

PRODUCT DATA

Industrial Laser Doppler Vibrometer — Type 8338

Type 8338 is a highly accurate and versatile non-contact vibration transducer for applications where it is impossible or undesirable to mount a vibration transducer onto a vibrating object. Ease of use and rugged construction make Type 8338 highly suitable in both laboratory and industrial environments. Type 8338 specifications have been designed and optimised for general Research, Development, Test and Evaluation (RDT&E) applications. The high velocity capability (max. 500 mm/s) makes it an extremely versatile multi-purpose laser-based vibration transducer, covering the vast majority of laser vibrometry applications.



Uses and Features

Uses

- **Industrial Applications:** vibration testing on car bodies and panels, automotive components, engines, hot exhaust or braking systems. Predictive maintenance and condition monitoring on rotating machinery
- **Research Applications:** vibration analysis of models under investigation within a wind tunnel, transducer design, field vibration testing, general non-contact vibrometry
- **Nuclear Applications:** vibration testing in a contaminated environment measured at long distances
- **Telecommunication Applications:** analysis of vibration by wind load of parabolic antennas on towers
- **Civil Engineering Applications:** vibration testing on buildings, bridges, platforms, windmills, electricity pylons
- **Consumer Products Applications:** loudspeaker testing, household appliances (washing machines, television tubes and screens, vacuum cleaners), power tools, computer parts (CD-ROM drives and hard disk)
- **Environmental Applications:** analysis of sound absorption materials

Features

- High quality and compact, durable die-cast aluminium housing
- Rugged mechanical, electrical and optical construction
- Velocity range up to 500 mm/s (p-p) over 3 ranges
- Digital decoding technology allowing precise measurement on difficult surfaces
- Frequency range up to 22 kHz
- Dynamic range of >90 dB over full bandwidth
- Resolution of 0.02 $\mu\text{m/s}/\sqrt{\text{Hz}}$
- Stand off distance from 90 mm to 30 m
- Reliable measurements through precise 24-bit digital signal processing
- Easy set of ranges and filters selectable on the instrument (via buttons and LCD display)
- Eye-safe operation (Class II laser)
- Short setup time
- Intuitive and easy to operate
- Easily connected to a Data Acquisition system (such as Brüel & Kjær's PULSE™)
- Very low level of drop-out noise in any measurement setup, ensuring fast and reliable measurements
- Traceable calibration
- Signal strength indicator on the instrument
- Improved velocity resolution
- Outstanding measurement linearity and accuracy
- Portable, ergonomic and lightweight

Measuring non-contact vibration can be done very easily by connecting Type 8338 to PULSE, Brüel & Kjær's Multi-analyzer. After focusing the laser beam on the vibrating object, the velocity range can easily be set using the buttons on the instrument. Filter settings can also be performed using those buttons: one digital low-pass filter (FIR filter with cut-off at 1 kHz, 5 kHz, or 22 kHz) and one analogue high-pass filter (100 Hz). This allows precise filtering of unwanted frequency components in the analogue output velocity signal. Fig. 1 shows a typical measurement setup where the output velocity is used for vibration analysis on a washing machine, avoiding the mass loading of accelerometers.

Fig. 1
*Measuring on a
washing machine with
Type 8338*



PULSE allows the user to perform precise vibration analysis of the output velocity signal through easy-to-use, intuitive software as well as through high quality acquisition hardware. One can then perform time-domain analysis, FFT analysis, octave analysis, impact resonance testing or even order tracking analysis.

Applications in Industrial Vibration

When dealing with industrial applications like automotive vibration testing, Type 8338 and the Brüel & Kjær PULSE Multi-analyzer make a perfect combination. The analogue output velocity signal from the vibrometer can easily be used as a signal input to the PULSE system for advanced analysis, including FFT and octave analysis, order tracking, modal analysis, operating deflection shape testing, or for time-domain recording for further advanced post-processing analysis. Type 8338 and PULSE are also both very well suited for vibration analysis of complex mechanical systems, for determination of vibration levels, and system characteristics. Fig. 2 shows an example of Type 8338 used with the PULSE system on an engine troubleshooting application (FFT and order tracking analysis of vibrating car engine).

Fig. 2
*Type 8338 connected
to Type 3560-B PULSE
Multi-analyzer for
vibration measurement
on a car engine*



Type 8338 can be powered by the optional External Battery Pack ZG-0449 for portable applications like predictive maintenance of machinery, or by a 12 V power supply (via cigarette lighter connector) for in-vehicle applications like body panel radiation analysis. When direct line of sight from the instrument to the target is not achievable, you can make use of mirrors to redirect the laser beam. High-quality mirrors can be ordered as an option and are supplied with mounting magnets.

The instrument also comes with a transportation bag, and can be ordered with various accessories.

Specifications – Industrial Laser Doppler Vibrometer Type 8338

General Specifications			
High-pass Filter (Adjustable via LCD display)	100 Hz on/off (–3 dB analogue, 3rd order Butterworth 60 dB/dec)	CAUTION LASER RADIATION DO NOT STARE INTO BEAM 1mW HELIUM-NEON CLASS II LASER PRODUCT	
Low-pass Filter (Adjustable via LCD display)	FIR filter cut-off at 1 kHz, 5 kHz or 22 kHz, roll-off >120 dB/dec		
Frequency Range	0.5 Hz to 22 kHz		
Dynamic Range	>90 dB over full bandwidth		
Calibration Accuracy	±1%		
Output Impedance	50 Ω		
Propagation Delay (typical)	1.1 ms		
Power	11 – 14.5 V DC, max. 1 A		
	Range 1	Range 2	Range 3
Configured Velocity Range (Adjustable via LCD display)	±20 mm/s (p-p)	±100 mm/s (p-p)	±500 mm/s (p-p)
Configured Sensitivity (Adjustable via LCD display)	5 mms ^{–1} /V	25 mms ^{–1} /V	125 mms ^{–1} /V
Output Velocity Resolution (RMS) ^a	≤0.02 μm/s/√Hz	≤0.02 μm/s/√Hz	≤0.1 μm/s/√Hz
Housing			
Signal Output Connectors	1. Industrial connector for supply voltage 2. Signal strength level and velocity output		
Housing Protection	IP 64 standard		
Dimensions	299 mm × 148 mm × 83 mm (325 mm with lens) 11.7" × 5.8" × 3.2" (12.7" with lens)		
Weight	< 3.5 kg (7.71 lb.)		
Optics			
Optical System	1. Fixed focus lens (ff); 238 mm (9.3") optimal stand off distance 2. Variable focus lens (vf); 90 mm (3.5") to approximately 30 m (1180") stand off distance. Best signal at 100 mm + n × 138 mm (3.9" + n × 5.4")(n = 0, 1, 2, ...): 100 mm, 238 mm, 376 mm, etc.		
Laser and Safety	< 1 mW output power, safety class II, He-Ne visible 632.8 nm laser (red light) lens shutter		
Environmental	Ambient Temperature: +5°C to +40°C (+41°F to +104°F); Relative Humidity: up to 80%		
Compliance with Standards	CE Compliant with CE and C-Tick markings Compliant with EMC Emissions EN 61000–3–2 and EN 61000–3–3 Compliant with EMC Immunity EN 61000–4–2, EN 61000–4–3, EN 61000–4–4, EN 61000–4–5, EN 61000–4–6 and EN 61000–4–11		

a. The resolution is defined as the RMS signal amplitude at which the signal-to-noise ratio is 0 dB.

Ordering Information

Type 8338 includes the following accessories:

- Main Sensor Unit
- User Manual
- AC Power Supply 110 – 220 V, 50 – 60 Hz
- Carrying Bag
- One Sheet of Reflective Tape
- Laser Safety Inspection and Test Report
- EC Declaration of Conformity
- Certificate of Traceable Calibration

OPTIONAL ACCESSORIES

KE-1012	Protective Case
ZG-0451	Power Supply
AQ-0670	Power Cable for Cigarette Lighter
ZG-0449	External Battery Pack
ZG-0450	Battery Charger
UA-1670	Mirror Set
UA-1671	Mounting Plate
QA-0137	Retro-reflective Tape (Roll)
UA-0989	Tripod

Brüel & Kjær reserves the right to change specifications and accessories without notice.

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