



4DShape

3D continuous linear inclinometer

YOUR CHALLENGES

- Obtain **reliable** and **precise** measurements to understand structural behaviour
- Observe in **real-time 3D deformation** of soil or structures
- Use a **compact instrument solution**, that can be adapted to your project's specific requirements



OUR SOLUTION



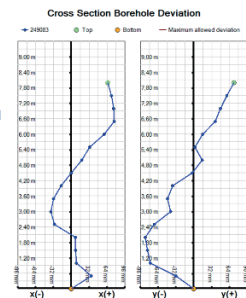
4DShape is an **all-in-one solution** that uses a flexible chain of 3D inclinometers to continually and automatically monitor **millimetric movements** in **soils** and on **structures**.

A relatively recent innovation based on MEMS (Micro Electromechanical Sensors) technology, it provides an efficient, **effective** and **optimised solution** for many applications.

Composed of **rigid segments** with flexible joints, the 4DShape can be installed in a borehole in the soil or on the surface of a structure vertically or horizontally, inclined or in an arc, without any orientation limit.

THE BENEFITS

- Data with **millimetric precision** available in **real time**
- **Compact size** and low visual impact
- **Excellent sampling** with 3 sensors per segment, with segment length availability down to 250 mm
- **Versatility**: measurement of buildings, linear infrastructure or in the ground
- A **long-term solution** requiring **little maintenance**
- A **tailormade automatic warning system** when used in conjunction with our Gescope or Beyond online platform



• Our reputation for excellence is built on our client's satisfaction.

• The worldwide specialist in usable, accurate data.

• Close collaboration with the manufacturer.

• Proactive maintenance for managing and following data quality for accurate and useful measurements.

CONTACT US

› monitoring@sixense-group.com

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TECHNICAL PRINCIPLES

- Each 4DShape segment contains **three inclination MEMS**, a **microprocessor** and a **digital temperature sensor**.
- The sensor's **measurement range** is **360°**, allowing **installation vertically, horizontally or on an inclined plane**.
- The total length of the 4DShape equipment is determined according to the project's requirements.
- 4DShape is connected to a **datalogger** to obtain **continuous** and **automatic measurements**.



APPLICATIONS



Its **robustness, versatility of installation** and **precision** means that 4DShape has **many different applications** :

- Automated measurements of **boreholes** (automatic vertical profiles)
- Tunnel and gallery **convergence** measurements
- **Settlement** measurements along horizontal profiles (embankments, rail tracks, etc.),
- **Deformation** measurements of vertical structures (walls, columns, etc.),

SPECIFICATIONS & LIMITATIONS

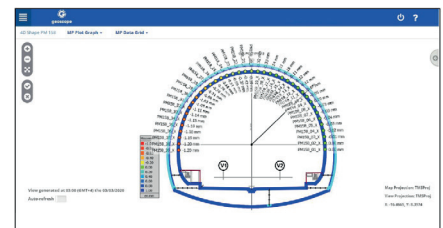
- **Segment length:** down to 250 mm
Typically 500 mm in all orientations and 1 m in horizontal.
- **Standard length of 4DShape:** 1 m to 150 m
- **Diameter:** 23 mm
- **System precision:**
+/- 0.5 mm for 30 m length
- **Segment resolution:**
+/- 1 arc second, ie. 0.00067°

Measurement range:

- 3D measurements up to +/- 60° from vertical
Beyond +/- 60° 2D measurements only (the azimuth variations aren't known when approaching horizontal)
- **Operating temperature:** -35°C to +60°C
- **Waterproof** to 980 kPa
- **High frequency measurement:** Please contact us.
- **Maximum cable length:** Please contact us.

ASSOCIATED TOOLS AND SERVICES

- A **turnkey solution** from installation to providing managed data in real time on a dedicated platform
- **Automatic alarms**, data validated by our engineers
- **Geotechnical** and **structural** expertise, permitting superior understanding of recorded measurements
- 4DShape is one of the solutions in our **toolbox**, we always optimise our solutions **to your requirements**



REFERENCES

- New Princess Grace Hospital, Monaco
- Chavanne Tunnel, France
- International Abu Dhabi Airport, UAE
- Microtunnelling under railway, Pont du Château, France
- Grand Paris Express :
- Line 14 South, Lot GC01, Line 15 South Lot T2A

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