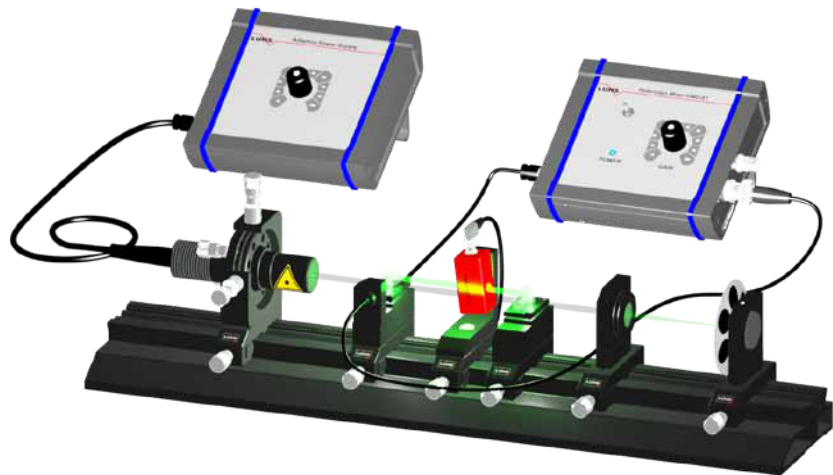


P5883 Laser vibrometer

- ✓ Dual Beam Interference
- ✓ Mach Zehnder Interferometer
- ✓ Acousto-optic light modulator
- ✓ Heterodyne optical detection
- ✓ Doppler Effect
- ✓ Vibration remote sensing

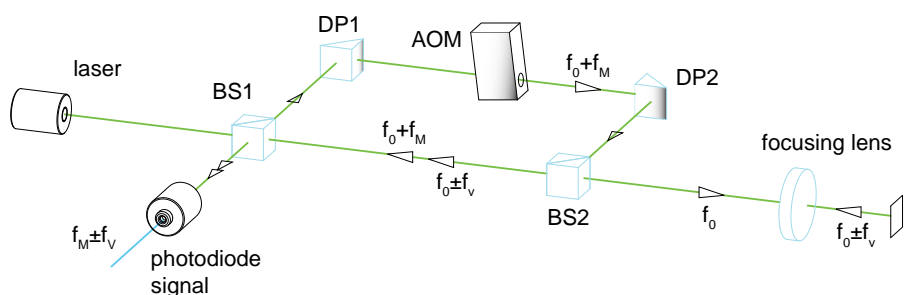


Principle of operation

The vibrometer consists of a Mach Zehnder Interferometer formed by the beam splitter BS1, BS2 and the reflecting prisms DP1 and DP2.

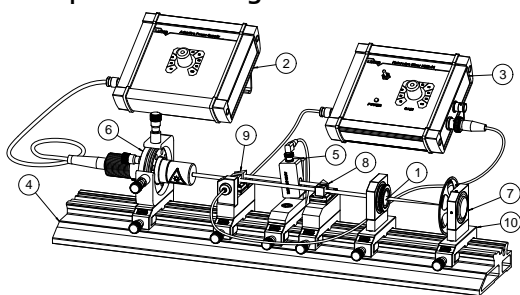
The beam of the laser is separated into two beams by the beam splitter cube (BS1). The splitting ratio is chosen in such a way that the most powerful beam is used for the measuring arm.

The reference beam passes a Bragg cell (AOM) where its frequency is shifted by 40 MHz. The frequency shifted beam passes DP2, BS2 and reaches the photodetector after being deflected by the beam splitter (BS1). At the photodiode the signal containing the modulation frequency and the Doppler shifted measuring signal is present for further conditioning.



The laser vibrometer is a high precise and contactless working instrument for the measurement of vibrations of a target. In common laser interferometer at least one mirror must be attached to the target to reflect the light back. The remarkable property of the laser vibrometer is the fact that it does not need such a mirror. The back scattered and Doppler shifted light is coupled back to the interferometer and superimposed with the reference beam. The frequency of the reference beam is shifted by a Bragg cell to make use of the high sensitive heterodyne fringe detection technique. The subsequent signal amplifiers can be AC coupled allowing a much higher gain in a simpler way.

Examples of investigation and measurement



General set-up

As light source a frequency doubled diode pumped Nd:YAG laser is used which emits a radiation with a wavelength of 532 nm and a power of 3 mW. The Mach Zehnder interferometer is formed by the beam recombiner (8) and the beam splitting assembly (9). The Bragg cell (5) is located inside the interferometer. The measuring beam is focussed by a lens (1) which is mounted into a mounting plate with carrier (10). As target a small speaker (7) is used with a reflective foil stuck to the membrane.

The signal of the photodetector which is part of the beam splitting assembly (9) is amplified and demodulated with the heterodyne mixer (3). It also contains the driver for the Bragg cell.

The amplified detector signal as well as the demodulated signal are available at BNC connectors.

P5883 Laser Vibrometer consisting of:

Item	Qty	Description
1	1	Biconvex lens, f=60 mm, C25 mount
2	1	Adaptive power supply APS-05
3	1	Heterodyne mixer, AOM driver
4	1	Optical rail MG 65, 500 mm
5	1	Acoustic optic modulator AOM
6	1	Dimo diode laser module, 532 nm (green), HC
7	1	Speaker mounted on carrier 20 mm

Item	Qty	Description
8	1	Beam recombiner LV
9	1	Beam splitting assembly LV
10	1	Mounting plate C25 with carrier 20 mm

Required Option:

- 1 Oscilloscope 100 MHz digital, two channel