

## Terms and Definitions for Force Sensors and Load Cells

The definitions of the technical characteristics for all sensors are extensively referring to the VDI / VDE-guideline no. 2637 /2638.

### Measurement Range

The measurement range is the load range in which the guaranteed error limits may not be exceeded.

### Nominal Load

Nominal load is the upper limit of the measuring range. Depending on the sensor type, the nominal load can be a tension load or a compression load.

### Accuracy Class

The maximum single error (indication in % for force sensors; for load cells according to OIML R60) of the sensors output signal is smaller than the corresponding value of the accuracy class. The tolerance of the characteristic value is not considered.

### Service Load

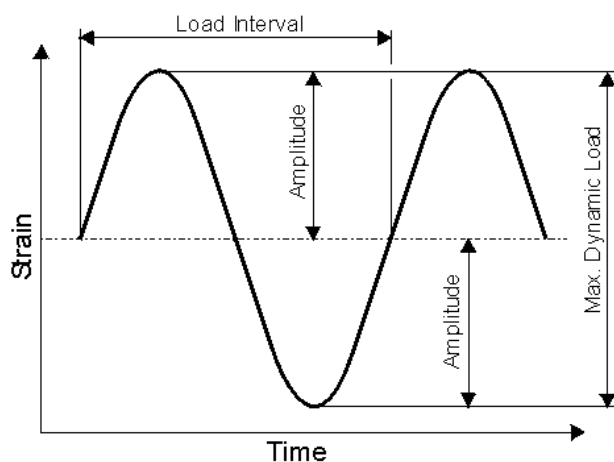
Service load is the maximum load into the direction of the measurement's axis of the sensor without changes of the specific characteristics of the measurement. The service load range should be used in exceptional cases only.

### Limit Load

Limit load is the maximum admissible load of the sensor without destroying the measuring system. The specific error limits are not valid at limit load.

### Max. Dynamic Load (according DIN 50100)

Maximum dynamic load is the band width -related to the nominal load- of a sinusoidal changing force in direction to the measurement's axis of the sensor. The sensor can be stressed with minimum  $10^7$  intervals of maximum dynamic load without changes of the specific characteristics of the measurement until nominal load.



### Nominal Displacement

Nominal displacement is the spring travel of the external load introduction point in measurement direction at introduction of the nominal load.

### Input Resistance

Input resistance is the ohmic resistance value between the supply voltage connections.

### Output Resistance

Output resistance is the ohmic resistance value between the output voltage connections.

### Bridge Resistance

Bridge resistance is the ohmic resistance of the complete measuring bridge.

### Insulation Resistance

Insulation resistance is the ohmic resistance between the connectors and the measuring body of the sensor.

### Temperature Coefficient of the Sensitivity

The temperature coefficient of the sensitivity is the change – related to the nominal sensitivity - of the actual sensitivity resulting from a temperature change of 10 K.

### Temperature Coefficient of the Zero Signal

The temperature coefficient of the zero point is the change – related to the nominal sensitivity - of the output signal of an unloaded sensor resulting from a temperature change of 10 K.

### Reference Temperature

Reference temperature is the ambient temperature which the technical sensor specifications refer to.

### Nominal Temperature Range

The nominal temperature range is the range of the ambient temperature in which the sensor is maintaining the technical data and error limits.

### Service Temperature Range

The service temperature range is the range of the ambient temperature in which the sensor can be operated without constant changes of the measurement characteristics. Within the service temperature range, the specific error limits are not valid.

### Supply Voltage

The supply voltage is necessary for the faultless operation of a sensor.

**Sensitivity**

Sensitivity is the output signal at nominal load less the preload signal.

**Nominal Sensitivity**

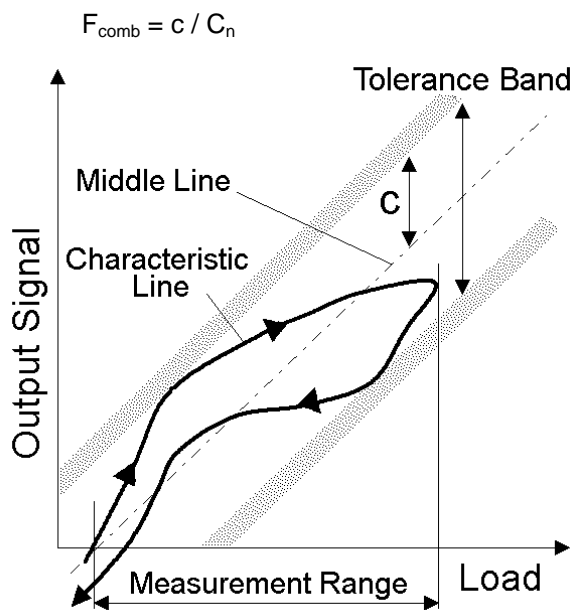
Nominal sensitivity is the nominal value of the sensitivity, which means a theoretical preset value.

**Storage Temperature Range**

The storage temperature range is the range of the ambient temperature in which the sensor can be stored without electrical or mechanical load and without a constant change of its measurement characteristics.

**Combined Error**

Combined error  $F_{comb}$  is the half distance  $c$  between the limits of the tolerance band which embeds the characteristic line in the measurement range - in relation to the sensitivity  $C_n$  - at increasing and decreasing load.  $F_{comb}$  is a combination of linearity error and hysteresis.



**Creep Error**

The creep error is the maximum admissible change of the output signal of the sensor over a certain period of time at constant load and steady environmental conditions.

**Repeatability**

Repeatability is a measure for the relative standard deviation of the output signal resulting from ten repeated measurements at two points of the characteristic line with in each case same mechanical sizes and same changes.

**Level of Protection according to DIN VDE0470, EN 60529 (replacement for DIN 40050)**

The level of protection of a housing is determined by the abbreviation IP and a two-digit code figure.

. The figure defines the protection against contact as well as foreign body and water protection for electrical devices.

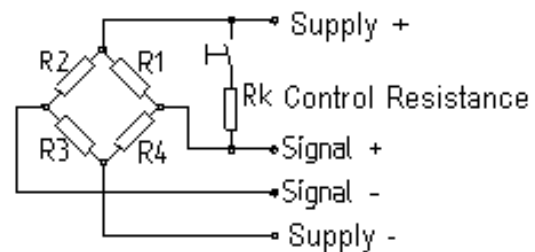
**Calibration Control**

By a control resistance, a signal, equal to the nominal value of the sensor is generated inside the sensor.

*Advantage:* Recalibrations are reduced. Zero point and nominal value can be controlled before each measurement.

*Function:*

By parallel switching of the resistance  $R_k$  to the measuring bridge  $R_1$ , the measuring bridge gets electrical detuned, so that a measuring signal of 50 or 100 % of the nominal value is available at the output.



**Minimum Division / Resolution**

The minimum division or resolution is the smallest measurable fractional partition.

**Zero Signal**

Zero signal is the output signal of the force sensor / load cell in unloaded condition.

**Zero Shift after Loading**

Zero shift after loading is the maximum admissible modification of the output signal over a certain period of time after complete unloading and stabilized environmental conditions.

**Tightening Torque**

Tightening torque is the required fastening torque of the mounting bolts for the fixation of the load cell.

**Labels**



Label for the compliance of the safety requirements according to the CE-guidelines



Label for the adequacy of electrical devices in explosion endangered locations (certified by a EEC-Authority)



Accuracy class according to OIML