®IEPE Premium Accelerometer, Top Connector

Main Characteristics

• Atex Approved for zone 0, 1, 22, 21, 22
• Piezoelectric annular shear mode
(better than obsolete compression design / Shear Plane)
• 10, 50, 100, 250, 500, 1000 mV/g version available
• -54°C to 121 °C (-67°F to 250°F)
• Dual case isolation with Faraday shield
• Submersible version (150 metres).
• life time hermetic sealing warranty (M12/Mil glass seal connector)

Competitive advantage

• Compare to obsolete compression design, 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 also less susceptible to transverse vibrations and better immune to electronic saturation at high frequency.
• Improved dynamic range (thanks to exceptional bias stability) at elevated temperatures.
• Resistant to shock (magnet mounting) thanks to Jfet 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. Sensors with epoxy seal will always leak after few temperature cycles.
• M12 connector offers compatibility with numerous sensors used in automation. M12 overmolded cable assemblies are available from many cable manufacturers around the world. Mil cordset are expensive because they are only available from vibration sensor manufacturer.

Description

The hermetic sealed industrial piezoelectric accelerometer model 101 is designed to monitor the vibration in harsh industrial environment. It uses the industry standard ©ICP / ©IEPE / ©LIVM 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. Low frequency accelerometers (A=9, 0) incorporate a low-pass filter within the conditioning electronic. This filter attenuates the sensor mechanical resonance and the associated distortion and overload.

Model 101.51-AA-2

Typical applications

Vibrations measurement in the rugged environments of industrial machinery monitoring. High frequency version monitor the vibration on roller bearing, pumps cavitation, ... Medium frequency version monitor overall vibration on pumps, motors, fans, ... Low frequency model is used in the petrochemical, machine tool, and paper industries for monitoring of slow speed agitators, cooling towers, ... High temperature version is typically used where extra temperature protection is needed, such as the dryer section of a paper machine.

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 :

101.51- AA - B - TT - HH - YY

AA : Sensitivity

3	…….	10 mV/g ± 5 %
3D	…….	10 mV/g ± 10 %
5	…….	50 mV/g ± 5 %
5D	…….	50 mV/g ± 10 %
6	……	100 mV/g ± 5 %
6D	……	100 mV/g ± 10 %
7	…….	250 mV/g ± 5 %
7D	……	250 mV/g ± 10 %
8	……	250 mV/g ± 5 %
8D	……	250 mV/g ± 10 %
9	…….	500 mV/g ± 5 %
9D	…….	500 mV/g ± 10 %
0	……	1000 mV/g ± 5 %
0D	……	1000 mV/g ± 10 %

Note: 7, 9, 0 High pass frequency = 0.2 Hz.
Available suffix : N, negative polarity

B : Connector

1	…….	MIL-C-5015, glass seal, Type MS3143 10SL-4P
2	……..	M12 glass seal, IEC 60947-5-2

B (CC-DD) : Integral Cable

5(01-DD)	……...	90°C Polyurethane cable
5(02-DD)	……...	200°C Teflon FEP cable
5(03-DD)	……...	120°C Radox Halogen Free cable
5(31-DD)	……...	90°C Polyurethane cable with Temperature output
5(12-DD)	……...	200°C Teflon FEP cable with Temperature output
5(13-DD)	…….	120°C Radox Halogen Free cable with Temperature output

7(01-DD)	…….....	90°C Polyurethane cable with sstl overbraid protection
7(02-DD)	……...	200°C Teflon FEP cable with sstl overbraid protection
7(03-DD)	……	120°C Radox Halogen Free cable with sstl overbraid protection
7(12-DD)	…	200°C Teflon FEP cable with sstl overbraid & Temp. output
7(13-DD)	.	120°C Radox Halogen Free cable with sstl overbraid & Temp. output

8(01-DD)	….	90°C Polyurethane cable with stainless steel protection conduit
8(02-DD)	…….	200°C Teflon FEP cable with stainless steel protection conduit
8(03-DD)	……..	120°C Radox Halogen Free cable with sstl protection conduit
8(31-DD)	………	90°C PU cable with sstl protection conduit & Temp. output
8(12-DD)	.	200°C Teflon FEP cable with sstl protection conduit & Temp. output
8(13-DD)	….	120°C Radox cable with sstl protection conduit & Temp. output

DD length in metres. Standard length are 2m, 5m, 10m, 15m, 20m, 30m.

TT : Temperature output. (Not available with Mil-C-5015 2 pins connector)

Omitted	……...	no temperature output
T0	……...	10 mV/°C. (range +2° to +120°C)

HH : Housing thread

Omitted	……..	M6x1
H7	…….....	1/4" 28 UNF-2A

YY : Explosion proof Agency Approval

Omitted	…….....	no specific agency approval
Y1 (Atex & IECEx)	…….....	Suitable for Zone 0, 1, 20, 21, 22
Group Category Gaz - Protection	…….	II 1 G - Ex ia IIC T4 Ga
Group Category Dusts - Protection	…	II 1 D - Ex ia IIIC T135°C Da
Group Mine - Protection	……..…….	I M1 - Ex ia I Ma
AA can be	……	3, 3D, 5, 5D, 6, 6D, 7, 7D, 8, 8D, 9, 9D, 0, 0D
B can be	……	1, 2
B(CC,DD) can be	……	5(03-DD), 7(02-DD), 7(03-DD) 8(02-DD), 8(03-DD) & DD ≤ 99
TT can be	……	Omitted
HH can be	……	Omitted or H7
Y5 (CSA Approval)	……..……...	Not Released
		IS Class 1, Division 1, Groups A to D
.		Ex ia IIC / Class I, Zone 0 AEx ia IIC T4
AA Options can be	……...	Same as Y1 (Atex)

OEM or Customer Engraving :

Add ZXX at the end of the part number.
XX is a number supplied by VibraSens.
Customer Engraving is not allowed for Explosion proof sensor.
OEM should contact VibraSens if custom Engraving for Explosion proof sensor is needed.

In stock Model

Metric connector

101.51-6D-2	100 mV/g ±10% general purpose version
101.51-6-2	100 mV/g ±5 %, general purpose version
101.51-9-2	500 mV/g ±5 %, low frequency version
101.51-3-2	10 mV/g ±5 %, high frequency version
101.51-6D-2-T0	100 mV/g ±10 %with temperature output

American/UK connector

101.51-6D-1-H7	100 mV/g±10% (1/4”28UNF housing thread)
101.11-6-1-H7	100 mV/g±5 % high temp. version (150°C)
101.51-9-1-H7	500 mV/g±5 % low frequency version
101.51-3-1-H7	10 mV/g 5 % high frequency version

Available Model with short lead time (1 week)

101.51-6D-5(01-Length)	integral polyurethane cable
101.51-6D-7(02-Length)	integral 200°C sstl overbraided teflon cable

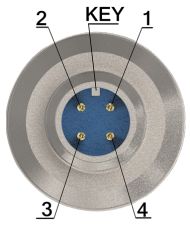
Obsolete Part number compatibility

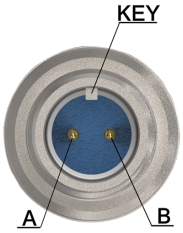
101.21-6 is replaced by 101.51-6D
B=3 : M12 epoxy seal connector is obsolete. B=2 should be ordered.

Ordering example :

101.51-6D-2: Premium accelerometer, 100mV/g, M12 glass seal connector
101.51-6D-7(02-05): Premium accelerometer, 5 metres Integral teflon cable with Stainless steel overbraid.

Configurations





M12 glass seal (B = 2)

Pin 1 : not connected
Pin 2 : not connected or temperature output (T0 option)
Pin 3 : (-)
Pin 4 : (+)

Associated cable 10.01-A01-E02-31-Length
Black (+); Blue (-)
Temperature Output (T0 option) between Blue (-) and White (+)

Mil-C-5015 (B = 1)

Pin A : (+)
Pin B : (-)

Associated cable 10.01-A01-B22-06-Length: Red (+); White (-)
Associated cable 10.01-A01-B22-02-Length: Red (+); White (-)
Note: No temperature option available

Integral Cable

B = 5 (CC-DD)

CC=01, 02 (PU, Teflon) : White (-); Red (+)

CC=03 (Radox) : White N°1 (-); White N°2 (+)

CC=12 (Teflon): White (-) ; Red (+)
Temperature output between Black and White

CC=13 (Radox) : White N°1 (-); WhiteN° 2 (+)
Temperature output between White N°3 and White N°1

CC=31 (PU) : Blue(-); Black(+); Brown (NC)
Temperature output between White(+) and Blue (-)

NC: Not connected; (1) with T0 option

Integral cable with overbraid

B = 7 (CC-DD)

Same wiring color as B=5

Integral cable with protection conduit

B = 8 (CC-DD)

Same wiring color as B=5

Specifications (24°C)

Dynamic

Frequency response (Typical curve). See Fig. 1. & 2. .	
A=3X	±10 % : 1 to 10000 Hz
	±3 dB : 0.5 to 16000 Hz
A=6X	±10 % : 1 to 9000 Hz
	±3 dB : 0.5 to 14000 Hz
A=9X	.±10 % : 0.4 to 1600 Hz
	±3 dB : 0.2 to 3700 Hz
A=0X	±10 % : 0.4 to 1600 Hz
	±3 dB : 0.2 to 3700 Hz
Mounted Resonant frequency	
A=3X	35 kHz Nom.
A=5X, 6X	25 kHz Nom.
A=9X, 0X	16 kHz Nom.
Dynamic range	
A=3X	800 g pk.
A=5X	160 g pk.
A=6X	80 g pk
A=9X	16 g pk
A=0X	8 g pk
Transverse response sensitivity (20Hz, 5g)	.<5%
Temperature response	see fig3
Linearity	.±1% Max
Warm up time	
A=3X, 5X, 6X	< 1Sec
A=9X, 0X	< 10 Sec
Temperature Output (Option T0)	
	Only available if sensor is powered via IEPE
	Output (between - and Temp)
	0VDC at 0°C
	Vout=10mV/°C * Temp.(°C)
	Range: +2° to 120°C

Electrical

Electrical Grounding	Isolated from machine ground
	Internal Faraday shielding
Isolation(Case to shield)	100 MΩ Min
Capacitance to ground	70 pF Nom
Output impedance	50 Ω Nom
DC output bias, 4mA supply (AA=3X, 5X, 6X)	12 VDC Nom
DC output Bias, 4 mA supply (AA=9X, 0X)	10 VDC Nom
Residual noise (24°C) : A=3X (10 mV/g)	
1 Hz	200 ug /√ Hz
10 Hz	30 ug /√ Hz
100 Hz	10 ug /√ Hz
1000 Hz	10 ug /√ Hz
Residual noise (24°C) : A=6X (100 mV/g)	
1 Hz	30 ug /√ Hz

10 Hz	6 ug /√ Hz
100 Hz	5 ug /√ Hz
1000 Hz	5 ug /√ Hz

Residual noise (24°C) : A=9X (500 mV/g)

0.1 Hz	20 ug /√ Hz
1 Hz	6 ug /√ Hz
10 Hz	2 ug /√ Hz
100 Hz	2 ug /√ Hz
1000 Hz	2 ug /√ Hz

Residual noise (24°C) : A=0X (1000 mV/g)

0.1 Hz	20 ug /√ Hz
1 Hz	5 ug /√ Hz
10 Hz	1 ug /√ Hz
100 Hz	0.5 ug /√ Hz
1000 Hz	0.5 ug /√ Hz

Power requirements

Constant current : +2 to +10mA DC
Voltage : +22 to +28 VDC

Protection

Overvoltage	Yes
Reverse polarity	Yes
ESD Protection	> 40 V

Environmental

Temperature, operating continuous : 101.51 (max. current =4mA)

A= 3X, 5X, 6X	-55 to 120 °C (-65 to 250 °F)
A=9X	.-55 to 90 °C (-65 to 212 °F)
A=0X	-55 to 70 °C (-65 to 158 °F)

Humidity / Enclosure

B=1, 2	Not affected, hermetically sealed, 1E-8 torr.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 (AA=6D)
Temp. transient sens. (3Hz, LLF, 20dB/dec)	5 mg/°C (AA=6D)
Acoustic sensitivity (164 dBSP)	0.5 mg (AA=6D)
Electromagnetic sens. (50Hz, 0.03 T)	0.2 g (AA=6D)

Physical

Design	Ceramic, annular shear mode

Weight with connector

A=3	80 gr Nom (2.8 Oz)
A=5, 6	85 gr Nom (3.0 Oz)
A=9, 0	95 gr Nom (3.4 Oz)

Weight with Integral cable : add sensor weight above + …

BB=5(CC-DD)	40gr/m
BB=7(CC-DD)	60 gr/m
BB=8(CC-DD)	105 gr/m

Material	AISI 316L, DIN 1.4404 (Stainless steel)

Mounting torque (M6, M7, M8 suffix)	2,4 N.m (21 in-lbs)

European Directive

EMC Directive	2014/30/EU
Standards	61326-1
RoHS Directive	2011/65/EU
Certificate	101.51-YN_Rohs2

Atex & IECEx Approval (YY=Y1)

Atex Directive	2014/34/EU
Standards	EN 60079-0, Atex General EN 60079-11, Intrinsic safety, Gas, Dusts
Certificates	LCIE 18 3031 X IECEx LCIE 18.0036X
Installation Drawing	101.51-Y1_IMI
EU Declaration of Conformity	101.51-Y1_EUDC

Accessories, supplied

Calibration supplied	Sensitivity (5g, 160 Hz)

Accessories, not supplied

Cable assembly B=1 (Mil connector)	
Polyurethane cable (90°C)	10.01-A01-B22-06-Length
FEP Teflon cable (200°C)	10.01-A01-B22-02-Length
Cable assembly B=2 (M12 connector)	
Polyurethane cable (90°C)	10.01-A01-E02-31-Length
FEP Teflon cable (200°C)	10.01-A01-E61-02-Length

For more cable option see Model 10.01 (specific cable harness).

Mounting Stud for M6 sensor thread	
M6 machine thread	191.01-06-06-1
1/4” 28 UNF machine thread	191.01-06-16-1
M8 machine thread	191.01-06-08-1
M10 machine thread	191.01-06-10-1
Mounting Stud for 1/4”28 UNF sensor thread	
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

Calibration, back to back, Frequency response (10 Hz-10 kHz), 4 pages	501.11
Calibration, back to back, single point., A4 certificates	501.01

Repair

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

Fig 1. Frequency Response, amplitude

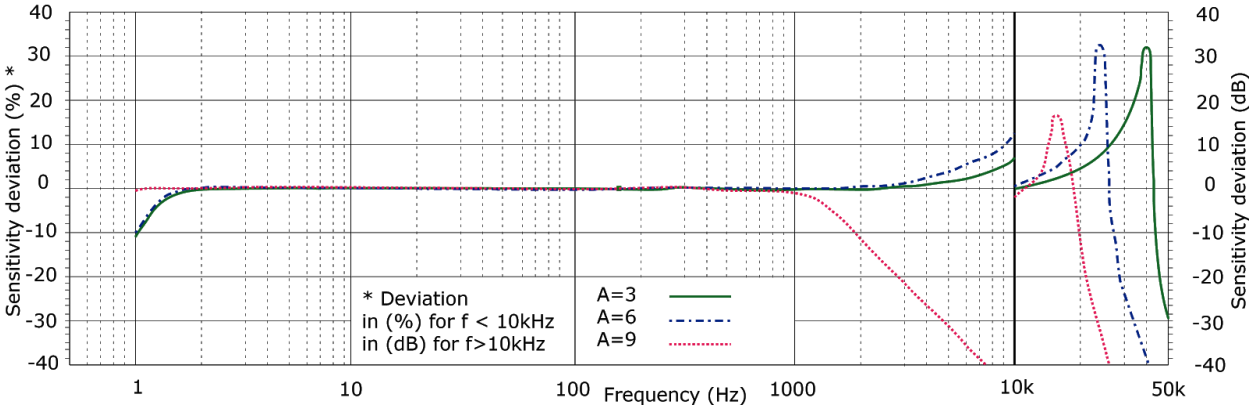


Fig 2. Low Frequency response, amplitude

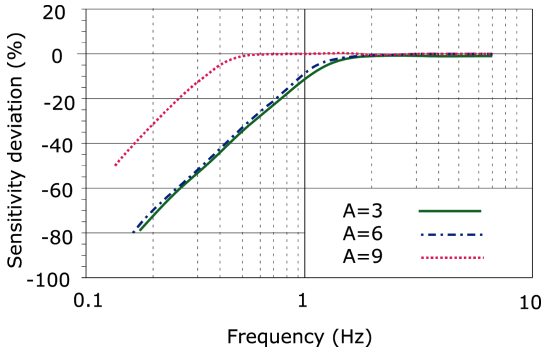


Fig 3. DC (Bias) deviation versus temperature

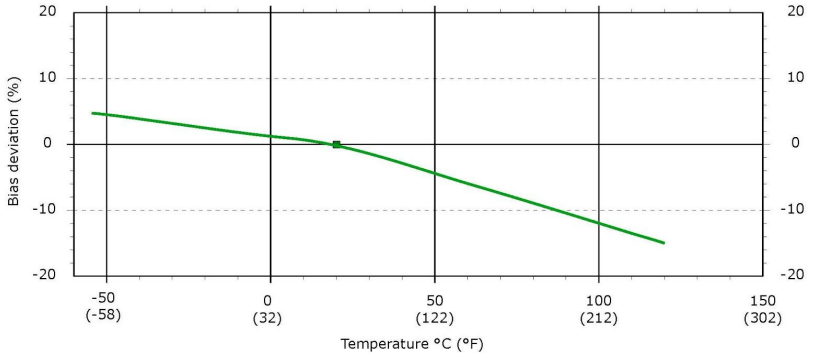
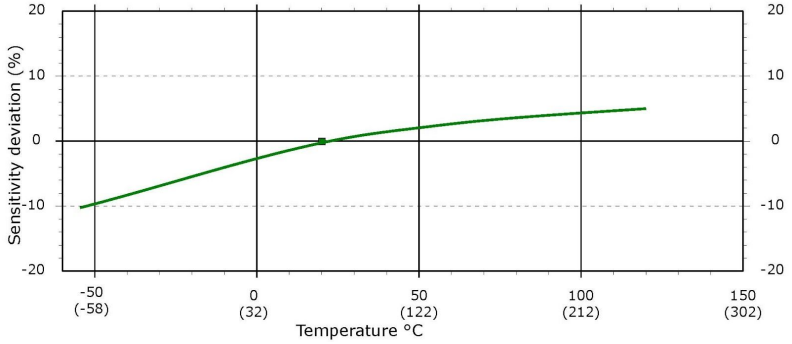


Fig 4. : Sensitivity deviation versus temperature



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