Data sheet

Álava Ingenieros
GRUPO ÁLAVA

Polytec

IVS-400 Industrial Vibration Sensor

Polytec Industrial Vibrometers

- OFV-2500 Series Vibrometer Controllers
- OFV Series Sensor Heads
- CLV-2534 Compact Laser Vibrometer
- **IVS-400 Industrial Vibration Sensor**

Measuring equipment employed in production environments requires a compact and robust design to be suitable for the challenges met in harsh industrial areas. Polytec's Industrial Vibrometers combine a robust integrated single-box design with the clear advantages of non-contact, laser-based vibration measurement. With a special focus on reliable measurement results, the IVS-400 produces optimal results on every measurement surface regardless of environmental conditions. These outstanding properties make it the first choice for process-integrated acoustic quality inspection.

Cost-effective and Flexible Quality Control

The IVS-400 Industrial Vibration Sensor measures structure-borne noise of objects reliably and without contact. The acquired data provide valuable information on manufacturing quality and compliance with a product's acoustic emission limits. Direct integration of the vibrometer into a production line makes up a real-time quality control system which enables automatic PASS/FAIL decisions on the basis of structure-borne vibration. Meaningful input data from the IVS-400 enhance proper classification dramatically. Thus, besides sustainable assurance of product quality, the IVS-400 substantially increases the cost efficiency of your production process.

The vibrometer is non-contact, wear-free and does not require servo-mechanisms or noise protection for performing measurements. The inherent fast cycle times between measurements are a direct result of high-speed data processing and the convenience of non-contact measurement.

Key Features and Benefits

- Robust and compact single-box design
- Simple to install and operate
- Non-contact, reliable and free from wear
- Easy to integrate into test setups and existing control systems
- Reduced impact from surface features due to DESPEC technology
- Covers acoustic measurement range up to 22 kHz frequency response
- Eye-safe visible low power laser (Class II)
- Automatic PASS/FAIL decision with optional QuickCheck software

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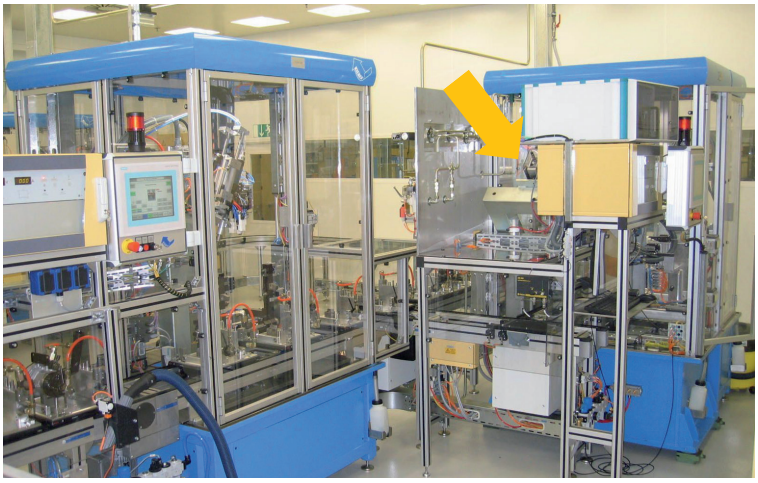
Industrial Applications

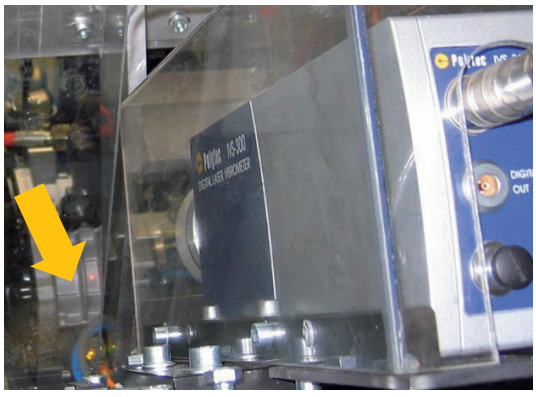
The IVS-400 Industrial Vibration Sensor is specifically designed for quality inspection: recording acoustic and vibration data as well as in-line testing of serial parts and products.

Higher Levels of Quality Control are Now Possible: 100% Certified Testing of Steering Gears Using Industrial Vibration Sensors

To ensure that hydraulic steering gears pumps do not make any unwanted noises in operation, all motor pump assemblies (MPA) at TRW Automotive in Gelsenkirchen are subjected to numerous tests prior to integration in the steering system. The vibration characteristics are measured by more than fifteen Industrial Vibration Sensors and are used as an indicator of the actual noise under normal operating conditions in an automobile. Based on the vibration spectrum, the process controller either approves the assembly for subsequent processing or rejects it as being faulty. MPA's that pass this test assure that only quiet assemblies are put into manufactured vehicles.



Automatic test station for motor pump assemblies (MPA). Mark: Industrial vibrometer



Vibration measurement on the MPA. Mark: red laser reflection

Other Applications:

Automotive

- Electric drives (window-lift motors, servo drives, gear motors)
- Transmissions (powertrain, steering gears)
- Antifriction bearings
- Compressors (cooling compressors)
- Fans for air-conditioners

Appliances

- Electric drives
- Pumps
- Cooling compressors for air-conditioners and refrigerators

Consumer Electronics

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

Medical technology

- Inhalation systems (membranes, pumps)

Industrial applications

- Solar cells (wafer inspection)
- Determination of Young's modulus (natural materials, e.g. wood)

How it works

Introduction to 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 for objects with low reflectivity surfaces.

More information:
www.polytec.com/vib-university

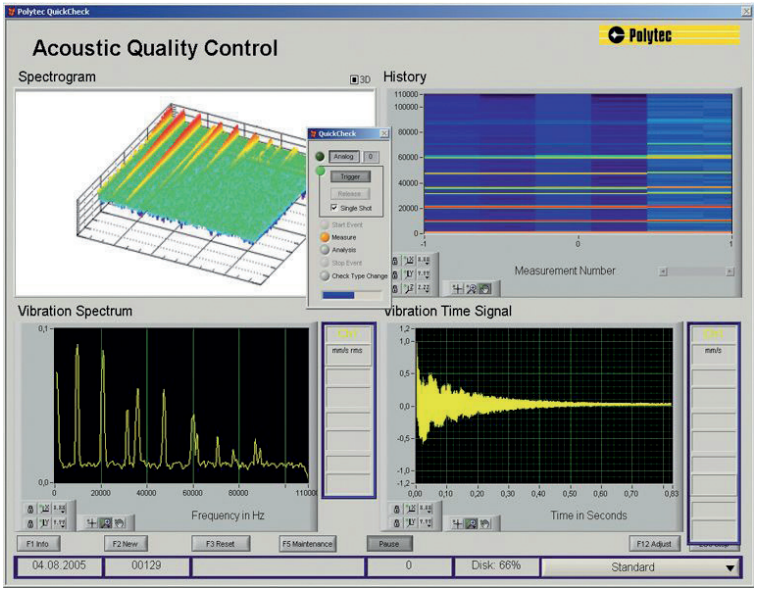
A Complete Solution with QuickCheck Software

Automatic PASS/FAIL Evaluation by QuickCheck

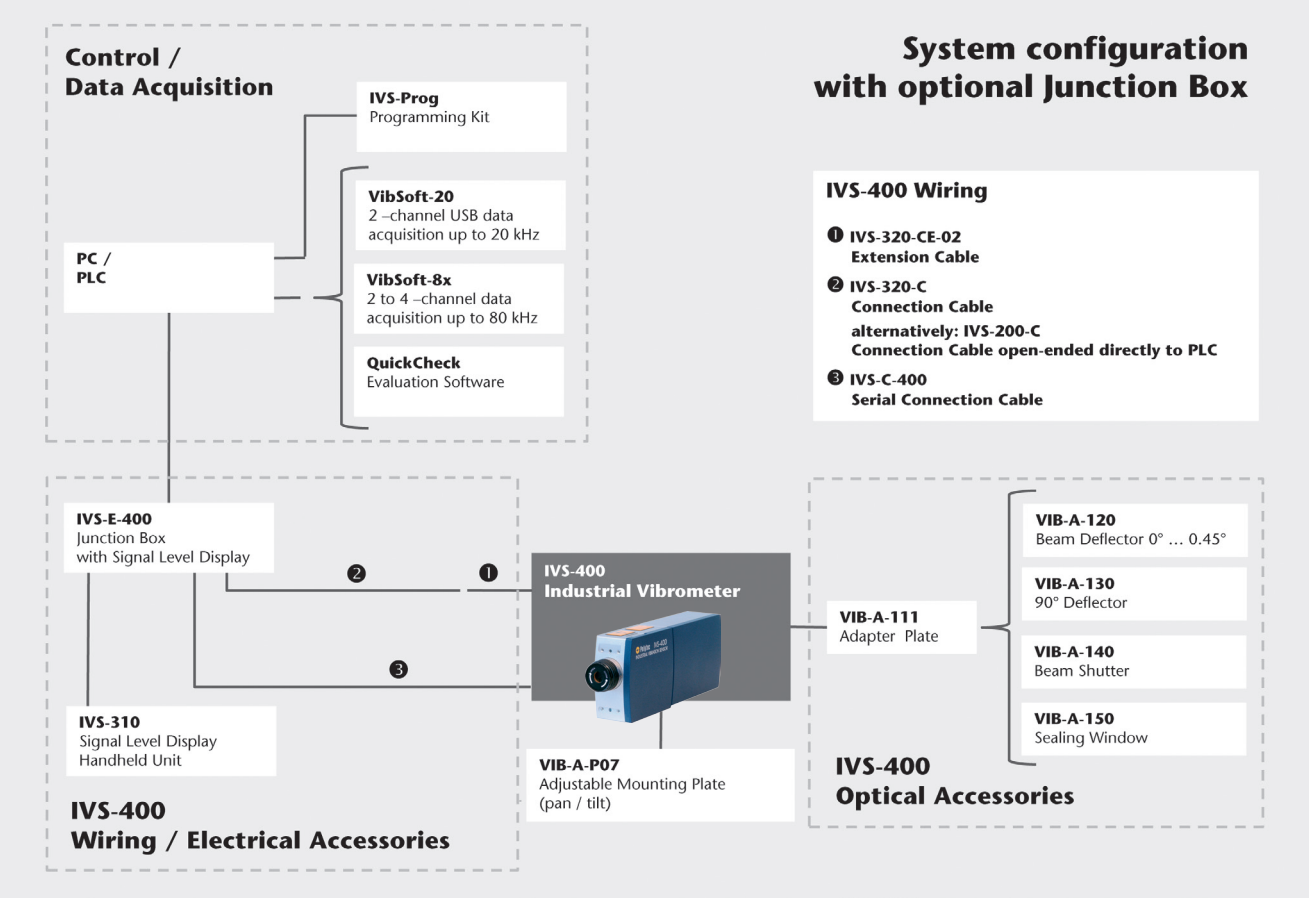
The QuickCheck evaluation software was specially developed for laser vibrometer based in-line acoustic quality checks. QuickCheck acquires and evaluates measurement data from the IVS-400 as well as from other sensors, controls the QC process and interacts with the PLC operating the production line.

- Straight forward threshold configuration in frequency domain and time domain
- Process integration by integrated trigger on sample and product type
- Test database with interface for statistics
- Safe operation through cascaded user levels

Please find more information in our QuickCheck datasheet on www.polytec.com/software



Accessories for Process Integration



Equipment for a wide range of applications and measurements combined with tailored software for data acquisition and analysis allow for a broad range of applications.

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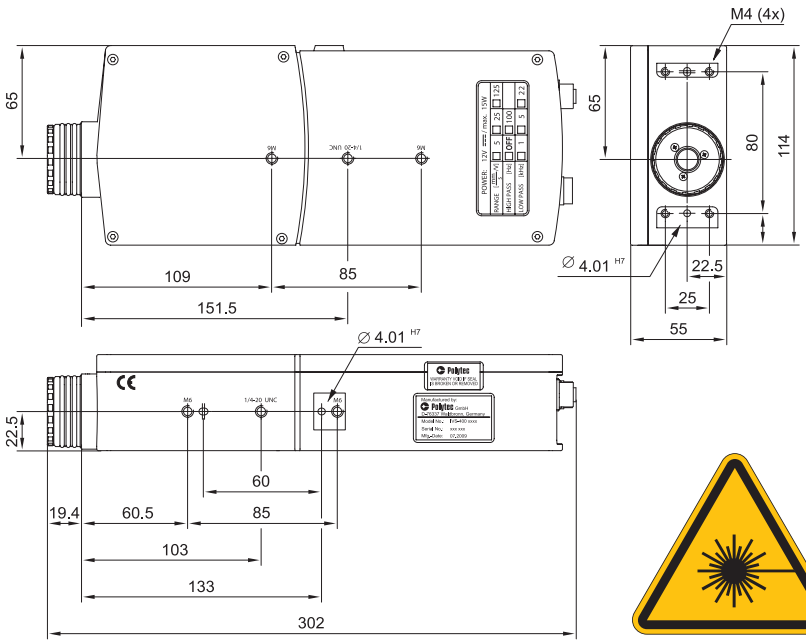
IVS-400 Technical Data			
Operating temperature	+5 °C … +40 °C (41 °F … 104 °F)		
Storage temperature	–10 °C … +65 °C (14 °F … 149 °F)		
Relative humidity	max. 80%, non-condensing		
Protection rating	IP 64		
Dimensions	see drawings below		
Weight	~2.6 kg		
Power	11 V … 14.5 V DC, max. 15 W		
Decoder type	DSP velocity decoder, 3 measurement ranges		
Velocity ranges	±20 mm s^{-1}	±100 mm s^{-1}	±500 mm s^{-1}
Scaling factor	5 mm s^{-1}/V	25 mm s^{-1}/V	125 mm s^{-1}/V
Velocity resolution[1)]	< 0.02 µm $s^{-1}/\sqrt{Hz}$	< 0.02 µm $s^{-1}/\sqrt{Hz}$	< 0.1 µm $s^{-1}/\sqrt{Hz}$
Frequency range	0 … 22 kHz (digital output) 0.5 Hz … 22 kHz (analog output)		
Filters	▪ Digital low pass filter 1kHz / 5 kHz / 22 kHz (-1 dB), roll-off >120 dB/dec (analog and digital output) ▪ Analog high pass filter 100 Hz (-3 dB) /off, roll-off about 60 dB/dec (analog output only) ▪ DESPEC filter for optimization of signals measured on rough surfaces		
Outputs analog	±4 V, 24-bit DAC, ranges: 5 / 25 / 125 (in mm s^{-1}/V)		
Outputs digital	S/P-DIF (Sony/Philips Digital Audio Interface) 24 bit, 48 kSa/s		
Connectors	▪ Industrial connector for voltage supply, optical signal level and velocity output ▪ Connector for IVS-310 signal level indicator and RS-232 cable ▪ Triax connector for S/P-DIF digital output		
Optical system	▪ Fixed focus lens (ff): 226 mm stand-off distance ▪ Variable focus lens (vf): 90 mm to 3 m stand-off distance		
Laser safety	< 1 mW output power, laser safety class II, visible 632.8 nm laser		

[1)] The resolution is defined as the signal amplitude (rms) at which the signal-to-noise ratio is 0 dB in a 1 Hz spectral band width (RBW), measured on 3M Scotchlite Tape®.



Laser Radiation
Do not stare into beam
Class 2 Laser Product
According to IEC/EN 60825-1 (2008)
Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice no. 50, dated 24 June 2007
P ≤ 1 mW/cw; λ = 633 nm

For more information please contact your Polytec application/sales engineer or visit our homepage **www.polytec.com/vibrometers**.

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