VIBRATING WIRE
STRAIN GAUGES
& THERMOMETERS
Vibrating wire strain gauges provide measurements of strain in steel or concrete structures. The measurements are used to calculate structural loads or stresses. Arc-weldable strain gauges are fixed to steel structures via weldable end-blocks. On concrete surfaces they can be installed by means of mounting blocks that include rebar-bolts. Embedment strain gauges are cast into concrete structures and are available also as “shotcrete” model with adjustable tensioning collar. For high concrete pressure, e.g. in deep piles, an embedment strain gage for deep applications is recommended.

**APPLICATIONS**
- Piles and mass concrete
- Concrete structures, beams and columns
- Concrete foundations and diaphragm walls
- Tunnel segments
- Steel structures, pipes and arch supports
- Gravity and arch dams
- RCC dams
- Bridges and viaducts

**FEATURES**
- Reliable long term performance
- Robust design, suitable for demanding environments
- Aged thermally to minimize long-term drift
- Built-in temperature sensor
- Totally waterproof
- Accurate readings even with long cable lengths

Meet the essential requirements of the EMC Directive 2014/30/EU
A tensioned wire, when plucked, vibrates at its resonant frequency. The square of this frequency is proportional to the strain in the wire.

To make use of this principle, the vibrating wire strain gauge is designed to hold a wire in tension between two end blocks that are fixed to the structure. An electromagnetic coil assembly is used to pluck the wire and then to return a frequency signal to the readout units.

Deformation of the structure changes the distance between the two end blocks, altering the tension of the wire and its resonant frequency. The returned signal is converted to units of microstrain. Gauges may be read up to 1000 meters away from their location.

The strain gauge has a built-in thermistor to provide temperature data for detecting thermal effects if necessary.

### TECHNICAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>PRODUCT CODE</th>
<th>Description</th>
<th>Measuring principle</th>
<th>Active gauge length</th>
<th>Range (nominal)</th>
<th>Typical frequency range</th>
<th>Repeatability</th>
<th>Sensitivity (nominal)</th>
<th>Resolution</th>
<th>Accuracy</th>
<th>Coil resistance (nominal)</th>
<th>Embedded thermistor type</th>
<th>Embedded thermistor accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td>VK4000VS00</td>
<td>weldable SG</td>
<td>vibrating wire</td>
<td>150 mm (5.9&quot;)</td>
<td>3000 με (±1500 με)</td>
<td>500 - 1000 Hz</td>
<td>&lt;±1 με</td>
<td>4.043 με / digit (1)</td>
<td>&lt;1.0 με</td>
<td>±0.5% FS</td>
<td>150 ohm</td>
<td>NTC (Negative Temperature Coefficient) 3 kΩ</td>
<td>±1°C (±0.5°C within 0 - 50 °C)</td>
</tr>
<tr>
<td>VK4000VSC0</td>
<td>concrete surface SG</td>
<td>vibrating wire</td>
<td>150 mm (5.9&quot;)</td>
<td>3000 με (±1500 με)</td>
<td>500 - 1000 Hz</td>
<td>&lt;±1 με</td>
<td>4.043 με / digit (1)</td>
<td>&lt;1.0 με</td>
<td>±0.5% FS</td>
<td>150 ohm</td>
<td>Automatically selected by readout (max 40 V)</td>
<td></td>
</tr>
<tr>
<td>VK4200VC00</td>
<td>embedment SG</td>
<td>vibrating wire</td>
<td>165 mm (6.5&quot;)</td>
<td>3000 με (±1500 με)</td>
<td>500 - 1015 Hz</td>
<td>&lt;±1 με</td>
<td>3.814 με / digit (1)</td>
<td>&lt;1.0 με</td>
<td>±0.5% FS</td>
<td>150 ohm</td>
<td>Frequency (strain), Ohm (temperature)</td>
<td></td>
</tr>
<tr>
<td>VK4200VCHP</td>
<td>embedment SG for deep application</td>
<td>vibrating wire</td>
<td>165 mm (6.5&quot;)</td>
<td>3000 με (±1500 με)</td>
<td>520 - 1025 Hz</td>
<td>&lt;±1 με</td>
<td>3.814 με / digit (1)</td>
<td>&lt;1.0 με</td>
<td>±0.5% FS</td>
<td>150 ohm</td>
<td>max 2.4 MPa</td>
<td></td>
</tr>
<tr>
<td>VK4000SM00</td>
<td>shotcrete SG with adjustable tensioning</td>
<td>vibrating wire</td>
<td>200 mm (7.9&quot;)</td>
<td>10000 με (±5000 με)</td>
<td>1800 - 2460 Hz</td>
<td>&lt;±3 με</td>
<td>3.542 με / digit (1)</td>
<td>&lt;1.0 με</td>
<td>±3.0% FS</td>
<td>150 ohm</td>
<td>max 2.4 MPa</td>
<td></td>
</tr>
</tbody>
</table>

1. The expressed values could have a ±10% variation  
2. "Digit" means (f x 10^-3) where f is the vibration frequency of the wire in Hz  
3. ±3.0% FS with standard calibration batch, ±0.5% FS with individual calibration.  
4. This is the maximum installation depth under fresh concrete column, i.e. in foundation piles.
PHYSICAL FEATURES (OVK4000VS00 AND OVK4000VSC0)

OVK4000VS00 - WELDABLE STRAIN GAUGE

OVK4000VSC0 - CONCRETE SURFACE STRAIN GAUGE

AN EXAMPLE OF APPLICATION ON STRUTS
PHYSICAL FEATURES (OVK4200VC00 AND OVK4200VCHP)

0VK4200VC00 / OVK4200VCHP - EMBEDMENT STRAIN GAUGES

- Embedment strain gauge for deep application
- SECTION AA:
  - Ø 20 mm
  - 42 mm
  - 6 mm
  - 150 mm

PHYSICAL FEATURES (OVK4000SM00)

0VK4000SM00 - SHOTCRETE EMBEDMENT STRAIN GAUGE

- Shotcrete embedment strain gauge
- min 206 mm - max 208 mm
- 51 mm
- 42 mm
- 6 mm
- Threaded collar for adjusting wire tensioning

AN EXAMPLE OF APPLICATION ON PILE

- OVK4200VCHP embedment strain gauge for deep application
AN EXAMPLE OF APPLICATION IN TBM TUNNEL

- 0VK4200VC00 strain gauge embedded into precast concrete lining

AN EXAMPLE OF TUNNEL APPLICATION WITH NATM METHOD

- 0VK4200VC00 strain gauge embedded into concrete lining
- 0VK4000VS00 strain gauge welded on steel lining
ACCESSORIES AND SPARE PARTS

SPACING JIG
OVK4O0JIG00
It allows to weld at the right distance the arc-weldable strain gauge end blocks.

3D ROSETTE MOUNTING
OVK42VC3DOO
It is a block that permits to mount three embedment gauges in 3D rosette configuration.

PROTECTIVE COVER
OVK4OOCOVER
Stainless steel made protective cover. Where thermal influence is expected the cover can be filled with expanding foam.

SPARE WELDABLE BLOCKS
OVK400MB200
Pair of spare weldable end blocks for arc-weldable strain gauges. Galvanized steel made.

SPARE CONCRETE BLOCKS
OVK400CMB20
Pair of spare concrete anchor end blocks for arc-weldable strain gauges. Galvanized steel made.

READABLE BY

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VR STRAIN GAUGES

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