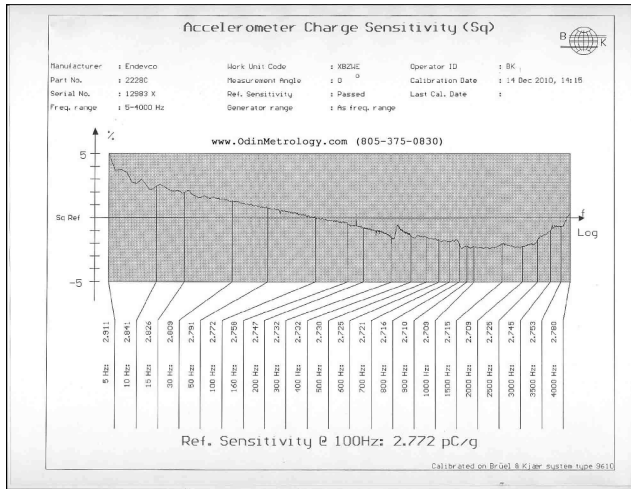
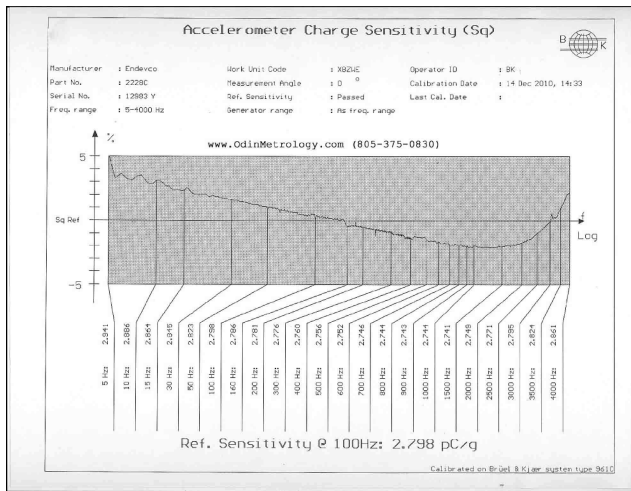


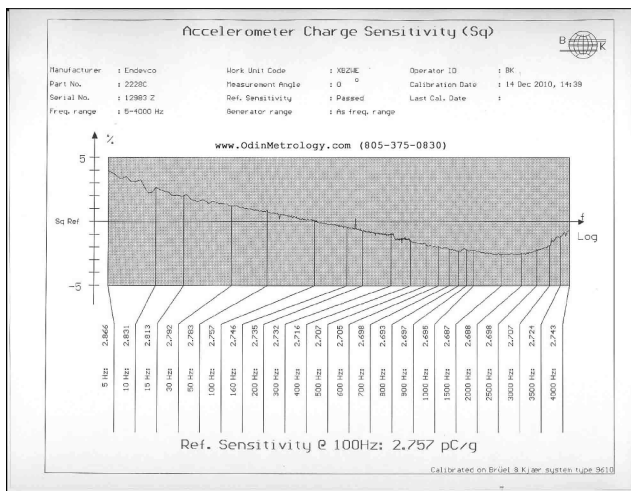
Certificate of Calibration for Endevco Triaxial Accelerometer



X-Axis



Y-Axis



Z-Axis

Accelerometer type **2228C**
Serial no. **12983**
Submitted by **Odin Metrology, Inc.**
Purchase order no. **N/A**
Asset no. **N/A**

PERFORMANCE FOUND				
Axis	Sens. at 100 Hz	Unit	Sensitivity	Frequency Response
X	2.772	pC/g	Within	Within
	0.2827	pC/m/s ²		
Y	2.798	pC/g	Within	Within
	0.2853	pC/m/s ²		
Z	2.757	pC/g	Within	Within
	0.2811	pC/m/s ²		

Note: this device is not adjustable: data is "as found" and "as left."

This calibration is performed with a reference frequency of 100 Hz at a level of 2g RMS on Brüel & Kjær transducer calibration system type 9610 with calibration software WT 9301 version 1.12.04, June 25, 2001. This calibration system operates in conformance to ANSI/NCCL Z540-1 (1994), ISO 17025, and ISO 9001:2008. NQA certification number: 11252.

REFERENCE STANDARDS			
Type no.	Serial no.	Cal. By	Cal. Due
8305/WH2335	1483343	B&K	19 AUG 2012

Expanded uncertainty of measurement ($k=2$): 0.5%
NIST traceable number: 822/278911-10, BK248 (04 JAN 2010)

BEST UNCERTAINTY OF MEASUREMENT	
With 95% confidence level at 100 Hz	1.30%

CONDITION OF TEST		
Ambient Pressure	986.45	hPa
Temperature	23	°C
Relative Humidity	42	%
Date of Calibration	14 Dec 2010	
Recalibration due on	14 Dec 2011	

Calibration performed by

Torben Ehlert, Quality Assurance Manager

ODIN METROLOGY, INC.
3533 OLD CONEJO ROAD, SUITE 125
THOUSAND OAKS, CA 91320
PHONE: (805) 375-0830; FAX: (805) 375-0405

ODIN METROLOGY, INC.

Note: the calibration documented on page 1 of this calibration report was performed on a Brüel & Kjær vibration transducer calibration system type 9610, the same system used at more than 30 US Air Force installations and by major aerospace companies. Calibration on type 9610 is performed by random excitation and measured in frequency ranges from 5-5,000 Hz and from 10 to 10,000 Hz. The calibration method is that of the improved back-to-back calibration by substitution utilizing a two-channel FFT analyzer. The system obtains calibration results that not only provide the low uncertainty of approximately 1% but also provide consistent repeatability of the calibrations. Extremely good correlation is proven between calibrations performed on different type 9610 calibration systems and also to national calibration laboratories. The consistency and accuracy of 9610 calibrations are provided by the continuous control of the process ensuring coherence between the measuring channels and providing verifications between working accelerometer and reference accelerometer.

Instrumentation used for calibration of accelerometers

Reference item	Type no.	Serial no.	Cal. Date	Due Date	Cal. by
Precision Barometer	Druck 141	299/95-10	23 NOV 2010	23 NOV 2011	CMI
Accelerometer Cal Set	BK 8305	1483343	19 AUG 2010	19 AUG 2012	B & K
Accelerometer Cal Set	BK 2525	1825039	19 AUG 2010	19 AUG 2012	B & K
Accelerometer Cal Set	BK 8305	1655945	19 AUG 2010	19 AUG 2012	B & K
Accelerometer Cal Set	BK 2525	1825039	19 AUG 2010	19 AUG 2012	B & K

Uncertainty of type 9610 calibrations

The following tabulations for uncertainty of accelerometer calibrations performed on type 9610 are from Brüel & Kjær's instruction manual for type 9610 and are all based on a confidence level of 95%.

For charge calibration performed on 9610 shaker type 4808 (range: 5-5,000 Hz):

100 & 160 Hz	5 Hz-10 Hz	10-40 Hz	40-2,000 Hz	2-4 kHz	4-5 kHz
1.30%	1.40%	1.30%	1.30%	1.80%	2.20%

For charge calibration performed on 9610 shaker type 4809 (range: 10-10,000 Hz):

100 & 160 Hz	10-40 Hz	40-2,000 Hz	2-4 kHz	4-7 kHz	7-10 kHz
1.30%	1.40%	1.30%	1.30%	2.20%	2.50%

For voltage calibration performed on 9610 shaker type 4808 (range: 5-5,000 Hz):

100 & 160 Hz	5 Hz-10 Hz	10-40 Hz	40-2,000 Hz	2-4 kHz	4-5 kHz
1.30%	2.00%	1.60%	1.40%	1.80%	2.20%

For voltage calibration performed on 9610 shaker type 4809 (range: 10-10,000 Hz):

100 & 160 Hz	10-40 Hz	40-2,000 Hz	2-4 kHz	4-7 kHz	7-10 kHz
1.30%	2.00%	1.60%	1.40%	2.20%	2.50%

For velocity pickup calibration performed on 9610 shaker type 4808 (range: 5-2,000 Hz):

100 & 160 Hz
2.73%

Revision: 23 NOV 2010