

Force Sensors / Load Cells Terms and Definitions

The definitions of the technical characteristics of all sensors largely relate to the VDI/VDE/DKD - guideline 2638.

Measuring Range

The measuring 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 may be tension or 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 value related to the accuracy class. The tolerance of the characteristic value is not being 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. The service load range should be used in exceptional cases, only.

Limit Load

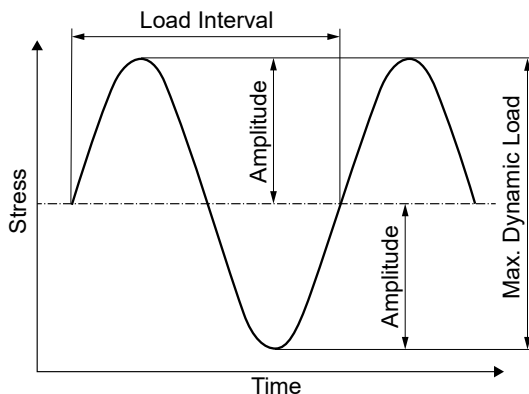
Limit load is the maximum permissible load of the sensor without expecting destruction of the measuring system. At limit load, the specific error limits no longer apply.

Ultimate Load

Ultimate load is the load at which a permanent change or destruction occurs.

Max. Dynamic Load (according DIN 50100)

The maximum dynamic load is the oscillation width, related to the nominal load, of sinusoidal changing force in the direction of the measurement axis of the sensor, which the sensor, when being repeatedly used, can bear at a load of 10^7 stress cycles, without causing significant changes of its metrological characteristics to nominal load.



Nominal Displacement

Nominal displacement is the spring suspension of the outer load application points in the measurement direction when applying the nominal load.

Input Resistance

Input resistance is the ohmic resistance value between the excitation 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 connection leads 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 characteristic value by a temperature change of 10 K.

Temperature Coefficient of the Zero Signal

The temperature coefficient of the zero signal is the output signal change related to the nominal sensitivity of the unstressed sensor by a temperature change of 10 K.

Reference Temperature

Reference temperature is the ambient temperature related to the technical specifications of the sensor.

Nominal Temperature Range

The nominal temperature range is the range of the ambient temperature in which the sensor complies with 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 occurrence of permanent changes of the measurement characteristics. Within the service temperature range, specified error limits no longer apply.

Excitation Voltage

The excitation voltage is the required operating voltage which guarantees the error-free function of a passive sensor.

Sensitivity

Sensitivity is the output signal at nominal load less the pre-load signal.

Nominal Sensitivity

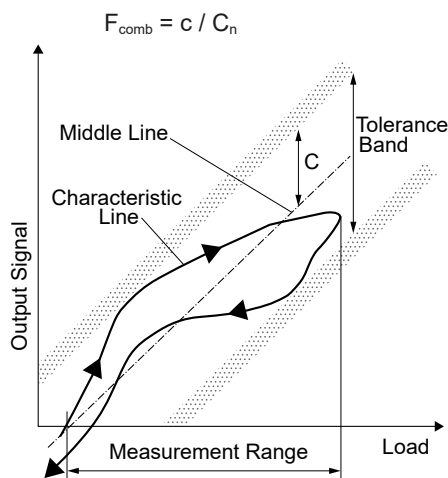
The nominal sensitivity is the theoretically predetermined rated value (sensitivity).

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 stress and without permanent changes of its measurement characteristics.

Combined Error

Combined error F_{comb} is half the distance c between the limits of the tolerance band which encloses the characteristic line in the measurement range at increasing and decreasing load, based on the nominal sensitivity C_n . F_{comb} consists of the linearity error and the hysteresis.



Creep Error

The creep error is the maximum admissible change of the sensor output signal over the specified time at constant load and stable environmental conditions.

Repeatability

The repeatability is a measure of the relative standard output signal deviation, resulting from ten repeated measurements at two points of the characteristic curve with the same size and same mechanical changes

Level of Protection according to DIN EN 60529; VDE 0470

The level of protection of a housing is determined by the letters IP and a two-digits code number. The number includes the protection from contact, foreign bodies and water for electrical equipment.

Control Signal

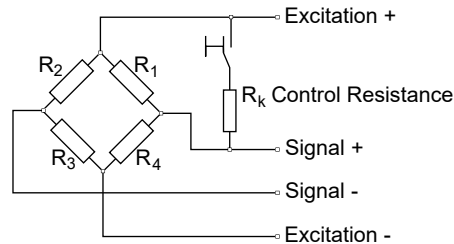
By a control resistance, a signal, corresponding to the sensitivity of the sensor, is generated inside the sensor.

Advantages: Recalibrations are reduced. Zero point and sensitivity can be controlled before each measurement.

Function:

By parallel switching of the resistor R_k to the measuring bridge R_1 , the measuring bridge is electrically de-tuned,

thus 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 sub-step fragmentation.

Zero Signal

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

Shift after Loading

Zero shift after loading is the maximum admissible change of the sensor output signal over a specified time after complete load relief under stable environmental conditions.


Tightening Torque


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


Explanation of Abbreviations


F.S. – Full Scale


Labels


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

 Label for the suitability of electrical devices in explosion endangered areas (certified by an EC inspection authority)

 Label for the suitability of electrical devices in explosion endangered areas (certified by International Electrotechnical Commission, IEC)

 Accuracy class according to OIML (Europe / Worldwide)

 Accuracy class according to NTEP (USA)

 Product testing and certification standards for loss prevention