pizzi instruments

Vibrating Wire Rod Extensometer

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Instruments and Systems for Geotechnical and Structural Monitoring

Vibrating Wire rod Extensometer

Descrizione

Rod extensometers are used in geotechnical monitoring to monitor and measure with precision movements of one or more surface points, with respect to points considered fixed and located at different depths in the rock. (bedding, subsidence and deformation) Reference points are formed by special anchors, fixed in boreholes at the desired depth through cementing or by using special devices. Each measuring rod is linked to the relevant anchoring point which connects to the reference head. These rods are inserted in a protective covering which insulates them from the surrounding soil or filling grout and ensures free sliding. The rods, free to slide inside the covering, allow measurement of the relative movements between the anchoring point and the reference head installed on the surface. Measurement is performed manually by means of a gauge, analog or digital or by means of automatic displacement sensors (potentiometers, LVDT or vibrating wire). Measurements are made absolute by the certainty by the stability of the reference point or by measuring the instrument head using another method.

Different types of rod extensometers are available:

- **Single-point or multi-point, up to six measuring points;**
- **With vibrating wire displacement transducer or potentiometer**
- **With manual reading, or with manual and automatic reading**
- **With stainless steel rods or fiberglass (Invar rods on request)**
- **With standard anchors in concrete or specific to requirements**
- **With protective tin cap for fixed applications and cementation**

Standard Measuring head

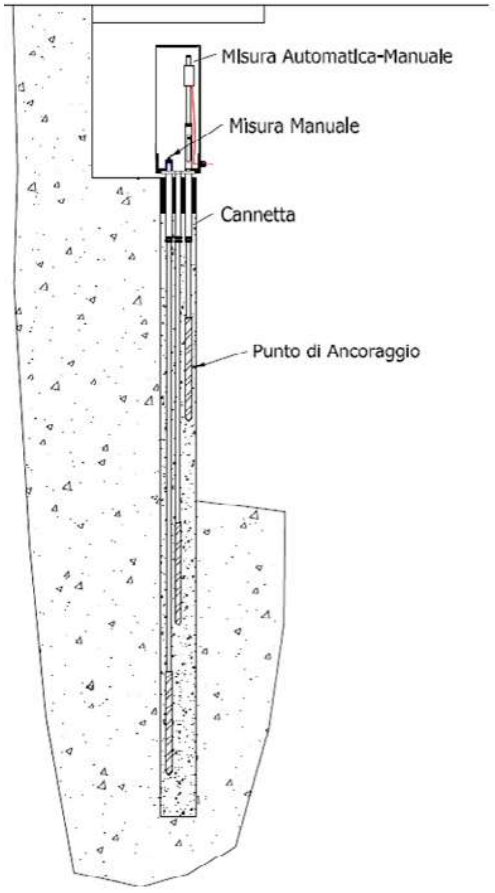
Applications

Rod extensometers are used for monitoring small displacements in rock or soil where a high degree of precision is necessary such as: the shifting and settling of foundations, the relaxation or yielding of rock around tunnels, shafts, caves. Typical applications include:

- Monitoring of movement or settlement in foundations
- Monitoring of tunnels, shafts, caves etc
- Monitoring of natural slopes, quarries and mining operations
- Monitoring of deformation of retaining walls, bridge pillars and shoulders
- Monitoring of dam foundations, intake towers and shoulders

Features and benefits

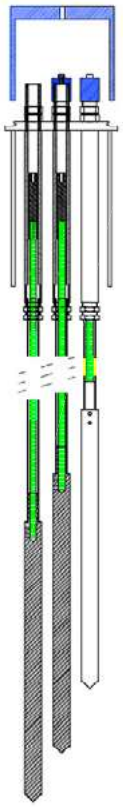
- High sensitivity and precision
- Strength of materials
- On site assembly
- Easy installation
- Automation of measurement and configuration for remote readings
- Verification of automatic measurements using manual readings without removal of the sensor
- Length and type of rods customizable to specific needs.
- Monitors up to six measuring points in one borehole
- Reliability over time
- Can be used with vibrating wire displacement transducers, potentiometers or LVDTs



Measurement principle

The rigid rods of the multi-point extensometer are anchored at one end specific locations in the soil or rock and slide in protective guide tubes, being free to move in one direction only.
The free ends of the rods are correlated to the instrument head (reference head) fixed at the surface and form the different measuring points. Distances between the free end of the rods and the reference head, measured over time, provide the movements of the various anchoring points relative to the head.
Movements are measured manually using a caliper or a dial gauge, or automatically through displacement transducers. The displacement transducers, fixed on the instrument reference head, can be LVDT, potentiometer or vibrating wire. Depending on the ground movements expected, sensors with different ranges can be chosen.

Technical specifications



Version	Glass Fiber	Stainless Steel	Invar	Wire in stainless
Diameter	7 mm	8 mm	8 mm	steel
Weight/meter	0,09 Kg/m	0,4 Kg/m	0,41 Kg/m	-
Young's Modulus	20 GPa	200 GPa	140 GPa	200 GPa
Coefficient of thermal expansion	3 ppm/°C	17 ppm/°C	1 ppm/°C	17 ppm/°C
Junction	Continuous	Threaded Bars M/F	Threaded Bars M/F	Continua
Protective Sheath	nylon Ø 12 mm tubo PVC da 1/2"	Nylon, PVC tube, PVC tube with ball bushing	Nylon, PVC tube, PVC tube with ball bushing	Nylon or PVC tube
Anchorages	Galvanized steel L=500 mm	Galvanized steel L=500 mm	Galvanized steel L=500 mm	Galvanized steel L=500 mm
Reference head	Stainless steel	Stainless steel	Stainless steel	Stainless steel

Vibrating wire transducer

Technology	Vibrating Wire
Temperature Sensor	On board
Range	5 ÷ 50 mm
Accuracy	± 0,2 % f.s.
Linearity	< ±0,2% f.s.
Resolution	< 0,02% f.s.
Frequency range	500 Hz ÷1000 Hz
Power Supply	From Datalogger
Material	Stainless Steel
Inner Rod	Stainless Steel
Protection	IP67 or IP68 up to 10 atm
Signal Cable	2 x 0,5 – 3x 0,5 with thermistor on board
Max Distance to Datalogge	1000 m

Potentiometer transducer

Technology	Linear Potentiometer
Temperature Sensor	On board
Range	0 ÷ 50 mm
Repeatability	0,01 mm
Linearity	± 0,1% f.s.
Resolution	Dependent on datalogger
Power Supply	9 ÷ 36 V
Material	Stainless Steel
Inner Rod	Stainless Steel
Anchor Types	Dowels, threaded bars, fixtures
Protection	IP67 (IP68 up to 10 atm on request)
Signal Cable	2 x 0,5; 3 x 0,5 with thermistor on board
Max Distance to Datalogger	1000 mt

On request LVDT can be supplied

Devices for manual readings

Model	Caliper	Dial Gauge
Range	200 mm	50 mm
Resolution	± 0,1 mm	± 0,01 mm
Accuracy	± 0,2mm	± 0,02 mm

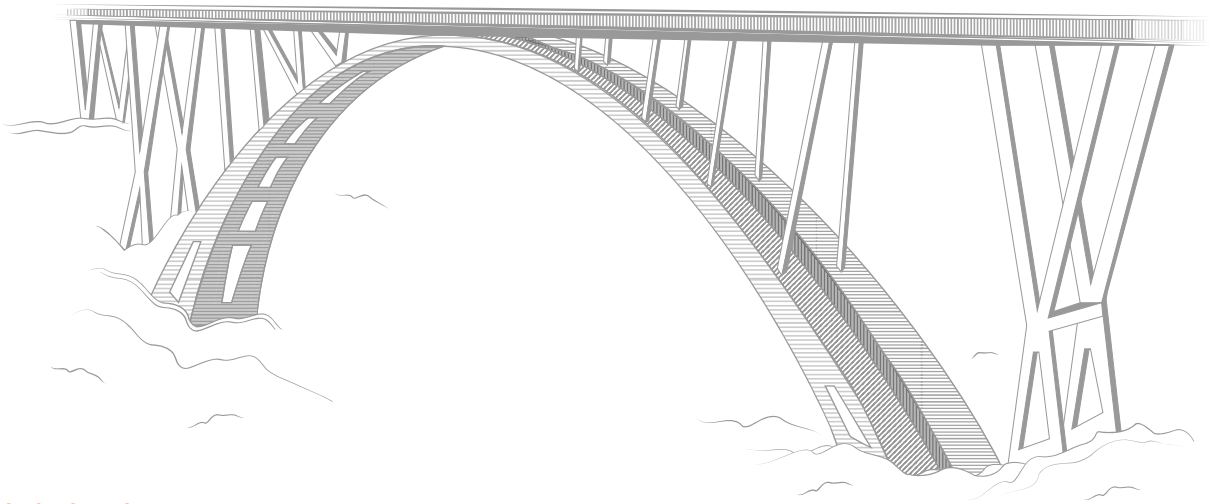
Accessories and related products

Caliper	Device for the manual reading of rod extensometer
Dial Gauge	Device for the manual reading of rod extensometer
Junction Boxes	Available in different models for the connection to different instrument
Multiwire Cable	Available with different conductors for the connection of different sensors to one cable
DEC5	Portable Readout Unit
DEC3000	Portable Datalogger
CUM3000	Multichannel Datalogger
MUX	Multiplexer for the connection of different sensors to Datalogger

The Company

For over 40 years we have been producing precision and large facility monitoring instruments sold throughout the world.

Accuracy in design, efficiency in construction, reliability in management; these are the prerogatives that every major work must have and that Structural Monitoring Systems must guarantee.



Technical assitance

If you have any requests or questions about our instruments or if you have special needs that require different solutions from the standard, please contact us. Our team will provide all the necessary information and will be very happy to work with you to study, develop and customize instruments and solutions suitable for your specific needs.

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