



# Accelerometers



## PJM LN Sensors

Best-in-class low noise accelerometer sensors  
Designed and manufactured by PJ Messtechnik GmbH  
Technology transfer from the University of Technology Graz, Austria

~ Superior Expertise Transforms™ ~



Guinness Enterprise Centre  
Taylor's Lane, Dublin 8, Eire  
[www.gerriko.ie/transport](http://www.gerriko.ie/transport)  
[info@gerriko.ie](mailto:info@gerriko.ie)

## INTRODUCTION

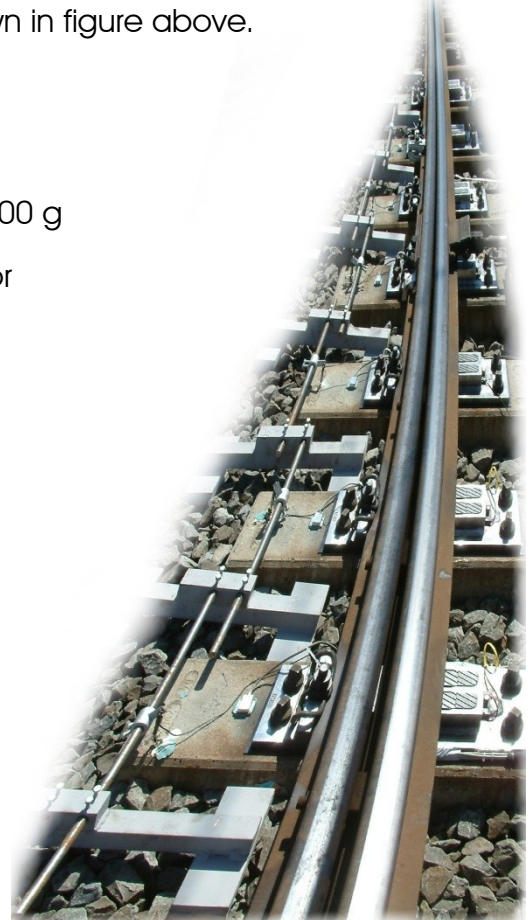
The PJM Low Noise (LN) Sensor is a uniaxial accelerometer based on capacitive technology. The PJM LN sensor range is constructed to achieve precise calibrated static acceleration measurements in real world dynamic situations, under any weather condition. This is due to its hermetically sealed steel casing which guarantees perfect protection from environmental influences. As they are built to resist extreme operating conditions they are ideal for taking undistorted measurements on rail vehicles or wayside on track.



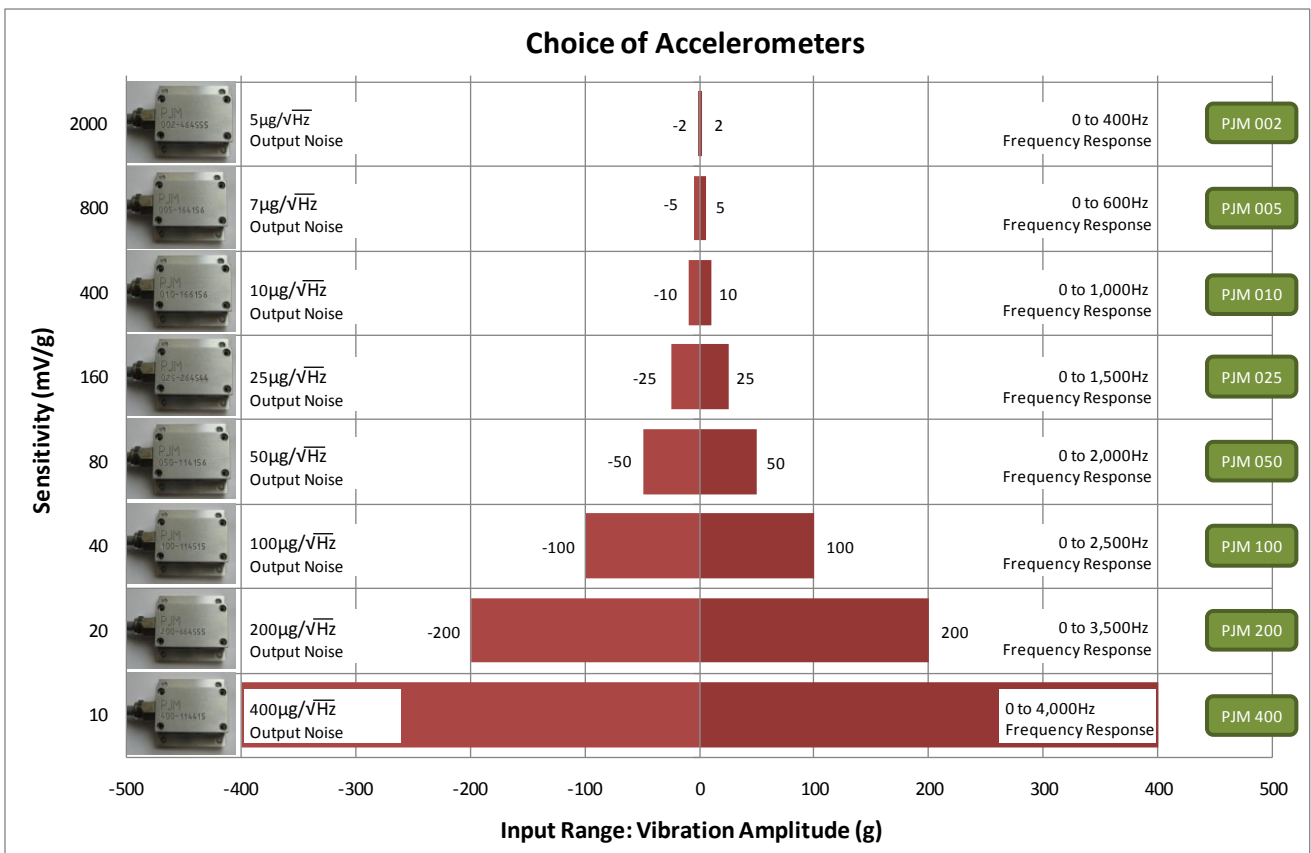
They can be used in zero to medium frequency instrumentation applications that require extremely low noise. Due to its internal Temperature Sensor it is relatively insensitive to temperature changes. The sensors do not exhibit any over-modulation by temporary observed high-frequency excitations and are particularly suitable for the use in running gear tests and in measuring the service strength. The sensitive axis is perpendicular to the bottom of the device, with direction of positive acceleration (output) as shown in figure above.

### Features:

- ❖ Vibration Amplitude (g-ranges) from 2 g to 400 g
- ❖ Low Noise: 5  $\mu\text{g}/\sqrt{\text{Hz}}$  for the PJM LN 2g sensor
- ❖ - 55 to + 125 °C Operation Temperature
- ❖ Nitrogen Damped / Hermetically Sealed
- ❖  $\pm 4$  V Differential with Analogue Output
- ❖ Responds to DC & AC Acceleration
- ❖ Internal Temperature Sensor
- ❖ Low Cross Axis Sensitivity
- ❖ High Shock Resistance
- ❖ Uniaxial, 4 Wire System
- ❖ 7 V - 11 V DC Power
- ❖ Amplified Output



## RANGE OF OPTIONS



### PERFORMANCE by MODEL at $V_{DD} = V_R = 5 \text{ VDC}$ , $T_C = 25^\circ\text{C}$

Model No.	PJM LN 2g	PJM LN 5g	PJM LN 10g	PJM LN 25g	PJM LN 50g	PJM LN 100g	PJM LN 200g	PJM LN 400g
Input Amplitude	$\pm 2 \text{ g}$	$\pm 5 \text{ g}$	$\pm 10 \text{ g}$	$\pm 25 \text{ g}$	$\pm 50 \text{ g}$	$\pm 100 \text{ g}$	$\pm 200 \text{ g}$	$\pm 400 \text{ g}$
Frequency Response (Nominal 3 dB)	0 – 400 Hz	0 – 600 Hz	0 – 1,000 Hz	0 – 1,500 Hz	0 – 2,000 Hz	0 – 2,500 Hz	0 – 3,500 Hz	0 – 4,000 Hz
Sensitivity (Differential) <sup>†</sup>	2,000 mV/g	800 mV/g	400 mV/g	160 mV/g	80 mV/g	40 mV/g	20 mV/g	10 mV/g
Output Noise (Differential, RMS, typical)	$5 \mu\text{g}/\sqrt{\text{Hz}}$	$7 \mu\text{g}/\sqrt{\text{Hz}}$	$10 \mu\text{g}/\sqrt{\text{Hz}}$	$25 \mu\text{g}/\sqrt{\text{Hz}}$	$50 \mu\text{g}/\sqrt{\text{Hz}}$	$100 \mu\text{g}/\sqrt{\text{Hz}}$	$200 \mu\text{g}/\sqrt{\text{Hz}}$	$400 \mu\text{g}/\sqrt{\text{Hz}}$
Maximum Mechanical Shock (0.1 ms)	2,000 g		5,000 g					

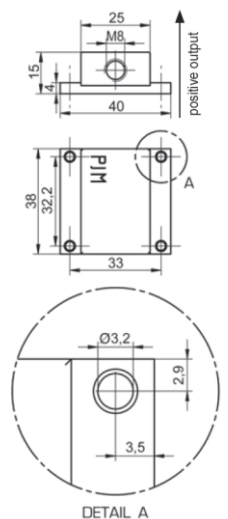
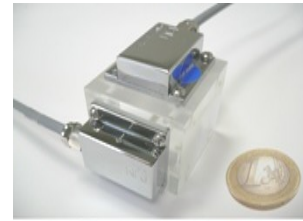
<sup>†</sup> Single ended sensitivity is half of values shown

## PERFORMANCE

Parameter	Typical Value
Operating Voltage	from 7 to 11 V
Output Impedance	90 Ohms
Operating Current ( $I_{DD} + I_{VR}$ ) <sup>2</sup>	8 mA (10 mA max)
Mass:	
<ul style="list-style-type: none"> <li>Aluminium</li> <li>Stainless Steel</li> </ul>	<ul style="list-style-type: none"> <li>30 grams</li> <li>80 grams</li> </ul>
Cross Axis Sensitivity	2% (3% max)
Power Supply Rejection Ratio	25 dB
Scale Factor Calibration Error †	1% (2% max)
Scale Factor Temperature Shift ( $T_C = -55$ to $+125$ °C)	From -250 to +250 ppm/°C
Bias Calibration Error	
<ul style="list-style-type: none"> <li>PJM LN 2g sensor</li> <li>All other sensors</li> </ul>	<ul style="list-style-type: none"> <li>2% of span (4% max)</li> <li>1% of span (2% max)</li> </ul>
Bias Temperature Shift ( $T_C = -55$ to $+125$ °C)	
<ul style="list-style-type: none"> <li>PJM LN 2g sensor</li> <li>All other sensors</li> </ul>	<ul style="list-style-type: none"> <li>100 ppm of span (300 max)</li> <li>50 ppm of span (200 max)</li> </ul>
Non-Linearity † (±90% of Full Scale)	
<ul style="list-style-type: none"> <li>PJM LN 2g – 50g sensors</li> <li>PJM LN 100g sensor</li> <li>PJM LN 200g sensor</li> <li>PJM LN 400g sensor</li> </ul>	<ul style="list-style-type: none"> <li>0.15% of span (0.5% max)</li> <li>0.25% of span (1.0% max)</li> <li>0.40% of span (1.5% max)</li> <li>0.70% of span (2.0% max)</li> </ul>

All models tested at  $V_{DD} = V_R = 5$  VDC,  $T_C = 25$  °C, Differential Mode

†: PJM LN100g and greater versions are tested from -65g to +65g



Dimensions in mm



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## TYPICAL APPLICATIONS

### Railway Measurements (vehicle & permanent way)

- ❖ Determination of service load factors (static, dynamic, rates of change, peak, etc.) on individual components of the track and vehicle system under controlled or normal operation.
- ❖ Measurements on railway track for increasing permitted speed-limit covering effects on switches and crossings, curvature and gauge alignment.
- ❖ Verification of the long-term effects of track and wheel wear and maintenance /refurbishment on the service load environment of the system.
- ❖ Testing and approval of running characteristics and dynamic behaviour of railway vehicles (sensors fully comply with European standards of test & commissioning certification). The technical properties of the sensor allow measurement of free lateral acceleration directly on the axle box of vehicle.

### Plant & Machinery monitoring

- ❖ Determine oscillation frequencies, deflections with maximum amplitudes, unbalances, etc. to ascertain levels and limits of steady-state vibrations versus shocks, etc.
- ❖ Dynamic natural frequency analysis will highlight the frequencies and the modes of vibration / harmonics of a system; being aware of the resonance frequencies makes it possible to remove them through design modification.
- ❖ Warrant service fatigue strength of components against performance and reliability statements under expected operating conditions and the induced loads on components; Determining load collectives during usual operation is amongst other things based upon measuring accelerations.

### Built Environment / Structures / Infrastructure

- ❖ Measure acceleration during rehabilitation of a building or during a building project, as well as in the immediate vicinity (e.g. bridges, churches, etc.).
- ❖ Ascertain extend of any low resonating frequencies from tunnelling on built environment.



## UNIT PRICING (EXCLUDING VAT)

Model No.	Quantity < 10 sensors	Quantity ≥ 10 to < 50 sensors	Quantity ≥ 50 sensors
PJM LN 002	€ 760	€ 685	€ 645
PJM LN 005	€ 760	€ 685	€ 645
PJM LN 010	€ 760	€ 685	€ 645
PJM LN 025	€ 710	€ 640	€ 605
PJM LN 050	€ 710	€ 640	€ 605
PJM LN 100	€ 710	€ 640	€ 605
PJM LN 200	€ 710	€ 640	€ 605
PJM LN 400	€ 710	€ 640	€ 605

### Terms & Conditions of Sale

- ❖ For full terms and conditions (the "Terms") related to the sale of these products by Gerriko S-E-T Technology Solutions Ltd. ("Gerriko"), with an address at Guinness Enterprise Centre, Taylor's Lane, Dublin 8, please refer to the PDF document "Gerriko Terms and Conditions of Sale", which can be found on the website: [www.gerriko.ie](http://www.gerriko.ie). Alternatively please contact us and we will gladly forward you on a copy.
- ❖ Gerriko will not be bound by any express or implied term, representation, warranty, promise or the like that is not described therein.
- ❖ These prices are subject to change.
- ❖ Pricing options for delivery and installation are not included and are subject to negotiation.
- ❖ Full Technical Support and training can be provided (may incur separate charges).
- ❖ Warranty exclusions may apply if own power supply units and / or data converters are used. Your normal statutory rights are not affected.
- ❖ Analytical software provided separately.

While every care has been taken to ensure the accuracy of the information in this brochure, Gerriko Technology Solutions accepts no responsibility for any errors which may occur.



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