IEPE Standard Industrial Accelerometers

IEPE is the worldwide standard for Industrial Accelerometers. Integrated Electronic Piezo Electric accelerometers feature an internal electronic circuit inside the sensor that transforms the high impedance charge output of the PZT ceramics into a low impedance voltage signal that can be transmitted over long cable lengths. The electronics also act as an amplifier providing outputs of 10, 50, 100, or 500 mV/g. IEPE accelerometers use a constant current source power supply rated at 2-10 mA. The output of the sensor includes a DC bias voltage (operating voltage) and an AC voltage proportional to the mechanical vibration. This 2 wire sensor and the IEPE design are considered to be the worldwide standard and are compatible with all major manufacturers of vibration data collectors and dynamic signal analyzers. IEPE accelerometers provide high-quality vibration signals at relatively low cost by avoiding specialized electrical circuits or proprietary connectors. The typical connector for an IEPE accelerometer is the MIL 5015 C, and it is available in many materials and styles to meet rugged industrial applications.

Twisted, Shielded Pair Cables

Coaxial cables are not used for industrial vibration. Coaxial cables have a shared common and ground shield. This means that the return signal (common) can not be separated from the earth ground. Such a setup leaves the coaxial cable susceptible to EMI noise, RFI noise, and triboelectric effects. It is challenging to avoid a ground loop when the common signal and ground signal are continuously mixing together. The braided shield is also difficult to work with. It is not easily connected inside of the connector or at the point of data collection.

Twisted, shielded pair cables are the worldwide standard for industrial accelerometers. The twisted action of the positive and return (common) conductors prevents induced noise. The independent shield can be connected to earth ground at the point of data collection and does not influence the common conductor. The shield should be accompanied by a drain wire, making the attachment very simple. This twisted, shielded pair cable provides rugged low noise transmission of vibration signals from the accelerometer to the point of data collection in all industrial environments.

Cable jackets should be chosen based on the application environment. Typical jacket materials include armored stainless steel, FEP, and polyurethane.

Cable Length and Frequency Response

The high-frequency response of the accelerometer signal can be affected by long cable lengths. This is a result of cable capacitance, drive current, and signal amplitude. A typical formula for determining cable length would be:

$$\text{Cable Length in feet} = \frac{(1{,}000{,}000{,}000) * (I_C)}{2\pi * C * f * V}$$

Where: *I_C = Constant Current Source (mA)*
C = Capacitance (pF/ft)
f = Frequency (Hz)
V = Peak Voltage from Accelerometer (V)

If the constant current source is increased from 2 to 4 to 10 mA, the cable length can be longer and achieve a higher frequency response.

If the capacitance, frequency, or voltage increases, the cable length will decrease the frequency response.

All four variables must be managed in any application that involves long cable lengths to minimize signal roll-off at high frequencies. This information is typically expressed in a chart based on the known cable capacitance and constant current value. A peak voltage value of 1 volt is used for calculation purposes. This represents 10 g's for a 100 mV/g accelerometer. Please reference Chart #1 for CB190 Cable.

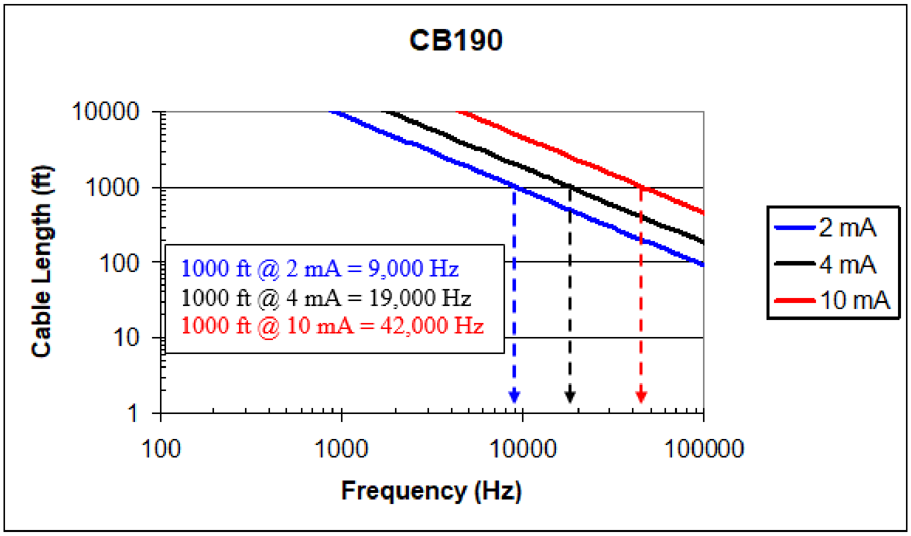

Chart #1 – Cable Length vs. Frequency Response