

M-DVRT[®]

Microminiature Displacement Sensor

Ideal for critical linear displacement measurements, the Microminiature DVRT[®] delivers high performance in a tiny package. Advanced materials and electronics have resulted in a rugged, fast, and sensitive instrument, capable of submersion in aqueous environments. The Microminiature DVRT[®] features micron- to-sub-micron resolution, linear analog output, flat dynamic response to kHz levels, and very low temperature coefficients. Its free-sliding cores are extremely lightweight and utilize flexible, elastic, bio-compatible alloys to provide resistance to kinking and permanent deformation.



Features & Benefits

High Performance

- micron resolution with large stroke/size ratio
- frictionless design for robust use over millions of cycles
- suitable for use in harsh fluids and environments

Ease of Use

- world's smallest linear displacement sensor
- plug and play usability
- easily customized to suit specific requirements
- signal conditioning options for any application

Applications

- Process Control for Production-Line Monitoring
- Miniature Position Control Elements
- Linear & Angular Motion Control
- Measuring Strain and Deflection in Materials and Structures
- Dimensional Gauging for Quality Control

System Overview

Sensor Design

Core position is detected by measuring the coils' differential reluctance using a sine wave excitation and synchronous demodulator. This differential detection method provides a very sensitive measure of core position while cancelling out temperature effects.

The transducers' coils and Teflon[®] cables are sealed in vacuum-pumped epoxy, within the stainless-steel case. This provides outstanding environmental resistance. The DVRT[®] has been successfully employed in harsh applications, including short term immersion in saline and pressurized oil.

Units available for long term immersion, corrosive and high pressure environments can be custom built to meet such requirements. LORD MicroStrain[®]'s desktop consoles and in-line signal conditioners provide the Microminiature DVRT[®] with plug and play housing, power, analog output, LCD display, RS-232 output and software. A range of modular positioning attachments and custom strokes are also available.

Specifications

Electrical Specifications Obtained using DEMOD-DVRT[®] and DVRT[®] with 800 Hz low pass filter at constant temperature

Linear Stroke Lengths	3, 6 & 9 mm (standard version) 1.5 mm (high resolution version)
Accuracy	± 1.5% using straight line ± 0.1% using polynomial
Sensitivity	DEMOD output/sensor range
Signal to noise	2000 to 1 (with filter 3 dB down at 800 Hz, standard); 600 to 1 (unfiltered) noise measured peak to peak
Resolution	1.5 µm for 3 mm stroke 3.0 µm for 6 mm stroke 4.5 µm for 9 mm stroke 300 nm for high resolution version
Frequency response	800 Hz standard, 20 kHz optional
Temperature coefficient	offset 0.0029%/ °C (typical) span 0.030%/ °C (typical)
Hysteresis	±1 micron
Repeatability	± 1 micron

Mechanical Specifications

Overall body length	11.3 mm for 3 mm stroke 18.7 mm for 6 mm stroke 26.8 mm for 9 mm stroke 11.3 mm for high resolution version
Outside diameter	1.5 mm (standard version) 1.8 mm (high resolution)
Housing material	smooth 316 stainless steel; 4-40, 6-32 & 8-32 400 series stainless steel imperial threaded body options M3x0.5-6g, M3.5x0.6-6g, & M4x0.7-6g 400 series stainless steel metric threaded body options
Attachment method	threaded body
Leadouts	45 cm, multi stranded, shielded, stainless steel reinforced, Teflon insulated
Connector	keyed 4-pin Lemo, polyolefin relief
Operating temperature	-55 to 175 °C
Core weight	3 mm: 0.06 g, 6 mm: 0.07 g, 9 mm: 0.07 g, 1.5 mm: 0.06 g
Core material	0.020" diameter super elastic NiTi alloy, 00-90 thread optional
Cable diameter	0.036 "

