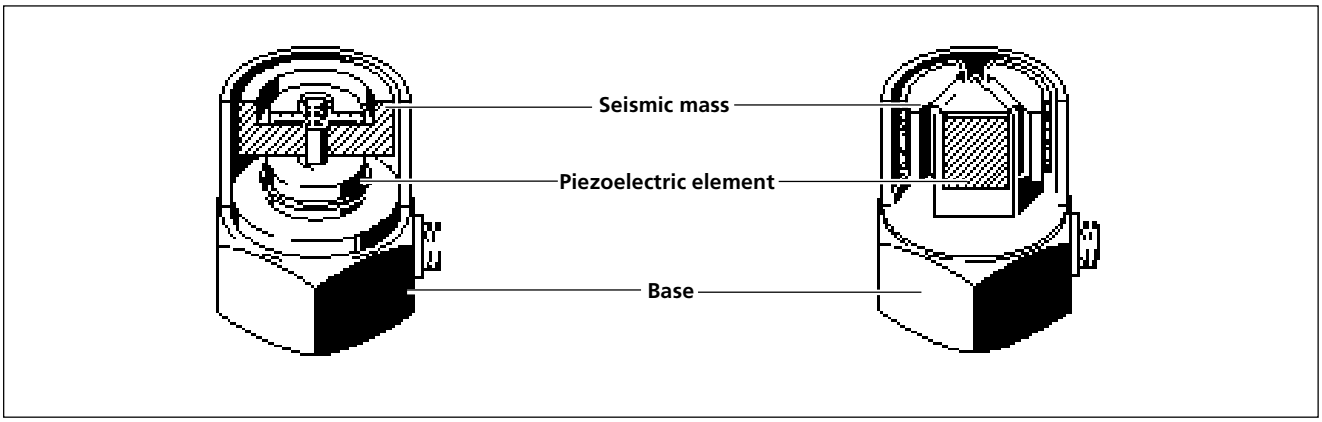
PRÜFTECHNIK AG

TechNote #02 TANDEM-PIEZO® design

TANDEM-PIEZO® Accelerometers vs. conventional designs

A comparison:



Compression type

Disadvantages:
- Prone to base strain effects
- Sensitive to temperature transients
- Sensitive to transverse vibration

Advantages:
- Simple design
- Inexpensive to build
- Shock resistant
- High sensitivity
- Wide frequency range

Δ shear / annular shear type

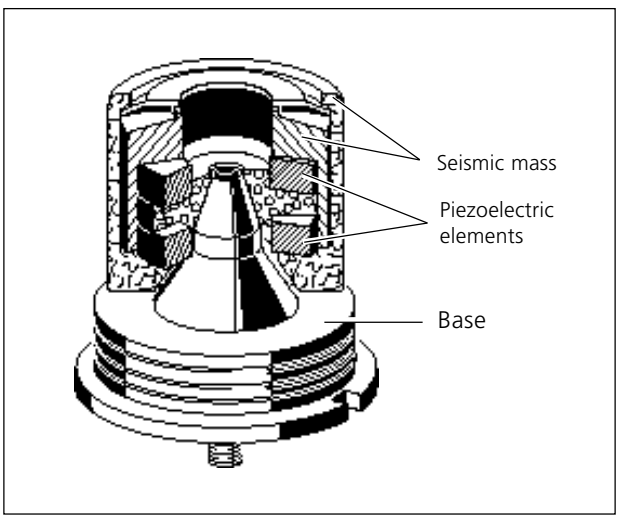
Disadvantages:
- Expensive
- Low shock resistance

Advantages:
- Wide frequency range
- Extremely low base strain sensitivity
- Low temperature transient sensitivity
- Wide temperature range
- Wide dynamic range
- High sensitivity
- Long-term stability

The patented Tandem-Piezo® accelerometer:

combines all the advantages of the D Shear-type (and annular shear-type) and compression-type accelerometers to give the following features:

- Low base strain sensitivity
- Low sensitivity to temperature transients (pyroelectric effect)
- Built-in 'Line-drive' amplifier offers unsurpassed immunity against cable noise and ground loops
- Low transverse sensitivity
- High shock resistance
- Integrated resonance suppression filters avoids amplifier overloading
- Factory burn-in for high long-term stability
- Intrinsically safe version (VIB 8.510) also available



'Line-drive' principle

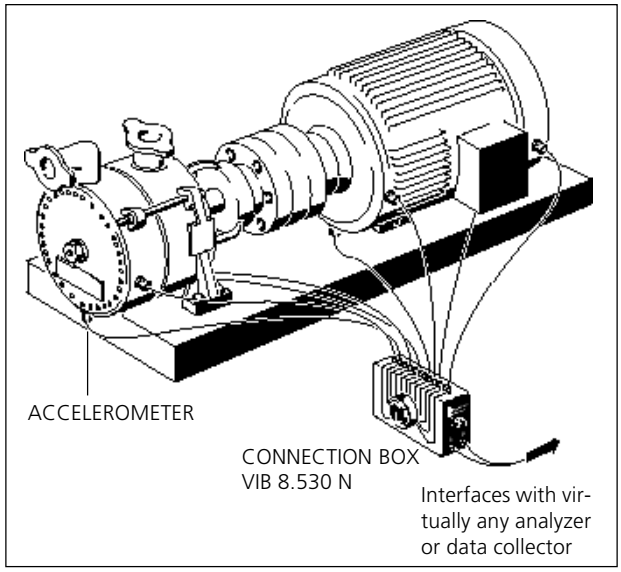
A 'line-drive' amplifier is essentially the 'front end' of a charge or voltage amplifier which can be built into an accelerometer.

The practice of building the charge or voltage amplifier into an accelerometer is not a new idea. The first 'line-drive' systems were designed to improve the performance of very low-capacitance and low-sensitivity accelerometers which used quartz as the piezoelectric element. These accelerometers were very sensitive to triboelectric noise (noise generated by the cable) and to electromagnetic noise (noise picked up by the cable).

Today, modern accelerometers use piezoelectric elements and low-noise cables to help solve most of the earlier problems. However, it is still an advantage to use a built-in amplifier and, consequently, 'line-drive' accelerometers are eminently suited for use in industrial measurement. Here they have the advantage of being able to drive signals along very long and inexpensive cables.

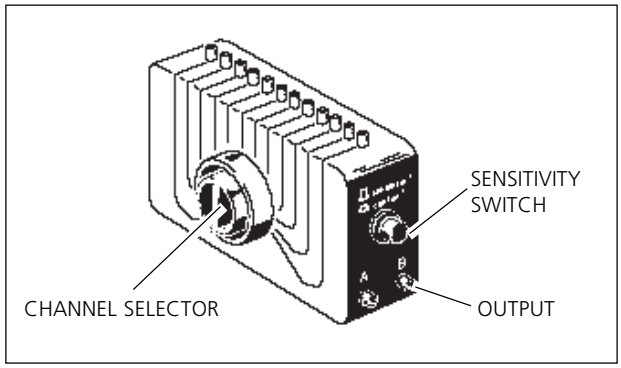
PRÜFTECHNIK's 'line-drive' accelerometers use a coaxial cable which links the amplifier to the power supply and carries both the power and the vibration signal. The system uses a modulated current source (which has an extremely high output resistance) to transmit the vibration signal. The current signal has the advantage of being insensitive to any voltage fluctuations which may occur and make the circuitry less sensitive to current supply variations, noise and ground loops.

Multichannel measurements



For connection of twelve or more accelerometers, PRÜFTECHNIK can supply connection boxes for multichannel measurements. The connection box can be interfaced with virtually any analyzer or data collector, making manual switching between channels possible.

Connection Box VIB 8.530 N



The connection box has a dual channel option for two-channel measurements and an internal sensitivity selector that allows you to choose between 1µA/ms^{-2} or 5.35 µA/ms^{-2}. It is also environmentally protected according to IP54. The output signal is in mV/ms^{-2} and the operating temperature range is from 0°C to 50°C (32° F to 122° F).

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