

VW rock bolt stressmeter

Description

Model 1350 **VW rock bolt stressmeter** is used to verify validity such as effective depth, quantity and stress of rock bolt. It also is equipped with four VW strain gages, each other equally spaced in the rock bolt, and is water proof, moisture proof and anticorrosive.

VW strain gages inside the rock bolt detect stress caused by behavior, slack and cutting transmitted to anchors. The VW strain gages is pretension about 2,000Hz.

When the displacement perpendicular to the rock bolt occurred, the gages detect and output frequency signal. This signal is transmitted to the VW readout unit and is displayed.

The VW rock bolt stressmeter employs typically four measurement points that is equivalent to layers.

Also it is equipped with the accurate temperature device for compensating temperature variations and is available 2 to 6 meters anchors in rock bolt.

The VW rock bolt stressmeter do not affected by contact resistance and induced voltage for electrical sensors, bringing on an unstable reading.

The model 1350 VW rock bolt stressmeter is carbon steel of ID $\varnothing 16.2\text{mm}$ \times OD $\varnothing 27.2\text{mm}$ that it is easy to establish into $\varnothing 38\text{mm}$ hole.

VW rock bolt stressmeter has no measurement error or difficulty that is mechanical system. And it is waterproof and rustproof that it is possible to measure semi permanently.

Applications

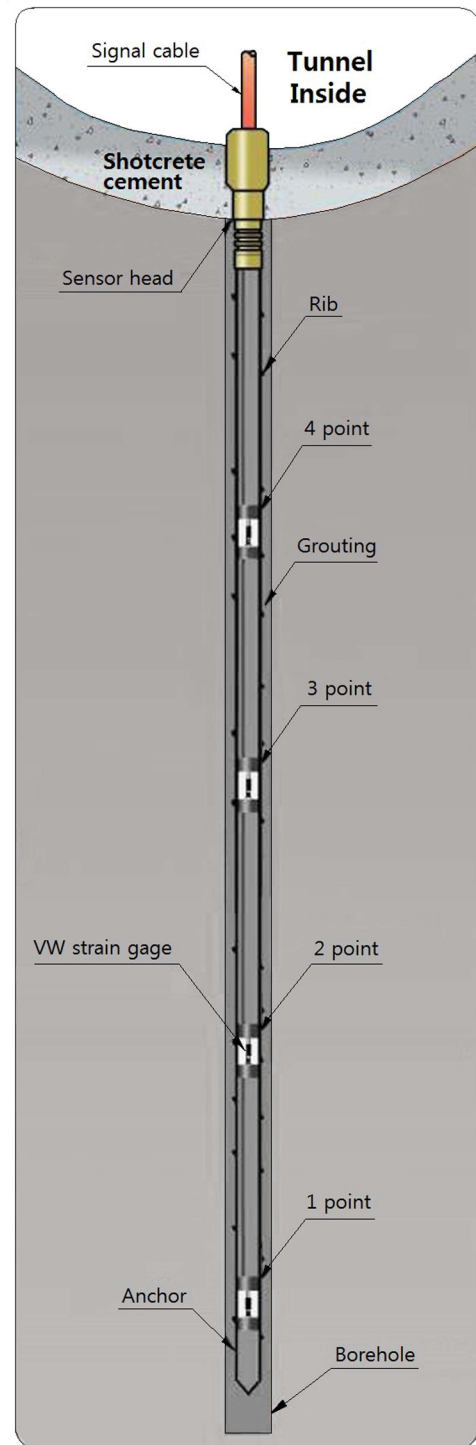
The model 1350 VW rock bolt stressmeter is designed to measure stress in rock bolts installed for reinforcing rock in tunnels, mines, hangars and caverns.

Features

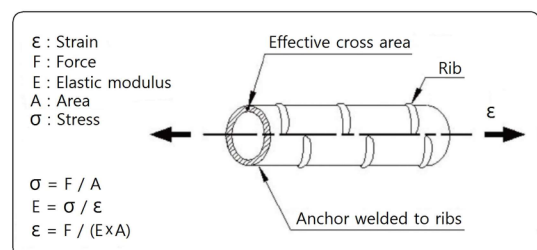
- Small design to apply in $\varnothing 38\text{mm}$ of the inside diameter of borehole
- High precision and reliability
- 4 station system length of 2~6m of anchor
- Stability and reliability in extreme environment
- Possible to automatic measurement

Ordering information

- Anchor length
- Keeping VW readout unit
- Cable length
- The VW rockbolt stressmeter can be manufactured up to 6 measurement points along the borehole and up to 20 meters long by order of customer.



[Installation of VW rock bolt stressmeter]



[Theory of calculation]

VW rock bolt stressmeter

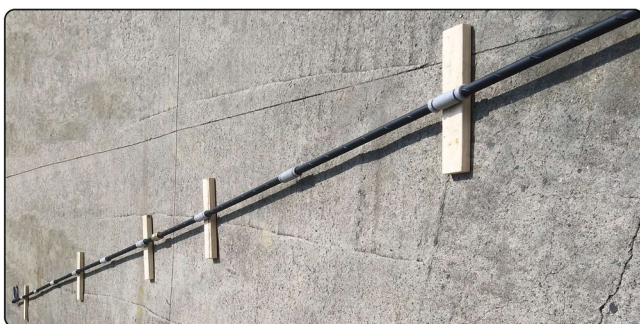
Specification

Model	1350 (Standard)	1350 BX
Sensor element	Vibrating wire sensor	
Range	Total 3,300 microstrain (tension 1,650, compression 1,650)	
Resolution	1.0 microstrain	
Accuracy	±0.1% FSR	
Nonlinearly	±0.5% FSR	
Coefficient of linear expansion	10.8 × 10 ⁻⁶ /°C	
Operating temperature	-40~80°C	
Built-in temperature device	Thermistor (3k Ω)	
Temperature device range	-40~105°C	
Temperature device accuracy	±0.5°C	
Measuring points	4 points (standard)	
Minimum borehole diameter	More than \varnothing 38mm (EX drill)	More than \varnothing 60mm (BX drill)
Effective load of VW gage	17 ton · f	18.9 ton · f
Waterproof	50m H ₂ O	
Anchor dimensions	ID \varnothing 16.2 × OD \varnothing 27.2mm	ID \varnothing 25 × OD \varnothing 34mm
Cross sectional area of anchor	374.95mm ²	417.05mm ²
Modulus of elasticity	2.1 × 10 ⁶ kg/cm ²	
Yield point of anchor	17 ton · f (assumed that it has 4,500kg/cm ² limit ratio of elasticity)	18.9 ton · f
Gage length	500mm 750mm 1,000mm 1,250mm 1,500mm	By order of customer
Length	2m 3m 4m 5m 6m	By order of customer(max.20m)
Weight	6kg 9kg 12kg 15kg 18kg	According to length
Material	Carbon steel pipe	
Signal cable	\varnothing 10mm, 0.37mm ² × 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)
- VL Module (Smart LoRa system)



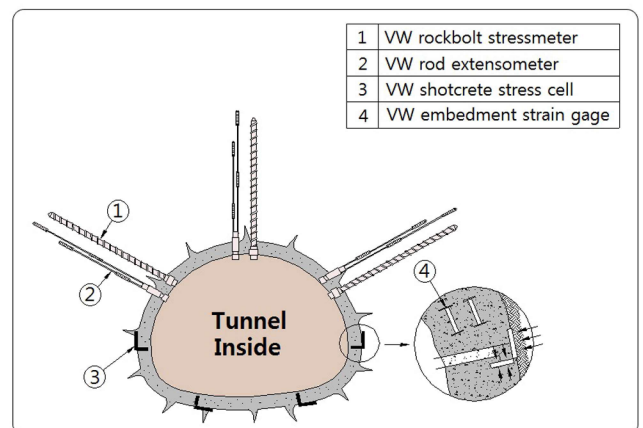
[Big size rockbolt stressmeter]

Ancillary equipments

- Universal terminal box (model 7012/7024)
- Portable hydraulic pump (model 7050)
- Nylon tube for grout

Recommendation

It is good to use grout in rock, if is possible, since adhesive power between rock bolts and mortar or mortar and rock depends on performance of VW rock bolt stressmeters.



[Installation at the tunnel]