

## Key Benefits

- **Ideally suited for monitoring lateral ground movements in geotechnical and civil engineering projects**
- **Wireless Bluetooth communication between the probe and the rugged PDA (Personal Digital Assistant)**
- **Offers fast and simple data gathering**
- **Enables highly accurate reading of lateral deflections of ground**
- **A Kevlar reinforced cable provides strength and significant weight reductions**
- **Sturdy but light and portable, can be easily carried and operated by one person**



## Technical Applications

### The Digital Inclinometer System

The Digital Biaxial Inclinometer System comprises a probe, cable reel and rugged PDA. The probe is fitted with guide



wheels and contains two MEMS accelerometers measuring tilts in two perpendicular planes. One measures tilt in the plane of the inclinometer wheels, known as the A axis, and the other measures tilt in a plane perpendicular to that of the wheels and is known as the B axis. It is connected by a graduated cable to the cable reel. A "key fob" is provided and when activated directs the probe to take readings and send data cable free to the PDA (via Bluetooth transmission) and saved.

### The Inclinometer Probe

The inclinometer probe is inserted into specially designed and installed inclinometer casing. The casing has two pairs of alignment keyways in which the probe guide wheels run. The accelerometers measure the angular difference between the probe's axis and the vertical A and B planes. The angles are converted to horizontal displacement in millimetres over the probe gauge length of 500mm. The casing can be grouted into a borehole formed in natural ground, embedded in fill material of an embankment or the concrete of a pile or diaphragm wall, or secured to the surface of a structure to be monitored. The two pairs of sprung guide wheels on the probe, in conjunction with the casing keyways, ensure coaxial alignment of the probe relative to the casing and orientation control of the A and B measurement axis.

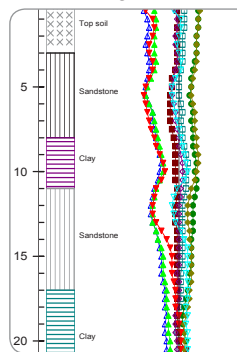
The configuration of both the probe and the casing, therefore enables lateral movements at depths to be monitored with a high degree of sensitivity and accuracy. For borehole or embedded installations, the base of the casing should be firmly founded in stable strata beyond the zone of anticipated movement, as any lateral movement is assumed relative to a fixed datum point. If this is not possible, the top of the casing may be measured topographically and movements calculated relative to that point.

## Features

- Wireless connectivity eliminates issues associated with cable resistance/noise issues
- The rugged PDA which interfaces with most office systems and applications
- Enhanced PDA software offers easy data gathering and a range of presentations
- Metal Marker/Cable Gate system ensures a high degree of accuracy and repeatability
- No field connections required, avoids water ingress and connection failures
- Light and easily portable, a 100m system weighs just 13kg
- Improved "intelligent" charging circuit with reel battery level meter on PDA screen

### Taking Readings

Displacement readings are taken at regular intervals (0.5m) within the casing, this is measured and controlled by graduation markers on the cable. An initial or 'base' set of inclinometer readings are obtained at each increment along the casing.



Summation of each incremental reading provides a profile of horizontal displacement of the casing as a function of depth. Subsequent readings are taken at identical depths. Comparison of successive casing profiles indicates the depth, direction, magnitude and the rate of change of movement, the clearest indication of this is given by plotting the change in displacement of the casing against depth using In-site inclinometer processing software.

Telescoping couplings are used to accommodate compression or extension of the casing where settlement or heave may occur in the ground hosting the installation. If these are not installed, compressive or extensive forces could deform the inclinometer casing to failure point preventing further inclinometer probe passage.

FOR FURTHER INFORMATION PLEASE CONTACT:

Soil Instruments Limited, Bell Lane, Uckfield, East Sussex, TN22 1QL, United Kingdom

Tel: +44(0)1825 765044 Fax: +44(0)1825 761740 Web: www.soil.co.uk Enquiries: sales@soil.co.uk

## Specifications

### PROBE SPECIFICATIONS

Probe gauge length	500mm (metric system) or 24 inches (imperial system)		
Probe diameter	28.5mm (1 1/8")		
Calibrated ranges	±30° (±250mm)	±60° (±433mm)	±90° (±500mm)
Resolution	0.01mm (0.001")		
Sensor accuracy	±0.02% FS (±0.1mm)	±0.02% FS (±0.17mm)	±0.02% FS (±0.2mm)
Operating temperature	-10 to +50°C		
Repeatability	±0.008% FS		
System accuracy <sup>1</sup> (over 25m)	±2mm	±3mm	±4mm
Minimum casing ID	48mm		
Maximum casing ID	83mm		

### CABLE SPECIFICATIONS

Type	Kevlar re-reinforced Polyurethane coated 4 core cable	Steel re-reinforced Polyurethane coated 6 core cable
Weight	42g per metre (approx)	126g per metre (approx)
Cable marker	Hard anodised colour coded	Stainless Steel numbered

### CABLE REEL SPECIFICATIONS

Dimensions	483 x 385 x 315mm	483 x 385 x 365mm (100m) (30m & 50m as standard)
Battery life	12 hrs continuous use	

### WEIGHT (COMPLETE WITH PROBE)

30 metre	8.5kg	11.4kg
50 metre	9.5kg	14.3kg
100 metre	11.5kg	21.6kg

### PDA (DIGITAL READOUT)

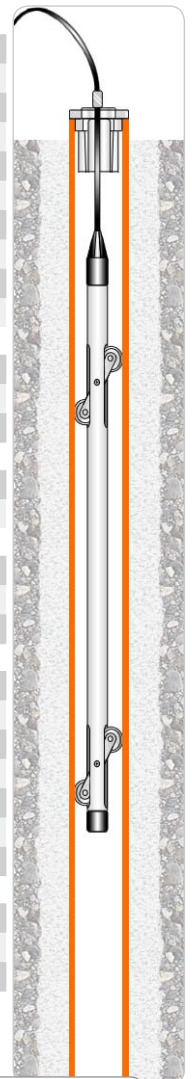
Program footprint	128KB
Initial database size	200KB
Dimensions	165 x 95 x 45mm
Weight	520g
Ingress protection	IP67
Operating temperature	-30 to +60°C
Battery life	8hrs (backlight on) 12hrs (backlight off)

### KEY FOB (REMOTE HANDHELD ACTIVATOR)

Dimensions	65 x 35 x 15mm
Weight	26g
Battery	1 x GP23A

<sup>1</sup>Derived empirically from surveys that include systematic and random errors introduced by casing, probe and operator.

Achieved using Interfels Easy Connect (EC) casing installed within 3° of vertical and operated in accordance with the user manual.



## Ordering Information

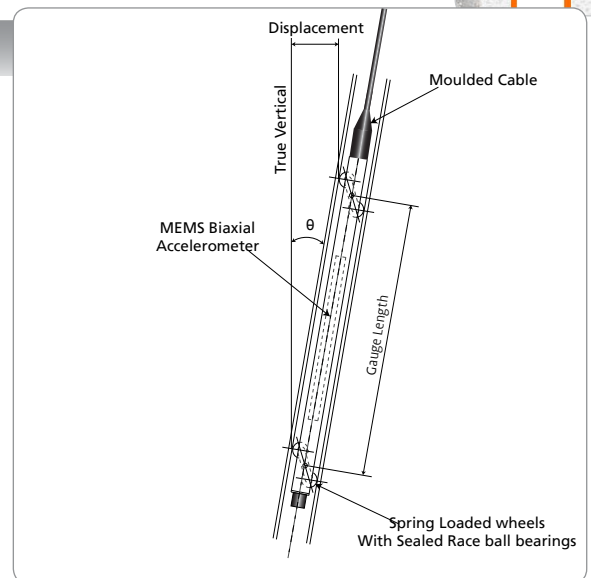
PART NO.	DESCRIPTION (STANDARD ±30° RANGE)
C17-30M	Inclinometer System with 30m Cable
C17-30M-R	Inclinometer System with 30m Cable - Heavy Duty Cable
C17-50M	Inclinometer System with 50m Cable
C17-50M-R	Inclinometer System with 50m Cable - Heavy Duty Cable
C17-100M	Inclinometer System with 100m Cable
C17-100M-R	Inclinometer System with 100m Cable - Heavy Duty Cable
C17-150M	Inclinometer System with 150m Cable
C17-150M-R	Inclinometer System with 150m Cable - Heavy Duty Cable
C17-200M	Inclinometer System with 200m Cable
C17-100F	Inclinometer System with 100ft Cable (24" probe)
C17-200F	Inclinometer System with 200ft Cable (24" probe)
C17-300F	Inclinometer System with 300ft Cable (24" probe)

### IN-SITE INCLINOMETER DATA MANAGEMENT PACKAGE

C13.1	In-Site Inclinometer Data Management Package
C13.4	In-Site Evaluation Package (included with system)

### INCLINOMETER PDA ACCESSORIES TDS recon 200x

C17-3.19	Additional battery pack for TDS Recon 200X
C17-3.20	AA battery pack for use with TDS Recon 200X
C17-3.21	World charger for TDS Recon 200X
C17-3.22	PDA cradle for TDS Recon 200X
C17-3.23	Vehicle charging cable for TDS Recon 200X



### INCLINOMETER ACCESSORIES

C10-3.1	Test Probe complete with 50m steel cable & cable reel
C10-3.2	Test Probe complete with 100m steel cable & cable reel
C10-3.8	Probe Reference Frame