

## MEMS Tilt Beam

Proven MEMS technology  
Excellent thermal stability  
Single cable digital BUS system  
High accuracy & resolution



# MEMS Tilt Beam

## Overview



Geosense® MEMS Tilt Beams are designed for attachment to structures, on either a vertical or horizontal surface, for the measurement of tilt or differential settlement.

They consist of a highly accurate MEMS sensor housed in a fully sealed enclosure which is mounted on a lightweight rigid GRP beam. This can be mounted onto the structure using special anchors. The GRP beam has a very low coefficient of thermal expansion meaning that thermal affects are minimised.

Both ends of the beam are fixed and when multiple beams are placed end to end, a differential displacement profile of the structure from anchor point to anchor point can be derived.

The design of the beam and end fixings means the beam can easily be cut to any length on site to accommodate any unexpected changes or constraints.

Each unit is individually calibrated to provide the ultimate in system accuracy and repeatability. It can be used in conjunction with a hand-held readout, automatic data acquisition systems such as the GeoLogger G8-Plus or the Wi-SOS 480 Digital Node to provide a wireless monitoring solution.

## APPLICATIONS

For monitoring tilt in:

Retaining walls

Diaphragm walls

Concrete dams

Party walls

Structures

Bridge piers

Tunnels

Compensation grouting

## FEATURES

Fully sealed sensor unit

EMC compliant to EN61326-1:2013

Uniaxial and Biaxial options

High accuracy and resolution

IP67 rated

Robust construction

Low coefficient of thermal expansion

Simple to install and use

Beams can be linked together to provide settlement profile

Beam length can be easily changed on site

Digital RS-485 BUS output

Easily adaptable to data logging

Integral temperature sensor



# MEMS Tilt Beam

## Specifications - Digital

### DIGITAL

MODELS	IPTB-M 5-V-1-485	IPTB-M 5-H-1-485	IPTB-M 10-V-1-485	IPTB-M 10-H-1-485	IPTB-M 15-V-1-485	IPTB-M 15-H-1-485
Range	±5°	±5°	±10°	±10°	±15°	±15°
Axis	Uniaxial	Uniaxial	Uniaxial	Uniaxial	Uniaxial	Uniaxial
Orientation	Vertical	Horizontal	Vertical	Horizontal	Vertical	Horizontal

### PERFORMANCE

Accuracy <sup>1</sup>	±0.0013°	±0.0013°	±0.002°	±0.002°	±0.004°	±0.004°
	±4.68 arc sec	±4.68 arc sec	±7.2 arc sec	±7.2 arc sec	±13.5 arc sec	±13.5 arc sec
	±0.02 mm/m	±0.02 mm/m	±0.035 mm/m	±0.035 mm/m	±0.065 mm/m	±0.065mm/m
	±0.013% FS	±0.013% FS	±0.01% FS	±0.01% FS	±0.0125% FS	±0.0125% FS
Resolution	0.0005°	0.0005°	0.0005°	0.0005°	0.0005°	0.0005°
	2 arc sec	2 arc sec	2 arc sec	2 arc sec	2 arc sec	2 arc sec
	0.01 mm/m	0.01 mm/m	0.01 mm/m	0.01 mm/m	0.01 mm/m	0.01 mm/m
	0.005% FS	0.005% FS	0.005% FS	0.005% FS	0.005% FS	0.005% FS
Repeatability	±0.002°	±0.002°	±0.002°	±0.002°	±0.002°	±0.002°
	±7.2 arc sec	±7.2 arc sec	±7.2 arc sec	±7.2 arc sec	±7.2 arc sec	±7.2 arc sec
	±0.34 mm/m	±0.34 mm/m	±0.34 mm/m	±0.34 mm/m	±0.34 mm/m	±0.34 mm/m
	±0.02% FS	±0.02% FS	±0.010% FS	±0.010% FS	±0.006% FS	±0.006% FS
Operating temperature		-40 to +85°C				
Thermal stability		±0.005% FS/°C				

### ELECTRICAL

Supply input	8-15VDC
Output signal	RS-485/digital BUS
Output unit	Sine of angle
Sensor Type	MEMS

### PHYSICAL

Beam dimensions	50 x 50 x 6mm
Beam length <sup>2</sup>	0.5, 1, 2 or 3 m
Material	GRP/Aluminium
Sensor enclosure	Aluminium
Enclosure rating	IP67

### EXTENSION CABLE (If required, to extend from beam to data logger)

Construction	2 x twisted pair, braided, PUR sheath
Type	Type 800 - multi-core with braid

<sup>1</sup> Using 3rd order polynomial <sup>2</sup> Other lengths available on request

## MEMS Tilt Beam

### Accessories & Ordering Information

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#### FIXINGS

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**Studding** (Pic 1) – Groutable M10 x 150mm (G40-160)

**Through Bolt** (Pic 2) - M10 x 175mm, 316 stainless steel (M19-005)

**L-Bracket** – For mounting on ceilings & floors (G40-162)

**Spares Kit** (Pic 3) – Washers & Bushes (G40-163)

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#### DATA ACQUISITION

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**GeoLogger G8 Plus** – Specification will vary (G211-001)

**WI-SOS 480 Digital Node** - Wireless digital node that can be connected to a maximum of 30 IPI sensors (G216-046)

**RS-485 to RS-232 Interface** - Enables digital RS-485 sensors to be used with Campbell Scientific loggers (Q38-010)

**10" Windows Tablet** - Manual data display (G200-040)

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#### SOFTWARE

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**GeoAxiom** (Pic 4) – Software which provides data handling, storage, visualisation, alarms, reporting and web-based access. specification will vary according to project requirement (T10-020)

**G-TILT** - Data display software for use with Windows Tablet

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#### ELECTRICAL

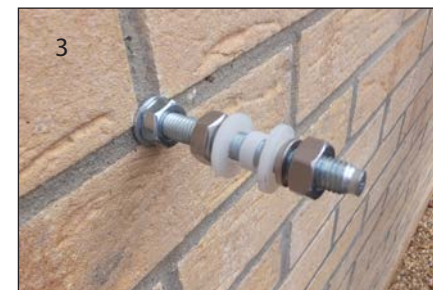
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**Cable Type** - 800/TP/04/050/PUR/GY/8.0 (Q10-150)

**End of line resistor/3.5m fly lead** – Right Hand (Q12-101)

**End of line resistor/3.5m fly lead** – Left Hand (Q12-101A)

**EMC Splice Kit** (Q12-105)



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