

# CTC AppNotes

A series of technical documents written by members of the CTC community

## Superior Design in IEPE Ultra-Low Frequency Sensors For Industrial Use

As more and more wind power projects are developed across the country and around the world, the necessity to accurately monitor bearings and gearboxes for slow speed applications becomes greater.



Figure 1— AC214-1D, 1000 mV/g IEPE sensor for low frequency applications such as wind turbines.

New improved designs for 1000 mV/g IEPE sensors offer many advantages over older sensors. Sensitivity tolerance of +/- 5 % and a frequency response from 6CPM(0.1Hz) to 600,000CPM(10,000 Hz) provide good data for analysis of both the low frequencies as well as good information on bearing and gear mesh frequencies. CTC's AC214-1D sensors have excellent RFI immunity and perform well in a wide range of temperatures from -58° to 250°F (-50°C to 121°C). The AC214-1D sensor is rated to 7g's peak, as vibration at low frequencies usually carries very little energy. The AC214-1D's low g rating is usually sufficient for most applications due to those low expected amplitudes of vibration in very slow speed applications.



Figure 2— AC212-1D, 250 mV/g IEPE sensor for low frequency and slow speed applications requiring a higher g rating.

In order to meet the needs of applications where 30g's may be required, CTC also manufactures a 250 mV/g sensor, the AC212-1D (See figure 2). The AC212 has a frequency response from 12 CPM (0.2 Hz) to 600,000CPM (10,000 Hz) and a dynamic range of +/- 30 g's peak.

The reason CTC is able to offer the 250 mV/g and 1000 mV/g sensors with both low noise and high accuracy is the improved internal design. In figure 3 we show a side by side comparison of a standard 100 mV/g sensor on the right and our low



Figure 3— Side by side comparison of sensors. Note the smaller mass assembly in the sensor on the right and the larger mass in the sensor on the left.

frequency sensor design for our 250, 500 and 1000 mV/g on the left. Many other manufacturers use designs similar to the standard 100 mV/g sensor on the right for their 500 and 1000 mV/g sensors by just raising the voltage gain. This causes an increase in the noise floor of the sensor, especially at low frequencies. The larger mass used in the CTC design on the left provides excellent data while keeping the noise floor at very low levels as well, for the 250, 500 and 1000 mV/g sensors.

If you have any questions or for further information please feel free to contact CTC directly via Email [techsupport@ctconline.com](mailto:techsupport@ctconline.com) or call 1-800-999-5290 in the US and Canada or +1-585-924-5900 internationally. Connect to confidence with CTC.

If any CTC vibration analysis hardware product should ever fail, we will repair or replace it at no charge.