



The Geosystems dual-axis tiltmeter designed for semi-permanent installation in either a borehole or surface application. The technology is based on an electrolytic tilt sensor that has a range of $\pm 2^\circ$ and an on-board digital temperature sensor. Each instrument is individually calibrated with coefficients stored in the micro-controller memory.

The RS485 output signal is an ASCII encoded message that includes the unique Sensor ID, the Sensor Type as well as the temperature and tilt data. This eliminates the necessity for expensive analogue-to-digital conversion so that the low-cost readout unit outputs data in real world units (arcdeg and $^\circ\text{C}$). Readings can also be made using the USB port of a PC or web-book computer. A Real-time Plug 'n Play network of sensors can be built in minutes. Long term, low power recording is possible with our digital loggers. These features make our solutions significantly more cost effective and powerful than competing products.

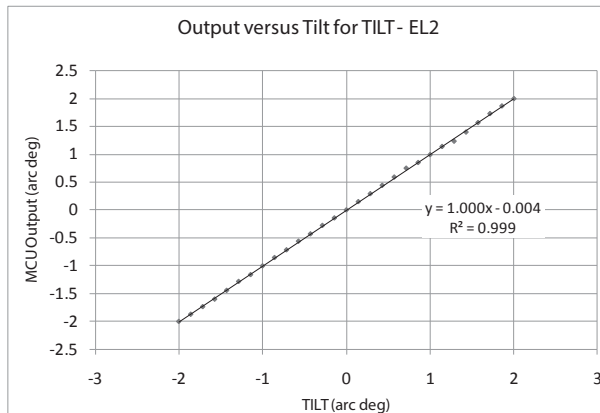
FEATURES

- Dual axis Electrolytic tilt sensor ± 2 arc degree range
- ASCII encoded RS485 Output signal
- Digital Temperature sensor
- On-board digital signal processing (Temp. comp. and digital filter)
- High Resolution (0.001arc deg) & absolute accuracy (0.025 arc deg)
- Robust RS485 output signal transmits over 1000ft
- Micro-controller stores sensor ID & Calibration Coeffs. in Flash EEPROM
- Suitable for moderate-high resolution applications
- High survivability following blasts and vibration
- Readout using Manual Interrogation Unit
- Automatic sampling over Ethernet or WiFi running TCP/IP
- Competitively priced

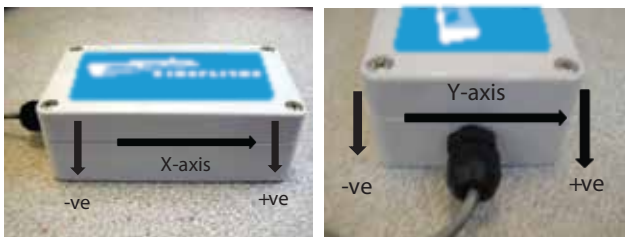
Technology

Sensor Technology

Based on electrolytic tilt sensors manufactured by Spectron Glass and Electronics Inc., a world leader in electrolytic tilt sensors, the Geosystems tilt sensor also includes a digital temperature sensor for temperature compensation.



Available in uniaxial or biaxial configurations with a range of ± 2 arc deg and a resolution of 0.001 arc deg.



Telemetry

Signal Processing

Each instrument is individually calibrated and the coefficient written into micro-controller memory. The associated 24 point piecewise linearization results in linearities with 0.25% F.S. (see plot). A digital temperature sensor ($\pm 1^\circ\text{C}$ accuracy) provides full temperature compensation over the specified thermal range of -25 to $+85^\circ\text{C}$.

Manual Readout

The RS485 output signal can be transmitted over 1000ft without amplification. Readout using our low cost readout unit provides the tilt and temperature data directly in $^\circ\text{C}$ and arc deg.

Automated Data Retrieval

Data from up to four tilt sensors can be collected using our digital data logger which can be monitored remotely when connected via serial cable or radio to a TCP/IP enabled hub. Networking can save time and money by transmitting data directly to a central control room or an engineer's desktop.

Applications

Geosystems tiltmeters are designed for moderate-high resolution applications involving borehole or surface deployment. Potential applications are:

- Slope monitoring
- Monitoring sag of backfill/ paste-fill
- Monitoring rotational failures
- Tailings dams
- Monitoring shear displacement of normal and reverse faults
- Monitoring shear failure of pillars
- Monitoring buckling of pillars
- Monitoring bulkheads
- Roadway deformation in coal-mines
- Monitoring deformation in salt/potash
- Monitoring any failure involving toppling
- Monitoring shear displacement of faults.



Two tilt sensors being installed on a bridge in Florida, US, by engineers from Sauls Seismic Inc.

Specifications

Dimensions: 115mm x 65mm x40mm.
10m of leadwire supplied.

Core Technology:

Dual axis Electrolytic tilt sensor with on-board microcontroller and digital temperature sensor

Output Signal: RS485 (9600,8,N,1)
ASCII encoded. Aprox. 30chrs /reading

Tilt. Range (F.S.):

$\pm 2^\circ$ uniaxial and bi-axial tilt

Resolution: 0.001 arc deg

Tilt .Linearity: typically 0.020% F.S

Tilt. Accuracy:

better than ± 0.05 arc deg.

Temp. Range: -20 to 85°C

Temp Accuracy: $\pm 1^\circ\text{C}$

Temp Resolution: 0.1 $^\circ\text{C}$

Temp coeff : $< 0.01\%$ FS/ $^\circ\text{C}$ (0-50 $^\circ\text{C}$)

Long Term drift:

$< 0.1\%$ F.S./yr. based on 1 reading/hour