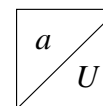


# Piezoelectric vibration sensors

## Measurement of structure-borne noise/acceleration



- Reliable detection of structure-borne noise for protecting machines and engines.
- Piezo-ceramic with high degree of measurement sensitivity.
- Sturdy compact design.



### Applications

Vibration sensors of this type are suitable for the detection of structure-borne acoustic oscillations as can occur for example in case of irregular combustion in engines and on machines. Thanks to their ruggedness, these vibration sensors can be used even under the most severe operating conditions.

### Areas of application

- Knock control for internal-combustion engines
- Protection of machine tools
- Detection of cavitation
- Monitoring of bearings
- Theft-deterrent systems

### Design and function

On account of its inertia, a mass exerts compressive forces on a ring-shaped piezo-ceramic element in time with the oscillation which generates the excitation. Within the ceramic element, these forces result in charge transfer within the ceramic and a voltage is generated between the top and bottom of the ceramic element. This voltage is picked-off using contact discs – in many cases it is filtered and integrated – and made available as a measuring signal. In order to route the vibration directly into the sensor, vibration sensors are securely bolted to the object on which measurements take place.

### Measurement sensitivity

Every vibration sensor has its own individual response characteristic which is closely linked to its measurement sensitivity. The measurement sensitivity is defined as the output voltage per unit of acceleration due to gravity (see characteristic curve). The production-related sensitivity scatter is acceptable for applications where the primary task is to record that vibration is occurring, and not so much to measure its severity.

The low voltages generated by the sensor can be evaluated using a high-impedance AC amplifier.

### Technical data

Frequency range	1...20 kHz
Measuring range	≈ 0.1...400 g <sup>1)</sup>
Sensitivity at 5 kHz	26 ±8 mV/g
Linearity between 5...15 kHz at resonances	+20/–10 % of 5 kHz-value (15...41 mV/g)
Dominant resonant frequency	> 25 kHz
Self-impedance	> 1 MΩ
Capacitance range	800...1400 pF
Temperature dependence of the sensitivity	≤ 0.06 mV/(g · °C)
Operating-temperature range:	
Type 0 261 231 118	–40...+150 °C
Type 0 261 231 148	–40...+150 °C
Type 0 261 231 153	–40...+130 °C
Permissible oscillations	
Sustained	≤ 80 g
Short-term	≤ 400 g

### Installation

Fastening screw	Grey cast iron	M 8 x 25; quality 8.8
	Aluminum	M 8 x 30; quality 8.8
Tightening torque (oiled permitted)	20 ±5 N · m	
Mounting position	Arbitrary	

<sup>1)</sup> Acceleration due to gravity  $g = 9.81 \text{ m} \cdot \text{s}^{-2}$ .

Resistant to saline fog and industrial climate.

### Range

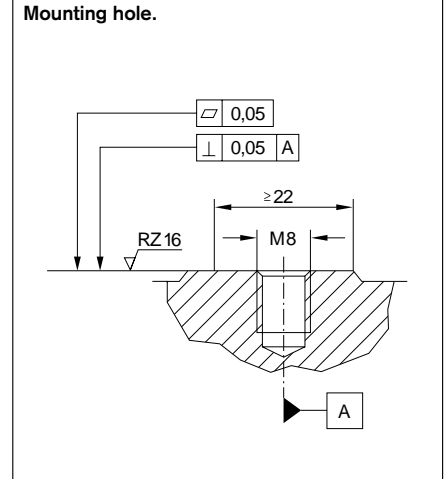
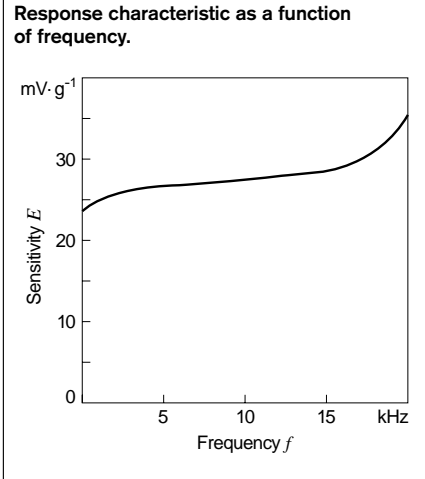
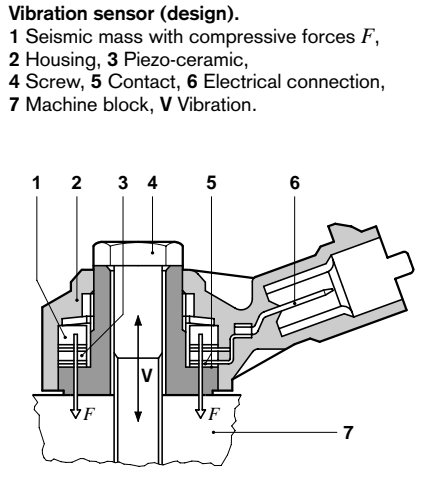
#### Vibration sensor

2-pole without cable	<b>0 261 231 148</b>
2-pole, with cable, length 480 mm, up to +130 °C	<b>0 261 231 153</b>
3-pole, with cable, length 410 mm, up to +150 °C	<b>0 261 231 118</b>

### Accessories

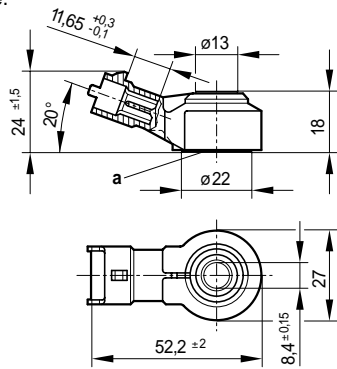
Sensor	Plug housing	Contact pins	Individual gasket	For cable cross section
0 261 231 148	1 928 403 137	1 987 280 103	1 987 280 106	0.5...1.0 mm <sup>2</sup>
		1 987 280 105	1 987 280 107	1.5...2.5 mm <sup>2</sup>
0 261 231 153	1 928 403 826	1 928 498 060	1 928 300 599	0.5...1.0 mm <sup>2</sup>
		1 928 498 061	1 928 300 600	1.5...2.5 mm <sup>2</sup>
0 261 231 118	1 928 403 110	1 987 280 103	1 987 280 106	0.5...1.0 mm <sup>2</sup>
		1 987 280 105	1 987 280 107	1.5...2.5 mm <sup>2</sup>

Note: A 3-pole plug requires 1 plug housing, 3 contact pins, and 3 individual gaskets. In automotive applications, original AMP crimping tools must be used.



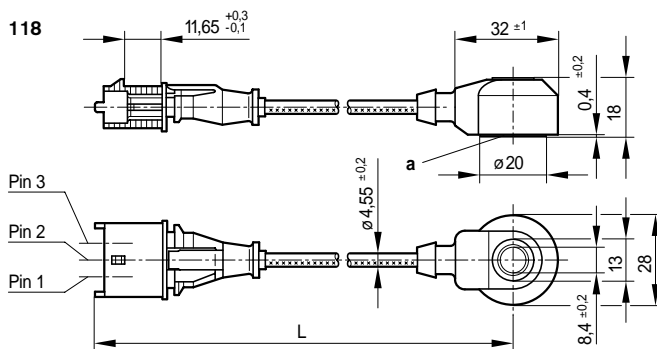
**Dimension drawings.**  
 a Contact surface.

0 261 231 148

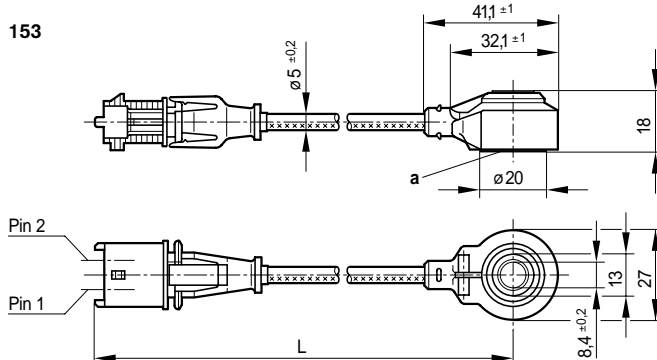


Part number	L mm
.. 118	410 ±10
.. 153	430 ±10

0 261 231 118



0 261 231 153



**Evaluation**

The sensor's signals can be evaluated using an electronic module. This is described on Pages 26/27.

**Installation instructions**

The sensor's metal surfaces must make direct contact. No washers of any type are to be used when fastening the sensors. The mounting-hole contact surface should be of high quality to ensure low-resonance sensor coupling at the measuring point. The sensor cable is to be laid such that there is no possibility of sympathetic oscillations being generated. The sensor must not come into contact with liquids for longer periods.

**Explanation of symbols**

- $E$  Sensitivity
- $f$  Frequency
- $g$  Acceleration due to gravity

**Connector-pin assignments**

- Pin 1, 2 Measuring signal
- Pin 3 Shield, dummy