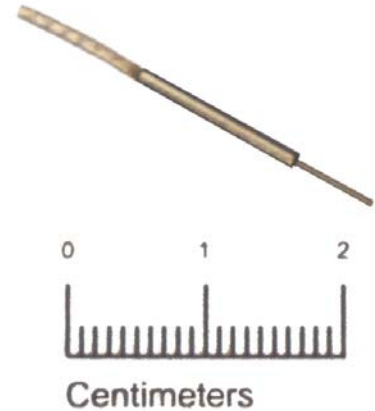


# Microminiature DVRT®

## Differential Variable Reluctance Transducer



### Introduction

Ideal for critical linear displacement measurements, the micro-miniature 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.

Features of our micro-miniature DVRTs include micron to sub-micron resolution, linear analog output, flat dynamic response to kHz levels, and very low temperature coefficients. Free-sliding transducer cores are extremely lightweight and utilize flexible, elastic, bio-compatible alloys to provide resistance to kinking and permanent deformation.

A range of stroke lengths and specialized, modular attachments have been developed. Longer stroke lengths provide greater linearity DVRTs with nonlinearity as low as  $\pm 0.15\%$ . This performance, combined with versatility of design allows the micro-miniature DVRT® to meet the needs of a wide variety of applications.

Miniature “plug and play” signal conditioners provide linear DC output when supplied with unregulated DC power. Multi-channel, OEM and digital display systems are also available.

### Features & Benefits

- available with sub-micron resolution and long stroke range
- operating temperature to 175 °C
- frequency response up to 20 kHz
- lightweight core will not influence frequency response
- stainless steel and high-performance polymer design suitable for extremely harsh environments
- waterproof, suitable for submersion in corrosive media such as brake fluid and hot saline
- frictionless design suitable for high duty-cycle applications
- easily customized to suit specific application

### Applications

- miniature control elements for automotive and robotic systems
- process control for production-line monitoring
- dimensional gauging for quality control applications
- measuring strain and deflection in materials science and civil structures
- linear/angular positioning of optical components
- miniature force, torque, acceleration sensors
- biomedical sensors for measuring strain in bone and soft tissue

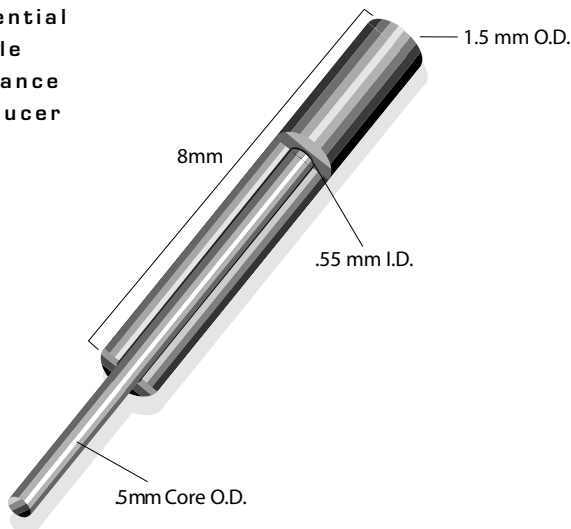


## How it works

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 flex circuit leads are sealed in vacuum-pumped epoxy, within the stainless-steel case. This provides outstanding environmental resistance. The micro-miniature DVRT® has been successfully employed in harsh applications, including immersion in saline and pressurized oil.

Differential  
Variable  
Reluctance  
Transducer



## Electrical Specifications

(with MicroStrain DEMOD-DVRT®)

Linear Stroke Lengths	3, 6 & 9 mm (standard version) 1.5 mm (high resolution version)
Accuracy*	± 1.0 % using straight line ± 0.1 % using polynomial
Sensitivity	2 volts/mm typical
Signal to noise	2000 to 1 (with filter 3 dB down at 800 Hz, standard)
Resolution (0.05% full scale for standard version)	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	7 KHz (unfiltered)
Temperature coefficient	offset 0.0029%/ °C (typical) span 0.030%/ °C (typical)
Hysteresis*	± 1 micron
Repeatability*	± 1 micron

\* at constant temperature

## Mechanical Specifications

Overall 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
Gauge length	adjustable, 1.5 mm minimum
Outside diameter	1.5 mm (standard version) 1.8 mm (high resolution)
Housing material	smooth stainless steel, 4-40, 6-32 & 8-32 threaded options
Attachment method	stainless steel clamp, screws or barbs
Leadouts	45 cm, multi stranded, shielded, stainless steel reinforced, Teflon insulated
Connector	keyed Lemo 4-pin with polyolefin strain relief
Operating temperature	-55 to 175 °C



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