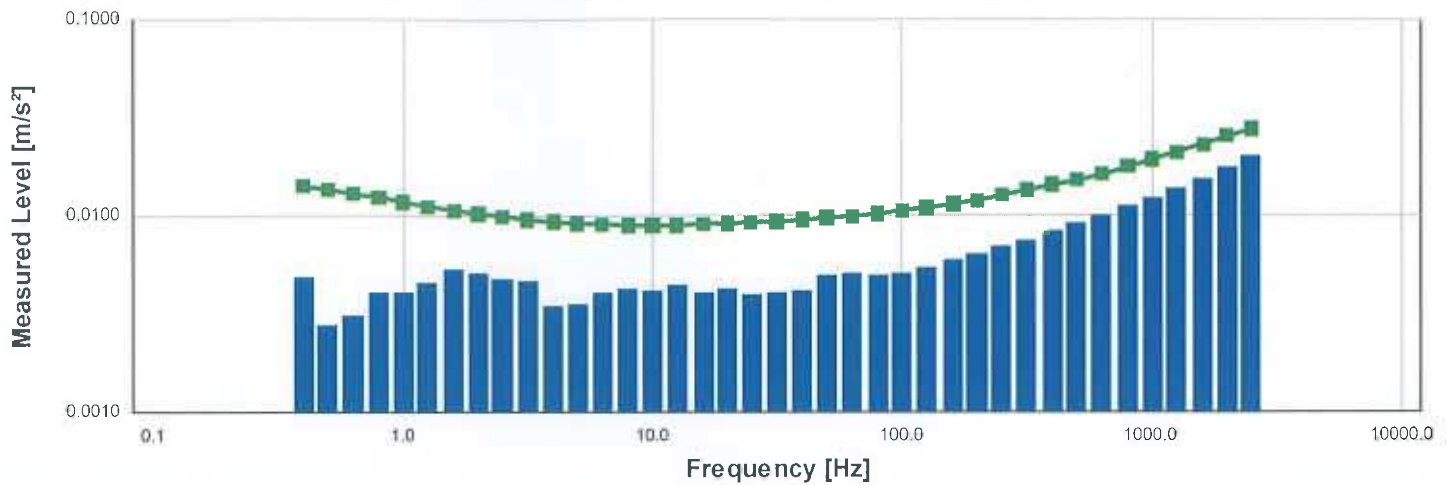
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6/12/2017 3:45:27PM

X-Axis 1/3-Octave Self-Generated Noise



Frequency [Hz]	Test Result [m/s²]	Upper limit [m/s²]	Result
0.40	0.004875	0.014200	Pass
0.50	0.002772	0.013700	Pass
0.63	0.003120	0.013000	Pass
0.80	0.004056	0.012500	Pass
1.00	0.004043	0.011800	Pass
1.25	0.004605	0.011200	Pass
1.60	0.005346	0.010700	Pass
2.00	0.005098	0.010300	Pass
2.50	0.004717	0.010000	Pass
3.15	0.004690	0.009600	Pass
4.00	0.003503	0.009400	Pass
5.00	0.003538	0.009200	Pass
6.30	0.004101	0.009100	Pass
8.00	0.004294	0.009000	Pass
10.00	0.004187	0.009000	Pass
12.50	0.004438	0.009000	Pass
16.00	0.004112	0.009100	Pass
20.00	0.004225	0.009200	Pass
25.00	0.004013	0.009300	Pass
31.50	0.004078	0.009400	Pass
40.00	0.004184	0.009600	Pass
50.00	0.005008	0.009800	Pass
63.00	0.005153	0.010000	Pass
80.00	0.004929	0.010300	Pass
100.00	0.005100	0.010700	Pass
125.00	0.005502	0.011000	Pass
160.00	0.005951	0.011500	Pass
200.00	0.006452	0.012000	Pass
250.00	0.006977	0.012700	Pass
315.00	0.007541	0.013500	Pass
400.00	0.008337	0.014400	Pass
500.00	0.009265	0.015200	Pass
630.00	0.010073	0.016300	Pass
800.00	0.011129	0.017800	Pass
1,000.00	0.012234	0.019400	Pass
1,250.00	0.013830	0.021100	Pass
1,600.00	0.015398	0.023100	Pass

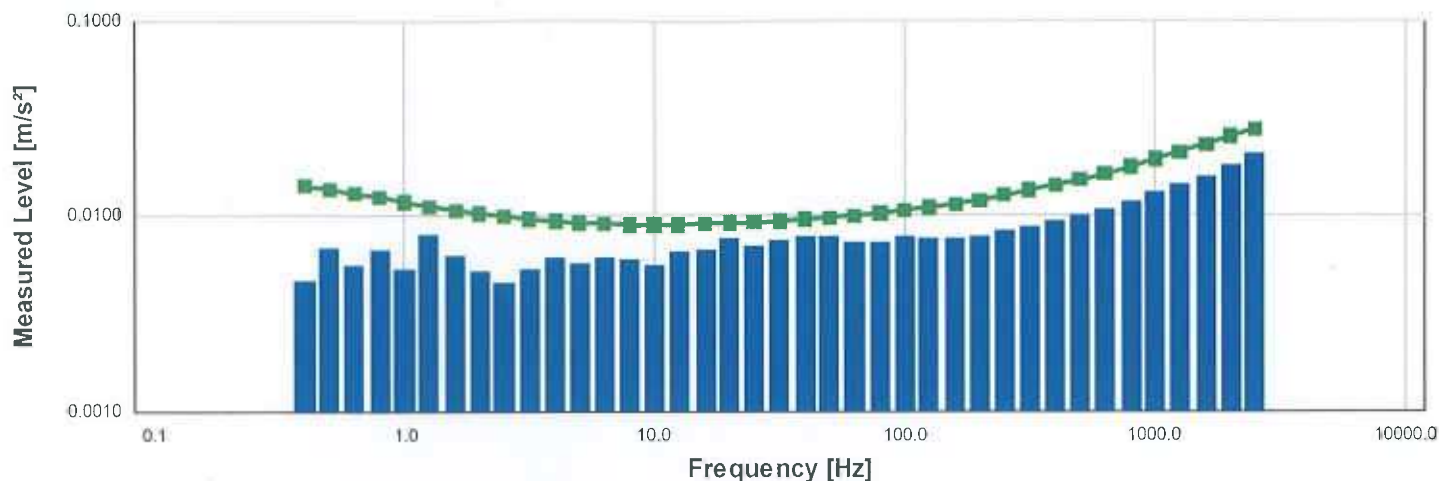
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Frequency [Hz]	Test Result [m/s ²]	Upper limit [m/s ²]	Result
2,000.00	0.017510	0.025500	Pass
2,500.00	0.020322	0.027800	Pass
-- End of measurement results--			

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Y-Axis 1/3-Octave Self-Generated Noise



Frequency [Hz]	Test Result [m/s²]	Upper limit [m/s²]	Result
0.40	0.004673	0.014200	Pass
0.50	0.006796	0.013700	Pass
0.63	0.005535	0.013000	Pass
0.80	0.006755	0.012500	Pass
1.00	0.005375	0.011800	Pass
1.25	0.007945	0.011200	Pass
1.60	0.006294	0.010700	Pass
2.00	0.005168	0.010300	Pass
2.50	0.004559	0.010000	Pass
3.15	0.005369	0.009600	Pass
4.00	0.006064	0.009400	Pass
5.00	0.005705	0.009200	Pass
6.30	0.006181	0.009100	Pass
8.00	0.005974	0.009000	Pass
10.00	0.005534	0.009000	Pass
12.50	0.006532	0.009000	Pass
16.00	0.006764	0.009100	Pass
20.00	0.007704	0.009200	Pass
25.00	0.007030	0.009300	Pass
31.50	0.007478	0.009400	Pass
40.00	0.007932	0.009600	Pass
50.00	0.007807	0.009800	Pass
63.00	0.007352	0.010000	Pass
80.00	0.007257	0.010300	Pass
100.00	0.007824	0.010700	Pass
125.00	0.007756	0.011000	Pass
160.00	0.007676	0.011500	Pass
200.00	0.007784	0.012000	Pass
250.00	0.008484	0.012700	Pass
315.00	0.008789	0.013500	Pass
400.00	0.009344	0.014400	Pass
500.00	0.010072	0.015200	Pass
630.00	0.010793	0.016300	Pass
800.00	0.011933	0.017800	Pass
1,000.00	0.013122	0.019400	Pass
1,250.00	0.014580	0.021100	Pass
1,600.00	0.016023	0.023100	Pass

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Frequency [Hz]	Test Result [m/s ²]	Upper limit [m/s ²]	Result
2,000.00	0.018279	0.025500	Pass
2,500.00	0.020761	0.027800	Pass

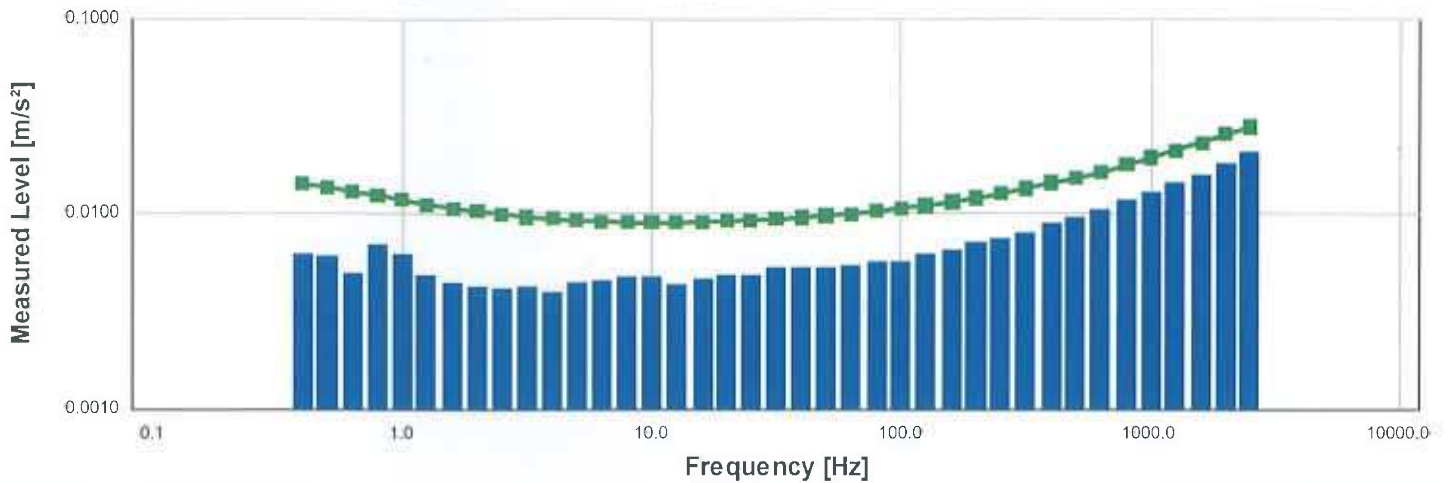
-- End of measurement results--

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Z-Axis 1/3-Octave Self-Generated Noise



Frequency [Hz]	Test Result [m/s²]	Upper limit [m/s²]	Result
0.40	0.006195	0.014200	Pass
0.50	0.006093	0.013700	Pass
0.63	0.004985	0.013000	Pass
0.80	0.007012	0.012500	Pass
1.00	0.006232	0.011800	Pass
1.25	0.004855	0.011200	Pass
1.60	0.004427	0.010700	Pass
2.00	0.004205	0.010300	Pass
2.50	0.004109	0.010000	Pass
3.15	0.004238	0.009600	Pass
4.00	0.003926	0.009400	Pass
5.00	0.004471	0.009200	Pass
6.30	0.004554	0.009100	Pass
8.00	0.004703	0.009000	Pass
10.00	0.004755	0.009000	Pass
12.50	0.004364	0.009000	Pass
16.00	0.004616	0.009100	Pass
20.00	0.004843	0.009200	Pass
25.00	0.004891	0.009300	Pass
31.50	0.005342	0.009400	Pass
40.00	0.005260	0.009600	Pass
50.00	0.005308	0.009800	Pass
63.00	0.005460	0.010000	Pass
80.00	0.005699	0.010300	Pass
100.00	0.005750	0.010700	Pass
125.00	0.006215	0.011000	Pass
160.00	0.006514	0.011500	Pass
200.00	0.007078	0.012000	Pass
250.00	0.007535	0.012700	Pass
315.00	0.008033	0.013500	Pass
400.00	0.008897	0.014400	Pass
500.00	0.009602	0.015200	Pass
630.00	0.010593	0.016300	Pass
800.00	0.011696	0.017800	Pass
1,000.00	0.012975	0.019400	Pass
1,250.00	0.014305	0.021100	Pass
1,600.00	0.015918	0.023100	Pass

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Frequency [Hz]	Test Result [m/s ²]	Upper limit [m/s ²]	Result
2,000.00	0.018059	0.025500	Pass
2,500.00	0.020934	0.027800	Pass
-- End of measurement results--			

-- End of Report--

Signatory: Ashley Mangum

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