

# Application Note AN509: SCM5B43 - DC Linear Variable Displacement Transducer (LVDT) Input Module

Linear variable displacement transducers (LVDTs) provide a method of measuring displacements with very high accuracy and infinite resolution. These type of transducers utilize a precision linear variable differential transformer (also referred to in the industry as LVDT) as a measuring source together with hybrid ICs which include an oscillator, demodulator and filter. This combination provides a self-contained unit that accepts a dc voltage input and provides a dc voltage output relative to armature position.

Until recently, LVDTs were powered from an AC voltage source. One of the major difficulties was providing a stable and accurate AC source and converting the AC output signal back to DC for input to data acquisition systems. This required expensive and bulky external AC excitation power, demodulators and amplification equipment. Development of practical DC powered LVDTs became possible when miniature, high performance, solid-state components became available.

Early DC LVDTs could not match the performance of the AC powered devices. However, continuing development in microcircuit technology has enabled manufacturers to provide high performance, economical DC LVDTs that now equal the performance of AC units.

The Dataforth SCM5B43 was designed to interface directly to DC LVDTs; providing the required DC excitation, filtering, isolation, and output scaling to the user's A/D equipment. The SCM5B43 1kHz bandwidth reduces ripple and noise which is inherent in these devices. The stable +/-10V, +/-2mV

excitation voltage source is fully isolated from the input and output circuits of the module, which allows the module inputs to operate over the full range of the excitation voltage. Special input circuits provide protection of signal inputs and isolated excitation supply up to 240VAC. Eight full-scale input ranges are offered; from +/-1V to +/-8V, producing +/-5V full-scale output. The SCM5B43 and a DC LVDT create an extremely precise but simple displacement measuring system to be set up.

LVDTs are available with measurement ranges from +/-1mm to greater than one meter. They are a reliable alternative to linear potentiometers. The absence of sliding contacts gives them a long operating life. They are available in operating temperature ranges up to military specifications of -40C to +125C.

Application of LVDTs cover almost all engineering practices; civil, mechanical, chemical and production. They are used in production lines to perform automatic gauging for quality, sorting, or go/no-go applications. Other typical applications include servo position feedback, sensor for pressure transducers, strain measurement in structural members, and machine control. Submersible units are available which are ideal for offshore drilling, mining, marine and hydraulic engineering applications. Aerospace and defense applications are possible with LVDTs which meet military environmental standards. More exotic applications are possible with LVDTs tolerant to shock, vibration, and stray electrical fields.