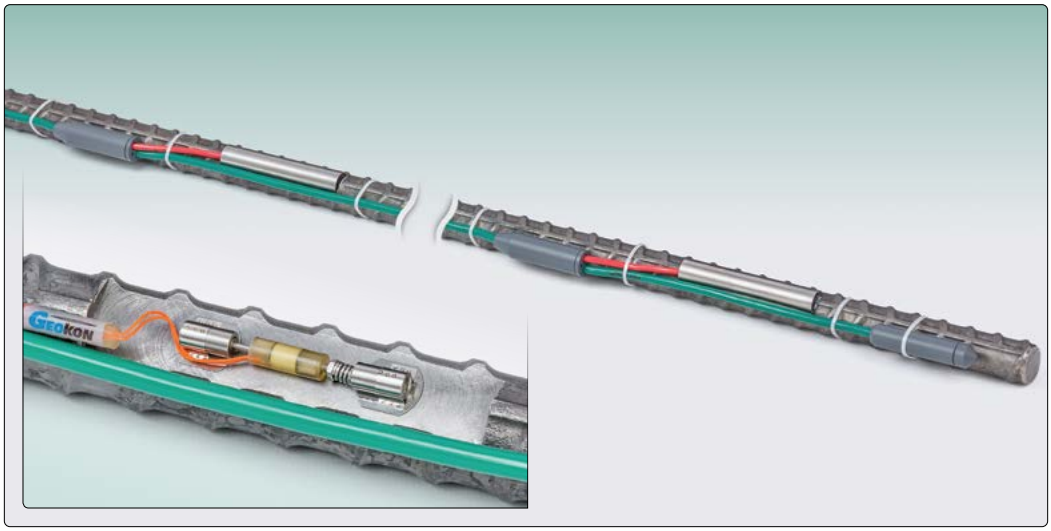
Addressable Vibrating Wire Interface

Applications

The Model 8020-30 Addressable Vibrating Wire Interface allows the monitoring of a number of vibrating wire sensors on one common cable, for example where strings of sensors are installed in or on…

- **Tiebacks**
- **Soil nails**
- **Tunnels**
- **Bridges**
- **Pipelines**
- **Retaining walls**



Model 4150 Addressable Strain Gauge, shown on soil nail. Inset shows closeup, with Model 4150-1 protective cover plate removed.

Operating Principle

Vibrating wire sensors are well known for their long-term stability. The advantage of vibrating wire sensors over more conventional types lies mainly in the sensor output, which is a frequency rather than a voltage, and which can be transmitted over long (> 2000 m) cables without appreciable degradation of the signal caused by variations in cable resistance, which can arise from water penetration, temperature fluctuations, contact resistance or leakage to ground. This factor, coupled with the elegance and ruggedness of **GEOKON®** designs results in sensors which exhibit excellent long-term stability and which are ideally suited for long-term measurements in adverse environments.

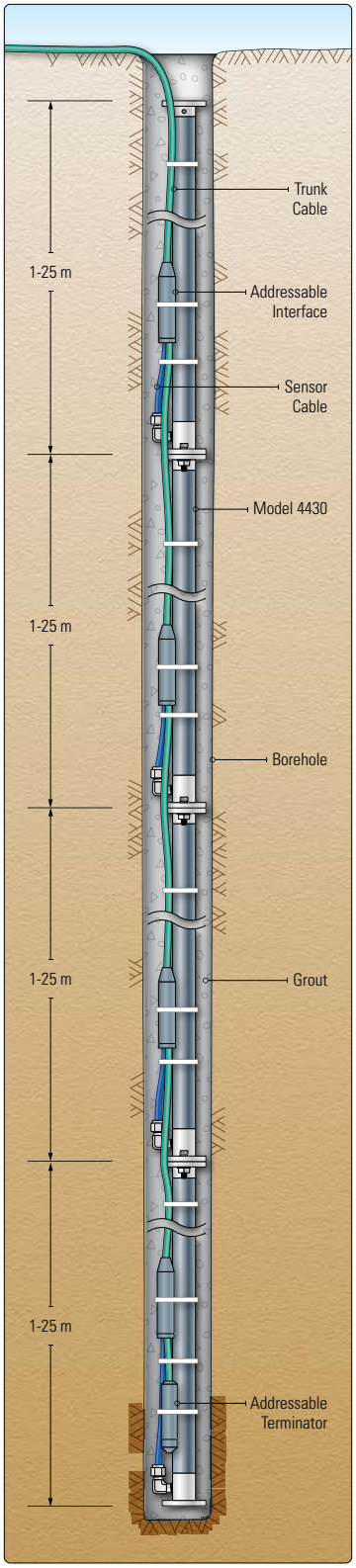
The Model 8020-30 Addressable Vibrating Wire Interface expands upon the abovementioned features by incorporating vibrating wire sensors with state of the art signal conditioning and digital addressing to provide a measuring system comprising of up to 100 sensors along one common cable *(the maximum number of sensors is determined by overall cable length and power supply: please contact **GEOKON** for more information).*

Advantages and Limitations

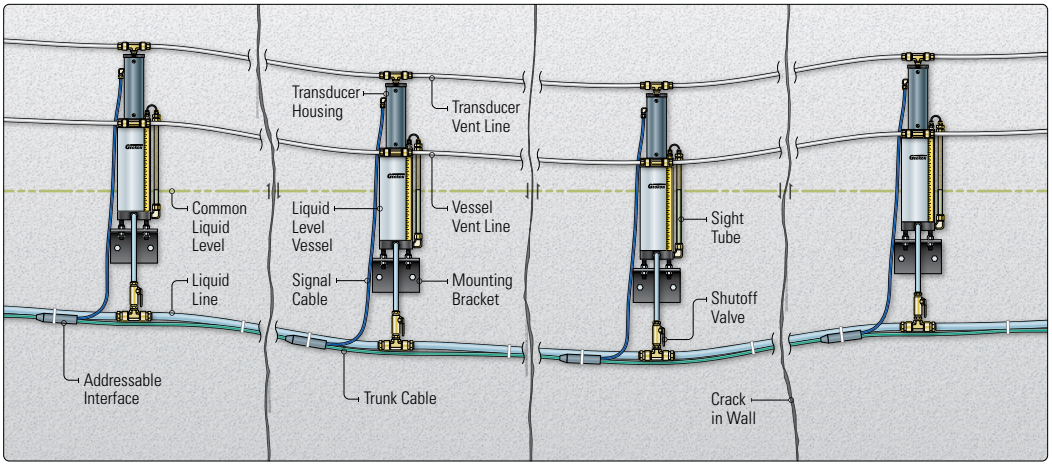
The Model 8020-30 Addressable Vibrating Wire Interface is designed to "daisy-chain" vibrating wire sensors on one common 4-conductor cable, which is made possible using the industry standard **Modbus®** RTU protocol over an RS-485 connection. It is particularly useful in incremental extensometers and other multipoint systems, for reducing lengthy cable runs in applications where sensors are installed in or on linear structures, for example a pipeline with strain gauges, a tunnel with pressure cells or a bridge deck with multilevel settlement sensors. It is also useful for applications where many sensor cables might compromise the effectiveness of a grout or cement bond, for example on a soil nail instrumented with vibrating wire strain gauges.

The system comprises a pre-fabricated trunk cable with cable splitters installed at locations close to the gauge locations. The splitters contain the necessary vibrating wire and thermistor circuitry to excite and read each sensor. Readings are accessed, or designated, by their unique **Modbus** addresses.

Systems can be configured with sensor cables and trunk cables cut to length and molded at **GEOKON**, or they can be provided with connectors for assembly in the field (please contact **GEOKON** for details regarding connector options).



● *A series of Model 4430 Deformation Meters, with Model 8020-30 Addressable Interface, installed as an incremental extensometer.*



● *Model 4675 High Sensitivity Settlement System with Model 8020-30 Addressable Interface, on a concrete wall with exaggerated settlement to illustrate change in elevation.*

Readout

Readout is achieved using the FPC-2 Field PC with USB-to-RS-485 Dongle, the 8600 Series Dataloggers or with GEOKON Addressable String Reader software[1].

Wireless readout can be accomplished using the GeoNet Wireless Data Hosting System.

1 Available for download at www.geokon.com/software

Technical Specifications

Measurements

▼ Vibrating Wire

Range	400 Hz to 5000 Hz
Frequency Trueness	0.082 Hz
Frequency Precision	0.146 Hz (99% Confidence Interval)
Frequency Resolution	0.002 Hz
Excitation Sweeps	400 Hz to 4500 Hz 400 Hz to 1200 Hz 800 Hz to 1600Hz 1400 Hz to 3500 Hz 2500 Hz to 5000 Hz
Frequency Measurement Duration	360 mS
Communication	**Modbus** RTU over RS-485 @ 115200 bps

▼ Thermistor

Temperature Range	–40 °C to +80 °C
Temperature Accuracy[1]	±0.5 °C
Temp. System Accuracy	±0.75 °C
Temperature Resolution	14-bit, non-linear, 0.032 °C *(worst case @ –40 °C)*

[1]*Stated accuracy is for thermistor only and is specified as interchangeability.*

Mechanical

Cable	2-250P4, 4-conductor, 2 twisted pairs, 6.35 mm (±0.25 mm) diameter
Housing	Machined PVC Cylinder/Epoxy filled 73 × 19 mm (L × ø)
Maximum Trunk Cable	Depends on number of sensors. Contact **GEOKON** for details.

Electrical

Supply Voltage	12V ± 20%
Supply Current (Idle)	1.2 mA/sensor
Supply Current (Active)	57 mA MAX (with 50Ω coils)/ 35 mA MAX (with 180Ω coils). Typical peak current is 30 mA and lasts for 100 ms during the excitation sweep.
Excitation Voltage	3.3 V
Operating Range	–40 °C to +80 °C

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