

CONVERTING THE SIGNAL OUTPUT OF A DC ACCELEROMETER TO ACCELERATION (G)

APPLICATION NOTE

One of the most common application questions we receive from first-time users of a DC accelerometers is, “How do I transpose the electrical output of the accelerometer to an engineering unit?”

This conversion is best done by referring to the sensitivity (mV/g) and zero output (mv) values on the calibration certificate shipped with each accelerometer. These values are typically located at the top right corner of the calibration certificate along with other specifications and identifying information (Figure 1).

FIGURE 1: Calibration Data from Calibration Certificate

| Calibration Certificate | |
|---------------------------------|--|
| Issue Date: 11/11-2008 | Device under test (DUT): Accelerometer |
| Excitation voltage (Vdc): 10.00 | Manufacturer: MEAS |
| Zero signal output (mV): 9.32 | Model name: 52-0200-10-240-XY |
| Input resistance (Ω): 4110 | Serial number: E000039 |
| Output resistance (Ω): 4088 | Calibration frequency range: 20 Hz-2800 Hz |
| Temperature (°C): 24 | Sensitivity at 100 Hz: 0.9932 mV/g |
| Relative humidity (%): 40% | Transverse sensitivity: % |
| | g Range: 200 |

When one plugs the respective sensitivity and zero output values into the following equation (Figure 2), along with the measured output reading from the accelerometer, the acceleration in g is easily calculated.

FIGURE 2: Formula to Calculate Acceleration

$$\text{Acceleration (g)} = [\text{output reading (mV)} - \text{zero output (mV)}] / \text{sensitivity (mV/g)}$$

EXAMPLE

Let's assume a measurement was taken with the accelerometer identified in Figure 1 above and the output reading was 90 mV. Below is the resulting Acceleration (g)

$$\begin{aligned} \text{Acceleration (g)} &= (90-9.32) / 0.9932 \\ &= 80.68 / 0.9932 \\ &= 81.23238 \end{aligned}$$

To ensure accuracy of accelerometer readings, each accelerometer should be calibrated every 12 months.

CALIBRATION SERVICES

Our Vibration Sensors team in California and manufacturing facilities in China and France offer factory calibration and test services for these types of accelerometers:

- Piezoresistive
- Variable Capacitance
- Piezoelectric (PE)
- Integrated Electronics Piezoelectric (IEPE)

We offer NIST (US), DKD (Germany), COFRAC (France) traceable calibration services on sensitivity at 100 Hz (102 or 120 Hz in Europe). Sensitivity reference frequencies other than 100/102/120Hz are available upon request as are A2LA and ISO- 17205 calibrations.

All Plug and Play accelerometers shipped from MEAS China have ISO-17025 certification.

Users of TE/Measurement Specialties accelerometers can expect one-week turnaround for full frequency response tests from 10 Hz through resonance and for transverse cross-axis sensitivity testing.

Calibration of accelerometers not manufactured by TE/Measurement Specialties may take longer depending on availability of test fixtures and the manufacturer's specifications.

Environmental testing over temperature, centrifuge testing and shock calibration are also offered on a case-by-case basis.

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