

FSG rod extensometers (MPBX)

Description

Model 4390 **FSG rod Extensometers** have sensor part built with four of small foil strain gage type sensor which is waterproof and moisture proof, has anchor for grouting treatment of tunnel base rock, and anchor rod made up of fiberglass rod to deliver displacement to sensor. Rod and anchor should be treated with grouting in the perforation.

When displacement happen by the movement, relaxation or joint, it is transferred by anchor rod into FSG displacement sensor, in this moment, the resistance factor changes slightly, and it is transmitted into output device and displayed in suitable mechanical unit that you can confirm the speed of displacement, rate, volume and section of displacement.

FSG rod extensometer is 4 measuring points of 4 anchors and designed into small size that it is easy to establish into $\varnothing 38\text{mm}$ hole that is smallest for rock bolt establishment.

The anchor rod has small liner expansion factor, and is designed with high strength of glass fibered tube.

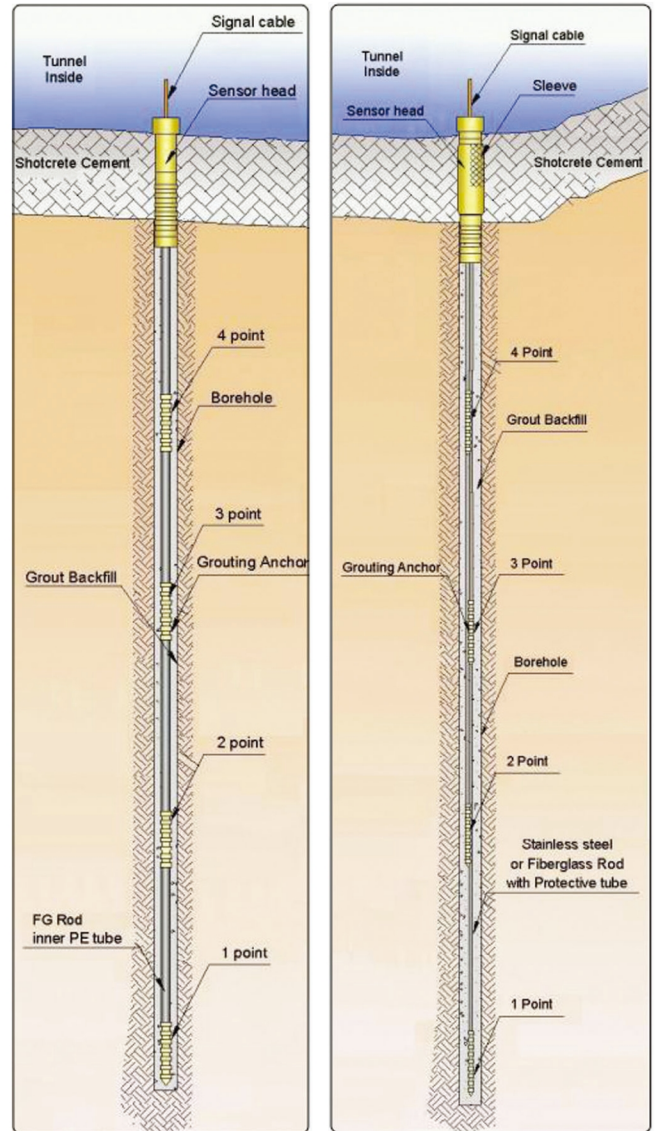
FSG displacement sensor is designed into total 50mm measurement range, and is assembled in advance before the shipment with individual calibration of mV by using exclusive calibrator that you can measure tension and compression with precision to each 25mm.

The length of FSG rod extensometer is divided into 2~6m of lengths based on the longest anchor that you can choose according to the appointed length in construction design or condition of construction site.

FSG rod extensometer has no measurement error or difficulty that is mechanical system. And it is waterproof and rustproof that it is possible to measure semi permanently.

Features

- Small design to apply in $\varnothing 38\text{mm}$ of the inside diameter of borehole
- High precision of small FSG sensor in it
- 4 station system length of 2~6m of anchor
- Possible to dynamic measurement



[Model 4390]

[Model 4391/ ass'y on site]

Applications

FSG rod extensometer is useful to measure displacement of ground by convergent excavation in the ground like tunnel, mine, or common duct and to measure deformation of slope and horizontal or vertical displacement of soil or rock in tunnel.

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Specification

Model	4390 (standard)		4391 (ass' y on site)		
Sensor element	FSG sensor (foil strain gage)				
Range	50mm				
Rating output	1 mV/V ($1,000 \times 10^{-6}$)				
Accuracy	$\pm 0.5\%$ FSR				
Nonlinearity	$\pm 1.0\%$ FSR				
Resistance	350 Ω				
Insulation resistance	More than 100 M Ω / 500 V				
Exciting voltage recommended	Less than 5 VDC				
Exciting voltage allowable	Less than 10 VDC				
Operating temperature	-30~80°C				
Measuring points	4 points (standard)				
Minimum drilling diameter borehole	More than $\varnothing 38$ mm (EX drill)				
Waterproof	50m H ₂ O				
Full length	2 m	3 m	4 m	5 m	6 m
Distance between gages	500mm	750mm	1,000mm	1,250mm	1,500mm
Weight	3.4kg	3.7kg	4kg	4.3kg	4.6kg
Material	Sensor part	Stainless steel, alloy steel (galvanized)			
	Anchor rod / anchor	$\varnothing 3$ mm, fiberglass rod nylon anchor ($\varnothing 31 \times 160$ mm)		Fiberglass rod ($\varnothing 6$ mm), nylon anchor ($\varnothing 20 \times 160$ mm)	
	Protective cover for anchor rod	$\varnothing 16 \times \varnothing 22$ mm Hi-VE pipe		PE tube ($\varnothing 8 \times \varnothing 10$ mm)	
Signal cable	$\varnothing 13$ mm, 0.3mm ² \times 16C shielded PVC sheath cable				

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

- Application field
- The depth of anchor rod
- Keeping FSG readout unit
- Cable length
- According to the order, design and production of the FSG extensometer is possible of 6 stations of measurement point, and 40m of length

Ancillary equipments

- Universal terminal box (model 7012/ 7024)