

®ICP Accelerometer, Model 109 Compact, Top Connector

Main Characteristics

- Annular shear mode
- 20 kHz Bandwidth
- 10, 50, 100 mV/g
- -55°C to 120 °C (-67°F to 250°F)
- Dual case isolation with Faraday shield
- Submersible version (150 metres) with associated IP68 over-molded cable
- Life time hermetic sealing warranty (M12/Mil glass seal connector)

Competitive advantage

- Annular shear piezoelectric sensors feature better frequency response, improved base strain, lower noise, smaller size, thermal transient immunity and insensitivity to cable motion. Annular shear mode is less susceptible to transverse vibrations and better immune to electronic saturation at high frequency.
- Exceptional bias voltage stability at elevated temperatures. (improved dynamic range, ex 80g dynamic for 100mV/g sensitivity)
- Resistant to shock (magnet mounting) thanks to protected Mosfet transistor input.
- ESD and reverse wiring protection.
- The glass seal hermetic connector protects the piezoelectric disc and the electronic from harmful environmental influences, significantly increasing their reliability and lifetime. Associated with low cost IP68 overmolded M12 cable assembly it is a perfect solution for submersible application down to 150 metres. Sensors with epoxy seal will always leak after few temperature cycles.
- M12 overmolded cable assembly is available through local electronic distributor
- M12 offers compatibility with sensors used in automation.

Description

The hermetic sealed industrial piezoelectric accelerometer model 109 is designed to monitor the vibration in harsh industrial environment. It uses the industry standard ©ICP 2-wire voltage transmission technique with a 4 mA standard constant current supply. Signal ground is isolated from the mounting surface and outer case to prevent ground loops. Faraday shielding will limit sensitivity to EMC to a minimum. Annular shear mode design will prevent from thermal transient and from spurious signal from high transverse vibrations. Low noise electronic and a temperature compensated design will give you accurate result over the complete temperature range. Large choice of frequency range will help to fit almost every customer requirements.



Model 109.01

Typical applications

Vibrations measurement in the rugged environments of industrial machinery monitoring. High frequency version (10mV/g) monitors the vibration on roller bearing, pumps cavitation, Medium frequency version (100mV/g) monitors overall vibration on pumps, motors, fans, ...

Approvals



Revision History

May 2003 : Released
Dec 2014 : electronic upgrade
Sept 2016 : improved case electrical isolation

Ordering information

To order, specify model number, options, accessories and suffix :

109.01- AA - B - TT - MM - HH - YY

AA : Sensitivity

3	.....	10 mV/g \pm 5 %
3D	.....	10 mV/g \pm 10 %
3V	.....	10 mV/g \pm 20 %
5	.....	50 mV/g \pm 5 %
5D	.....	50 mV/g \pm 10 %
5V	.....	50 mV/g \pm 20 %
6	.....	100 mV/g \pm 5 % (medium frequency, general purpose)
6D	.....	100 mV/g \pm 10 % (medium frequency, general purpose)
6V	100 mV/g \pm 20 % (medium frequency, general purpose)

Available suffix : N, negative polarity

B : Connector

2	M12 glass seal
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B (CC-DD) Integral cable

5 (CC-DD)	Integral cable
7 (CC-DD)	Integral cable with sstl overbraid protection
8 (CC-DD)	.....	Integral cable with stainless steel protection conduit
CC: Cable Type		
05 : *Teflon FEP twisted pair Cable (200°C). Previously code was 02		
DD : length in metre		

TT : Temperature output

Omitted	.....	No temperature output
T0	.....	10 mV/°C. (range +2°C to +120°C) \pm 10 %

MM : Machine thread

Omitted	.....	No mounting stud will be shipped with the sensor
M6	.....	M6x1
M7	.....	1/4" 28 UNF 2A
M8	.....	M8x1.25

HH : Housing thread

H2	10-32 UNF-2A
H7	1/4" 28 UNF-2A

YY : Agency Approval

Omitted	No agency approval
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Special Engraving :

Add ZXX at the end of the part number.
XX is a number supplied by VibraSens

In stock model :

109.01-6D-2-H7	.....	100 mV/g \pm 10% general purpose version
109.01-3D-2-H7	.....	10 mV/g \pm 10% high frequency version

Available Model with short lead time (1 week) :

109.01-6D-5(05-Length)-H7	integral 200°C teflon cable
109.01-6-6D-7(05-Length)-H7	integral 200°C sstl overbraided teflon cable

Old Part number compatibility

Not applicable

Ordering example :

109.01-6D-2-H7-M6 Compact accelerometer, 100mV/g, M12 glass seal connector
 109.01-6D-7(05-05)-H7-M6 Compact accelerometer, 5 metres Integral teflon cable with Stainless steel overbraid

Specifications (24°C)

Dynamic

Sensitivity (101.01)	
AA=3	10 mV/g ± 5%
AA=3D	10 mV/g ± 10%
AA=3V	10 mV/g ± 20%
AA=5	50 mV/g ± 5%
AA=5D	50 mV/g ± 10%
AA=5V	50 mV/g ± 20%
AA=6	100 mV/g ± 5%
AA=6D	100 mV/g ± 10%
AA=6V	100 mV/g ± 20%
Frequency response	
AA=3X	±10 % : 1 to 10000 Hz ±3 dB : 0.5 to 20000 Hz
AA=5X	±10 % : 1 to 10000 Hz ±3 dB : 0.5 to 20000 Hz
AA=6X	±10 % : 1 to 10000 Hz ±3 dB : 0.5 to 20000 Hz
Mounted Resonant frequency	
AA=3X	40 kHz Nom.
AA=6X	40 kHz Nom.
Dynamic range	
AA=3X	800 g pk.
AA=5X	160 g pk
AA=6X	80 g pk
Transverse response sensitivity (20Hz, 5g)	<5%
Temperature response	see fig. 3
Polarity	(fig. 1) Suffix dependant
Linearity	±1% Max
Warm up time (Typical)	
AA=3X, 6X	< 1Sec
Option T0 (sensor should be powered to get temperature output)	
Output (between - and Temp)	Vout=10mV/°C * Temp.(°C)
	0VDC at 0°C
Range	+2° to 120°C

Electrical

Electrical Grounding	Isolated from machine ground
	Internal Faraday shielding (fig. 1)
Isolation(Case to shield)	100 M Ω Min
Capacitance to ground	70 pF Nom
Output impedance	50 Ω Nom
DC output bias, 4mA supply	12 VDC Nom (Fig; 2)
Residual noise (24°C) : A=3X	
1 Hz to 25 Hz	300 ug rms
1 Hz	30 ug
Residual noise (24°C) : A=6X	
1 Hz to 25 Hz	300 ug rms
1 Hz	30 ug
Power requirements	
	Constant current : +2 to +10mA DC
	Voltage : +22 to +28 VDC
Protection	
Overvoltage	Yes
Reverse polarity	Yes

Environmental

Temperature, operating continuous : (max. current =4mA)	-55 to 120 °C (-65 to 250 °F)
Humidity / Enclosure	
B=2	Not affected, hermetically sealed, 1E-8torr.l/s
B=5, 7, 8	IP68, epoxy sealed
Acceleration limit : Shock	5000 g peak
Continuous vibration	500 g peak
Base strain sensitivity	0.0002 g pk/u strain
Temp. transient sens. (3Hz, LLF, 20dB/dec)	5 mg/°C
Acoustic sensitivity (164 dBSP)	0.5 mg
Electromagnetic sens. (50Hz, 0.03 T)	0.2 g
Mean time between failure (MTBF)	10 Years Nom
ESD Protection	> 40V
Safety	EN 61010-1 and IEC 1010-1
EMC emission	EN 50081-1, EN 50081-2
EMC immunity (1)	EN 50082-1, EN 50082-2

Physical

Design	Ceramic, annular shear mode
Weight	
AA=3X	20 gr Nom (0.7 Oz)
AA=6X	20 gr Nom (0.7 Oz)
Connector	
B=2	M12 glass seal, IEC 60947-5-2
Material	AISI 316L, DIN 1.4404 (Stainless steel)
Mounting torque (M6, M7, M8 suffix)	2.4 N.m (21 in-lbs)

Accessories, supplied

Calibration supplied	Sensitivity (5g, 160 Hz)
.....	No frequency response

Accessories, not supplied

Cable assembly B=2 (M12 connector)	
Polyurethane cable	10.01-A01-E02-31-Length
FEP Teflon cable	10.01-A01-E02-12-Length
For more cable option see Model 10.01 (specific cable harness)	

Accessories, spare parts

Mounting Stud with HH=H6	
M6 machine thread	191.01-16-06-1
1/4" 28 UNF machine thread	191.01-16-16-1
M8 machine thread	191.01-16-08-1

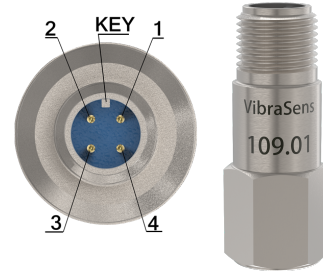
Repair

Consult factory for replacement of connector in case of broken or bended pins. Repair of electronic is not possible.

- (1) Guaranteed if using accessories listed in this product datasheet only.

Configurations

Model Number	Pin 1	Pin 2	Pin 3	Pin 4
Standard, no option	NC	NC	(-)	(+)
T0 Option (10mV/°C)	NC	(Temps)	(-)	(+)



(NC) : Not connected

Fig. 1b : Electrical layout, B=2 (M12 glass seal)

CC=05 (Teflon)	White (-) / Red (+)
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Fig 1c : Electrical layout, B= 5, 7,8 (cable only)

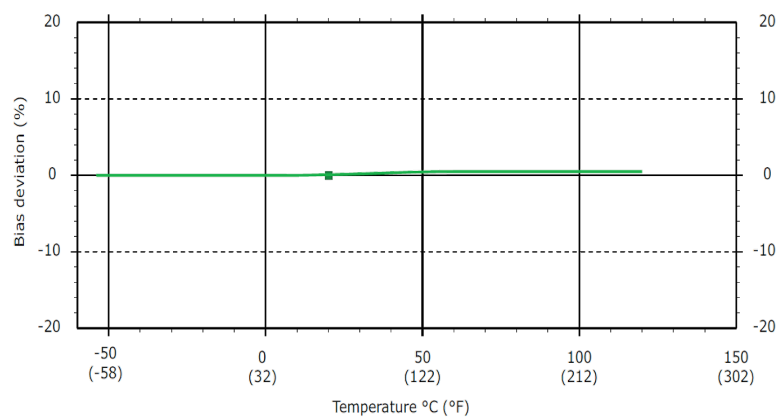


Fig 2. DC (Bias) deviation versus temperature

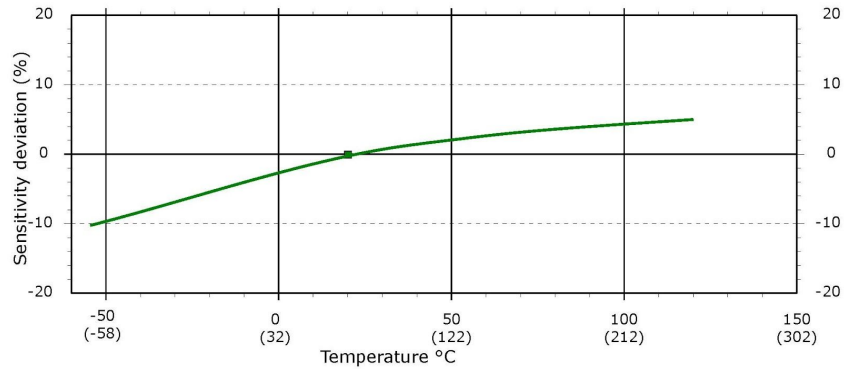


Fig 3. : Sensitivity deviation versus temperature

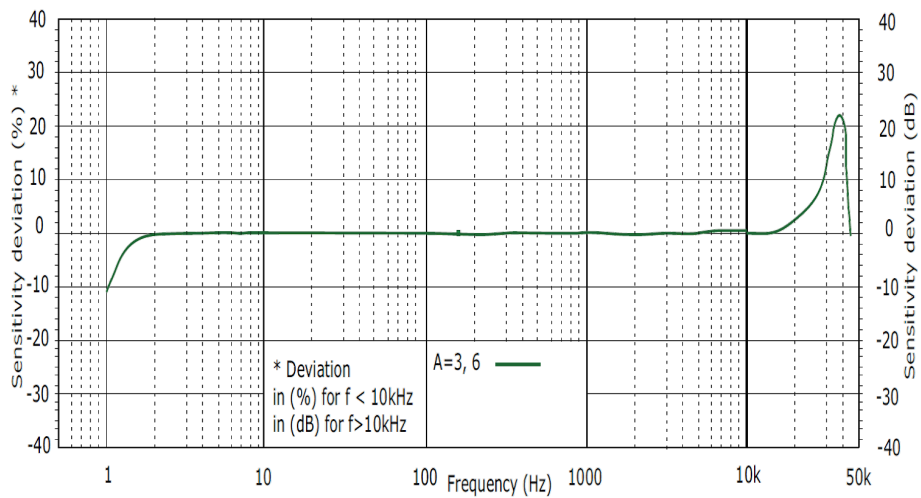


Fig 4a. Frequency Response, amplitude

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