

Number : ZTKB0000.DOC
 Index: A
 Prepared: 11.11.2008 / ZB
 Inspected: 14.08.2009 / RR
 Released: 14.08.2009 / RR
 Changed:

Brief Technical Description



The acceleration sensor (measurement direction uniaxial)

- For vibration and
- Rolling bearing condition monitoring

General information

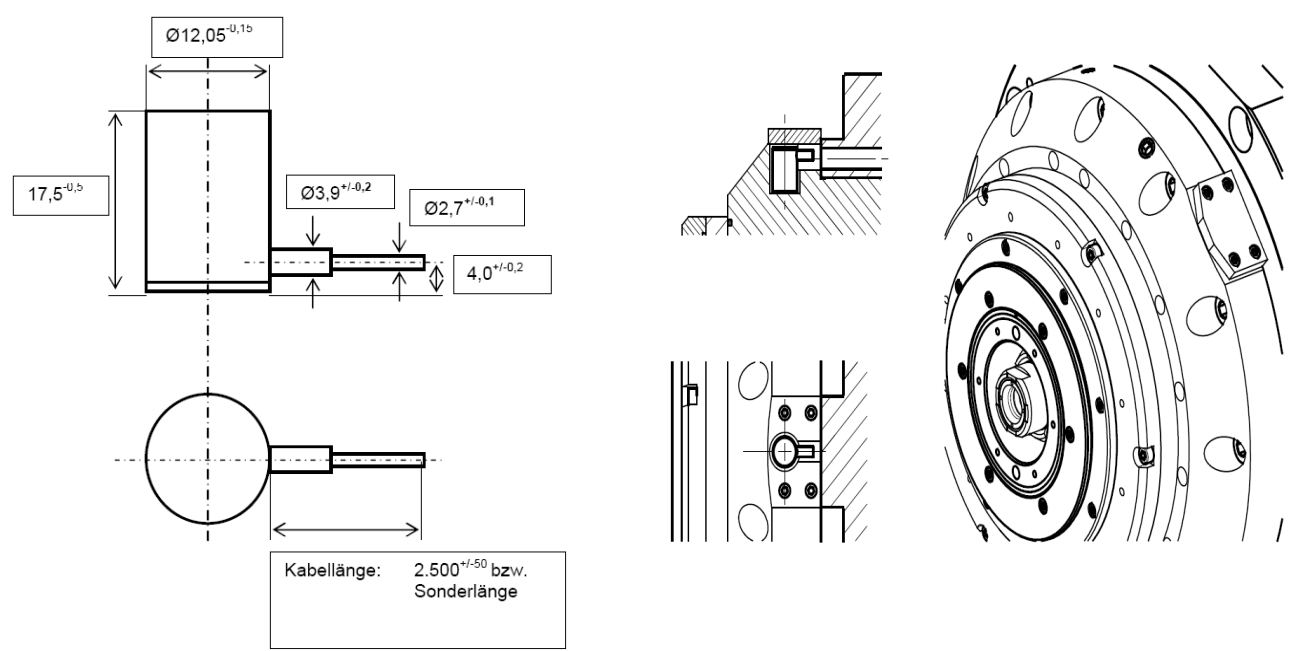
The FISCHER acceleration sensor provides the user with a system for measuring the radial vibrations arising on the spindle. The sensor is powered over an IPC interface and has a sensitivity of 100mV/g. The signals generated by the acceleration sensors can be used to evaluate vibrations and for rolling bearing condition monitoring using an evaluation system, either by integration in a controller or in SmartVision.

FISCHER acceleration sensor

The acceleration sensor used by Fischer is integrated on the spindle nose via the front bearings and measures radial acceleration. The connecting cable passes through the spindle and exits at the back end of the spindle. A 3-pole Lemo plug is located on a short cable.

Various evaluation systems are available from Fischer for evaluating the signals. The difference between the various versions is primarily in the number of connections (single sensor, multiple sensors), the port used (RS232, RS232 + Ethernet) and the functionality of the "Sivib Record Control Software" supplied with the system.

Sensor dimensions



Dimensions Position of the acceleration sensor

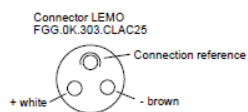
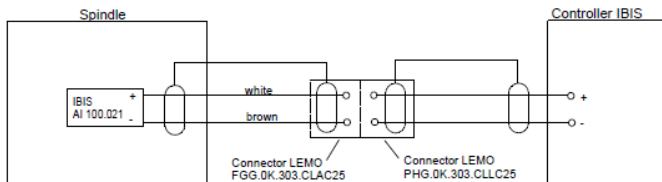
German	English
Kabellänge: 2.500 ^{+/- 50%} bzw. Sonderlänge	Cable length: 2.500 ^{+/- 50%} or special length

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Sensor connector



Electrical diagram of the sensor connector

Sensor connector dismantled (top) and assembled (bottom))

Note:

When assembling the sensor connectors, ensure that the sensor cable is earthed by connecting the metal screen to the metal sensor plug casing.



Sensor connector with section of cable on the end of the spindle

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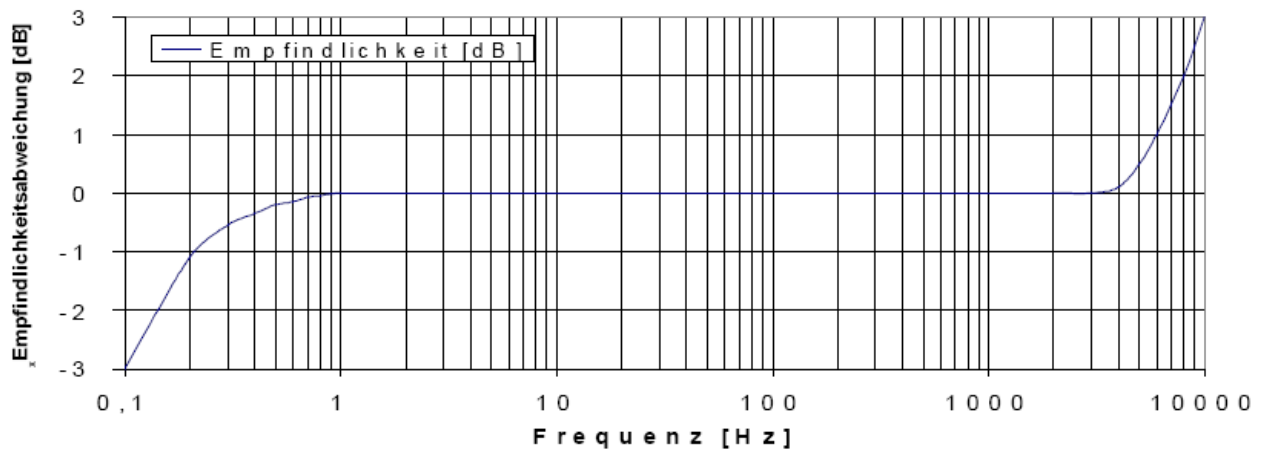
Specifications

Power supply:

Constant current 2-10 mA; 18 – 28 VDC, IPC interface

Properties:

Sensor element: Piezoelectric acceleration sensor (PZT/shear)
 Sensitivity: 100 mV/g +/- 10%
 Resolution: 0.001g
 Effective range: max. 50g
 Shock loading: max. 5000g
 Frequency range: 0.5 – 10000Hz +/- 3 dB (5000 – 50000 Hz for spike energy measurement)



Resonant frequency: > 25 kHz

Operating temperature range:

Sensor and connecting cable: -40°C – +120°C

Ambient operating conditions:

Corrosion resistant, coolant proof

German	English
Empfindlichkeit [dB]	Sensitivity [dB]
Empfindlichkeitsabweichung [dB]	Difference of sensibility [dB]
Frequenz [Hz]	Frequency [Hz]

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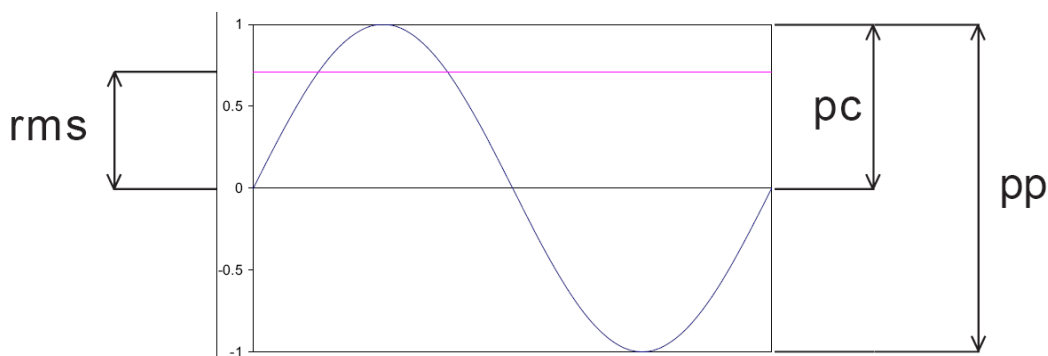


Controller integration

Principle of operation

The signal generated by the acceleration sensor is evaluated by an evaluation system and is provided to the controller in the form of a voltage. By integrating the acceleration value, the analog signal corresponds to a vibration velocity that can be used by the controller to monitor balance condition, vibrations and machining limits. The limits given in the instruction manuals are indicated in the unit "peak calculated" (pc) and the signal from the evaluation unit is in rms.

The figure below shows the relationship between the various units.



Relationship between the units

The following limits should not be exceeded:

pc = 3 mm/s pc	Maximum vibration value with the tool currently in use at maximum speed while idling.
pc < 6 mm/s pc	Ensures maximum spindle life.
pc = 8 – 10 mm/s pc	Should not be exceeded while milling.
pc > 10 mm/s pc	Spike values – must never be exceeded.

High-pass filter

Vibrations due to the motion of the axes of a machine tool may result in a limit being exceeded. The interference caused by these low-frequency vibrations can be minimized by using a high-pass filter. Experience has shown that signals with a frequency > 60 Hz should be used. The evaluation systems available from Fischer are all equipped with such a high-pass filter.

Änderungen:	
Index:	Änderung