pizzi instruments

LEA_IT_EXT1001000

Vibrating Wire rod Extensometer

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Instruments and Systems for Geotechnical and Structural Monitoring

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Vibrating Wire rod Extensometer

Description

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**

The instrument can be read with our portable unit DEC3000 or with our automatic acquisition unit DAC3000.

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

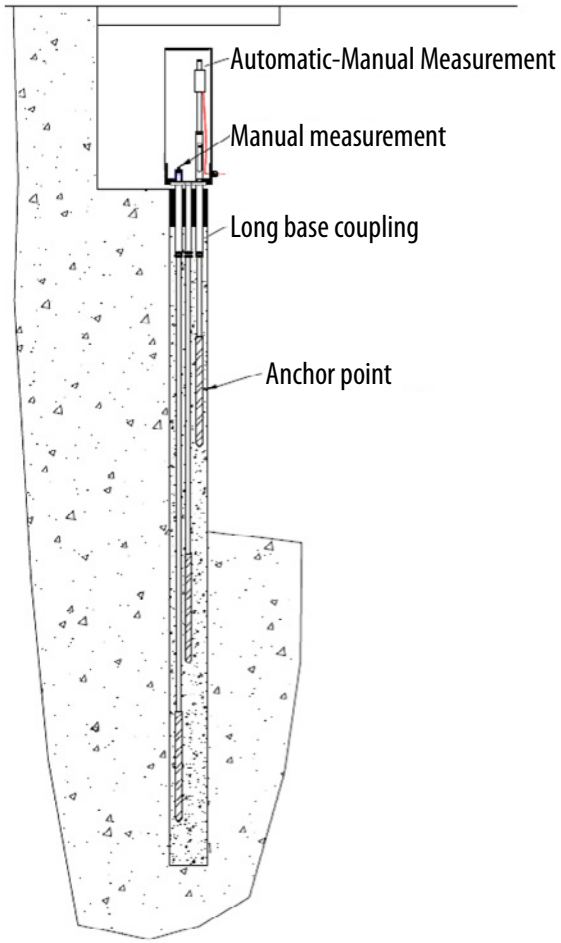
- **High sensitivity and precision**
- **Strength of materials**
- **On site assembly**
- **Easy installation**
- **Automation of measurement and configuration for remote readings**
- **Verification of automatic measurements using manual readings without removal of the sensor**
- **Length and type of 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 in 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.

Measurement principle

Reading of the potentiometric transducers can be performed manually with our hand-held read-out units or our portable datalogger DEC 3000; or with our automated datalogger CUM3000. Rod extensometers can be integrated into automatic monitoring systems with real-time monitoring of phenomena and managed with local and remote real-time alarms. In addition, versions with displacement transducers retain the facility to perform manual readings without the need to remove the sensors.
Stainless steel and Invar rods are supplied in lengths of 2 or 3 meters, linkable with threaded pins.
Guide tubes may be made of flexible, single piece nylon or of rigid linkable piping (length 2-3m or on request).



Fiberglass rods are supplied ready assembled in the workshop, to the desired length and complete with anchors and nylon guide tubing.

Stainless steel or Invar steel rods, complete with flexible or rigid protective pipes can be supplied on request.

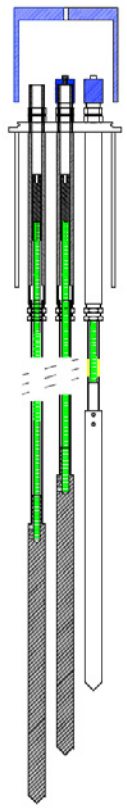
Rigid pipes can be supplied with ball bushings or Teflon sleeves. Standard anchors are suitable for cementing into rock or soil.

For particular soil conditions or specific installation requirements, special anchors can be made on request.
The reference head is made of stainless steel complete with protective cap. this facility allows control and reliability of electrical measurement and continued readings in the case of maintenance to or replacement of the sensor.

Fiberglass rods are supplied ready assembled from the workshop, of the desired length and complete with anchors and protective sheath with nylon guide tube.

Measuring head

Technical specifications



Version	Glass Fiber	Stainless Steel	Invar	Wire in stainless steel
Diameter	7 mm	8 mm	8 mm	3 mm
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	Continuous
Protective Sheath	nylon Ø 12 mm tubo PVC da 1/2"	In rods 3M long	In rods 3M long	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 Datalogger	1000 mt

Potentiometer transducer

Technology	Linear Potentiometer
Temperature Sensor	On board
Range	5 ÷ 50 mm
Repeatability	0,01mm
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)
Protezione	IP67 o IP68 fino a 10 atm
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	200mm	50mm
Resolution	± 0,1 mm	± 0,01mm
Accuracy	± 0,2 mm	± 0,02mm

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 instruments
Multiwire Cable	Available with different conductors for the connection of different sensors to one cable
DEC 5	Portable Readout Unit
DEC 3000	Portable Datalogger
CUM 3000	Multichannel Datalogger
MUX	Multiplexer for the connection of different sensors to Datalogger

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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The product information may be subject to variations at any time.
Please carefully check the release and contact Pizzi Instruments for further details.

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