

# Vibrating Wire Stressmeters

## Applications

The Model 4300 Series are designed to measure stress changes in elastic rocks and are especially suited for...

- Mine openings
- Tunnels
- Support pillars
- Shafts



• Model 4300EX (front), Model 4300BX (center) and Model 4300NX (rear) Vibrating Wire Stressmeters.

## Operating Principle

The stressmeter consists essentially of a high strength steel proving ring wedged tightly across one diameter of a borehole drilled into the rock. The distortion of the proving ring, caused by changing rock stresses, is measured by means of a vibrating wire. Changes in rock stress cause changes in the resonant frequency of vibration of the tensioned wire, and the two are related by means of calibration data supplied with each stressmeter.

The stressmeter behaves as a rigid inclusion in that the calibration varies by only a factor of two if the rock modulus varies by a factor of ten. The relationship between calibration factor and rock modulus is supplied with the instruction manual.

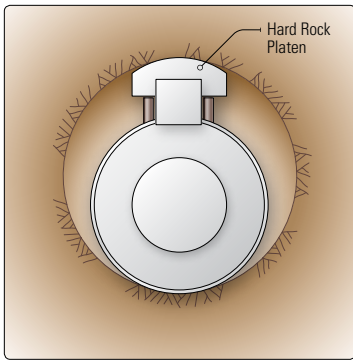
## Advantages and Limitations

The 4300 Series Stressmeters are available in three standard sizes and provide high sensitivity, very high range and long-term stability for extended monitoring periods. The stressmeters are corrosion resistant, waterproof, easily installed and suitable for remote readout.

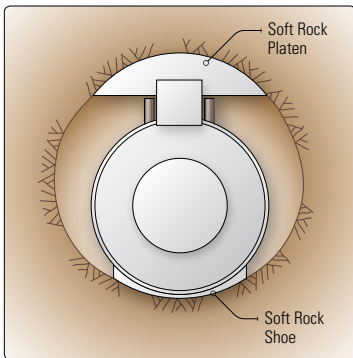
The design is an improvement of the stressmeter developed for the U.S. Bureau of Mines (U.S. Patent 3889525). By reorienting the vibrating wire to be at 90° with respect to the loading platens, the gage has been given a high initial sensitivity coupled with a virtually unlimited range of increasing stresses. Installation procedures have been modified to permit the gage to be wedged into place at much higher preloads than hitherto possible. This extends the range of tensile stress changes that can be measured.

A thermistor is located inside the stressmeter to enable simultaneous measurement of temperatures.

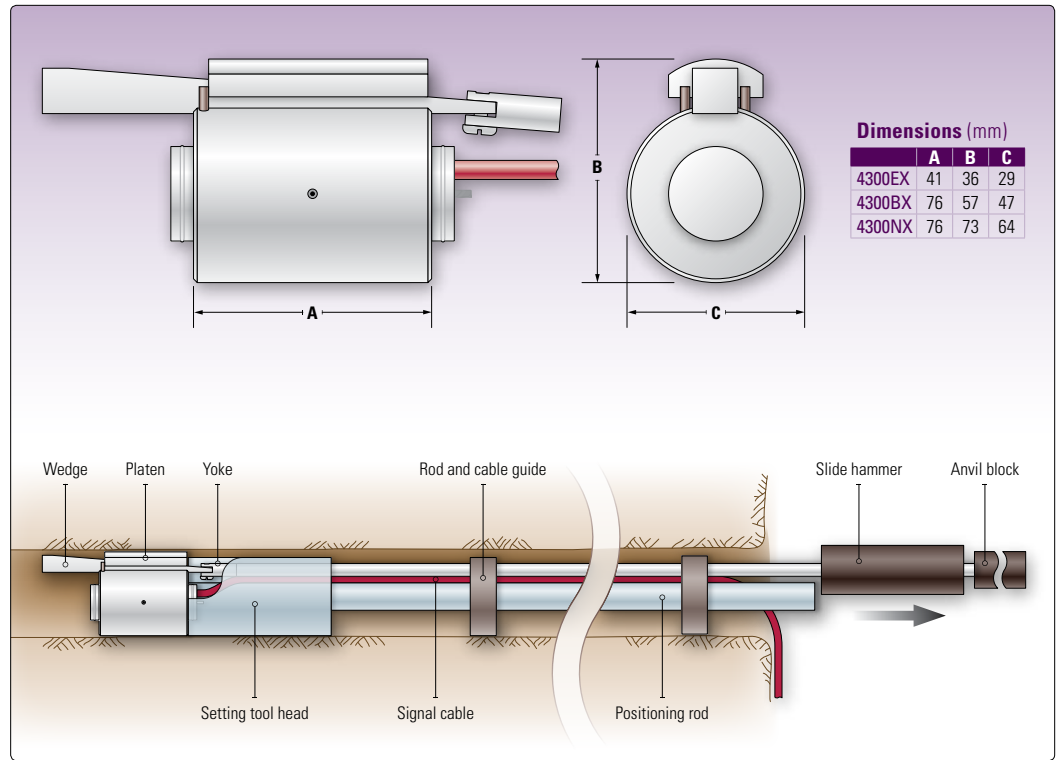
High temperature versions (up to 200°C) are also available (please contact **GEOKON®** for details).



• Model 4300 installation in hard rock.



• Model 4300 installation in soft rock, using a soft rock shoe and soft rock platen.



• Model 4300 details and installation tool assembly.

Dimensions (mm)			
	A	B	C
4300EX	41	36	29
4300BX	76	57	47
4300NX	76	73	64

## System Components

The stressmeter is installed in boreholes up to 30 meters deep by means of a setting tool, which is used to drive a wedge so that a platen is expanded against the side of the borehole (see illustration above). When used in soft rocks and coal, a soft rock shoe and soft rock platen are used to increase the area of contact. Diamond drill holes EX (Model 4300EX), BX (Model 4300BX) or NX (Model 4300NX) are preferable. Boreholes drilled percussively should have their walls smoothed by incorporating a reaming shell in the bit.

The stressmeter can be read using the Model GK-404 or GK-405 Readouts or the Model 8021 Micro-1000 or 8025 Micro-800 Dataloggers.

## Technical Specifications

Range in Compression	70 MPa
Range in Tension	3 MPa
Resolution <sup>1</sup>	14 to 70 kPa
Temperature Range <sup>2</sup>	-20°C to +80°C
Maximum Borehole Depth	30 m
Borehole Diameter	(4300EX) 37 to 39 mm (4300BX) 58 to 61 mm (4300NX) 74 to 77 mm

<sup>1</sup>Depends on rock modulus.

<sup>2</sup>High temperature versions (to 200°C) available on request.

## Model Numbers

	Hard Rock	Soft Rock
EX	4300-1EX-H	4300-1EX-S
BX	4300-1BX-H	4300-1BX-S
NX	4300-1NX-H	4300-1NX-S