



SmartDiagnostics® Application Note **Vibration Sensor Mounting**

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KCF Technologies, Inc.

Background

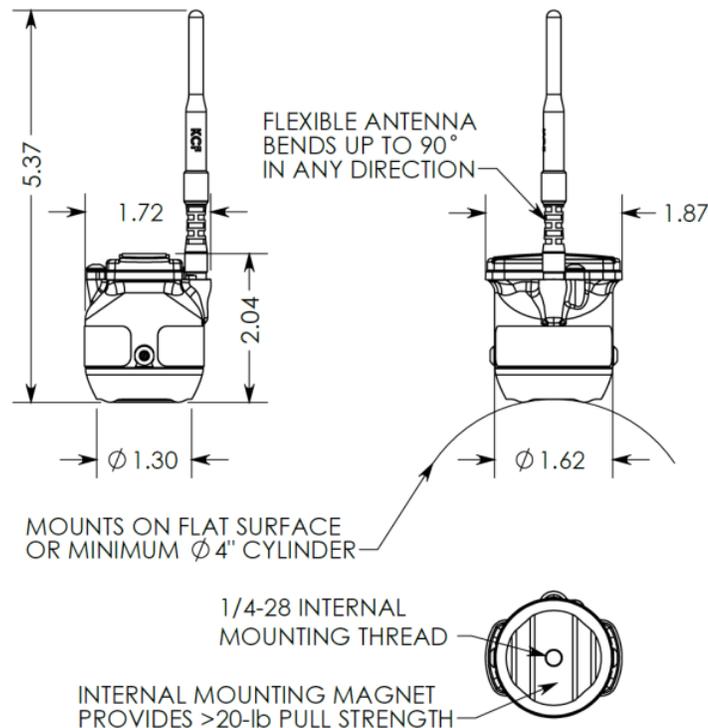
KCF's SmartDiagnostics® Vibration Sensor Node is designed to provide broadband acceleration data on a miniscule power budget, allowing accurate wireless data collection with an extremely long battery life. Taking advantage of MEMs technology and KCF's circuit design expertise, the Vibration Sensor Node is capable of reproducing the function of a traditional wired accelerometer in a much more convenient package which can be deployed and managed much more easily than wired sensors. This document details the proper method of mounting KCF SmartDiagnostics® Vibration Sensors.



Magnet Mounting

KCF's sensors contain a strong internal magnet that is suitable for mounting on most ferromagnetic host structures. The base of the vibration sensor is designed to accommodate flat surfaces or surfaces with one curvature, such as a cylindrical housing or pipe. Guidelines for magnet mounting include:

- **CAUTION:** Use care when handling multiple sensors, and when handling sensors near metal structures. Because of the very strong magnets built included in the sensors, they can pull very hard toward each other or toward a metal structure, easily pinching fingers or other body parts.
- Make sure the surface is clean of loose debris before mounting; use a rag or wire brush to remove loose rust, dirt, or grease before attaching the sensor.
- Check that the sensor is rigidly attached; wiggle the sensor by hand and ensure that it does not rock back and forth. If it does, rotate it slightly or try a slightly different mounting location until a spot is found where the sensor will not wobble.
- When mounting on a cylindrical surface, align the ridges on the base with the axis of the cylinder; this will allow the sensor to attach without rocking.

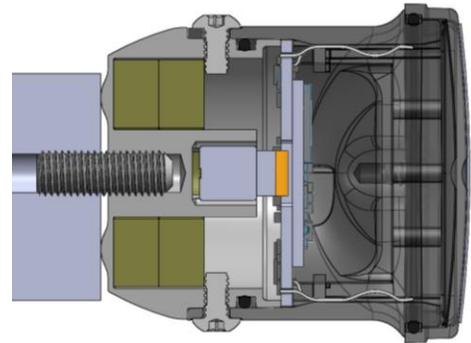




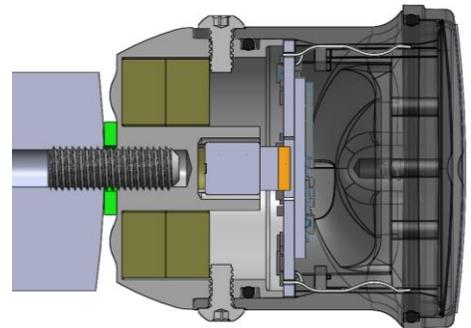
Stud Mounting

In most cases, magnet mounting is preferable since it requires no tools and no permanent changes to the machine. However, in some cases it is preferable to have a more permanent connection to the machine. For these cases, KCF's sensors have a 1/4"-28 female thread in their base for stud-mounting to a host structure. Guidelines for stud mounting:

- KCF recommends using a 1/2" long 1/4"-28 set screw for secure stud mounting; these parts are available from KCF.
- The female threads in the host machine should be at least 1/4" deep to provide solid attachment.
- When drilling new holes for stud mounting, care should be taken to ensure the hole is drilled perpendicular to the machine surface.
- The male stud should protrude from machine at least 3/8" to fully engage with the sensor base.
- Thread-locking compound should be used on the stud to prevent it from vibrating loose over time.
- The sensor should be tightened hand-tight onto the stud; DO NOT use wrenches or pliers to tighten the sensor further.



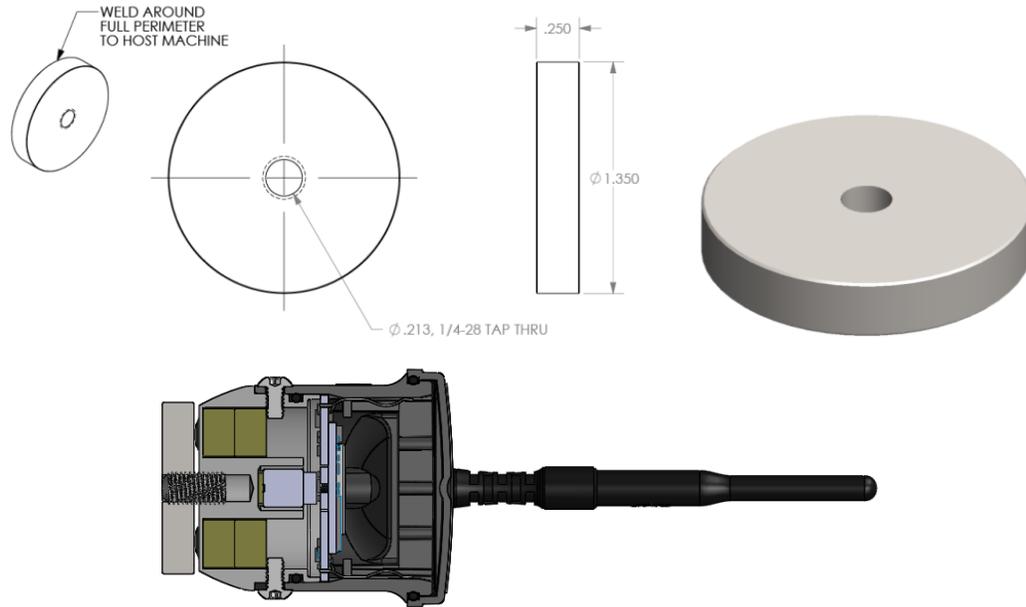
- When attaching to a curved or irregular surface, a spacer washer may be used to allow the sensor to tighten down fully without being affected by the ridges on the base. These parts are available from KCF.





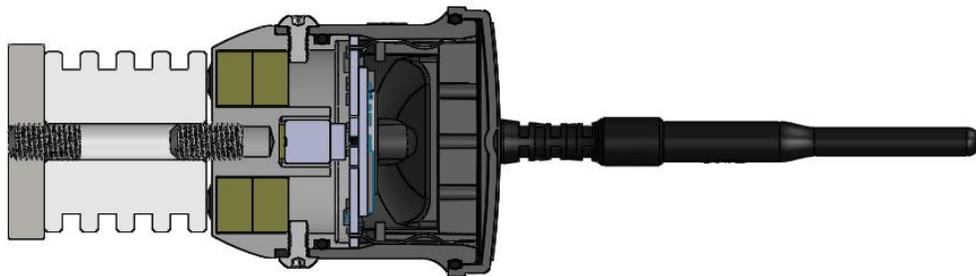
Weld Mounting

If a stud mount is required, but it is not possible to drill and tap the host structure, a weld mount can be used. KCF provides a steel weld mount with a pre-machined stud hole which can be welded to the host structure, allowing a stud mount without the risk of drilling into the host machine or structure. Once the weld mount is fully welded to the host structure, follow the stud mounting instructions as above.



Thermal Mount

KCF offers a ceramic thermal mount to dissipate heat between a host structure and a SmartDiagnostics sensor, allowing sensors to be used on host structures whose surface temperature is too hot for a SmartDiagnostics sensor to be in direct contact. The thermal mount must be stud mounted to the host structure. Follow the same guidelines as above for stud mounting. Note that the ceramic thermal mount is brittle and can shatter if dropped or struck with a tool. As with all stud-mount applications, all hardware should be tightened by hand, and thread-locking compound should be used.





Epoxy Mounting

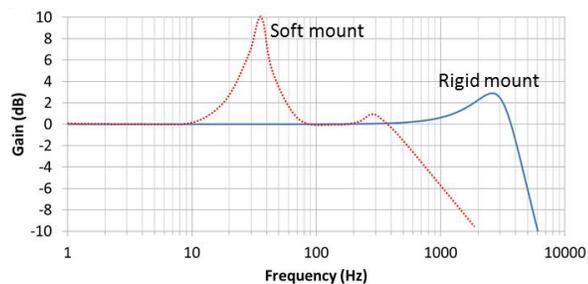
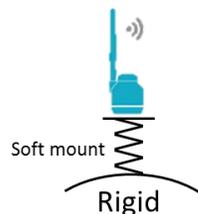
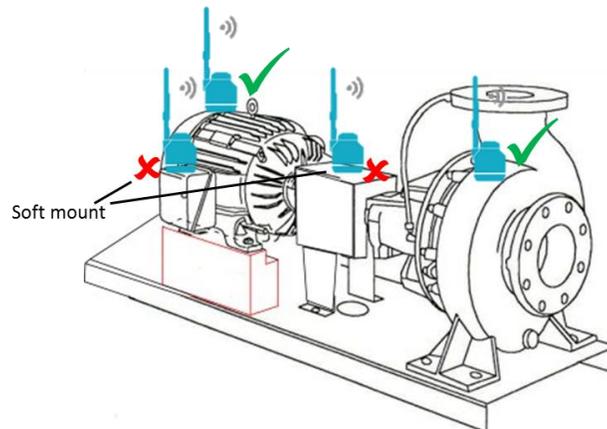
In some cases it is possible to use a 2-part epoxy to mount the sensors. This is somewhat of a last-resort mounting method for cases where magnet or stud mounting is not possible. An example would be a thin-walled motor case made of aluminum. In this case the magnet will not be attracted to the aluminum, and the wall thickness may be too thin to accommodate drilling and tapping for a stud.

In these cases, KCF recommends epoxying a large steel washer to the host structure at the desired monitoring location. The KCF sensor can then simply be attached to this position by magnet.

Sensor Location

Selecting the sensor mounting location is important because flexible or soft mounting locations on a machine can influence the sensor measurement. Soft mounting can result from locating the sensor on housings or guards that are not rigidly in communication with the key vibration sources. It can also result from thick epoxy bonds.

Examples of poor mounting location choices and the influence on the frequency response of the accelerometer are shown below.





Antenna Positioning

As a general rule, it is best to have the antennas on both the sensor and the receiver oriented vertically. The sensors have a flexible antenna which allows it to be bent up to 90° in any direction. Keep in mind that depending on a sensor's mounting orientation, it may make more sense to have the antenna pointing straight down rather than straight up. Orienting antennas vertical will normally give the best reception. Orienting antennas to be pointing at each other will normally give the worst reception.

