



McWade Monitoring Systems
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Sensor and Preamplifier Calibration

Sensor Calibration

McWade Monitoring Systems test and calibrate all sensors during and after production.

The frequency response and output amplitude are defined by the physical properties of the component parts of the unit. Piezo-electric elements are remarkably consistent and the case and front face components tend to have very similar resonant characteristics from unit to unit.

Each type of sensor is characterised and standard reference unit kept for comparison. Each manufactured unit is tested against this standard to +/- 1dB. This ensures consistent results between arrays of sensors.

McWade Monitoring Systems generally use both thickness and radial resonance simultaneously to enhance the bandwidth and sensitivity of data capture. Independent tests have shown that this method achieves a measurable improvement in performance.

Preamplifier Calibration

McWade Monitoring Systems test and calibrate all preamplifiers during and after production.

The filter frequency response and amplitude are controlled to a template response curve.

Table of Industry Standard AE signal amplitude related to dB

The 'Typical Log Amp Output' shown in column 4 is for McWade Monitoring Systems' signal conditioning circuits using logarithmic data compression techniques.

For gain of 100 (40dB) Preamplifier

Sensor output (Volts pk)	Preamp output (Volts pk)	dBae*	Typical Log Amp Output (Volts)
0.500	50.0	114	2.85
0.160	16.0	104	2.60
0.100	10.0	100	2.50
50.0m	5.00	94	2.35
25.0m	2.50	88	2.20
15.8m	1.58	84	2.10
5.0m	0.50	74	1.85
1.60m	0.16	64	1.60
500.0μ	50.00m	54	1.35
159.6μ	15.96m	44	1.10
50.0μ	5.00m	34	0.85
31.6μ	3.16m	30	0.75
15.8μ	1.58m	24	0.60
10.0μ	1.00m	20	0.50
5.0μ	500μ	14	0.35
1.0μ	100μ	0	0.00

* dBae is the industry standard scale used for AE event amplitude measurement referenced to 1μ volt at the AE sensor

Values shown shaded will be below the noise floor or beyond the normal dynamic range of the preamplifier.

Note that voltages are peak (not peak to peak)



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Acoustic Emission Event related to Earthquake Severity

The Richter scale of earthquake severity is well known and gives a feel to the amplitude of an Acoustic Emission event.

This coincidence is arbitrary and is included for interest only. (The Richter scale should be multiplied by 10 to give a comparative value in dBae.) 80dBae or greater is indeed a large Acoustic Emission event.

Magnitude	Effect
Less than 3.5	Generally not felt, but recorded.
3.5-5.4	Often felt, but rarely causes damage.
Under 6.0	At most slight damage to well-designed buildings. Can cause major damage to poorly constructed buildings over small regions
6.1-6.9	Can be destructive in areas up to about 100 kilometres across where people live
7.0-7.9	Major earthquake. Can cause serious damage over larger areas.
8 or greater	Great earthquake. Can cause serious damage in areas several hundred kilometres across.