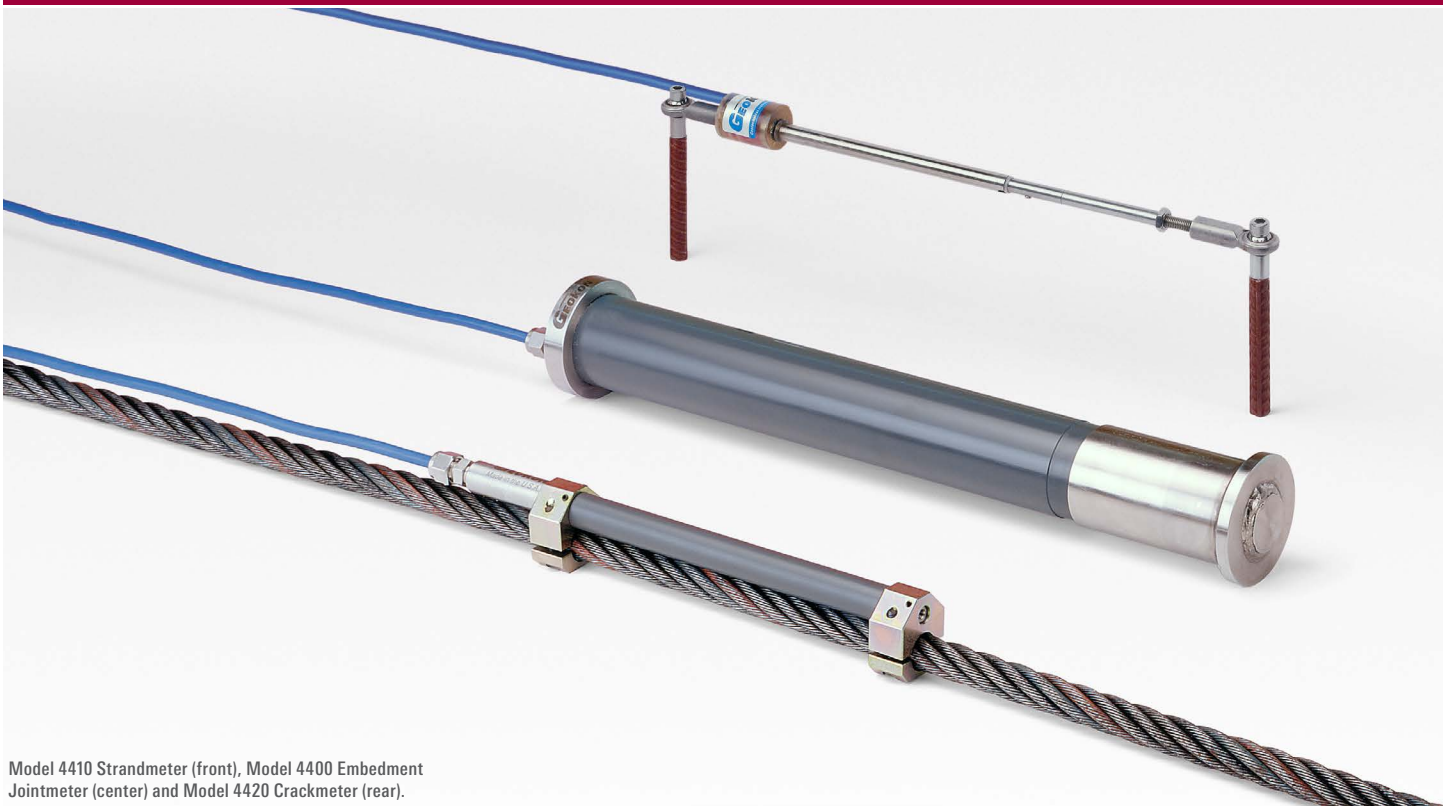
VIBRATING WIRE DISPLACEMENT TRANSDUCERS

GEOKON®

MODEL 4400 SERIES



Model 4410 Strandmeter (front), Model 4400 Embedment Jointmeter (center) and Model 4420 Crackmeter (rear).

APPLICATIONS

The 4400 Series are designed to measure or monitor the:

- Expansion or contraction of a joint
- Strains in tendons and steel cables
- Movement across surface cracks and joints
- Closures in underground excavations, tunnels, etc.
- Displacements associated with landslides
- Movement of boulders, snow, etc. on unstable slopes



GeoNet Vibrating Wire Data Logger.

OPERATING PRINCIPLE

GEOKON vibrating wire displacement transducers are designed to measure displacements across joints and cracks in concrete, rock, soil and structural members.

In essence, the transducer consists of a vibrating wire in series with a tension spring. Displacements are accommodated by a stretching of the tension spring, which produces a commensurate increase in wire tension.

The wire and spring are connected to a free-sliding rod which protrudes from, and is free to slide inside, a protective outer tube. An O-ring seal prevents water from entering.

The frequency signal is transmitted through the cable to the readout location, conditioned, and displayed on portable readouts or dataloggers.

ADVANTAGES AND LIMITATIONS

The 4400 Series Displacement Transducers are fabricated entirely from stainless steel and are waterproof to 1.75 MPa, which, coupled with their excellent long-term stability, guarantees reliability and performance in even the harshest environments.

An advantage of vibrating wire displacement transducers over more conventional linear potentiometers (or LVDT's) lies mainly in the use of a frequency, rather than a voltage, as the output signal. Frequencies may be transmitted over long lengths of electrical cable without appreciable degradation caused by variations in cable resistance or leakage to ground. This allows for a readout location that may be over a thousand meters from the transducer.

Thermistors are provided with all transducers for temperature measurement.

COMPATIBLE READOUTS AND DATA LOGGERS

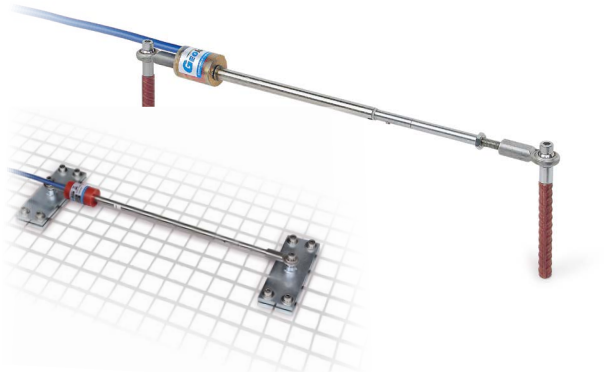
GK-404: Handheld Readout
GK-406: Vibrating Wire Analyzer
8800 and 8900 Series: GeoNet Wireless Mesh Data Acquisition System
8910 Series: GeoNet Wireless LoRa® Data Acquisition System
8920 and 8921 Series: GeoNet Cellular Data Loggers
8930 Series: GeoNet Wi-Fi Data Loggers
8940 Series: GeoNet Local Data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

MODEL 4420 CRACKMETER

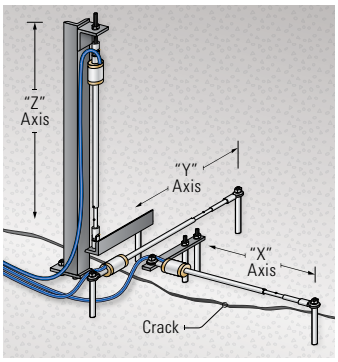
The Model 4420 Crackmeters are designed to measure movement across joints such as construction joints in buildings, bridges, pipelines, dams, etc.; tension cracks and joints in rock and concrete.

The ends of the sensor are attached to anchors (with ball joints) that have been grouted, bolted, welded or bonded on opposite sides of the crack or fissure to be monitored. 3-D Mounting brackets (see illustration on previous page) allow measurement of displacements in two or three orthogonal directions. Special clamps for attachment to a variety of earth reinforcements and geogrids are also available.

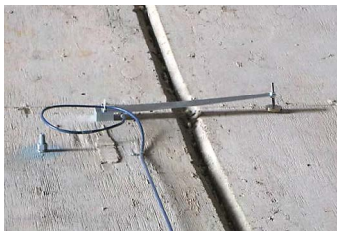
Special versions of the Model 4420 are offered including low profile models (Model 4420-3); versions for underwater use, where water pressures exceed 1.7 MPa; and versions for use in cryogenic or elevated temperature regimes (please contact GEOKON for details).



Model 4420 Crackmeter (inset: configured with special clamps for attachment to geogrids).



Model 4420 Crackmeters configured as a single 3-D Crackmeter (2-D also available.).



Model 4420-3 Low Profile Crackmeter for measurements in the "Z" direction.

MODEL 4422 MICRO CRACKMETER

The Model 4422 is a miniature crackmeter intended to measure displacements across surface cracks and joints. It has been specially designed for applications where access is limited and/or where monitoring instrumentation is to be as unobtrusive as possible (e.g. on historical structures or buildings).



Model 4422 Micro Crackmeter.

MODEL 4450 DISPLACEMENT TRANSDUCER

The Model 4450 Displacement Transducer provides remote readout capability for Borehole Extensometers (see the Model 1100 Rod-Type Borehole Extensometers data sheet for more information). They are particularly useful where other types of vibrating wire sensors are used and/or for installations where long cable runs are required.

The Model 4450 can also be installed between borehole anchors, in conjunction with the requisite length connecting rod, to provide a permanent, in-place incremental extensometer (contact GEOKON for details).



Model 4450 Displacement Transducers and Extensometer Head Assembly (inset).

MODEL 4410 STRANDMETER

The Model 4410 Strandmeter is designed to measure strains in tendons and steel cables, including bridge tendons, cable stays, ground anchors, tiebacks, etc. Two clamps at each end of the strandmeter hold it firmly onto the cable. Various size clamps are available.



Model 4410 Strandmeter.

MODEL 4425 CONVERGENCE METER

The Model 4425 Convergence Meter is designed to detect deformation in tunnels and underground caverns by measuring the contraction (or elongation) between 2 anchor points fixed in the walls of the tunnel or cavern.

The Model 4425 consists of a spring-tensioned vibrating wire transducer assembly, turnbuckle, 6 mm diameter connecting rods (stainless steel, fiberglass or graphite), rod clamp, and a pair of anchor points. Changes in distance between the 2 anchors are conveyed by the connecting rods and measured by the transducer.

The Model 4425 can operate in horizontal, inclined or vertical orientations. In areas where construction traffic is expected or where the instrument may be left in an exposed location, some form of protective housing should be considered.



Model 4425 Convergence Meter.

MODEL 4400 EMBEDMENT JOINTMETER

The Model 4400 is designed for use in construction joints; e.g. between lifts in concrete dams. In use, a socket is placed in the first lift of concrete and, when the forms are removed, a protective plug is pulled from the socket. The gauge is then screwed into the socket, extended slightly and then concreted into the next lift. Any opening of the joint is then measured by the gauge which is firmly anchored in each lift. The sensing gauge itself, is smaller than the protective housing, and a degree of shearing motion is allowed for by the use of ball-joint connections on the gauge.

A tripolar plasma surge arrestor is located inside the housing and provides protection from electrical transients such as those that may be induced by lightning.



Model 4400 Embedment Jointmeter shown with socket removed.

MODEL 4430 DEFORMATION METER

The Model 4430 Deformation Meter with flanged ends is designed to measure longitudinal deformation in dams and embankments. It can also be grouted or held in place by hydraulic anchors to measure deformations in boreholes (over the gauge length). Gauge lengths from 0.5 to 100 meters are available. Specifications overleaf. Please see the Model 4430 Deformation Meter data sheet for full product information.



Model 4430 Deformation Meter.

MODEL 4435 SOIL EXTENSOMETER

The Model 4435 Soil Extensometer is designed to be installed, in series, to measure horizontal strain and settlements in earthfill or rock-fill dams. The 4435 has flanges on either end, which enable a series of extensometers to be bolted together, forming long strings of sensors that allow complete profiles of deformation or settlement to be monitored. Please see the Model 4435 Soil Extensometer data sheet for full product information.



Model 4435 Soil Extensometer.

CUSTOM DISPLACEMENT TRANSDUCERS

Displacement transducers can be customized to meet your needs. Our staff will work with you throughout the process. Common customizations include waterproofing, high-temperature operation, corrosion resistance, specialty cables, etc.



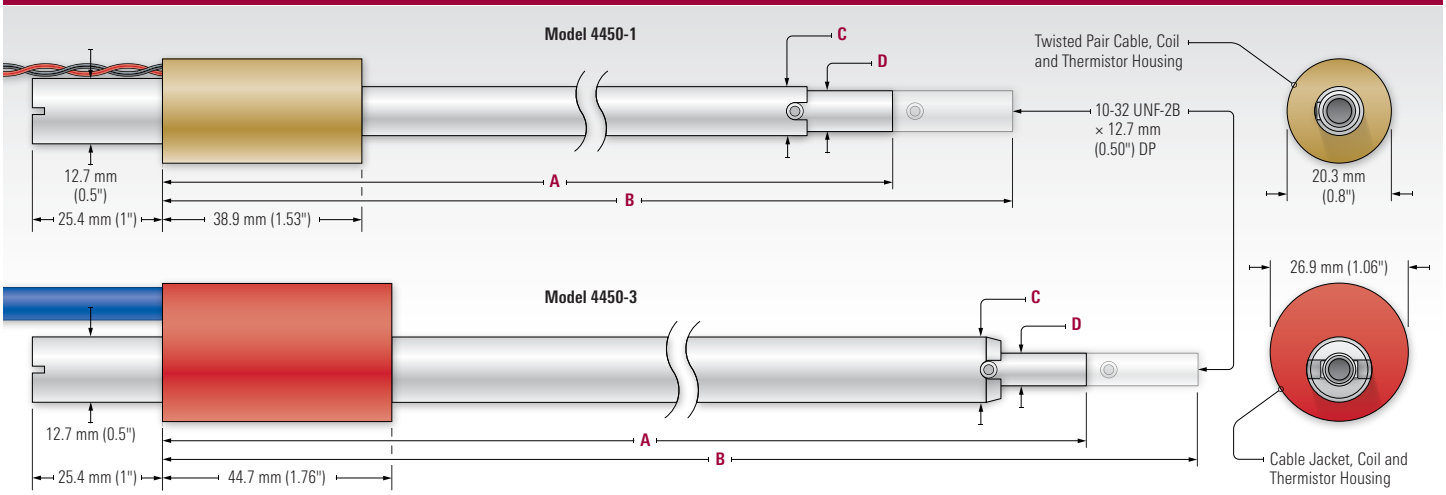
Custom Titanium Crackmeter

TECHNICAL SPECIFICATIONS

Model	Standard Ranges	Resolution	Accuracy[3]	Nonlinearity	Temperature Range[1]	Dimensions
4400 Embedment Jointmeter	12.5, 25, 50, 100 mm[1]	0.025% F.S.	±0.1% F.S.	< 0.5% F.S.	–20 °C to +80 °C	Lengths: 441, 441, 441, 569 mm Flange Diameter: 51 mm
4410 Strandmeter	3 mm (15,000 με)[1]	< 5 με	±0.1% F.S.	< 0.5% F.S.	–20 °C to +80 °C	Length: 203 mm Clamp Width: 45 mm
4420 Crackmeter	12.5, 25, 50, 100, 150, 300, 400, 500 mm[1]	0.025% F.S.	±0.1% F.S.	< 0.5% F.S.	–20 °C to +80 °C	Lengths[5]: 318, 343, 397, 555, 645 mm Shaft Diameter: 8 mm (12.5, 25, 50 mm ranges); 12.7 mm (100, 150 mm ranges) Coil Diameter: 25 mm
4420-3 Low Profile Crackmeter	25 mm[2]	0.01% F.S.	±0.25% F.S.	< 1.5% F.S.	–20 °C to +80 °C	Dimensions (L × W × H): 292 × 50 × 38 mm
4422 Micro Crackmeter	4 mm (±2 mm)	0.025% F.S.	±0.1% F.S.	< 0.5% F.S.	–20 °C to +80 °C	Length: 120 mm Shaft Diameter: 8 mmε
4425 Convergence Meter	12.5, 25, 50, 100, 150 mm[1]	0.025% F.S.	±0.1% F.S.	< 0.5% F.S.	–20 °C to +80 °C	Lengths: varies with application Transducer Diameter: 25 mm
4430 Deformation Meter	25, 50, 100, 150, 300 mm[1]	0.025% F.S.	±0.1% F.S.	< 0.5% F.S.	–20 °C to +80 °C	Length: 1 m (standard); as required Pipe Diameter: 27 mm Flange Diameter: 51 mm
4435 Soil Extensometer	25, 50, 100, 150, 300 mm[1]	0.025% F.S.	±0.1% F.S.	< 0.5% F.S.	–20 °C to +80 °C	Length: 610 mm (minimum) Pipe Diameter: 27 mm Slip Coupling Diameter: 33 mm Flange Dimensions (L × W × H): 610 × 75 × 75 mm
4450 Displacement Transducer	3, 12.5, 25, 50, 100, 150, 200, 230, 300 mm[1]	0.025% F.S.	±0.1% F.S.	< 0.5% F.S.	–20 °C to +80 °C	See dimensions below

[1]Other ranges available on request. | [2]Other ranges (< 25 mm) available on request. | [3]Accuracy established under laboratory conditions. | [4]Accuracy using polynomial. | [5]Length dimensions are in mid-range position.

MODEL 4450 DISPLACEMENT TRANSDUCER DIMENSIONS



Model 4450 Range ►	3 mm (0.125")	12.5 mm (0.5")	25 mm (1")	50 mm (2")	100 mm (4")	150 mm (6")	200 mm (8")	230 mm (9")	300 mm (12")
A: Full Compression	174.6 mm (6.875")	177.1 mm (6.971")	196.2 mm (7.726")	262.8 mm (10.348")	399.2 mm (15.718")	464.3 mm (18.28")	662.8 mm (26.093")	688.2 mm (27.093")	929.5 mm (36.593")
B: Full Extension	177.6 mm (7.000")	189.6 mm (7.471")	221.2 mm (8.726")	312.8 mm (12.348")	499.2 mm (19.718")	614.3 mm (24.280")	862.8 mm (34.093")	918.2 mm (36.093")	1229.5 mm (48.593")
C: Housing Ø	9.5 mm (0.375")	9.5 mm (0.375")	9.5 mm (0.375")	9.5 mm (0.375")	12.7 mm (0.500")	12.7 mm (0.500")	12.7 mm (0.500")	12.7 mm (0.500")	12.7 mm (0.500")
D: Shaft Ø	7.9 mm (0.312")	7.9 mm (0.312")	7.9 mm (0.312")	7.9 mm (0.312")	6.4 mm (0.250")	6.4 mm (0.250")	6.4 mm (0.250")	6.4 mm (0.250")	6.4 mm (0.250")

Please Note: Dimensions are for reference only.

GEOKON | TRUSTED MEASUREMENTS

GEOKON
48 Spencer Street
Lebanon, NH 03766 • USA

www.geokon.com
e: teamsales@geokon.com
p: +1 · 603 · 448 · 1562

GEOKON is an **ISO 9001:2015** registered company

Not all models are CE approved. Contact GEOKON for details.

The **GEOKON**® logo and word mark are registered trademarks with the United States Patent and Trademark Office. | **GEOKON** maintains an ongoing policy of design review and reserves the right to amend products and specifications without notice. | All other trademarks are the property of their respective owners.

©**GEOKON**. All Rights Reserved. | Rev-0-07/22/2026