

DrX Application Note

DrX	DrKnock, DrHiss, DrRumble, DrSonic, DrSnap
Subject	Detecting loud noises through air
Note Ref.	AN270.13

I thought all DrX modules were contact sensors?

All DrX units are designed to be used as contact sensors. In fact their design specifically isolates the sensor from the rest of the housing to improve the sensor's contact with the test piece, and to isolate it from the rest of the DrX housing.

However, there are certain instances when particular units can be used in free air to detect audio and ultrasonic frequencies of significant magnitude.

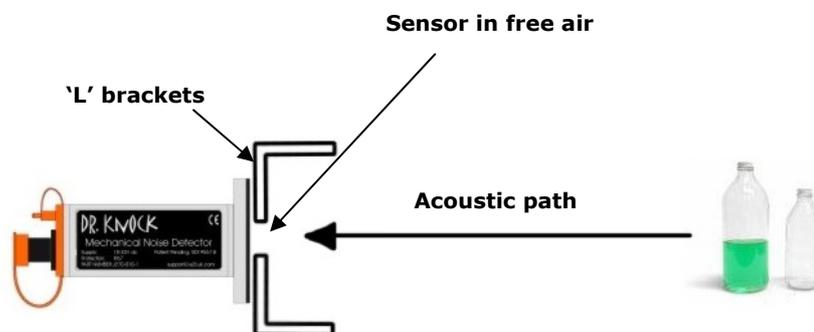
DrSonic, as its name suggests, is tuned to detect normally audible frequency ranges. Its design acts as a point contact microphone, but when it's not clamped directly to a surface it becomes a moving diaphragm microphone. Consequently it can be used as a wideband audio noise detector.

DrKnock, DrHiss, DrRumble, and DrSnap, however, use specifically configured ultrasonic contact sensors as their detection mechanism. This makes them extremely sensitive ultrasonic contact microphones when used in the clamped situation, but relatively insensitive units when in free air. This insensitivity can be used to an advantage when applied to particularly noisy application areas.

This application note was written for a client who needed to detect glass bottles exploding whilst being filled. Obviously the environment is relatively noisy but the explosions present a much higher signal.

Method

DrKnock was chosen for the detection device; firstly because a DrSonic would be far too sensitive in such a noisy environment as a bottling plant, and secondly, an ultrasonic based module rejects all the audible noise of the surroundings – in many ways ultrasonic environment provides a much less noisy platform to work in.



To implement the detector a simple 'L' shaped bracket was needed to mount the unit and ensure the contact sensor was in free air. The sensor is pointed towards the bottle filler but the orientation is not critical.

The design of DrX modules ensures that the sensor is not acoustically coupled to the housing so no special mounting requirements are required.

Calibration of the unit was as normal – whilst the plant was running normally the adjustment screw is turned until the green light turned red. The screw is then turned back to desensitize the module and turn the LED back to green. In this particular case the screw can be reversed two or three turns since we know the magnitude of the signal is so great.

To test the unit loud hand claps, or slapping two pieces of wood together, near to sensor will confirm its operation in the presence of high acoustic noise.

This method can be used to monitor other sources of noise in free air. The sensitivity range is largely controlled by the application, not of the module itself.

Conclusion

Attenuating very large signals using simple mechanical means such as these extend both the physical range and the variety of applications DrX modules can address.