

Subminiature Gauging DVRT[®]

Differential Variable Reluctance Transducer



Introduction

Designed to get into tight spaces, the sub-miniature gauging DVRT delivers high performance in a small package. A ruby bearing and hardened stainless steel ball guide the spring-loaded tip, providing an exceptionally smooth static and dynamic response and resistance to side load.

Features of the sub-miniature DVRT's include: sub-micron resolution, linear analog output, flat dynamic response to kHz levels, and very low temperature coefficients. Extremely lightweight, captive cores are small yet rugged. Manufactured using corrosion-resistant alloys, the sub-miniature gauging DVRTs are suitable for submersion in harsh media such as brake fluid and hot saline.

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.

Custom ranges are available on request.

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

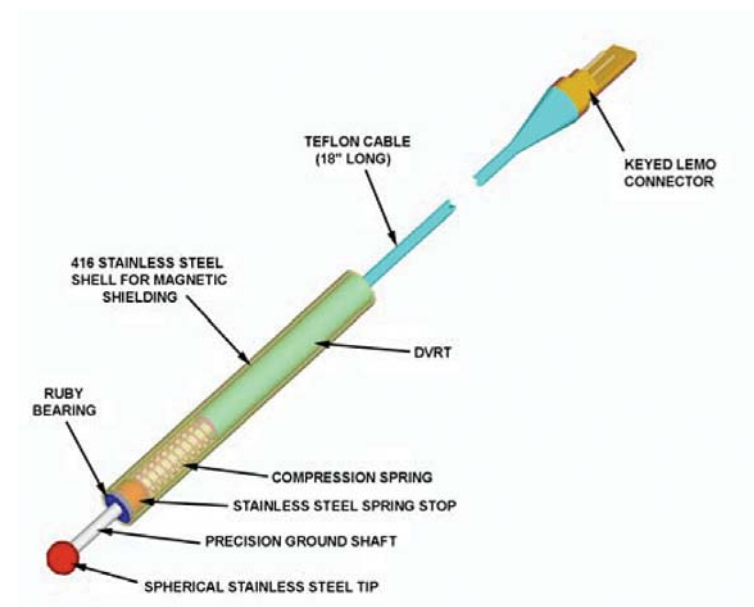
- miniature control elements for automotive and robotic systems
- process control for production-line monitoring
- dimensional gauging for quality control applications
- measuring strain and deflection in materials science and civil structures
- linear/angular positioning of optical components
- miniature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



How it works

Core position is detected by measuring the coils' differential reluctance, using a sinewave 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 DVRT® has been successfully employed in harsh applications, including immersion in saline and pressurized oil.



Electrical Specifications

(obtained using MicroStrain's DEMOD-DVRT)

Linear Stroke Lengths	4, 8, 24, 38 mm (standard resolution) 6 mm (high resolution) 500 µm or less (nano resolution)
Accuracy*	± 1.0 % using straight line ± 0.1 % using polynomial
Sensitivity	1 volt/mm typical (for 8 mm stroke)
Signal to noise (using DEMOD-DVRT)	4200 to 1 (with filter 3 dB down at 800 Hz, standard resolution), 466 to 1 (unfiltered)
Resolution (0.025% of full scale for standard version)	1.0 µm for 4 mm stroke 2.0 µm for 8 mm stroke 6.0 µm for 24 mm stroke 9.5 µm for 38 mm stroke 0.6 µm for high resolution version 10 nm for nano resolution
Frequency response	800 Hz standard, 20 KHz optional
Temperature coefficient	offset 0.002% / °C (typical) span 0.030% / °C (typical)
Hysteresis*	± 1 micron
Repeatability*	± 1 micron

* at constant temperature

Mechanical Specifications

Overall body length	30.5 mm for 4 mm stroke 50.5 mm for 8 mm stroke 127 mm for 24 mm stroke 183 mm for 38 mm stroke
Outside diameter	6.0 mm (smooth body)
Housing	400 stainless steel; smooth body or 3/8-24 UNF thread
Core material	stainless steel
Bearing material	ruby and stainless steel
Standard core tip	4.76 mm stainless steel ball
Leadouts	45 cm multistrand, shielded, stainless steel reinforced teflon insulated cable
Connector	keyed 4 pin Lemo
Operating temperature	-55 to 175 °C

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