

# CTC AppNotes

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

## Vibration Sensors: Dynamic Output vs 4-20 mA Output They look exactly the same—what is different?



Figure 1— Dynamic output AC102-1A (on left), 4-20 mA output LP202-1R2-1D sensor on right.

Many non-vibration analysts assume that all vibration sensors are the same. Frequently the question is asked “I have an accelerometer I bought from CTC, why is it not providing a 4-20 mA output to my PLC?”

The answer is usually the same as the customer is expecting a 4-

20 mA loop powered output from a dynamic output IEPE (Integrated Electronic Piezo-Electric) accelerometer such as the AC102-1A.

### Different sensors for different needs

4-20 mA sensors—Process control engineers do not necessarily need to know exactly what is causing a vibration, just that vibration has exceeded a certain level and it could be dangerous to continue operating the machine. 4-20 mA sensors can provide an output proportional to overall vibration in a selected frequency band for trending and alarm (see Figure 2), but provide little information that can assist in diagnosing what is causing

the vibration. In many locations, once an alarm level has been exceeded, an analyst is sent out to diagnose the problem.

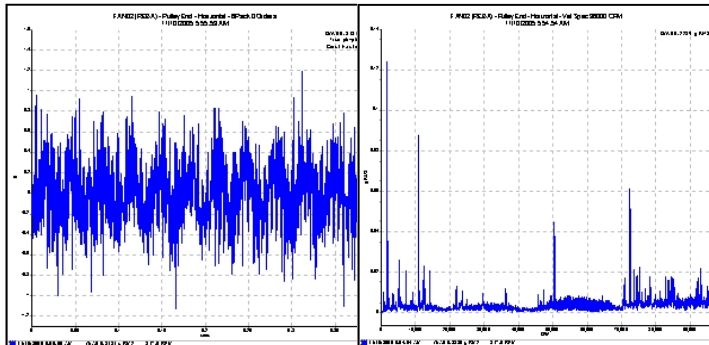


Figure 3— Time waveform from a dynamic IEPE accelerometer used to create the spectrum on the right.

Figure 4— FFT spectrum created from the time waveform at the left.

Dynamic output IEPE accelerometers—Vibration analysts on the other hand, need to know exactly what is causing the vibration so they can either fix the problem immediately or schedule a repair during the next maintenance interval. Dynamic output accelerometers provide a time waveform (see Figure 3) signal that a data analyzer can perform a FFT (Fast Fourier Transformation) on to create a spectrum (see Figure 4). The spectrum, in conjunction with the time waveform and historical data on the machine, can provide sufficient information for trained analysts to make a call about a particular problem in a piece of machinery.

### Costs vs. Benefits

While 4-20 mA sensors are slightly higher in cost than dynamic IEPE accelerometers, they are able to provide continuous output to a PLC/DCS system for alarms or automatic shutdown before catastrophic failures and provide a benefit that far outweighs the cost. Dynamic accelerometers can provide diagnostic information that can pinpoint a vibration issue and reduce overall costs of maintenance and repairs, avoiding costly emergency shutdowns. Used together, 4-20 mA sensors and dynamic sensors utilized with the knowledge of a qualified analyst, can provide valuable cost reductions and improved uptime.

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.

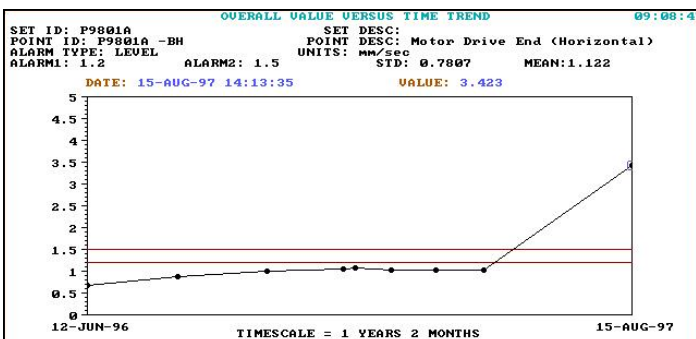


Figure 2— Overall vibration trend showing a gradual increase in vibration overtime. Once a safe level is exceeded, a vibration analyst could be dispatched to provide a diagnosis.