MEMS Tiltmeters and MEMS Tiltloggers

Applications

The Model 6160 MEMS Tiltmeters and Model 8101 MEMS Tiltloggers are designed to measure tilt in structures including…

- **Buildings**
- **Dams**
- **Embankments**
- **Slopes**
- **Excavation walls**
- **Open pits**

Model 6160 MEMS Tiltmeter with mounting bracket assembly.

Model 8101 MEMS Tiltlogger shown with optional mounting plate.

Operating Principle

The Model 6160 MEMS Tiltmeter is designed for attachment to structures, on either a vertical or horizontal surface by means of an adjustable bracket, and for the subsequent measurement of any tilting that may occur.

The tiltmeter itself contains a Micro-Electro-Mechanical-System (MEMS) sensor which offers a high range, with high sensitivity and accuracy. The included associated signal conditioning yields a sensor output of ±3 V at ±10° and is designed to drive long cables without degradation.

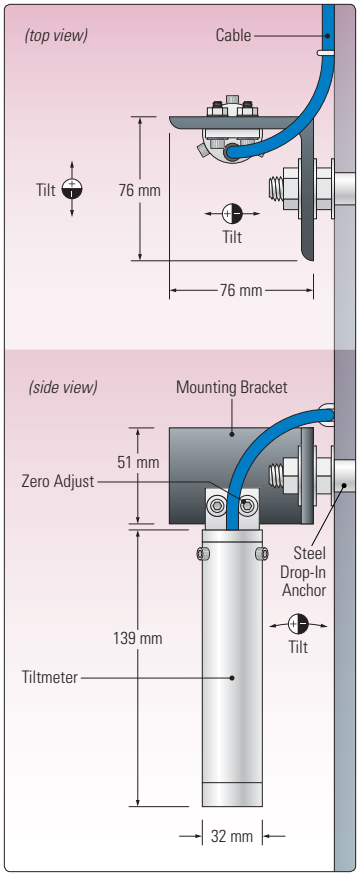
Advantages and Limitations

The MEMS tilt sensors have very good long-term stability and are virtually immune to shock loading. They are low-cost and robust. Biaxial sensors contain two sensors oriented at 90° to one another. They are readily adaptable for automation via data acquisition, which allows a series of sensors to be monitored for profiling purposes.

System Components

The basic transducer for the Model 6160 MEMS Tiltmeter is mounted inside a stainless steel housing equipped with a lug for mounting the sensor to an adjustable bracket. The bracket is bolted to the structure using the supplied hardware, which includes a ⅜" drop-in anchor. Special mounting brackets and protective enclosures are also available. A thermistor mounted inside the sensor housing permits the measurement of temperatures. A cable runs from the tiltmeter and readout is accomplished using a Geokon Model RB-500 Readout Box or the Model 8021 Micro-1000 Datalogger.

The **Model 8101 MEMS Tiltlogger** comprises the same MEMS tiltmeter/signal conditioner mentioned above packaged inside a rugged Nema 4X enclosure with a lithium battery power supply, one (uniaxial) or two (biaxial) 16 bit low level voltage loggers and a miniature standalone temperature logger. The loggers are capable of storing 37,767 readings and operate from 3.6 V lithium batteries (user replaceable) with a 1 year battery life (typical). Windows®-based software provides multiple graphing capability and real-time recording allowing data to be displayed while continuing to log.



● *Installation details and dimensions for the Model 6160 Tiltmeter.*

● *Model 8101 MEMS Tiltlogger shown with cover removed.*

Technical Specifications (Tiltmeter)

Standard Range[1]	±15°
Resolution[2]	±10 arc seconds (±0.05 mm/m)
Input	8-15 VDC
Output	280 mV/°
Accuracy[3]	±0.1% F.S.
Temperature Range	–20°C to +50°C
Shock Survival	2000 g
Length × Diameter[4]	139 × 32 mm

[1]*Other ranges available on request.*
[2]*Depends on readout technique.*
[3]*Established under laboratory conditions.*
[4]*Transducer only.*

Technical Specifications (Tiltlogger)

Voltage Range	–0.25 to +2.75 V
Voltage Resolution	0.1 mV
Calibrated Accuracy	*(Tilt)* ±0.01% F.S. *(Temperature)* ±0.5°C
Temperature Range	–40°C to +80°C
Temperature Resolution	0.1°C
Memory	32,767 readings
Reading Rate	*(Tilt)* 1 reading every second up to 1 reading every 12 hours *(Temperature)* 1 reading every 2 seconds up to 1 reading every 12 hours
Battery Type	3.6 V Lithium (user replaceable)
L × W × H	122 × 122 × 81 mm

Software Features

Multiple Graphs	Simultaneously analyze tilt and temperature data
Graphical Cursor	Displays readings by time, value, parameter or sample number
Data Table	Provides detailed dates, times, values, and annotations
Scaling Options	Manual or autoscale (fit to screen)
Formatting Options	Change colors, line styles, plotting options, show or hide channels
Statistics	Calculate averages, minimum, maximum, and standard deviation
Export Data	Export in a variety of common formats, or switch to Microsoft® Excel®
Calibration	Automatically calculate and store calibration parameters
Logger Configuration	Program data loggers with immediate or delayed start, sample rate, and device ID
Communications	Communications port can be set automatically or manually

System Requirements

Computer Interface	PC Serial or USB (interface cable required); 2,400 baud
Operating System	Windows® 95, 98, Me, NT, 2000, XP

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