IVS-500 Industrial Vibration Sensor

The IVS-500 Industrial Vibrometer is the key to reliable acoustic quality inspection, clear and repeatable pass-fail or structure-borne noise analysis in-line.

With its rugged and robust design, the optical sensor measures reliably in demanding industrial environments, without contact and therefore non-invasively, on virtually all technical surfaces. Productivity is improved by reducing false alarms and pseudo rejects.

Analog and digital signal outputs, each providing velocity, displacement or acceleration data, offer versatile connection options for the sensor. Thanks to its simple setup, a wide frequency range up to 100 kHz, variable working distances and application specific accessories, the IVS-500 easily adapts to any production line and vibro-acoustic test requirement.

Highlights

- Flexible setup with large and variable working distances up to 3 m
- Non-contact and reliable with laser precision
- Auto and remote focus for best signal even with goods variation
- Versatile with large bandwidth up to 100 kHz
- Vibration output as velocity, displacement and acceleration
- Easy integration with digital and analog signal output option

IVS-500 Industrial Vibration Sensor

Acoustic quality control with laser precision

Datasheet

Technical data

Metrological specifications

Model	Version	Max. frequency	Focus	Velocity output	Max. velocity full scale	Displacement output	Acceleration output
Entry	EM	10 kHz	Manual	7 ranges	±0.5 m/s	14 ranges	10 ranges
	ER	10 kHz	Remote	7 ranges	±0.5 m/s	14 ranges	10 ranges
Basic	BM	25 kHz	Manual	8 ranges	±1.0 m/s	14 ranges	12 ranges
	BR	25 kHz	Remote	8 ranges	±1.0 m/s	14 ranges	12 ranges
High frequency	HR	100 kHz	Remote	9 ranges	±2.0 m/s	14 ranges	15 ranges

Velocity

Measurement range velocity (peak)	Resolution [1] for selected frequency [µm/s/√Hz]			Model/package		
mm/s	10 kHz	25 kHz	100 kHz	Entry	Basic	High frequency
5	< 0.01	< 0.02	< 0.03	•	•	•
10	< 0.01	< 0.02	< 0.03	•	•	•
20	< 0.01	< 0.02	< 0.03	•	•	•
50	< 0.02	< 0.02	< 0.03	•	•	•
100	< 0.02	< 0.02	< 0.03	•	•	•
200	< 0.04	< 0.04	< 0.04	•	•	•
500	< 0.1	< 0.1	< 0.1	•	•	•
1,000	< 0.2	< 0.2	< 0.2		•	•
2,000	< 0.4	< 0.4	< 0.4			•

[1] The noise-limited resolution is defined as the signal amplitude (rms) at which the signal-to-noise ratio is 0 dB with 1 Hz spectral resolution, measured on 3M Scotchlite™ Tape (reflective film). The typical value refers to the center of the operating frequency range.
For digital data transfer via the VibroLink Ethernet interface, a digital resolution of 168 nm/s can be reached in the smallest measurement range.
The digital resolution is defined by the quantization step of the measured data, which are transferred with a bit depth of 16-bit. For additional digital output, the option IVS-DIG is required.

Displacement					Acceleration			
Measurement range displacement (peak) [1]	Resolution [1]	Model/package			Measurement range acceleration (peak)	Model/package		
mm	pm	Entry	Basic	High frequency	m/s^2	Entry	Basic	High frequency
0.002	67.82	•	•	•	2	•	•	•
0.005	169.5	•	•	•	5	•	•	•
0.01	339.1	•	•	•	10	•	•	•
0.02	678.2	•	•	•	20	•	•	•
0.05	1,695	•	•	•	50	•	•	•
0.1	3,390	•	•	•	100	•	•	•
0.2	6,781	•	•	•	200	•	•	•
0.5	16,954	•	•	•	500	•	•	•
1	33,908	•	•	•	1,000	•	•	•
2	67,816	•	•	•	2,000	•	•	•
5	169,542	•	•	•	5,000		•	•
10	339,084	•	•	•	10,000		•	•
20	678,168	•	•	•	20,000			•
50	1,695,421	•	•	•	50,000			•
					100,000			•

[1] The resolution corresponds to the quantization step at the analog output. Noise limited resolution (frequency dependent): < 80 fm/√Hz for at 100 kHz in the smallest measurement range. The noise-limited resolution is defined as the signal amplitude (rms) at a signal-to-noise ratio of 0 dB and a spectral resolution of 1 Hz.

Decoder type	Digital velocity decoder, 7..9 measurement ranges [1] Digital displacement decoder, 14 measurement ranges Digital acceleration decoder, 10..15 measurement ranges [1]
Filters	Adjustable frequency bandwidth: 1 kHz, 5 kHz, 10 kHz , 25 kHz [2], 50 kHz [3], 100 kHz [3] Digital high pass filter 13 Hz / 104 Hz (-3 dB) ASE Adaptive Signal Enhancement for signal optimization on uncooperative surfaces
Analog signal output	±4 V, output for vibration signal velocity, can be switched to displacement or acceleration
Digital signal output	Ethernet interface for configuration of parameter settings and reading of measurement data, requires option IVS-DIG and IVS-C-540-xx Ethernet cable or IVS-500-DPS Digital Pack
Connectors	Industrial connection for voltage supply, trigger input, optical signal level and velocity/displacement/acceleration output Connector for IVS-A-510 signal level indicator, RS-232 serial interface and digital interface connector (Ethernet)

[1] Depending on model.
[2] Only available for models IVS-500 BM, BR and HR.
[3] Only available for model IVS-500 HR.

Optical specifications		
Laser type	Helium Neon (HeNe)	
Laser class	Class 2, < 1mW output power, eye-safe	
Laser wavelength	633 nm, visible red laser beam	
Focus	Manual (M)	Remote (R)
Minimum stand-off distance [1]	86 mm	47 mm
Maximum stand-off distance [1]	3 m	3 m
Visibility maxima [1, 2]	x = 53 mm + n · 138 mm; n = 0, 1, 2, 3, ...	

[1] For definition of stand-off distance see drawing on last page, dimension "x".
[2] The optimal stand-off distances where the signal level is at its maximum are called visibility maxima. The visibility maxima recur every 138 mm corresponding to the laser cavity length.

General specifications	
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 class	IP 64
Dimensions	see drawing on last page
Weight	ca. 2.8 kg
Power supply	11 V ... 14.5 V DC , max. 15 W

Accessories for process integration

Accessories for optics

VIB-A-210 **90° Deflection unit**

VIB-A-220 **Protective window,**
VIB-A-221 **Protective window (flat)**
protects front lens

VIB-A-230 **Air purge unit**
for oily and dusty environment

VIB-A-240 **Pneumatic beam shutter**
protects optics when not measuring

VIB-A-310 **Alignment tool**
for easy perpendicular beam setup

VIB-A-320 **Folding ruler**
shows visibility maxima for optimal working distance

VIB-A-P07 Adjustable mounting plate (pan/tilt)

VIB-A-P09 Alignment device (tip/tilt)

Control / Software

PC /PLC

SonicTC QuickCheck
Diagnostic software

IVS-Prog
Programming Kit

Data acquisition

VibSoft-20
2-channel USB data acquisition up to 20 kHz

VibSoft-8x
2- or 4-channel data acquisition up to 80 kHz

... or any analog data acquisition

Wiring / electrical accessories

IVS-E-500 Junction box
with I/O controls, BNC output, USB interface, AC power supply (100 ... 240 V) and integrated Signal Level Display

IVS-A-510 Signal level display
Handheld Unit

Two wiring alternatives with or without IVS-E-500 Junction box

Using junction box:

1. **IVS-C-500** Main connecting cable
3. **IVS-C-520** Serial connecting cable
5. Measured data (BNC) and configuration data (USB)
7. **IVS-C-540-xx** Ethernet Cable [1]

Direct connection:

2. **IVS-C-510** Main connecting cable with jack or open end
4. **IVS-C-530** RS-232 cable
6. **IVS-500-DPS** Digital Pack [2]

[1] In order to use the Ethernet connection, the junction box acts as a power supply in this case. Option IVS-DIG is required.
[2] Package for digital operation includes Ethernet cable, power supply cable (100 .. 240 V AC) and IVS-DIG option.

Accessories

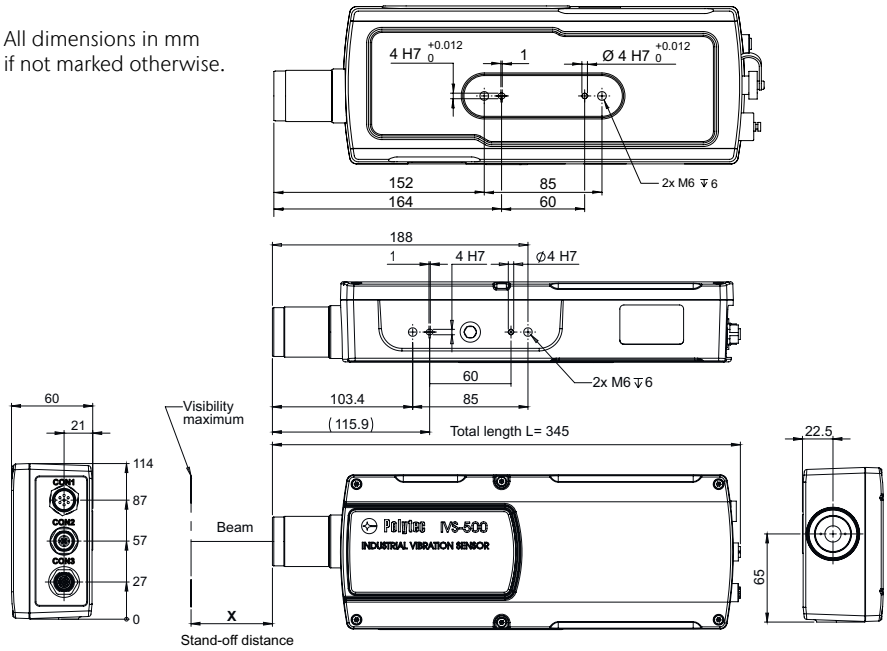
Optical accessories		
VIB-A-210 90° Deflection unit	Allows 90° deflection of laser beam and video image. Can be rotated in any direction. Must be combined with VIB-A-220 or VIB-A-221 Protective Window or a VIB-A-230 Air purge unit.	
VIB-A-220 Protective window	Protects the objective lens of the laser vibrometer from dust, oil and contamination. Tube around window for additional protection.	
VIB-A-221 Protective window flat	Protects the objective lens of the laser vibrometer from dust, oil and contamination. Flat design for easy cleaning.	
VIB-A-230 Air purge unit	For improved protection of the protective window from oil mist and dust. Includes a Protective window with tube (similar to VIB-A-220) and VIB-A-202 Lens adapter with compressed air connection for mounting on sensor head. Requires oil-free compressed air.	
VIB-A-240 Pneumatic beam shutter	For mounting on VIB-A-220 Protective window with tube or VIB-A-230 Air purge unit. Mechanically protects protective window from dust and contamination. Requires compressed air for opening.	
VIB-A-310 Alignment tool	Allows adjustment of laser beam perpendicular to the object surface for best signal quality.	
VIB-A-320 Folding ruler	Shows visibility maxima for optimal working distance.	

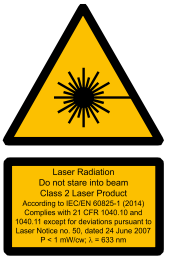
Positioning stages		
VIB-A-P07 Adjustable mounting plate (pan/tilt)	For installation in industrial production lines. Allows fine adjustment of the tilt and rotation angles by ± 1.3°.	
VIB-A-P09 Alignment device	For installation in industrial production lines. Allows adjustment in 2 translational directions and 2 rotations (tip/tilt).	

Software		
SonicTC QuickCheck diagnostic software	Multi-channel, PC-based testing software – flexible tool for acoustic and vibrometric measurements in industrial quality testing.	

Compliance with standards	
Laser safety	IEC/EN 60825-1 (Safety of laser products, complies to US 21 CFR 1040.10 and 1040.11 except for deviations pursuant to laser notice no. 50, dated 24 June 2007)
Electrical safety	IEC/EN 61010-1 (Safety requirements for electrical equipment for measurement, control, and laboratory use)
EMC	IEC/EN 61326-1 (EMC requirements on emission and immunity – Electrical equipment for measurement, control, and laboratory use) Emission: Limit class B IEC/EN 61000-3-2 and 61000-3-3 Immunity: IEC/EN 61000-4-2 to 61000-4-6 and IEC/EN 61000-4-11
RoHS	IEC/EN 63000

All dimensions in mm
if not marked otherwise.





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