

LM-3000-LSV LASER DOPPLER VELOCIMETER

NON-CONTACT, SURFACE VELOCITY MEASUREMENT SYSTEM



FEATURES:

- MILL-DUTY, WATER-COOLED & AIR-PURGED HOUSING
- ACCURACY: +/- 0.05 %
- REPEATABILITY: +/- 0.02 %
- ANALOG and DIGITAL OUTPUTS
- ALARM SYSTEMS
- 100V to 240VAC, 50 Hz / 60 Hz. OR 24 VDC

APPLICATIONS:

The **LSV** is the best designed, and the most precise velocity measurement for all metal applications including:

- Velocity
- Length
- Cut-to-Length
- Thickness
- Elongation Ratio



MADE IN THE USA

DESCRIPTION:

The beam emitting from a laser is split into two beams, with the same intensity each by means of an optical beam splitter. As the laser tube is a reliable light source that transmits only one constant light frequency without any influence by temperature no additional stabilization is necessary. Both beams overlap in the measurement region. They form a measurement spot with an interference pattern with light and dark areas. The distance between the fringes is caused by the angle of the beams and the laser frequency itself.

PHYSICAL PRINCIPLE:

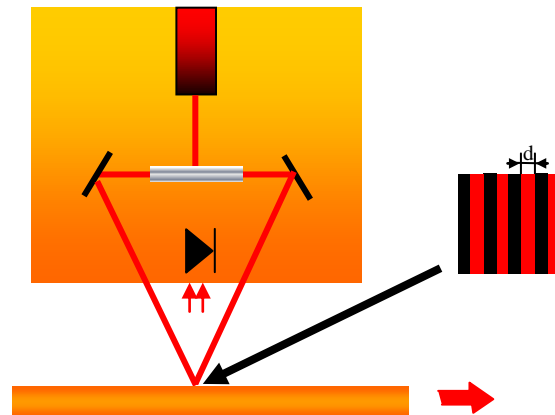
The fringe spacing “ d_f ”, is a system constant which is dependent on the laser wavelength λ and the angle between the measurement beams 2φ :

$$d_f = \frac{\lambda}{2 \sin \varphi}$$

A scattered optical signal is generated whose frequency “ f_D ” is directly proportional to the measurement object’s velocity component perpendicular to the laser beam and is given by:

$$f_D = \frac{V_p}{d_f}$$

V_p: perpendicular velocity component
d_f: fringe spacing in the measurement volume.



The exact value of the fringe spacing is measured during manufacture. This value is also stored in the non-volatile memory of the controller. It is used as a calibration factor to determine the velocity (if PC is used).

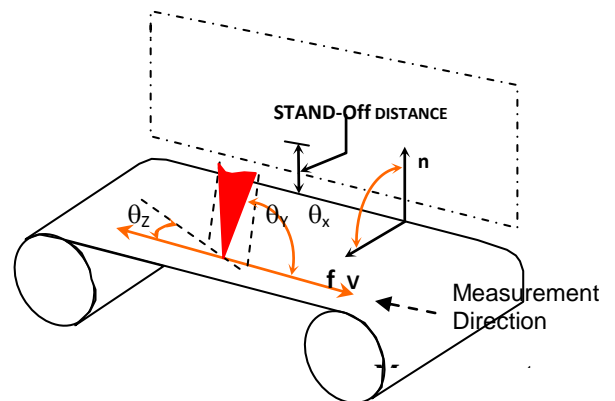
The LSV can operate in the heterodyne mode, i.e. the optical frequency of each measurement beams is shifted by approximately 80 MHz. Thus it is possible to detect the direction of motion of the moving object as well as measure at zero velocity. The fringes in the measurement volume move past with a velocity corresponding to the offset frequency f_B in the heterodyne LSV.

$$f_{mod} = f_B + \frac{2V_p \sin \varphi}{\lambda}$$

The resulting modulation frequency f_{mod} at the photo-receiver is detected by the controller and processed in real time.

ORIENTATION OF THE MEASUREMENT HEAD:

The measurement head is positioned correctly, if the interference fringes lie in parallel to “f” on the surface



SPECIFICATIONS:

LM-3000-LSV-A

Standoff Distance	300mm / 12 in.	600mm / 24 in.	1000mm / 39.4 in.	1500mm / 59 in.
Speed Range	0.4 to 4000 m/min (1.3 to 13100 ft/min)	0.8 to 8000 m/min (2.6 to 26200 ft/min)	1.0 to 12000 m/min (3.2 to 39400 ft/min)	2.0 to 19000 m/min (6.5 to 62400 ft/min)
Measurement Depth of Field	35 mm / 1.4 in.	50 mm / 2.0 in.	75 mm / 3.0 in.	75 mm / 3.0 in.

LM-3000-LSV-B

Standoff Distance	300mm / 12 in.	600mm / 24 in.	1000mm / 39.4 in.	1500mm / 59 in.	2000mm / 78 in.
Speed Range	± 4000 m/min (± 13100 ft/min)	± 8000 m/min (± 26200 ft/min)	± 12000 m/min (± 39400 ft/min)	± 19000 m/min (± 62400 ft/min)	± 20000 m/min (± 65600 ft/min)
Measurement Depth of Field	35mm / 1.4 in.	50 mm / 2 in.	100 mm / 3.0 in.	200 mm / 3.0 in.	200 mm / 3.0 in.

INPUT VOLTAGE	100 – 240 VAC OR 24 VDC
DIGITAL OUTPUT	RS232, RS485
ANALOG OUTPUT	0-2 VDC
ACCURACY	< ± 0.05% of Reading
REPEATABILITY	± 0.02%
MEASUREMENT RATE:	LM-3000-LSV-A: 50,000/s; LM-3000-LSV-B: 100,000/s
ACCELERATION RATE	> 500 m/s ²
HOUSING	IP66 Aluminium Alloy
WATER/AIR COOLING	Removable water / air-cooling jacket
PROTECTIVE HOOD	Hinged protective hood with positive pressure air purge: 4-16 liters/min. at 2 bars; (0.14 to 0.56 ft ³ /min at 29 PSI)
MOUNTING	Fully adjustable foot mount swivel stand
CABLE	2 meter, Standard, high-temperature Teflon shielded
CONNECTOR	Standard: Quick-disconnect Harting plug
OPERATING TEMPERATURE	-10°C to 60°C (14°F to 140°F). Above 60°C (140°F), auxiliary cooling is required: 1-2 bars at 1-2 liters/min (14.5 to 29 PSI at 0.035 to 0.07 ft ³ /min)

DIMENSIONS:

