



Perth
West Perth
0408 034 668

Brisbane
Toowong
0419 477 715

Melbourne
Niddrie
0428 315 502

Sydney
Belrose
0418 381 709

www.pcte.com.au

VW Rebar Strain Meter & Sister Bars



GEOSENSE

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-4000 series vibrating wire Rebar Strain Meters (often known as 'sister bars') are designed to be embedded in concrete to measure strains due to imposed loads in mass concrete.

They comprise two lengths of ribbed rebar welded to a central gauge section. The central gauge section has a miniature stainless steel VW strain gauge, fitted along the longitudinal axis of the gauge. They are normally installed in pairs within the structure on either side of the neutral axis to separate bending moments from axial loads.



Four Sisters Bars are installed in the cage of a cast pile

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 ribbed rebar with a tensioned steel wire between them. 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 concrete will cause the end bars to move relative to each other. The tension in the wire between the bars will change accordingly thus altering the resonant frequency of the wire.

The coil units and cable connection are encapsulated with a proprietary rigid epoxy resin to keep the gauge de-bonded from the concrete.

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
- High accuracy
- Insensitive to long cable lengths
- Direct concrete embedment
- Optional Thermistor

Applications

Measurement of stress and strain deformation in:

- Concrete Piles
- Tunnel Linings
- Mass concrete structures
- Diaphragm walls and barrettes

Installation

VWS-4000 strain meters are dual purpose, and depending upon installation will serve a different purpose.

SISTER BAR

The VWS-4000 Sister Bar is installed by tying it alongside an existing length of rebar within the cage.

REBAR STRAIN METER

The VWS-4001 Rebar Strain Meter is installed by welding it into the existing rebar cage at a location within the structure where loads can be accurately passed from the concrete into the gauge.



Perth
West Perth
0408 034 668

Brisbane
Toowong
0419 477 715

Melbourne
Niddrie
0428 315 502

Sydney
Belrose
0418 381 709

www.pcte.com.au

Models	VWS-4000, VWS-4001
Thermistor	3k Ohms at 25°C
Over-range	+20%
Resolution	0.4µε
Accuracy	±0.5%FS
Non-linearity	<0.75%FS
Operating range	2500 micro strain
Cable	2 pair PUR outer sheath
Installation	Direct Embedment
Effective Gauge Length	50mm (nominal)
Debonded Length	175mm
Overall Length	1.39m
Standard Diameter	16mm
Coefficient of thermal expansion	12ppm/°C

Specifications

VWS-4000 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-4000 series strain gauges the following information should be specified:

- Cable length
- Rebar size
- Thermistor
- Lightning protection

The accessories below will speed installation and data collection:

- In-house calibration
- Readout units
- Terminal units

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.

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