

IVS-500 Industrial Vibration Sensor



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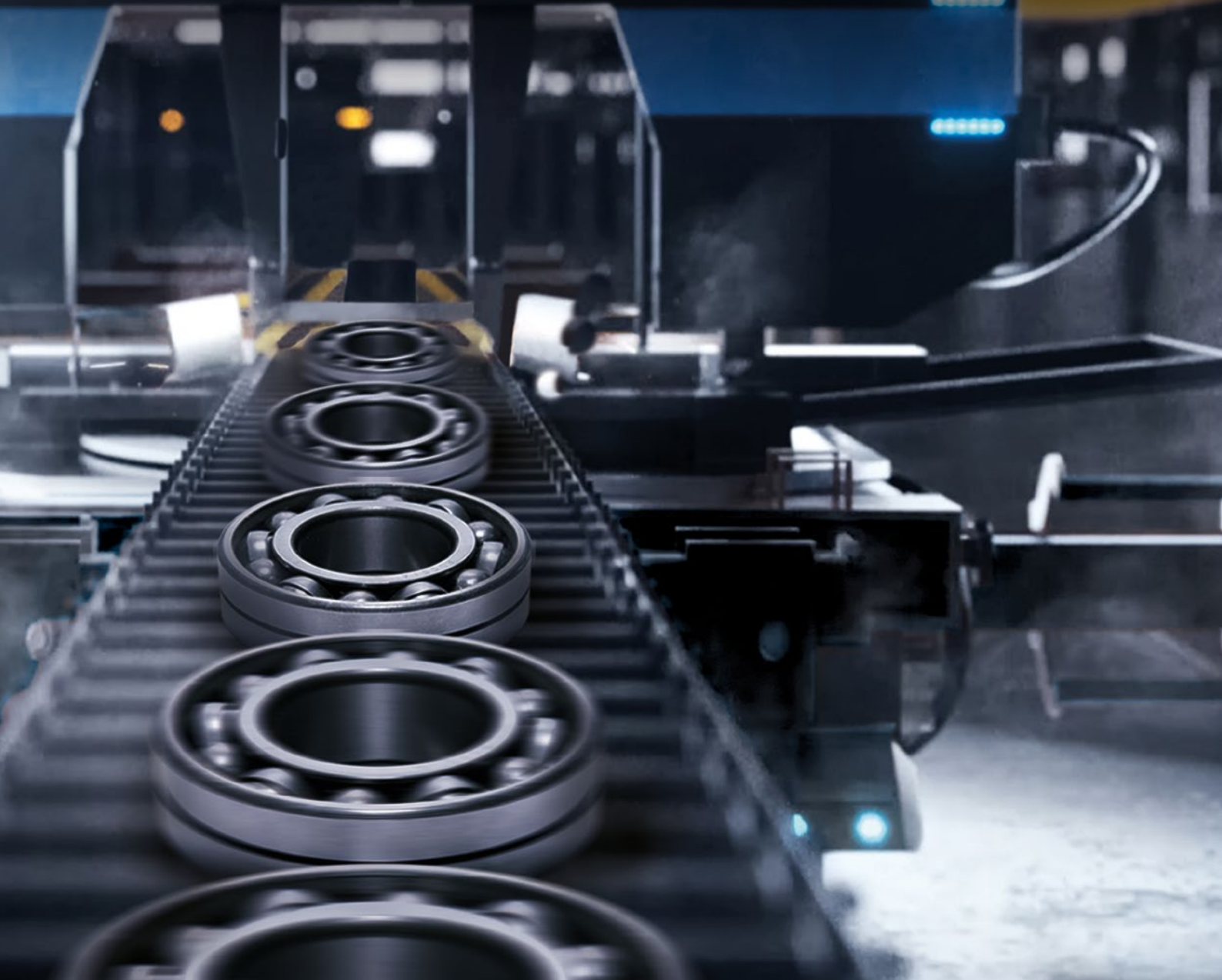
Acoustic quality control with laser precision

Product brochure



Judge

Subtle differences



Acoustic quality control with laser precision

Manufacturers these days understand the importance of objective in-line quality inspections to enhance reputation, maximize market share and reduce costs also by increasing reliability. The IVS-500 Industrial Vibration Sensor is the key to fast vibro-acoustic quality inspection, structure-borne noise analysis and reliable pass-fail decisions. This Laser sensor measures reliably, in demanding industrial environments, without contact and therefore without wear and on virtually all technical surfaces. Costs and yields are therefore optimized by reducing false rejects.

Production testing with laser precision

Direct detection of vibration at the source avoids expensive sound insulation and reduces cycle times. With flexible operating distances, this non-contact measuring technology achieves reliable pass-fail analysis. With reduced maintenance it avoids unwanted downtime, typically associated with tactile methods. The laser can measure on any surface geometry, and optimally adapts to varying and wideranging working distances with auto and remote focus for ultimate precision in production testing.

Depending on the applications, e.g. in the field of final inspection, the signals of the IVS-500 can be output as velocity, displacement or acceleration either via a analog or digital connection.

The simple setup and ruggedized sensor design of the IVS-500 make integration into production test systems easy. Complemented with the software tool SonicTC QuickCheck, Polytec offers a comprehensive solution for reliable pass/fail analysis.



Highlights

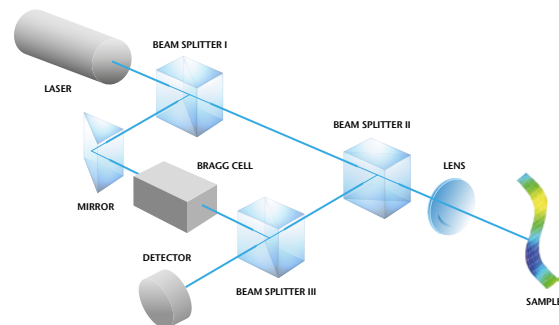
- Reliable, non-contact vibro-acoustic quality inspection with laser precision
- Clear pass/fail decisions based on repeatable vibration measurement
- Best signal quality and flexible working distances with auto and remote focus
- Robust and wear-free sensor technology
- Easy integration and setup
- Vibration output as velocity, displacement and acceleration data
- Signal output analog and optionally digital
- Complete automation solution with optional SonicTC QuickCheck software



How it works: laser Doppler vibrometry

If a light beam is reflected by a moving object, the frequency of the light is shifted proportional to its velocity, a phenomenon referred to as the Doppler shift. Through this process, the velocity information becomes coded in the frequency of the light and is subsequently used by the laser Doppler vibrometry to measure the vibration. A precision interferometer and digital decoding electronics transform the frequency shift into a voltage signal that can be processed by standard data acquisition systems.

A significant property of the technology, the velocity information is independent of the intensity of the reflected light; hence, the robust measuring principle works well even for objects with low reflectivity surfaces.



A photograph showing a white industrial vibration sensor unit, labeled 'Polytec IVS-500', mounted on a complex metal test stand. The sensor is connected to various cables and is positioned to measure vibrations on a bearing. The background is a blurred industrial setting.

Easily adapts to your production line

Industrial Vibration Sensor in an acoustic test stand for bearings

The IVS-500 comes as compact all-in-one system with decoding electronics integrated into the sensor. Several models can be selected depending on your application – from low to ultrasonic frequencies and from low to high velocities. The optional auto and remote focus allow you to adapt to different sample geometries and guarantee the best signal-to-noise ratio for each sample tested.

All IVS-500 models feature an analog measured velocity, displacement and acceleration output, which is compatible with standard data acquisition hardware and can be controlled via the serial interface from a computer or the PLC (programmable logic controller). A digital signal output via an Ethernet interface allows configuring parameter settings and reading out velocity, displacement and acceleration measurement data.

Increased yield by reducing false rejects

To achieve 100% quality economically, it is essential to minimize false rejects. Polytec's non-contact industrial vibration sensor detects structure-borne vibration precisely and repeatably. The laser spot does not damage the part and the output is typically unaffected by dirt and oil. When your measurement uncertainty is drastically reduced, pass/fail thresholds can be set lower to more precisely match desired specs, resulting in fewer unwanted rejects.

Reliable data – guaranteed

The industrial vibrometer does not only deliver high fidelity measurement data to your PLC system, but it also provides a signal strength value indicating the validity of the reading, unique to laser vibrometry.

Cost-effective and flexible quality control

Unlike conventional sensors, which often require a flat metal surface, the IVS's micrometer-sized laser spot detects out-of-plane vibrations at the best location – in holes, on welds, plastics, metals, glass – independent of the material, surface conditions or geometry.

The IVS offers a large and flexible stand-off distance, allowing to measure from outside critical areas. This saves costly special fixtures or moving parts that require regular maintenance.

Simple setup saves trouble

Unlike microphones or ultrasonic non-contact sensors, laser vibrometry is insensitive to ambient noise, eliminating the need for additional sound insulation cabins, which reduces cost and cycle times, thereby increasing productivity. Being non-contact, optical sensors are easily added to existing processes.

Non-contact laser testing at production level

Vibro-acoustic quality control is a versatile, non-destructive procedure to assess the quality and reliability of products and manufacturing processes. It also can give deeper insights into a possible malfunction or out-of-spec material properties of the sample. For example, during 100% end-of-line cold-tests of combustion engines, acoustic signatures can reveal damaged or wrongly mounted components like bearings, cams or pinions, or problems in ancillary components. Furthermore, vibration measurement in quality control is used to detect cracks or check material properties such as Young's modulus.

Overcoming challenging conditions

Laser vibrometry is especially well suited for critical applications such as in medical products. For example during the production of nebulizers used for precise drug delivery, 100% of membranes are measured to ensure that only perfectly working systems are delivered to the patient.



Easy sensor integration into any production line thanks to a compact design, auto and remote focus and a variable stand-off distance up to 3 m.



Reliable non-contact end-of-line testing on single components or complete assemblies (here on a WILO heating pump using two industrial vibrometers).

Fields of application

Automotive

- Combustion engines
- Electric drives (window-lift motors, servo drives, gear motors)
- Transmissions (powertrain, steering gears)
- Anti-friction bearings
- Compressors (A/C compressors)
- A/C fans
- Human-machine interfaces

Appliances

- Electric drives
- Pumps
- Compressors for A/C and refrigerators
- Haptic devices

Consumer electronics

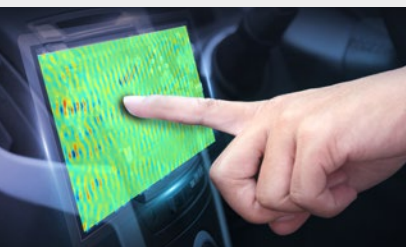
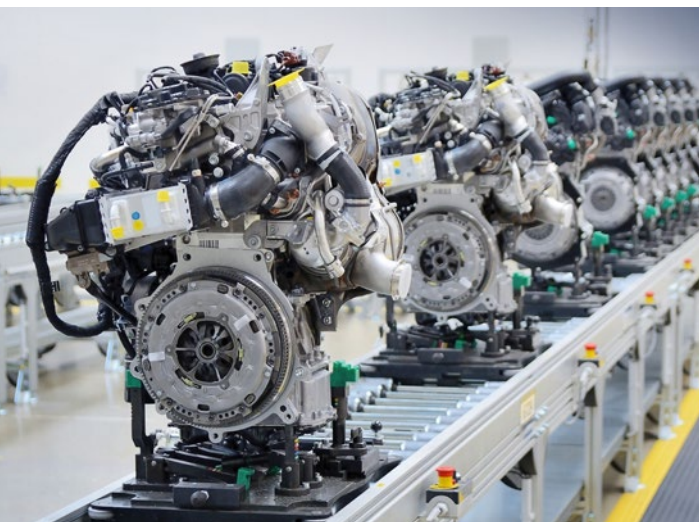
- Fan drives for instruments and electronics
- Acoustic inspection of hard disks and drives for optical data storage devices
- Loudspeaker membranes
- Microphones

Medical technology

- Inhalation systems (membranes, pumps)

Industrial applications

- Solar cells (wafer inspection)
- Determination of Young's modulus or rupture strength (e.g. concrete, wood)





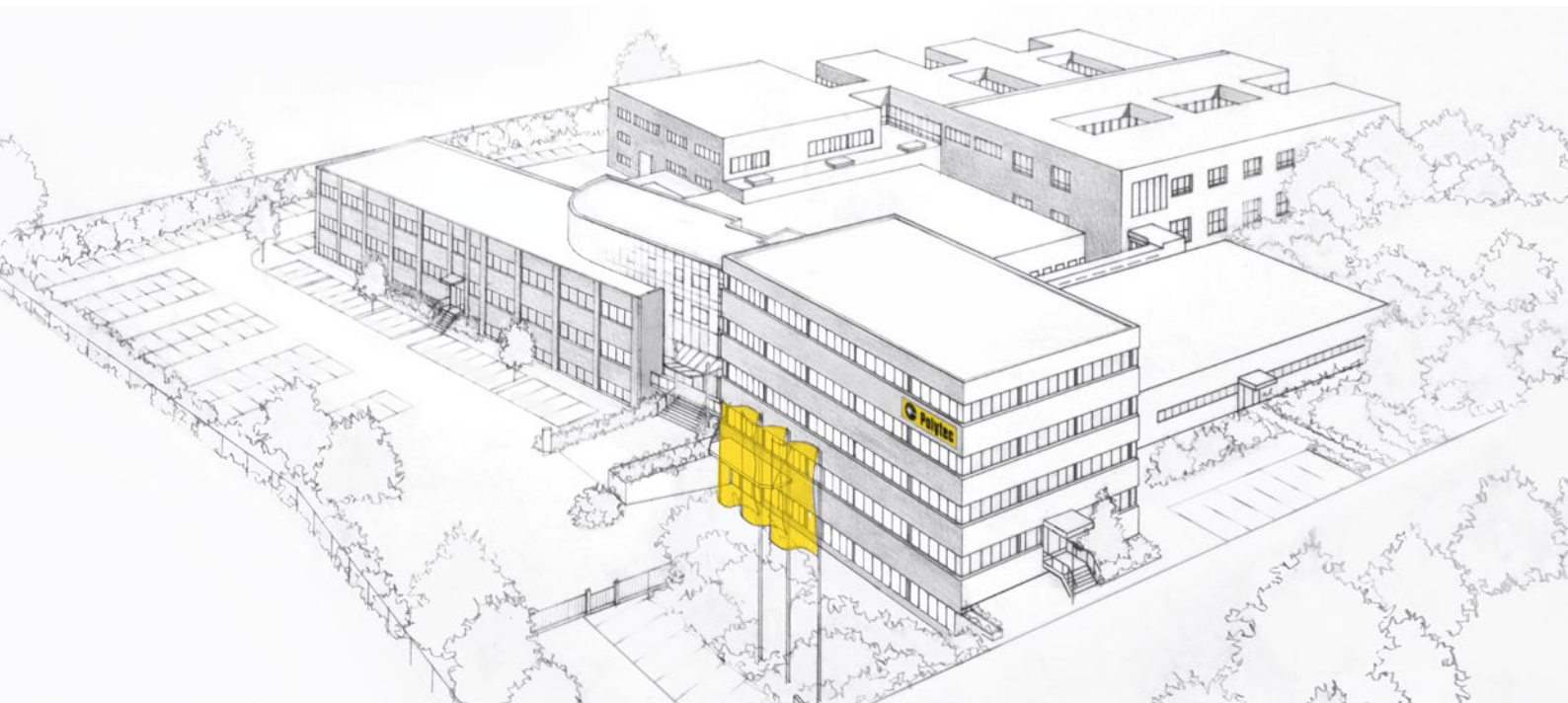
Accessories prepared for everything

An extensive set of accessories is available for optics, wiring, alignment and data acquisition.

- Direct connection to a PLC/PC
- DC power supply via junction box
- Signal level display
- Fixtures for precise aiming of the laser
- 90° laser deflection unit for restricted space
- Protective window
- Air purge with pneumatic beam shutter for protecting optics from oil and dust
- Single- and multi-channel VibSoft data acquisition
- Accessory set for pure digital operation

Teamwork – IVS-500 and SonicTC QuickCheck

Polytec's SonicTC QuickCheck software complements the IVS-500 sensor to a complete solution for quality testing. SonicTC QuickCheck is a flexible evaluation tool for measurements of acoustics and vibration within industrial quality inspections. Its varied fields of use range from series production to in-process development, representing an effective and flexible solution for fully or semiautomatic process monitoring.



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