

Terms and Definitions for Torque Sensors

The definitions of the technical characteristics of all sensors are extensively referring to VDI/VDE/DKD - guideline no. 2639.

Passive Sensor

A passive sensor is a device without amplifier. The output signal of the sensor is depending on the applied strain gauges. Generally, strain gauges with a sensitivity of 0,5 up to 3mV / V are used.

Active Sensor

An active sensor is a device with amplifier. Usually the output signal of the sensor is $\pm 10V$, $\pm 5V$, 0...20mA, 4...20mA, 10 $\pm 10mA$ or 12 $\pm 8mA$. All sensors by Lorenz Messtechnik GmbH can be supplied with these output signals.

Measuring Range

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

Repeatability

Repeatability is the maximum admissible output signal change in relation to the output signal (indication in %).

Nominal Torque

Nominal torque is the upper limit of the measuring range in which the guaranteed error limits may not be exceeded.

Accuracy Class

The maximum single error of the sensor output signal is smaller than the value of the accuracy class (the tolerance of the sensitivity is not considered).

Service Torque

Service torque is the torque which the sensor may be loaded with beyond nominal torque without changing the specified characteristics of the measurement. The service torque range should be used in exceptional cases, only.

Limit Torque

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

Ultimate Torque

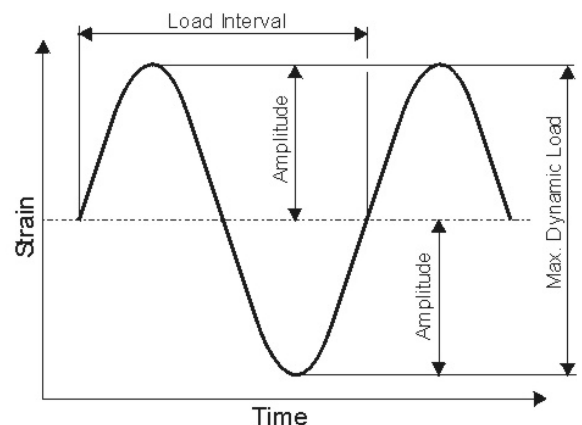
Ultimate torque is the torque which can cause mechanical destructions.

Signal

Signal is the digital output signal of the sensor at angle and speed measurement. Usually the signal is 5 V TTL (either 5 V or 0 V).

Band Width / Max. Dynamic Load (according DIN 50100)

Band width - related to the nominal torque – is the sinusoidal changing dynamic load 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 torque.



Bridge Resistance

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

Temperature Coefficient of 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.

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.

Excitation Voltage

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

Sensitivity

Sensitivity is the output signal of a passive sensor at nominal load less the preload signal.

Supply Voltage

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

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.

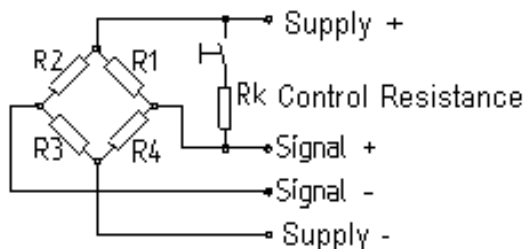
Calibration Control

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.



The calibration control of a sensor with an analog output signal can be switched on and off by a voltage signal. Two setting positions can be defined: $L < 2,0V$ (low- signal) and $H > 3,5V$ (high- signal). The calibration control of a sensor with a digital output signal can be controlled by software.

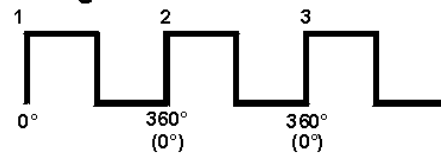
Twist Angle

The twist angle is the angle which occurs through introduction of nominal torque between test side and drive side of the specimen. The natural resonance of the measuring body changes with the angular displacement. The twist angle should be as small as possible to prevent interferences caused by the changing of the natural resonance.

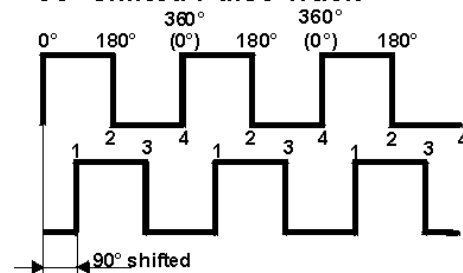
Pulses / Revolutions

Pulses / revolutions are acquired at angle / speed measurement. By a second 90°-shifted pulse track and flank evaluation, the pulses / revolutions can be quadruplicated.

Single Pulse Evaluation



Pulse Evaluation with a second 90°-shifted Pulse Track



Reading Rate / Sample Rate

The reading rate or sample rate describes the number of measurements per second.

Moment of Inertia

The moment of inertia is the counteracting moment of the measuring body in opposition to the acceleration moment. The moment of inertia should be as small as possible to minimize the load of the measured section during the acceleration procedure.

Admissible Thrust Load

Admissible thrust load is the maximum allowable force into the direction of the measurement's axis.

Output Signal

Output signal is a conditioned signal, necessary for the faultless operation of an active sensor.