

## RLV-5500 Rotational Laser Vibrometer



## RLV-5500 Rotational Laser Vibrometer

Non-Contact Measurement of Rotational Vibration  
Product Brochure





Everything Revolves  
Around Your Application

RLV-5500 Rotational Laser Vibrometers are advanced non-contact angular velocity and displacement sensors, perfect for measuring rotating structural dynamics. RLV give access to order analysis data of drivetrains, power generation equipment or aircraft propulsion systems without touching or disassembling components.

## The Better Way to Measure Rotational Dynamics

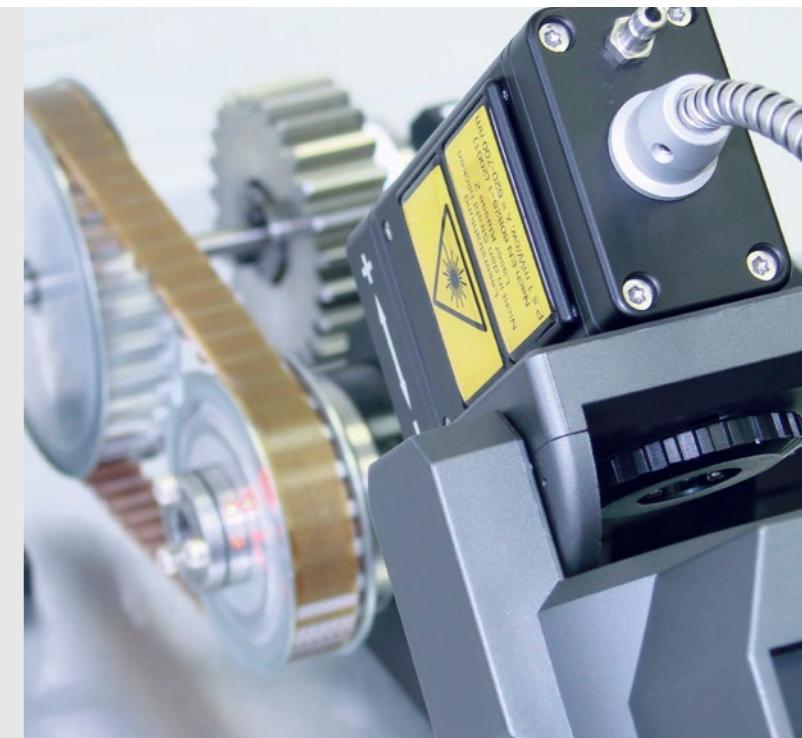
The RLV-5500 Rotational Laser Vibrometer incorporates high-performance digital decoding techniques for an improved signal-to-noise-ratio, an expanded RPM range to 20,000 RPM and a compact sensor. The compact design with flexible fiber-optics makes it very easy to get close to the measurement object. For industrial environments, a robust design is combined with an integrated air purge system to cool the sensor head and prevent contamination from oil mist and dust.

Taken together, these industrial features enable difficult on-vehicle measurements of an operating drivetrain. The proven RLV-5500 has helped to reduce engine noise and to increase drivetrain durability for many years.



### Highlights

- Non-contact measurement of RPM, angular velocity and angular displacement
- Quick setup, alignment and repositioning of fiber-coupled sensor
- Versatile with up to 20,000 RPM and 10 kHz
- Good signal-to-noise ratio through digital demodulation and filtering
- High resolution within expanded RPM range
- Integrated air purge to cool and protect the optics
- Order filters facilitate run-up measurements



## Lighten Your Way

With the non-contact measurement by light, no inertial mass is added to the rotating structure and no telemetry is required to get highly accurate and reliable data. The optical way avoids time-consuming mounting and ignores ambient vibrations. The compact, rugged optical sensor head and its large stand-off distances from 70 to 600 mm allow a convenient setup also in confined spaces.

### Designed for Flexibility and Precision

The RLV-5500 Rotational Laser Vibrometer consists of the laser-based RLV-500 Sensor Head and the RLV-5000 Controller. The compact sensor design allows an easy and flexible handling and the digital vibrometry delivers extraordinary results with precision optics.



The non-contact method per laser allows a quick setup, easy repositioning for fast and reliable vibration analysis.

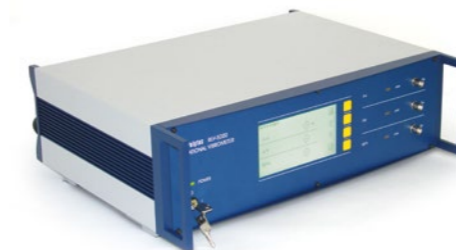
### RLV-500 Sensor Head

The RLV-500 Sensor Head is divided into a Laser Unit and a compact sensor. Separating the laser and interferometers from the delivery and receiving optics leads to a compact sensor with flexible mounting and positioning options without sacrificing measurement precision. It is connected to the Laser Unit with an industrialized, steel-sheathed optical fiber that delivers the light from the laser through the optics to the rotating structure and collects the back-scattered light needed for the measurement. Choose from several stand-off distances and beam separations to suit your application. The sensor is easily positioned in industrial environments where hot temperatures, dirt, moisture and oil are prevalent (IP-67).



### RLV-5000 Controller for Signal Processing

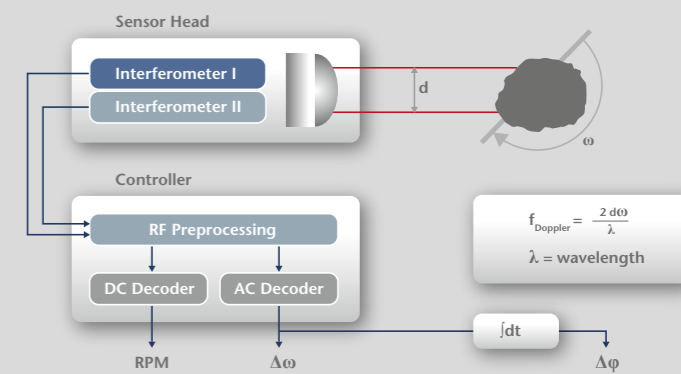
The signal processing electronics and power supply are incorporated in a 19" rack-mount industrial housing. High-pass, low-pass and band-pass filters adapt the bandwidth to the required ranges, getting rid of ambient noise. Order-filters were designed for precision tracking of specified orders. Special RPM filters are available to allow applications ranging from high-speed run-ups with a change rate up to 40,000 RPM/s to monitoring constant running shafts with slight variations of the rotation close to DC. The filter overview, the menu-driven user interface or loadable configuration files are some examples of the easy and intuitive operation.



## Principle of Operation

The RLV-5500 Rotational Laser Vibrometer uses two parallel laser beams which strike the rotating surface. Each back-scattered laser beam is Doppler-shifted in frequency by the surface velocity vector in the beam direction. This velocity is made up of rotational and lateral components.

The dual interferometer approach uses the Doppler shift effect to derive angular velocity and displacement.



## Flexibility to Solve Your Application

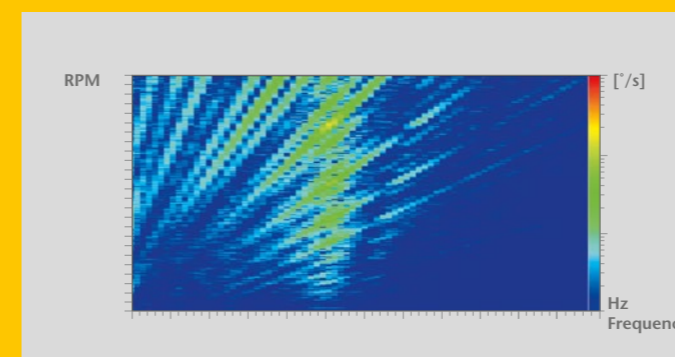
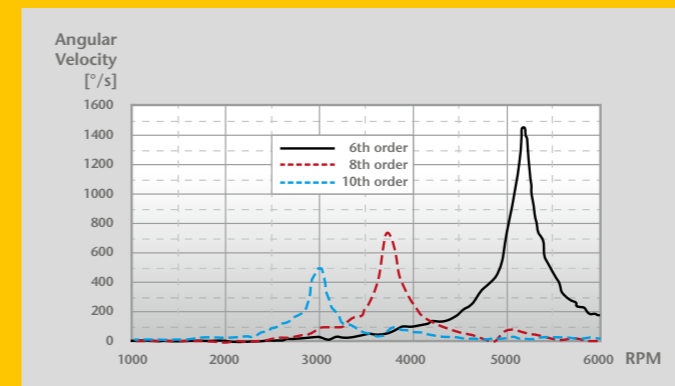
Easy, non-contact measurement on rotating structures, gathering rotational velocity and angular velocity.



The Polytec RLV-5500 measures rotational vibrations without contact, on arbitrarily shaped structures including engine crankshafts, vehicle axles, marine driveshafts, electrical generator shafts and rotating parts in lithographic machines, printers and photocopiers. Automotive engineers use the rotational vibrometer to develop torsional vibration dampers that reduce engine noise and increase product durability. Faults in gearboxes, compressors and generators cause torsional vibrations at certain system-specific frequencies.

### Applications

- Rotational dynamics of drivetrains, gas turbines, electrical generators or printers
- Reduction of noise and vibration
- Studies of rotational fatigue
- Monitoring and troubleshooting production machinery
- Simplifying adjustment of torsional vibration dampers in vehicle drive shafts
- Order tracking analysis
- Testing auxiliary equipment for combustion engines
- Torsional transfer functions with two RLV



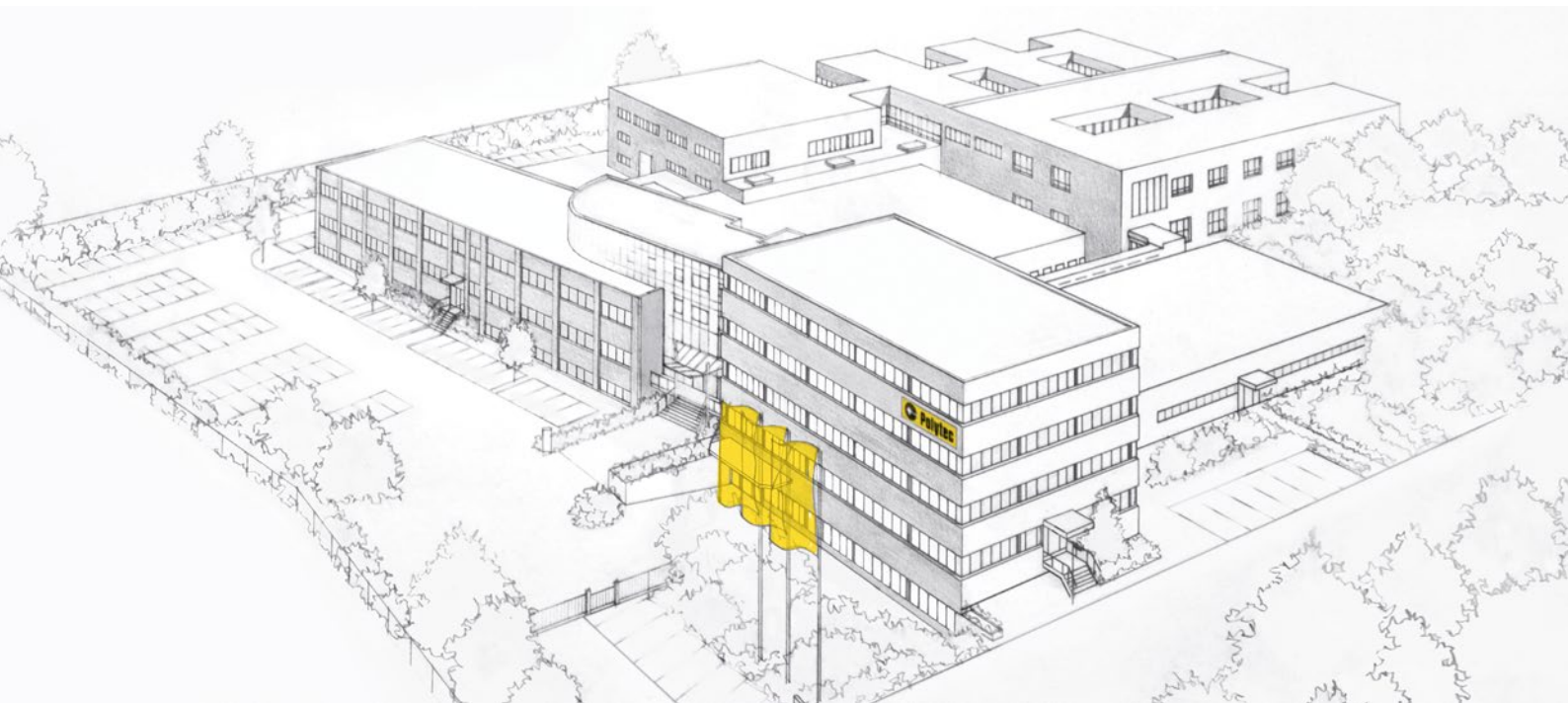
**Order tracking analysis of a crankshaft:**  
Results are equivalent to the output from a magnetic encoder but free from added inertial mass. Setup, data acquisition and tear-down were accomplished by the RLV-5500 Rotational Vibrometer in a fraction of the time needed to install the encoder.



### Accessories

For industrial environments, a robust design is combined with an integrated air purge system to cool the sensor head and prevent contamination from oil mist or dust. Furthermore, choose from a wide range of positioning and optical accessories.

Contact your local Polytec sales or application engineer for more detailed information, or visit [www.polytec.com/rotvib](http://www.polytec.com/rotvib).



**Polytec GmbH**  
 Polytec-Platz 1-7  
 76337 Waldbronn  
 Tel. +49 7243 604-0  
 info@polytec.de

**Polytec GmbH**  
 Vertriebs- und  
 Beratungsbüro Berlin  
 Schwarzschildstraße 1  
 12489 Berlin  
 Tel. +49 30 6392-5140



**Polytec, Inc.**  
**(USA)**  
 North American  
 Headquarters  
 16400 Bake Parkway  
 Suites 150 & 200  
 Irvine, CA 92618  
 Tel. +1 949 943-3033  
 info@polytec.com

**Central Office**  
 1046 Baker Road  
 Dexter, MI 48130  
 Tel. +1 734 253-9428

**East Coast Office**  
 25 South Street, Suite A  
 Hopkinton, MA 01748  
 Tel. +1 508 417-1040



**Polytec Ltd.**  
**(Great Britain)**  
 Lambda House  
 Batford Mill  
 Harpenden, Herts AL5 5BZ  
 Tel. +44 1582 711670  
 info@polytec-ltd.co.uk



**Polytec France S.A.S.**  
 Technosud II  
 Bâtiment A  
 99, Rue Pierre Semard  
 92320 Châtillon  
 Tel. +33 1 496569-00  
 info@polytec.fr



**Polytec Japan**  
 Arena Tower, 13th floor  
 3-1-9, Shinyokohama  
 Kohoku-ku, Yokohama-shi  
 Kanagawa 222-0033  
 Tel. +81 45 478-6980  
 info@polytec.co.jp



**Polytec South-East Asia  
 Pte Ltd**  
 Blk 4010 Ang Mo Kio Ave 10  
 #06-06 TechPlace 1  
 Singapore 569626  
 Tel. +65 64510886  
 info@polytec-sea.com



**Polytec China Ltd.**  
 Room 1026, Hanwei Plaza  
 No. 7 Guanghua Road  
 Chaoyang District  
 100004 Beijing  
 Tel. +86 10 65682591  
 info-cn@polytec.com