

Torque Sensors Terms and Definitions

The definitions of the technical characteristics of all sensors largely relate to the VDI/VDE/DKD - guideline 2639.

Passive Sensor

A passive sensor is a sensor without amplification. The output signal, supplied by the sensor, is in the range of approx. 3 mV/V (depending on the applied strain gauge, the geometry and the material of the measuring body).

Active Sensor

An active sensor is a device with an amplifier. Usually the output signal of the sensor is ± 10 V, ± 5 V, 0...20 mA, 4...20 mA, 10 ± 10 mA or 12 ± 8 mA. 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

The 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 specified error limits may not be exceeded.

Accuracy Class

The maximum single error of the sensor output signal (indicated in %) is smaller than the value related to the accuracy class. Hereby, the tolerance of the sensitivity is not considered.

Service Torque

Service torque is the torque which the sensor may be stressed with above nominal torque without changing its specified characteristics. The service torque range should be used in exceptional cases, only.

Limit Torque

Limit torque is the maximum permissible load of the sensor in which destruction of the measuring system is not expected. At limit torque, the specific error limits no longer apply.

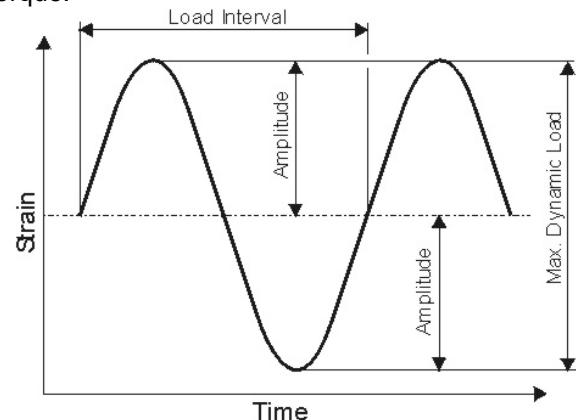
Signal

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

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

Band width – related to nominal torque – is the sinusoidal varying dynamic load in the direction of the measurement axis of the sensor, which is tolerated by the sensor at a stress of 10^7 vibration cycles without causing significant changes of the

measurement characteristics up to nominal torque.



Bridge Resistance

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

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.

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 supply voltage to allow error-free operation of a passive sensor.

Sensitivity

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

Nominal Sensitivity

The nominal sensitivity is the theoretically predetermined rated value (sensitivity) of a passive sensor.

Supply Voltage

Supply voltage is the required operating voltage to allow error-free operation of an active sensor.

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-digit code number. The number indicates the contact protection, foreign object protection and water protection for electrical equipment.

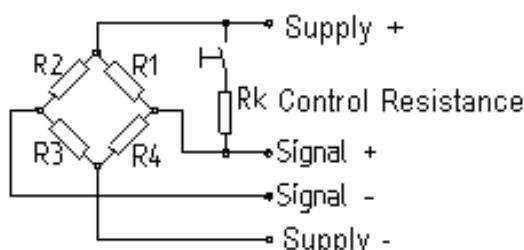
Control Signal

By a control resistance, a signal, corresponding to the sensitivity of the sensor, is generated in 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, so that a measuring signal of 50 % or 100 % of the sensitivity is available at the output.



Twist Angle

The twist angle occurs at the initiation of the nominal torque between test side and drive side of the specimen. By a shift of the torsion angle, the natural resonance of the measuring body changes as well. To avoid interference caused by natural resonance changes, the torsion angle should be minimized.

Ultimate Torque

Ultimate torque is the stress which causes permanent changes or destruction.

Control Signal Excitation

For a sensor with an analog output the control signal can be switched on/off via a voltage signal.

Two switching positions can be defined:

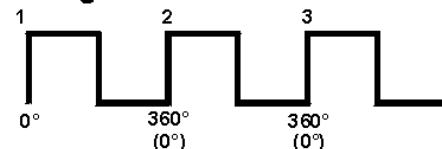
$L < 2,0 \text{ V}$ (Low- signal) and $H > 3,5 \text{ V}$ (High- signal).

The control signal of a sensor with a digital output signal can be controlled by software.

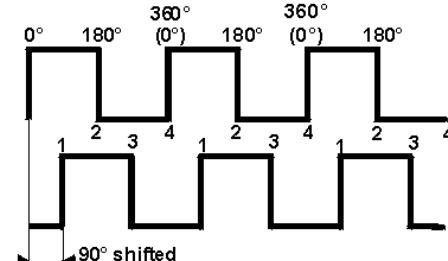
Pulses / Revolutions

Pulses / revolutions are recorded at angle / speed measurement. By a second 90° offset encoder track and flank evaluation, the pulses / revolutions can be quadrupled.

Single Pulse Evaluation



Pulse Evaluation with a second 90°-shifted Pulse Track



Reading Rate / Sample Rate

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

Moment of Inertia

The moment of inertia is the moment which a body opposes to the acceleration torque. The mass moment of inertia should be as small as possible to keep the stress of the measuring section as low as possible during the acceleration process.

Limit Thrust Load

The limit thrust load is the maximum force in axial direction (axial force) with which the sensor may be loaded.

Limit Shear Force

The limit shear force is the maximum shear force (radial force) with which the sensor may be loaded.

Output Signal

Output signal is a conditioned signal, necessary for the error free function of an active sensor.

Limit Speed

The limit speed (in rotating devices, usually expressed in r.p.m.) is the upper limit of the speed range that the sensor can permanently withstand.

Explanation of Abbreviations

f.s. – Full Scale

Labels



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