

C17 DIGITAL BLUETOOTH INCLINOMETER SYSTEM

Datasheet C17



Description

The Digital Inclinometer System comprises a biaxial probe, cable reel and a rugged field PC supplied with 'Inport' data logging software. The Digital Inclinometer System takes highly accurate readings of lateral deflections.

A Bluetooth connection between the instrument and the field PC makes taking readings fast, simple and allows for winding of the cable reel as you take readings without having to disconnect data-logging equipment. The Kevlar reinforced cable provides strength but yields significant weight reductions.

Features

- No connectors between probe, cable reel and field PC
- Probe is manufactured from 316 stainless steel
- Precision sprung wheel assemblies
- Bluetooth connection between cable reel and field PC
- Accurate and precise measurements using MEMS sensors
- Repeatable depth control using metal markers and cable gate system
- Field PC allows easy interface with most office systems and applications
- Enhanced 'Inport' software to use with field PC for easy data capture

Benefits

- Eliminates water ingress and connection problems
- Digital signal allows interference-free data transmission
- Advanced electronics ensure long, trouble free use in a site environment
- Can take a day's worth of readings on a single battery charge
- Lightweight and easily portable



Comprehensive information about this product and our full range is available at www.itmsoil.com
If you would like to speak with someone directly please call +44 (0)1825 765044 or email sales@itmsoil.com



Microelectromechanical Systems, or MEMS, is a technology that uses miniaturised mechanical and electromechanical elements that are made using the techniques of microfabrication. The physical dimensions of MEMS devices can vary from well below one micron all the way to several millimetres.

Our MEMS microsensor is a small discrete device that converts a measured mechanical signal, gravity (g) into a voltage signal.

Operation

The inclinometer probe is inserted into inclinometer casing.

The probe is connected by a graduated cable to the cable reel. A 'key fob' activates the saving of readings from the accelerometers. These are transmitted to the field PC from the cable reel via Bluetooth transmission and saved.

Displacement readings are taken at regular intervals of 0.5m within the casing (the gauge length between the probe wheels). This is measured and controlled by metal markers crimped around the cable that pass through a notch in the cable gate, giving an exact position for each reading. An initial or 'base' set of inclinometer readings are obtained at each increment within the casing.

The summation of each incremental reading provides a profile of horizontal displacement of the casing as a function of depth. When you take all subsequent readings at identical depths, the comparison of successive casing profiles indicates the depth, direction, magnitude and the rate of change of movement. You can see the clearest indication of movement by plotting the change in displacement of the casing against depth.

Applications

Inclinometer systems measure lateral movement in the ground or in a structure. They are useful for determining the depth, direction, magnitude, and also rate of movement.

For example, they can be used to ascertain the stability of retaining walls by measuring bending and rotation in the retaining wall. They can also reveal ground movement that could affect other buildings. Inclinometer systems can be used to detect and monitor deformation of upstream slabs of concrete-faced rock-fill dams, to monitor the up and downstream displacements of embankment and concrete dams and to define and monitor shear zones in the foundations of all dams.

The measurements of recorded movement can be utilised to check that the deflections are within the design assumptions. Continue monitoring to establish any long term effects after works have finished.

Use inclinometer casing in boreholes, embedded in fill material, cast into concrete or attached to structures for the following typical applications:

- **Detecting slope failures and landslides**
- **Determining shear and slip zones**
- **Monitoring diaphragm or sheet pile walls**
- **Monitoring bending in piles**
- **Verifying design assumptions and finite element analysis**
- **Long term monitoring purposes**
- **Monitoring dams**
- **Detecting and recording ground movement due to tunnelling operations.**
- **Monitoring retaining walls**



Associated products

For details on:	Catalogue code:
EC casing	C9
Standard casing	C18
In-site software	C13
Inclinometer test probe	C10

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THE TECHNICAL RATING FOR THIS PRODUCT:

INTERMEDIATE

As the correct installation of any monitoring sensor or system is vital to maximise performance and accuracy, itmsoil makes the following recommendations, for the skill level of the installation contractor.

ADDITIONAL SUPPORT

itmsoil offer installation and monitoring services to support this system. For more information please email : sales@itmsoil.com or call **+44 (0) 1825 765044**

ADVANCED

The installer is trained and experienced in the installation of this type of instrument or systems, and is ideally a specialist Instrumentation and Monitoring contractor.

INTERMEDIATE

The installer already has previous experience and/or training in the installation of this instrument or system.

BASIC

As a minimum the installer has read and fully comprehends the manual, and if possible has observed these instruments or systems being installed by others.

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) [±12"]	±60° (±433mm) [±20.78"]	±90° (±500mm) [±24"]
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% full scale		
System accuracy ¹ (over 25m)	±2mm	±3mm	±4mm
Minimum casing internal diameter	48mm		
Maximum casing internal diameter	83mm		

Cable specifications

	Standard Cable	Heavy Duty Cable
Type	Kevlar re-enforced Polyurethane coated 4 core cable	Steel / Kevlar re-enforced Polyurethane Coated 4 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

Field PC

Program Footprint	128KB
Initial Database Size	200KB
Dimensions	165 x 89 x 43mm
Weight	482g
Ingress Protection	IP67
Operating Temperature	-30 to +55°C
Battery Life	Up to 20 hours

Key fob (remote handheld activator)

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

¹Derived empirically from surveys that include systematic and random errors introduced by casing, probe and operator. Achieved using Soil Instruments Easy Connect (EC) Casing installed within 3° of vertical and operated in accordance with the user manual.

Ordering information

Digital Inclinometer System

Includes biaxial 500mm probe, cable, cable reel & charger, cable gate, key fob, robust field PC & charger, calibration certificate and manual.
For use with up to 85mm outer diameter casing.

C17-30M	30metre cable length, $\pm 250\text{mm}/500\text{mm}$ (± 30 arc degree)
C17-50M	50metre cable length, $\pm 250\text{mm}/500\text{mm}$ (± 30 arc degree)
C17-75M	75metre cable length, $\pm 250\text{mm}/500\text{mm}$ (± 30 arc degree)
C17-100M	100metre cable length, $\pm 250\text{mm}/500\text{mm}$ (± 30 arc degree)
C17-125M	125metre cable length, $\pm 250\text{mm}/500\text{mm}$ (± 30 arc degree)
C17-150M	150metre cable length, $\pm 250\text{mm}/500\text{mm}$ (± 30 arc degree)
C17-175M	175metre cable length, $\pm 250\text{mm}/500\text{mm}$ (± 30 arc degree)
C17-200M	200metre cable length, $\pm 250\text{mm}/500\text{mm}$ (± 30 arc degree)
C17-225M	225metre cable length, $\pm 250\text{mm}/500\text{mm}$ (± 30 arc degree)
C17-250M	250metre cable length, $\pm 250\text{mm}/500\text{mm}$ (± 30 arc degree)
C17-30M- $\pm 60^\circ$	30metre cable length, $\pm 433\text{mm}/500\text{mm}$ (± 60 arc degree)
C17-50M- $\pm 60^\circ$	50metre cable length, $\pm 433\text{mm}/500\text{mm}$ (± 60 arc degree)
C17-100M- $\pm 60^\circ$	100metre cable length, $\pm 433\text{mm}/500\text{mm}$ (± 60 arc degree)
C17-150M- $\pm 60^\circ$	150metre cable length, $\pm 433\text{mm}/500\text{mm}$ (± 60 arc degree)
C17-200M- $\pm 60^\circ$	200metre cable length, $\pm 433\text{mm}/500\text{mm}$ (± 60 arc degree)
C17-30M- $\pm 90^\circ$	30metre cable length, $\pm 500\text{mm}/500\text{mm}$ (± 90 arc degree)
C17-50M- $\pm 90^\circ$	50metre cable length, $\pm 500\text{mm}/500\text{mm}$ (± 90 arc degree)
C17-100M- $\pm 90^\circ$	100metre cable length, $\pm 500\text{mm}/500\text{mm}$ (± 90 arc degree)
C17-150M- $\pm 90^\circ$	150metre cable length, $\pm 500\text{mm}/500\text{mm}$ (± 90 arc degree)
C17-200M- $\pm 90^\circ$	200metre cable length, $\pm 500\text{mm}/500\text{mm}$ (± 90 arc degree)
C17-250M- $\pm 90^\circ$	250metre cable length, $\pm 500\text{mm}/500\text{mm}$ (± 90 arc degree)

English Digital Inclinometer System

Includes biaxial 2 foot length probe, cable, cable reel & charger, cable gate, key fob, robust field PC & charger, calibration certificate and manual.
For use with up to 85mm outer diameter casing.

C17-100F	24inch Probe with 100feet cable Length (± 30 arc degree)
C17-200F	24inch Probe with 200feet cable Length (± 30 arc degree)
C17-300F	24inch Probe with 300feet cable Length (± 30 arc degree)

Replacement Battery Charger and Cables

C17-4.1	Universal inclinometer battery charger kit (3 LED 2 pole connection) Includes UK mains cable, select alternatives from below
C17-4.2	Mains cable Australasia region plug 1.9 metre long
C17-4.3	Mains cable, EU region plug 1.9 metre long
C17-4.4	Mains cable, USA region plug 1.9 metre long

Inclinometer Accessories

C10-3.1	Test probe with 50 metre steel cable & cable reel
C10-3.2	Test probe with 100 metre steel cable & cable reel
C10-3.8	Probe reference frame

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