

Noise is an unwanted additional signal, or distortion of signal that results in unstable readings. Noise can come from a variety of different sources and can have a negative impact on your sensor's performance. We created this short guide to help you better understand how to minimize noise when using a force measurement system.

COMMON SOURCES OF ELECTRICAL NOISE



Lights



Generators



Fans



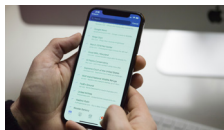
Motors



RF signals



Industrial machinery



Cell phones



Computers



Switches and relays

SIGNAL DISTORTED BY NOISE

To test for noise it is helpful to test one component first and then add the next component observing noise as the system is built up. Where possible grounding inputs to components can help determine how much noise that component is contributing, or receiving.

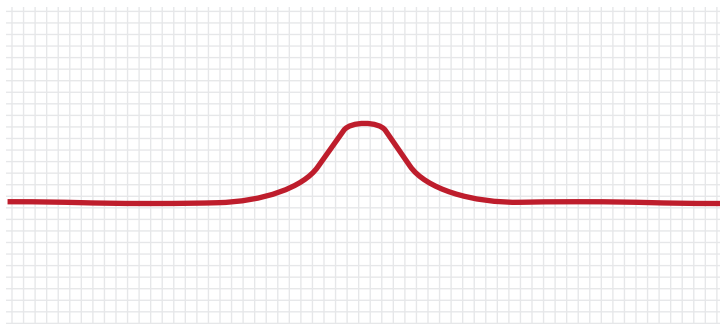


Figure 1: Desired signal

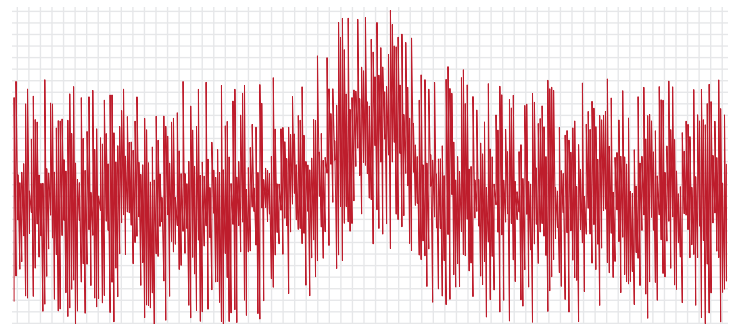
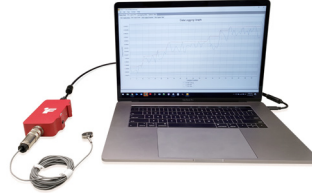


Figure 2: Signal with noise

TESTING FOR NOISE



1. On the DAQ/PLC or USB and computer system, ground all inputs and observe how much noise is present. This should give you an idea of how much noise your system will generate.
2. Attach the cable for the sensor, or amplifier to the DAQ/PLC. Then ground the input through the cable to the DAQ/PLC. This will help show how much noise the cable will add to the system.
3. Attach the sensor or amplifier to the cable and observe any additional noise. If connecting an amplifier continue testing by grounding the input to the amplifier.
4. Turn on and off equipment nearby to test for sources of noise while observing noise in components.

REDUCING NOISE

Below are some tips on reducing noise. For instruments that have inherent noise, refer to the instrument spec sheet for expected noise levels.

- Shields should only be connected on one end to avoid ground loops. A cable shield is not in contact with a sensor when it is labeled as floating on the sensor spec sheet.
- Move cables away from equipment. Avoid unnecessary cable length.
- Utilize cables with ferrite beads or ferrite chokes.
- Make sure that your application is situated away from items that may create noise. If possible, try to isolate components, such as through a shielded cover over components.
- Look for any ground connections in your application that are shared with other equipment and try to isolate if possible.
- Avoid using low-quality cables and connectors.
- Consider using an instrument, such as the FUTEK IAA300 Differential Strain Gauge Amplifier, in order to reduce noise through differential signal cancellation.
- If possible, keep your system in an environment that has a constant temperature. Temperature changes on a sensor can cause readings to drift. Uneven temperature changes across a sensor can have larger effects.
- Ensure sensor support surfaces are stable and do not give over time.
- Avoid loading the sensor with material susceptible to high vibrations.
- Allow for equipment to warm up before taking readings.
- Avoid setting up your system in an environment that will be exposed to loud noises.
- Avoid airflow onto application components from air conditioners or heaters.
- Use fewer significant figures when programming instrument to ensure that you are working with stable and more accurate readings.
- Consider software averaging to establish a static signal. Note: averaging may reduce bandwidth.
- Apply digital filtering if available.

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