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VW Strain Gauge – Surface Mount



Introduction

Strain gauges offer the ability to measure the effect of loads, settlement or other changes in a structure. They record strain, which is a dimensionless measure of deformation. Stress is related to strain by a material's properties and is predictable within a certain range of applied strain.

Strain gauges are useful for determining the effects of applied loads to a structure, such as the loading of post tension cables or removal of temporary supports. Piles of driven, cast or pre cast construction can also benefit from strain measurement as with sufficient strain gauges information such as the depth at which the load is transferred to the soil and the percentage of the load born as end bearing can be determined.

Geosense® VWS-2000 series vibrating wire surface strain mount gauges are designed for the long term monitoring of steel or concrete structures. Gauges may be attached to steel structures by arc welding or using alternative end blocks, bonded or grouted into concrete.

Working principle

The strain gauge operates on the principle that a tensioned wire, when plucked, vibrates at its resonant frequency. The square of this frequency is proportional to the strain in the wire. The gauge consists of two end blocks with a tensioned steel wire between them. The end blocks can be attached by either arc welding, bonding or groutable anchors to steel or concrete.

Around the wire is a magnetic coil which when pulsed by a vibrating readout or data logger interface plucks the wire and measures the resultant resonant frequency of vibration.

Deformation within the steel or concrete will cause the two end blocks to move relative to each other. The tension

in the wire between the blocks will change accordingly thus altering the resonant frequency of the wire.

Temperature information can be used to correct for different thermal expansion rates of dissimilar materials and if logging regularly can also determine swift temperature changes during which strain readings may be exaggerated

Features

- Reliable long term performance
- Rugged, suitable for demanding environments
- Range of mounting blocks
- Insensitive to long cable lengths.
- High accuracy
- Integral Thermistor for temperature correction
- Suitable for remote reading and data logging

Applications

Measurement of stress and strain deformation in:

- Steel struts
- Excavation support systems
- Driven and bored piles
- Tunnel linings
- Bridges & arches
- On-board truck weighing

Specifications

VWS-2000 vibrating wire strain gauges may be read by the VW-2106 or any vibrating wire readout device and may be readily connected with data loggers with vibrating wire interface modules.

Vibrating wire strain gauges output a frequency signal and are therefore insensitive to resistance changes in connecting cables caused by contact resistance or leakage to ground.

Cable may be readily and simply extended on site without special precautions. Gauges may be read up to 1000 metres away from their installed location without change in calibration.



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Model	VWS-2000	VWS-2010
Gauge length	150mm	89mm
Overall length	156mm	95mm
Resolution	1 $\mu\epsilon$	1 $\mu\epsilon$
Strain Range	3000 $\mu\epsilon$	3000 $\mu\epsilon$
Accuracy ¹	± 0.1 to $\pm 0.5\%$ FS	± 0.1 to $\pm 0.5\%$ FS
Non linearity	<0.5% FS	<0.5% FS
Temperature	-20°C to +80°C	-20°C to +80°C
Frequency range	850-1550	900-2000

¹ $\pm 0.1\%$ with individual calibration, $\pm 0.5\%$ FS with standard batch calibration

Anchor Types

A range of interchangeable anchor blocks allow the VWS-2000 to be used for many tasks.



Arc Weld

Grout

Bolt/bond

Accessories and Customisation

To order VWS-2000 series strain gauges the following information should be specified:

- Gauge length
- Anchor type
- Cable length

The accessories below will speed installation and data collection:

- Readout or datalogger
- Setting tool
- Spacing jig
- Dummy gauge

Readout Systems



Single Channel VW Readout

This unit allows a user to collect readings from a VW Sensor and Thermistor during installation or for short term jobs where an operator can check manually. With a switching box multiple VW system can be read one after the other.



Single Channel VW Datalogger

A low cost battery powered system for unattended monitoring of a single VW Sensor and thermistor.

Ten Channel VW Datalogger



Each channel records data from a VW sensors or thermistor.

Typically will record data for 5 VW sensors and integral thermistors.

Custom datalogger systems for any number of sensors in any configuration are also available and can be designed on request.

Please see our other data sheets for details of readout equipment, terminal boxes and data loggers specific to vibrating wire devices.

PCTE

PCTE have over 30 years' experience in the measurement and testing of concrete. With experience in research, consulting and construction they are able to assist you in reviewing the issues and developing solutions. PCTE can provide more than just the equipment. They can provide leading technical support for your business.

Other Equipment

GeoSense offer a complete range of structural health monitoring equipment, including VW strain gauges, extensometers, load cells and tilt meters.

The Olson Instrument range includes the NDE360, CTG, Freedom Data PC and DAS as well as the resonance tester. The full Proceq range of equipment is available for insitu non-destructive concrete measurement, including Schmidt Hammers, Covermeters, Half Potentials, Resistivity, Ultrasonics and Permeability.

We also supply Engius maturity, temp and humidity logging systems, corrosion rate monitoring equipment and GPR.