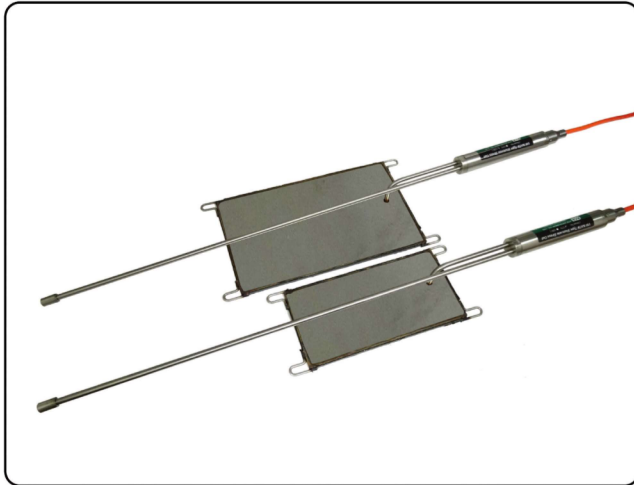


VW shotcrete stress cells (NATM style)



Description

VW NATM type shotcrete stress cells are formed from two rectangular stainless steel plates welded around the periphery. The intervening space between the plates is filled with oil.

Then a pressure transducer is attached to the cell.

A pressure transducer is connected to pinch tubes, which are forced out of the tube and into the cell, which expands until the gap is eliminated. The stress applied on the sensitive surface cause a corresponding rise in the oil pressure as the stainless steel plates are squeezed together. The oil in the cell is reached through to a pressure transducer. A pressure transducer converts pressure in liquid into the frequency signal. The signal is transmitted to the readout and is displayed.

Shotcrete stress cells are usually installed in tangential and radial direction after excavating the tunnel but before applying the shotcrete. Radial cells are placed at the interface between the excavated ground surface and the tunnel wall.

Tangential cells are either attached to short pieces of reinforcing bar protruding from the wall, or to the reinforcing cage (if one is used). Pinch tubes are bent so that they will protrude from the finished lining, and be accessible for pinching. Once the cells are positioned, shotcrete takes places.

After the shotcrete cures, tangential cells are pushed by plier the cell's pressurization tube, which forces oil from the tube into the cell. The cell is inflated by influx of oil, forcing the sensitive side of the cell into contact with the surrounding shotcrete materials.

Applications

The VW NATM type shotcrete stress cells are designed to measure radial and tangential stress in shotcrete tunnel linings, which is suitable for NATM method.

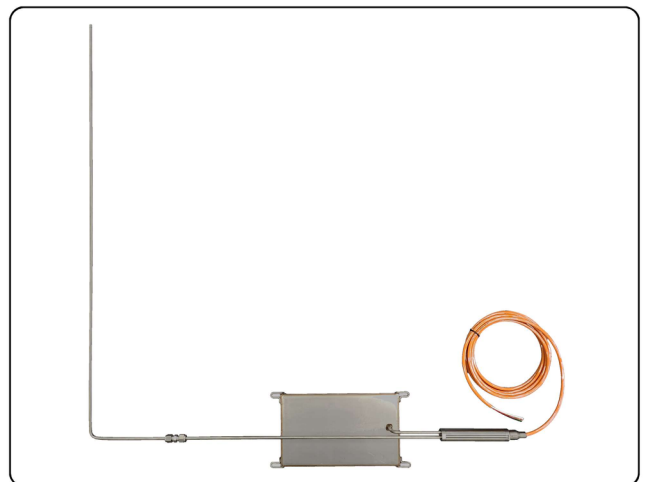
They are often used in conjunction with a tape extensometer, VW rod extensometer and VW rock bolt stressmeters to measure the magnitude of and the orient of stress on the lining and to determine whether the shotcrete lining is thick enough.

Features

- Stability and reliability in extreme environment
- Not affected by cable length and resistance change, reproducibility are very excellence
- Possible to automatic measurement

[Pinch tube extension]

If the pinch tube needs to be configured long due to the tunnel structure, it can be manufactured by extending the pinch tube as an option.



VW shotcrete stress cells (NATM style)

Specification

Model	1270	1280
Sensor element	Vibrating wire sensor	
Application	Tangential cell	Radial cell
Range	70, 200kg/cm ²	30, 50kg/cm ²
Resolution	0.025% FSR	
Accuracy	±0.1% FSR	
Nonlinearity	±0.5% FSR	
Over range capacity	150% FSR	
Thermal zero shift	Less than 0.05% FSR/°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	
Liquid	Oil	
Pinch tube length	450mm (standard)	
Waterproof	300m H ₂ O	
Materials	Stainless steel, high grade epoxy potting	
Weight	1.5kg	2kg
Signal cable	Ø6.4mm, 0.37mm ² × 4C 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.

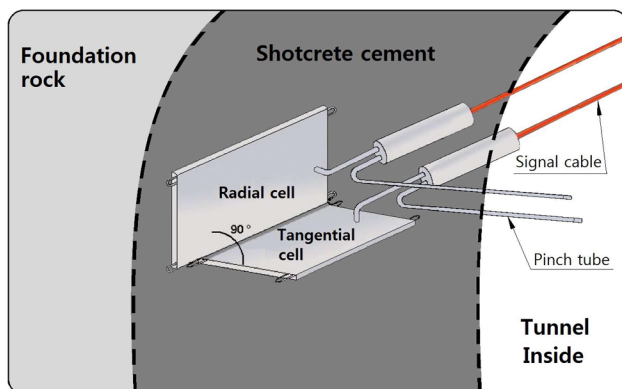
- ACE-800 (VW readout)
- ACE-1000 (VW data recorder)
- ACE-1100 series (VW mini logger)
- ADL-16V (VW data logger)
- ADL-200A (Smart logger)
- VL Module (Smart LoRa system)

Ordering information

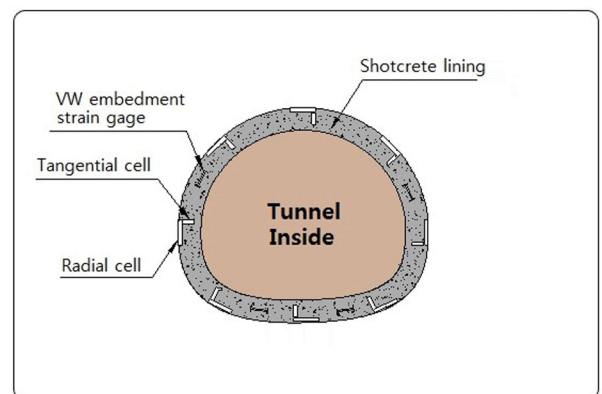
- Application field
- Range
- Keeping VW readout unit
- Cable length
- Specially ordered goods that is not in catalogue is possible to manufacture to 200kg/cm² and size of Ø500 or 500 × 500mm.

Ancillary equipments

- Universal terminal box (model 7012/7024)
- Heavy duty cable



[Installation in tunnel lining]



[Cross sectional drawing of Installation]