MicroStrain Sensing Technical Note

All LVDT Displacement Sensors

Mounting Basics

Date
March 5, 2021

Mounting Basics
Parker LORD displacement sensors are offered in smooth and threaded shell versions. Depending on the application, one of these types may make more sense than the other.

Off the shelf, sensors will come with a smooth stainless-steel body. For subminiature (non-gauging) and microminiature sensors, this shell is a 300 series stainless. For gauging subminiature sensors, this shell is 400 series.

A smooth shell sensor can be mounted in a fixture or product in a number of ways:

1. Epoxy the sensor in a close tolerance through hole.
✓ Fast integration of the sensor
✓ Provides rigid mounting
✗ Sensor is permanently fixed
✗ Future recalibration difficult or impossible
✗ Potential thermal expansion effects

2. Use a 3rd party collar clamp to fix the sensor to a product.
✓ Available in stainless steel and other materials
✓ Offered in a wide range of sizes
✓ Sensor is removable
✗ Requires a means of attaching the collar clamp to the product (Epoxy/fasteners)
✗ Precise sensor alignment is more difficult.

3. Through hole with a set screw.
✓ Fast integration of the sensor
✓ Stiff mounting, yet removable
✓ Resilient to thermal expansion
✗ Requires a tapped hole intersecting the sensor hole
✗ Overtightening set screw could damage sensor

4. Feedthrough/Grommet.
✓ Sensor is removable
✓ Grommets can seal around the smooth shell
✓ Fast integration
✗ Polymer seals can compromise precise measurements if too soft.
✗ Threading/accommodation of a grommet

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Threaded shells are perhaps the easiest to install. They require a tapped hole of the mating thread (shells are offered in both Metric and imperial), and either a follower nut or a set screw to fix the sensor into position. The threaded body allows for precise axial positioning of the sensor, the ability to remove the sensor in the future, and an increased magnetic shielding from the surroundings.

Mounting Rules of Thumb

Avoid Magnetic Influences
All Parker LORD LVDT Sensors are susceptible to outside magnetic fields (both static and dynamic). Non-gauging type sensors with smooth shells are the most susceptible due to the thin walls of the 300 series shell. Gauging type sensors, NC-LVDTS, and threaded shell versions of all models have higher resistance to external fields, but it is still recommended that sensors not be exposed to any magnetic fields during use. External fields will influence the output of the sensor and result in incorrect readings. If magnetic fields are unavoidable, contact a Parker LORD support engineer to discuss options for custom calibrations or magnetic shielding.

Appropriate Fixture Materials
As a general rule, fixturing should be **non-magnetic for all sensors**. For NC-LVDTs there is an additional requirement is that the fixture is non-conductive (the target of the NC-LVDT should, however, be conductive or magnetic!). Depending on the sensor type, and performance customizations (high-res, low noise, low drift, etc.) magnetic materials, and even "mostly" non-magnetic materials, can have an effect on sensor output. In cases where sensors are mounted in non-ideal materials, Parker LORD can calibrate the sensor in your fixturing to remove any offset or gain errors the fixture is contributing, bringing the sensor back into peak performance.

Sensors with threaded shells, LS-LVDTs, and gauging-type sensors have higher resistance to nearby magnetic materials than the free-sliding smooth body sensors (M-, and S-LVDTs).

Examples of acceptable fixturing materials for Contact-type sensors:
- All polymers/plastics
- Carbon Fiber/composites
- Aluminum
- Non-magnetic stainless steel (300 series)
- Wood
- Ceramic
- Titanium
- Other non-magnetic metals

Examples of influential materials:
- 400-series stainless
- Ferrite
- Iron
- Carbon Steels

Non-contact LVDTS must be mounted in a non-conductive material, such as those listed below. In special cases NC-LVDTs can be mounted in conductive fixturing, but Parker LORD must perform the calibration with the sensor installed in the fixturing. The calibration repeatability is also contingent on careful axial alignment of the sensor within the fixture.

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Acceptable Non-contact LVDT fixture materials:

- All Polymers
- Carbon Fiber (limited information)
- Composites
- Wood
- Ceramic

As always, Parker LORD support engineers are available to go over your particular application and work with you to find the optimal way to mount our sensors.

Plan for Cable Strain Relief
Plan to have some room at the back of the sensor for routing the cable out and away to the signal conditioner. The cable we use in our sensor is armored but is not unbreakable. Pulling on the cable at a sharp angle against the back of the sensor is likely to cause a cable failure, either at the epoxy edge or internal to the sensor. Use your thumb- if the cable turns tighter than the diameter of you thumb, it may be too tight.

Avoid Twisting the Sensor Independent of the Cable
It sounds easy to avoid, but we have seen it many times. When installing a threaded body sensor, be sure that the cable is spinning with the sensor! If the cable it plugged into the signal conditioner, or not freely rotating as the sensor is inserted it will eventually over-twist and snap.

Support
MicroStrain Sensing support engineers are always available by phone, email, chat, and Teams to support you in any way we can.

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