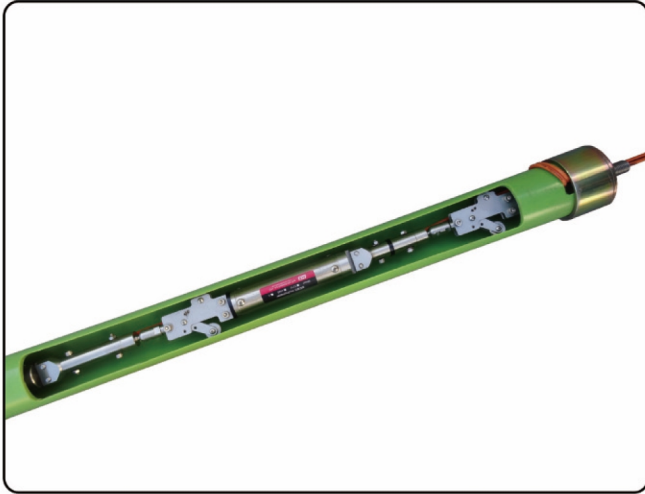


## FSG vertical multi-point inclinometers



### Description

Model 4430 **FSG** (foil strain gage) **vertical multi-point inclinometer** that replace the Portable servo type inclinometer is connected type with numbers of model 4410 FSG type inclinometer using wheel assembly and extension tube.

It is designed to solve the trouble of portable inclinometer to insert probe into inclinometer casing to get data.

The measured value can easily approach by setting terminal box in upper part of perforation. And manless operation or long distance measurement can be possible by using data logging equipment and data acquisition system.

FSG vertical multi-point inclinometer can be operated according to the attached direction in uniaxial or biaxial.

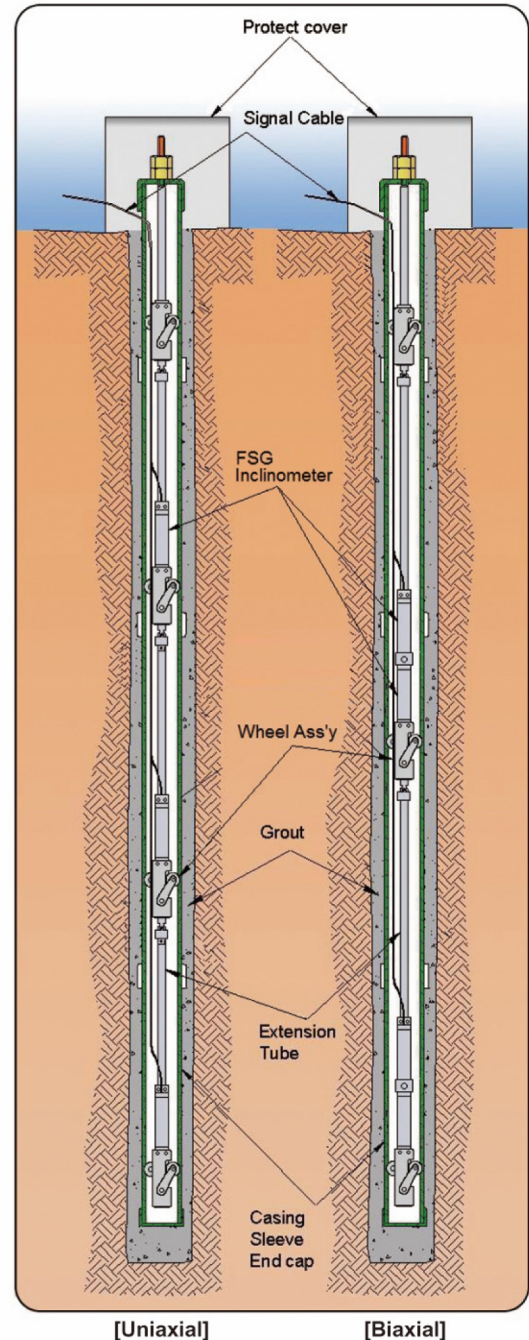
This instrument should set by using standard inclinometer casing and guide wheel should be made to come to the center of casing. Casing of inclinometer controls the direction of inclinometer, and is established within vertical borehole that passes expected zone of displacement.

In case of using casing of  $\varnothing 59\text{mm}$  inside diameter, it can be set maximum 40 nos in the inclinometer, and as displacement in layer happens, it changes the position angle of casing and inclinometer. This change is displayed in voltage (mV), can be easily calculated by multiply converted  $\sin\theta$  gage with original gage length and the displacement (moved distance) is difference between initial and present measurement.

This product is treated with water and rust proof and has high precision of resistance temperature sensor and thunderbolt protective sensor in it that semi permanent measurement is possible.

### Features

- Easy installation and use
- Stability and confidence with which it can be operated in severe environment
- Selection of anticorrosive and rustproof material
- Selected materials for minimizing thermal zero shift
- Dynamic measurement is possible



[Uniaxial] [Biaxial]  
[Installation of FSG vertical multi-point inclinometer]

### Applications

It is useful to measure slope displacement or horizontal displacement in underground bedrock, and in case of real time measurement dynamic measurement is needed.

- Measurement of layer displacement made from tunnel and excavation construction
- Measurement of displacement in the levee and retaining wall
- Measurement of horizontal displacement in the unstable underground like slope over dam, highway, and railway
- Measurement of displacement in pile loading test

## FSG vertical multi-point inclinometers

### Specification

Model	4430U(Uniaxial)	4430B(Biaxial)
Applied sensor	FSG(foil strain gage) sensor	
Range	± 5°	
Rating output	1 mV/V (1,000 × 10 <sup>-6</sup> )	
Accuracy	± 0.1% FSR	
Exciting voltage recommended	Less than 5 VDC	
Exciting voltage allowable	Less than 10 VDC	
Insulation resistance	More than 100 M $\Omega$ / 500V	
Resistance	350 $\Omega$	
Operating temperature	-30~80°C	
Gage length	Selection of standard length 1, 2, 3m	
Maximum sensor volume	Inclinometer sensor 40 ea / ID $\varnothing$ 59mm casing	
Waterproof	200m H <sub>2</sub> O	
Materials	Stainless steel, fluorinate series O-ring, high grade silicone potting	
Weight	① Sensor 1.0kg ② Guide wheel 0.4kg ③ Extension tube 0.7kg/m ④ Union 0.15kg	
Signal cable	$\varnothing$ 3~4.5mm, 0.24mm <sup>2</sup> × 4C shielded PVC sheath cable	
Accessories	① Guide wheel ② Extension tube ③ Union ④ Top cover ⑤ Connection part	

### The readout

It is electric resistance sensor that generates mV and can be used by connecting with strain meter or data logger that can read strain

- ACE-600A (FSG readout)
- ADL-200A (Smart logger)

### Ordering information

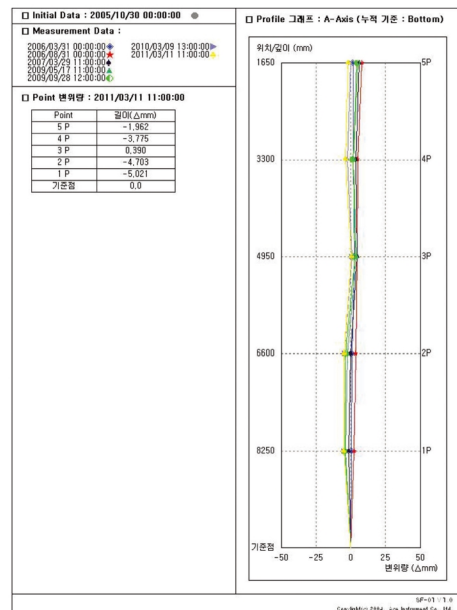
- Place to install
- Constitution of system
- System specification / controlled standard
- Depth of installation and cable length
- Keeping readout unit
- Length of signal cable
- System of FSG vertical multi-point inclinometer has limit in radius of curvature, original gage length cannot exceed 3m, and in case of using standard casing of  $\varnothing$ 59mm inside diameter, the volume of establishment of foil strain gage type inclinometer cannot exceed 40 sensors.
- In case of installing FSG vertical multi-point inclinometer, the casing of inclinometer should be applied to establish with over  $\varnothing$ 59mm inside diameter.

### Ancillary equipments

- Universal terminal box (model 7012/7024)
- Material related with casing
- Analysis program for horizontal displacement (SF-01)

### Recommendation

- In setting casing of the standard inclinometer, if the horizontal displacement is expected to be too large, please use telescopic section for extension so that it make displacement to be absorbed in extension and prevent from damage of casing and sensor.
- When the setting depth is over 40m, or in case of too much shear zone, you can use inclinometer casing of  $\varnothing$  73mm inside diameter.
- When there are too many volumes to set, you can measure tendency or volume of displacement easily and quickly by using analysis program (SF-01) for horizontal displacement.



[SF-01 software program]