Precision Tension and Compression Load Cell

Model 8524

Application
Due to their compact design and construction, these tension-pressure load cells can be operated without any problems in laboratories as well as in industrial environments. Made of corrosion-resistant steel, these load cells can be integrated easily in existing structures, due to their standardized nominal characteristic value and simple assembly. Model 8524 can be used to measure static, semi-static and dynamic tension and compression forces depending on the measurement task.

Areas of application include:
- Measurement of press-in and insertion forces
- Measurement of spring forces
- Measurement of shearing and cutting forces
- Force measurement and control during assembly
- Measurement of pressure on drilling machines

A load-centering plate mounted on the load cell can be used to measure joint lugs, tension forces in ropes, chains, etc. (refer to page 4: load-centering plate).

Description
The bending diaphragm inside the load cell is equipped with strain gauges which, on the exertion of a force, supply a bridge-output voltage directly proportional to the measurement variable. The center axis of the tension/compression load cells incorporates a continuous thread through which the measurement force is applied free from lateral or torsion force either using a load application button or an application-specific adapter part. Starting at a measurement range of 0 ... 5 kN, the measurement accuracy is ideal if the load cell has been mounted on a levelled, hard and polished base. This condition is not necessary for small measurement ranges of 0 ... 2 kN due to 3 special knife-edge bearings (see dimensional drawing 1).

Structural measures should be taken to avoid exposing the load cell to lateral forces (for instance, mounting on movable bearings, levers held by roller bearings). Attachment via the clearance bore holes integrated in the external ring allows simple handling of the sensor. A stop serves as overload protection against damages caused by impermissible high compression forces (option up to measurement range 0 ... 20 kN). Lateral forces of up to 5 % nominal strength only have little influence.

- Measuring ranges from 0 ... 500 N to 0 ... 200 kN
- Measurement accuracy better than 0.25 % F.S.
- Output signal 1.5 mV/V, standardized
- Highly versatile and for universal use
- Type of protection acc. EN 60529
  IP67 for measuring ranges ≥ 0 ... 20 kN
- Linearity error 0.1 % F.S.
  for measuring ranges ≤ 0 ... 5 kN (option)
- Cable suitable for drag chains and highly flexible

Optional overload protection up to the fivefold of measurement range

Code: 8524 EN
Delivery: ex stock
Warranty: 24 months
Technical Data

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>8524-5500</td>
<td>0 ... 0.5 kN</td>
<td>54.5 15 35.5 33.5 16 45 4.5 8 M 8x1.25</td>
<td>3</td>
<td>&gt; 2</td>
<td>0.25</td>
<td>3 Nm</td>
<td>M 4</td>
<td></td>
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<tr>
<td>8524-6001</td>
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<td>3</td>
<td>&gt; 3</td>
<td>0.25</td>
<td>3 Nm</td>
<td>M 4</td>
<td></td>
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<tr>
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<td>0 ... 2 kN</td>
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<td>3</td>
<td>&gt; 5</td>
<td>0.25</td>
<td>3 Nm</td>
<td>M 4</td>
<td></td>
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<tr>
<td>8524-6005</td>
<td>0 ... 5 kN</td>
<td>54.5 15 35.5 34.5 16 45 4.5 8 M 8x1.25</td>
<td>6</td>
<td>&gt; 8</td>
<td>0.25</td>
<td>3 Nm</td>
<td>M 4</td>
<td></td>
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<tr>
<td>8524-6010</td>
<td>0 ... 10 kN</td>
<td>54.5 15 35.5 34.5 16 45 4.5 8 M 8x1.25</td>
<td>6</td>
<td>&gt; 12</td>
<td>0.25</td>
<td>3 Nm</td>
<td>M 4</td>
<td></td>
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<tr>
<td>8524-6020</td>
<td>0 ... 20 kN</td>
<td>79 22 59 58.6 25 68 4.5 8 M 12x1.5</td>
<td>8</td>
<td>&gt; 4</td>
<td>0.65</td>
<td>3 Nm</td>
<td>M 4</td>
<td></td>
</tr>
<tr>
<td>8524-6050</td>
<td>0 ... 50 kN</td>
<td>119 44 94 92.6 35 105 6.6 11 M 24x1.5</td>
<td>8</td>
<td>&gt; 3</td>
<td>2</td>
<td>10 Nm</td>
<td>M 6</td>
<td></td>
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<tr>
<td>8524-6100</td>
<td>0 ... 100 kN</td>
<td>155 60 109 107 50 129 8 M 36x3</td>
<td>8</td>
<td>&gt; 3</td>
<td>5</td>
<td>100 Nm</td>
<td>M 12</td>
<td></td>
</tr>
<tr>
<td>8524-6200</td>
<td>0 ... 200 kN</td>
<td>155 60 109 107 50 129 8 M 36x3</td>
<td>8</td>
<td>&gt; 5</td>
<td>5</td>
<td>100 Nm</td>
<td>M 12</td>
<td></td>
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</tbody>
</table>

Electrical values

Bridge resistance (full bridge): foil strain gauge 350 Ω, nominal* Excitation: max. 10 V DC or AC Sensitivity: 1.5 mV/V ± 0.25 % positive output at compression Calibration resistor (burster model 1148-6080): 80 kΩ; 0.1 %

* Deviation from stated values are possible.

Environmental conditions

Temperature compensated: 15 °C ... 70 °C
Temperature operating: -30 °C ... 80 °C
Temperature effect zero shift: ≤ 0.02 % F.S./K
Temperature effect span shift: ≤ 0.02 % Rdg./K

Mechanical values

Accuracy: ≤ ± 0.25 % F.S.
Combined value consisting of non-linearity, hysteresis and non-repeatability in constant installation position.
Kind of measurement: Tension and compression
Load calibration in compression direction (preferential direction, output signal positive).
At use with tension load deviant output signal can be expected.
Deflection full scale: < 80 µm
Overload safe: 150 % of capacity
Overload burst: > 250 % of capacity
Dynamic performance:
recommended 70 % of capacity
maximum 100 % of capacity
Material: stainless steel 1.4542
Protection class: acc. EN 60529 measuring range ≤ 0 ... 10 kN: IP65
measuring range ≥ 0 ... 20 kN: IP67

Electrical termination:
highly flexible, oil resistant, drag chains suitable, shielded cable with bare ends for soldering. Bending radius three times the diameter for fixed cable, ten times the diameter for cable permanently moving, length 2 m. Further details see dimensional drawing.

Cable model PUR, ø 4.2 mm
Wiring code:
white excitation positive
brown excitation negative
yellow signal output positive
green signal output negative
Dimensions: see table dimensional drawing
Units with range ≤ 0 ... 2 kN are equipped with bearing edges within clearance holes. Therefore they are 1 mm higher.
Assembly:
measuring ranges up to 0 ... 2 kN: 3 clearance holes with edges for three-point-support
measuring ranges from 0 ... 5 kN: 6 resp. 8 clearance holes (see dimensions drawing 2-4)
The entire bearing area of the sensor must be mounted on a base which is hardened (60 HRC), flat, polished or better lapped.
Counter bores in compliance with DIN 74-km, in compliance with DIN 912 head cap screws.
Mechanical strength of screws: 12.9 or better
Also refer to the accessories comprising load-centering plates and load introduction buttons, page 4.

Dimensional drawing 1 measuring range 0 ... 0.5 kN and 0 ... 2 kN

The three bearing blades eliminate the need for a polished assembly base.
The CAD drawings (3D/2D) for this sensors can be imported online directly into your CAD system.
Download via www.burster.com or directly at www.traceparts.com. For further information about the burster traceparts cooperation refer to data sheet 80-CAD-EN.

Accessories
Load buttons
load buttons for introducing compressive forces

<table>
<thead>
<tr>
<th>Order Code</th>
<th>for Load Cell with Nominal Load</th>
<th>øD [mm]</th>
<th>H [mm]</th>
<th>L [mm]</th>
<th>T [mm]</th>
<th>SW</th>
<th>R</th>
<th>Tightening Torque</th>
<th>Mass [kg]</th>
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<tbody>
<tr>
<td>8580-V008</td>
<td>0.5 ... 10 kN</td>
<td>14</td>
<td>7.3</td>
<td>7</td>
<td>1.25</td>
<td>-</td>
<td>20</td>
<td>up to 2 kN: max. 5 Nm / 5 kN and 10 kN: max. 8 Nm</td>
<td>0.01</td>
</tr>
<tr>
<td>8580-V012</td>
<td>20 kN</td>
<td>20</td>
<td>15.1</td>
<td>12</td>
<td>1.5</td>
<td>16</td>
<td>25</td>
<td>max. 10 Nm</td>
<td>0.05</td>
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<tr>
<td>8580-V024</td>
<td>50 kN</td>
<td>40</td>
<td>20</td>
<td>17</td>
<td>1.5</td>
<td>32</td>
<td>100</td>
<td>max. 20 Nm</td>
<td>0.25</td>
</tr>
<tr>
<td>8580-V036</td>
<td>100 kN, 200 kN</td>
<td>57</td>
<td>30</td>
<td>40</td>
<td>3</td>
<td>46</td>
<td>200</td>
<td>max. 50 Nm</td>
<td>1</td>
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</table>

These load buttons prove extremely useful if a mechanical coupling (for instance, by means of a threaded rod) is not necessary or possible for a measurement of compressive forces. The spherical surface minimizes measurement errors in case of not axial force introduction.

The compression force needs to be introduced into the load button by means of a component with a plane surface, hardness > 60 HRC. Calibration Certificates for compression load require a load button, which consequently is part of the load cell and must be ordered along with.
Pull Plates

A pull plate extends the range of application of flat-design tension-pressure load cells to include the measurement of tensile forces in freely movable arrangements (rope tension, joint tension ...). A pull plate has roughly the same dimensions as the sensor body and is mounted on the load cell (see drawing). The central tapped holes allow an installation of customer-specific or standard threaded components (for example, joint heads).

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>8590-V002</td>
<td>bis 10</td>
<td>M 8 x 1.25</td>
<td>0.28</td>
<td>3 Nm</td>
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<tr>
<td>8590-V003</td>
<td>20</td>
<td>M 12 x 1.5</td>
<td>0.70</td>
<td>3 Nm</td>
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<tr>
<td>8590-V004</td>
<td>50</td>
<td>M 24 x 1.5</td>
<td>2.2</td>
<td>10 Nm</td>
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<tr>
<td>8590-V005</td>
<td>100, 200</td>
<td>M 36 x 3</td>
<td>5.5</td>
<td>10 Nm</td>
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</table>

Screws of strength class 12.9 are required for attaching the pull plates to the load cells.

Mobile high-precision calibrator and testing device TRANS CAL 7281-V0001 with integrated strain gauge simulator for the compensation and calibration of indicators, measuring amplifiers and DIGIFORCE® measurement chains. In combination with a reference sensor it is possible to test, check and measure existing force, torque and pressure systems. Model 7281-V0001

Mating connection, 12 pins for burster desktop devices Model 9941

Mating connection, 9 pins for 9163-V3, 7281 and 9311 Model 9900-V209

Mating connection, 9 pins for 7281 and 9311 with TEDS Model 9900-V229

Mounting of mating connector on sensor cable upon prevalent use of the load cell in preferential direction (output signal is positive in compressive direction)

Order Code 99004

only for connection to SENSORMASTER model 9163 desktop version

Order Code 99002

opposite to preferential direction (output signal is positive)

Order Code 99007

only for connection of the sensor to SENSORMASTER model 9163 desktop version

Order Code 99008

Options

Overload protection compression direction (see drawing on the right)

Order Code V400

<table>
<thead>
<tr>
<th>Load cell with option overload protection for compression direction</th>
<th>Measuring Range</th>
<th>Protected up to</th>
<th>Dimensions [mm]</th>
<th>Order Code</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>øD1</td>
<td>H1</td>
</tr>
<tr>
<td>8524-5500-V400</td>
<td>0 ... 500 N</td>
<td>2.5 kN</td>
<td>54.5</td>
<td>19</td>
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<td>0 ... 1 kN</td>
<td>5 kN</td>
<td>54.5</td>
<td>19</td>
</tr>
<tr>
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<td>10 kN</td>
<td>54.5</td>
<td>19</td>
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<tr>
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<td>54.5</td>
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<td>0 ... 20 kN</td>
<td>80 kN</td>
<td>79</td>
<td>25</td>
</tr>
</tbody>
</table>

The overload protection protects the load cell against damages resulting from loads higher than the operating load value (150 % of the nominal load). The overload protection is realized through a dead stop limiting the displacement of the spring bellow upon load application to max. 150 % of the nominal load. The measurement of tension forces is possible also with mounted overload stop. For this reason the overload protection has the same external mounting bores as the sensor itself.

Useful Information

- Overload protection for compression only.
- Overload protection mounting by factory only.
- Tolerance of standardized output of load cell at overload protection ± 0.5 %.
- Do not use the overload protection often.
- It is not allowed to introduce overload on load cell by thread (allowed are load buttons, see accessories or similar parts).
- The overload protection does not have any centric threaded holes.

Standardized sensitivity, 1 mV/V ± 0.25 % - V010

Cable length 3 m - V203

Cable length 5 m - V206

Improved linearity error ± 0.1 % F.S. (only for measurement ranges ≤ 0 ... 5 kN) - V502

Order Information

Tension and compression, range 0 ... 20 kN Model 8524-6020

Tension and compression, range 0 ... 5 kN, overload protection up to 20 kN Model 8524-6005-V400

Signal conditioning

Digital indicator e.g. model 9180, amplifier e.g. model 9243 or DIGIFORCE® refer to section 9 of the catalog.

Factory Calibration Certificate (WKS)

Calibration of a load cell separately as well as connected to an indicator. Standard is a certificate with 11 points, starting at zero, running up and down in 20% increments covering the complete measuring range for preferential direction. Special calibrations on request. Calculation of costs by base price plus additional costs per point.

Order Code 85WKS-85...