PAPWORTHS CONSTRUCTION TESTING EQUIPMENT

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VW Strain Gauge – Spot Weld

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.

Geosense® VWS-2020 series vibrating wire strain gauges are designed primarily to measure strains on the surface of steel structures but may also be used on other types of material. VWS 2020 strain gauges are available as a gauge with integral coil housing, or a gauge only with separate coil housing.

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 are attached to stainless steel tabs which may be attached to steel structures by spot welding or, using alternative end blocks, bonded or grouted.

Precision tensioning is carried out on site using a special tensioning jig and the gauge can be set for compression, tension or at mid point.

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 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

- Small size
- Can be used in confined spaces
- Easily tensioned on site
- Reliable long term performance
- Rugged, suitable for demanding environments
- 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:

- Bridges & Dams
- Buildings
- Struts and support systems.
- Pipelines
- Tunnel linings
- Piles & Mass Concrete
- Reinforcement bars

Avaliable Models

Model VWS-2020 consists of the gauge plus a separate plucking coil housing which is placed over the top of the gauge and secured using stainless steel straps.

The plucking coil housing is made from tough corrosion resistant plastic and also acts as protection to the gauge. It can also be used as a portable readout unit

Model VWS-2025 consists of an integral coil pluck housing which is encapsulated around the gauge.

Model VWS-2026 is the same as 2025 except the end blocks have pins which are designed to be grouted or bonded into holes drilled into the material under test.

For Models VWS-2025 & 2026 a separate cover plate is placed over the gauges to protect them and is secured using stainless steel straps

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1TYPE	VWS-2020	VWS-2025	VWS-2026
Fixing method	Spot welding	Spot welding	Bond/grout
Coil type	Separate	Integral	Integral
Gauge length	49mm	49mm	49mm
Overall length	65mm	65mm	65mm
Resolution	0.4 ε	0.4 ε	0.4 ε
Strain Range	3000 ε	3000 ε	3000 ε
Accuracy[1]	±0.1% to ±0.5% FS	±0.1% to ±0.5% FS	±0.1% to ±0.5% FS
Non linearity	<0.5% FS	<0.5% FS	<0.5% FS
Temperature range	-20°C to +80°C	-20°C to +80°C	-20°C to +80°C
Frequency range	1500-3500	1500-3500	1500-3500

Specifications

VWS-2020 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.

Accessories and Customisation

To order VWS-2020 series strain gauges the following information should be specified:

- Fixing method
- Coil type
- Protective cover
- Cable length

The accessories below will speed installation and data collection:

- Readout or datalogger
- Tensioning Jig

Readout Systems

Single Channel VW Readout

This unit allows a user to collect readings from a VW Sensor and Thermistpr during installation or for short term jobs where a 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 full Proceq range of equipment is available for insitu non-destructive concrete measurement, including Schmidt Hammers, Covermeters, Half Potentials, Resistivity, Ultrasonics and Permeability.