

## VW rod extensometers (MPBX)

### Description

Model 1390 **VW rod extensometers** is patented article (Korea patent 0490826) of Ace Instrument. It has sensor part built with 4 of small VW displacement sensor which is water proofed and moisture proofed, anchor for grouting treatment of tunnel base rock, and anchor rod made up of glass fiber to deliver displacement to sensor.

When displacement happen by the movement, relaxation or joint, it is transferred by anchor rod into the VW displacement sensor, in this moment, after magnetization of vibrating wire by plucking coil, it generates resonance frequency, this frequency is transmitted into VW readout unit and displayed in needed mechanical unit that you can confirm the speed of displacement, rate, volume and section of displacement.

VW rod extensometer of our company are 4 stations system of 4 measuring point and designed into small size that it is easy to establish into  $\varnothing 38\text{mm}$  hole that is smallest for rock bolt establishment.

In case of model 1391, the anchor rod has small liner expansion factor, and is designed with high strength of fiberglass rod. And in case of 1390,  $\varnothing 3\text{mm}$  of glass tube is connected with anchor in the high strength of PE pipe. In case of model 1390, the length of VW rod extensometer 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.

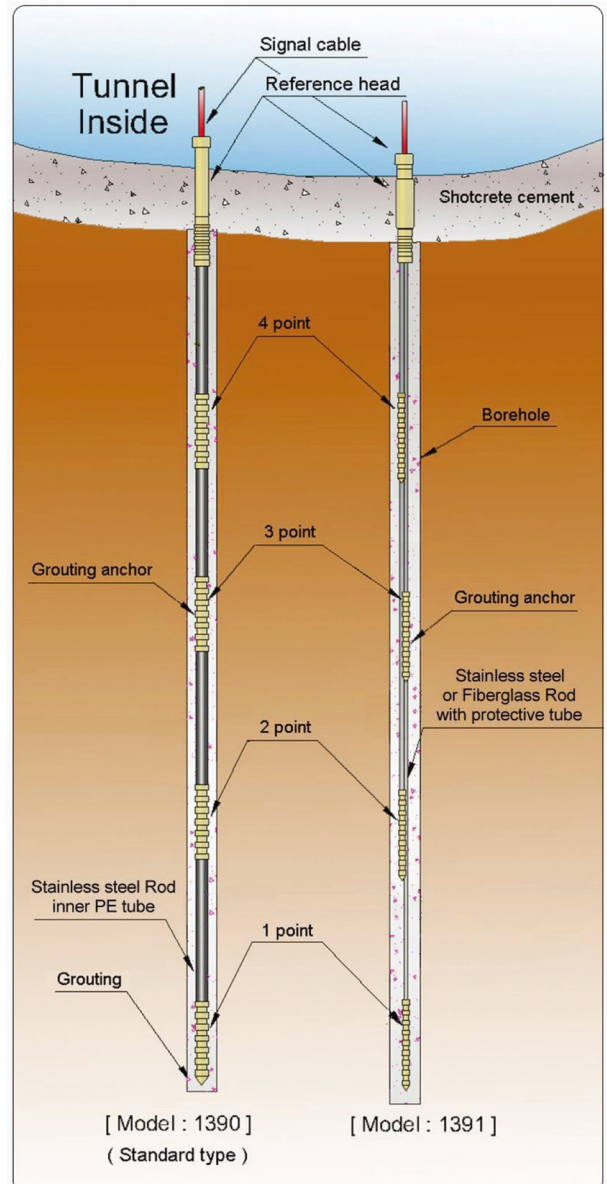
Model 1391 is VW rod extensometers whose point distance is over 6m and is designed into a structure that is possible to assemble and establish in the construction site. Model 1391, VW displacement sensor is designed into total 50mm measurement range, after grouting in the part of anchor get stiffen, by setting sleeve in the point of 25mm in the head of controlling point, you can measure tension and compression with precision to each 25mm. and before generate sensor, it calibrate frequency and display by using exclusive use of calibrator that it is easy to calculate applying conversion factor. It is waterproof that it is possible to measure semi permanently.

### Applications

The VW rod extensometer is useful to measure of 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.

### Features

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



[Installation of VW rod extensometers]



[Model 1391 ass'y]



## VW rod extensometers (MPBX)

### Specification

Model	1390 (standard type)					1391 (ass'y on site)
Sensor element	Vibrating wire sensor					
Range	50~200mm					
Resolution	0.025% FSR					
Accuracy	±0.1% FSR					
Nonlinearity	±0.5% FSR					
Operating temperature	-40~80°C					
Built-in temperature device	Thermistor (3kΩ)					
Temperature device range	-40~105°C					
Temperature device accuracy	±0.5°C					
Measuring points	4 points ( standard )					
Water proof	50mH <sub>2</sub> O					
Minimum drilling diameter borehole	More than Ø38mm (EX drill)					
Full length	2 m	3 m	4 m	5 m	6 m	By order of customer(max.40m)
Distance between gages	500mm	750mm	1,000mm	1,250mm	1,500mm	By order of customer
Weight	3.4kg	3.7kg	4kg	4.3kg	4.6kg	4 ~ 10kg
Material	Sensor	Stainless steel, alloy steel (galvanized)				
	Anchor rod / anchor	Ø3mm fiber glass rod nylon anchor (Ø31×160mm)				Ø6mm fiberglass rod nylon anchor (Ø20×160mm)
	Protective cover for anchor rod	Ø16×Ø22mm Hi-VE pipe				PE tube (Ø8×Ø10mm)
Signal cable	Ø10mm, 0.37mm <sup>2</sup> ×8C shielded PVC sheath cable					

### The readout

It is connected to the system such as the VW readout units, data loggers to be data logging and data acquisition system to monitor readings. It is compatible with other company's readout unit.

- ACE-800 (VW readout)
- ACE-1000 (VW data recorder)
- ACE-1100 series (VW mini logger)
- ADL-16V (VW data logger)
- ADL-200A (Smart logger)

### Ordering information

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

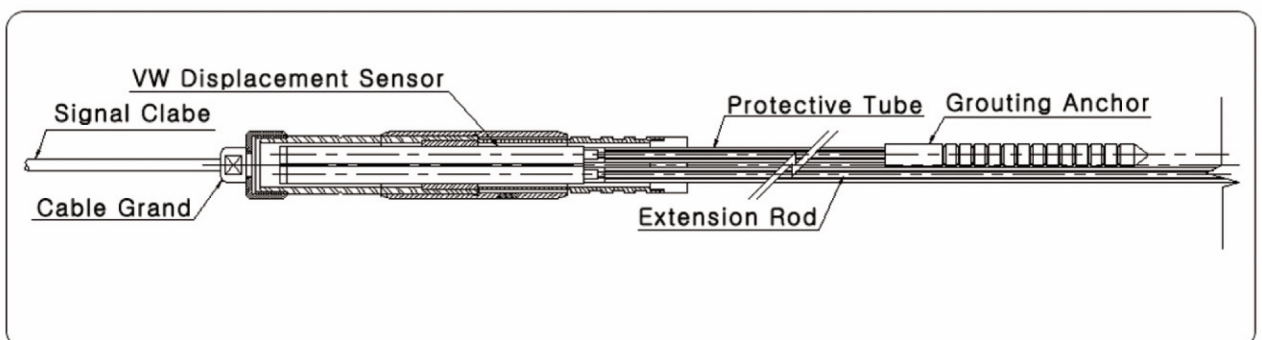
### Ancillary equipments

- Universal terminal box (model 7012/7024)
- Carryable size of water pressure pump
- Nylon tube for the use of grout

### Recommendation

Construction site assembling type VW rod extensometer of model 1391 is designed to establish into Ø38mm that is usual size of perforation for the establishment of rock bolt and independent anchor type of structure and slim type for the precise measurement.

Because of this construction environment, the material for back filling should be grouted with mortar to prevent from breakdown of sensor.



[Drawing of VW rod extensometer]