

# The Beamer

## Tilt Beam Sensor

### ADVANTAGES

- **Precision.** The Beamer detects tilt change smaller than one arc second (0.005 mm/m).
- **Long Cable Length.** Readings can be transmitted over distances >500 meters without signal loss.
- **Easy Installation.** Beamers are made with two fork-shaped ends for use with groutable anchors.



All Beamers include their own signal conditioning electronics.

### OVERVIEW

Beam sensors detect rotation between two fixed points. A tilt sensor is mounted inside a rigid beam, typically one to three meters in length, anchored at each end to the structure being measured. In this manner changes in tilt

are easily converted to displacements since the measured rotation occurs over a defined length.

Beam sensors can be connected end-to-end to determine cumulative displacement along a horizontal or vertical profile.

The Applied Geomechanics Beamer consists of a uniaxial tiltmeter within a rigid 38 x 38mm square aluminum beam. Beams may be ordered for horizontal or vertical mounting. An adjustment screw inside the Beamer allows sensor zeroing and range adjustment without moving the beam. The beam is fixed to the structure using two anchors, one at each end, so that very precise measurements may be made over a long gauge length. When multiple beams are installed end-to-end for a continuous profile, adjacent ends share a common anchor. Beamers can be read with a manual readout or an automated data acquisition system at a remote location.

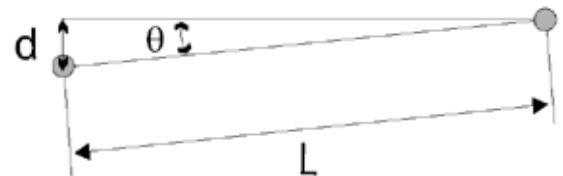
Unlike other beam sensors on the market, signal conditioning electronics are built into every Applied Geomechanics BEAMER. These electronics provide a stable, low-noise signal that can be transmitted over long cable lengths. Adding or removing cable in the field has no effect on Beamer performance.

### APPLICATIONS

- Monitor the effect of excavation and tunneling on existing structures. Long gauge length spans discontinuities in masonry walls.
- Monitor movement of tunnel walls and linings.
- Monitor the performance of bridges and structures under load.
- Monitor settlement in dams, retaining walls, pipelines and over tunnels.



Cumulative displacements along a horizontal profile



$$\text{Displacement (d)} = L \sin \theta$$

	VOLTAGE OUTPUT	4-20 MA OUTPUT
<b>TILT OUTPUT</b>	± 2.5 VDC (referenced to signal ground)	4-20 mA
<b>SCALE FACTOR</b>	0.4 degree/Volt	0.125 degree/mA
<b>TEMPERATURE OUTPUT</b>	0.1°C/mV (single-ended), -40° to +100°C, ±0.75°C accuracy, 0°C = 0 mV	2500 Ohm thermistor
<b>POWER REQ'TS.</b>	8 - 24 VDC @ 8 mA, reverse polarity protected 250 mV peak to peak ripple max	14.2 to 28 VDC using 100 Ohm sense resistor, reverse polarity protected
<b>MEASUREMENT RANGE</b>	±1 degrees (greater ranges available)	
<b>ADJUSTMENT RANGE</b>	±5 degrees	
<b>RESOLUTION</b>	0.0003 degree (1 arc second)	
<b>REPEATABILITY</b>	0.001 degree at constant temperature	
<b>LINEARITY</b>	1% of full span typical	
<b>TIME CONSTANT</b>	150 milliseconds	
<b>TEMPERATURE COEF.</b>	KZ = ±1 arc sec / °C typical; Ks = +0.04% / °C typical	
<b>ENVIRONMENTAL</b>	-30°C to +70°C operation and storage; NEMA 4X (IP65) weatherproof housing	
<b>MATERIALS</b>	Square aluminum tube, 38 x 38mm; Cable: PVC jacket, polypropylene insulation	
<b>WEIGHT</b>	1m Beamer: 1.8 kg (4lb); 2m Beamer: 2.8kg (6 lb.)	

#### ORDER CODES:

**Model A805**— 

□	□	—	□	□
S	T		V	A
∅			H	B

 Standard gain  
Temp. sensor  
∅ No temp. sensor  
Vertical  
Horizontal  
A one meter  
B two meters

**Model C805**— 

□	□	—	□	□
S	T		V	A
∅			H	B

 Standard gain  
Temp. sensor  
∅ No temp. sensor  
Vertical  
Horizontal  
A one meter  
B two meters

#### USEFUL ACCESSORIES:

- 89028** Stainless steel mounting stud and hardware set, 1 per end
- 70369** Hook-up cable (specify length)
- 98001** ADVisor Handheld Readout Unit and Datalogger
- 98002** Model 870 Readout Module and Digital Multimeter for manual readings
- 62204** 6-pin male receptacle (connector) for Beamer cable; required for use with ADVisor or Model 870
- 798-A** Handi-Logger for continuous data acquisition  
Handi-Logger for continuous data acquisition



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