DISPLACEMENT TRANSDUCERS

INTRODUCTION:

Displacement Transducer is used to measure linear displacements in borehole extensometers, Joint Meters or crack meters. It is ideally suited for applications involving transmission of electronic signals over long distances where other types of transducers based on resistance strain gages or potentiometers cannot be used. The linear displacement between the plunger and the body of the transducer is converted into a stable frequency signal by a vibrating wire transducer.

Displacement Transducers measure linear displacement differential expansion by means of vibrating wire sensors with the resonant frequency of vibration of a tensioned steel wire is proportional to the strain or tension in the wire. This fundamental relationship is utilized in a variety of configurations for the measurement of pressure. Vibrating wire sensors are well known for their long term stability.

The design contributes to the outstanding features and performances over conventional Vibrating Wire Displacement Transducer. The Displacement Transducer offers

Unprecedented sensitivity
Long term stability and reliability
Robust and sturdy construction
Slim-line design

TYPICAL APPLICATION:

As electronic sensors in rod type extensometers for measurement of linear displacement inside soil, concrete or rock.
As electronic sensor in joint-meters for measurements of relative movements of two surfaces in x, y, z directions.
For electronic monitoring of cracks with mounting blocks.
For measurement of displacements in inaccessible locations where mechanical measurements is not possible.

VIBRATING WIRE SENSOR

The sensor has a unique design. It comprises of a small stainless steel enclosure having a high tensile strength, heat treated and tempered steel wire. The wire is anchored at one end to the enclosure and at the other to a small pin. A coiled assembly is precisely located at the center of the wire inside the same enclosure. This greatly enhances the response characteristics of the vibrating wire. The sensor is placed in such a way that any movement of the displacement shaft causes its pin to move. The 'O' ring seal provides complete water proofing and high degree of protection from humid and corrosive environmental conditions

OPERATION:

Any change in the position of the displacement shaft changes the tension of the wire of the vibrating wire sensor. To measure the change in tension of the wire, its frequency of vibration is measured. The wire is plucked by energizing the coil magnet so that it vibrates at its natural resonant frequency that is read by the readout unit. The resonant frequency is proportional to the square root of the tension of the wire.

A conventional readout unit can accurately measure the resonant frequency of the wire. A more sophisticated microprocessor based readout unit can display the frequency as well as the displacement directly in engineering units. The transducer is suitable for connection to data loggers for recording displacement in engineering units automatically at predetermined intervals. By the use of appropriate software, the data logger can present recorded data in desired formats, predict trend of variations and even generate alarms at predetermined set points. A thermistor mounted in the transducer enables reading of temperature at the time of measurement allowing any corrections to be made in the observed reading due to temperature changes. Transducers with lightening protection are available on request.

SPECIFICATION

Model SIS 8000 Series
Standard Ranges 25, 50, 100, 150, mm
Nonlinearity 1% F.S.
Thermistor 3k Ohm @ 25^{o} C
Temperature Range −10°C to +60°C
Lengths Diameter 220, 270, 410, 550, 815 mm × 16 mm