

MODEL 3100

The Geotechnical Systems Australia Pty Ltd **Vibrating Wire Stressmeter** is an instrument designed to monitor stress changes in rock and concrete.

APPLICATIONS

Underground mining, deep excavations, tunnels and shafts.



OPERATING PRINCIPLES

In essence, the instrument consists of a highly tensioned steel wire stretched across the diameter of a stainless steel proving ring. The proving ring is wedged tightly inside the borehole and when a stress change occurs the ring is distorted. This distortion alters the tension in the wire, which in turn alters its natural resonant frequency.

An electromagnetic coil located adjacent to the steel wire, plucks it and the measured change in resonant frequency is related to the change in rock stress.

The stressmeter is read by a handheld digital readout Model 9120, an eight channel VW logger Model 9140 or Geologger Model 9150. Because the output is a frequency, contact resistance, leakage to ground and cable lead resistance does not effect the stressmeter readings and the cable need only be continuous in order to obtain readings. Cable lengths of up to 1.5 kilometers have been successfully measured without difficulty.

The stressmeter can be installed in boreholes 30m in length; it is wedged in the borehole by means of a manually or hydraulically operated setting tool that pulls the wedge between the proving ring and the platen. For soft rocks and

coal, special larger top platens and a soft shoe beneath the ring are available to lower the contact stresses within the borehole walls. In open boreholes the stressmeter can be recovered by pushing the wedge back, freeing the ring and withdrawing it from the borehole by the signal cable.

Because the stressmeter is rigid compared to the surrounding material, conversion of the frequency readings to stress changes does not require accurate knowledge of the rock modulus in rocks with an elastic modulus of less than 15×10^6 kPa. In rocks with a higher modulus, the modulus should be measured and calibration calculated from data supplied with the stressmeter.

In the Geotechnical Systems stressmeter the steel wire is perpendicular to the direction in which the body is loaded. This minimises point and centre loading effects and also increases the range of the instrument, as the wire remains taut for an increase in stress.

Since the stressmeter is uniaxial, to completely evaluate stress changes in a plane perpendicular to the axis of the borehole a minimum of three stressmeter installations are required.

Vibrating Stress meter

SPECIFICATION	VIBRATING WIRE STRESSMETER	Model 3100
Compression Range (mPa)		70
Tension Range (mPa)		5
Sensitivity (kPa)		10
Operating Temperature (Deg. C)		-20 to +60
Borehole Diameter (mm)		37-39
Maximum Borehole Depth (m)		30
Dimensions (L x Dia in mm)		41 x 28
Weight (kg)		0.25

(Note: Values for compression, tension and sensitivity are nominal values only).

SPECIAL FEATURES

- Very high range
- Simplified installation
- Corrosion resistant
- Waterproof
- Long-term stability
- Suitable for remote readout
- Rugged construction
- Intrinsically safe for use in coalmines

PERFORMANCE

Each cell is supplied with a performance plot of direct load against output. This plot does not take into account variation in rock modulus and the effectiveness of the coupling of the stressmeter to the rock, it is simply verification of the mechanical operation of the cell.

MODELS

Geotechnical Systems stressmeters are available in two versions, the Model 3100 is standard with hard rock top platen, and the Model 3110 has a soft rock top platen and a soft shoe attached underneath to lower contact stresses.

ORDERING INFORMATION

When ordering a Geotechnical Systems stressmeter please specify the following;

The model number

The cable length

The installation tool

Whether the soft rock option is required