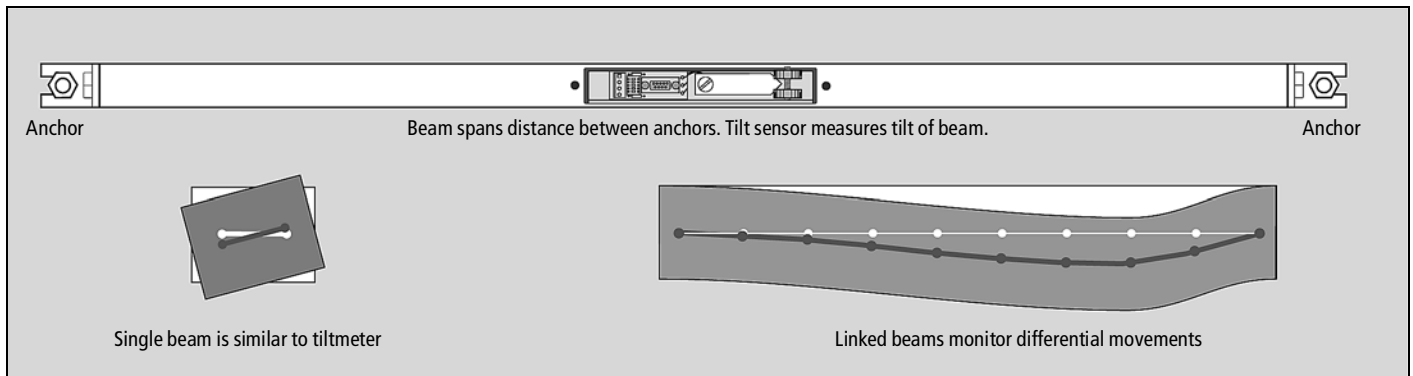


EL Beam Sensors



Applications

EL beam sensors monitor differential movement and rotation in structures. Horizontal beam sensors monitor settlement and heave. Vertical beam sensors monitor lateral displacement and deformation.

Typical applications include:

- Monitoring stabilization measures, such as pressure grouting and underpinning.
- Monitoring structures for the effects of tunneling and excavating.
- Monitoring the behavior of structures under load.
- Monitoring the stability of structures in landslide areas.
- Monitoring the deflection and deformation of retaining walls.
- Monitoring convergence and other movements in tunnels.

Operation

The beam sensor consists of an electrolytic tilt sensor attached to a rigid metal beam. The tilt sensor is a precision bubble-level that is sensed electrically as a resistance bridge. The bridge circuit outputs a voltage proportional to the tilt of the sensor.

The beam, which is typically one to two meters long, is mounted on anchor bolts that are set into the structure. Movement of the structure changes the tilt of the beam and the output of the sensor.

The voltage reading from the sensor is converted to a tilt reading in mm per meter. Displacements are then calculated by subtracting the initial tilt reading from the current reading and multiplying by the gauge length of the sensor (the distance between anchors).

When sensors are linked end to end, displacement values can be accumulated from anchor to anchor to provide a profile of differential movements or settlement.

Advantages

High Resolution: The beam sensor can detect a movement as small as 0.005 mm per meter of gauge length.

Easy Installation: The low profile beam fits nearly anywhere. The length of the beam can be modified to fit the structure, and special mounting brackets provide easy installation on curved surfaces.

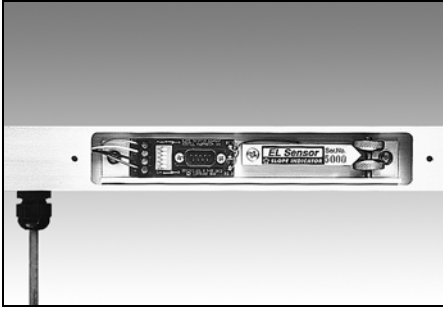
Simple and Robust: The electrolytic tilt sensor has no moving parts.

Ready for Data Logging: Beam sensors can be connected to a data acquisition system. Such systems can monitor continuously and trigger alarms when threatening movements are detected.

Cost Effective: The EL beam sensor provides reliable, high-resolution measurements, is simple to install, and is easily connected to a data acquisition system. It represents an economical alternative to precision leveling surveys and settlement profiling systems.



HORIZONTAL BEAM SENSOR



A horizontal beam sensor consists of a horizontal tilt sensor, a horizontal beam with mounting brackets, anchors that secure the beam to the structure, and signal cable.

HORIZONTAL TILT SENSOR

Horizontal EL Tilt Sensor56801200
Horizontal EL Tilt Sensor SC56801220

Sensor: Uniaxial electrolytic tilt sensor designed to fit inside a horizontal beam. The standard version of the tilt sensor works with CR10X, CR800, CR1000 data loggers and uses a 3-wire connection. The SC version of the tilt sensor works with other data loggers and readouts. It requires a six-wire connection.

Range: ±40 arc minute (±11 mm/m).

Resolution: 1 arc second or better, depending on the data logger used. (0.005 mm/m or 0.00006 inch per foot).

Repeatability: ± 3 arc seconds (±0.015 mm/m or 0.00018 inch per foot).

Adjustment Range: Sensor can be zero-adjusted ±4° without moving beam.

Operating Temperature: -20 to +50°C.

Dimensions: Horizontal sensor fits inside beam.

HORIZONTAL BEAM

Horizontal Beam, 1 m56801312
Horizontal Beam, 2 m56801314
Horizontal Beam, 3'56801323
Horizontal Beam, 6'56801326
Extra End-Bracket56801815

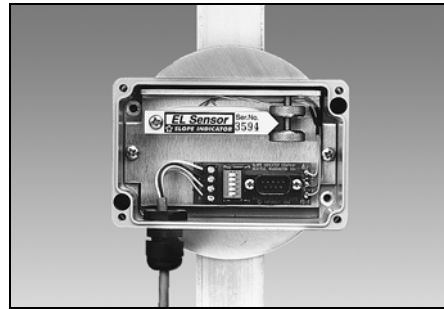
38 mm x 38 mm square section aluminum beam with sensor compartment and cover. Includes two end-brackets and a cable gland. Beams are sized to provide a gauge length that is measured from anchor to anchor. Does not include anchors.

GROUTABLE ANCHORS

Anchor & Hardware56801910

Includes one M10 x 200mm all-thread stud, an angle bracket, low-friction bushings, and other hardware. Refer to drawing on front page to determine number of anchors required.

VERTICAL BEAM SENSOR



A vertical beam sensor consists of a vertical tilt sensor, a vertical beam with mounting brackets, anchors that secure the beam to the structure, and signal cable.

VERTICAL TILT SENSOR

Vertical EL Tilt Sensor 56801500
Vertical EL Tilt Sensor SC 56801520

Sensor: Uniaxial electrolytic tilt sensor inside a weatherproof housing. The standard version of the tilt sensor works with CR10X, CR800, CR1000 data loggers and uses a 3-wire connection. The SC version of the tilt sensor works with other data loggers and readouts. It requires a six-wire connection.

Range: ±40 arc minutes (±11 mm/m).

Resolution: 1 arc second or better, depending on the data logger used. (0.005 mm/m or 0.00006" per foot).

Repeatability: ± 3 arc seconds (±0.015 mm/m or 0.00018" per foot).

Adjustment Range: Mounting plate provides 360° of adjustment.

Operating Temperature: -20 to +50°C.

Dimensions: Housing for vertical sensor is 125mm wide x 80 mm high x 59 mm deep (4.9 x 3.2 x 2.3 inch).

VERTICAL BEAM

Vertical Beam, 1 m 56801612
Vertical Beam, 2m 56801614
Vertical Beam, 3' 56801623
Vertical Beam, 6' 56801626
Extra End-Bracket 56801815

38 mm x 38 mm square section aluminum beam. Includes two end-brackets. Beams are sized to provide a gauge length that is measured from anchor to anchor. Does not include anchors.

GROUTABLE ANCHORS

Anchor & Hardware 56801910

Includes one M10 x 200mm all-thread stud, an angle bracket, low-friction bushings, and other hardware.

SIGNAL CABLE

Signal Cable50612804
 Shielded cable with four 24-gauge tinned-copper conductors and PVC jacket.

Signal Cable for SC Sensors50613527
 Shielded cable with seven 22-gauge tinned-copper conductors and polyurethane jacket.

READOUTS & DATA LOGGERS

Campbell Scientific CR10X Data Logger

12 standard EL tilt sensors can be connected directly to one CR10. Up to 32 sensors can be connected to an AM16/32 multiplexer.

3 SC tilt sensors can be connected directly to one CR10. Up to 16 sensors can be connected to an AM16/32 multiplexer.

EL Data Recorder56813500

This readout is used only with the SC version of the EL tilt sensor. It displays and stores tilt readings in volts and temperature readings in degrees C. It can also be used to zero SC sensors that will be connected to a data logger. Includes software for transferring stored readings to a Windows PC.

EL Nulling Device56803300

The EL Nulling device provides a convenient way to zero sensors that will be connected to a data logger. The nulling device is compatible with both standard and SC sensors.

