

**Digital horizontal/slope inclined inclinometer system**

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**Applications**

**[Digital horizontal inclinometer / 5481H]**

The digital horizontal inclinometer is a device that precisely measures the vertical displacement such as settlement and uplift of the embankments. It is operates with horizontal probe, Bluetooth reel and smart device



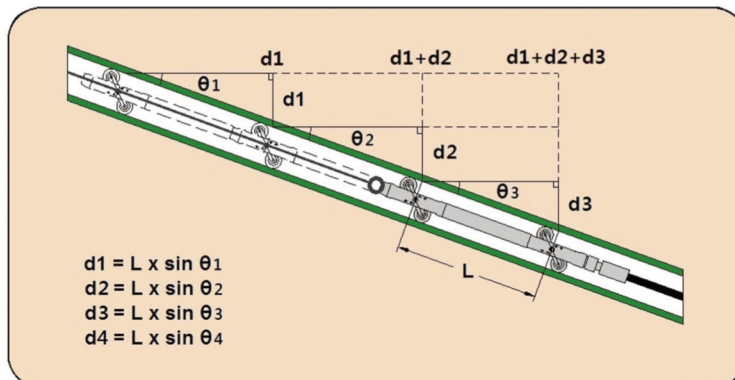
**[Digital slope inclined inclinometer / 5481T]**

The digital slope inclinometer is equipped with an inclination sensor set at a slope inclined of 45° in the inside to precisely measure the slope of the dam, the retaining wall, and the settlement and uplift of the slope inclined of the stiffener. It is operates with slope inclined probe, Bluetooth reel and smart device



**Description**

Digital horizontal / slope inclined inclinometer system has pursued a development by concentrating on high-performance nature such as responsiveness, ultra-light and high-reliability. The digital horizontal / slope inclined inclinometer system consists of a lightweight probe and a lightweight Bluetooth cable reel. You can download and run native apps provided by our company on your own or your company's android smart device. Ground displacement is generated in the inclinometer casing which is installed along the horizontal or slope inclined depending on the surrounding load. The horizontal plane is measured by a horizontal probe, Model 5481R Bluetooth cable reel, smart device. The slope inclined is measured a slope inclined probe, a model 5481R Bluetooth cable reel, a smart device to acquire data by inserting the probe into the inclinometer casing.



[Theory of calculation]



## Digital horizontal/slope inclined inclinometer system

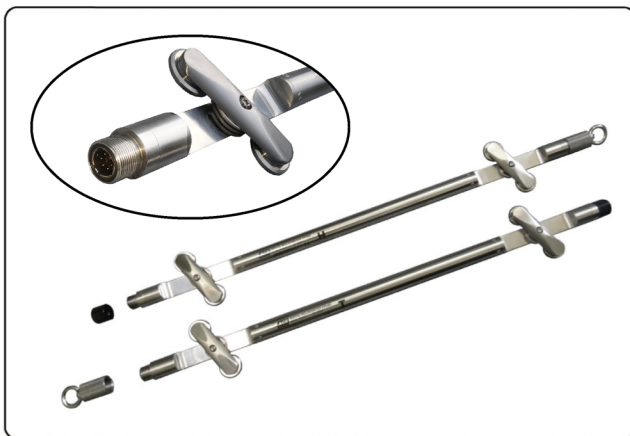
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### Features

- High-speed measurement**  
 The stabilization time of 50cm or 1 unit has been improved as 5 seconds responsiveness
- Easy to carry**  
 The digital inclinometer probe, Bluetooth reel, and cable guide are mounted in one carriage so that it is easy to carry and handle at work site.
- Applied durable control cable**  
 The control cable are composed with  $\varnothing 6\text{mm}$  polyurethane outside and  $\varnothing 3\text{mm}$  aramid fiber inside so that it holds over 150kg·f weight.
- Applied lightweight digital inclinometer probe**  
 The probe set has a size of  $\varnothing 25.4\text{mm} \times 778\text{mm}$  and weighs 1.4kg, which makes it easy to operate the inside of the casing with small radius of curvature to transmit accurate data.
- The data transitions and store by smart device**  
 It is possible to download app inclinometer Collector at Google play store and it can be used in any smart devices that android 4.3 or later OS is applied  
 You can download the android app (Inclinometer Collector) from the Google Play Store.
- Linkage Bluetooth (Reel & Remote control)**  
 The Bluetooth has own module code so that it can connect with Bluetooth reel and smart device easily. Also, you can additionally link the commonly used camera remote control for smartphone via Bluetooth to save by pushing the remote control without tapping by hand during measurement.
- Applied rechargeable Bluetooth reel**  
 It is applied rechargeable battery inside of Bluetooth reel. Therefore, it is possible to use 40Hr (based on  $20^{\circ}\text{C}$ ) continuously after single charging.

### Explain

#### [Digital MEMS inclinometer probe]



The Model 5481T digital MEMS inclinometer probe has an internal  $\pm 30^{\circ}$  2-axis MEMS accelerometer sensor (micro-electro mechanical engineering and micro-reaction technology) and electronic circuits built in. The horizontal probe has  $\pm 30^{\circ}$  1-axis MEMS accelerometer sensor. Digital values provide excellent resolution and precision. The MEMS accelerometer sensor has an impact value of 2000g, which is hardly affected by vibration and accurately detects the magnitude of the displacement. STS316 bearings are mounted on the wheel with a gauge distance of 500mm and can be used for a long time. Wheel cartridges are fixed by springs and can be used in casings with an inner diameter of  $\varnothing 48\text{mm} \sim \varnothing 85\text{mm}$ . It is designed with outer diameter of  $\varnothing 25.4\text{mm}$  and semi-permanent measurement is possible because it is light and STS steel is waterproofed by precision machining.

#### [Control cable and Bluetooth reel]



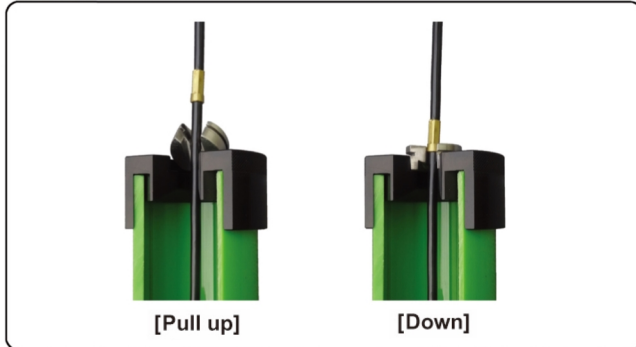
The Model 5481R Bluetooth reel is equipped with a connector clip to connect the probe to the cable, and the opposite end is waterproofed with a built-in Bluetooth circuit. The control cable jacket is molded with a  $\varnothing 6\text{mm}$  polyurethane sheath. The inside of the cable is molded with four signal wires and  $\varnothing 3\text{mm}$  Kevlar fiber to keep the strong tension and soft. The outer shell is molded with a position control Gaff which is made of brass at equal intervals of 50cm. It will communicate with a Bluetooth reel and a smartphone with Android OS 4.3 or higher, and store the measured data in real time. The battery of the Bluetooth reel can be recharged continuously for more than 40 hours, and the probe holder kit and the cable guide holder are attached to the reel set. It is very convenient because you only need to carry a Bluetooth reel set on site.



**Digital horizontal/slope inclined inclinometer system**

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**[Cable guide / For slope inclined probe]**



During the monitoring, the cable guide helps the brass Gaff to be set on right place  
 Our company s cable guide is designed with automatic hooks for quick and easy measurement.

**[Operating program / Application]**



The operating program is inclinometer collector . It is an application program only for digital vertical inclinometer system.

- **DATA STORAGE**  
 To set work site and borehole up first and to pull the digital inclinometer probe. Then, to read the data and save it.
- **VIEW DATA & PROFILE**  
 To find out displacement data and accumulated displacement graph.
- **IMPORT DATA**  
 After copying e-mail or data by using the import data function, you can enter data files on different smart devices for continuous measurement and management.
- **SEND TO E-MAIL**  
 To send data that measured by smart device by e-mail.

**Specification**

Model		5481T (Slop inclined)	5481H (Horizontal)
Digital inclinometer probe	Applied sensor	2-MEMS sensor	1-MEMS sensor
	Measuring Range	± 30° (45° Slop iclinded)	± 30° (Vertical displcement)
	Resolution	0.005mm/500mm	
	Rating output	Digital	
	Nonlinearity	0.02% FSR / ± 10° section	
	Repeatability	± 0.003°	
	Shock coefficient	2000g	
	Opoeating Temp.	-20 ~ 70 °C	
	Wheel gage length	500mm	
	System accuracy	± 2mm / 25m	
	Dimension	Ø25.4 × 778mm	
	Weight	1.4 kg	
	Material	Stainless	
	Water proof	1000m H <sub>2</sub> O	
Accessories	Carry bag, Spanner		
Control cable	Operating Temp.	-25 ~ 80 °C	
	Stiffener	Ø3mm Kevlar (Aramid fiber)	
	Outer diameter	Ø6.0mm	
	Wire	0.3mm <sup>2</sup> × 5C	
	Max tensile strength	200 kg · f	
Cable guide	Material of cable	Polyurethane rubber	
	Weight	About 3.3kg / 50m	
	Applied casing	Outer Diameter Ø70, Ø85mm casing	
Bluetooth reel	Material	Polycarbonate	
	Dimension	350(W) × 250(D) × 360(H)mm	
	Status display	Power, Bluetooth, Charge	
	Convenience	ON/OFF Switch Probe holder Cable guide holder(5481T)	
	Battery	Ni-MH 7.2V	
	Weight	2.0kg	
	Operation time	Cont' 40 Hr	
	Charging time	Cont' 4 Hr	
	Accessories	Charger, Carry bag	
	Application	Inclinometer Collector	
Operating application	Function	Data storage View data & graph Import data Send to e-mail	
	Device	Android 4.3 or later OS Smartphone or device	
	Remote control	Bluetooth camera shutter for android	



**Digital horizontal/slope inclined inclinometer system**

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**Accessories**



[Probe carry bag \_ Parts code : 017110]

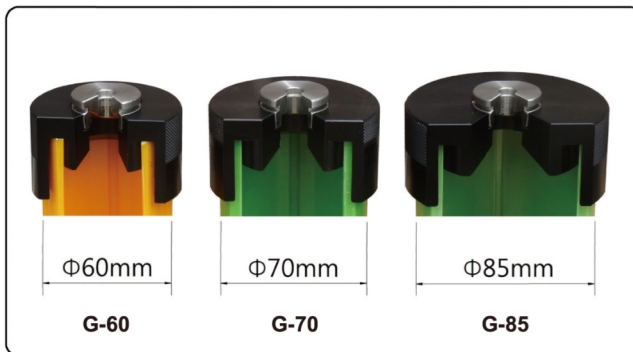
The model 5481H/T Digital horizontal / slope inclined probe has a sponge pad inside the nylon bag to provide safe portability.

If you are not measuring for a long time, disconnect the probe from the cable and store it after cleaning by oil.



[Bluetooth reel carry bag \_ Parts code : 017301]

The model 5481R Bluetooth reel has a sponge pad inside the nylon bag for safe portability. Use when not using a reel set or disconnecting the probe when transporting.



[Cable guides]

The cable guides for inclinometer casings are manufactured in three sizes as  $\varnothing 60$ ,  $\varnothing 70$ ,  $\varnothing 85$ mm. The main product,  $\varnothing 70$ mm casing, is supplied in the digital inclinometer set.  $\varnothing 60$  and  $\varnothing 85$ mm casings are sold separately.

**STD control cables**

Model	Description	Weight
5481R-30	30m Control cable & Bluetooth reel	3.5kg
5481R-50	50m Control cable & Bluetooth reel	4.4kg
5481R-75	75m Control cable & Bluetooth reel	5.8kg
5481R-100	100m Control cable & Bluetooth reel	7.0kg
5481R-150	150m Control cable & Bluetooth reel	9.5kg

※ It is required the special order for over 150m control cable and special Bluetooth reel.

**[PDA / Android OS]**

Our company sells PDA (Personal Digital Assistant) as an optional measuring instrument base on Android OS.

The model PM-45 PDA is a smart device manufactured by Point Mobile Co., Ltd. It can be used like a smart phone.



**Ancillary equipment**

- Dead-end return pulley
- Return pipe
- Wire Rope & Reel
- PDA (Android OS)
- Wheel cartridge [Parts code: 017307]  
/ Torsion spring [Parts code: 200019]

The wheel cartridge set is supplied as a kit for easy replacement of broken wheel parts in the field, and a torsion spring is also sold separately.



[Wheel cartridge & Torsion spring]

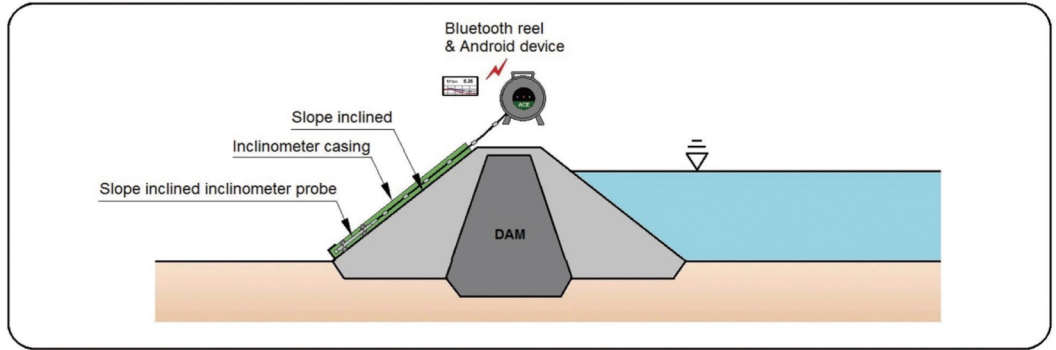


**Digital horizontal/slope inclined inclinometer system**

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**[Slope inclined Inclinometer]**

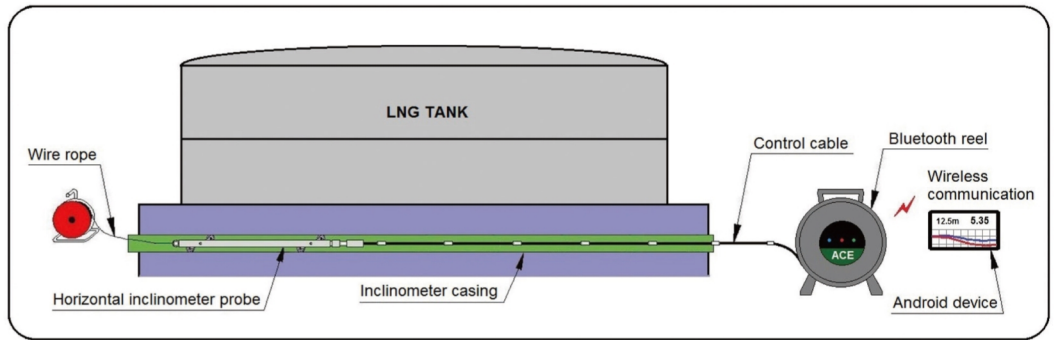
Measure the displacement of a fill dam, a concrete dam, or a casing installed on a slope inclined of a retaining wall. The slope inclined inclinometer is equipped with a 45° diagonal MEMS sensor.



**[Horizontal inclinometer]**

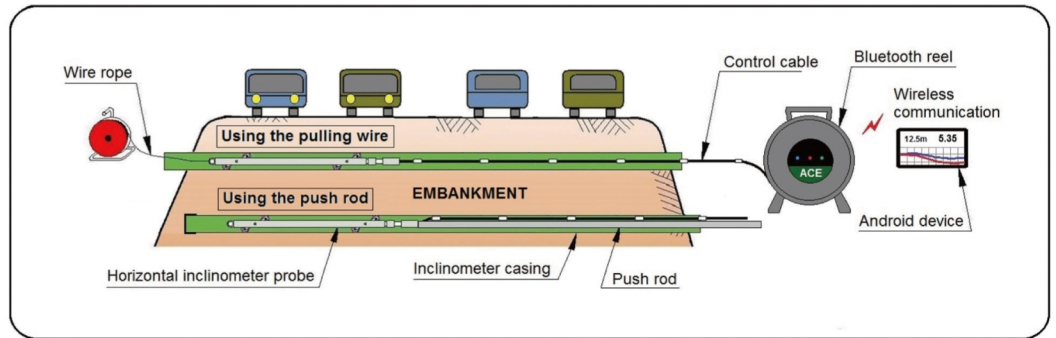
• **Measurement of LNG tank settlement**

The settlement of basal part of LNG tank, LPG tank or oil tank can be measured.



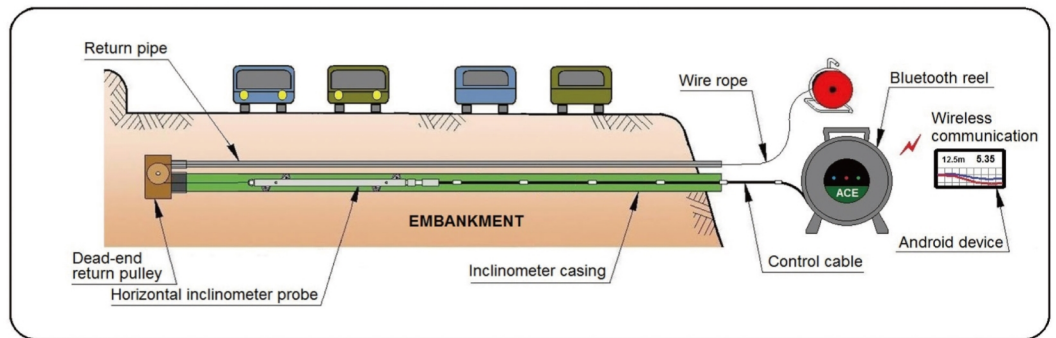
• **Measurement of vertical displacement of embankment**

The settlement can be measured by filling the casing in the buried soil for road improvement. Measurements can be made by pulling the wire rope from the opposite side or by pushing it with the push rod.



• **Measurement of Dead-End type**

The settlement is measured by installing return pulley with casing and return pipe in areas where one side is difficult to access or blocked.



**Recommendations**

It is recommended to use the OD Ø85mm casing as possible because the horizontal inclinometer will cause the normal settlement largely due to the installation operation.