ARC WELDABLE STRAIN GAUGE

GEOKON®

MODEL 4000, 4050



Model 4000 Vibrating Wire Strain Gauge (shown with pluck and read coil, mounting blocks and hose clamp).

APPLICATIONS

The Model 4000 Vibrating Wire Strain Gauge is designed primarily for long-term strain measurements of steel structures including

- Tunnel linings
- Excavation bracing
- Arches
- Struts
- Sheet piling
- Piles
- Bridges



GeoNet Vibrating Wire Data Logger.

OPERATING PRINCIPLE

The Model 4000 Series Vibrating Wire Arc Weldable Strain Gauges are designed to be arc welded to the surface of a structural steel member. Strains are measured using the vibrating wire principle. A length of steel wire tensioned between two mounting blocks that are arc welded to the surface of a structural steel member. Deformation of the structure under load produces relative movement between the two mounting blocks causing a change in the wire tension and a corresponding change in its frequency of vibration.

The resonant frequency is measured by plucking the wire using an electromagnetic coil connected through a signal cable to a readout, which also measures the frequency and displays the strain in the wire directly in microstrain.

ADVANTAGES AND LIMITATIONS

The Model 4000 vibrating wire Strain Gauge features an elegant and robust design with all the usual advantages of vibrating wire technology. It has long-term stability, high resistance to water intrusion and lightning damage, and the ability to be used with long signal cables.

The electronic coil can be detached from the rest of the gauge at any time without disturbing the gauge reading. This provides a degree of flexibility in the event of cable damage. Gauges and coils are re-usable.

The Model 4000 can also be used on other materials such as wood, rock or concrete. Standard mounting blocks can be epoxy bonded to the surface or special concrete mounting blocks can be used in which short rebar studs are grouted into boreholes.

Temperature effects are automatically compensated for when the gauges are welded to steel. The thermistor permits real thermal induced strain to be distinguished from load induced strains.

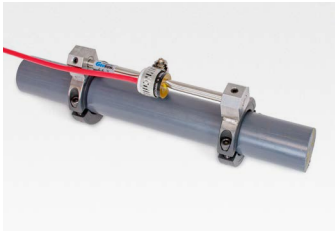
The Model 4050 is a modified version of the Model 4000 designed for measuring strains over a longer base length.

Also available are the Model 4000-ER-5 and 4000-ER-10 extended range versions, which are designed for measuring large strains of up to 5,000 and 10,000 microstrain respectively.

Strain Gauges can be customized to meet your needs. Our staff will work with you throughout the process. Common customizations include gage length, materials, mounting options, temperature range, etc.



Model 4050 with a 305 mm active gage length (mounting blocks sold separately).



Model 4000-4X Custom Strain Gauge with C-Clamp Mounting Blocks.



Model 4000BX Custom Strain Gauge Crackmeter.



Model 4000WP-2X Arc Weldable Waterproof Strain Gauge.



Model 4050X-TI Titanium Strain Gauge.

SYSTEM COMPONENTS

The vibrating wire is protected inside a stainless steel tube with O-ring seals at both ends for water-proofing. The electronic coil clips over the center of the tube and a thermistor is encapsulated with the coil to permit the measurement of temperature.

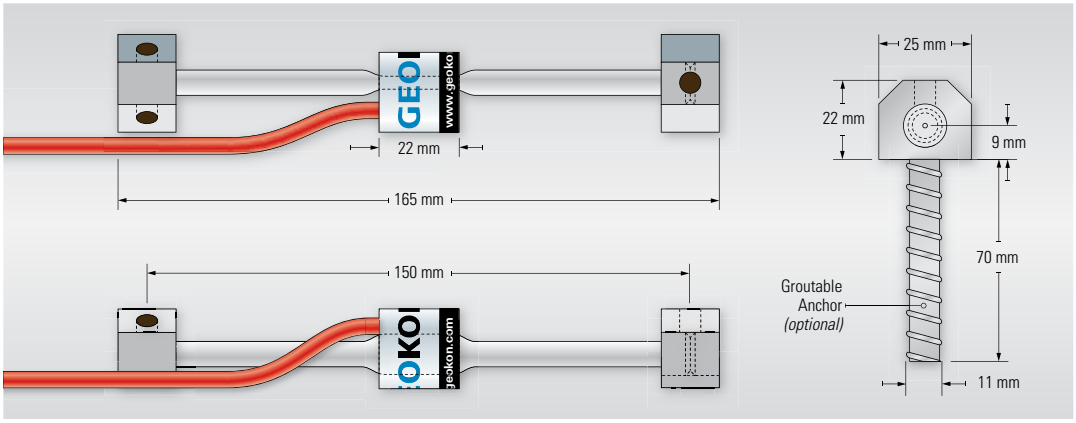
The Model 4000-8 spacer bar and welding jig is used to correctly space the mounting blocks during welding. Cover plates (Model 4000-6) can be used to protect the gauge from accidental damage.

Data acquisition can be performed manually via direct readout or autonomously using data loggers that provide automatic data collection at predetermined intervals and wireless data transmission.

TECHNICAL SPECIFICATIONS

	4000	4000-ER-5, 4000-ER-10	4050
Standard Range	3000 με	5000 με (4000-ER-5) 10000 με (4000-ER-10)	3000 με
Accuracy	±0.5% F.S.[1]	±0.5% F.S.	±0.5% F.S.[1]
Nonlinearity	< 0.5% F.S.	±2.5-4.0% F.S.	< 0.5% F.S.
Temperature Range[2]	–20 °C to +80 °C	–20 °C to +80 °C	–20 °C to +80 °C
Active Gage Length[2]	150 mm (5.875 in.)	150 mm (5.875 in.)	305 mm (12 in.)

[1]±0.5% F.S. with standard batch calibration. ±0.1% F.S. with individual calibration. Accuracy established under laboratory conditions. [2]Other lengths and ranges available on request.



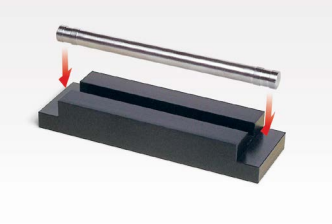
Dimensions of the Model 4000 Strain Gauge, plucking coil, and Model 4000-5 concrete mounting blocks.



Model 4000-5 Concrete Mounting Blocks.



Galvanized Steel Cover Plate.
(Model 4000-6 or Model 4000-13.)



Spacer bar and welding jig.
(Model 4000-8 or 4050-8.)



Model GK-404 Handheld Read Out.



Model GK-406 Vibrating Wire Analyzer.



Model 8600 Series Data Logger.

4000 ORDERING INFORMATION[1]

4000: Vibrating Wire Strain Gauge only.
4000A-1: Model 4000 Strain Gauge, with plucking coil, 3 m cable, thermistor, hose clamp, and arc weldable mounting blocks.
4000A-2: Model 4000 Strain Gauge, with plucking coil, thermistor, hose clamp, and arc weldable mounting blocks. Cable sold separately.
4000B-1: Model 4000 Strain Gauge, with plucking coil, 3 m cable, thermistor, hose clamp, and rebar mounting blocks.
4000B-2: Model 4000 Strain Gauge, with plucking coil, thermistor, hose clamp, and rebar mounting blocks. Cable sold separately.
4000C-1: Model 4000 Strain Gauge, with plucking coil, 3 m cable, thermistor, and hose clamp. Mounting blocks not included.
4000C-2: Model 4000 Strain Gauge, with plucking coil, thermistor, and hose clamp. Mounting blocks not included. Cable sold separately.
4000D-1: Model 4000 Strain Gauge, with plucking coil, 3 m cable, and thermistor. Mounting blocks and hose clamps not included.
4000-ER-5: Vibrating Wire Strain Gauge, 5,000 με range, gauge only. Includes individual calibration.
4000-ER-5-SL: Model 4000-ER-5 Strain Gauge, with plucking coil, 3 m cable, thermistor, hose clamp, arc weldable mounting blocks, and individual calibration.
4000-ER-5-VL: Model 4000-ER-5 Strain Gauge, with plucking coil, thermistor, hose clamp, arc weldable mounting blocks, and individual calibration. Cable sold separately.
4000-ER-10: Vibrating Wire Strain Gauge, 10,000 με range, gauge only. Includes individual calibrations.
4000-ER-10-SL: Model 4000-ER-10 Strain Gauge, with plucking coil, 3 m cable, thermistor, hose clamp, arc weldable mounting blocks, and individual calibration.
4000-ER-10-VL: Model 4000-ER-10 Strain Gauge, with plucking coil, thermistor, hose clamp, arc weldable mounting blocks, and individual calibration. Cable sold separately.
4050: Vibrating Wire Strain Gauge, 305 mm extended length version, with plucking coil, and thermistor. Mounting blocks sold separately.
02-187V3: Red PVC Cable, 4.75 mm (±0.25 mm) [0.187"] ø, 2 twisted pairs, for the above.
4000-1: Plucking coil and hose clamp. Includes thermistor. Cable sold separately
4000-3: Plucking coil and hose clamp. Includes thermistor and 3 m cable.
4000-4: Arc weldable mounting blocks.
4000-5: Concrete mounting rebar blocks.
4000-6: Galvanized steel cover plate, 0.6 m length. Includes mounting hardware.
4000-8: Welding jig and spacer bar installation tools.
4000-9: Spacer bar installation tool.
4000-10: Installation Tool for cover plates.
4000-11: Installation Tools for Strain Gauges with rebar-style mounting blocks (includes spacer bar, modified jig, and drilling template).
4000-13: Cover Plate for concrete installation. Requires TLS-209 Rawl Setting Tool.
4000-15: Adhesive Kit. Devcon putty, for concrete installations. (Sufficient adhesive for up to 50 gauges).
4000-18: Adhesive Kit. H4500 epoxy, for steel installations. (Sufficient adhesive for up to 50 gauges).
4050-8: Welding Jig and Spacer Bar installation tools.
4050-11: Installation Tools for Strain Gauges with rebar-style mounting blocks (includes spacer bar, modified jig and drilling template).
TLS-209: Rawl, Setting Tool, 3/8"

[1]Unless otherwise specified, Strain Gauges are batch calibrated. Individual calibrations are available upon request for an additional fee.

COMPATIBLE READOUTS AND DATA LOGGERS

GK-404: Handheld Readout
GK-406: Vibrating Wire Analyzer
8600 Series: Data Loggers
8800 and 8900 Series: GeoNet Wireless Mesh Data Acquisition System
8910 Series: GeoNet Wireless LoRa® Data Acquisition System
8920 and 8921 Series: GeoNet Cellular Data Loggers
8930 Series: GeoNet Wi-Fi Data Loggers
8940 Series: GeoNet Local Data Loggers
8951 Series: GeoNet Satellite Data Loggers

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