Terms/Explanations
General

Strain

$$\varepsilon = \frac{\Delta l}{l}$$

Strain is defined as the non-dimensional ratio of length change / initial length. Microstrain is often used as strain unit.

$$1 \text{ microstrain } [\mu\varepsilon] = 10^{-6} \frac{m}{m} = 1 \frac{\mu m}{m}$$

Mechanical strain

The mechanical strain results of the strain of the E-modulus of the material respectively of the force per area.

$\sigma = \varepsilon * E$ **(in the flexible span)**

bzw. $\sigma = F/(E*A)$

Material	E-modulus (typical)
Steel	210 kN/mm²
Aluminium	70.5 kN/mm²

Example: 250 µm/m strain equals to a mechanical strain of 52,2 N/mm² respectively (52,5 MPa) on steel.

Output range

The output voltage is the difference between the output signal at zero load and the output signal at nominal load.

Nominal characteristic value

Specified output signal at nominal load (nom. output voltage).

Characteristic value

Actual (measured) output range.

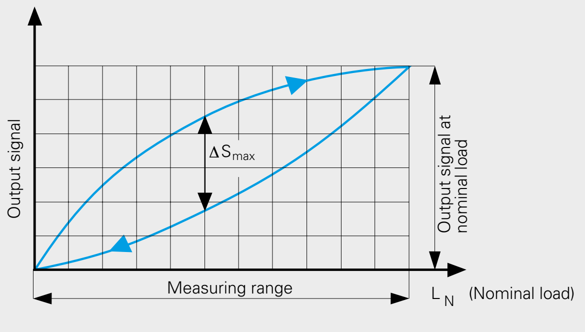
Measuring range

Load range in which the specified errors are not exceeded.

Hysteresis

Hysteresis signifies the hysteresis error F_h. ΔS_{max} is the largest difference between the increasing and decreasing calibration curve up to the nominal load. Hysteresis is expressed in % of full scale.

$$F_h = \frac{\Delta S_{max}}{F_N}$$

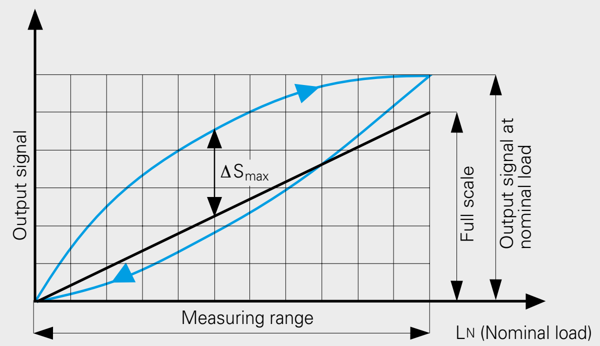


Terms/Explanations
General

Characteristic curve deviation

The characteristic curve deviation signifies the maximum deviation of the calibration curve to the specified straight line. The specified straight line passes through the origin. The end point results from the origin + nominal output voltage.
The characteristic curve deviation contains hysteresis, linearity error, repeatability and deviation of real to nominal output voltage.

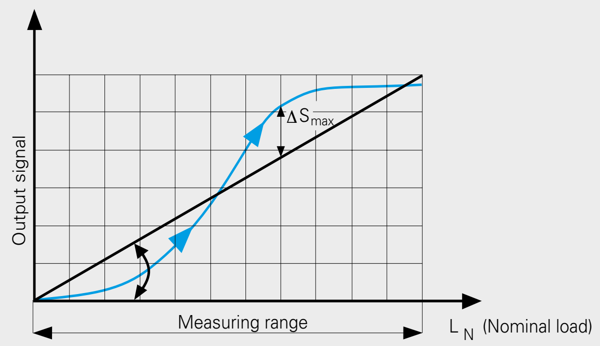
$$F_{Com} = \frac{\Delta S_{max}}{FS}$$



Linearity

Linearity error F_L is the largest difference ΔS_{max} between the increasing calibration curve and the straight line through the origin with slope C_L.
C_L is selected such that ΔS_{max} is minimized. The linearity is expressed in % of full scale.

$$F_L = \frac{\Delta S_{max}}{C_L \cdot L_N}$$



Micro strain [με]

See strain.

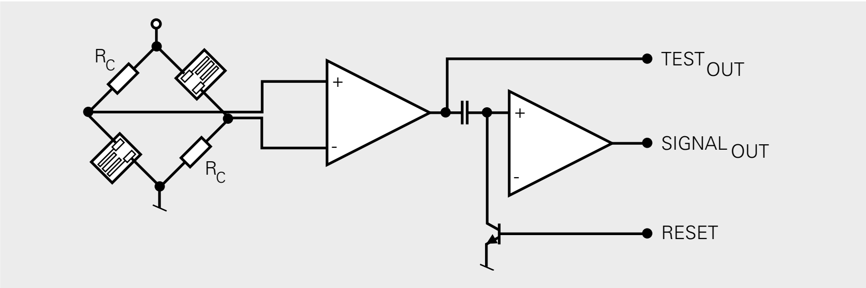
Zero, bridge balance

Generally all S/G bridges exhibit an initial offset which can be tared by different means. After the installation the offset of STRAIN MATE™ sensors may be quiet large due to the press-on technique. Baumer amplifiers and display instruments are equipped with a reset circuit which allows fast and convenient zeroing over a large range. For static applications, amplifiers with zero balance potentiometers or digital taring are used.

Repeatability

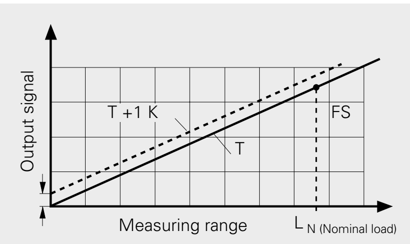
The difference in reference to the characteristic value between the max. and the min. display value of equal measuring points in case of repeatation of identical load cycles.

$Test_{OUT}$



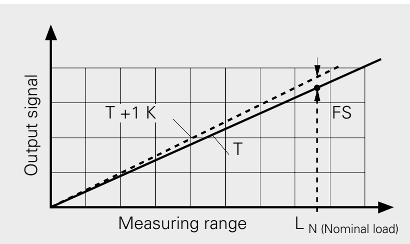
The non-tared signal is available at the output $Test_{OUT}$. To prevent saturation of subsequent stages, $Test_{OUT}$ should ideally read between -2 V and +2 V when the sensor is installed and no load is applied. During operation this value may then be between -5 V and +5 V. The $Test_{OUT}$ output can furthermore be used to check the measuring chain. In case of an open bridge circut, $Test_{OUT}$ goes into saturation.

TC of zero signal



The maximum temperature coefficient (TC) of the zero signal is the largest variation of the zero signal which occurs during a change in temperature by 1 Kelvin. It is expressed in percent of full-scale per Kelvin.

TC of output range



The largest temperature coefficient (TC) of output range is the largest variation in output range which occurs during a change in temperature by 1 Kelvin. It is expressed in percent of FS*) per Kelvin.

*) FS = Fullscale of output range