Triax Vibration Meter

Technical Manual

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Rev A

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Contents

Technical Specification

Instrument Standards

BS EN ISO 8041-1:2017 Human response to vibration – Measuring Instrumentation

All design goals and measurement tolerance limits within this standard have been met, self-validation completed August 2022, firmware version 1.16

Measurement Parameters

Hand Arm

Real Time:

- a_{RMS}, a_{EQ}, a_{PK},

Time History:

- a_{EQ}, a_{PK}, Vector a_{hv} or Dominant Axis, OL, UR

Cumulative:

- a_{EQ}, a_{PK}, Vector a_{hv} or Dominant Axis, A(8), Time to EAV, Time to ELV, Exposure Points, OL, UR

Whole Body

Real Time:

- a_{RMS}, a_{EQ}, a_{PK},

Time History:

- a_{EQ}, a_{PK}, a_{CF}, Vector a_{wv} or Dominant Axis, VDV, VDV Vector or VDV Dominant Axis, OL, UR

Cumulative:

- a_{EQ}, a_{PK}, a_{CF}, Vector a_{wv} or Dominant Axis, VDV, VDV Vector or VDV Dominant Axis, A(8), Time to EAV, Time to ELV, VDV Time to EAV, VDV Time to ELV, Exposure Points, OL, UR

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rms values are not recorded

Reference Points

Description	Value
Air Temperature	23 °C (73 °F)
Relative Humidity	50 %
Vibration Reference Value	10.00 m/s^2
Input Signal	10.197 mV
Range	High (where applicable)
Frequency (Hand Arm)	79.58 Hz
Frequency (Whole Body)	15.915 Hz

Instrument Warm Up Time

Less than one minute, excluding accelerometer settling time.

Environmental Stabilisation Time

Depending on the severity of the environmental change, the instrument, transducer and cable should all be stabilised under the new environmental conditions for a period of no less than 15 minutes.

If batteries to power the instrument are also subject to the environmental change, these should be included in this time period.

Signal Transmission

The Triax vibration meter accepts an analogue voltage signal carried by wire from the attached accelerometer. The input range is determined by the instrument configuration.

Accelerometer Specifications

Hand Arm

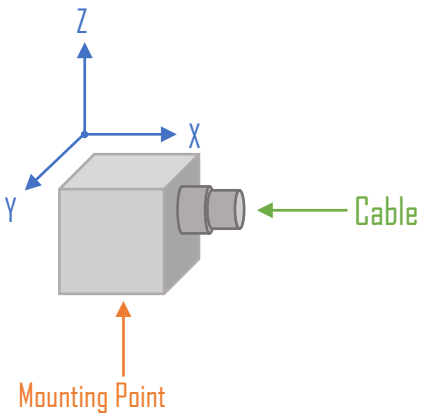
CVB202

	Specification
Voltage Sensitivity	*CVB202: 1 mV/g ±10 % @ +20 °C
Size	16.4 x 16.4 x 13.4 mm
Resonant Frequency	X/Y ≥ 25 kHz , Z ≥ 33 kHz
Transverse Sensitivity	≤5 % Max
Typical Frequency Range ±5%	1 Hz – 6000 kHz
Voltage Sensitivity Deviation	-5 % @ -50 °C, +5 % @ +125 °C
Base Strain Sensitivity	≤5 %
Maximum Operational Shock (peak)	5000 g
Supply Voltage	15 to 35V DC
Temperature Range	-50/+125 °C
Case Material	Titanium
Case Seal	Hermetic
Weight	16.6 g
Settling Time	60 s

*Standard supplied HAV accelerometer

Axes Direction

The diagram below indicates the direction of the Accelerometer Axes in relation to the accelerometer mounting point and cable.

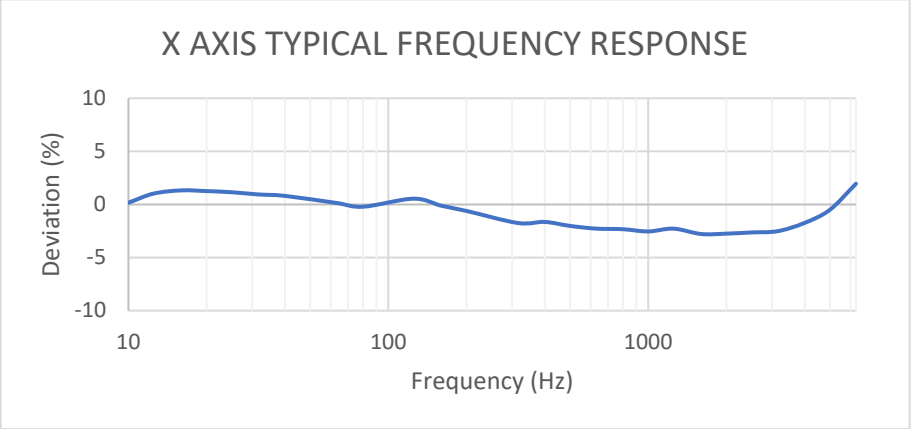


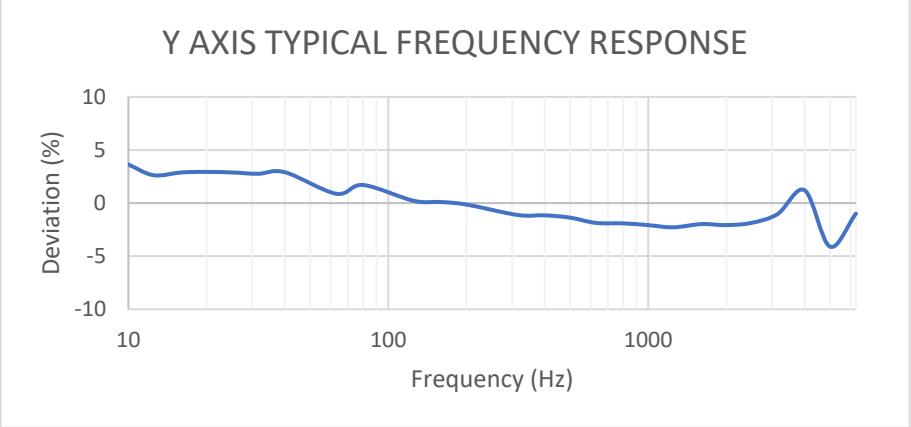
Physical Effect

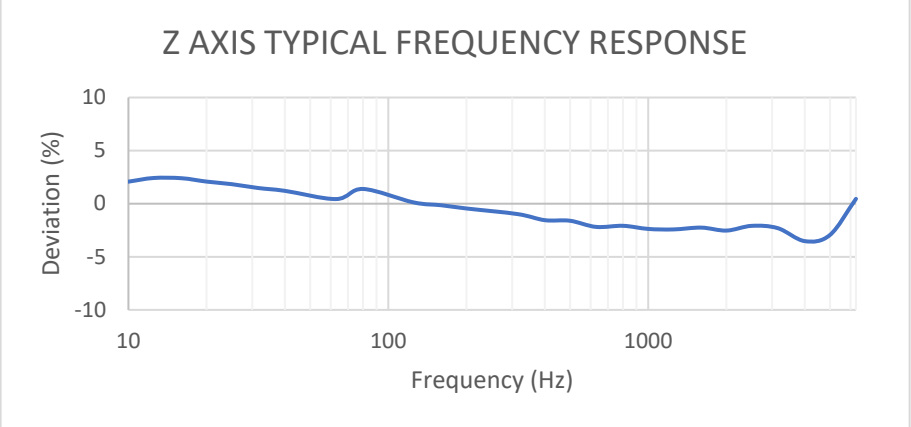
Triaxial vibration transducer comprising of three voltage output piezo-electric sensing elements, using the voltage induced across the sensing element in the presence of vibration.

Typical Frequency Response

The diagrams below indicate the individual and typical frequency response for each axis of the CVB202 accelerometer.







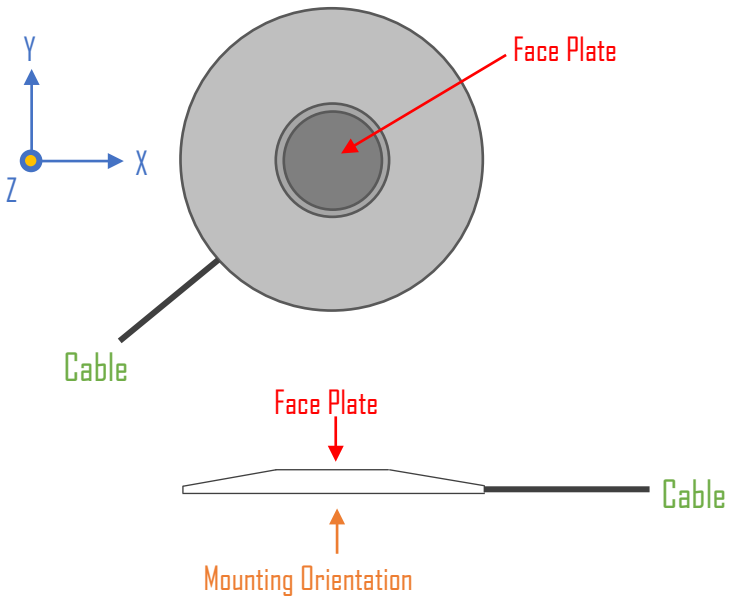
Whole Body

CVB203

	Specification
Sensitivity	1000mV/g ±5%
Size	236 x 12 mm
Resonant Frequency	5 kHz
Transverse Sensitivity	≤5 % Max
Typical Frequency Range	0.1 – 100 Hz ±5%
Voltage Sensitivity Deviation	< +0.012 dB /°C
Max Shock Vibration	100,000 m/s^2
Supply Voltage	22 to 30V DC
Temperature Range	-10/+50 °C
Material, Pad	Rubber
Material, Central Housing Plates	Anodized Aluminium
Seal	Hermetic
Weight	550 g (inc cable)
Settling Time	60 s

Axes Direction

The diagram below indicates the direction of the Accelerometer Axes in relation to the accelerometer mounting orientation and cable.

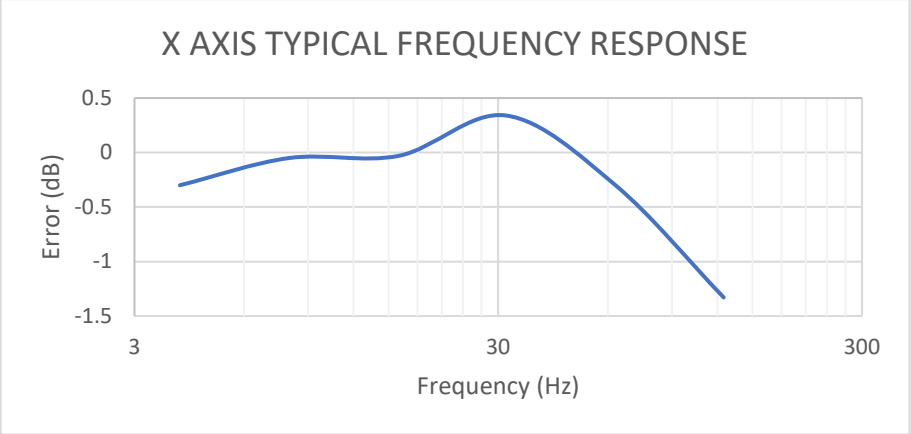


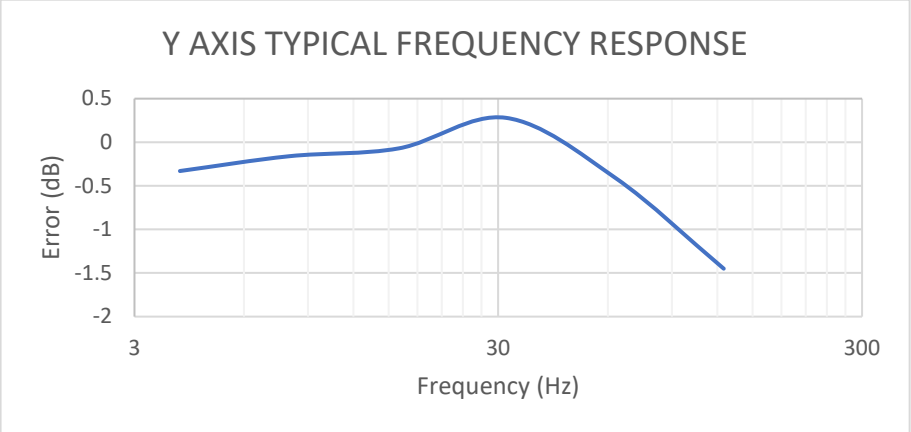
Physical Effect

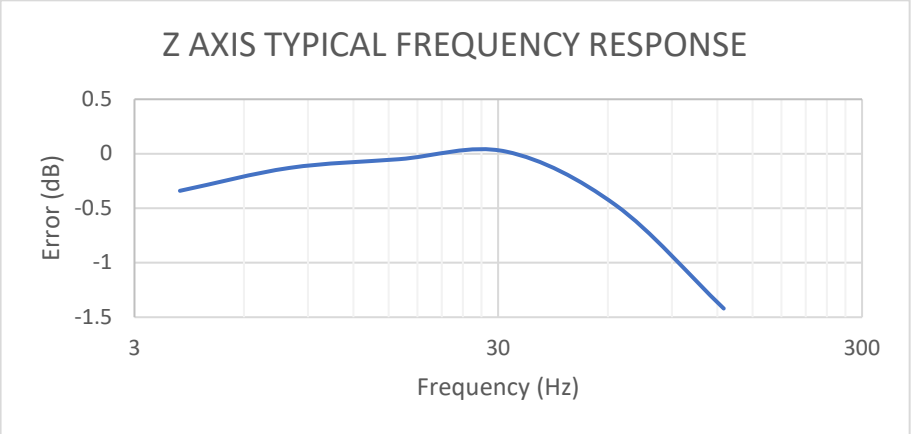
Triaxial vibration transducer comprising of a voltage signal derived from the capacitance measurement of an internal plate's deflection as caused by vibration.

Typical Frequency Response

The diagrams below indicate the individual and typical frequency response for each axis of the CVB202 accelerometers.



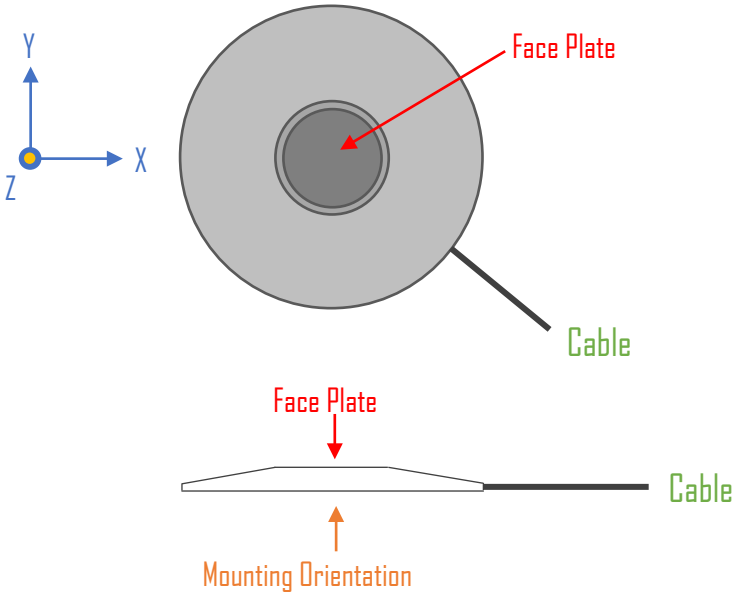




Accelerometer Axes

The diagram below indicates the direction of the Accelerometer Axes in relation to the accelerometer

mounting orientation and cable.



Physical Effect

Triaxial vibration transducer comprising of three voltage output piezo-electric sensing elements, using the voltage induced across the sensing element in the presence of vibration.

Typical Self Generating Noise Levels

All figures quoted are combined axes a_{EQ} 60 second averages with the stated accelerometer fitted.

Hand Arm

CVB202

Low Range, Wh	High Range, Wh
0.0059 m/s^2	0.0100 m/s^2

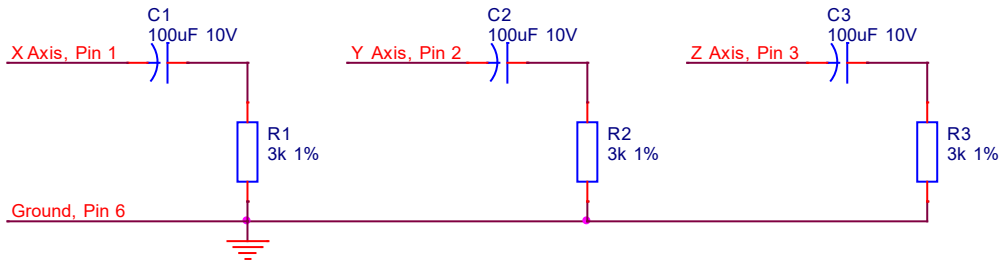
Whole Body

CVB203

Single Range, Wd	Single Range, Wk
0.002 m/s^2	0.004 m/s^2

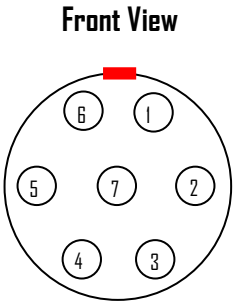
Electrical Signal Input

The following circuitry can be used to inject electrical signals into the Triax vibration meter.



Input Connector

Pin	Description
1	X Axis
2	Y Axis
3	Z Axis
4	ID1
5	ID0
6	Ground
7	+5V



Maximum Electrical Input Signal for No Damage

+31.0V, -0.6V

Air Temperature Range & Effect

Operating Range (°C)	Accuracy (%)
-10 to 50	±5

ADC Word Length

20 bits

ADC Sampling Rate

16 kHz

Digital Filters

All filtering and band limiting uses direct processing with digital recursive filters (infinite impulse response often abbreviated as IIR).

Anti-Aliasing

The Triax vibration meter incorporates an anti-aliasing filter prior to the signals Delta-Sigma ADC with a bandwidth of 60 kHz.

Vector Sum and rms Sequence

The Vector Sum result is the sum of the X, Y and Z rms values.

Overload

Latching overload warning whilst recording and/or time averaged values.

Display

2.4” Full Colour TFT LCD with 240 x 320 pixels

Refresh rate = 500 mS

Time History

User selectable with a minimum integrating period of one second.

Maximum potential recording size containing approximately 13500 intervals and without any other files stored.

File Storage

Max number of files stored is approximately 4080 without any other file stored that uses Time History.

Timer Functions

An adjustable countdown timer to automatically stop recordings with a user defined overall measurement period.

Real Time Clock

Battery backed clock and calendar.

Input Voltage

Batteries:	3.6V to 6.4V
	Alkaline Type AA 1.5V recommended
	Typical life >10 Hours continuous recording use with Auto Dim feature enabled
	3.6V absolute minimum level for conformance to ISO 8041-1:2017
USB:	4.9V to 5.1V @ 500 mA

Dimensions

145mm (H) x 70mm (W) x 30mm (D)

Weight

Weight: 480g approximately (including batteries)

Environmental Stabilisation Time

60 seconds.

Measurement Ranges

Hand Arm

CVB202

	Low Range	High Range
Metric (m/s^2)	0.2 rms - 2000 pk	1.0 rms - 10000 pk
Imperial (ft/s^2)	0.656 rms - 6560 pk	3.28 rms - 32800 pk
g	0.02 rms - 200 pk	0.1 rms - 1000 pk

Whole Body

CVB203

	Low Range (Single)
Metric (m/s^2)	0.01 rms - 50 pk
Imperial (ft/s^2)	0.0328 rms – 164 pk
g	0.001 rms – 5 pk

Frequency Weightings

Band limited weightings (Whb, Wdb, Wkb) are available via the calibration menu if required.

Vibration Mode	Weightings Available
Hand Arm	Wh, Whb
Whole Body	Wd, Wk, Wdb, Wkb

Wh Weighting

CVB202: X Axis – Electrical, Reference Range

	Frequency		Weighting, Wh					
	Nominal	True	Target	Difference	Input Signal	Input Level	Difference	
n	Hz	Hz	dB	dB	mV rms	dB	dB	Pass/Fail
6	4	3.981	-8.51	5.37	0.003339	-75.55	5.43	Pass
7	5	5.012	-5.27	8.61	0.002298	-78.79	8.67	Pass
8	6.3	6.31	-2.77	11.11	0.001723	-81.29	11.17	Pass
9	8	7.943	-1.18	12.7	0.001437	-82.87	12.75	Pass
10	10	10	-0.43	13.45	0.001318	-83.62	13.50	Pass
11	12.5	12.59	-0.38	13.5	0.001315	-83.64	13.52	Pass
12	16	15.85	-0.96	12.92	0.001402	-83.09	12.96	Pass
13	20	19.95	-2.14	11.74	0.001615	-81.86	11.73	Pass
14	25	25.12	-3.78	10.1	0.001953	-80.21	10.08	Pass
15	31.5	31.62	-5.69	8.19	0.002423	-78.33	8.21	Pass
16	40	39.81	-7.72	6.16	0.003062	-76.30	6.18	Pass
17	50	50.12	-9.78	4.1	0.003895	-74.21	4.09	Pass
18	63	63.1	-11.83	2.05	0.004959	-72.11	1.99	Pass
19	80	79.43	-13.88	0	0.006236	-70.12	0.00	Pass
20	100	100	-15.91	-2.03	0.007886	-68.08	-2.04	Pass
21	125	125.9	-17.93	-4.05	0.009938	-66.07	-4.05	Pass
22	160	158.5	-19.94	-6.06	0.0125	-64.08	-6.04	Pass
23	200	199.5	-21.95	-8.07	0.01581	-62.04	-8.08	Pass
24	250	251.2	-23.96	-10.08	0.01998	-60.01	-10.11	Pass
25	315	316.2	-25.97	-12.09	0.02515	-58.01	-12.11	Pass
26	400	398.1	-28.00	-14.12	0.03187	-55.95	-14.17	Pass

27	500	501.2	-30.07	-16.19	0.04052	-53.87	-16.26	Pass
28	630	631	-32.23	-18.35	0.0523	-51.65	-18.47	Pass
29	800	794.3	-34.60	-20.72	0.06932	-49.20	-20.92	Pass
30	1000	1000	-37.42	-23.54	0.09783	-46.21	-23.91	Pass
15	1250	1259	-40.97	-27.09	0.1535	-42.30	-27.82	Pass
32	1600	1585	-45.42	-31.54	0.2722	-37.32	-32.80	Pass
33	2000	1995	-50.60	-36.72	0.5499	-31.21	-38.91	Pass

CVB202: Y Axis – Electrical, Reference Range

	Frequency		Weighting, Wh					
	Nominal	True	Target	Difference	Input Signal	Input Level	Difference	
n	Hz	Hz	dB	dB	mV rms	dB	dB	Pass/Fail
6	4	3.981	-8.51	5.37	0.01677	-61.53	5.39	Pass
7	5	5.012	-5.27	8.61	0.0115	-64.81	8.67	Pass
8	6.3	6.31	-2.77	11.11	0.008649	-67.28	11.14	Pass
9	8	7.943	-1.18	12.7	0.007169	-68.91	12.77	Pass
10	10	10	-0.43	13.45	0.006586	-69.65	13.51	Pass
11	12.5	12.59	-0.38	13.5	0.006582	-69.65	13.52	Pass
12	16	15.85	-0.96	12.92	0.007033	-69.08	12.94	Pass
13	20	19.95	-2.14	11.74	0.008091	-67.86	11.72	Pass
14	25	25.12	-3.78	10.1	0.009778	-66.22	10.08	Pass
15	31.5	31.62	-5.69	8.19	0.01214	-64.34	8.20	Pass
16	40	39.81	-7.72	6.16	0.01536	-62.29	6.16	Pass
17	50	50.12	-9.78	4.1	0.01947	-60.23	4.10	Pass
18	63	63.1	-11.83	2.05	0.02472	-58.16	2.02	Pass
19	80	79.43	-13.88	0	0.0312	-56.14	0.00	Pass
20	100	100	-15.91	-2.03	0.03939	-54.11	-2.02	Pass
21	125	125.9	-17.93	-4.05	0.0496	-52.11	-4.03	Pass
22	160	158.5	-19.94	-6.06	0.06244	-50.11	-6.03	Pass
23	200	199.5	-21.95	-8.07	0.079	-48.07	-8.07	Pass
24	250	251.2	-23.96	-10.08	0.09969	-46.05	-10.09	Pass
25	315	316.2	-25.97	-12.09	0.1255	-44.05	-12.09	Pass
26	400	398.1	-28.00	-14.12	0.1591	-41.99	-14.15	Pass
27	500	501.2	-30.07	-16.19	0.2027	-39.88	-16.25	Pass

28	630	631	-32.23	-18.35	0.2615	-37.67	-18.47	Pass
29	800	794.3	-34.60	-20.72	0.3462	-35.23	-20.90	Pass
30	1000	1000	-37.42	-23.54	0.4891	-32.23	-23.90	Pass
15	1250	1259	-40.97	-27.09	0.7675	-28.32	-27.82	Pass
32	1600	1585	-45.42	-31.54	1.363	-23.33	-32.81	Pass
33	2000	1995	-50.60	-36.72	2.757	-17.21	-38.93	Pass

CVB202: Z Axis – Electrical, Reference Range

	Frequency		Weighting, Wh					
	Nominal	True	Target	Difference	Input Signal	Input Level	Difference	
n	Hz	Hz	dB	dB	mV rms	dB	dB	Pass/Fail
6	4	3.981	-8.51	5.37	0.003339	-75.55	5.43	Pass
7	5	5.012	-5.27	8.61	0.002298	-78.79	8.67	Pass
8	6.3	6.31	-2.77	11.11	0.001723	-81.29	11.17	Pass
9	8	7.943	-1.18	12.7	0.001437	-82.87	12.75	Pass
10	10	10	-0.43	13.45	0.001318	-83.62	13.50	Pass
11	12.5	12.59	-0.38	13.5	0.001315	-83.64	13.52	Pass
12	16	15.85	-0.96	12.92	0.001402	-83.09	12.96	Pass
13	20	19.95	-2.14	11.74	0.001615	-81.86	11.73	Pass
14	25	25.12	-3.78	10.1	0.001953	-80.21	10.08	Pass
15	31.5	31.62	-5.69	8.19	0.002423	-78.33	8.21	Pass
16	40	39.81	-7.72	6.16	0.003062	-76.30	6.18	Pass
17	50	50.12	-9.78	4.1	0.003895	-74.21	4.09	Pass
18	63	63.1	-11.83	2.05	0.004959	-72.11	1.99	Pass
19	80	79.43	-13.88	0	0.006236	-70.12	0.00	Pass
20	100	100	-15.91	-2.03	0.007886	-68.08	-2.04	Pass
21	125	125.9	-17.93	-4.05	0.009938	-66.07	-4.05	Pass
22	160	158.5	-19.94	-6.06	0.0125	-64.08	-6.04	Pass
23	200	199.5	-21.95	-8.07	0.01581	-62.04	-8.08	Pass
24	250	251.2	-23.96	-10.08	0.01998	-60.01	-10.11	Pass
25	315	316.2	-25.97	-12.09	0.02515	-58.01	-12.11	Pass
26	400	398.1	-28.00	-14.12	0.03187	-55.95	-14.17	Pass
27	500	501.2	-30.07	-16.19	0.04052	-53.87	-16.26	Pass

28	630	631	-32.23	-18.35	0.0523	-51.65	-18.47	Pass
29	800	794.3	-34.60	-20.72	0.06932	-49.20	-20.92	Pass
30	1000	1000	-37.42	-23.54	0.09783	-46.21	-23.91	Pass
15	1250	1259	-40.97	-27.09	0.1535	-42.30	-27.82	Pass
32	1600	1585	-45.42	-31.54	0.2722	-37.32	-32.80	Pass
33	2000	1995	-50.60	-36.72	0.5499	-31.21	-38.91	Pass

CVB203: X Axis – Electrical, Reference Range

	Frequency		Weighting, Wd					
	Nominal	True	Target	Difference	Input Signal	Input Level	Difference	
n	Hz	Hz	dB	dB	mV rms	dB	dB	Pass/Fail
-6	0.25	0.2512	-8.68	9.27	0.03572	-54.96	8.94	Pass
-5	0.315	0.3162	-5.47	12.48	0.02412	-58.37	12.35	Pass
-4	0.4	0.3981	-2.98	14.97	0.01835	-60.75	14.73	Pass
-3	0.5	0.5012	-1.37	16.58	0.01526	-62.35	16.33	Pass
-2	0.63	0.631	-0.5	17.45	0.01356	-63.38	17.35	Pass
-1	0.8	0.7943	-0.08	17.87	0.01289	-63.82	17.79	Pass
0	1	1	0.1	18.05	0.01209	-64.37	18.35	Pass
1	1.25	1.259	0.06	18.01	0.01267	-63.97	17.94	Pass
2	1.6	1.585	-0.26	17.69	0.01307	-63.70	17.67	Pass
3	2	1.995	-1	16.95	0.01387	-63.18	17.16	Pass
4	2.5	2.512	-2.23	15.72	0.0164	-61.72	15.70	Pass
5	3.15	3.162	-3.88	14.07	0.01948	-60.23	14.21	Pass
6	4	3.981	-5.78	12.17	0.02424	-58.33	12.31	Pass
7	5	5.012	-7.78	10.17	0.03096	-56.20	10.18	Pass
8	6.3	6.31	-9.83	8.12	0.03918	-54.16	8.14	Pass
9	8	7.943	-11.87	6.08	0.04958	-52.11	6.09	Pass
10	10	10	-13.91	4.04	0.06263	-50.08	4.06	Pass
11	12.5	12.59	-15.93	2.02	0.07943	-48.02	2.00	Pass
12	16	15.85	-17.95	0	0.1	-46.02	0.00	Pass
13	20	19.95	-19.97	-2.02	0.1254	-44.05	-1.97	Pass
14	25	25.12	-21.98	-4.03	0.1589	-42.00	-4.02	Pass
15	31.5	31.62	-24.01	-6.06	0.2002	-39.99	-6.03	Pass
16	40	39.81	-26.08	-8.13	0.2535	-37.94	-8.08	Pass
17	50	50.12	-28.24	-10.29	0.3279	-35.71	-10.31	Pass
18	63	63.1	-30.62	-12.67	0.4313	-33.33	-12.70	Pass
19	80	79.43	-33.43	-15.48	0.5901	-30.60	-15.42	Pass
20	100	100	-36.99	-19.04	0.8911	-27.02	-19.00	Pass
21	125	125.9	-41.43	-23.48	1.487	-22.57	-23.45	Pass
22	160	158.5	-46.62	-28.67	2.696	-17.41	-28.61	Pass

CVB203: Z Axis – Electrical, Reference Range

	Frequency		Weighting, Wk					
	Nominal	True	Target	Difference	Input Signal	Input Level	Difference	
n	Hz	Hz	dB	dB	mV rms	dB	dB	Pass/Fail
-6	0.25	0.2512	-14.74	-12.52	0.06676	-49.53	-12.26	Pass
-5	0.315	0.3162	-11.55	-9.33	0.04893	-52.23	-9.56	Pass
-4	0.4	0.3981	-9.11	-6.89	0.03693	-54.67	-7.11	Pass
-3	0.5	0.5012	-7.56	-5.34	0.03096	-56.20	-5.58	Pass
-2	0.63	0.631	-6.77	-4.55	0.028	-57.08	-4.71	Pass
-1	0.8	0.7943	-6.44	-4.22	0.02696	-57.41	-4.38	Pass
0	1	1	-6.33	-4.11	0.02733	-57.29	-4.50	Pass
1	1.25	1.259	-6.29	-4.07	0.026	-57.72	-4.07	Pass
2	1.6	1.585	-6.13	-3.91	0.02553	-57.88	-3.91	Pass
3	2	1.995	-5.5	-3.28	0.02338	-58.64	-3.14	Pass
4	2.5	2.512	-3.97	-1.75	0.02002	-59.99	-1.80	Pass
5	3.15	3.162	-1.86	0.36	0.0156	-62.16	0.37	Pass
6	4	3.981	-0.31	1.91	0.01307	-63.70	1.91	Pass
7	5	5.012	0.33	2.55	0.0122	-64.29	2.51	Pass
8	6.3	6.31	0.46	2.68	0.01186	-64.54	2.75	Pass
9	8	7.943	0.32	2.54	0.01211	-64.36	2.57	Pass
10	10	10	-0.10	2.12	0.01271	-63.94	2.15	Pass
11	12.5	12.59	-0.93	1.29	0.01405	-63.07	1.28	Pass
12	16	15.85	-2.22	0	0.01628	-61.79	0.00	Pass
13	20	19.95	-3.91	-1.69	0.01982	-60.08	-1.71	Pass
14	25	25.12	-5.84	-3.62	0.02463	-58.19	-3.60	Pass
15	31.5	31.62	-7.89	-5.67	0.03111	-56.16	-5.62	Pass
16	40	39.81	-10.01	-7.79	0.03975	-54.03	-7.75	Pass
17	50	50.12	-12.21	-9.99	0.05139	-51.80	-9.98	Pass
18	63	63.1	-14.62	-12.4	0.06809	-49.36	-12.43	Pass
19	80	79.43	-17.47	-15.25	0.0943	-46.53	-15.26	Pass
20	100	100	-21.04	-18.82	0.1413	-43.02	-18.77	Pass
21	125	125.9	-25.50	-23.28	0.2366	-38.54	-23.25	Pass
22	160	158.5	-30.69	-28.47	0.4307	-33.34	-28.45	Pass

Overload and Under Range Triggering Points

Hand Arm

CVB202

	Under Range		Overload	
	Low Range	High Range	Low Range	High Range
Metric (m/s²)	0.02 rms	1.0 rms	1900 pk	9500 pk
Imperial (ft/s²)	0.656 rms	3.28 rms	6232 pk	31160 pk
g	0.02 rms	0.1 rms	190 pk	950 pk

Whole Body

CVB203

	Under Range	Overload
Metric (m/s²)	0.01 rms	33.25 pk
Imperial (ft/s²)	0.0328 rms	109.1 pk
g	0.001 rms	3.325 pk

Linearity

All linearity tests are performed using the appropriate Band Limiting filter.

Hand Arm

CVB202 Accelerometer, Electrical Testing

Frequency = 8 Hz, Range = Low

dB	m/s^2	X-Axis Reading	Y-Axis Reading	Z-Axis Reading	Lower Limit	Upper Limit	Pass/Fail
-34.4	0.191	Under Range ON					
-34	0.200	0.206	0.207	0.206	0.188	0.211	Pass
-33	0.224	0.230	0.230	0.230	0.210	0.237	Pass
-32	0.251	0.257	0.257	0.257	0.236	0.266	Pass
-31	0.282	0.287	0.287	0.286	0.265	0.299	Pass
-30	0.316	0.321	0.321	0.321	0.297	0.335	Pass
-25	0.562	0.568	0.568	0.568	0.529	0.596	Pass
-20	1.000	1.007	1.007	1.007	0.940	1.060	Pass
-15	1.778	1.778	1.780	1.780	1.672	1.885	Pass
-10	3.162	3.166	3.167	3.167	2.973	3.352	Pass
-5	5.623	5.625	5.628	5.628	5.286	5.961	Pass
0	10.000	10.000	10.000	10.000	9.400	10.600	Pass
5	17.783	17.770	17.780	17.780	16.716	18.850	Pass
10	31.623	31.530	31.550	31.550	29.725	33.520	Pass
15	56.234	56.080	56.110	56.110	52.860	59.608	Pass
20	100.000	99.620	99.680	99.680	94.000	106.000	Pass
25	177.828	177.400	177.500	177.500	167.158	188.498	Pass
30	316.228	315.690	315.860	315.860	297.254	335.201	Pass
35	562.341	560.960	561.270	561.270	528.601	596.082	Pass
36	630.957	629.240	629.590	629.590	593.100	668.815	Pass
37	707.946	706.580	706.970	706.980	665.469	750.423	Pass
38	794.328	792.040	792.470	792.480	746.669	841.988	Pass
39	891.251	888.290	888.770	888.790	837.776	944.726	Pass
40	1000.000	997.210	997.750	997.760	940.000	1060.000	Pass
40.9	1109.175	Overload ON					

Frequency = 8 Hz, Range = High

dB	m/s^2	X-Axis Reading	Y-Axis Reading	Z-Axis Reading	Lower Limit	Upper Limit	Pass/Fail
-20.1	0.989	Under Range ON					
-20	1.000	1.010	1.010	1.010	0.940	1.060	Pass
-19	1.122	1.120	1.120	1.120	1.055	1.189	Pass
-18	1.259	1.260	1.260	1.260	1.183	1.334	Pass
-17	1.413	1.420	1.410	1.420	1.328	1.497	Pass
-16	1.585	1.580	1.580	1.580	1.490	1.680	Pass
-15	1.778	1.780	1.780	1.780	1.672	1.885	Pass
-10	3.162	3.170	3.170	3.170	2.973	3.352	Pass
-5	5.623	5.620	5.620	5.610	5.286	5.961	Pass
0	10.000	10.000	9.990	9.990	9.400	10.600	Pass
5	17.783	17.800	17.780	17.780	16.716	18.850	Pass
10	31.623	31.560	31.540	31.540	29.725	33.520	Pass
15	56.234	56.140	56.110	56.110	52.860	59.608	Pass
20	100.000	99.670	99.610	99.610	94.000	106.000	Pass
25	177.828	177.300	177.200	177.200	167.158	188.498	Pass
30	316.228	315.600	315.400	315.400	297.254	335.201	Pass
35	562.341	560.500	560.200	560.200	528.601	596.082	Pass
40	1000.000	999.100	998.500	998.500	940.000	1060.000	Pass
45	1778.279	1773.100	1771.900	1772.100	1671.583	1884.976	Pass
49	2818.383	2812.200	2810.400	2810.600	2649.280	2987.486	Pass
50	3162.278	3154.700	3152.700	3152.900	2972.541	3352.014	Pass
51	3548.134	3539.000	3536.700	3537.000	3335.246	3761.022	Pass
52.000	3981.072	3973.500	3971.000	3971.300	3742.207	4219.936	Pass
53.000	4466.836	4466.500	4463.700	4464.000	4198.826	4734.846	Pass
54.000	5011.872	5018.700	5015.500	5015.900	4711.160	5312.585	Pass
54.7	5432.503	Overload ON					

Frequency = 80 Hz, Range = Low

dB	m/s^2	X-Axis Reading	Y-Axis Reading	Z-Axis Reading	Lower Limit	Upper Limit	Pass/Fail
-34.3	0.193	Under Range ON					
-34	0.200	0.206	0.206	0.206	0.188	0.211	Pass
-33	0.224	0.230	0.230	0.230	0.210	0.237	Pass
-32	0.251	0.258	0.258	0.258	0.236	0.266	Pass
-31	0.282	0.286	0.287	0.286	0.265	0.299	Pass
-30	0.316	0.322	0.322	0.322	0.297	0.335	Pass
-25	0.562	0.568	0.569	0.569	0.529	0.596	Pass
-20	1.000	1.009	1.010	1.010	0.940	1.060	Pass
-15	1.778	1.775	1.776	1.776	1.672	1.885	Pass
-10	3.162	3.162	3.163	3.164	2.973	3.352	Pass
-5	5.623	5.628	5.631	5.631	5.286	5.961	Pass
0	10.000	10.000	10.000	10.000	9.400	10.600	Pass
5	17.783	17.790	17.800	17.800	16.716	18.850	Pass
10	31.623	31.460	31.470	31.470	29.725	33.520	Pass
15	56.234	56.060	56.090	56.090	52.860	59.608	Pass
20	100.000	99.730	99.790	99.790	94.000	106.000	Pass
25	177.828	177.250	177.340	177.340	167.158	188.498	Pass
30	316.228	315.420	315.590	315.600	297.254	335.201	Pass
35	562.341	560.360	560.660	560.670	528.601	596.082	Pass
37	707.946	705.500	705.870	705.890	665.469	750.423	Pass
38	794.328	792.320	792.740	792.760	746.669	841.988	Pass
39	891.251	889.030	889.500	889.530	837.776	944.726	Pass
40	1000.000	996.850	997.370	997.400	940.000	1060.000	Pass
41	1122.018	1119.300	1119.900	1119.900	1054.697	1189.340	Pass
42	1258.925	1256.000	1256.600	1256.700	1183.390	1334.461	Pass
42.4	1318.257	Overload ON					

Frequency = 80 Hz, Range = High

dB	m/s^2	X-Axis Reading	Y-Axis Reading	Z-Axis Reading	Lower Limit	Upper Limit	Pass/Fail
-20.1	0.989	Under Range ON					
-20	1.000	1.010	1.010	1.010	0.940	1.060	Pass
-19	1.122	1.130	1.130	1.130	1.055	1.189	Pass
-18	1.259	1.270	1.270	1.270	1.183	1.334	Pass
-17	1.413	1.410	1.410	1.410	1.328	1.497	Pass
-16	1.585	1.590	1.590	1.590	1.490	1.680	Pass
-15	1.778	1.780	1.780	1.780	1.672	1.885	Pass
-10	3.162	3.160	3.160	3.160	2.973	3.352	Pass
-5	5.623	5.630	5.630	5.630	5.286	5.961	Pass
0	10.000	10.010	10.000	10.000	9.400	10.600	Pass
5	17.783	17.800	17.790	17.790	16.716	18.850	Pass
10	31.623	31.480	31.460	31.470	29.725	33.520	Pass
15	56.234	56.110	56.080	56.080	52.860	59.608	Pass
20	100.000	99.820	99.750	99.760	94.000	106.000	Pass
25	177.828	177.400	177.300	177.300	167.158	188.498	Pass
30	316.228	315.700	315.500	315.500	297.254	335.201	Pass
35	562.341	560.900	560.500	560.500	528.601	596.082	Pass
40	1000.000	997.100	997.000	997.100	940.000	1060.000	Pass
45	1778.279	1774.500	1773.400	1773.500	1671.583	1884.976	Pass
50	3162.278	3157.000	3154.900	3155.200	2972.541	3352.014	Pass
51	3548.134	3542.100	3539.800	3540.100	3335.246	3761.022	Pass
52	3981.072	3974.600	3972.000	3972.400	3742.207	4219.936	Pass
53	4466.836	4458.000	4455.100	4455.500	4198.826	4734.846	Pass
54.000	5011.872	5007.900	5004.600	5005.100	4711.160	5312.585	Pass
55.000	5623.413	5618.500	5614.900	5615.400	5286.008	5960.818	Pass
56.000	6309.573	6306.100	6302.100	6302.600	5930.999	6688.148	Pass
56.2	6456.542	Overload ON					

Frequency = 800 Hz, Range = Low

dB	m/s^2	X-Axis Reading	Y-Axis Reading	Z-Axis Reading	Lower Limit	Upper Limit	Pass/Fail
-34.3	0.193	Under Range ON					
-34	0.200	0.205	0.205	0.205	0.188	0.211	Pass
-33	0.224	0.227	0.227	0.227	0.210	0.237	Pass
-32	0.251	0.256	0.256	0.256	0.236	0.266	Pass
-31	0.282	0.286	0.286	0.286	0.265	0.299	Pass
-30	0.316	0.321	0.321	0.321	0.297	0.335	Pass
-25	0.562	0.567	0.568	0.568	0.529	0.596	Pass
-20	1.000	1.009	1.010	1.010	0.940	1.060	Pass
-15	1.778	1.776	1.777	1.777	1.672	1.885	Pass
-10	3.162	3.161	3.163	3.163	2.973	3.352	Pass
-5	5.623	5.626	5.629	5.629	5.286	5.961	Pass
0	10.000	9.999	10.000	10.000	9.400	10.600	Pass
5	17.783	17.780	17.790	17.790	16.716	18.850	Pass
10	31.623	31.440	31.460	31.460	29.725	33.520	Pass
15	56.234	56.030	56.060	56.070	52.860	59.608	Pass
20	100.000	99.670	99.720	99.730	94.000	106.000	Pass
25	177.828	177.130	177.220	177.230	167.158	188.498	Pass
30	316.228	315.160	315.330	315.350	297.254	335.201	Pass
35	562.341	559.820	560.120	560.160	528.601	596.082	Pass
36	630.957	628.240	628.570	628.620	593.100	668.815	Pass
37	707.946	705.360	705.730	705.790	665.469	750.423	Pass
38	794.328	791.430	791.850	791.910	746.669	841.988	Pass
39	891.251	887.500	887.970	888.030	837.776	944.726	Pass
40	1000.000	995.680	996.210	996.280	940.000	1060.000	Pass
41	1122.018	1117.900	1118.500	1118.600	1054.697	1189.340	Pass
41.6	1202.264	Overload ON					

Frequency = 800 Hz, Range = High

dB	m/s^2	X-Axis Reading	Y-Axis Reading	Z-Axis Reading	Lower Limit	Upper Limit	Pass/Fail
-20.1	0.989	Under Range ON					
-20	1.000	1.010	1.010	1.010	0.940	1.060	Pass
-19	1.122	1.130	1.130	1.130	1.055	1.189	Pass
-18	1.259	1.260	1.260	1.260	1.183	1.334	Pass
-17	1.413	1.410	1.410	1.410	1.328	1.497	Pass
-16	1.585	1.580	1.580	1.580	1.490	1.680	Pass
-15	1.778	1.780	1.770	1.780	1.672	1.885	Pass
-10	3.162	3.160	3.160	3.160	2.973	3.352	Pass
-5	5.623	5.630	5.630	5.630	5.286	5.961	Pass
0	10.000	10.000	10.000	10.000	9.400	10.600	Pass
5	17.783	17.790	17.780	17.780	16.716	18.850	Pass
10	31.623	31.460	31.440	31.450	29.725	33.520	Pass
15	56.234	56.070	56.030	56.040	52.860	59.608	Pass
20	100.000	99.750	99.680	99.700	94.000	106.000	Pass
25	177.828	177.300	177.200	177.200	167.158	188.498	Pass
30	316.228	315.500	315.200	315.300	297.254	335.201	Pass
35	562.341	560.400	560.000	560.100	528.601	596.082	Pass
40	1000.000	996.700	996.100	996.200	940.000	1060.000	Pass
45	1778.279	1772.100	1770.900	1771.200	1671.583	1884.976	Pass
50	3162.278	3151.300	3149.300	3149.700	2972.541	3352.014	Pass
51	3548.134	3535.700	3533.400	3533.900	3335.246	3761.022	Pass
52	3981.072	3965.400	3962.900	3963.500	3742.207	4219.936	Pass
53.000	4466.836	4454.100	4451.200	4451.900	4198.826	4734.846	Pass
54.000	5011.872	4994.600	4991.300	4992.100	4711.160	5312.585	Pass
55.000	5623.413	5603.800	5600.100	5601.000	5286.008	5960.818	Fail
55.7	6095.369	Overload ON					

Frequency = 1 Hz, Range = Low

dB	m/s^2	X-Axis Reading	Y-Axis Reading	Z-Axis Reading	Lower Limit	Upper Limit	Pass/Fail
-40.1	0.0099	Under Range ON					
-40	0.010	0.010	0.010	0.010	0.009	0.011	Pass
-39	0.011	0.011	0.011	0.011	0.011	0.012	Pass
-38	0.013	0.013	0.013	0.013	0.012	0.013	Pass
-37	0.014	0.014	0.014	0.014	0.013	0.015	Pass
-36	0.016	0.016	0.016	0.016	0.015	0.017	Pass
-35	0.018	0.018	0.018	0.018	0.017	0.019	Pass
-30	0.032	0.032	0.032	0.032	0.030	0.034	Pass
-25	0.056	0.056	0.056	0.056	0.053	0.060	Pass
-20	0.100	0.100	0.100	0.100	0.094	0.106	Pass
-15	0.178	0.178	0.178	0.178	0.167	0.188	Pass
-10	0.316	0.317	0.317	0.317	0.297	0.335	Pass
-5	0.562	0.561	0.562	0.562	0.529	0.596	Pass
0	1.000	1.000	1.000	1.000	0.940	1.060	Pass
5	1.778	1.781	1.781	1.780	1.672	1.885	Pass
10	3.162	3.166	3.166	3.166	2.973	3.352	Pass
15	5.623	5.626	5.621	5.621	5.286	5.961	Pass
20	10.000	10.020	10.010	10.010	9.400	10.600	Pass
25	17.783	17.820	17.800	17.790	16.716	18.850	Pass
30	31.623	31.620	31.610	31.630	29.725	33.520	Pass
32	39.811	39.880	39.850	39.850	37.422	42.199	Pass
33	44.668	44.730	44.710	44.720	41.988	47.348	Pass
34	50.119	50.160	50.140	50.140	47.112	53.126	Pass
35	56.234	56.400	56.360	56.330	52.860	59.608	Pass
36	63.096	63.220	63.160	63.150	59.310	66.881	Pass
36.1	63.826	Overload ON					

Frequency = 1 Hz, Range = High

dB	m/s^2	X-Axis Reading	Y-Axis Reading	Z-Axis Reading	Lower Limit	Upper Limit	Pass/Fail
-26.1	0.050	Under Range ON					
-26	0.050	0.050	0.050	0.050	0.047	0.053	Pass
-25	0.060	0.060	0.060	0.060	0.056	0.064	Pass
-24	0.063	0.060	0.060	0.060	0.059	0.067	Pass
-23	0.071	0.070	0.070	0.070	0.067	0.075	Pass
-22	0.079	0.080	0.080	0.080	0.075	0.084	Pass
-21	0.089	0.090	0.090	0.090	0.084	0.094	Pass
-20	0.100	0.100	0.100	0.100	0.094	0.106	Pass
-15	0.178	0.180	0.180	0.180	0.167	0.188	Pass
-10	0.316	0.320	0.320	0.320	0.297	0.335	Pass
-5	0.562	0.560	0.560	0.560	0.529	0.596	Pass
0	1.000	1.000	1.000	1.000	0.940	1.060	Pass
5	1.778	1.770	1.760	1.760	1.672	1.885	Pass
10	3.162	3.160	3.150	3.150	2.973	3.352	Pass
15	5.623	5.630	5.630	5.630	5.286	5.961	Pass
20	10.000	10.000	9.990	10.000	9.400	10.600	Pass
25	17.783	17.800	17.790	17.800	16.716	18.850	Pass
30	31.623	31.630	31.620	31.650	29.725	33.520	Pass
35	56.234	56.320	56.310	56.360	52.860	59.608	Pass
40	100.000	100.000	100.100	100.100	94.000	106.000	Pass
45	177.828	178.200	178.000	178.100	167.158	188.498	Pass
46	199.526	199.600	199.500	199.600	187.555	211.498	Pass
47	223.872	223.800	223.700	224.000	210.440	237.304	Pass
48	251.189	251.300	251.200	251.400	236.117	266.260	Pass
49	281.838	281.800	281.900	282.000	264.928	298.749	Pass
50	316.228	316.500	316.300	316.500	297.254	335.201	Pass
50.5	334.965	Overload ON					

Frequency = 4 Hz, Range = Low

dB	m/s^2	X-Axis Reading	Y-Axis Reading	Z-Axis Reading	Lower Limit	Upper Limit	Pass/Fail
-40.1	0.0099	Under Range ON					
-40	0.010	0.010	0.010	0.010	0.009	0.011	Pass
-39	0.011	0.011	0.011	0.011	0.011	0.012	Pass
-38	0.013	0.013	0.013	0.013	0.012	0.013	Pass
-37	0.014	0.014	0.014	0.014	0.013	0.015	Pass
-36	0.016	0.016	0.016	0.016	0.015	0.017	Pass
-35	0.018	0.018	0.018	0.018	0.017	0.019	Pass
-30	0.032	0.032	0.032	0.032	0.030	0.034	Pass
-25	0.056	0.056	0.056	0.056	0.053	0.060	Pass
-20	0.100	0.100	0.100	0.100	0.094	0.106	Pass
-15	0.178	0.178	0.178	0.178	0.167	0.188	Pass
-10	0.316	0.317	0.317	0.317	0.297	0.335	Pass
-5	0.562	0.563	0.563	0.563	0.529	0.596	Pass
0	1.000	1.000	1.000	1.000	0.940	1.060	Pass
5	1.778	1.779	1.779	1.779	1.672	1.885	Pass
10	3.162	3.161	3.161	3.161	2.973	3.352	Pass
15	5.623	5.619	5.616	5.616	5.286	5.961	Pass
20	10.000	10.000	9.999	10.000	9.400	10.600	Pass
25	17.783	17.800	17.780	17.780	16.716	18.850	Pass
30	31.623	31.650	31.630	31.630	29.725	33.520	Pass
32	39.811	39.860	39.820	39.830	37.422	42.199	Pass
33	44.668	44.670	44.670	44.660	41.988	47.348	Pass
34	50.119	50.160	50.140	50.160	47.112	53.126	Pass
35	56.234	56.350	56.280	56.310	52.860	59.608	Pass
36	63.096	63.160	63.180	63.160	59.310	66.881	Pass
36.3	65.313	Overload ON					

Frequency = 4 Hz, Range = High

dB	m/s^2	X-Axis Reading	Y-Axis Reading	Z-Axis Reading	Lower Limit	Upper Limit	Pass/Fail
-26.1	0.050	Under Range ON					
-26	0.050	0.050	0.050	0.050	0.047	0.053	Pass
-25	0.060	0.060	0.060	0.060	0.056	0.064	Pass
-24	0.063	0.060	0.060	0.060	0.059	0.067	Pass
-23	0.071	0.070	0.070	0.070	0.067	0.075	Pass
-22	0.079	0.080	0.080	0.080	0.075	0.084	Pass
-21	0.089	0.090	0.090	0.090	0.084	0.094	Pass
-20	0.100	0.100	0.100	0.100	0.094	0.106	Pass
-15	0.178	0.180	0.180	0.180	0.167	0.188	Pass
-10	0.316	0.320	0.320	0.320	0.297	0.335	Pass
-5	0.562	0.560	0.560	0.560	0.529	0.596	Pass
0	1.000	1.000	1.000	1.000	0.940	1.060	Pass
5	1.778	1.780	1.780	1.780	1.672	1.885	Pass
10	3.162	3.170	3.170	3.170	2.973	3.352	Pass
15	5.623	5.630	5.630	5.630	5.286	5.961	Pass
20	10.000	10.030	10.030	10.030	9.400	10.600	Pass
25	17.783	17.830	17.820	17.820	16.716	18.850	Pass
30	31.623	31.710	31.700	31.730	29.725	33.520	Pass
35	56.234	56.470	56.470	56.500	52.860	59.608	Pass
40	100.000	100.300	100.400	100.300	94.000	106.000	Pass
45	177.828	178.400	178.300	178.500	167.158	188.498	Pass
46	199.526	200.100	200.000	200.100	187.555	211.498	Pass
47	223.872	223.900	223.800	224.000	210.440	237.304	Pass
48	251.189	251.200	251.100	251.300	236.117	266.260	Pass
49	281.838	281.900	281.700	282.000	264.928	298.749	Pass
50	316.228	316.200	316.100	316.300	297.254	335.201	Pass
50.3	327.341	Overload ON					

Frequency = 16 Hz, Range = Low

dB	m/s^2	X-Axis Reading	Y-Axis Reading	Z-Axis Reading	Lower Limit	Upper Limit	Pass/Fail
-40.1	0.0099	Under Range ON					
-40	0.010	0.010	0.010	0.010	0.009	0.011	Pass
-39	0.011	0.011	0.011	0.011	0.011	0.012	Pass
-38	0.013	0.013	0.013	0.013	0.012	0.013	Pass
-37	0.014	0.014	0.014	0.014	0.013	0.015	Pass
-36	0.016	0.016	0.016	0.016	0.015	0.017	Pass
-35	0.018	0.018	0.018	0.018	0.017	0.019	Pass
-30	0.032	0.032	0.032	0.032	0.030	0.034	Pass
-25	0.056	0.056	0.056	0.056	0.053	0.060	Pass
-20	0.100	0.100	0.100	0.100	0.094	0.106	Pass
-15	0.178	0.179	0.178	0.178	0.167	0.188	Pass
-10	0.316	0.317	0.317	0.317	0.297	0.335	Pass
-5	0.562	0.563	0.563	0.562	0.529	0.596	Pass
0	1.000	1.000	1.000	1.000	0.940	1.060	Pass
5	1.778	1.779	1.778	1.778	1.672	1.885	Pass
10	3.162	3.164	3.163	3.163	2.973	3.352	Pass
15	5.623	5.621	5.617	5.618	5.286	5.961	Pass
20	10.000	10.010	10.000	10.010	9.400	10.600	Pass
25	17.783	17.800	17.780	17.780	16.716	18.850	Pass
30	31.623	31.640	31.630	31.630	29.725	33.520	Pass
31	35.481	35.510	35.480	35.490	33.352	37.610	Pass
32	39.811	39.850	39.830	39.840	37.422	42.199	Pass
33	44.668	44.730	44.710	44.710	41.988	47.348	Pass
34	50.119	50.170	50.140	50.150	47.112	53.126	Pass
35	56.234	56.350	56.310	56.310	52.860	59.608	Pass
36	63.096	63.190	63.150	63.160	59.310	66.881	Pass
36.3	65.313	Overload ON					

Frequency = 16 Hz, Range = High

dB	m/s^2	X-Axis Reading	Y-Axis Reading	Z-Axis Reading	Lower Limit	Upper Limit	Pass/Fail
-27	0.045	Under Range ON					
-26	0.050	0.050	0.050	0.050	0.047	0.053	Pass
-25	0.060	0.060	0.060	0.060	0.056	0.064	Pass
-24	0.063	0.060	0.060	0.060	0.059	0.067	Pass
-23	0.071	0.070	0.070	0.070	0.067	0.075	Pass
-22	0.079	0.080	0.080	0.080	0.075	0.084	Pass
-21	0.089	0.090	0.090	0.090	0.084	0.094	Pass
-20	0.100	0.100	0.100	0.100	0.094	0.106	Pass
-15	0.178	0.180	0.180	0.180	0.167	0.188	Pass
-10	0.316	0.320	0.320	0.320	0.297	0.335	Pass
-5	0.562	0.560	0.560	0.560	0.529	0.596	Pass
0	1.000	1.000	1.000	1.000	0.940	1.060	Pass
5	1.778	1.780	1.780	1.780	1.672	1.885	Pass
10	3.162	3.170	3.160	3.170	2.973	3.352	Pass
15	5.623	5.620	5.620	5.620	5.286	5.961	Pass
20	10.000	10.010	10.010	10.020	9.400	10.600	Pass
25	17.783	17.790	17.780	17.800	16.716	18.850	Pass
30	31.623	31.650	31.640	31.650	29.725	33.520	Pass
35	56.234	56.340	56.320	56.360	52.860	59.608	Pass
40	100.000	100.200	100.100	100.200	94.000	106.000	Pass
45	177.828	178.000	177.900	178.100	167.158	188.498	Pass
46	199.526	199.700	199.600	199.800	187.555	211.498	Pass
47	223.872	224.100	224.000	224.200	210.440	237.304	Pass
48	251.189	251.400	251.300	251.500	236.117	266.260	Pass
49	281.838	282.200	282.100	282.300	264.928	298.749	Pass
50	316.228	316.500	316.400	316.600	297.254	335.201	Pass
50.3	327.341	Overload ON					

Frequency = 63 Hz, Range = Low

dB	m/s^2	X-Axis Reading	Y-Axis Reading	Z-Axis Reading	Lower Limit	Upper Limit	Pass/Fail
-40.1	0.0099	Under Range ON					
-40	0.010	0.010	0.010	0.010	0.009	0.011	Pass
-39	0.011	0.011	0.011	0.011	0.011	0.012	Pass
-38	0.013	0.013	0.013	0.013	0.012	0.013	Pass
-37	0.014	0.014	0.014	0.014	0.013	0.015	Pass
-36	0.016	0.016	0.016	0.016	0.015	0.017	Pass
-35	0.018	0.018	0.018	0.018	0.017	0.019	Pass
-30	0.032	0.032	0.032	0.032	0.030	0.034	Pass
-25	0.056	0.056	0.056	0.056	0.053	0.060	Pass
-20	0.100	0.100	0.100	0.100	0.094	0.106	Pass
-15	0.178	0.178	0.178	0.178	0.167	0.188	Pass
-10	0.316	0.317	0.317	0.317	0.297	0.335	Pass
-5	0.562	0.562	0.562	0.562	0.529	0.596	Pass
0	1.000	1.000	1.000	1.000	0.940	1.060	Pass
5	1.778	1.779	1.778	1.778	1.672	1.885	Pass
10	3.162	3.163	3.161	3.162	2.973	3.352	Pass
15	5.623	5.620	5.616	5.617	5.286	5.961	Pass
20	10.000	10.010	10.000	10.000	9.400	10.600	Pass
25	17.783	17.790	17.770	17.780	16.716	18.850	Pass
30	31.623	31.630	31.610	31.620	29.725	33.520	Pass
31	35.481	35.520	35.490	35.500	33.352	37.610	Pass
32	39.811	39.850	39.820	39.830	37.422	42.199	Pass
33	44.668	44.700	44.670	44.670	41.988	47.348	Pass
34	50.119	50.150	50.120	50.120	47.112	53.126	Pass
35	56.234	56.320	56.280	56.290	52.860	59.608	Pass
35.7	60.954	Overload ON					

Frequency = 63 Hz, Range = High

dB	m/s^2	X-Axis Reading	Y-Axis Reading	Z-Axis Reading	Lower Limit	Upper Limit	Pass/Fail
-26.1	0.050	Under Range ON					
-26	0.050	0.050	0.050	0.050	0.047	0.053	Pass
-25	0.060	0.060	0.060	0.060	0.056	0.064	Pass
-24	0.063	0.060	0.060	0.060	0.059	0.067	Pass
-23	0.071	0.070	0.070	0.070	0.067	0.075	Pass
-22	0.079	0.080	0.080	0.080	0.075	0.084	Pass
-21	0.089	0.090	0.090	0.090	0.084	0.094	Pass
-20	0.100	0.100	0.100	0.100	0.094	0.106	Pass
-15	0.178	0.180	0.180	0.180	0.167	0.188	Pass
-10	0.316	0.320	0.320	0.320	0.297	0.335	Pass
-5	0.562	0.560	0.560	0.560	0.529	0.596	Pass
0	1.000	1.000	1.000	1.000	0.940	1.060	Pass
5	1.778	1.770	1.770	1.770	1.672	1.885	Pass
10	3.162	3.150	3.150	3.150	2.973	3.352	Pass
15	5.623	5.600	5.590	5.600	5.286	5.961	Pass
20	10.000	9.980	9.980	9.980	9.400	10.600	Pass
25	17.783	17.710	17.700	17.700	16.716	18.850	Pass
30	31.623	31.500	31.510	31.510	29.725	33.520	Pass
35	56.234	56.080	56.080	56.100	52.860	59.608	Pass
40	100.000	99.670	99.650	99.710	94.000	106.000	Pass
44	158.489	157.900	157.800	157.900	148.980	167.999	Pass
45	177.828	177.200	177.200	177.200	167.158	188.498	Pass
46	199.526	198.700	198.600	198.800	187.555	211.498	Pass
47	223.872	223.000	222.900	223.100	210.440	237.304	Pass
48	251.189	250.300	250.200	250.400	236.117	266.260	Pass
49	281.838	280.800	280.700	280.900	264.928	298.749	Pass
49.7	305.492	Overload ON					

Function Equations

The following table describes the functions that are available on the Triax vibration meter and how they are derived mathematically.

All calculations displayed are subject to rounding and/or truncation.

Function	Equation
Linear Time Averaged & Frequency Weighted Acceleration (Metric m/s^2)	$a_{EQ} = \left(\frac{1}{T}\int_0^T a_w^2(t)\,d(t)\right)^{1/2}$ T = total integration time aw(t) = the instantaneous weighted acceleration level as a function of time (t)
Linear Time Averaged & Frequency Weighted Acceleration (Imperial ft/s^2)	$a_{EQ} = 3.28084 \times \left(\frac{1}{T}\int_0^T a_w^2(t)\,d(t)\right)^{1/2}$ T = total integration time aw(t) = the instantaneous weighted acceleration level as a function of time (t)
Linear Time Averaged & Frequency Weighted Acceleration (g)	$a_{EQ} = \frac{1}{9.807} \times \left(\frac{1}{T}\int_0^T a_w^2(t)\,d(t)\right)^{1/2}$ T = total integration time aw(t) = the instantaneous weighted acceleration level as a function of time (t)

Function	Equation
Frequency Weighted Running RMS Acceleration (Metric m/s^2)	$a_{RMS,\theta}(t) = \left(\frac{1}{\theta}\int_{t-\theta}^{t} a_w^2(\xi)\, d(\xi)\right)^{1/2}$ t = instantaneous time θ = integration time of the measurement aw(ξ) = the frequency weighted instantaneous acceleration level at time (ξ)
Frequency Weighted Running RMS Acceleration (Imperial ft/s^2)	$a_{RMS,\theta}(t) = 3.2804\sqrt{\frac{1}{\theta}\int_{t-\theta}^{t} a_w^2(\xi)\, d(\xi)}$ t = instantaneous time θ = integration time of the measurement aw(ξ) = the frequency weighted instantaneous acceleration level at time (ξ)
Frequency Weighted Running RMS Acceleration (g)	$a_{RMS,\theta}(t) = \frac{1}{9.807}\sqrt{\frac{1}{\theta}\int_{t-\theta}^{t} a_w^2(\xi)\, d(\xi)}$ t = instantaneous time θ = integration time of the measurement aw(ξ) = the frequency weighted instantaneous acceleration level at time (ξ)
Peak Frequency Weighted Acceleration	a_{PK} = The peak level of the frequency weighted instantaneous (positive and negative) acceleration over the measurement period or Time History period
Crest Factor	$a_{CF} = \frac{a_{PK}}{a_{RMS}}$ The ratio of the frequency weighted peak and RMS acceleration levels

Function	Equation
Frequency Weighted Acceleration Vibration Dose Value	$$VDV = \left[\int_0^{\Phi} a_w^4(\xi)\, d(\xi)\right]^{1/4}$$ Φ = total (daily) period for which vibration occurs $a_w(\xi)$ = the frequency weighted instantaneous acceleration level at time (ξ) The exposure period Φ, is likely to be assumed to be equal to the measurement period (T)
Frequency Weighted Acceleration VDV Exposure	$$VDV\ Exposure = VDV\left(\frac{ET}{t}\right)^{1/4}$$ VDV = Vibration Dose Value ET = Exposure Time (Seconds) t = Measurement Log Duration (Seconds)
Linear Time Averaged & Frequency Weighted Acceleration Vector Sum (HARM)	$$Vector\ Sum\ a_{hv} = \sqrt{a_{EQ,x}^2 + a_{EQ,y}^2 + a_{EQ,z}^2}$$ The combined magnitude from the three axes of time averaged and frequency weighted acceleration vibration levels
Linear Time Averaged & Frequency Weighted Acceleration Vector Sum (WBV)	$$Vector\ Sum\ a_{wv} = \sqrt{k_x^2 a_{EQ,x}^2 + k_y^2 a_{EQ,y}^2 + k_z^2 a_{EQ,z}^2}$$ k_x , k_x , k_x are the axis scaling factors The combined magnitude from the three axes of time averaged and frequency weighted acceleration vibration levels inclusive of axis scaling factors
Acceleration Dominant Axis (HARM)	The largest individual time averaged and frequency weighted acceleration level (a_{EQ}) value from either the X, Y and Z axis readings
Acceleration Dominant Axis (WBV)	The largest individual time averaged and frequency weighted acceleration level (a_{EQ}) value from either the X, Y and Z axis readings inclusive of the axis scaling factors

Function	Equation
A(8) (HARM, Vector Sum)	$A(8) = Vector\ Sum\ a_{hv}\sqrt{\frac{ET}{28800}}$ ET = Exposure Time (Seconds) The daily average exposure over an 8-hour period calculated using the vector sum magnitude of the time averaged and frequency weighted acceleration levels and the time exposed to it
A(8) (WBV, Vector Sum)	$A(8) = Vector\ Sum\ a_{wv}\sqrt{\frac{ET}{28800}}$ ET = Exposure Time (Seconds) The daily average exposure over an 8-hour period calculated using the vector sum magnitude of the time averaged and frequency weighted accelerations levels inclusive of the axis scaling factors and the time exposed to it
A(8) (HARM, Dominant Axis)	$A(8) = dom_{xyz}\sqrt{\frac{ET}{28800}}$ ET = Exposure Time (Seconds) The daily average exposure over an 8-hour period calculated using the individual axis with the largest individual time averaged and frequency weighted acceleration level
A(8) (WBV, Dominant Axis)	$A(8) = dom_{xyz}\sqrt{\frac{ET}{28800}}$ ET = Exposure Time (Seconds) The daily average exposure over an 8-hour period calculated using the individual axis with the largest individual time averaged and frequency weighted acceleration level and inclusive of the axis scaling factor

Function	Equation
Time to EAV (Vector Sum) HARM	$$Time\ to\ EAV = 8\left(\frac{EAV}{Vector\ Sum\ a_{hv}}\right)^2$$ EAV = Country Specific Exposure Action Value The Exposure Time allowed before the permitted Action Value is reached
Time to EAV (Vector Sum) WBV	$$Time\ to\ EAV = 8\left(\frac{EAV}{Vector\ Sum\ a_{wv}}\right)^2$$ EAV = Country Specific Exposure Action Value The Exposure Time allowed before the permitted Action Value is reached
Time to ELV (Vector Sum) HARM	$$Time\ to\ ELV = 8\left(\frac{ELV}{Vector\ Sum\ a_{hv}}\right)^2$$ ELV = Country Specific Exposure Limit Value The Exposure Time allowed before the permitted Limit Value is reached
Time to ELV (Vector Sum) WBV	$$Time\ to\ ELV = 8\left(\frac{ELV}{Vector\ Sum\ a_{hv}}\right)^2$$ ELV = Country Specific Exposure Limit Value The Exposure Time allowed before the permitted Limit Value is reached
Time to EAV (Dominant Axis) HARM	$$Time\ to\ EAV = 8\left(\frac{EAV}{dom_{xyz}}\right)^2$$ EAV = Country Specific Exposure Action Value dom_{xyz} = Dominant Axis The Exposure Time allowed before the permitted Action Value is reached

Function	Equation
Time to EAV (Dominant Axis) WBV	$Time\ to\ EAV = 8\left(\frac{EAV}{dom_{xyz}}\right)^2$ EAV = Country Specific Exposure Action Value dom_{xyz} = Dominant Axis The Exposure Time allowed before the permitted Action Value is reached
Time to ELV (Dominant Axis) HARM	$Time\ to\ ELV = 8\left(\frac{ELV}{dom_{xyz}}\right)^2$ ELV = Country Specific Exposure Limit Value dom_{xyz} = Dominant Axis The Exposure Time allowed before the permitted Limit Value is reached
Time to ELV (Dominant Axis) WBV	$Time\ to\ ELV = 8\left(\frac{ELV}{dom_{xyz}}\right)^2$ ELV = Country Specific Exposure Limit Value dom_{xyz} = Dominant Axis The Exposure Time allowed before the permitted Limit Value is reached
VDV Time to EAV WBV	$VDV\ Time\ to\ EAV = \frac{RT(EAV_{VDV})^4}{VDV^4}$ RT = total measurement duration EAV = Country Specific Exposure Action Value VDV = Vibration Dose Value Exposure Time allowed before the permitted Action Value reached
VDV Time to ELV WBV	$VDV\ Time\ to\ ELV = \frac{RT(ELV_{VDV})^4}{VDV^4}$ RT = total measurement duration ELV = Country Specific Exposure Limit Value VDV = Vibration Dose Value

	Exposure Time allowed before the permitted Limit Value reached

Function	Equation
Points (Dominant Axis or Vector Sum) HARM or WBV	$Points = 100\left[\left(\frac{a_{EQ}}{EAV}\right)^2\left(\frac{ET}{8}\right)\right]$ EAV = Country Specific Exposure Action Value ET = Exposure Time (hours)
Points (5m) (Dominant Axis or Vector Sum) HARM or WBV	$Points\ 5m = 100\left[\left(\frac{a_{EQ}}{EAV}\right)^2\left(\frac{0.0833}{8}\right)\right]$ EAV = Country Specific Exposure Action Value ET = Exposure Time (hours)
Points (15m) (Dominant Axis or Vector Sum) HARM or WBV	$Points\ 15m = 100\left[\left(\frac{a_{EQ}}{EAV}\right)^2\left(\frac{0.25}{8}\right)\right]$ EAV = Country Specific Exposure Action Value ET = Exposure Time (hours)
Points (30m) (Dominant Axis or Vector Sum) HARM or WBV	$Points\ 30m = 100\left[\left(\frac{a_{EQ}}{EAV}\right)^2\left(\frac{0.5}{8}\right)\right]$ EAV = Country Specific $Exposure\ Action\ Value$ $ET = Exposure\ Time\ (hours)$
Points (1hr) (Dominant Axis or Vector Sum) HARM or WBV	$Points\ 1hr = 100\left[\left(\frac{a_{EQ}}{EAV}\right)^2\left(\frac{1}{8}\right)\right]$ EAV = Country Specific Exposure Action Value ET = Exposure Time (hours)

EU Declaration of Conformity

The CE marking indicates compliance with the European Community harmonisation legislation.

The UK marking indicates compliance with the UK product legislation.

Cirrus Research plc declares that all models of **Triax Vibration Level Meters** have been designed in accordance with the following legislative areas: -

- The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 No 3032 (RoHS) EN IEC 63000:2018
- Radio Equipment Regulations 2017 No 1206 (Implementing Directive 2014/53/EU)
- The Electrical Equipment (Safety) Regulations 2016 No 1101
- Electromagnetic Compatibility Regulations 2016 No 1091
- 2004/108/EC
- 2023/1542/EU – Regulation concerning Batteries and Waste Batteries

to the following specification: -

- EN61326-1:2013

with the following Tests: -

- Radiated Emissions Class B: EN55011:2009 + A1:2010 , CISPR11 : 2009 + A1:2010
- ESD: EN61000-4-2:2009 Levels: ±4kV (Contact) , ± 8kV (Air)
- Radiated Immunity: EN61000-4-3:2006 + A1:2008 + A2:2010

  Level: 10V/m, 80MHz-1000MHz, 80% 1kHz AM

  Level: 3V/m, 1400MHz-2000MHz, 80% 1kHz AM

  Level: 1V/m, 2000MHz-2700MHz, 80% 1kHz AM

No differences in radio frequency emissions are apparent between the available operating ranges where applicable on the instrument.

Approved cables for use with the above-named instruments to comply with these standards: -

- 01ZL1108-01 , 1m USB Cable

I hereby declare that the instrument named above have been designed to comply with the relevant sections of the above referenced specifications, and that the above-named instruments comply with all essential requirements of the specified Directives.

Disclaimer

Whilst every effort is made to ensure the accuracy and reliability of both the instrument described and the associated documentation, Cirrus Research plc makes no representation or warranties as to the completeness or accuracy of this information.

Cirrus Research plc assumes no responsibility or liability for any injury, loss or damage incurred as a result of misinterpreted or inaccurate information.

Any documentation supplied with your product is subject to change without notice.