AN8E

Application Note
Piezoelectric Accelerometers
Accelerometer Mounting

Choosing the optimum mounting arrangement will significantly improve the accuracy.

> For best performance, particularly at high frequencies, the accelerometer base and the test object should have clean, flat, smooth, unscratched, and burr-free surfaces.

A scratched accelerometer base can be applied to a lapping plate for restoration of flatness. If lapping is not possible, other machining processes such as grinding, spotfacing, milling, turning, etc., can produce acceptably flat mounting surfaces.
It is also important to provide a stiff mechanical connection between the sensor and the source of vibration. Sheet metal or plastic parts and other thin and flexible components are unsuited for accelerometer mounting.

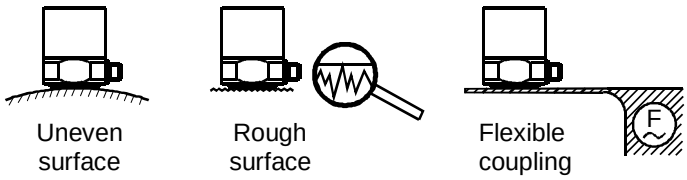


Figure 1: Typical reasons of coupling errors

Errors due to unwanted sensor vibrations can be reduced by symmetric mounting.

The weight of the sensor including all mounting components should be low compared to the weight of the test object.

Misalignment of the sensor axis and the measuring directions should be kept as low as possible, particularly if transverse vibration of high magnitude occurs.

The following mounting methods are used for accelerometers:

- Stud mounting with stud bolt, insulating flange, mounting cube or adhesive flange
- Magnetic base
- Adhesive by bee wax, cyanoacrylate, epoxy glue or dental cement
- Probe by hand pressure

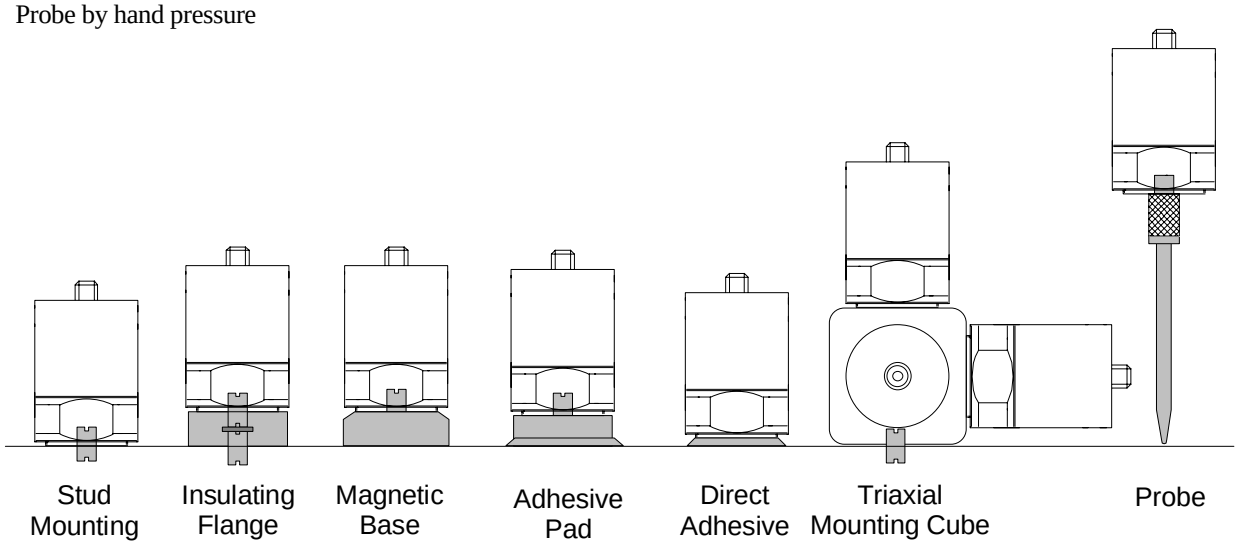


Figure 2: Mounting methods for accelerometers

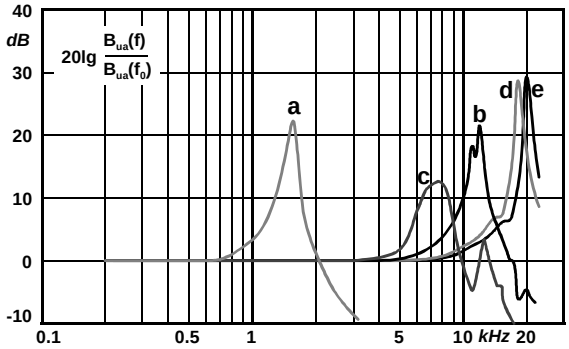
Metra Mess- und Frequenztechnik Radebeul
Meissner Str. 58
D-01445 Radebeul
Phone +49-351-836 21 91
P.O. Box 01 01 13
D-01435 Radebeul
Fax +49-351-836 29 40
Internet: www.MMF.de
Email: Info@MMF.de

The following table compares some typical mounting techniques for piezoelectric accelerometers with regard to different criteria (Source: ISO 5348).

	Resonant frequency	Temperature	Sensor weight and coupling stiffness	Resonance peak (Q)	Relevance of surface quality
Stud mounting	●	●	●	●	●
cyanoacrylate glue	●	●	●	●	◑
Bee wax	◑	○	◑	●	●
Double sided adhesive tape	○	◑	○	○	●
Magnetic base	◑	●	○	○	●
Probe	○		○	○	○

● high ◑ medium ○ low

Figure 3 compares the typical high frequency performance of these methods as a result of added mass and reduced mounting stiffness.



a Probe

b Insulating Flange

c Magnetic Base

d Adhesive Mounting

e Stud Mounting

Figure 3: Resonance frequencies of different mounting methods

Metra accelerometers may have the mounting thread sizes: M3, M5 and M8.
Many transducers are available with an accessory kit (ordering option "/01") which contains all suitable mounting parts.
The following table shows the available mounting accessories from Metra:

Mounting Studs 021 (M3) 003 (M5) 043 (M8) 022 (M3 to M5) 044 (M5 to M8) 045 (M5 to 10-32) 046 (M5 to ¼"-28)	➔ For best performance, good for permanent mounting. • Mounting thread required in the test object. • A thin layer of silicon grease between mating surfaces aids in the fidelity of vibration transmission. Recommended torque: 1 Nm. • Make sure that the mounting stud is not too long resulting in a gap between sensor and test object.
Insulating Studs 106 (2 x M3) 006 (2 x M5) 206 (2 x M8)	➔ Avoids grounding problems. Limited performance at high frequencies. • Model 006 not for use above 100 °C. • Models 029 and 129 for adhesive attachment using cyanoacrylate, epoxy glue or dental cement.
Mounting Pads 129 (M3, small) 329 (M3, large) 029 (M5) 229 (M8)	➔ For adhesive attachment if holes for sensor attachment cannot be drilled. • Models 129, 329 and 029 are isolating.

Mounting Magnets 108 (M3, small) 308 (M3, large) 408 (M4 tap) 008 (M5) 208 (M8)	➔ For rapid mounting with limited high frequency performance. • Ferromagnetic object with smooth and flat surface required. If not available, weld or epoxy a steel mounting pad to the test surface. • Don't drop the magnet onto the test object to protect the sensor from shock acceleration. Gently slide the sensor with the magnet to the place. • Do not use magnets for seismic accelerometers.
Triaxial Mounting Cubes 130 (M3) 030 (M5) 230 (M8) 330 (M10)	➔ For triaxial measurements with uniaxial accelerometers
Probe 001 (M5)	➔ For estimating and trending measurements above 5 Hz and below 1000 Hz. • Attach the accelerometer via the M5 thread. • Press onto the test object perpendicularly. • Drilling a countersink will increase repeatability.
Adhesive Wax 002	➔ For quick mounting of light sensors at room temperature and low acceleration. • Soften the wax with the fingers. Apply thinly onto the test surface. Press sensor onto wax.
Cable Clamps 004 (M5) 020 (M3)	➔ Avoid introduction of force via the cable into the transducer. • To be screwed onto the test object together with the accelerometer.