



## Applications

CGEO-IPI series IPI systems are used to measure lateral movement in the ground or in a structure. They are useful for determining the depth, direction, magnitude, and also rate of movement and can be used to ascertain the stability of retaining walls by measuring bending and rotation. Inclinator systems can also be used to detect movement in the downstream and upstream side of dams and to define shear zones in the foundations of concrete faced dams.

Typical applications include: detecting slopes and landslides, determining shear and slip zones, monitoring diaphragm or sheet pile walls, monitoring bending in piles, verifying design assumptions and finite element analysis, horizontal IPI systems to measure settlement and deformation of concrete slabs and tank bases.

## Description

The Model CGEO-IPIA MEMS Vertical In-Place Inclinator consist of a string of MEMS (Micro-Electro-Mechanical Systems) tilt sensors (uniaxial or biaxial) mounted on lengths of stainless steel tubing which are linked together by universal joints. The string of sensors is inserted inside a pipe, or a casing installed in a borehole in the ground, with the sensor cable(s) passing to the surface where they are connected to readout or dataloggers.

The Model CGEO-IPIB MEMS Horizontal In-Place Inclinator consists of a string of MEMS tilt sensors (uniaxial) mounted on

lengths of stainless steel tubing which are linked together by universal joints.

The Model CGEO-IPID Smart In-Place Inclinator system (uniaxial or biaxial) is used to remotely monitor lateral displacement within a vertical borehole. The Smart IPI system comprises a data acquisition system, a Sensor Interface Module, one single cable can be connected with up to 40 Smart IPI nodes.

## Key Features

- ◆ Accurate and precise measurements using MEMS sensors
- ◆ Robust design and reliable
- ◆ Fit for manual or remote reading
- ◆ Available in uniaxial and biaxial versions
- ◆ In-built temperature compensation



Comprehensive information about this product and our full range is available at [www.cgeo-instruments.com](http://www.cgeo-instruments.com)  
If you would prefer to speak with someone directly, please call +852 2206 0092 or email [info@cgeo-instruments.com](mailto:info@cgeo-instruments.com)

## Main Specifications

Model	CGEO-IPIA	CGEO-IPIB	CGEO-IPID
Range	±15°(Vertical)	±15°(Horizontal)	±15°(Vertical)
Resolution	<10 arc seconds		
Accuracy	±0.1% F.S.		
Operating Temperature	-20 to + 80°C		
Sensor Output	±4V@±15°	RS485	
Input Voltage	12 VDC		
Minimum casing internal diameter	56mm		
Dimensions	Φ32mm x215mm		

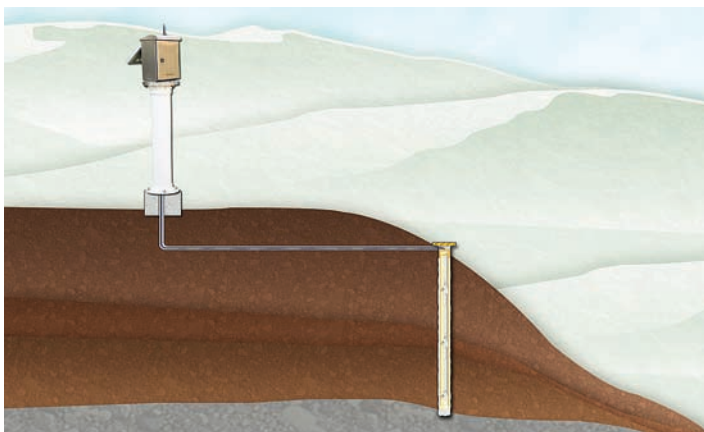
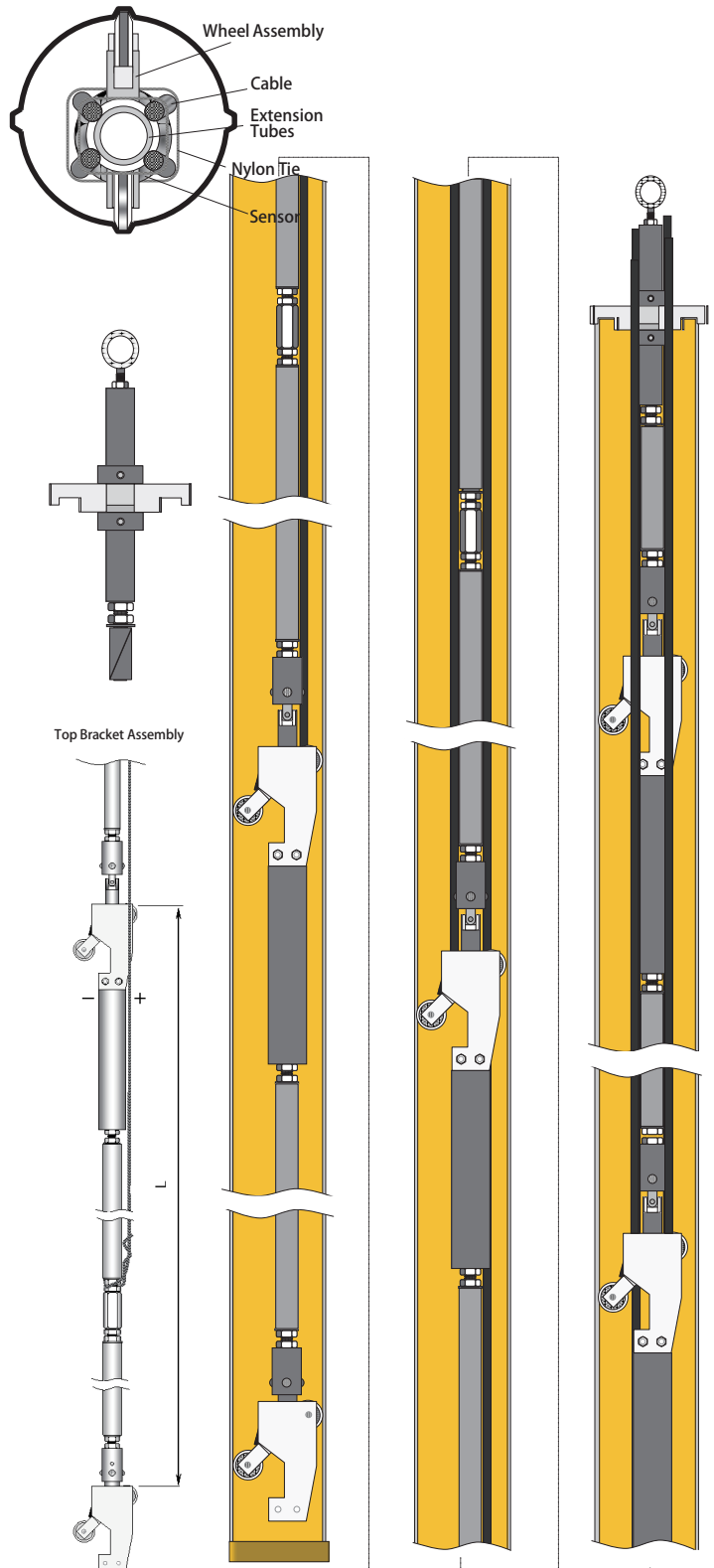
## Operation

The tilt sensors are installed in inclinometer casing within a borehole, a sprung wheel assembly on the IPI engages into the keyways of the inclinometer casing to ensure alignment. Multiple IPIs are installed at varying depths and secured using gauge rods connected to the next and previous IPI.

The final gauge rod is secured at the top of the borehole using a top support assembly. Each IPI is connected to a datalogger which powers the sensors, initiates readings and retrieves the data.

Each tilt sensor also contains a thermistor to permit temperatures to be recorded.

The smart IPI sensors are connected to each other by means of a four-wire bus cable. Each sensor has a length of this cable exiting from the top and bottom of the sensor housing. The same cable (customer specified length) connects the uppermost sensor to the chosen readout (PC or datalogger, system, etc.).



International Manufacturer of Geotechnical & Structural Instruments

CGEO INTERNATIONAL LIMITED  
 Room 06, 13A/F, South Tower,  
 World Finance Centre, Harbour City, 17  
 Canton Road, Tsim Sha Tsui, Kowloon, Hong Kong.

Tel: +852 2206 0092  
 Fax: +852 3003 0133  
 Http: //www.cgeo-instruments.com  
 Email: info@cgeo-instruments.com

CGEO INTERNATIONAL LIMITED Registered Office: Room 06, 13A/F., South Tower, World Finance Centre, Harbour City, 17 Canton Road, Tsim Sha Tsui, Kowloon, Hong Kong.