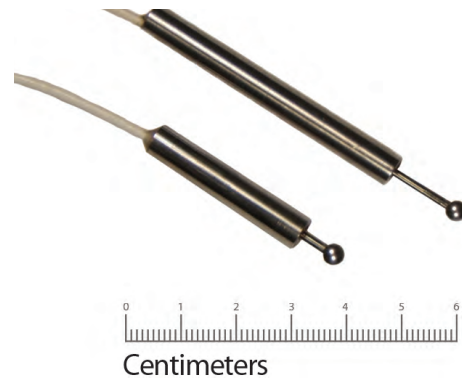


Subminiature Gauging DVRT®

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® 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, sub-miniature gauging DVRT®s are suitable for short term submersion in harsh media such as brake fluid and hot saline. Units can be custom built for long term submersion and other application specific requirements.

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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

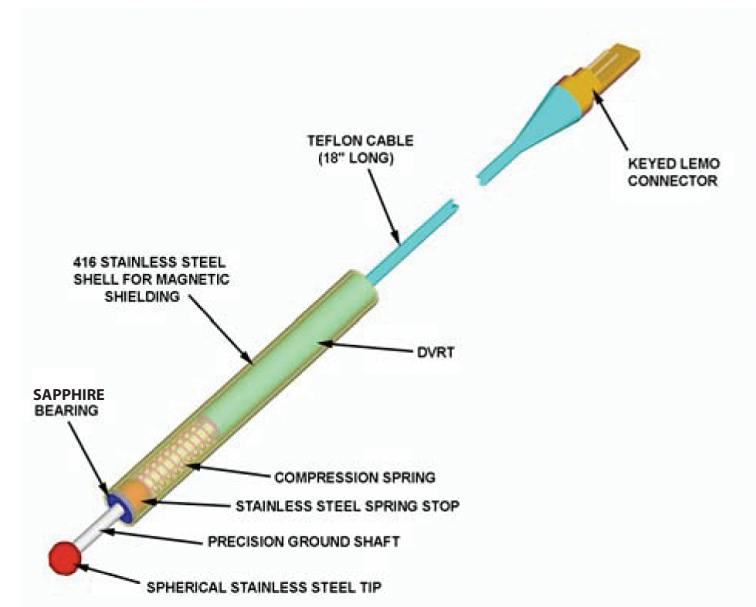
- miniature control elements for automotive and robotic systems
- process control for production-line monitoring
- dimensional gauging for quality control applications
- measuring strain and deflection in materials science and civil structures
- linear/angular positioning of optical components
- miniature 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	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 version
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 50.5 mm for high res version 50.5 mm for nano version
Outside diameter	6.0 mm (smooth body), 8.0 mm for 38 mm stroke
Spring stiffness	0.2 N/mm (1 lb/in)
Bearing material	sapphire and stainless steel
Standard core tip	4.76 mm stainless steel ball
Housing material	400 stainless steel; smooth body or 3/8-24 UNF thread; 38 mm stroke has 7/16-20 UNF thread
Attachment method	threaded body
Leadouts	45 cm multistrand, shielded, stainless steel reinforced teflon insulated cable
Connector	keyed 4 pin Lemo
Operating temperature	-55 to 175 °C
Cable diameter	0.070"

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