Main Characteristics
• Atex Approved for zone 0, 1, 2.
• Piezoelectric annular shear mode
• 10, 50, 100, 250, 500, 1000 mV/g version available
• -55°C to 120°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.

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
Nov 2017 : new housing with M8 option.
Model 103.02

Ordering information

To order, specify model number, options, accessories and suffix:
103.02 - AA - B - TT - HH - YY

AA : Sensitivity

<table>
<thead>
<tr>
<th>Sensitivity</th>
<th>Sensitivity</th>
<th>Offset</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>10 mV/g ± 5 %</td>
<td></td>
</tr>
<tr>
<td>3D</td>
<td>10 mV/g ± 10 %</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>50 mV/g ± 5 %</td>
<td></td>
</tr>
<tr>
<td>5D</td>
<td>50 mV/g ± 10 %</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>100 mV/g ± 5 %</td>
<td></td>
</tr>
<tr>
<td>6D</td>
<td>100 mV/g ± 10 %</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>250 mV/g ± 5 %</td>
<td></td>
</tr>
<tr>
<td>7D</td>
<td>250 mV/g ± 10 %</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>250 mV/g ± 5 %</td>
<td></td>
</tr>
<tr>
<td>8D</td>
<td>250 mV/g ± 10 %</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>500 mV/g ± 5 %</td>
<td></td>
</tr>
<tr>
<td>9D</td>
<td>500 mV/g ± 10 %</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>1000 mV/g ± 5 %</td>
<td></td>
</tr>
<tr>
<td>0D</td>
<td>1000 mV/g ± 10 %</td>
<td></td>
</tr>
</tbody>
</table>

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

B : Connector

<table>
<thead>
<tr>
<th>Connector</th>
<th>Connector</th>
<th>Connector</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MIL-C-5015, glass seal, Type MS3143 10SL-4P</td>
<td>M12 glass seal, IEC 60947-5-2</td>
</tr>
<tr>
<td>2</td>
<td>90°C Polyurethane cable</td>
<td>200°C Teflon FEP cable</td>
</tr>
<tr>
<td>5(01-DD)</td>
<td>90°C Polyurethane cable with Temperature output</td>
<td>120°C Radox Halogen Free cable with Temperature output</td>
</tr>
<tr>
<td>5(02-DD)</td>
<td>200°C Teflon FEP cable with Temperature output</td>
<td>200°C Teflon FEP cable with sstl overbraid protection</td>
</tr>
<tr>
<td>5(03-DD)</td>
<td>90°C Polyurethane cable</td>
<td>120°C Radox Halogen Free cable with Temp. output</td>
</tr>
<tr>
<td>5(04-DD)</td>
<td>120°C Polyurethane cable with Temperature output</td>
<td>200°C Teflon FEP cable with sstl protection conduit</td>
</tr>
<tr>
<td>5(05-DD)</td>
<td>200°C Teflon FEP cable with sstl overbraid &amp; Temp. output</td>
<td>120°C Radox cable with sstl protection conduit</td>
</tr>
<tr>
<td>5(06-DD)</td>
<td>120°C Radox Halogen Free cable with sstl overbraid &amp; Temp. output</td>
<td>200°C Teflon FEP cable with sstl &amp; Temp. output</td>
</tr>
<tr>
<td>5(07-DD)</td>
<td>120°C Radox Halogen Free cable with sstl overbraid</td>
<td>120°C Radox cable with sstl protection conduit &amp; Temp. output</td>
</tr>
<tr>
<td>5(08-DD)</td>
<td>120°C Radox Halogen Free cable with sstl &amp; Temp. output</td>
<td>200°C Teflon FEP cable with sstl &amp; Temp. output</td>
</tr>
<tr>
<td>5(09-DD)</td>
<td>120°C Radox Halogen Free cable with sstl &amp; Temp. output</td>
<td>120°C Radox cable with sstl protection conduit</td>
</tr>
<tr>
<td>5(10-DD)</td>
<td>120°C Radox Halogen Free cable with sstl &amp; Temp. output</td>
<td>200°C Teflon FEP cable with sstl &amp; Temp. output</td>
</tr>
<tr>
<td>5(11-DD)</td>
<td>120°C Radox Halogen Free cable with sstl &amp; Temp. output</td>
<td>120°C Radox cable with sstl protection conduit</td>
</tr>
<tr>
<td>5(12-DD)</td>
<td>120°C Radox Halogen Free cable with sstl &amp; Temp. output</td>
<td>200°C Teflon FEP cable with sstl &amp; Temp. output</td>
</tr>
<tr>
<td>5(13-DD)</td>
<td>120°C Radox Halogen Free cable with sstl &amp; Temp. output</td>
<td>120°C Radox cable with sstl protection conduit</td>
</tr>
<tr>
<td>8(01-DD)</td>
<td>200°C Teflon FEP cable with stainless steel protection conduit</td>
<td>120°C Radox Halogen Free cable with sstl &amp; Temp. output</td>
</tr>
<tr>
<td>8(02-DD)</td>
<td>200°C Teflon FEP cable with sstl protection conduit</td>
<td>120°C Radox Halogen Free cable with sstl &amp; Temp. output</td>
</tr>
<tr>
<td>8(03-DD)</td>
<td>200°C Teflon FEP cable with sstl protection conduit</td>
<td>120°C Radox Halogen Free cable with sstl &amp; Temp. output</td>
</tr>
<tr>
<td>8(04-DD)</td>
<td>200°C Teflon FEP cable with sstl protection conduit &amp; Temp. output</td>
<td>120°C Radox Halogen Free cable with sstl &amp; Temp. output</td>
</tr>
<tr>
<td>8(05-DD)</td>
<td>200°C Teflon FEP cable with sstl protection conduit &amp; Temp. output</td>
<td>120°C Radox Halogen Free cable with sstl &amp; Temp. output</td>
</tr>
<tr>
<td>8(06-DD)</td>
<td>200°C Teflon FEP cable with sstl protection conduit &amp; Temp. output</td>
<td>120°C Radox Halogen Free cable with sstl &amp; Temp. output</td>
</tr>
<tr>
<td>8(07-DD)</td>
<td>200°C Teflon FEP cable with sstl protection conduit &amp; Temp. output</td>
<td>120°C Radox Halogen Free cable with sstl &amp; Temp. output</td>
</tr>
<tr>
<td>8(08-DD)</td>
<td>200°C Teflon FEP cable with sstl protection conduit &amp; Temp. output</td>
<td>120°C Radox Halogen Free cable with sstl &amp; Temp. output</td>
</tr>
<tr>
<td>8(09-DD)</td>
<td>200°C Teflon FEP cable with sstl protection conduit &amp; Temp. output</td>
<td>120°C Radox Halogen Free cable with sstl &amp; Temp. output</td>
</tr>
<tr>
<td>8(10-DD)</td>
<td>200°C Teflon FEP cable with sstl protection conduit &amp; Temp. output</td>
<td>120°C Radox Halogen Free cable with sstl &amp; Temp. output</td>
</tr>
<tr>
<td>8(11-DD)</td>
<td>200°C Teflon FEP cable with sstl protection conduit &amp; Temp. output</td>
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</tr>
<tr>
<td>8(12-DD)</td>
<td>200°C Teflon FEP cable with sstl protection conduit &amp; Temp. output</td>
<td>120°C Radox Halogen Free cable with sstl &amp; Temp. output</td>
</tr>
<tr>
<td>8(13-DD)</td>
<td>200°C Teflon FEP cable with sstl protection conduit &amp; Temp. output</td>
<td>120°C Radox Halogen Free cable with sstl &amp; Temp. output</td>
</tr>
</tbody>
</table>

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 ........................................... ½” 28 UNF
H8 ............................................. M8x1.25
**Model 103.02**

YY : Explosion proof Agency Approval

Omitted ....................................................... no specific agency approval

Y1 (Atex & IECEx) ............................................. LCIEX.XXX
Group Category Gaz - Protection ........... II 1 G - Ex ia IIC T4 Ga
Group Category Dusts - Protection ... II 1 D - Ex ia llIC T135°C Da
Group Mine - Protection ........................................ Not Applicable
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(01-DD), 7(02-DD), 7(03-DD)
8(01-DD), 8(02-DD), 8(03-DD)
DD ≤ 99 metres
TT can be ......................................................... Omitted
HH can be ......................................................... Omitted or H8

Y5 (CSA Approval)................................................ Not Released
........................................................ IS Class 1, Division 1, Groups A to D
........................................................ Ex ia IIC / Class I, Zone 0
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 they need custom Engraving for Explosion proof sensor.

In stock Model

Metric connector

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>103.02-6D-2</td>
<td>100 mV/g ±10% general purpose version</td>
</tr>
<tr>
<td>103.02-6-2</td>
<td>100 mV/g ±5 %, general purpose version</td>
</tr>
</tbody>
</table>

Available Model with short lead time (2 weeks)

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>103.02-6D-5(01-05)</td>
<td>integral polyurethane cable, 5 metres</td>
</tr>
<tr>
<td>103.02-6D-7(02-05)</td>
<td>integral 200°C ssil overbraided teflon cable, 5 metres</td>
</tr>
<tr>
<td>103.02-9D-2</td>
<td>500 mV/g ±10 %, low frequency version</td>
</tr>
<tr>
<td>103.02-0D-2</td>
<td>1000 mV/g ±10 %, low frequency version</td>
</tr>
</tbody>
</table>

Ordering example :

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>103.02-6D-2</td>
<td>Premium accelerometer, 100mV/g, M12 glass seal side connector</td>
</tr>
<tr>
<td>193.31-06-1</td>
<td>M6 mounting screw</td>
</tr>
<tr>
<td>103.02-6D-7(02-05)-H8</td>
<td>Premium accelerometer, 5 metres Integral teflon cable with Stainless steel overbraid.</td>
</tr>
<tr>
<td>193.31-08-1</td>
<td>M8 mounting screw</td>
</tr>
</tbody>
</table>
**Specifications (24°C)**

**Dynamic**

Frequency response (Typical curve). See Fig. 1 & 2.

- A=3X  ±30% : 1 to 9000 Hz
- A=6X  ±30% : 1 to 8000 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)
  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 ΩNom

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 : (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 : 5000g peak
- Continuous vibration : 500g 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

Physical
- Design : Ceramic, annular shear mode
- Weight with connector
  - A=3 : 150 gr Nom (5.2 Oz)
  - A=5, 6 : 155 gr Nom (5.6 Oz)
  - A=9, 0 : 165 gr Nom (6.0 Oz)

- Weight with Integral cable : add sensor weight above + …
Model 103.02

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) 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
IEC 61241-0, Atex General
IEC 61241-11, Intrinsic safety, Dust
Certificates LCIE ATEX XXX
IECEx XXXXXX
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
Mounting Hex cap screw :
M6 machine thread 193.31-06-1
¼' 28 UNF machine thread 193.31-16-1
M8x1.25 193.31-08-1

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).

Calibration, back to back, Frequency response (10 Hz-5 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.
**Model 103.02**

**Configurations**

**Mil-C-5015 (B=1)**
- Pin A : (+)
- Pin B : (-)

Associated cable
10.01-A01-B22-06-Length:
Red (+); White (-)

Note: No temperature option available

**M12 glass seal (B=2)**
- Pin 1 : NC
- Pin 2 : NC or temp. 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 (+)

**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 (-); White N°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
Model 103.02

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
Fig 2. Low Frequency response, amplitude

Fig 3. DC (Bias) deviation versus temperature

Fig 4. Sensitivity deviation versus temperature

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