

# Acceleration Sensors

For universal usage

**Model 89010**  
**Model 89011**  
**Model 89012**

Code:	89010 EN
Delivery:	ex stock / 10 weeks
Warranty:	24 months



**Model 89010**  
Screw mounting



**Model 89011**  
Bolt mounting

- Measuring ranges between 0 ... ± 5 g and 0 ... ± 200 g
- With full-bridge strain gauge
- Working frequencies of 0 ... 2 kHz
- Simple calibration
- High sensitivity

## Application

Thanks to the design, these sensors can be applied universally. They are suitable for movement and vibration investigations in the laboratory as well as for industrial use. Ground loop problems are avoided, as they are insulated from ground.

Typical applications include:

- ▶ The measurement of both constant and variable accelerations in automobiles, railway trains, aircraft, rockets, lifts, robots, grippers, sport
- ▶ Seismic measurements and geophysical investigations of buildings, towers, bridges, buttress dams; earthquake monitoring, the recording of vibrations in foundations caused, for instance, by passing vehicles
- ▶ Tilt measurements on optical devices, ships, offshore drilling platforms, heavy vehicles and in machine construction
- ▶ Measurements of vibration, vibration speed and vibration displacement in land vehicles, ships and aircraft, machines, structures, movement investigations (neurology, posturography, sport)

## Description

The acceleration sensors are classed as absolute vibration sensors; in contrast to relative sensors, they do not require a stationary reference point.

The converter elements, wire strain gauges, adhere to a deforming part that is coupled to a seismic mass. When accelerated in the direction of the acceptable bending, the seismic mass exerts a force -  $F = m \cdot a$  - and changes the shape of the deforming part. As a result of this structure, these models are also suitable for the measurement of constant accelerations (working frequency 0 Hz, such as the earth's acceleration).

The wire strain gauges are connected to form a Wheatstone bridge and output a bridge voltage that is proportional to the mechanical displacement.

The sensor is hermetically encapsulated in a metal housing to protect it from external influences.

**Technical Data**

 gn = 9,8067 m/s<sup>2</sup> standard acceleration in free fall

Order Code	Measurement Range	Nominal Sensitivity, at 5 V Excitation [mV/g]*		Operation Frequency Range [Hz]	Natural Frequency (mounted) [Hz]	Weight [g]
		Nominal	Range			
89010-5	0 ... ± 5 g	8	5.0 ... 12	0 ... 300	800	28
89010-10	0 ... ± 10 g	3.8	2.4 ... 5.0	0 ... 400	1000	28
89010-20	0 ... ± 20 g	1.8	1.2 ... 2.4	0 ... 600	1500	28
89010-50	0 ... ± 50 g	0.8	0.5 ... 1.2	0 ... 1000	2000	28
89010-100	0 ... ± 100 g	0.38	0.24 ... 0.5	0 ... 1500	3000	28
89010-200	0 ... ± 200 g	0.18	0.12 ... 0.24	0 ... 2000	4000	28
89011-100	0 ... ± 100 g	0.38	0.24 ... 0.5	0 ... 1500	3000	59
89011-200	0 ... ± 200 g	0.18	0.12 ... 0.24	0 ... 2000	4000	59
89012-5	0 ... ± 5 g	8	5.0 ... 12	0 ... 300	800	59
89012-10	0 ... ± 10 g	3.8	2.4 ... 5.0	0 ... 400	1000	59
89012-20	0 ... ± 20 g	1.8	1.2 ... 2.4	0 ... 600	1500	59
89012-50	0 ... ± 50 g	0.8	0.5 ... 1.2	0 ... 1000	2000	59
89012-100	0 ... ± 100 g	0.38	0.24 ... 0.5	0 ... 1500	3000	59
89012-200	0 ... ± 200 g	0.18	0.12 ... 0.24	0 ... 2000	4000	59

\* Output voltage and excitation voltage are proportional

**Electrical values**

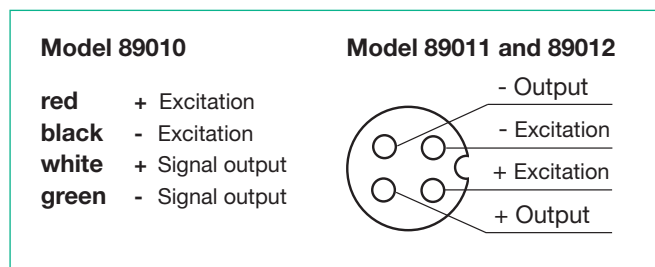
Bridge resistance: full bridge of semiconductor strain gauges nominal 4000 Ω  
 Excitation voltage: recommended 5 V; maximum 10 V DC  
 Nominal sensitivity: values in mV/g refer to table  
 Insulation resistance: > 10<sup>9</sup> Ω

**Environmental conditions**

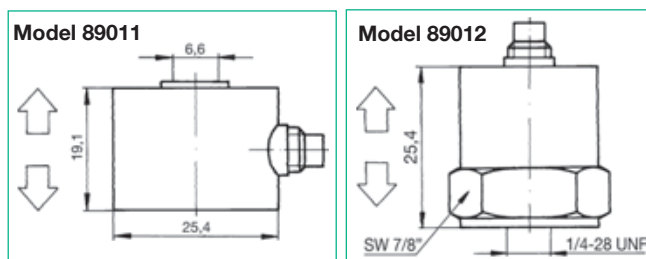
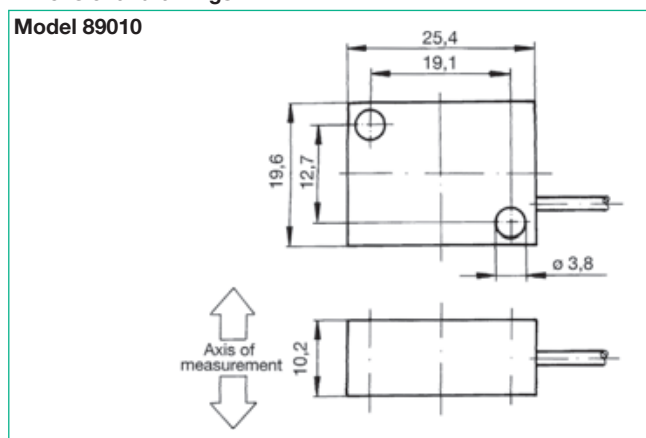
Range of operation temperature: - 40 ... 120 °C  
 Range of nominal temperature: 20 ... 70 °C  
 Influence of temperature: to zero signal ≤ 0.035 % F.S./K; to sensitivity max. ± 2 %

**Mechanical values**

Non-linearity and hysteresis: ± 1 % F.S.  
 Overload protection: 20 x nominal acceleration  
 Cross sensitivity: ≤ 5 %  
 Frequency response of the nominal sensitivity: max. ± 5 %  
 Attenuation coefficient at 20 °C: 0.7 nominal  
 Housing material: 89010 anodized aluminium; 89011 and 89012 stainless steel  
 Electrical connection: 89010 Teflon cable, length 1.5 m; 89011 and 89012 plug-in connection, 4 pin, mating connector model 9900-V568 (included in scope of delivery)

**Wiring**

**Mounting**

Model 89010 with screws M4 (length = 20 mm)  
 Model 89011 with screw or extension bolt (approx. M6 x 28)  
 Model 89012 with mounting screw 1/4" - 28 UNF x 1/4  
 Alternatively all acceleration sensors may be mounted with cyanoacrylat glue (protect the pins!) or, for temporary usage, with wax (beeswax, petroleum wax).

**Dimensional drawings**

**Order Information**

Acceleration sensor, screw mounting, measuring range 50 g

**Model 89010-50 g**
**Accessories**
**for Model 89010:**

 Mating connector, 12 pin for burster desktop devices **Model 9941**  
 Mounting of a connector to the sensor cable **Order code: 99004**
**for Model 89011 and Model 89012:**

 Mating connector (included in scope of delivery) **Model 9900-V568**  
 Connection cable, length 1.5 m **Model 8100-K001**  
 Connection cable, length 4.5 m **Model 8100-K002**

Measurement amplifier with or without digital indicator, measurement value control, storage or processing units

**refer to section 9 of the catalog.**