Multi-Sensor

Multi-Parameter Sensor for Monitoring Stress in Railways

Description

Conventional track-based monitoring systems face many challenges; physical bulk, unfriendly connection systems, poor mounting techniques and fragility are the main problem areas. The Vortok Measure & Detect sensor integrates three measuring technologies into a single compact, rugged stainless steel body. Inserted into a single 10mm diameter hole in on the neutral axis of the rail web, the Multi-sensor measures rail force in a vertical or horizontal plane, rail acceleration both vertically and laterally as well as rail core temperature.

Dimensions

Wiring

Cable

<table>
<thead>
<tr>
<th>Screen</th>
<th>LS0H 7 core with overall screen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pink</td>
<td>Terminated at computer</td>
</tr>
<tr>
<td>Grey</td>
<td>5V dc Power</td>
</tr>
<tr>
<td>Green</td>
<td>0V</td>
</tr>
<tr>
<td>White</td>
<td>Strain +ve</td>
</tr>
<tr>
<td>Blue</td>
<td>Strain -ve</td>
</tr>
<tr>
<td>Yellow</td>
<td>Temperature</td>
</tr>
<tr>
<td>Brown</td>
<td>Accn X +/-70g (0g=2.5V)</td>
</tr>
<tr>
<td></td>
<td>Accn Y +/-35g (0g=2.5V)</td>
</tr>
</tbody>
</table>

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Connector Option

The Multi-Sensor can be supplied with a 7-pin connector in place of the cable gland. Details available on request.

Specification

Amplifier: x100G instrumentation amplifier
Temperature: Solid state precision sensor +/- 1 degree
  10mV per degree K
Temperature Range: -40 to +85 degrees Celsius
  +/- 0.5 degrees
Acceleration: 2 axis MEMS (4000g overload)
  Vertical +/-70g (0g=2.5V)
  Horizontal (Lateral) +/-35g (0g=2.5V)
  +/- 1%
Strain: RWL 350 Ohm (x100 amplification)
Load Range: +/- 40 Tonnes vertical shear
  +/- 80 Tonnes tension / compression
  +/- 1% when calibrated
Sensor Body: Cast Stainless Steel
Sensor barrel: 10mm
Weight: 50g
Supply Voltage: 5v dc
Stain offset imbalance: less than +/- 0.75v
Sealing: IP68
Installation: drill - ream - insert H7 interference fit
  less than 10 minutes per sensor
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Applications

**Train Weighing or Wheelflat Detection** - Sensors can be placed with their cable outlets horizontal. In this orientation the strain gauge measures vertical shear and the accelerometers measure vertical and lateral acceleration.

Sensors should be placed, at least, 25mm inboard of the rail supports.

**Stress-Free (Neutral) Temperature** - A Sensor is be placed with its cable outlet at 45 degrees from Horizontal. In this orientation the strain gauge measures rail tension and the accelerometers measure vertical and lateral acceleration. The temperature sensor measures rail core temperature coincident with the strain gauge, allowing accurate tracking of temperature, induced rail strain.
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Standards

The MultiSensor has been designed to conform with the following standards:

- Environmental service conditions “TX” as specified within BS:EN50155
- Electrical Category “Class S2” specified in BS:EN50155 shall apply.