m o u n t i n g

Technical Note 21

Mounting Considerations

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INTRODUCTION

This technical note describes basic installation techniques for accelerometers and other vibration sensors. It will allow qualified field technicians to install vibration sensors in a variety of applications and environments. Some techniques will be general to all installations, whereas others may be specific to a particular application. If additional information is required, please consult the sensor manufacturer.

The process of installation begins with verifying that the proper sensor was selected for the measurement point. Refer to the Wilcoxon Research Sensor Selection Guide (TN16) for assistance.

The vibration analyst must evaluate and determine the mounting location of the individual sensor based on the specific machine and vibration source to be monitored. With a firm understanding of the sensors requirements, capabilities, and limitations the installation can be accomplished. After installation, verification of operation must be made to complete the process.

MOUNTING THE SENSOR

When using Piezoelectric sensors to measure vibration, the sensor must directly contact the machine surface.

The sensor should be mounted in a location that minimizes the vibration transmission route through the machine. Avoid mounting the sensor on thin sections or vibration-free areas (antinodes).

MOUNTING CONFIGURATIONS

There are multiple mounting configurations that are used to couple the sensors to the machine surface. Figure 1 illustrates the various types of mounting configurations.

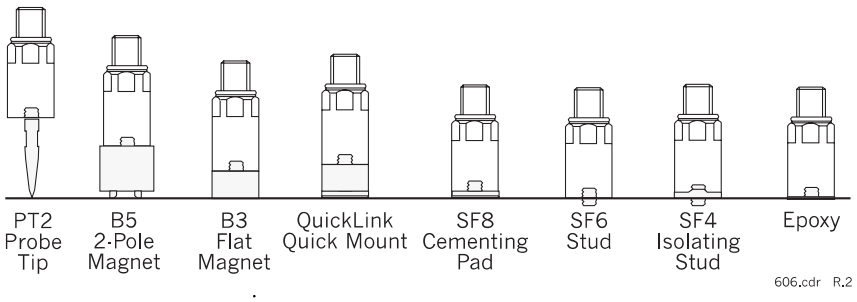


Figure 1

WILCOXON RESEARCH

Direct stud mounting, epoxy and cementing pads are used for permanent installations.

The sensor can be directly mounted by tapping a hole into the structure and attaching the sensor with a threaded stud. Cementing pads can be epoxied in place of the tapped hole; the sensor is then mounted to the pad. In some cases, the sensor can be mounted directly to the machine using epoxy.

Attaching magnetic bases or probe tip (stingers) allow the sensor to be easily moved from point to point. Quick mounts combine the capabilities of a stud with the speed of a magnet. The most significant disadvantage of the magnet base or probe tip is the lower resonant frequency of the coupled system. The more intimate the contact between sensor and the machine, the better the ability to couple and measure high frequency signals.

TEMPORARY MOUNTING

(Probe Tips, Magnets, Quick Mounts)

Magnets and probe tips produce a significantly different response at higher frequencies compared to stud and cemented pad measurements.

PROBE TIPS

Probe tips require very little surface preparation and are easy to use. Tips should be slightly rounded at the point and maintained free of burrs. Drilling a countersink into the mounting surface will increase repeatability and decrease tip chatter. Probe tips should not be used to measure readings above 1,000 Hz (60,000 cpm).

Wilcoxon's Model PT2 Probe Tip is recommended for the sensors with a 1/4-28 tapped hole. Other 1/4-28 compatible probe tips can be substituted, but may further limit frequency response. Probe tips longer than six inches should be avoided.

MAGNETS

In all applications, the machine surface must be magnetically attractive and free of paint chips and scale. Painted surfaces are acceptable, but should be clean and well maintained. The magnet must be clean and free of metal particles and burrs.

For flat surfaces, the Wilcoxon Model B3 flat bottom magnet is recommended. Coupling fluids, such as oil, greatly improve measurements with flat bottom magnets and should be used wherever possible.

For use on rounded non-flat surfaces, the Wilcoxon Models B5 and B6 two pole magnets are recommended.

QUICK MOUNTS

Quick mounts allow the sensor to be mounted rapidly with little effort. The coupling resonance approaches cementing pad and stud mounted configurations.

Quick mounts consist of a special adapter mounted to the sensor and a mating pad on the machine. The mating pad can be stud mounted or cemented to the mounting location.

Wilcoxon's QuickLINK™ Mount (Model QB-1) is recommended for use with the most industrial accelerometers. The QP-1 and QP-2 are recommended for cementing and stud mounts respectively. The QuickLINK™ system requires a less than one-half turn to mount the sensor making walkaround collection faster without compromising repeatability.

PERMANENT MOUNTING

(Threaded Stud, Cementing Pad)

Cementing pads approach the capabilities of stud mounts when used properly. The following are recommended permanent mounting procedures. Alternative procedures should be evaluated with respect to frequency response, grounding, and installation requirements. Adhesive selection is critical for long-term reliability; please consult Wilcoxon before other procedures and materials are used.

THREADED STUD

Stud mounting requires a tapped hole drilled directly into the structure. A threaded stud provides electrical and mechanical connection between the sensor and machine.

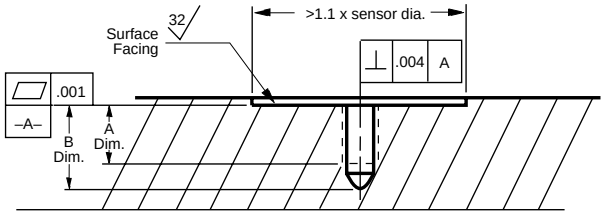
The sensor requires a flat spot faced surface with a perpendicular tapped hole. The spot face must be 1.1 times larger than the diameter of the sensor housing to ensure flash mounting. For measurements above 1,000Hz (60,000 cpm), the surface should be flat within 1 mil and have a surface texture no greater than 32 microinches. In all cases burrs between the sensor and the machine must be eliminated.

The center line of the tapped hole must be perpendicular within 1° of the mounting surface to ensure no gaps are present between the base of the sensor and the structure. The tap drill and spot face can be machined in one stop with proper tooling.

From the material list below, modify the shank of the tap drill to fit into the counterbore. Mount the tap drill into the counterbore with a minimum of .35 inches drill extension past the counterbore. If the extension (and #3 hole) is greater than .45 inches, the bottom tap can be eliminated.

Materials/Equipment for 1/4-28 Studs

- 1.062 inch counterbore
- # 3 (.213) tap drill (modified shank)
- 1/4-28 starter tap
- 1/4-28 bottom tap
- Tap Stand
- Versilok 406
- Silicone Grease
- Cutting Fluid
- 15/16 (24mm) torque wrench
- Screw Driver



Stud	Stud Size	A in. (min)	B in. (min)	Torque (in-lbs)
SF1	10-32 UNF	.188	.250	20
SF6	1/4-28 UNF	.250	.350	26
1/4 - 28 captive screw		.250	.350	30

NOTE: The above chart is based on the Wilcoxon Research standard stud length.

Figure 2

Procedure (see Figure 2):

1. Machine the spot face and drill to a minimum depth of .350 inches. Use cutting fluid.
2. Using the tap stand, cut .250 inches of full thread (7 thread minimum). Use a bottom tap on holes less than .450 inches deep. Use cutting fluid.
3. Clean the hole and mounting surface free of metal shavings and debris.
4. Apply a service removable threadlock such as Loctite 242 blue to the tapped holes in both the structure and the sensor.
5. Screw the Model SF6 stud into the machine and seat with a screw driver.
6. Apply oil to the spot face taking care to avoid the stud.
7. Torque the sensor its appropriate value.

CEMENTING PAD

Cementing pads eliminate tapping into the structure, but provide high frequency capability approaching stud mounts. The sensor should be used with a Wilcoxon Model SF8 cementing pad.

The flat side is bonded to the machine with an appropriate adhesive. The opposite side contains a 1/4-28 stud for mounting the sensor. The procedure below leaves the pad and the sensor housing electrically isolated from ground.

Materials:

- end mill
- Versilok 406 Adhesive
- Silicone Grease
- Ohmmeter
- 15/16 (24mm) torque wrench

Procedure (see Figure 3):

1. Bore a 1.1 times larger spot face than the diameter of the cementing pad to be installed on the machine housing. Allow the machine tool to groove and abrade the surface to prepare for the adhesive bonding. Do not use cutting fluids as they may contaminate the bonding area.
2. Apply the primer with a brush and let dry for 5 minutes.
3. Mix the Bi-pack thoroughly by removing the clip and working the epoxy and catalyst into each other.
4. Apply a generous amount to the spot face and seat the Model SF8 pad with a turning motion.
5. Filet the adhesive around the sides of the pad to increase shear strength and assist electrical isolation. The working time is 5 minutes but may vary depending on the ambient temperature. Do not get epoxy in the sensor mounting surface.
6. Test electrical isolation from the pad to the machine with the ohmmeter.
7. Apply a service removable threadlock such as Loctite 242 blue to the tapped hole in the sensor.
8. Torque the sensor to 26 to 30 inch-pounds.

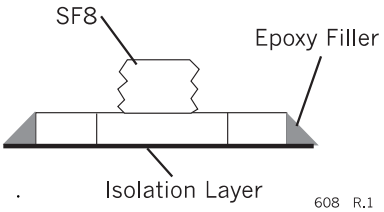


Figure 3