LB 210 Series
Load Measuring Pins

FEATURES

- For overload detection and load measurement from 2.5 kN to 1250 kN (0.28 tf to 140.5 tf).
- Admissible Overload: 150% of the nominal load.
- Overload at Rupture: up to 500% of the nominal load.
- Insensitive to external mechanical and chemical effects.
- Ideal for use in hostile environments.
- Temperature-compensated transducers with strain gauges in full-bridge configuration. On request, available with double bridge redundant.
- Simple installation for cost-saving solutions to measurement problems.
- High reliability for strict safety requirements.
- Many options may be added to the lower-cost standard load pin for greater flexibility.
- Can be designed with special dimensions for adaptation to various construction conditions.

DESCRIPTION

Magtrol Load Measuring Pins are used to measure load and force and provide overload protection. The pins are mounted into machines in place of normal shafts and fitted with strain gauges, allowing them to produce a signal proportional to the measured load. Manufactured in Switzerland, Magtrol’s LB 210 Series Load Pins are rugged with high resistance stainless steel and tight construction, designed specifically for use in harsh industrial environments. Available in 10 standard ranges from 2.5 kN to 1250 kN, these highly ergonomic pins can be used for either new or refitted installations and are adaptable to various conditions.

APPLICATIONS

When forces acting on mechanical constructions are measured, the additional equipment required can often be costly and difficult to install. Magtrol Load Measuring Pins offer an excellent solution since they act as a direct element in the assembly, replacing a non-instrumented pin or shaft. LB 210 Series Load Pins are used for load measuring devices and overload protection on cranes, hoisting gear, elevators and winches, and force measurement for regulation processes in industrial installations and machinery production.

DESIGN

The Magtrol Load Pin has 2 circular grooves and an axial bore. Inside the central bore, adjacent to the external grooves, the strain gauges are mounted in a full-bridge configuration. The positioning and orientation of the strain gauges have been optimized by means of the finite element method (FEM).
### Specifications

#### Standard Version

<table>
<thead>
<tr>
<th>MECHANICAL CHARACTERISTICS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nominal Load, fns (Metric)</strong></td>
</tr>
<tr>
<td><strong>Nominal Load, fns (US)</strong></td>
</tr>
<tr>
<td><strong>Overload Admissible</strong></td>
</tr>
<tr>
<td><strong>Overload Limit</strong></td>
</tr>
<tr>
<td><strong>Overload at Rupture (of rated load)</strong></td>
</tr>
<tr>
<td><strong>Material</strong></td>
</tr>
<tr>
<td><strong>Protection Class</strong></td>
</tr>
<tr>
<td><strong>Fit</strong></td>
</tr>
<tr>
<td><strong>Lubrication</strong></td>
</tr>
</tbody>
</table>

#### ELECTRICAL CHARACTERISTICS

- **Operating Principle**: Full-bridge strain gauge
- **Bridge Impedance**:
  - Input: 400 Ω
  - Output: 350 Ω
- **Power Supply**: 5 to 12 V DC / AC
- **Zero Adjustment**: ± 1% of fns
- **Transducer Sensitivities**: 0.5 mV/V ± 3% 1 mV/V ± 3% 1.8 mV/V ± 3%
- **Non-linearity Error**: < 0.25% of fns < 0.25% of fns < 0.5% of fns
- **Non-linearity + Hysteresis Error**: < 0.5% of fns < 0.5% of fns < 0.8% of fns
- **Repeatability**: ± 0.1% of fns
- **Operating Temperature**: -25 °C to +80 °C
- **Storage Temperature**: -55 °C to +125 °C
- **Temperature Influence**:
  - On Zero: ± 0.02% of fns / K
  - On Sensitivity: ± 0.02% / K
- **Influence on Measurement Signal (Shift of Force Angle with Respect to Measurement Axis)**: According to the cosine function

#### ELECTRICAL CONNECTION

- **Cable Type**: K-414
- **Cable Length**: 3 m (standard); 6 m, 12 m, 20 m (optional)
- **PG Output**: Axial, with heat-shrinkable sleeve
- **Optional Output Connector**: not available
- **Optional Connection**: not available

* Ratings apply to standard load pins only, special models are available by contacting Magtrol.

---

#### OPERATING PRINCIPLE

When force is applied to the Load Measuring Pin along its sensitive axis, the effect on the strain gauge bridge results in an output signal proportional to the applied force. The powering of the strain gauge bridge, as well as the amplification of its output signal voltage, is performed by an external amplifier. Depending on the execution, the latter allows the monitoring of several levels.

R\textsubscript{a} should equal R\textsubscript{b} so that the force is evenly distributed.
### Specifications

**LB 210**

#### Dimensions

![Diagram of LB 210 - LB 213](image)

**NOTE:** Original dimensions are in Metric units. Dimensions converted to English units have been rounded up to 3 decimal places.

<table>
<thead>
<tr>
<th>Model</th>
<th>Units</th>
<th>Ø A</th>
<th>B</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>M</th>
<th>N</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>LB 210</td>
<td>mm</td>
<td>25h6</td>
<td>84</td>
<td>18</td>
<td>16</td>
<td>10</td>
<td>7</td>
<td>24</td>
<td>5.2</td>
<td>9</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.2 kg</td>
</tr>
<tr>
<td></td>
<td>in</td>
<td>0.984</td>
<td>3.307</td>
<td>0.709</td>
<td>0.630</td>
<td>0.394</td>
<td>0.276</td>
<td>0.945</td>
<td>0.205</td>
<td>0.354</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.441 lb</td>
</tr>
<tr>
<td>LB 211</td>
<td>mm</td>
<td>25h6</td>
<td>84</td>
<td>18</td>
<td>16</td>
<td>10</td>
<td>7</td>
<td>24</td>
<td>5.2</td>
<td>9</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.2 kg</td>
</tr>
<tr>
<td></td>
<td>in</td>
<td>0.984</td>
<td>3.307</td>
<td>0.709</td>
<td>0.630</td>
<td>0.394</td>
<td>0.276</td>
<td>0.945</td>
<td>0.205</td>
<td>0.354</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.441 lb</td>
</tr>
<tr>
<td>LB 212</td>
<td>mm</td>
<td>25h6</td>
<td>84</td>
<td>18</td>
<td>16</td>
<td>10</td>
<td>7</td>
<td>24</td>
<td>5.2</td>
<td>9</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.2 kg</td>
</tr>
<tr>
<td></td>
<td>in</td>
<td>0.984</td>
<td>3.307</td>
<td>0.709</td>
<td>0.630</td>
<td>0.394</td>
<td>0.276</td>
<td>0.945</td>
<td>0.205</td>
<td>0.354</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.441 lb</td>
</tr>
<tr>
<td>LB 213</td>
<td>mm</td>
<td>25h6</td>
<td>84</td>
<td>18</td>
<td>16</td>
<td>10</td>
<td>7</td>
<td>24</td>
<td>5.2</td>
<td>9</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.2 kg</td>
</tr>
<tr>
<td></td>
<td>in</td>
<td>0.984</td>
<td>3.307</td>
<td>0.709</td>
<td>0.630</td>
<td>0.394</td>
<td>0.276</td>
<td>0.945</td>
<td>0.205</td>
<td>0.354</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>0.441 lb</td>
</tr>
<tr>
<td>LB 214</td>
<td>mm</td>
<td>35h6</td>
<td>112</td>
<td>25</td>
<td>14</td>
<td>12</td>
<td>12</td>
<td>35</td>
<td>6.3</td>
<td>11.5</td>
<td>---</td>
<td>---</td>
<td>16</td>
<td>0.65 kg</td>
</tr>
<tr>
<td></td>
<td>in</td>
<td>1.378</td>
<td>4.409</td>
<td>0.984</td>
<td>0.551</td>
<td>0.472</td>
<td>0.472</td>
<td>1.378</td>
<td>0.248</td>
<td>0.453</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>1.433 lb</td>
</tr>
<tr>
<td>LB 216</td>
<td>mm</td>
<td>50h6</td>
<td>161</td>
<td>32</td>
<td>24</td>
<td>18</td>
<td>18</td>
<td>48</td>
<td>10.5</td>
<td>20</td>
<td>---</td>
<td>---</td>
<td>21.5</td>
<td>2.0 kg</td>
</tr>
<tr>
<td></td>
<td>in</td>
<td>1.967</td>
<td>6.339</td>
<td>1.260</td>
<td>0.945</td>
<td>0.709</td>
<td>0.709</td>
<td>1.890</td>
<td>0.413</td>
<td>0.787</td>
<td>---</td>
<td>---</td>
<td>0.847</td>
<td>4.409 lb</td>
</tr>
<tr>
<td>LB 217</td>
<td>mm</td>
<td>65h6</td>
<td>196</td>
<td>32</td>
<td>26</td>
<td>20</td>
<td>25</td>
<td>65</td>
<td>10.5</td>
<td>22.5</td>
<td>---</td>
<td>---</td>
<td>28.5</td>
<td>4.4 kg</td>
</tr>
<tr>
<td></td>
<td>in</td>
<td>2.559</td>
<td>7.717</td>
<td>1.260</td>
<td>1.024</td>
<td>0.787</td>
<td>0.984</td>
<td>2.559</td>
<td>0.413</td>
<td>0.886</td>
<td>---</td>
<td>1.122</td>
<td>9.700 lb</td>
<td></td>
</tr>
<tr>
<td>LB 218</td>
<td>mm</td>
<td>85h6</td>
<td>258</td>
<td>34</td>
<td>39</td>
<td>35</td>
<td>28</td>
<td>89</td>
<td>10.5</td>
<td>28</td>
<td>32</td>
<td>M6</td>
<td>35</td>
<td>10.6 kg</td>
</tr>
<tr>
<td></td>
<td>in</td>
<td>3.347</td>
<td>10.158</td>
<td>1.339</td>
<td>1.535</td>
<td>1.378</td>
<td>1.102</td>
<td>3.504</td>
<td>0.413</td>
<td>1.102</td>
<td>1.260</td>
<td>---</td>
<td>1.378</td>
<td>23.369 lb</td>
</tr>
<tr>
<td>LB 220</td>
<td>mm</td>
<td>100h6</td>
<td>347</td>
<td>36</td>
<td>61</td>
<td>55</td>
<td>35</td>
<td>120</td>
<td>10.5</td>
<td>36</td>
<td>35</td>
<td>M8</td>
<td>45</td>
<td>19.2 kg</td>
</tr>
<tr>
<td></td>
<td>in</td>
<td>3.937</td>
<td>13.661</td>
<td>1.417</td>
<td>2.402</td>
<td>2.165</td>
<td>1.378</td>
<td>4.724</td>
<td>0.413</td>
<td>1.417</td>
<td>1.378</td>
<td>---</td>
<td>1.772</td>
<td>42.328 lb</td>
</tr>
<tr>
<td>LB 221</td>
<td>mm</td>
<td>120h6</td>
<td>347</td>
<td>36</td>
<td>61</td>
<td>55</td>
<td>35</td>
<td>120</td>
<td>12.5</td>
<td>40</td>
<td>35</td>
<td>M8</td>
<td>45</td>
<td>28.4 kg</td>
</tr>
<tr>
<td></td>
<td>in</td>
<td>4.724</td>
<td>13.661</td>
<td>1.417</td>
<td>2.402</td>
<td>2.165</td>
<td>1.378</td>
<td>4.724</td>
<td>0.492</td>
<td>1.575</td>
<td>1.378</td>
<td>---</td>
<td>1.772</td>
<td>62.611 lb</td>
</tr>
</tbody>
</table>
### OPTIONS AND ORDERING INFORMATION

#### STANDARD MODELS
- Model LB 210 - Electrical Connection: PG Axial
- Model LB 210 - Electrical Connection: PG Radial

#### OPTIONS FOR MODELS LB 214 – LB 221
- Electrical Connection: PG Radial (standard) PG Radial PG Axial 1
- Radial Connector 2

#### CONNECTION CABLE ASSEMBLY
- Cable Length: 3 m 6 m 12 m
- 20 m

### ACCESSORIES

#### Cable Assemblies

**Axial Connection between Load Measuring Pin and LMU**

**Radial Connection between Load Measuring Pin and LMU**

**Pin Configuration**

Supply + : red  Supply - : blue  Signal + : white  Signal - : green  Shield : black

### Example

An LB 216 Load Measuring Pin with lubrication, PG axial electrical connection and 20 m cable would be ordered as LB 216-111/114.

### Accessory Ordering Information

**COUNTER-CONNECTOR**

- Straight Connector: P/N 957.11.08.0030
- 90° Connector: P/N 957.11.08.0029

**CONNECTION CABLE ASSEMBLY**

- Part Number: EH 13 0 1
  - Straight Connector 8
  - 90° Connector 9

**CONNECTION CABLE ASSEMBLY**

- Cable Length:
  - 3 m 1
  - 6 m 2
  - 12 m 3
  - 20 m 4

*Due to the continual development of our products, we reserve the right to modify specifications without forewarning.*