# Product Information
## Load cell Xforce HP+ and Xforce K+

Xforce family



Xforce K load cell in an AllroundLine materials testing machine

### Patented Xforce load cells - exclusively from ZwickRoell
Xforce load cells are only available from ZwickRoell. These high-accuracy load cells are used for all load-frame ranges, including for ProLine - no compromises here.
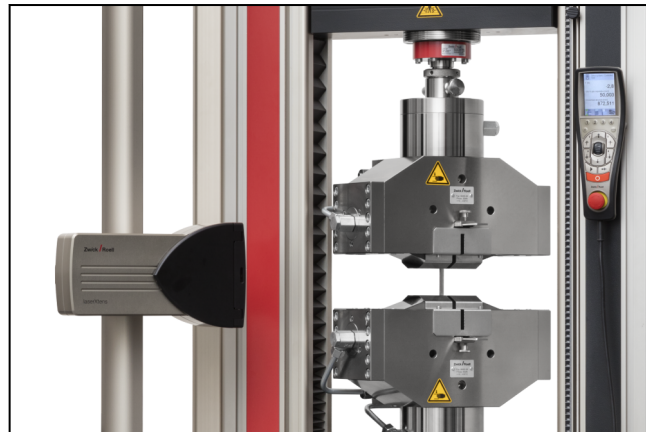
### Area of application
Xforce load cells are ideal for tensile, compression and flexure tests and for cyclic tests with zero crossing.

### Parasitic influences
All Xforce load cells are highly insensitive to parasitic influences such as transverse forces, bending moments, torque and temperature variations.

### Load cell design and construction
• All Xforce load cells are based on a rotation-symmetrical or axis-symmetrical design principle, making them highly resistant to transverse forces.
• The low overall height reduces measurement errors.
• The design delivers high operating forces, very small measurement travel and high stiffness levels.
• A high-quality shielded measurement cable with sensor plug forms the connection to the measurement amplifier for the measuring equipment.

### Self-identifying sensor plugs
These intelligent load cells have a unique electronic identification system stored on an internal EEPROM.
• The testXpert III testing software automatically identifies the sensor type and properties.
• Force and travel limits are automatically imported.
• Sensor overloads plus date are stored in the EEPROM.

### Fast load cell change
If several load cells are to be used, or in the event of frequent load cell changes, we recommend the 'Connection via Mounting Stud' option.
• Saves time and increases flexibility.
• Avoids unnecessary strain on the load cell cable during screwing in and unscrewing.
• The plug-in system delivers better alignment to the test axis than the usual threaded mounting.
• Reference positions for different test arrangements are automatically re-attained (with a threaded mounting, reference positions change according to the number of turns screwed in).

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Satisfies all 5 criteria for ISO 7500-1, Accuracy Class 0.5
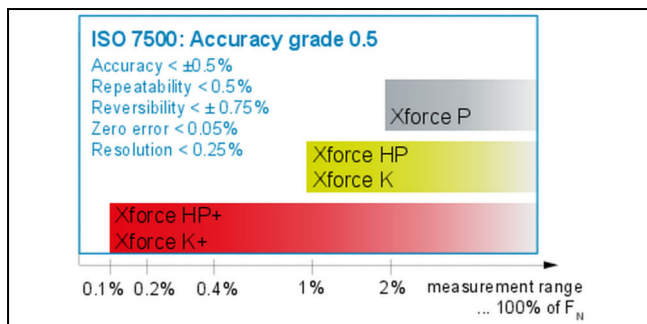


Satisfies all 5 criteria for ISO 7500-1, Accuracy Class 1

### Simple mechanical plug-in system, including for two test areas

- Each load cell is equipped with a precision-fit mounting stud, allowing fast, play-free fitting of specimen grips and test fixtures, with optimum alignment to the test axis.
- Reference positions (e.g. test-fixture separation) are set up just once by the operator and are stored in the test environment of the testXpert III testing software. This reference position is automatically and exactly reattained after each fixture change. It doesn't get more convenient than that!
- With Xforce K load cells a second mounting-stud can optionally be used, allowing use in two test areas.

### System calibration

Before dispatch each load cell is calibrated with the testing system plus drive and the measurement and control electronics as a complete system. This is recorded in the accompanying factory calibration certificate.

### Calibration and accuracy as per ISO 7500-1

All data apply to measured values in compression and tension directions.

- All load cells are calibrated up to the relevant nominal force $F_{nom}$ and satisfy the requirements of the following standards: EN ISO 7500 -1, EN ISO 7500 -2, ASTM E4.
- Xforce load cells satisfy the calibration requirements and all five criteria of the ISO 7500-1 accuracy classes over a very large measurement range.
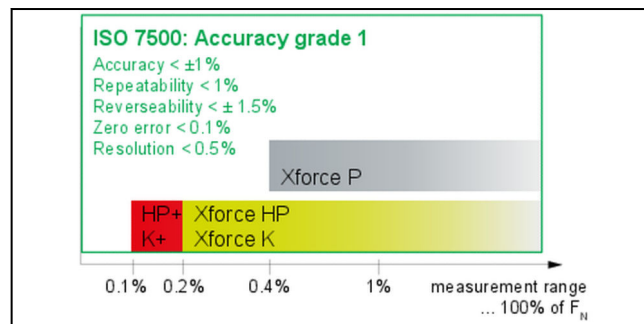
- Xforce HP+ and K+ load cells satisfy Classes 0.5/1 from as low as 0.1%.
- Xforce HP+ and K+ load cells with extended measurement range can be used and calibrated subject to the following requirements.
  - The machine must be equipped with testControl II and possess a vacant USC module (the standard DCSC module in the first slot can be exchanged for a USC module - see Item No. 085848).
  - The extended measurement range is only possible in conjunction with new AllroundLine and zwickiLine machines.
  - Appropriate environmental and operating conditions must be present. This basically means a vibration-free installation site and a virtually constant ambient temperature. More detailed information can be found in the Operating Manual and the Environmental Conditions.

### Large measurement range

- The large measurement range frequently eliminates the need to purchase a second load cell, saving the costs of acquisition and annual calibration.
- Even with high pre-loads due to heavy test fixtures or specimen grips, virtually the entire load-cell measurement-range remains available. The load cell can still be used to full nominal capacity with fixture weights amounting to 45 % of nominal force.

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**Overload protection, force limits and operating force**

- Xforce load cells are very robust and can withstand loads up to 300% of nominal capacity without mechanical failure and up to 150% without zero-point shift. This means that overload protection such as pre-loaded springs, mechanical stops or guiders to absorb transverse forces is generally unnecessary.
- The crosshead travel range can be restricted via software and hardware limit stops, protecting load cells and text fixtures.
- Force limits can be set in testXpert III to switch off the testing system automatically, protecting the load cell.

- Xforce HP+ and K+ have a usable operating range (incl. tare) of 120%.

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### Technical data

#### Xforce HP+ (0.5 - 10 kN) and Xforce K/K+ (10 - 250 kN)

| Type<br>Measurement range | Xforce HP+[1)]<br>0.5 - 10 | Xforce K+[1)]<br>10 - 250 | kN |
|---|---|---|---|
| **Force limits/ranges** | | | |
| Limit force $F_L$ | 150 | 150 | % of $F_{nom}$ |
| Force at break $F_B$ | 300 | 300 | % of $F_{nom}$ |
| Limit transverse force $F_Q$ | 100 | 100 | % of $F_{nom}$ |
| **Influences/limit values** | | | |
| Torque influence | ±0.2 | ±0.005 | % of $F_{nom}$/mm |
| Ambient temperature | +10 ... +60 | +10 ... +60 | °C |
| **Other values** | | | |
| Nominal characteristic value $C_{nom}$ | 2 | 2 | mV/V |
| Cable length | 3.5 | 3.5 | m |

[1)]  Only possible in conjunction with testControl II!

### Xforce HP+ (0.5 - 1kN)

| Load cell<br>Item No. | 0.5<br>082894 | 0.5<br>082895 | 1<br>082896 | kN |
|---|---|---|---|---|
| Nominal force $F_{nom}$ | 0.5 | 0.5 | 1 | kN |
| Nominal force $F_{nom}$ [lbf] | 112 | 112 | 225 | lbf |
| **Accuracy** | | | | |
| Accuracy Class 0.5 (from 0.1 % of $F_{nom}$) | 0.5 | 0.5 | 1 | N |
| **Dimensions** | | | | |
| Installation height | 55 | 61 | 61 | mm |
| **Connection** | | | | |
| Connection thread | M28x1.5 | M28x1.5 | M28x1.5 | |
| Mounting stud | Ø8 | Ø20 | Ø20[1)] | mm |
| **Influences/limit values** | | | | |
| Limit bending moment | 5 (7)[2)3)] | 5 (7)[2)3)] | 15 (17)[2)3)] | Nm |
| Limit torque | 7 (35)[4)3)] | 7 (35)[4)3)] | 17 (50)[4)3)] | Nm |

[1)]  With Xforce load cells the diameter of the mounting stud for a 1 kN load cell has been changed from 8 mm to 20 mm!

[2)]  Maximum bending moments Mb for a load cell which is unloaded in the direction of measurement. In the case of simultaneous loading with a nominal load, the values should be halved.

[3)]  The values refer to the limit torques of the connection system. If these values are exceeded, recalibration is required. The values in relation to the limit torques of the measurement cell appear in parentheses.

[4)]  Unloaded. In the case of simultaneous loading with a nominal load, these values should be halved.

### Xforce HP+ (2.5 - 10 kN)

| Load cell<br>Item No. | 2.5<br>082897 | 5<br>082898 | 10<br>082899 | 10<br>082900 | kN |
|---|---|---|---|---|---|
| Nominal force $F_{nom}$ | 2.5 | 5 | 10 | 10 | kN |
| Nominal force $F_{nom}$ [lbf] | 562 | 1124 | 2248 | 2248 | lbf |

All data at ambient temperature.

Subject to change in the course of further development.

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# Product Information
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| Load cell<br>Item No. | 2.5<br>082897 | 5<br>082898 | 10<br>082899 | 10<br>082900 | kN |
|---|---|---|---|---|---|
| **Accuracy** | | | | | |
| Accuracy Class 0.5 (from 0.1 % of $F_{nom}$) | 2.5 | 5 | 10 | 10 | N |
| **Dimensions** | | | | | |
| Installation height | 61 | 61 | 54 | 70 | mm |
| **Connection** | | | | | |
| Connection thread | M28x1.5 | M28x1.5 | - | M28x1.5 | |
| Connection flange | - | - | Flange 1[1] | - | |
| Mounting stud | Ø20 | Ø20 | Ø20 | Ø20 | mm |
| **Influences/limit values** | | | | | |
| Limit bending moment | 30 (34)[2][3] | 50 (58)[2][3] | 80 (115)[2][3] | 80 (115)[2][3] | Nm |
| Limit torque | 17 (80)[4][3] | 17 (130)[4][3] | 17 (200)[4][3] | 17 (200)[4][3] | Nm |

[1]    Flange 1 = pitch circle 115 mm, Flange 2 = pitch circle 220 mm.

[2]    Maximum bending moments Mb for a load cell which is unloaded in the direction of measurement. In the case of simultaneous loading with a nominal load, the values should be halved.

[3]    The values refer to the limit torques of the connection system. If these values are exceeded, recalibration is required. The values in relation to the limit torques of the measurement cell appear in parentheses.

[4]    Unloaded. In the case of simultaneous loading with a nominal load, these values should be halved.

## Xforce K+ (10 - 50 kN)

| Load cell<br>Item No. | 10<br>1008816 | 10<br>1008734 | 20<br>082902 | 30<br>082903 | 50<br>082904 | kN |
|---|---|---|---|---|---|---|
| Nominal force $F_{nom}$ | 10 | 10 | 20 | 30 | 50 | kN |
| Nominal force $F_{nom}$ [lbf] | 2248 | 2248 | 4496 | 6744 | 11240 | lbf |
| **Accuracy** | | | | | | |
| Accuracy Class 0.5 (from 0.1 % of $F_{nom}$) | 10 | 10 | 20 | 30 | 50 | N |
| **Connection** | | | | | | |
| Connection thread | - | M28x1.5 | - | - | - | |
| Connection flange | Flange 1[1] | - | Flange 1[1] | Flange 1[1] | Flange 1[1] | |
| Mounting stud | Ø20 | Ø20 | Ø36 | Ø36 | Ø36 | mm |
| **Dimensions** | | | | | | |
| Installation height | 74 | 90 | 75.5 | 75.5 | 75 | mm |
| **Influences/limit values** | | | | | | |
| Limit bending moment | 500[2] | 500[2] | 600[2] | 700[2] | 1100[2] | Nm |
| Limit torque | 500[3] | 500[3] | 500[3] | 500[3] | 1800[3] | Nm |

[1]    Flange 1 = pitch circle 115 mm, Flange 2 = pitch circle 220 mm.

[2]    Maximum bending moments Mb for a load cell which is unloaded in the direction of measurement. In the case of simultaneous loading with a nominal load, the values should be halved.

[3]    Unloaded. In the case of simultaneous loading with a nominal load, these values should be halved.

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**Xforce K+ (100 - 250 kN)**

| Load cell<br>Item No. | 100<br>082905 | 100<br>082908 | 150<br>082906 | 250<br>082907 | 250<br>082909 | kN |
|---|---|---|---|---|---|---|
| Nominal force $F_{nom}$ | 100 | 100 | 150 | 250 | 250 | kN |
| Nominal force $F_{nom}$ [lbf] | 22481 | 22481 | 33721 | 56202 | 56202 | lbf |
| **Measurement range/measurement travel** | | | | | | |
| Accuracy Class 0.5 (from 0.1 % of $F_{nom}$) | 100 | 250 | 150 | 250 | 250 | N |
| Accuracy Class 1 (from 0.04 % of $F_{nom}$) | - | 100 | - | - | - | N |
| **Connection** | | | | | | |
| Mounting stud | Ø60 | Flange | Ø60 | Ø60 | Flange | mm |
| Connection flange | Flange 2[1] | Flange 2[1] | Flange 2[1] | Flange 2[1] | Flange 2[1] | |
| **Dimensions** | | | | | | |
| Installation height | 106 | 131 | 106 | 162 | 131 | mm |
| **Influences/limit values** | | | | | | |
| Limit bending moment | 4800[2] | 30000[2] | 8000[2] | 30000[2] | 30000[2] | Nm |
| Limit torque | 10000[3] | 55000[3] | 20000[3] | 55000[3] | 55000[3] | Nm |

[1] Flange 1 = pitch circle 115 mm, Flange 2 = pitch circle 220 mm.

[2] Maximum bending moments Mb for a load cell which is unloaded in the direction of measurement. In the case of simultaneous loading with a nominal load, the values should be halved.

[3] Unloaded. In the case of simultaneous loading with a nominal load, these values should be halved.